



Cisco Billing and Measurements Server User Guide

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Cisco Billing and Measurements Server User Guide

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Preface

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This section provides the following information:

- [Who Should Use This Guide](#), page xiii
- [How This Guide Is Organized](#), page xiii
- [Understanding Document Conventions](#), page xiv
- [Related Documentation](#), page xvi
- [Obtaining Documentation](#), page xvi
- [Obtaining Technical Assistance](#), page xvii

Who Should Use This Guide

This guide provides the procedures you need to configure and manage the Cisco Billing and Measurements Server (BAMS) using the Man-Machine Language (MML) command-line interface.

This guide is intended for people responsible for system configuration and day-to-day operations.



Caution

Users of this guide should be familiar with Central Office direct and tandem switch operations; SS7 signaling operations; Cisco PGW 2200 PSTN Gateway (formerly known as the Cisco Media Gateway Controller), in particular its Call Control and Signalling modes; network management tools and protocols, such as FTP, SFTP, TCP/IP; UNIX system administration for Solaris systems with Korn shell; SUN Netra platform management; telco billing operations, including BAF Bellcore requirements; use of MML; and Cisco requirements on which BAMS software is based.

How This Guide Is Organized

The *Cisco Billing and Measurements Server User's Guide* is organized into the following chapters:

- [Chapter 1, Introduction to Cisco BAMS](#)
- [Chapter 2, Setup and Installation](#)
- [Chapter 3, Provisioning BAMS](#)
- [Chapter 4, Using MML Commands](#)

- [Chapter 5, Using BAMS Tag IDs](#)
- [Chapter 6, Configuring BAMS for BAF Output](#)
- [Chapter 7, Configuring BAMS for ASCII Output and Measurements](#)
- [Chapter 8, Configuring BAMS for P01 Output](#)
- [Chapter 9, Configuring BAMS for NICS Output](#)
- [Chapter 10, Configuring BAMS for 1110 Binary Output](#)
- [Chapter 11, Configuring BAMS for QoS Output](#)
- [Chapter 12, Obtaining Measurements](#)
- [Appendix A, Troubleshooting Cisco BAMS](#)
- [Appendix B, Upgrading to BAMS Release 3.30](#)
- [Appendix C, Backing up and Restoring BAMS](#)
- [Appendix D, Installing Solaris 10 Version 0708-V02 on Sun Netra T5220](#)

Understanding Document Conventions

The following conventions are used in the procedures in this guide:

- All steps are numbered from 1.
- If there is more than one effort to a step, the step is broken down by the letters a, b, c, and so on.
- If there is more than one option in a step, the options are identified by bullet points. You can select only one option.
- [Table 1](#) lists MML conventions.

Table 1 MML Conventions

Convention	Meaning	Examples and Comments
Boldface	Commands and keywords you enter literally as shown	offset-list
<i>Italics</i>	Variables for which you supply values	command <i>type interface</i> You replace the variable with the type of interface. In contexts that do not allow italics, such as online help, arguments are enclosed in angle brackets (<>).
Square brackets ([])	Optional elements	command [abc] abc is optional (not required), but you can choose it.
Vertical bars ()	Separated alternative elements	command [abc def] You can choose either abc or def, or neither, but not both.

Table 1 MML Conventions (continued)

Convention	Meaning	Examples and Comments
Braces ({ })	Required choices	command { abc def } You must use either abc or def, but not both.
Braces and vertical bars within square brackets ([{ }])	A required choice within an optional element	command [abc { def ghi }] You have three options: <ul style="list-style-type: none"> • nothing • abc def • abc ghi
A string	A nonquoted set of characters	For example, when you set a Simple Network Management Protocol (SNMP) community string to <i>public</i> , do not use quotation marks around the string; otherwise, the string will include the quotation marks.
System prompts	Denotes interactive sessions and indicates that the user enters commands at the prompt	The system prompt indicates the current command mode. For example, the prompt <code>mml:sys></code> indicates an open MML session at the system level, and <code>mml:n></code> indicates a session for the displayed <i>n</i> th node. Note <i>n</i> can be any whole number from 1 to 8, or a node name; for example, <code>mml:1></code> OR <code>mml:1:boston></code>
Screen font	Terminal sessions and information the system displays	For example: <code>Save</code>
Angle brackets (< >)	Nonprinting characters such as passwords	For example: <code><password></code>

**Caution**

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

**Note**

Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

**Tip**

Means *the following information might help you solve a problem*.

**Timesaver**

Means the *described action saves time*. You can save time by performing the action described in the paragraph.

Related Documentation

Cisco Media Gateway Controller Hardware Installation Guide

Cisco Media Gateway Controller Software Release 9 Installation and Configuration Guide

Cisco MML Command Reference (online document)

Access the Cisco Media Gateway Controller Software guides by starting at the following URL:

http://www.cisco.com/en/US/products/hw/vcallcon/ps2027/tsd_products_support_series_home.html

Cisco PGW 2200 PSTN Gateway installation and user documentation

Sun Solaris UNIX user documentation

Tape backup instructions: Sun Netra j2.0 (or later) *Answerbook (Administrator's Guide)*

SNMP information: <http://www.isp-planet.com/equipment/automanage1.html>

Sun Microsystems information: <http://www.sun.com>

General UNIX information: SYBEX: *UNIX Complete*

General networking information: SYBEX: *Networking Complete*

BAF documentation: Bellcore GR-1100-CORE

Obtaining Documentation

These sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at this URL:

<http://www.cisco.com>

Translated documentation is available at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

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http://www.cisco.com/cgi-bin/order/order_root.pl
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<http://www.cisco.com/go/subscription>
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San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from online tools by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you with these tasks:

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- Resolve technical issues with online support
- Download and test software packages

- Order Cisco learning materials and merchandise
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If you want to obtain customized information and service, you can self-register on Cisco.com. To access Cisco.com, go to this URL:

<http://www.cisco.com>

Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Cisco TAC inquiries are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

The Cisco TAC resource that you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

You can use the Cisco TAC Web Site to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to this URL:

<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

<http://www.cisco.com/register/>

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC Web Site, you can open a case online by using the TAC Case Open tool at this URL:

<http://www.cisco.com/tac/caseopen>

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

This document is to be used in conjunction with the documents listed in the “[Related Documentation](#)” section on page xvi.

Documentation Feedback

If you are reading Cisco product documentation on the World Wide Web, you can submit technical comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco.

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To submit your comments by mail, for your convenience many documents contain a response card behind the front cover. Otherwise, you can mail your comments to the following address:

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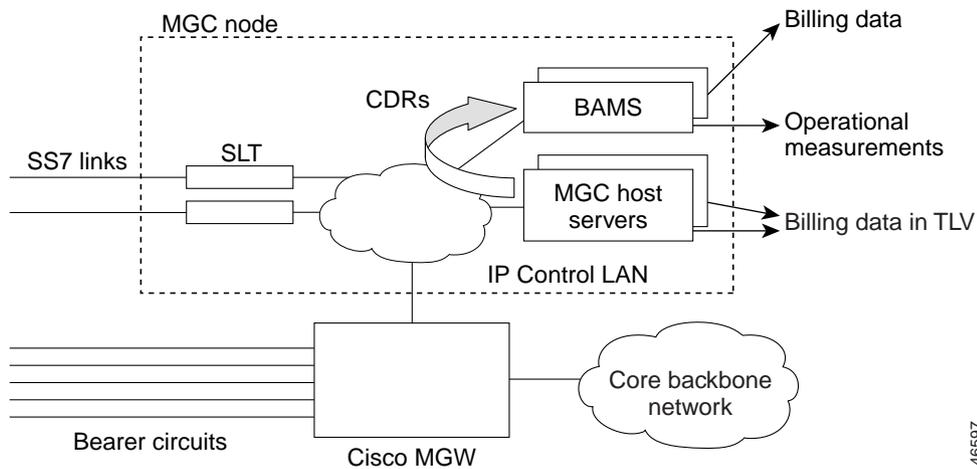
CHAPTER 1

Introduction to Cisco BAMS

Revised: March 10, 2011, OL-11618-18

The Cisco Billing and Measurements Server (BAMS) collects, formats, and stores billing and measurements data derived from CDR files, which BAMS polls from a Cisco PGW 2200 operating in signaling mode or call-control mode. (see [Figure 1-1](#)). BAMS-formatted data can then be processed by a billing system and other measurement collection and reporting systems. BAMS also reports error information using the *bamstrap* utility. This error information is collected and displayed by the Cisco MGC Node Management System.

Figure 1-1 Cisco PGW 2200 PSTN Gateway Components



Collecting Data

Cisco BAMS collects data from the Cisco MGC through File Transfer Protocol (FTP) or Secure File Transfer Protocol (SFTP). BAMS is configured with a login ID and password for the Cisco MGC hosts. BAMS can collect data from the Cisco MGC in simplex or redundant mode of operation.

Data Collection

Cisco BAMS can collect data from up to eight MGC nodes with BAMS software Release 3.0 and above. Data collected from the first MGC node is stored in the /opt/CiscoBAMS/data/s01 directory, data collected from the second MGC pair is stored in the /opt/CiscoBAMS/data/s02 directory, and so forth. Cisco BAMS collects data from the Cisco MGC through the File Transfer Protocol (FTP) or SFTP.

Each BAMS node can collect from a single MGC node. The polling function of each BAMS node is configured with a login ID and password for the Cisco MGC hosts. BAMS can collect data from the Cisco MGC in simplex or redundant mode of operation. In a simplex mode of operation, the single BAMS unit performs the data collection across all eight nodes. In redundant mode, for each node, one BAMS unit actively collects from the MGC while the other unit is in standby mode. The active/standby polling status is independent for each BAMS node. On a single BAMS unit in a redundant system, some nodes may be in the active collection state, while other nodes are in the standby state. The corresponding nodes on the other BAMS unit will have the opposite polling status.

For each node, the data collection can be manually rotated from the active to the standby BAMS unit. Such a rotation is referred to as a data switchover and can be carried out routinely for preventive maintenance purposes. The fail-safe mode of operation invokes an automatic rotation from the active BAMS unit to the standby unit in the event of a system failure on the active unit.

Cisco BAMS Terminology

Cisco has changed some of the names for its products. Not all of these name changes have yet been made within the Cisco BAMS software. Note the following terms used in the Cisco BAMS software and configurations and their more recent Cisco MGC software equivalent.

Cisco BAMS Software Term	Cisco MGC Software Term
Nailed	Signaling mode
Switched	Call Control mode
Cisco MGC node	Cisco PGW node
Cisco MGC software	Cisco PGW software
Cisco SC2200 Signalling Controller	Cisco PGW 2200 PSTN Gateway
Cisco VSC3000 Virtual Switch Controller	Cisco PGW 2200 PSTN Gateway

Formatting Data

The raw data collected from the Cisco MGC units is in the form of binary files. This data must be converted into a format that the billing system can recognize. In addition to formatting the data files, BAMS also augments the billing data, adding data required by the billing system but not automatically provided by the Cisco MGC. BAMS validates the records and flags exceptions.

Finally, BAMS provides the data in a uniform format to the billing system, which permits record comparisons. Because the records are normalized, they are in a format suitable for statistical analysis. In addition to standardized billing data, BAMS generates measurements data. Measurements can be taken in a specified time interval and for a variety of data objects. This data is suitable for traffic studies on network usage.

**Note**

Depending on the error flagged during validation, the record can be written to an error file and dropped, or it can flow through the system with default values. In either case, alarms are generated and written to the system log file (syslog). In general, structure or record-format errors result in the record being dropped. Lookup errors result in the record acquiring default values.

Storing Data

BAMS stores the formatted data on disk in a data directory where it can be collected or polled by the billing system. In addition to billing data, BAMS stores exception and measurements data, and writes system messages to a log file. The data collected by the billing system is renamed and is deleted from BAMS after archival, if desired, by the Mass Storage Control (MSC) task.

Files collected by BAMS from the Cisco MGC are time-stamped and sequence-numbered. Successfully formatted files are renamed with special prefix and suffix symbols. The MSC task must be set up with this file pattern information. The MSC can also be configured to generate alarms when specified data thresholds are passed. Alarm notification can also be set up for aged files. Alarms flag polling problems and prevent available disk space from filling up completely and halting or otherwise impeding system operation.

**Note**

Billing files contain Bellcore AMA (Automatic Message Accounting) Format (BAF) records. BAF records do not contain an indexing field, such as a record count or sequence number. The billing file name, however, can be traced back to the original input file from the Cisco MGC.

Trapping Errors

Each BAMS software task generates its own set of error messages. A Simple Network Management Protocol (SNMP) task, *bamstrap*, is used to manage the trap messages. All messages are written to the system log by the Alarm task (ALM), converted into traps by *bamstrap*, and forwarded to the Cisco MGC Node Manager for response. The operator can then determine appropriate action based on the reported alarm or event.

System Backup and Recovery

Backup of data on BAMS can be accomplished in one of the following ways:

- **For BAMS Release 3.20 and later:** By using the BAMS utility, *bamsbackup*, to back up the configuration and data files to a file or device. For more information, see the [Appendix C, “Backing up and Restoring BAMS.”](#)
- **For BAMS Release 3.14 and earlier:** By backing up the data from the Sun Netra to a mass storage device, in which case the storage device must be supported by the Sun Netra platform
- **For BAMS Release 3.14 and earlier:** By collecting the data from BAMS over a TCP/IP network connection when backup is required and storing it on a backup server

The procedures for backing up and restoring data on Sun Solaris client/server systems are well established and documented, and several related tools are available to the UNIX system administrator. In addition to Sun Solaris documentation, third-party vendor documentation (for example, by Veritas) and general reference information are provided by UNIX software publishers, including O'Reilly and Wiley.

The best backup strategy depends on the user's network configuration and available resources. In general, users should collect files in an FTP session as often as necessary and store them as required. Each file recommended for backup is indicated in [Table 1-5](#) by an asterisk following the description.

See the Sun Netra j20 (or later) *Answerbook (Administrator's Guide)* for system backup instructions.

BAMS features built-in recovery processes for system interrupt or crash. If the unit crashes in the middle of a provisioning session, restart the session using the dstver that the system crashed with as your srcver, and use a new dstver (see [“prov-sta—Provision Start”](#) section on [page 4-16](#) for details).



Note

Contact the Cisco Technical Assistance Center for assistance with performing a BAMS system backup or restoring BAMS from a previous backup.

Installing the Sun Solaris 10 Operating System



Note

The BAMS software package by itself does not contain any operating-system-dependent code and, therefore, will run on Solaris 10. The BAMS software license libraries do contain some operating-system-dependent calls that are not available in Solaris versions prior to 5.8. The only BAMS task that links to the software licensing libraries is MGR. The MGR task is built on Solaris version 5.8. BAMS 3.30 is compatible with Solaris 5.8 through 5.10.

Cisco BAMS 3.30 is compatible with the Sun Solaris 10 operating system. In addition, Cisco BAMS requires that you follow specific guidelines in the partitioning of the BAMS hard disks.

Before you install Cisco BAMS Release 3.30 software, you must ensure that Sun Solaris 10 is installed and that the Cisco BAMS server disks are properly partitioned. For information on installing Solaris 10 installation and disk partitioning, see the *Cisco Media Gateway Controller Software Release 9 Installation and Configuration Guide*.

BAMS 3.30 Modifications Overview

The Cisco Billing and Measurements Server (BAMS), for Release 3.30 software is modified to provide the following:

- Support for all the feeds and capabilities that are available in BAMS 3.20 release.
- Support for any new fields/CDRs that are supported in the Cisco Media Gateway Controller software, Releases 9.6(2) and 9.7(3), which runs on the Cisco PGW 2200.
- Support for any fields/CDRs that were changed after the release of Cisco BAMS 3.20.
- Support for the following Trunk Group measurements. Traps must be supported that notify when a configured threshold is crossed.

- Total seizures on a trunk group during a measured period—BAMS counts the call attempts (seizures) on a trunk group (IAM/SETUP in TAG 4003), over a defined period of time. The measured period must be configurable (1 hour is the default duration).
- Total answered calls on a trunk group during a measurement period—BAMS counts the receipt of ANM/ANSWER messages (TAG 4005) on a trunk group, over a defined period of time. The measured period must be configurable (1 hour is the default duration).
- Answer Seizure Ration (ASR) value during a measurement period—Information is derived using the measurements in A and B above ($B \div A$). The measured period must be configurable (1 hour is the default duration). The measurement threshold on ASR is crossed when the value drops below a specified value.
- Peak Traffic carried by each trunk group in Erlangs—A measurement is required for each trunk group to determine the Busy Hour (calls that reach the answer state) during a 24-hour period.

BAMS 3.30 Features and Formats

BAMS 3.30 supports all of the features and output formats that were supported in prior versions of BAMS. The BAMS 3.30 package supports all of the BAMS 3.20 features and output formats. The following new features and output formats are provided in BAMS 3.30:

- Support for Solaris 10 operating system
- Support for new fields/CDR in MGC Release 9.6 and 9.7
- Length change in existing CDE tags
- New CDE fields for extended ASCII output and Binary 1110 Output
- Support for trunk group measurements such as total seizures on a trunk group during a measured period and total answered calls on a trunk group during a measurement period; answer seizure ration (ASR) value during a measurement period; and peak traffic carried by each trunk group in Erlangs.
- New Measurements reported in the Daily file, based on current and new stored values, requiring new captured data and non-integer measurements
- Support for BAMS software licensing
- New alarms related to license failures
- Support for new QoS feed
- Support for the mode PGW Dynamic Update = True only
- SFTP File Transfer Support
- Generic Error Handling

Solaris 10 Support

The BAMS software package runs on the Solaris 10 operating system. The BAMS software licensing libraries do contain some operating-system-dependent calls that are not available in Solaris versions prior to 5.8. The BAMS MGR task is the only task that links to the license libraries. The MGR task is built on Solaris version 8. BAMS 3.30 is compatible with Solaris 5.8 through 5.10.

Continued Support for BAMS 3.20 Features and Formats

BAMS 3.30 supports all of the features and output formats that were supported in prior versions of BAMS. The BAMS 3.30 package is based on the source code of BAMS 3.20. The BAMS 3.30 new features and output formats are added to the existing functionality.

CDE Tag Length Changes

[Table 1-1](#) lists the CDE tags for which the maximum length is changed. The internal structure of BAMS 3.30 is adjusted to accommodate the maximum length for the listed tags.

Table 1-1 CDE Tag Length Changes

CDE Tag Number	CDE Tag Name	CDE Minimum Length	CDE Maximum Length
4215	Charge Tariff Info	8	68
4223	PRI AOC-S Charge Info	6	66
4224	PRI AOC-D Charge Info	10	70
4225	PRI AOC-E Charge Info	10	70
4098	Originating Leg DSP Statistics	280	794
4099	Terminating Leg DSP Statistics	280	794

New CDE fields

[Table 1-2](#) lists new CDEs in BAMS 3.30 that were not present in BAMS 3.20. FMT converts these fields into the internal BAMS format. The COR task merges the new fields.

Table 1-2 New CDE Fields

CDE Tag Number	CDE Tag Name	CDE Minimum Length	CDE Maximum Length
4227	RO/PR Executed	1	1
4228	RO/PR Other Call Ref	8	8
4229	RO/PR Replacement TRK group	2	2
4230	RO/PR Replacement Chan ID	2	2
4231	RO/PR Switchover Timestamp	4	4
4232	Rejecting Location Label	1	20
4233	Rejecting Location Label Direction	1	1
4236	H323 Destination	1	29
4237	Ingress Redirecting Number	1	16
4239	Service Usage Data	2	2
4242	Terminating Remote SIP Host	1	256

Table 1-2 New CDE Fields (continued)

CDE Tag Number	CDE Tag Name	CDE Minimum Length	CDE Maximum Length
4243	Terminating Local SIP Host	1	256
4244	License Reject License Reason	1	20
4245	License Rejecting Direction	1	1
4013	LRN number	1	96
2018	ANSI Egress Calling number Nature of Address	1	1
2019	ANSI Egress Redirecting number Nature of Address	1	1
2020	ANSI Egress Original Called Number Nature Of Address	1	1
3018	ITU Egress Calling number Nature of Address	1	1
3019	ITU Egress Redirecting number Nature of Address	1	1
3020	ITU Egress Original Called Number Nature Of Address	1	1

New CDE Fields for Extended ASCII Output

For Cisco BAMS 3.30, new fields are added to the BAMS 3.20 Extended ASCII Output. The Field Index is a reference to the field in the comma-separated billing-output record.

See [Chapter 7, “Extendable ASCII Output”](#)



Note

CDE 4234 and 4235 were present in BAMS 3.20 but are only used in CDB 1071. Therefore, they will not be generated on any billing outputs.

New CDE Fields for Binary 1110 Output

New fields 97-132 are added to the BAMS Binary1110 Output. The Field Index is for reference only and is not related to position in output.

See [Chapter 10, “1110 Binary Output”](#)

New Measurements

See [Chapter 12, “Obtaining Measurements”](#)

Support for BAMS Software Licensing

See the section [“Cisco BAMS Software License”](#) section on page 1-10.

Support for New QoS Feed

See [Chapter 11, “Configuring BAMS for QoS Output”](#)

Support for the Mode PGW Dynamic Update = True

The feature PGW Dynamic Update Mod was introduced in the BAMS 3.20 software release. All of the code necessary to support PGW Dynamic Update Mode already exists in the code base. The code base also supports operation when the PGW Dynamic Update Mode is set to False. The Mode of operation is determined by an environment variable (PGW_DYNAMIC_MODE). A utility provided in BAMS 3.20 was used to set this variable and make the necessary table modification when the value was changed.

The code that controls the operation of BAMS based on the value of the PGW_DYNAMIC_MODE is spread across almost all processes. To minimize the possibility of introducing errors into the system, the tasks have not been modified to change the way they handle the PGW_DYNAMIC_MODE variable. Instead, the **set-pgw-mode** utility is modified to enable setting the value to TRUE only. The utility changes the table structure to the PGW_DYNAMIC_MODE=TRUE structure.

The utility is required for users that wish to upgrade to BAMS 3.30; but, who currently are operating BAMS in the mode PGW_DYNAMIC_MODE = False. For such cases, the utility backs up the current configuration and then restructures the TRUNKGRP table. This action retains the customer’s current trunk configuration and creates a TRUNKGRP table that is compatible with the PGW_DYNAMIC_MODE=TRUE mode. The default value for new installations is set to TRUE and an empty TRUNKGRP table with the correct structure for PGW_DYNAMIC_MODE=TRUE is installed. No utility is provided to change the PGW_DYNAMIC_MODE to FALSE. The MML command **set-pgw-mode** not available in Cisco BAMS 3.30. The MML command **rtrv-ne** will not report the PGW_DYNAMIC_MODE state.

SFTP File Transfer Support

Cisco BAMS 3.20 uses FTP to collect files from the Cisco PGW 2200 and to pass files between redundant BAMS units. In BAMS 3.30, operators can use FTP or the more secure SFTP as the file transfer protocol. The PGW2200 polling protocol is controlled by the poll.CTL file on a node by node basis. By default, the file transfer protocol is set to FTP for new installations. For upgraded installations, the current poll.CTL file is changed to the BAMS 3.30 structure and the polling protocol is set to FTP. In BAMS 3.30, file transfer protocol for BAMS-to-redundant-BAMS connections can be SFTP or FTP; but, for security purposes, Cisco recommends SFTP.

The FTP protocol is integrated into the BAMS software. Instead, BAMS invokes the command-line FTP utility supplied with the operating system. In BAMS 3.30, the polling task invokes either the command-line FTP or SFTP. SFTP is somewhat more complicated because the password cannot be supplied in the polling script as it is with FTP. In addition, SFTP attempts to read commands from a terminal. SFTP is invoked with the -b switch to redirect the command input to a file. In place of the password, the systems use a public key with a plaintext key file as the authentication method. Although this is not the most secure unattended authentication method, it does not require users to manually configure an ssh agent after each reboot. The use of public keys require the user to generate pairs of keys for each PGW 2200 that will be configured for SFTP using the **ssh-keygen** utility. The **ssh-keygen** utility must be used for new installations and for systems that are upgraded to BAMS 3.30. The **setbamunit** utility is used to identify a redundant BAMS system and the user name. A password is no longer required and can be left blank. There is no data-structure change and no migration is required.

Generic Error Handling

Background

The Generic Error Handling feature supports changes in CDE lengths without causing BAMS to stop processing data or shutting down. In prior releases, BAMS did not check the length of each CDE. The BAMS software ran with the assumption that the CDE length would match the expected length. When the FMT task encountered a CDE that exceeded the expected length, it used the length supplied in the CDE and copied it to the BAMS internal data structure. This caused memory to be overwritten and could cause a core dump and the task would shutdown. The MGR restarted the FMT task but the problem repeated until an operator intervened manually.

Implementation

Initially, all CDRs are processed by the FMT task and converted from Cisco raw format into BAMS internal format. As the FMT task processes each CDE, it checks it against an expected length. If the length is correct, it converts the CDE into internal format. If the CDE exceeds the expected length, FMT transfers only the expected number of bytes into the BAMS internal format. Any extra bytes are discarded. A minor alarm is raised and the system logs the discrepancy in the syslog.

Alarm

Whenever a CDE exceeds the expected length, an alarm is raised and a record of the alarm is entered into the syslog. [Table 1-3](#) identifies a new alarm that supports generic error handling.

Table 1-3 *New Error-Handling Alarm*

Condition	Message	Level	Frequency
CDE expected length exceeded	“CDE from w CDB are truncated from CDR file cdr_xxx_yyy.bin due to larger than expected size.”	Minor	Once per input file

Cisco BAMS Software License

Cisco BAMS, Release 3.30 introduces software licensing. The BAMS software license enables running the BAMS application software on a specified Sun platform. The license is assigned per BAMS system. The license file is node locked on the hostID of the BAMS machine. For BAMS systems configured in an active-standby context, both BAMS nodes require an individual license file.

Host ID Mechanism

All Sun Microsystems machines have a unique hostID, which is a 32-bit integer. For BAMS software licensing, the hostID is used for node locking. For example, on Sun systems running the Solaris operating system, entering the **hostid** command obtains the 32-bit hostID in hexadecimal format.

The hostID is associated with the main board of the machine. If the main board is replaced or if a user wants to move the software to a new machine, the user must contact Cisco for a new license.

BAMS License Validation

BAMS 3.30 checks the base license with the **start_system** script first. Then BAMS continues to perform license validation. If there is no valid base license, the **start_system** script stops running and the user is informed that no valid base license exists.

Periodic License Validation

The BAMS software periodically checks (every 5 minutes) to ensure that the base license remains valid.

- If the base license expired, BAMS generates the “License Expired” alarm and shuts down the BAMS software. A user can read the log file to learn why BAMS shutdown.
- If there is a valid base license but it is due to expire in a week or less, BAMS generates the “License to Expire at MM/DD/YYYY” alarm. However, the BAMS application software continues to run.

Base License Management During Switchover

BAMS checks for the existence of a base license during startup, and periodically thereafter, on both active and standby BAMS systems. A switchover does not affect base license management.

Exception Management

If the BAMS **start_system** script stops because there is no valid base license, the user first checks to verify that a valid base license exists and that the license is located in the directory `/opt/CiscoBAMS/license` on the associated machine.

If a valid base license exists but the license file is located in the wrong directory, the user must place the license file in the directory `/opt/CiscoBAMS/license` on the associated machine.

If no valid base license exists or an existing license has expired, the user must contact Cisco to obtain a license.

If BAMS generates a license-related alarm, the user should respond appropriately to address the problem identified in the alarm or contact the Cisco TAC.

If the BAMS software shuts down, the user should read the log file to see whether the shutdown occurred because the license expired. If the license expired, the user must contact the Cisco account team.

BAMS Software License Operations

Cisco BAMS Release 3.30 provides a **check_license** script that displays the current license information.

To install a new license file, a user copies the file to the directory `/opt/CiscoBAMS/license`.

License-Related Alarms

The BAMS Release 3.30 software includes the following alarms that it can generate if a license file does not exist:

- **License Expired**—This is a critical alarm. BAMS shuts down immediately following this alarm.
- **License to Expire at MM/DD/YYYY**—This is a major alarm. This alarm is cleared when a new license is installed. The alarm is generated when there are 7 days or fewer remaining for the license. This alarm is generated every 24 hours until a new license file is installed.

BAMS License File Types

Cisco BAMS Release offers five distinct license types.

- **General license**—A general (base) license does not expire.
- **Temporary license**—A temporary license is intended to be used by a customer whose application has gone down and must be reactivated quickly but cannot get a license through the appropriate channel.
- **Demo license**—“Evaluation” orders for BAMS include a demo license that expires after 60 days. After 60 days, BAMS will not operate until a new product authorization key (PAK) is registered.
- **External Lab License**—An external lab license enables a Cisco partner to run BAMS in its lab to validate interoperability of its systems with BAMS. This license is similar to a Demo License, but expires after 180 days.
- **Internal Lab License**—A lab license for running BAMS in Cisco labs. This license expires after one year.

[Table 1-4](#) provides additional information about the BAMS license types.

Table 1-4 **BAMS License Types**

License Type	Expiration Time
General	none
Temporary	72 hours
Demo	60 days
Internal lab	1 year
External lab	180 days

**Note**

Cisco BAMS 3.30 provides the command **check_license** that you can enter to check the status of a BAMS software license.

Installing BAMS with the Licensing Mechanism

To support BAMS licensing, the BAMS 3.30 software includes the new directory `/opt/CiscoBAMS/license`, which is provided to contain license files. Also, a new license management utility named **lmutil** is included in the directory `/opt/install/bin`.

**Note**

If BAMS is uninstalled, existing license files remain on the system so that they are present in case the user re-installs BAMS.

To install BAMS 3.30 to include the licensing mechanism on an active-standby system, complete the following steps:

- Step 1** Install BAMS on the active platform and configure it as BAMS unit 0.
- Step 2** Obtain the hostID of the BAMS system by establishing a Telnet session and issuing the **hostid** command as shown in the following example:

```
bash-3.00$ telnet <BAMS_IP_address>
Trying <BAMS_IP_address>...
Connected to <BAMS_IP_address>.
Escape character is '^]'.
login: bams
Password:
Last login: Wed Mar 12 21:56:30 from <BAMS_hostname>
Sun Microsystems Inc. SunOS 5.10 Generic January 2005

$ hostid
8459d5de
```

- Step 3** Go to the Cisco Systems web site and use the hostID of BAMS unit 0 with the PAK that is provided with the BAMS software CD to apply the license file.

**Note**

Cisco emails the appropriate license file to each BAMS customer.

- Step 4** Copy the license file to the directory `/opt/CiscoBAMS/license`. If an older license file is present in this directory, delete it.

The active BAMS is now ready for operation.

- Step 5** Login as bams user and enter the command **start_system**.
- Step 6** Install BAMS on the standby platform and configure it as BAMS unit 1.
- Step 7** Go to the Cisco Systems website and use the hostID of BAMS unit 1 with the PAK that is provided with the BAMS software CD to apply the license file.
- Step 8** Copy the license file to the directory `/opt/CiscoBAMS/license`. If an older license file is present in this directory, delete it.
- Step 9** Login as bams user on BAMS unit 1 and enter the command **start_system**

**Note**

The preceding steps are all that are required to install BAMS 3.30 (with the licensing mechanism) on a BAMS active-standby system. For a single, standalone BAMS system, only the first four steps are required.

License Upgrade Procedure

To upgrade BAMS to include the licensing mechanism on an active-standby system, complete the following steps:

- Step 1** Stop BAMS on BAMS unit 0.
- Step 2** Remove the preceding release of the BAMS software.
- Step 3** Install BAMS 3.30.
- Step 4** Go to the Cisco Systems web site and use the hostID of BAMS unit 0 with the PAK that is provided with the BAMS software CD to apply the license file.
- Step 5** Install the license file on BAMS unit 0.
- Step 6** Login as bams user on BAMS unit 0 and run **start_system**.
- Step 7** Stop BAMS on BAMS unit 1.
- Step 8** Remove the preceding release of the BAMS software.
- Step 9** Install BAMS 3.30.
- Step 10** Go to the Cisco Systems website and use the hostID of BAMS unit 1 with the PAK that is provided with the BAMS software CD to apply the license file.
- Step 11** Install the license file on BAMS unit 1.
- Step 12** Login as bams user on BAMS unit 1 and run **start_system**.

**Note**

The preceding steps are all that are required to upgrade to BAMS 3.30 (with the licensing mechanism) on a BAMS active-standby system. For a single, standalone BAMS system, only the first four steps are required.

Upgrading from a Temporary to a Base License

If you operate BAMS initially with a demo or temporary license and subsequently wish to upgrade to a base BAMS license, complete the following steps.

- Step 1** Obtain the appropriate license file via email from Cisco.
- Step 2** Copy the new license file onto the license server and into the directory `/opt/CiscoBAMS/license` on the BAMS system.
- Step 3** Delete the demo or temporary license file from the license server and from the BAMS system.

Migration

See the section [Appendix B, “Upgrading to BAMS Release 3.30”](#)

Creating Directory Structures

Data directories are created for you during BAMS installation. [Table 1-5](#) describes the Cisco BAMS directories.

Table 1-5 Cisco BAMS Directories

Directory	Description
opt/CiscoBAMS/bin	Contains executable processes and shell scripts.
opt/CiscoBAMS/CDR	Contains the call record data. ¹
opt/CiscoBAMS/CDR/archive	Contains archived call record data.
opt/CiscoBAMS/contrib	Contains system utilities.
opt/CiscoBAMS/data	Contains data subdirectories. ¹
opt/CiscoBAMS/data/error	Contains error files.
opt/CiscoBAMS/data/logs	Contains daily MML session logs.
opt/CiscoBAMS/data/s0x	Contains node data files.
opt/CiscoBAMS/data/nodename0x	When a node name is assigned to node0x, a directory link with that name is created for s0x.
opt/CiscoBAMS/data/s0x/ASCII	Contains generated Cisco MGC End of Call 1110 files.
opt/CiscoBAMS/data/s0x/QOS-STAT	Contains generated QOS output files
opt/CiscoBAMS/data/s0x/ASCIIBAF	Contains generated ASCII BAF files.
opt/CiscoBAMS/data/s0x/BAF	Contains generated BAF files.
opt/CiscoBAMS/data/s0x/BIN1110	Contains generated 1110 Binary files.
opt/CiscoBAMS/data/s0x/error	Contains node-specific error files.
opt/CiscoBAMS/data/s0x/EXTASCII	Contains generated extendable ASCII files.
opt/CiscoBAMS/data/s0x/input	Contains input files.
opt/CiscoBAMS/data/s0x/Measurements	Contains measurements data.
opt/CiscoBAMS/data/s0x/NICS	Contains generated NICS files.
opt/CiscoBAMS/data/s0x/output	Contains output files. This directory contains files that are currently being processed. Note Any files in this directory that are older than a few weeks can be manually removed as a preventive maintenance procedure.
opt/CiscoBAMS/data/s0x/p001	Contains generated P01 records.
opt/CiscoBAMS/data/s0x/TLV	Contains raw billing files from the Cisco MGC that are in TLV format.

Table 1-5 Cisco BAMS Directories (continued)

Directory	Description
opt/CiscoBAMS/data/s0x/xfr	This directory contains temporary, raw CDR files to be transferred to the redundant BAMS unit for redundant processing.
opt/CiscoBAMS/defaults	Contains default configuration files. ¹
opt/CiscoBAMS/files	Contains system configuration files and log files. ¹
opt/CiscoBAMS/files/mml	Contains configurations created by the user in provisioning sessions.
opt/CiscoBAMS/files/s0x	Contains configuration files and log files for node0x. ¹
opt/CiscoBAMS/testdata	Contains test files.
opt/CiscoBAMS/files/snmpmibs	Contains SNMP MIB definitions in ASCII formatted files.

1. Indicates files recommended for backup.



CHAPTER 2

Setup and Installation

Revised: March 10, 2011, OL-11618-18

Overview

This chapter provides information on how to configure the Cisco Media Gateway Controller (MGC) for using the Billing and Measurements Server (BAMS), how to uninstall previous BAMS software versions, and how to install and configure new versions of BAMS.



Caution

Before upgrading to a new BAMS release, ensure that you have backed up the latest configuration and data files. For more information, see the [“System Backup and Recovery”](#) section on page 1-3.



Note

Before you can run the Cisco BAMS, you must obtain a software license. See the [“Cisco BAMS Software License”](#) section on page 1-10.

Upgrading to BAMS Release 3.30

If this is a first-time BAMS installation, follow the installation procedure in this chapter. If you are currently operating a version of BAMS prior to Release 3.30, you need to follow a migration procedure. Proceed to [Appendix B, “Upgrading to BAMS Release 3.30.”](#)

Configuring the Cisco MGC for Using BAMS

You must edit your `dmpSink.dat` file to set the interval to dump the call detail records (CDRs) to the pool directory every 4 minutes. To do so, use this procedure:

-
- Step 1 `cd /opt/CiscoMGC/var`
 - Step 2 `mkdir bam`
 - Step 3 `chmod 777 bam`
 - Step 4 Open a vi session:
`vi /opt/CiscoMGC/etc/dmpSink.dat`

Step 5 Edit it as follows:

```
1 "callDetail" bin "cdr" "../var/log" "../var/bam" 10000 0 5
```



Caution

The last field in the above line (that is, “5”) is the MGC CDR dump interval (in minutes). This value must be lower than and not equal to the BAMS measurements file interval (interval-minutes parameter) set in the Node Parameters table (see [“Updating the Node Parameters Table” section on page 5-11](#) for details). If the Cisco MGC file interval is greater than or equal to the BAMS measurement interval, more than one measurement interval could be crossed in a single input file. If this happens, a COR206 major alarm occurs. The end result is the loss of measurement data. This loss of data causes the ACC task to generate an ACC222 minor alarm.

Step 6 Open another vi session on the XECfgParm.dat:

```
vi /opt/CiscoMGC/etc/XECfgParm.dat
```

Step 7 Verify the correct CDB settings:

- a. `engine.CDRtimeStamp = M`
- b. `engine.CDRmessageTypes = "1010,1020,1030,1040,1050,1060,1070,1080"`



Note

The time stamp must be in milliseconds (M) and the message types must be from 1010 through 1080, except 1110 is not supported when you are using BAMS in its normal configuration. However, BAMS can be configured to output Cisco MGC End of Call records (see [Chapter 6, “Configuring BAMS for BAF Output,”](#) for details).

The 1110 CDB (Summary CDB) is generated at the completion of a call or after a call fails to attain the setup status. The 1110 CBD includes basic billing information.

The 1071 CDB reports SS7-side circuit information in two CDE tags: CDE 4234, which presents the total circuit count; CDE 4235, which presents the number of unavailable circuits. For a PGW 2200 in call control mode, the 1071 CDB is generated for trunk groups. For a PGW 2200 in signaling mode, the 1071 CDB is generated for a signaling path.

- Step 8** Edit the diskmonitor parameter in XECfgParm.dat to indicate whether the CDR files are to be kept after collection. You can use the same parameter to indicate how long the files are to be kept. If the value is 0, the .finished files are removed immediately. A value of 1 means that the .finished files are deleted after 1 day, 2 for 2 days, and so on. In the following example, the files are removed after 1 day, as reflected in `diskmonitor.CdrRmFinished = 1`.

```
#-----
# Disk Monitor Parameters
#-----

diskmonitor.Limit = 7 # Minimum number of days to preserve (Trimming occurs only when the
threshold is exceeded.)

diskmonitor.Threshold = 80 # The percentage that the threshold is filled (80% full in this
case) .

diskmonitor.SoftLimit = false # Set to true to allow override of preserve limit. Setting this
parameter to false does not affect log file removal. See also the PreserveLogs setting.

diskmonitor.CdrRmFinished = 1 # Remove "finished" cdrs after X days (0 = immediate).

diskmonitor.OptFileSys = # List of optional file systems to monitor (no trimming).
```

- Step 9** Open another vi session:

```
vi /opt/CiscoMGC/etc/CONFIG_LIB/new/XECfgParm.dat
```

- Step 10** Repeat [Step 4](#) through [Step 8](#) in the active_link directory, the prov_link directory, and in the new directory.

- Step 11** Stop the Cisco MGC:

```
/etc/init.d/CiscoMGC stop
```

- Step 12** Start the Cisco MGC for the file changes to take effect:

```
/etc/init.d/CiscoMGC start
```



Note

If you are operating two Cisco PGW 2200 systems in a redundant Active/Standby configuration, you must perform the 12 steps of this procedure for both PGW 2200s.

Uninstalling BAMS

If a previous BAMS release is already installed, you must uninstall it to start a new system. This procedure removes all BAMS software; however, you can save the data and archive directories during the uninstall procedure. The uninstall procedure also asks you if you want to save the current active BAMS configuration to a restorable provisioning batch file.



Note

The uninstallation process removes the contents of the /opt/CiscoBAMS directory except the /opt/CiscoBAMS/CDR and /opt/CiscoBAMS/data folders.



Caution

Do not remove the /opt/CiscoBAMS/CDR and /opt/CiscoBAMS/data directories manually. They are disk partition mount points.

To uninstall BAMS, use this procedure:

Step 1 Log in as the BAMS user.

Step 2 Stop the application by entering the following commands:

```
$ cd /opt/CiscoBAMS/bin
$ mml
mml:sys> stp-softw::confirm
mml:sys> quit
```



Note The default UNIX prompt (\$ or #) might vary with the shell program being used.

Step 3 Log out. Make sure that all BAMS logins have exited. This account is removed during the uninstallation.

Step 4 Log in as the root user by entering the following command:

```
:root
:<password>
```

Step 5 Uninstall the application software:

```
$ cd /opt/install
```

Step 6 Run the uninstall script:

```
$ bams uninstall
```

Step 7 Follow the prompts from the uninstallation script. (The uninstall script automatically copies the BAMS configuration files from /opt/CiscoBAMS/files to /usr/tmp/bamsconfig).

Step 8 Uninstall the application software:

```
$ cd /opt
$ pkgrm CSCOcABAM
```

This completes the uninstallation procedure.

Installing Cisco BAMS



Note Cisco BAMS Release 3.30 requires the Sun Solaris 10 operating system. (Previous releases of BAMS required the Solaris 8 operating system.) In addition, Cisco BAMS requires that you follow specific guidelines in the partitioning of the BAMS hard disks.

Before you install Cisco BAMS Release 3.30 software, you must ensure that Sun Solaris 10 is installed and that the Cisco BAMS server disks are properly partitioned. For information on installing Solaris 10 installation and disk partitioning, see the *Cisco Media Gateway Controller Software Release 9 Installation and Configuration Guide* located at:

<http://www.cisco.com/univercd/cc/td/doc/product/access/sc/re19/swinstl/index.htm>

If you choose to install the Sun Solaris 10 operating system on a Sun Netra T5220 platform, see [Appendix D, “Installing Solaris 10 Version 0708-V02 on Sun Netra T5220.”](#)

**Caution**

When you install Cisco BAMS 3.30, you must also install the most recent patch of the software. If you fail to install the patch, the software might experience a COR failure.

-
- Step 1** Insert the CD labeled “Cisco Billing and Measurements Server (BAMS)” (Release 3.30) in a CD-ROM drive.
- Step 2** For each machine on which BAMS is to be installed, obtain the following information from your system administrator:
- Platform host name.
 - Platform IP address.
 - Platform user name.
 - Platform user password.
 - Home directory for the BAMS account (default: /opt/CiscoBAMS/local).
 - Where to put the /opt/CiscoBAMS/data directory for all data files created by the application. This is usually a separate disk or file system (default: /opt/CiscoBAMS).

**Note**

The system prompts are displayed in the UNIX Korn shell. Refer to user documentation such as *UNIX Complete* by SYBEX for more information on the Korn shell. You must be familiar with the Korn shell and use of the UNIX vi text editor in order to properly set up and configure BAMS.

- Step 3** Log in as the root user by entering the following command:

```
:root
:<password>
```

- Step 4** Install the CSCOCaBAM package (from the solaris_patches directory) by entering the following commands:

```
$ cd /cdrom/cdrom0
$ pkgadd -d CSCOCaBAM.pkg
```

- Step 5** Follow the prompts.
- Step 6** Run the BAMS install script by entering the following commands:

```
$ cd /opt/install
$ ./bams install
```

- Step 7** Follow the prompts.

**Note**

For upgrade installations: An option to restore the BAMS configuration files is given during the installation:

Do you wish to restore the BAMS configuration files from the previous installation? [y,n]

Answering “y” to this prompt restores the provisioning tables from the previous installation, provided that you saved the previous configurations when prompted to during the uninstallation procedure. This restore function also retains the simplex/redundant state configured by the **change_mode** command, the polling **seqno** for each node, and the **setbamunit** information.

Step 8 You are prompted for the following:

```
Enter the version of BAMS that was uninstalled prior to this installation of BAMS 3.30:
0) New installation
1) BAMS 3.20
2) BAMS 3.30
```

```
Enter ( 0 | 1 | 2 )?
```

If you select options 1 or 2, the installation program converts any in-progress call records to the latest data format so that these records can be processed by the latest version of the software.

When the installation is complete, the system displays the following message:

```
Installation of <CiscoBAMS> was successful.
```

Step 9 After the installation has successfully completed, reboot the system.**Step 10** Go to the Cisco website and download the latest patch for BAMS Release 3.30.**Step 11** Install the patch.

Installing a Cisco BAMS Software Patch

Complete the following steps to install a patch to the Cisco BAMS software.

Step 1 Log in as the BAMS user.**Step 2** Stop the Cisco BAMS software by entering the following commands.

```
$ mm1
mm1:sys> stp-softw::confirm
```



Note The default UNIX prompt (\$ or #) might vary with the shell program being used.

Step 3 Identify whether Cisco BAMS is running in simplex or redundant mode by entering the following command.

```
mm1:sys>rtrv-ne
mm1:sys> quit
```

Step 4 If you must install the patch on redundant BAMS units, change the operating mode of the standby unit to simplex mode by entering the following command. (See Step 5 in the [“Configuring BAMS” section on page 2-10.](#))

```
change_mode
```

**Caution**

For a redundant Cisco BAMS system, Send File Transfer (SXF) task alarms will be visible on the active unit. Ignore such alarms generated at this time. These alarms will disappear when both BAMS units are restored in redundant mode after patch installation.

Step 5 Log in as the root user by entering the following command.

```
:root
:<password>
```

- Step 6** To identify patches currently installed on Cisco BAMS, enter the following command.
- ```
$ pkginfo -1 | grep CSC0*
```
- Step 7** Before you install a new patch, you must remove the old patch. To remove the old patch, enter the following command.
- ```
$ pkgrm <patch_name>
```
- Step 8** To verify that the patch you wished to remove was deleted, enter the following command.
- ```
$ pkginfo -1 | grep CSC0*
```
- Step 9** To install a new patch on Cisco BAMS, enter the following command.
- ```
$ pkgadd -d <patch_name>
```
- If the patch is installed, the system generates a message to confirm successful installation
-  **Caution** If the initial attempt to install the patch failed, you must remove the patch by issuing the **pkgrm** command before you attempt to install the patch again.
- Step 10** To verify that the new patch is successfully installed, enter the following command.
- ```
$ pkginfo -1 | grep CSC0*
```
- Step 11** Repeat steps 1 through 9 for the redundant Cisco BAMS system.
- 

## Enabling SFTP on Cisco BAMS and the Cisco PGW 2200

This section provides the procedures you must perform to enable the use of the SFTP on the Cisco BAMS and the Cisco PGW 2200.

### Generate Public and Private Keys on the Cisco PGW 2200

To generate public and private keys for the Cisco PGW 2200, complete the following steps:

- 
- Step 1** Login to the active PGW 2200 with a valid user name.
- Step 2** Issue the command:
- ```
cd /usr/bin
```
- Step 3** Issue the command:
- ```
ssh-keygen -t rsa
```
- Step 4** Press Enter to accept the default file name for the key (/.ssh/id\_rsa).
- Step 5** If you are prompted to choose whether to overwrite the existing file, enter yes.
- Step 6** When you are prompted to enter a pass phrase, press Enter.
-

## Generate Public and Private Keys on the Cisco BAMS

To generate public and private keys for the Cisco BAMS, complete the following steps:

- 
- Step 1** Login to the active Cisco BAMS as a valid BAMS user.
- Step 2** Issue the command:
- ```
cd /usr/bin
```
- Step 3** Issue the command:
- ```
ssh-keygen -t rsa
```
- Step 4** Press Enter to accept the default file name for the key (/.ssh/id\_rsa).
- Step 5** If you are prompted to choose whether to overwrite the existing file, enter yes.
- Step 6** When you are prompted to enter a pass phrase, press Enter.
- 



**Note** To generate public and private keys for a redundant Cisco BAMS and Cisco PGW 2200 system, repeat the steps provided in the preceding two procedures on the standby PGW 2200 and redundant Cisco BAMS, respectively.

---

## Enabling Automatic SFTP Login

In interoperating with the Cisco PGW 2200, Cisco BAMS uses the SSH Secure File Transfer Protocol (SFTP). Consequently, one must provide a password to run SFTP to transfer files from one system to another. To avoid the requirement to provide a password to use SFTP, you must enable automatic login.

To enable automatic login on Cisco BAMS, complete the following steps:

- 
- Step 1** Ensure that the directory ~/.ssh includes the two files id\_rsa and id\_rsa.pub. If these files are not present, create them by running the program ssh-keygen -t rsa.
- Step 2** Append your local id\_rsa.pubfile to the remote host's file ~/.ssh/authorized\_keys.



**Note** If the file authorized\_keys does not exist, create it with vi text editor.

---

To append your public key to the file ~/.ssh/authorized\_keys, copy and paste the contents of your public key into the file authorized\_keys on the remote machine. Alternatively, use the UNIX cat command as follows:

```
cat id_rsa.pub >>authorized_keys
```

- Step 3** The file permission of the file `~/.ssh/authorized_keys` must be 644. Use the following command to set the required file permission:

```
chmod 644 ~/.ssh/authorized_keys
```



- Note** To set the required permission, you might have to modify the file `/etc/ssh/sshd_config` by adding the following line if it is already configured:

```
* RSAAuthentication yes
```

- Step 4** To ensure that the SFTP automatic login works correctly (with no password prompt), from the active BAMS issue the following command:

```
sftp (PGW_username)@(PGW_IP_address | hostname)
```



- Note** Repeat this procedure to enable automatic login on a redundant BAMS unit.

## Configuring BAMS to Forward SNMP Traps

To configure BAMS to forward SNMP traps to a management application, perform the following steps:

- Step 1** Log in as the root user by entering the following command:

```
:root
:password
```

- Step 2** Open a vi session:

```
vi /etc/srconf/agt/snmpd.cnf
```

- Step 3** Make sure the following lines exist under the `snmpNotifyEntry` section (if they are not there, add them):

```
snmpNotifyEntry 31 Console trap nonVolatile
snmpNotifyEntry 32 TrapSink trap nonVolatile
```



- Note** Number 31 must be unique in that section. Each entry number must be unique.

- Step 4** Make sure the following lines exist under the `snmpTargetAddrEntry` section (if they are not there, add them):

```
snmpTargetAddrEntry 33 snmpUDPDomain 127.0.0.1:0 100 3 Console \
v1ExampleParams nonVolatile 255.255.255.255:0 2048
snmpTargetAddrEntry 34 snmpUDPDomain 127.0.0.1:0 100 3 Console \
v2cExampleParams nonVolatile 255.255.255.255:0 2048
```



- Note** Number 33 must be unique in that section. Each entry number must be unique.

- Step 5** To forward a V1 trap to the IP address of the network management platform (A.B.C.D in the lines below), add the following line:

```
snmpTargetAddrEntry 35 snmpUDPDomain A.B.C.D:0 100 3 TrapSink \
v2cExampleParams nonVolatile 255.255.255.255:0 2048
```

- Step 6** To forward a V2c trap to destination A.B.C.D, add the following line:

```
snmpTargetAddrEntry 36 snmpUDPDomain A.B.C.D:0 100 3 TrapSink \
v2cExampleParams nonVolatile 255.255.255.255:0 2048
```

- Step 7** Restart the snmpd process:

```
kill -9 pid
```



**Note**

The value of pid is the process ID for snmpd, and snmpd restarts itself after termination.

## Configuring BAMS

To configure BAMS, perform the following steps:

- Step 1** Log in as the root user by entering the following command:

```
:root
:password
```

- Step 2** Define the network node names and IP addresses of the Cisco MGC and the BAMS units in the file /etc/hosts. You must edit and save the host file with the information obtained from your system administrator, using the UNIX vi text editor to enter the following commands:

```
$ cd /etc/inet
$ chmod 744 hosts
$ vi hosts
```

The following text represents a sample /etc/hosts file. In the sample file, sh-v210-primrose and sh-v210-medusa are the BAMS hostnames. The active and standby PGW 2200 hostnames are sh-gox and sh-hox respectively.

```
127.0.0.1 localhost
10.74.50.187 sh-v210-primrose loghost
10.0.50.187 sh-v210-primrose_b
10.0.50.184 sh-v210-medusa
10.74.50.184 sh-v210-medusa_b
10.74.57.53 sh-gox_b
10.0.33.53 sh-gox
10.0.33.54 sh-hox
10.74.57.54 sh-hox_b
```

- Step 3** Log out as the root user.



**Caution**

All of the dual Ethernet connections and host names should be set up and defined for each BAMS and Cisco MGC unit. The redundant Ethernet connection should have a suffix of \_b; for example: MGC1 hostname=ciscomgc1, MGC1 redundant connection hostname=ciscomgc1\_b.

**Step 4** Log in as the BAMS user.

**Step 5** (Skip this step if you are upgrading your BAMS version and you chose to restore the previous configuration files during the installation procedure.)

Set up the basic BAMS configuration: simplex or redundant.

- a. To change the system settings for simplex versus redundant mode, run **change\_mode** and follow the instructions. The following change\_mode example shows user input for setting up BAMS in redundant mode:

```
$ cd /opt/CiscoBAMS/bin
$ change_mode
```

```
The change_mode program sets the BAMS configuration to simplex or redundant.
Do you want to continue (y/n)? y
```

```
Enter mode of operation:
1. Simplex BAMS mode
2. Redundant BAMS mode
```

```
Enter mode [1-2]: 2
```

```
Specify the transfer protocol between the BAMS units:
1. FTP
2. SFTP
```

```
Enter mode [1-2]: 2
```

```
To finish configuration for a redundant system:
```

1. On unit 1, set UNITNO to 1 in file /opt/CiscoBAMS/bin/sym\_defs
2. Run /opt/CiscoBAMS/bin/setbamunit and enter all parameters

```
User should execute the following to set up current environment:
$./opt/CiscoBAMS/bin/sym_defs
```

```
As an alternative, the user can log out and log in again to re-set the shell
environment.
```

```
Installation complete
```

```
hostname : sh-v210-medusa
date of change_mode : Fri Feb 9 15:56:22 EST 2007
system mode : Redundant BAMS mode
BAMS protocol : SFTP
$
```

To set up the BAMS unit for SC2200 applications and check the measurements reporting interval, start an MML provisioning session, modify the configuration of the Node Parameters table using the NODEPARMS tag ID, and deploy any changes you make.

Refer to the [“Configuring Node Parameters” section on page 2-17](#).

**Step 6** (Skip this step if you are upgrading your BAMS version and you chose to restore the previous configuration files during the installation procedure.)

Complete the instructions given at the end of the **change\_mode** program:

- a. Set the unit designation.



**Note** For a redundant configuration, this step must be performed on both units:

- b. Modify the UNITNO environment variable definitions to define the unit number in the file `/opt/CiscoBAMS/bin/sym_defs`. (The primary BAMS unit should be 0, and the secondary BAMS unit should be 1.)



**Note** You can designate the Cisco MGC units 1 and 2. You must confirm the unit designations with your system administrator. Do not modify the BAMS 0 and 1 unit numbers to match the Cisco MGC numbers 1 and 2, or the system will not work as intended.

- c. After unit designation is complete, reset the system environment variables by entering the following commands:

```
$ cd /opt/CiscoBAMS/bin
$. sym_defs
```



**Note** Only valid users with appropriate permissions can access the Cisco MGC. They must be set up with permissions in the Cisco MGC group for Cisco MGC software Release 7.4 and later releases, and in the TransPath group for releases before software Release 7.4.

- d. From within the `/opt/CiscoBAMS/bin` directory, enter the **setbamunit** command to configure the host name, login ID, and password parameters for both BAMS units.

All parameters should be defined. The parameters `bam_name0` and `bam_name1` should correspond to the node names of the BAMS units defined in the file `/etc/hosts`. See the following example:

```
$ cd /opt/CiscoBAMS/bin
$ setbamunit
New value for 'bam-name0' [] : bams0
New value for 'login0' [bams] : bams
Enter new password for 'passwd0': xxxxxxxx
Re-enter password: xxxxxxxx
New value for 'bam-name1' [] : bams1
New value for 'login1' [bams] : bams
Enter new password for 'passwd1': yyyyyyyy
Re-enter password: yyyyyyyy
$
```

**Step 7** Configure the Cisco MGC polling parameters for the first node by using the Man-Machine Language (MML) program to set the first node. This creates the initial polling control file for node 1 (`/opt/CiscoBAMS/files/s01/poll.CTL`).

```
$ cd /opt/CiscoBAMS/bin
$ mml
```

You can also change the MML environment by just entering the node identifier:

```
mml:sys> set-node:1:
```



**Note** The node identifier represents the first PGW 2200 pair connected to the BAMS system.

**Note**

In representations of MML sessions, the prompt `mml:sys>` indicates that what you configure will be applied to all nodes.

To start an MML editing session, enter the following command:

```
mml:1> prov-sta::srcver="active",dstver="test1"
```

To set the node name "boston" for the first node, enter the following command:

```
mml:sys> set-nodename:1:name="boston"
```

**Note**

The syntax for the `set-nodename` command is `set-nodename:node#:name=nodename`. The value of `node#` is an integer in the range 1–8.

The value of `nodename` must be a valid UNIX filename because this name is used to create a directory link in the data directory.

The nodename should be the Cisco PGW 2200 node name.

You can issue the `set-nodename` command to modify any existing node names. However, you cannot issue the command to modify the system name.

To display the polling record for this node, enter the following command:

```
mml:1> prov-rtrv:poll:
Billing and Measurements Server - BAMS-00 2004-10-09 15:30:02
B RTRV
;
```

Initially, this file is empty. To display the configuration parameters, enter the following command:

```
mml:1> prov-add:poll:host-name1="MGCTest1",rem-dir1="/opt/CiscoMGC/var/bam",
file-prefix1="cdr*",file-suffix1=".bin",host-name2="MGCTest2",file-prefix2="cdr*",
file-suffix2=".bin",action="R",interval=5,timeout=2,maxtries=2, protocol="ftp"
```

```
Billing and Measurements Server - BAMS-00 2004-10-09 15:21:49
B COMPLD
host-name1 (string)
rem-dir1 (string)
file-prefix1 (string)
file-suffix1 (string)
host-name2 (string)
rem-dir2 (string)
file-prefix2 (string)
file-suffix2 (string)
action (string)
interval (numeric)
maxtries (numeric)
protocol (string)
;
```

When you add a polling record to the Poll table, you must specify the file prefix (for example, “cdr\*”) and suffix (for example, “.bin”) for the CDR files on each host. The CDR files produced on the Cisco MGC switch use the following naming convention:

```
<prefix>_yyyymmddhhMMss_nnnnnn.bin
```

where:

*<prefix>* is defined in the Cisco MGC switch configuration (for example, “cdr”)

*yyyymmddhhMMss* is the timestamp. BAMS ignores the timestamp when polling; it uses the file sequence number instead.)

*nnnnnn* is the file sequence number. You specify this number with the **chgn** command in .

*.bin* is the suffix

To add a polling record (all required fields and values must be specified), enter the following command

```
mml:1> prov-add:poll:host-name1="MGCTest1",rem-dir1="/opt/CiscoMGC/var/bam",
file-prefix1="cdr*",file-suffix1=".bin",host-name2="MGCTest2",file-prefix2="cdr*",
file-suffix2=".bin",action="R",interval=5,timeout=2,maxtries=2,protocol="ftp"
;
```



#### Note

---

The host-name should match the PGW 2200 hostname configured in the /etc/hosts file.

---

In the preceding example, the file-prefix1 and file-suffix1 parameters must correspond to the file generated on the Cisco MGC switch 1 (host-name1 parameter), and the file-prefix2 and file-suffix2 parameters must correspond to the file generated on the Cisco MGC switch 2 (host-name2 parameter).

To edit the polling configuration information for this node, use the following command:

```
mml:1> prov-ed:poll:maxtries=3
```

Refer to the [“POLL Tag ID” section on page 5-18](#) for details on the Poll table’s required fields and values.

**Step 8** To deploy the changes, use the following command:

```
mml:1> prov-dply::
```

If the remote unit is online, the files are synchronized and messages such as the following display on the screen:

```
/* Synchronizing remote BAMS ... */
/* Transferring file /opt/CiscoBAMS/files/s01/zoneinfo.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/TrunkGroup.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/alm_parms.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/country.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/maptype.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/nodeParm.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/NpaNxx.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/poll.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/RatingType.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/RatingException.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/NailedConn.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/skipcdb.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/skipcde.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/thresholds.CTL ... */
/* Transferring file /opt/CiscoBAMS/files/s01/tollfree.CTL ... */
;
```



**Note**

You must be in an active provisioning session (**prov-sta** command) to edit any parameters; use the **prov-dply** command to implement the changes.

**Step 9** (Skip this step if you are upgrading your BAMS version and you chose to restore the previous configuration files during the installation procedure.)

Identify the sequence number of the first file to be polled from each Cisco MGC switch. You modify the polling file sequence number by using the MML **chgno** command. This file sequence number must correspond to the sequence number of the files generated by the Cisco MGC switches. Refer to [Step 7](#) for the filename format. You can change one or both file sequence numbers with this command.

```
mml:1> chgno::[seqno1=#,][seqno2=#]
```

seqno1 is the file sequence number of the first polled unit, and seqno2 is the file sequence number of the second polled unit. For example:

```
chgno::seqno1=0001,seqno2=0002
```

The system should be stopped when you execute the **chgno** command. If the system is running, be sure it is not polling, or else a “Load record failed error” message could be generated. If **chgno** fails, you receive the message “Polling control record #1 in use by POL program — try again later.”

**Step 10** Quit the MML session by entering the following command:

```
mml:1> quit
```

- Step 11** For security reasons, the login information for the Cisco MGCs is not entered through the MML interface. The BAMS user must execute the program `/opt/CiscoBAMS/bin/setpollpwd` to define the login IDs and passwords for the redundant Cisco MGC units.

```
$ cd /opt/CiscoBAMS/bin
$ setpollpwd -sx (Where x represents the node identifier: 1 to 8)
New value for 'userid1' []: mgcuser1
Enter new password for 'password1': xxxxxxxx
Re-enter password: xxxxxxxx
New value for 'userid2' []: mgcuser2
Enter new password for 'password2': yyyyyyyy
Re-enter password: yyyyyyyy
$
```

- Step 12** Repeat [Step 7](#) through [Step 11](#) to set up each additional node (2 through 8).

- Step 13** Configure the MSC Thresholds table and the MSC Parameters table to monitor the disk usage levels.



**Note** The MSC threshold levels have been set at default values, but you can modify them by entering the following commands:

```
$ cd /opt/CiscoBAMS/bin
$ mml
mml:sys> sta-softw
```

To display threshold values, enter the following command:

```
mml:sys> prov-rtrv:msc-thres:
```

To display file parameters, enter the following command:

```
mml:sys> prov-rtrv:msc-parms:
```



**Note** If BAMS Release 1.x has been uninstalled and is being replaced by BAMS Release 3.x, log in as a user and enter the following commands:

```
$ cd /opt/CiscoBAMS/data/output
$ mv /tmp/incomplete_cdr.cor.out incomplete_cdr.cor
```

Reconfigure the provisioning tables using the MML command.

- Step 14** Start the system by entering the following commands:

```
$ cd /opt/CiscoBAMS/bin
$ mml
mml:sys> sta-softw
```

This completes the installation process.



**Note** You can also start or stop the system from the UNIX prompt by using `start_system` or `stop_system`.

## Configuring Node Parameters

Use the NODEPARMS tag ID to set node parameters such as record-type outputs (for example, ASCII, BAF, NICS, P01) and measurements.

To display the node parameters, you need to first set a node. Enter the following commands:

```
$ cd/opt/CiscoBAMS/bin
$ mml
mml:sys> set-node:1:
Billing and Measurements Server - BAMS-00 2004-10-12 10:36:39
mml:1:boston> prov-rtrv:NODEPARMS:
Billing and Measurements Server - BAMS-00 2004-10-12 10:36:58
B RTRV

"NODEPARMS:activate=1,statoutput=1,bafoutput=0,asciibafoutput=0,asciioutput=2,lookupinfo=1
,bafinfo=0,dynamicaccumes=0,sup-zero-counts=0,interval-minutes=15,nailed-cfg=1,p01output=0
,p01prefix="p01_",enable-h323=0,extasciioutput=0,nicsoutput=0,bin1110output=0,
qosoutput=0"
;
```



### Caution

The Cisco MGC dump CDR interval (set in the dmprSink.dat file) must be set to a value less than and not equal to the BAMS measurements interval (interval-minutes parameter). For example, if the measurements interval is set to 5 minutes, the dump CDR interval must be set to 4 minutes or less. If the Cisco MGC dump CDR interval is greater than or equal to the BAMS measurements interval, the possibility exists that more than one measurements interval can be crossed in a single input file. If this happens, a COR206 major alarm occurs. The end result is the loss of measurement data. This loss of data causes the ACC task to generate an ACC222 minor alarm. For details about modifying the Cisco MGC dump CDR interval value in the dmprSink.dat file, see [“Configuring the Cisco MGC for Using BAMS” section on page 2-1](#).



### Note

Refer to the [“NODEPARMS Tag ID” section on page 5-11](#) for details on the available node parameters and acceptable values.

## Host Configuration Setup for Downstream Polling

You can collect files in the opt/CiscoBAMS/data directories (ASCII, BAF, measurements, NICS, and so forth) through an appropriate FTP (or SFTP) session. This is referred to as FTP (or SFTP) polling of BAMS by the downstream billing system. In an automated FTP or SFTP session, data collected from BAMS is stored in appropriate directories on the downstream billing system. After a successful poll of a data file, the data file in the BAMS /data subdirectory should be renamed with a \*.finished suffix. In a redundant configuration, the duplicate file on the redundant BAMS unit should also be renamed. This allows the BAMS MSC task to delete these polled files, freeing up disk space. Refer to [“Updating the Poll Table” section on page 5-18](#) for information about specifying a \*.finished suffix for polled files.

The billing system host must be set up to support such polling. Data files should be collected through FTP (or SFTP) in binary transfer mode so that data file corruption is avoided. For automated storage, report creation and generation, and analysis, a number of solutions are available.

## Setting Up Disk Monitoring Thresholds

The Mass Storage Control (MSC) task maintains disk space on the BAMS units according to percentage-based disk-space usage thresholds. Use the MSC-THRES tag ID at the system level to configure the MSC thresholds. Refer to [Chapter 4, “Using MML Commands,”](#) for the MSC-THRES field names and values.

In the following example, the MSC task is set up to run at 15-minute intervals:

```
prov-ed:msc-thres:interval=15,iut=50000,put=60,plt=40,uut=80,mil=75
```

Note the following in this example:

- The inode upper threshold has been set at 50,000 inodes.
- The polling upper threshold is set at 60 percent of the available disk space, and the lower threshold is set at 40 percent of the disk space.
- The unpolled upper threshold has been set at 80 percent of the available disk space.
- A minor alarm level has been set at 75 percent.

The MSC task uses the directory name and a user-defined file pattern to distinguish polled files from unpolled files. The actual values depend on disk usage and fill factors that vary between BAMS locations. The system administrator must determine the appropriate values for a given location.

## Calculating Disk Space Usage

When you establish the MSC task interval, you must make disk space usage estimates. The following examples are provided to help you estimate data processing and archive partitioning based on average calls per second (CPS). You can use the estimates listed to:

- Calculate how long data files will remain in the data directories before deletion by the MSC task
- Determine a backup procedure if the BAMS data is not being forwarded to another device
- Customize the MSC disk usage parameters

The estimates listed in [Table 2-1](#) are based on an 18-GB disk partition and an output configuration for BAF, measurements, and ASCII. The estimates in [Table 2-2](#) are based on an 18-GB disk partition and an output configuration for BAF and measurements. The estimates in [Table 2-3](#) are based on a 12-GB disk partition.

**Table 2-1 Data Disk Partitioning (Output Configuration for BAF, Measurements, and ASCII)**

| CPS | Disk Usage MB per Hour | Disk Usage (Percent) per Day | Disk Usage (Percent) per Week |
|-----|------------------------|------------------------------|-------------------------------|
| 20  | 32                     | 4.2                          | 29.4                          |
| 40  | 64                     | 8.4                          | 58.8                          |
| 60  | 96                     | 12.6                         | 88.2                          |
| 80  | 128                    | 16.8                         | 100 (in 0.86 of a week)       |

**Table 2-2 Data Disk Partitioning (Output Configuration for BAF and Measurements)**

| CPS | Disk Usage (MB) per Hour | Disk Usage (Percent) per Day | Disk Usage (Percent) per Week |
|-----|--------------------------|------------------------------|-------------------------------|
| 20  | 7                        | 0.9                          | 6.5                           |
| 40  | 14                       | 1.9                          | 13.0                          |
| 60  | 21                       | 2.8                          | 19.6                          |
| 80  | 28                       | 3.7                          | 26.1                          |

**Table 2-3 Archive Disk Partitioning**

| CPS | Disk Usage (MB) per Hour | Disk Usage (Percent) per Day | Disk Usage (Percent) per Week |
|-----|--------------------------|------------------------------|-------------------------------|
| 20  | 36                       | 7.2                          | 50.4                          |
| 40  | 72                       | 14.4                         | 100                           |
| 60  | 108                      | 21.6                         | 100 (in 0.71 of a week)       |
| 80  | 144                      | 28.8                         | 100 (in 0.57 of a week)       |

## Defining Conditions for MSC Alarms

Use the MSC-PARMS tag ID to define conditions that generate alarms or events, based on parameters such as file size, file type, and file age. Refer to [Chapter 4, “Using MML Commands,”](#) for a detailed description of the tag ID field names and values.

In the following example, the MSC task looks for polled files with a baf\* prefix to determine whether or not to set off a minor alarm:

```
prov-ed:msc-parms:type=baf*,polled=1
```

## Setting a File-Age Condition

You can set a file-age condition by setting an age value (in days) in the MSC-PARMS tag ID's agealarm field. In the following example, an alarm will occur once BAF files are 40 days old:

```
prov-ed:msc-parms:type="baf*",agealarm=40
```

## Setting a File-Type Condition

You can add file-type conditions for files that the MSC task should monitor. To do so, use the **prov-add** command. Configure the MSC task to clean up unneeded files and to conserve disk space. A file already polled by the downstream billing system is an example of an unneeded file. A BAMS file-naming convention is used to indicate the file processing state and whether files have been polled or not. Thus file naming serves to indicate to the control task which files must be saved and which files are unneeded.

In the following example, the MSC task looks for files with a \*.polled suffix.

```
prov-add:msc-parms:type="*.polled"
```

## Setting Disk Usage Thresholds

You can add disk usage thresholds to be monitored by the MSC task. To do so, use the **prov-add** command. In the example below, the MSC task looks for unpolled files with the `baf*` prefix and generates a minor alarm if a file is older than 10 days. After 30 days, the MSC task deletes that file and sets a critical alarm.

```
prov-add:msc-parms:type="baf*",polled=2,agealarm=10,agelevel=2,delage=30,delalarm=0
```

## Setting the Initial PGW CDR Sequence Number

To set the initial PGW CDR sequence number, perform the following steps:

- 
- Step 1** On each PGW host, change directory to `/opt/CiscoMGC/var`.  
This directory contains the file `.cdr.seq`, which contains a number that identifies the last CDR sequence number written to the file.
- Step 2** Issue the MML **chgno** command to set the sequence number you want BAMS to collect initially.

### Example

```
mml : 3>chgno : : seqno1=2, seqno2=2
```



### Note

Within the **chgno** command expression, **seqno1** represents host1 in the POLL table; **seqno2** represents host2 in the POLL table.

For a description of the **chgno** command, see [chgno—Change Number, page 4-7](#).



### Note

If you wish to collect older records, you can obtain the sequence numbers by issuing the command **ls -lt |cdr\*** from the `/opt/CiscoMGC/var/bam` directory on each PGW host.

## Setting the PGW Dynamic Update Mode

Based on a feature on PGW 9.4(1) and later, two CDEs (4234 and 4235) are produced in the 1071 CDB. These two CDEs take a “snapshot” of the trunk group or sigpath on the PGW for the number of circuits in the trunk group (sigpath in nailed mode) and the number of unavailable circuits for the trunk group (sigpath in nailed mode). The 1071 CDB is triggered whenever a trunk group (sigpath) is added or updated, or when a manual MML audit command is issued on the PGW.

With these two CDEs produced on PGW 9.4(1), it is now possible for BAMS—when running in PGW Dynamic Update mode—to update the trunk groups and the number of circuits in a trunk group dynamically without end-user intervention. BAMS can:

- Update the number of circuits for each update on the PGW.
- Report accurately the number of circuits out of service for a trunk group.

In BAMS 3.30, PGW Dynamic Update Mode is set to True.

## Processing Pre-9.4.1 Data

By default, the `PGW_DYNAMIC_UPDATE` value is `FALSE`, therefore BAMS uses the number of available circuits in the Trunk Group table as the total number of circuits. Since the number of unavailable circuits is unreliable in this mode, BAMS does not attempt to track them.

## Processing 9.4.1 (and Newer) Data

For processing PGW 9.4.1 (and newer) data, the `PGW_DYNAMIC_UPDATE` is set to `TRUE`. Consequently, the following changes are enabled in Cisco BAMS 3.30:

- A backup of all current BAMS configuration tables is made.
- The structure of the Trunk Group table is modified by eliminating the `circuits` field, because BAMS will know the exact number of configured circuits and the number of unavailable circuits.
- A dynamic table of circuits is maintained.
- The BAMS algorithm for counting the number of circuits per trunk group is changed, thereby affecting measurements (see the [“Suppressed Measurements”](#) section on page 2-21).
- The MML command `rtmv-circuits` is enabled.

## Suppressed Measurements

The following table illustrates which measurements are suppressed or not pegged based on the `PGW_DYNAMIC_UPDATE` value (i.e., `TRUE` or `FALSE`).

**Table 2-4 Suppressed Measurements**

| Measurement Name                      | PGW Dynamic Update = True |                       |          |        |
|---------------------------------------|---------------------------|-----------------------|----------|--------|
|                                       | Pre-defined No 1071       | Pre-defined with 1071 | Dynamic  | MGCP   |
| Call Attempts Incoming                |                           |                       |          |        |
| Call Attempts Outgoing                |                           |                       |          | No Peg |
| Outgoing Attempts Blocked             |                           |                       |          | No Peg |
| Failed Calls-Congestion               |                           |                       |          |        |
| Successful Calls Incoming             |                           |                       |          |        |
| Successful Calls Outgoing             |                           |                       |          | No Peg |
| Percent Trunk Group Usage Incoming    | Suppress                  |                       | Suppress |        |
| Percent Trunk Group Usage Outgoing    | Suppress                  |                       | Suppress | No Peg |
| Maintenance Duration per Trunk Group  | Suppress                  |                       | Suppress |        |
| Total Traffic in Erlangs              |                           |                       |          |        |
| Total Calls Terminated Normally       |                           |                       |          |        |
| Calls Terminated Abnormally           |                           |                       |          |        |
| Calls Terminated, Failed MGW or NAS   |                           |                       |          |        |
| Calls Rejected                        |                           |                       |          |        |
| Calls Rejected, Unknown Dialed Number |                           |                       |          |        |

Table 2-4 Suppressed Measurements (continued)

| Measurement Name                                        | PGW Dynamic Update = True |                       |          |        |
|---------------------------------------------------------|---------------------------|-----------------------|----------|--------|
|                                                         | Pre-defined No 1071       | Pre-defined with 1071 | Dynamic  | MGCP   |
| Calls Rejected, Other Reasons                           |                           |                       |          |        |
| Overflow, Outgoing Attempts Blocked                     |                           |                       |          | No Peg |
| Total Sum of Usage Pegs per Trunk Group                 |                           |                       |          |        |
| Tandem Routing Attempts, Outgoing                       |                           |                       | Suppress | No Peg |
| Tandem Completions, Outgoing                            |                           |                       | Suppress | No Peg |
| Tandem Attempts, Incoming                               |                           |                       | Suppress |        |
| Tandem Completions, Incoming                            |                           |                       | Suppress |        |
| Tandem Duration, Outgoing                               |                           |                       | Suppress |        |
| Tandem Duration, Incoming                               |                           |                       | Suppress |        |
| IC Destined Calls                                       |                           |                       |          |        |
| IC Destined Calls, No Circuit                           |                           |                       |          |        |
| IC Usage                                                |                           |                       |          |        |
| Conversation Duration Ingress                           |                           |                       |          |        |
| Conversation Duration Egress                            |                           |                       |          | No Peg |
| Setup Duration Ingress                                  |                           |                       |          |        |
| Setup Duration Egress                                   |                           |                       |          | No Peg |
| Teardown Duration Ingress                               |                           |                       |          |        |
| Teardown Duration Egress                                |                           |                       |          | No Peg |
| Call Routing I Peg                                      |                           |                       |          |        |
| Call Routing II Peg                                     |                           |                       |          |        |
| Call Routing III Peg                                    |                           |                       |          |        |
| Carrier Select No Indication                            |                           |                       | Suppress |        |
| Carrier Select PreSubscribed Not Input                  |                           |                       | Suppress |        |
| CarrierSelect PreSubscribed and Input                   |                           |                       | Suppress |        |
| CarrierSelect PreSubscribed with No Indication          |                           |                       | Suppress |        |
| Carrier Id Code Not PreSubscribed but Input by Customer |                           |                       | Suppress |        |
| Successful H.323 Terminating Pegs                       |                           |                       |          |        |
| Successful H.323 Originating Pegs                       |                           |                       |          |        |
| Unsuccessful H.323 Terminating Pegs                     |                           |                       |          |        |
| Unsuccessful H.323 Originating Pegs                     |                           |                       |          |        |
| Successful ISUP Terminating Pegs                        |                           |                       |          |        |
| Successful ISUP Originating Pegs                        |                           |                       |          |        |
| Unsuccessful ISUP Terminating Pegs                      |                           |                       |          |        |

**Table 2-4** *Suppressed Measurements (continued)*

| Measurement Name                                               | PGW Dynamic Update = True |                          |          |      |
|----------------------------------------------------------------|---------------------------|--------------------------|----------|------|
|                                                                | Pre-defined<br>No 1071    | Pre-defined<br>with 1071 | Dynamic  | MGCP |
| Unsuccessful ISUP Originating Pegs                             |                           |                          |          |      |
| ISDN Terminating Setup Message Delay Pegs                      |                           |                          |          |      |
| ISDN Originating Setup Message Delay Pegs                      |                           |                          |          |      |
| Number of Defined CICs during the Measurement Period           | Suppress                  |                          | Suppress |      |
| Average Number of Available CICs during the Measurement Period | Suppress                  |                          | Suppress |      |

**Note**

In representations of MML sessions, the prompt `mml:sys>` indicates that what you configure will be applied to all nodes.





# CHAPTER 3

## Provisioning BAMS

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Revised: March 10, 2011, OL-11618-18

### Overview

This chapter provides information and examples on how to provision the Billing and Measurements Server (BAMS), both at the system level and at the node level.



Note

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Before following the steps in this chapter, ensure that BAMS is correctly set up and installed. For more information, see [Chapter 2, “Setup and Installation.”](#)

---

You must provision BAMS tables to specify such attributes as alarm parameters, polling information, node parameters, billing outputs, and disk-space parameters and thresholds. Before starting a provisioning session, read through the procedures at the beginning of this chapter to understand how to provision BAMS according to your system configuration and output requirements, and consult the provisioning examples in the rest of this chapter to assist you in deciding on the best provisioning strategy for your system.

### Provisioning Commands

Use the MML **prov-add** (add), **prov-ed** (edit), and **prov-dlt** (delete) commands to modify BAMS tables (tag IDs). Use the **prov-dply** command to deploy your provisioning changes. Use the **prov-rtrv** (retrieve) command to view existing values in the tables, and to verify your provisioning changes.

Additionally, you can use the **prov-exp** (export) command to export existing values, for one table or for the entire system, to a file. You can use the **prov-cpy** (copy) command to copy one or more tables from one node to the current node.



Note

---

For more information about MML commands, see [Chapter 4, “Using MML Commands”](#) or the MML online help. For more information about BAMS tables, see [Chapter 5, “Using BAMS Tag IDs.”](#)

---

## System-level Provisioning

System-level provisioning for Cisco BAMS is optional because default values are set during installation. You should maintain the default values unless you have specific reasons that require modifying them.

To provision BAMS three system-level tables, perform the following steps:

- 
- Step 1** Log in as the BAMS user, and start an MML session.
  - Step 2** Execute the **set-node:sys:** command to ensure that you are at the system level.
  - Step 3** Execute the **prov-sta** command.
  - Step 4** Provision the Alarm Parameters table (ALM-PARMS tag ID), or use the default values.
  - Step 5** Provision the MSC Thresholds table (MSC-THRES tag ID), or use the default values.
  - Step 6** Provision the MSC Parameters (MSC-PARMS tag ID), or use the default values.




---

**Note** The default values in the MSC Parameters table are set fairly high, so evaluate your disk-space limitations and make any necessary changes to the values in this table. For more information, see [“Setting Up Disk Monitoring Thresholds” section on page 2-18.](#)

---

- Step 7** Execute the **prov-dply** command at the system level.

## Node-level Provisioning

For every Cisco MGC to be polled by BAMS, you must define and provision a BAMS node for it. For example, if there are eight Cisco MGCs, you must provision eight BAMS nodes. You need to perform the following steps for each node. You can also create a multi-node batch file to provision more than one node at the same time. For more information, see the [“Provisioning Commands and Examples” section on page 3-5.](#)

To provision BAMS node-level tables for one BAMS node, perform the following steps:

- 
- Step 1** Execute the **set-node** command to go to the desired node (for example, Node1).
  - Step 2** Start a provisioning session with the **prov-sta** command.
  - Step 3** Execute the **set-nodename** command.
  - Step 4** Provision the Poll table (POLL tag ID).
  - Step 5** Provision the Node Parameters table (NODEPARMS tag ID).




---

**Note** Any values that you do not specify when provisioning the Node Parameters table are automatically assigned the default values.

---

- Step 6** Provision the Trunk Group table (TRUNKGRP tag ID).
  - Step 7** For Cisco SC2200 configurations, provision the Nailed Connection table (SIGPATH tag ID).
-

## QoS Output Provisioning

To provision the Cisco BAMS to produce QoS output, enable the QoS output in the NODEPARNMS table (NODEPARMS tag ID).

For information about QoS output, see [Chapter 11, “Configuring BAMS for QoS Output.”](#)

## Billing Output Provisioning

You can provision BAMS to output billing data in BAF, 1110 Binary, NICS, or P01 formats.

### BAF Output

To provision BAMS to produce BAF output, perform the following steps:

- 
- Step 1** Ensure that BAF output is enabled in the Node Parameters table (NODEPARMS tag ID).
  - Step 2** Provision the Switch Information table (SWITCHINFO tag ID).
  - Step 3** Provision the Map Type table (MAPTYPE tag ID).
  - Step 4** Provision the Zone Information table (ZONE-INFO tag ID).
  - Step 5** Provision the NPANXX table (NPANXX tag ID).
  - Step 6** Provision the Rating Type table (RATING-TYPE tag ID).
  - Step 7** Provision the Tollfree table (TOLLFREE tag ID).
  - Step 8** If applicable, provision the Country table (COUNTRY tag ID).



**Note**

For more information about BAF output, see [Chapter 6, “Configuring BAMS for BAF Output.”](#)

---

### 1110 Binary Output

To provision BAMS to produce 1110 Binary output, perform the following steps:

- 
- Step 1** Ensure that 1110 Binary output is enabled in the Node Parameters table (NODEPARMS tag ID).
  - Step 2** Provision the 1110 Binary table (BIN1110 tag ID).



**Note**

For more information about 1110 Binary output, see [Chapter 10, “Configuring BAMS for 1110 Binary Output.”](#)

---

## NICS Output

To provision BAMS to produce NICS output, perform the following steps:

- Step 1 Ensure that NICS output is enabled in the Node Parameters table (NODEPARMS tag ID).
- Step 2 Provision the Trunk Group Prefix table (TKGPREFIX tag ID).



**Note** For more information about NICS output, see [Chapter 9, “Configuring BAMS for NICS Output.”](#)

## P01 Output

To provision BAMS to produce P01 output, perform the following steps:

- Step 1 Ensure that P01 output is enabled in the Node Parameters table (NODEPARMS tag ID).
- Step 2 Provision the P01 Filter table (P01FILTER tag ID).



**Note** For more information about P01 output, see [Chapter 8, “Configuring BAMS for P01 Output.”](#)

## Threshold Crossing Alarms (TCA) Provisioning

To provision BAMS to produce threshold crossing alarms, perform the following steps:

- Step 1 Provision the TCA-TBL table (TCA-TBL tag ID).



**Note** The Skip CDB and Skip CDE tables should only be provisioned as directed by Cisco, or left with the default values.

## Deploying Node-level Provisioning

To deploy your configuration and output changes for one node, perform the following steps:

- Step 1 Execute the **prov-dply** command at the node level.



**Note** If you are provisioning a redundant BAMS system, the **prov-dply** command automatically synchronizes the provisioning tables for that node on both units.

- Step 2** Provision the next node. Return to the [“Node-level Provisioning” section on page 3-2](#) and repeat the above steps.
- 

## Provisioning Commands and Examples

The **prov-add** (add), **prov-ed** (edit), and **prov-dlt** (delete) commands can be used in conjunction with any of the tag IDs shown below to modify BAMS tables. Use the **prov-rtrv** (retrieve) command to view existing values in the tables.

- ALM-PARMS
- BIN1110
- COUNTRY
- MAPTYPE
- MSC-PARMS
- MSC-THRES
- NODEPARMS
- NPANXX
- P01FILTER
- POLL
- RATE-EXC
- RATING-TYPE
- SIGPATH
- NODEPARMS
- SKIPCDB
- SKIPCDE
- SWITCHINFO
- TCA-TBL
- TKGPREFIX
- TOLLFREE
- TRUNKGRP
- ZONE-INFO

For more information about these tag IDs, see the [“Tag IDs and Field Names” section on page 5-1](#).

## Starting a Provisioning Session

In order to modify BAMS tables, you must first start a provisioning session with the **prov-sta** command. For example:

```
mml:sys>prov-sta::srcver=active,dstver=test10

Billing and Measurements Server - BAMS-00 2004-10-19 14:15:08
B COMPLD
;
```



### Note

The value assigned to **dstver** must be a unique string, unless you use **confirm** to overwrite an existing configuration. When a provisioning session is started, a directory with the specified name is created. The directory is created under the directory name of the destination directory, `/opt/CiscoBAMS/files/mml/dirname`.

In the example above, the `/opt/CiscoBAMS/files/mml/test10` directory was created. For more information about using the **prov-sta** command, see the [“prov-sta—Provision Start” section on page 4-16](#).

## Provisioning Multiple Records with a Single Command

You can provision multiple records with a single command if you use the **prov-add**, **prov-dlt**, or **prov-ed** command. Specify the parameter values by a range so that multiple records can be provisioned. Here are examples:

Example 1:

```
prov-add:SIGPATH:sigpath=0x140004,trunkgrp=805
```

This command adds 32 records to the SIGPATH table. Each record has `sigpath=0x140004`, `trunkgrp=805`.

Example 2:

```
prov-dlt:SIGPATH:sigpath=0x140001-0x140005
```

This command deletes five records from the SIGPATH table.

Example 3:

```
prov-ed:TRUNKGRP:trunkgrp=100-199,connection="T"
```

This command edits 100 records in the TRUNKGRP table. For each record where `trunkgrp` falls within the range 100–199, the `connection` parameter is set to “T.”



### Note

To view the current settings in a table, use the **prov-rtrv** command. For details, see the [“prov-rtrv—Provision Retrieve” section on page 4-16](#).

## Deploying Changes

Use the **prov-dply** command when changes have been made and you must deploy them to the specified location. In the following example, a provisioning session is started and a change is made and then deployed.

Example:

```
mm1:1>prov-sta::srcver=active,dstver=test10901,confirm

Billing and Measurements Server - BAMS-00 2004-10-08 16:30:25
B COMPLD
;
mm1:1>prov-add:NPANXX:npanxx=301829,lata=00001,zone=000001

Billing and Measurements Server - BAMS-00 2004-10-08 16:31:09
B COMPLD
 "NPANXX"
;
mm1:1>prov-dply::srcver=test10901

Billing and Measurements Server - BAMS-00 2004-10-08 16:33:28
B COMPLD
;
```

For more information about using the **prov-dply** command, see the [“prov-dply—Provision Deploy” section on page 4-13](#).

## Making Changes Using Batch Files

Consult the examples in this section, which show sample provisioning sessions, if you want to provision BAMS using a batch file.



Note

A BAMS provisioning batch file must have a **prov-sta** command at the beginning (right after the **set-node** command) and end with a **prov-dply** command. These commands denote the beginning and the end of the provisioning session.

The command-line instruction to execute a provisioning batch file is as follows:

```
mm1 -b filename [-o outputfilename]
```

BAMS does not monitor each command's execution status, but the results are placed in the MML session log file. You specify the log filename (that is, *outputfilename*) with the *-o* parameter, as shown above.

Using a batch file, you can provision the system as follows:

- System-level only
- One node only
- Multiple nodes (with or without the system level)



Note

For ease of troubleshooting, it is recommended that you provision only one or two nodes at a time.

## System-Level Example

This section provides an example of system-level provisioning.



### Note

System-level provisioning for Cisco BAMS is optional because default values are set during installation. You should maintain the default values unless you have specific reasons that require modifying them.

```

set-node:sys:
prov-sta::srcver=new,dstver=bams_system,confirm
prov-add:ALM-PARMS:maxlines=10000,msgdisclvl=5,msgfwdlvl=3
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="baf*bin",
polled=2,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="acc_h*",polled=1
,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="acc_d*",polled=1
,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="acc_r*",polled=1
,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="cdr*bin",
polled=2,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="**finished",
polled=1,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="elkup*",polled=1
,alarm=6,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="esyn*",polled=1,
alarm=6,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="esem*",polled=1,
alarm=6,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="ebaf*",polled=1,
alarm=6,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="cdr*csv",polled=
2,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="baf*csv",polled=
2,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/CDR/archive",subdirs="Y",type="cdr*",
polled=1,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="ext*csv",
polled=2,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="p01_*bin",
polled=2,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="CDR*",polled=2,
alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="cdr*BIN",
polled=2,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-add:MSC-THRES:interval=10,put=80,plt=60,uut=95,iut=950000,mil=80,mal=85,crl=90
prov-add:MSC-PARMS:active="Y",dir="/opt/CiscoBAMS/data",subdirs="Y",type="QOS_STAT_*csv",
polled=1,alarm=5,agealarm=30,agelevel=6,delage=30,delalarm=6
prov-dply::

```

## One-Node Example

This section provides an example of one-node provisioning.

```
set-node:1:
prov-sta::srcver=active,dstver=node1,confirm
set-nodename::name="PGW_hostname"
prov-add:TRUNKGRP:trunkgrp=8888,connection="D"
prov-add:TRUNKGRP:trunkgrp=2632,connection="D"
prov-add:TRUNKGRP:trunkgrp=5511,connection="D"
prov-add:TRUNKGRP:trunkgrp=2066,connection="D"
prov-add:TRUNKGRP:trunkgrp=9600,connection="D"
prov-add:TRUNKGRP:trunkgrp=5200,connection="D"
prov-ed:NODEPARMS:activate=1,statoutput=1,asciioutput=2,extasciioutput=2
prov-add:POLL:host-name1="PGW_hostname",rem-dir1="/opt/CiscoMGC/var/bams",file-prefix1="cdr*",file-suffix1=".bin",action="R",interval=5,timeout=5,maxtries=5,protocol="FTP"
prov-add:TCA-TBL:ID="global/0",egr-call-blkd=5,t1l-failed-cong=5,t1l-maint-use=10,igr-pct-trk-use=90,egr-pct-trk-use=90,t1l-term-abnorm=10
prov-dply::
```

## Multiple-Node Example

This section provides an example of multi-node provisioning.

```
set-node:1:
prov-sta::srcver=active,dstver=node1,confirm
set-nodename::name="va-okinawa"
prov-add:TRUNKGRP:trunkgrp=8888,connection="D"
prov-add:TRUNKGRP:trunkgrp=2632,connection="D"
prov-add:TRUNKGRP:trunkgrp=5511,connection="D"
prov-add:TRUNKGRP:trunkgrp=2066,connection="D"
prov-add:TRUNKGRP:trunkgrp=9600,connection="D"
prov-add:TRUNKGRP:trunkgrp=5200,connection="D"
prov-ed:NODEPARMS:activate=1,statoutput=1,asciioutput=2,extasciioutput=2
prov-add:POLL:host-name1="va-okinawa",rem-dir1="/opt/CiscoMGC/var/bams",file-prefix1="cdr*",file-suffix1=".bin",action="R",interval=5,timeout=5,maxtries=5,protocol="FTP"
prov-add:TCA-TBL:ID="global/0",egr-call-blkd=5,t1l-failed-cong=5,t1l-maint-use=10,igr-pct-trk-use=90,egr-pct-trk-use=90,t1l-term-abnorm=10
prov-dply::
set-node:2:
prov-sta::srcver=active,dstver=node2,confirm
set-nodename::name="node2_reston"
prov-add:TRUNKGRP:trunkgrp=9000,connection="D"
prov-add:TRUNKGRP:trunkgrp=8000,connection="D"
prov-add:TRUNKGRP:trunkgrp=7000,connection="D"
prov-add:TRUNKGRP:trunkgrp=6000,connection="D"
prov-add:TRUNKGRP:trunkgrp=5000,connection="D"
prov-add:TRUNKGRP:trunkgrp=4000,connection="D"
prov-ed:NODEPARMS:activate=1,statoutput=1,asciioutput=2,extasciioutput=2
prov-add:POLL:host-name1="va-reston",rem-dir1="/opt/CiscoMGC/var/bams",file-prefix1="cdr*",file-suffix1=".bin",action="R",interval=5,timeout=5,maxtries=5,protocol="FTP"
prov-add:TCA-TBL:ID="global/0",egr-call-blkd=5,t1l-failed-cong=5,t1l-maint-use=10,igr-pct-trk-use=90,egr-pct-trk-use=90,t1l-term-abnorm=10
prov-dply::
```

## Executing the Batch File

Once the batch file is created, it must be executed from outside of MML:

```
mml -b <filename>
```

Example:

```
$mml -b node01_script
```

```
Copyright (C) 1998-2003, Cisco Systems, Inc.
Processing...
mml:sys>set-node:1:
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:20
B COMPLD
;
mml:1:node01>prov-sta::srcver=active,dstver=node1,confirm
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:20
B COMPLD
;
mml:1:node01>set-nodename::name="PGW_hostname"
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:21
mml:1:node01>prov-add:TRUNKGRP:trunkgrp=8888,connection="D"
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:21
B COMPLD
"TRUNKGRP"
;
mml:1:node01>prov-add:TRUNKGRP:trunkgrp=2632,connection="D"
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:21
B COMPLD
"TRUNKGRP"
;
mml:1:node01>prov-add:TRUNKGRP:trunkgrp=5511,connection="D"
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:21
B COMPLD
"TRUNKGRP"
;
mml:1:node01>prov-add:TRUNKGRP:trunkgrp=2066,connection="D"
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:21
B COMPLD
"TRUNKGRP"
;
mml:1:node01>prov-add:TRUNKGRP:trunkgrp=9600,connection="D"
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:21
B COMPLD
"TRUNKGRP"
;
mml:1:node01>prov-add:TRUNKGRP:trunkgrp=5200,connection="D"
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:21
B COMPLD
"TRUNKGRP"
;
mml:1:node01>prov-ed:NODEPARMS:activate=1,statoutput=1,asciioutput=2,extasciioutput=2
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:22
B COMPLD
"NODEPARMS"
;
mml:1:node01>prov-add:POLL:host-name1="PGW_hostname",rem-dir1="/opt/CiscoMGC/var/bams",
file-prefix1="cdr*",file-suffix1=".bin",action="R",interval=5,timeout=5,maxtries=5,
protocol="FTP"
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:22
B COMPLD
"POLL"
```

```
;
mm1:1:node01>prov-add:TCA-TBL:ID="global/0",egr-call-blkd=5,t1l-failed-cong=5,
t1l-maint-use=10,igr-pct-trk-use=90,egr-pct-trk-use=90,t1l-term-abnorm=10
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:22
B COMPLD
 "TCA-TBL"
;
mm1:1:node01>prov-dply::
Billing and Measurements Server - BAMS-00 2008-12-19 10:09:22
B COMPLD

/* Synchronizing remote BAMS ... */

/* Transferring file /opt/CiscoBAMS/files/s01/zoneinfo.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/TrunkGroup.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/alm_parms.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/bin1110.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/country.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/matype.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/nodeParm.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/NpaNxx.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/p01Filter.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/poll.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/RatingType.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/RatingException.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/NailedConn.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/skipcdb.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/skipcde.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/switchinfo.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/thresholds.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/tollfree.CTL ... */

/* Transferring file /opt/CiscoBAMS/files/s01/TrunkPrefix.CTL ... */
;
mm1:1:PGW_hostname>
```





## CHAPTER 4

# Using MML Commands

---

Revised: March 10, 2011, OL-11618-18

## Introduction

This chapter provides general reference information to help you understand how to operate the Cisco Billing and Measurements Server (BAMS) using Man-Machine Language (MML) commands. See [Chapter 5, “Using BAMS Tag IDs”](#) for the information about the tag IDs that you use in conjunction with MML commands to modify BAMS tables.



Note

---

MML commands are differentiated from the surrounding text by being set in a Courier typeface. This makes them appear as they would on a computer screen. User input is shown in a bold font, and system responses are shown in a plain font. Text strings that you enter with MML commands are enclosed in quotes. Integers are shown without quotes.

---

## Command Notation

The command notation follows the Backus-Naur conventions.

## Command Syntax

The command syntax follows the Bellcore TL1 conventions.

## Starting and Stopping BAMS

The following sections describe the system-level MML commands that you use to start and stop BAMS.

### Starting the System

To start the system from the MML system prompt, use the **sta-softw** (start software) command.

Example:

```
sta-softw
or
start_system (from UNIX)
```

## Stopping the System or OOS

To stop the system or bring it out-of-service (OOS), use the **stp-softw** (stop software) command.

Example:

```
stp-softw::confirm
or
stop_system (from UNIX)
```

## Starting an MML Session

To start an MML session, and to get information about MML commands, perform the following steps:

---

**Step 1** Log in to BAMS using your user ID and password.

When MML is started, the system prompt changes to `mml : sys>`.

The system is now ready to accept command-line instructions.



**Note**

This is an alternate method for starting the command-line interface: In the BAMS bin directory, type **mml** in lowercase letters at the UNIX system prompt. Certain environment variables must be defined before MML can run. To define these variables, run **. sym\_defs** in the profile of authorized users. The UNIX prompts and scripts follow the conventions for the UNIX Korn shell.

---

**Step 2** Type **help**.

The system displays a list of available MML commands. One screen of information is presented. Press **Enter** to display additional information.

These MML commands are discussed in more detail in the following sections.

---

## Help—Help Command

|                    |                                                                                                                                                                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Displays a list of available commands or help on a specified command.                                                                                                                                                                                                                     |
| <b>Format</b>      | <b>help</b> [ : <i>commandname</i> ]                                                                                                                                                                                                                                                      |
| <b>Description</b> | The Help function provides syntax and other general command information. At the node level, the Help function provides command information for the current node. At the system level, the Help function provides command information for the system as a whole, as well as for each node. |

**Example**

```

mml:sys>help
Billing and Measurements Server - BAMS-00 2004-09-22 15:28:46

Available commands (in alphabetical order):
<command name>:? Displays a list of possible tagIDs
<command name>:<tagID>:? Displays a list of possible field
 names
clr-alm:<tagID>:msgnumber="<nnn>"[,msgtext="<message_text>"]
 Generates a clear message
dialog:<file name>: Redirects output to a file
get-nodenames:: Lists node names from all nodes
h::[<number>[,<number>]] Displays commands in the history
 buffer
help[:<command name>] Displays a list of available commands
 or help on a specified command
prov-add:<tagID>:<field name1>=["][<value1>"]["[range1-range2], ...
 <field nameN
 <valueN>"]["[range1-range2]
 Adds a new record to the ACRF format
 file
prov-cpy:[<tagid>|all]:srcnode=<1..8> | <nodename>,srcver=active |
 default | new | <dirname>
 Copies a table or tables from one node
 to the current node
prov-diff:: Compares active parameters between
 units
prov-dlt:<tagID>:<field name1>=["]<value1>["[range1-range2], ...<field
 nameN>=["]<valueN>["[range1-range2]
 Deletes a record from the ACRF format
 file
prov-dply::[srcver=<dirname>]
 Copies a provisioning session to the
 active parameters
prov-ed:<tagID>:<field name1>=["]<value1>["[range1-range2], ... <field
 nameN>=["]<valueN>["[range1-range2]
 Modifies one or more records that have
 already been inserted
prov-exp:[<tagID>|all]:dirname=<mml subdirectory>
 Exports a list of parameters for a
 specific table or all tables
prov-rtrv:<tagID>: Displays the contents of a record in
 ACRF format file
prov-sta::srcver=<dirname>,dstver=<dirname>[,confirm]
 Starts a provisioning session.
 <dirname>=active | default | new |
 dirname
prov-stp::[force] Stops the current provisioning session
prov-sync:: Copies active parameters from the cur-
 rent unit to the remote unit
quit Quit the session
r::[n] Executes a previously entered command
rtrv-alms Displays the active alarms
rtrv-configs Displays available configurations
rtrv-file:::<file name> Displays the contents of a Unix text
 file
rtrv-ne Displays attributes of the Network
 Element
rtrv-session Displays the current session
rtrv-softw:<process name>|all
 Displays the status of system modules
rtrv-syslog::[cont] Displays syslog continuously
set-alm:taskname:msgnumber="<nnn>"[,level=<n>
 Generates an alarm message level n can
 be 0 | 1 | 2
set-node:<node #>|<node_name>|sys:Sets node number
sta-softw Starts the system application
stp-softw::confirm Stops the system application
mml:7:node07>help

```

**Example**

```

mml:7:node07>help
Billing and Measurements Server - BAMS-00 2004-09-22 12:07:35
Available commands (in alphabetical order):
<command name>?:? Displays a list of possible tagIDs
<command name>:<tagID>:? Displays a list of possible field names
chgno::[seqno1=<#>],[seqno2=<#>] Changes polling sequence numbers
clr-alm:<tagID>;msgnumber="<nnn>"[,msgtext="<message_text>"]
 Generates a clear message
dialog:<file name>: Redirects output to a file
get-nodenames:: Lists node names from all nodes
h::[<number>[,<number>]] Displays commands in the history buffer
help[:<command name>] Displays a list of available commands or
 help on a specified command
prov-add:<tagID>;<field name1>=["][<value1>]["][range1-range2], ...
 <field nameN>=["][<valueN>]["][
 range1-range2]
 Adds a new record to the ACRF format file
prov-cpy:[<tagid>|all];srcnode=<1..8> | <nodename>,srcver=active |
 default | new | <dirname>
 Copies a table or tables from one node to
 the current node
prov-diff:: Compares active parameters between units
prov-dlt:<tagID>;<field name1>=["][<value1>]["][range1-range2], ...<field
 nameN>=["][<valueN>]["][range1-range2]
 Deletes a record from the ACRF format
 file
prov-dply::[srcver=<dirname>] Copies a provisioning session to the
 active parameters
prov-ed:<tagID>;<field name1>=["][<value1>]["][range1-range2], ... <field
 nameN>=["][<valueN>]["][
 range1-range2]
 Modifies one or more records that have
 already been inserted
prov-exp:[<tagID>|all];dirname=<mml subdirectory>
 Exports a list of parameters for a
 specific table or all tables
prov-rtrv:<tagID>: Displays the contents of a record in ACRF
 format file
prov-sta::srcver=<dirname>,dstver=<dirname>[,confirm]
 Starts a provisioning session.
 <dirname>=active | default | new |
 dirname
prov-stp::[force] Stops the current provisioning session
prov-sync:: Copies active parameters from the current
 unit to the remote unit
quit Quit the session
r::[n] Executes a previously entered command
rtrv-alm Displays the active alarms
rtrv-circuit:<all>;<trunkgrp>="nnn"> Displays number of circuits/trunkgrp
rtrv-configs Displays available configurations
rtrv-file::<file name> Displays the contents of a Unix text file
rtrv-ne Displays attributes of the Network
 Element
rtrv-session Displays the current session
rtrv-softw:<process name>|all Displays the status of system modules
rtrv-syslog::[cont] Displays syslog continuously
set-alm:taskname;msgnumber="<nnn>"[,level=<n>]
 Generates an alarm message level n can be
 0 | 1 | 2
set-node:<node #>|<node_name>|sys: Sets node number
set-nodename::name=<node name> Sets the nodename of a node
sw-ovr Forces a manual rotation

```

**Note**

Variables such as tag ID, field name, and so on, are shown in brackets.

**Note**

Strings must be enclosed in quotes, for example “*string*”. Anything enclosed in brackets, for example [*command name*] is an option. Colons are used to separate major command components, for example the command name from the tag ID, and the tag ID from the field name. Fields are separated by commas. When modifying field name values, do not enter spaces before or after the equal sign (=) or commas.

## command name:?:—Help on Tag IDs

**Purpose** Displays a list of tag IDs that can be used with the specified MML command.

**Format** *command name:?:*

**Description** The value of *command name* is any valid MML command. Type **help** to display a list of available commands.

**Example** `mml:sys>prov-add:?:`

```

Billing and Measurements Server - BAMS-00 2004-09-22 11:33:04
B COMPLD
ALM-PARMS
MSC-PARMS
MSC-THRES
;

```

**Note**

In the preceding example, the specified command displays three valid tag IDs at the system level prompt. When a node is set, the tag IDs are displayed, as shown in the example below:

```

mml:1:boston>prov-add:?:
Billing and Measurements Server - BAMS-00 2004-09-22 11:26:35
B COMPLD
ZONE-INFO
TRUNKGRP
ALM-PARMS
BIN1110
COUNTRY
MAPTYPE
NODEPARMS
NPANXX
P01FILTER
POLL
RATING-TYPE
RATE-EXC
SIGPATH
SKIPCDB

```

```

SKIPCODE
SWITCHINFO
TCA-TBL
TOLLFREE
TKGPREFIX
;

```

## command name:tagID:?—Help on Field Names

|                    |                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Obtains a list of field names for a specified table.                                                                                                                              |
| <b>Format</b>      | <i>command name:tagID:?</i>                                                                                                                                                       |
| <b>Description</b> | The value of <i>command name</i> is any valid MML command.<br>The value of <i>tag ID</i> is any valid tag ID.<br>Type <b>command name:?</b> to obtain a listing of valid tag IDs. |

**Example**

```

mml:sys>prov-add:MSC-THRES:?
Billing and Measurements Server - BAMS-00 2004-08-06 13:50:13
B COMPLD
interval (numeric)
put (numeric)
plt (numeric)
uut (numeric)
iut (numeric)
mil (numeric)
mal (numeric)
crl (numeric)
;

```



### Note

In the example above, the specified command and tag ID display the field names for the MSC-THRES table. See the [“Tag IDs and Field Names” section on page 5-1](#) for a description of the fields in each BAMS table.

## MML Session Logs

The /opt/CiscoBAMS/data/logs directory contains daily MML session logs.

The log contains the time stamp of all user activity on BAMS and can be used for audits and troubleshooting.

# MML Commands

To use the Man-Machine Language (MML) commands, define your user profile by typing `.sym_defs` in the `/opt/CiscoBAMS/bin` directory. Next, type `mml` to start the MML program. The UNIX system prompt changes to `mml:sys>` and allows you to enter MML commands, which are listed in the following sections.

## chgno—Change Number

|                    |                                                                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Changes the polling sequence numbers                                                                                                                                        |
| <b>Format</b>      | <code>chgno:: [seqno1=#] , [seqno2=#]</code>                                                                                                                                |
| <b>Description</b> | The value of <code>seqno1</code> is the value of the first polling sequence number.<br>The value of <code>seqno2</code> is the value of the second polling sequence number. |
| <b>Note</b>        | This command can be executed only at the node level.                                                                                                                        |
| <b>Example</b>     | <pre>mml:3&gt;chgno::seqno1=1,seqno2=1 Billing and Measurements Server - BAMS-00 2004-09-08 14:11:09 B  COMPLD ;</pre>                                                      |

## clr-alm—Clear Alarm

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Clears a previously set alarm that was written to the alarm history file. These alarms are generally set for test purposes, for example, to test the alarm trapping. This command sends an alarm trap clear to the SNMP agent. (For details about setting alarms, see the “ <a href="#">set-alm—Set Alarm</a> ” section on page 4-26.)                                                                                               |
| <b>Format</b>      | <code>clr-alm: taskname:msgnumber="nnn" [,msgtext="message_text"]</code>                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | The value of <code>taskname</code> is any valid BAMS task name.<br>The value of <code>msgnumber</code> can be any three-digit number. This number corresponds to the number of the message to be cleared. For ACC227 and POL402 alarms, you need to specify the full <code>msgtext</code> value to clear the alarm, because the message text for these alarms can vary. For ACC227, the <code>msgtext</code> includes the timestamp. |
| <b>Example</b>     | <pre>mml:3&gt;clr-alm:MSC:msgnumber="030" mml:3&gt;clr-alm:POL:msgnumber="402",msgtext="Cannot connect to unit bams0-a" mml:3&gt;clr-alm:ACC:msgnumber="227",msgtext="TTL CALL ROUTING III, TG1, 0 is equal to 0 @ 20021102220000 UTC" Billing and Measurements Server - BAMS-00 2004-09-08 14:11:09 B  COMPLD ;</pre>                                                                                                               |

**Note**

For more information on the field names, refer to the [“Updating the Poll Table”](#) section on page 5-18.

## dialog—Dialog

|                    |                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Redirects output to a log file.                                                                                                                                                                                                                                                                                                                                  |
| <b>Format</b>      | <b>dialog:</b> <i>filename</i> :                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | The value of <i>filename</i> is a UNIX filename. This command is used to create a special log file that is stored in the /opt/CiscoBAMS/files/mml directory in the format <i>filename.dlog</i> when you quit MML. This log is different from the MML daily session log files stored in the /opt/CiscoBAMS/data/log/mml directory, which are prefixed with “mml.” |
| <b>Example</b>     | <pre>mml:sys&gt;dialog:test: Billing and Measurements Server - BAMS-00 2004-09-08 09:37:30 B  COMPLD ;</pre>                                                                                                                                                                                                                                                     |

## get-nodenames—Get Node Names

|                    |                                                                                                                                                                                                                                                  |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Lists all node names.                                                                                                                                                                                                                            |
| <b>Format</b>      | <b>get-nodenames::</b>                                                                                                                                                                                                                           |
| <b>Description</b> | Displays a list of all defined node names. The system default values for the node names are node01, node02, ... node08.                                                                                                                          |
| <b>Example</b>     | <pre>mml:sys&gt;get-nodenames:: Billing and Measurements Server - BAMS-00 2004-09-15 17:47:37 node 1: "newyork" node 2: "sanfrancisco" node 3: "baltimore" node 4: "richmond" node 5: "washingtondc" node 6: "" node 7: "miami" node 8: ""</pre> |

## h—History

|                    |                                                                                                                                                                                                                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Displays commands in the history buffer.                                                                                                                                                                                                                                                                                  |
| <b>Format</b>      | <b>h::</b> [ <i>number</i> [, <i>number</i> ]]                                                                                                                                                                                                                                                                            |
| <b>Description</b> | The value of <i>number</i> is a numeric value. <b>h::</b> is equivalent to <b>h::1,15</b> , which displays the last 15 commands in the history buffer. The first number option represents the <i>n</i> th command in the history list. The second number represents the number of commands in the list (a maximum of 15). |
| <b>Example</b>     | <pre> mml:sys&gt;h::1 Billing and Measurements Server - BAMS-00 2004-09-08 09:40:38 B  COMPLD   1   h::1   ; </pre>                                                                                                                                                                                                       |

## prov-add—Provision Add

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Adds a new record to the table specified by the tag ID.                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Format</b>      | <b>prov-add:</b> <i>tagID</i> : <i>field name1</i> =["] <i>value1</i> ["], ... <i>field nameN</i> =["] <i>valueN</i> ["][ <i>range1</i> - <i>range2</i> ]                                                                                                                                                                                                                                                                                                        |
| <b>Description</b> | <p>The value of <i>tagID</i> is any valid tag ID.</p> <p>The value of <i>field name1</i> is a first field name.</p> <p>The value of <i>value1</i> is a first value.</p> <p>The value of <i>field nameN</i> is an <i>N</i>th field name.</p> <p>The value of <i>valueN</i> is an <i>N</i>th value.</p> <p>The value of <i>range1</i> is a first value of a desired field range.</p> <p>The value of <i>range2</i> is a second value of a desired field range.</p> |
| <b>Example</b>     | <pre> mml:2&gt;prov-add:sigpath:sigpath=0x50-0x60,trunkgrp=0-16 Billing and Measurements Server - BAMS-00 2004-09-08 11:06:53 B  COMPLD   "SIGPATH"   ; </pre>                                                                                                                                                                                                                                                                                                   |

## prov-cpy—Provision Copy

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Copies a table or tables from one node to the current node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Format</b>      | <b>prov-cpy:</b> [ <i>&lt;tagid&gt;</i>  all]:srcnode=<1..8>   <nodename>,srcver=active   default   new   <dirname>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b> | <p>The value of <i>tagID</i> is any valid tag ID.</p> <p>The value of <i>srcnode</i> is a node identifier (1 through 8).</p> <p>The value of <i>nodename</i> must be a valid UNIX filename because this name is used to create a directory link in the /data directory.</p> <p>The value of <i>srcver</i> is one of the following:</p> <ul style="list-style-type: none"> <li>• Active—Use this value to copy the table from the source node’s active configuration.</li> <li>• Default—Use this value to copy the table from the source node’s default configuration. This could be used if the <b>prov-sta</b> command does not use the <i>srcver=default</i> setting. In this case, use <b>prov-cpy</b> to copy the default table for one table only.</li> <li>• New—Use this value to empty the table. This could be used if the <b>prov-sta</b> command does not use <i>srcver=new</i>. In this case, use <b>prov-cpy</b> to copy an empty table into the current session.</li> </ul> <p>The value of <i>dirname</i> specifies that the table is copied from the source node’s MML directory. This is the same as the <b>prov-sta</b> command’s <i>dstver</i> argument.</p> |

**Example**

```

mml:sys>set-node:2:
Billing and Measurements Server - BAMS-00 2004-09-26 18:19:04
B COMPLD
;
mml:2:node02>prov-sta::srcver=active,dstver=test,confirm
Billing and Measurements Server - BAMS-00 2004-09-26 18:19:21
B COMPLD
;
mml:2:node02>prov-cpy:nodeparms:srcnode=1,srcver=active
Billing and Measurements Server - BAMS-00 2004-09-26 18:20:11
B COMPLD
Do you want to copy control file(s) from /opt/CiscoBAMS/files/s01 to
the current provisioning directory /opt/CiscoBAMS/files/s02/mml/test ?
(y/n)
B COMPLD
;
mml:2:node02>prov-rtrv:nodeparms:
Billing and Measurements Server - BAMS-00 2004-09-26 18:20:22
B RTRV

"NODEPARMS:activate=1,statoutput=1,bafoutput=1,asciibafoutput=1,asciout
tput=2,lookupinfo=1,bafinfo=1,dynamicaccumes=0,sup-zero-counts=0,interv
al-minutes=5,nailed-cfg=1,p01output=0,p01prefix="p01_",enable-h323=0,ex
tasciioutput=0,nicsoutput=0,bin1110output=0,qosoutput=0"
;
mml:2:node02>prov-dply::
Billing and Measurements Server - BAMS-00 2004-09-26 18:23:06
B COMPLD

/* The measurements interval (interval-minutes) has been modified in
the NODEPARMS table. */
/* This node will be dynamically restarted for the local unit if it
is currently running. */ ;

```

## prov-diff—Provision Compare

|                |                                                |
|----------------|------------------------------------------------|
| <b>Purpose</b> | Compares active parameters between BAMS units. |
| <b>Format</b>  | <b>prov-diff::</b>                             |

**Description** No variables need to be specified.

**Example**

```

mml:sys>prov-diff::
Billing and Measurements Server - BAMS-00 2004-09-21 17:38:28
B COMPLD
 /* Table ALM-PARMS matches for both BAMS units */
 /* Table MSC-PARMS matches for both BAMS units */
 /* Table MSC-THRES matches for both BAMS units */
 ;
mml:sys>set-node:1:
Billing and Measurements Server - BAMS-00 2004-09-21 09:45:20
B COMPLD
 ;
mml:1:node01>prov-diff::
Billing and Measurements Server - BAMS-00 2004-09-21 09:45:24
B COMPLD

 /* Table ZONE-INFO matches for both BAMS units */
 /* Table TRUNKGRP matches for both BAMS units */
 /* Table ALM-PARMS matches for both BAMS units */
 /* Table BIN1110 matches for both BAMS units */
 /* Table COUNTRY matches for both BAMS units */
 /* Table MAPTYPE matches for both BAMS units */
 /* Table NODEPARMS matches for both BAMS units */
 /* Table NPANXX matches for both BAMS units */
 /* Table P01FILTER matches for both BAMS units */
 /* Table POLL matches for both BAMS units */
 /* Table RATING-TYPE matches for both BAMS units */
 /* Table RATE-EXC matches for both BAMS units */
 /* Table SIGPATH matches for both BAMS units */
 /* Table SKIPCDB matches for both BAMS units */
 /* Table SKIPCDE matches for both BAMS units */
 /* Table SWITCHINFO matches for both BAMS units */
 /* Table TCA-TBL matches for both BAMS units */
 /* Table TOLLFREE matches for both BAMS units */
 /* Table TKGPPREFIX matches for both BAMS units */
 ;

```



**Note**

If two (or more) tables are not identical across units, you will receive a message similar to the following:

```

/* Table <table name> DOES NOT MATCH across BAMS units. Examine this table on both BAMS
units. Execute prov-sync from correct unit. */

```

After you determine which BAMS unit has the correctly configured table, execute the prov-sync command for the appropriate node of the correctly configured BAMS unit. For more information, see [“prov-sync—Provision Synchronize” section on page 4-19](#).

## prov-dlt—Provision Delete

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Deletes a record from the table specified by the tag ID.                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Format</b>      | <b>prov-dlt</b> : <i>tagID</i> : <i>field name1</i> =[ <i>value1</i> ["], ... <i>field nameN</i> =[ <i>valueN</i> [" [ <i>range1-range2</i> ]                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>The value of <i>tagID</i> is any valid tag ID.</p> <p>The value of <i>field name1</i> is a first field name.</p> <p>The value of <i>value1</i> is a first value.</p> <p>The value of <i>fieldnameN</i> is an <i>N</i>th field name.</p> <p>The value of <i>valueN</i> is an <i>N</i>th value.</p> <p>The value of <i>range1</i> is a first value of a desired field range.</p> <p>The value of <i>range2</i> is a second value of a desired field range.</p> |
| <b>Example</b>     | <pre>mm1:2&gt;prov-dlt:sigpath:sigpath=0x50-0x60,trunkgrp=0-16, Billing and Measurements Server - BAMS-00 2004-09-08 11:25:03 B  COMPLD    "SIGPATH"    ;</pre>                                                                                                                                                                                                                                                                                                 |

## prov-dply—Provision Deploy

|                |                                                                     |
|----------------|---------------------------------------------------------------------|
| <b>Purpose</b> | Implements changes specified during an active provisioning session. |
| <b>Format</b>  | <b>prov-dply</b> : : [ <b>srcver</b> = <i>dirname</i> ]             |

**Description** The value of *dirname* is the directory name; if you are in a provisioning session, you can deploy another session from within the active directory. **prov-dply::** copies the changes in the current provisioning session to the active session (directory). If a directory name is specified with the **prov-dply** command, the files in that directory are copied to the active session.

**Note** When you execute a **prov-dply** command in a redundant BAMS configuration, all the tables at the same level (node or system) are synchronized with the remote unit (i.e., they are transferred to that unit). This is the same behavior as when you execute the **prov-sync** command. The following message indicates that an MML table has been successfully transferred to the remote BAMS unit:

```
/* Transferring file <filename> ... */
```

If an SXF error message is displayed instead, the MML tables may not be synchronized if this table was edited in this session. For more information, refer to the specific message in the [“Send File Transfer Task Messages” section on page A-65](#).

**Example**

```
mml:2>prov-dply::srcver=test
Billing and Measurements Server - BAMS-00 2004-09-08 11:29:15
B COMPLD
;
```



**Note**

When you execute **prov-dply** at the node level, if the values to be provisioned for the NODEPARMS parameters nailed-cfg and interval-minutes are different from those in the current active configuration, the processing tasks for this node automatically restart so that these parameter changes can take effect. The restart of the node tasks generates MGR801 alarms, which indicate that certain processes are being terminated and restarted. Since changing these parameters has a significant effect on how the data is processed, the measurements data produced might show some incongruities with previously generated measurements data.

## prov-ed—Provision Edit

**Purpose** Modifies one or more provisioning records in the table specified by the tag ID.

**Format** **prov-ed:** *tagID:field name1=["]value1["], ... field name>=["]valueN["][range1-range2]*

- Description**
- The value of *tagID* is any valid tag ID.
  - The value of *field name1* is a first field name.
  - The value of *value1* is a first value.
  - The value of *fieldnameN* is an *N*th field name.
  - The value of *valueN* is an *N*th value.
  - The value of *range1* is a first value of a desired field range.
  - The value of *range2* is a second value of a desired field range.
- Note** Execute the **prov-rtrv** command first, to see the existing configuration.

**Example**

```
mml:2>prov-ed:sigpath:sigpath=0x50-0x61,trunkgrp=0-17
Billing and Measurements Server - BAMS-00 2004-09-08 11:33:47
B COMPLD
 "SIGPATH"
 ;
```

## prov-exp—Provision Export

- Purpose**
- Exports a list of parameters for a specific table or all tables. The parameters are the field names and values of the table or tables.
- This command can be executed at the system or node level. When executed at the system level, the command generates a file that contains all of the commands to provision the system and all of the nodes. When executed at the node level, the command generates a file that contains all of the commands to provision the indicated node.
- Format**
- ```
prov-exp: [tagID|all]:dirname=mml subdirectory
```
- Description**
- The value of *tagID* is any valid tag ID.
 - The value of *dirname* is the directory name that is created under the /opt/CiscoBAMS/files/mml directory. The **all** option exports all tag IDs.
- Example**
- ```
mml:3>prov-exp:sigpath:dirname=testbackup
Billing and Measurements Server - BAMS-00 2004-09-08 11:51:11
B COMPLD
 ;
```

## prov-rtrv—Provision Retrieve

**Purpose** Retrieves the configuration for the specified tag ID.

**Format** `prov-rtrv: tagID:`

**Description** The value of *tagID* is any valid tag ID.

**Example**

```
mm1:3>prov-rtrv:sigpath:
Billing and Measurements Server - BAMS-00 2004-09-08 11:54:15
B RTRV
 "SIGPATH:sigpath=0x40, trunkgrp=16
 "SIGPATH:sigpath=0x41, trunkgrp=16
 "SIGPATH:sigpath=0x42, trunkgrp=16
 "SIGPATH:sigpath=0x43, trunkgrp=16
 "SIGPATH:sigpath=0x44, trunkgrp=16
 "SIGPATH:sigpath=0x45, trunkgrp=16
 "SIGPATH:sigpath=0x46, trunkgrp=16
 "SIGPATH:sigpath=0x47, trunkgrp=16
 "SIGPATH:sigpath=0x48, trunkgrp=16
 "SIGPATH:sigpath=0x49, trunkgrp=16
 "SIGPATH:sigpath=0x4a, trunkgrp=16
 "SIGPATH:sigpath=0x4b, trunkgrp=16
 "SIGPATH:sigpath=0x4c, trunkgrp=16
 "SIGPATH:sigpath=0x4d, trunkgrp=16
 "SIGPATH:sigpath=0x4e, trunkgrp=16
 "SIGPATH:sigpath=0x4f, trunkgrp=16
 "SIGPATH:sigpath=0x50, trunkgrp=16
 ;
```

## prov-sta—Provision Start

**Purpose** Starts a provisioning session.

**Format** `prov-sta::srcver=dirname,dstver=dirname[,confirm]`

**Description**

In order to modify the contents of BAMS tables, you must execute the **prov-sta** command to start a provisioning session.

You specify the source of the tables to be used in the provisioning session with the **srcver** parameter. The value of *dirname* is the name of the source or destination directory. Setting **srcver=new** sets the configuration tables to empty. Setting **srcver=default** sets the configuration tables to the default values. Setting **srcver=active** retrieves the currently provisioned tables.

The **dstver** parameter defines the name of the provisioning session. This parameter creates a separate directory containing the tables for the provisioning session.

**Note** You must specify the **confirm** command option if the destination directory (**dstver**) already exists.

Once you start a provisioning session by executing the **prov-sta** command, you can modify the BAMS tables by using the MML editing commands **prov-add**, **prov-dlt**, and **prov-ed**, in conjunction with tag IDs.

Once all edits have been made, you execute the **prov-dply** command to make the tables of the provisioning session the current active tables at either the BAMS system level or node level (defined by the **set-node** command). If you do not wish to deploy the edited tables, use the **prov-stp** command to quit the provisioning session.

**Example**

```
mml:sys>prov-sta::srcver=active,dstver=test,confirm
Billing and Measurements Server - BAMS-00 2004-09-08 14:32:49
B COMPLD
;
```

**Note** When you execute the **prov-sta** command, it creates a working directory with the same name as the **dstver** parameter value. These directories are saved so that a user can retrieve tables from this directory at a later time. (In this case the user would execute **prov-sta** where the **srcver** is the name of a previously created **dstver** value.) Over time, these MML working directories can accumulate if many different values are used for the **dstver** parameter. A maintenance script, **clean\_mml.sh**, should be executed periodically on the BAMS unit so that the MML working directories do not use up too much disk space. This script prompts you, at the system level and for each BAMS node, to delete an MML directory or not. The newest working directory of each node is automatically saved.

To run this script, log in as the BAMS user and execute the following:

```
$ clean_mml.sh
** clean_mml.sh will clean up the mml working directories. The latest
** directory for each node will automatically be saved.
** Examining mml directories in BAMS system level:
Remove directory /opt/CiscoBAMS/files/mml/bams_system ?(y/n) y
Newest directory /opt/CiscoBAMS/files/mml/bams_system_vers2
automatically saved.
** Examining mml directories in BAMS node 01:
Remove directory /opt/CiscoBAMS/files/s01/mml/node1_config ?(y/n) n
Remove directory /opt/CiscoBAMS/files/s01/mml/test_config ?(y/n) y
Newest directory /opt/CiscoBAMS/files/s01/mml/jims_config
automatically saved.
** Examining mml directories in BAMS node 02:
Remove directory /opt/CiscoBAMS/files/s02/mml/jims_config ?(y/n) y
Newest directory /opt/CiscoBAMS/files/s02/mml/bobs_config
automatically saved.
** Examining mml directories in BAMS node 03:
Remove directory /opt/CiscoBAMS/files/s03/mml/test ?(y/n) y
Newest directory /opt/CiscoBAMS/files/s03/mml/joes_config
automatically saved.
** Examining mml directories in BAMS node 04:
** Examining mml directories in BAMS node 05:
** Examining mml directories in BAMS node 06:
** Examining mml directories in BAMS node 07:
** Examining mml directories in BAMS node 08:
** clean_mml.sh finished.
```

## prov-stp—Provision Stop

|                    |                                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Stops the current provisioning session.                                                                                                                                                                                                            |
| <b>Format</b>      | <b>prov-stp:: [force]</b>                                                                                                                                                                                                                          |
| <b>Description</b> | You use this command if you do not want to deploy the changes made in your provisioning session to the active session. Use the force argument to force a provisioning session to stop (that is, when you must clear a lock on a prov-sta session). |
| <b>Example</b>     | <pre>mml:3&gt;prov-stp:: Billing and Measurements Server - BAMS-00 2004-09-08 11:55:57 B  COMPLD ;</pre>                                                                                                                                           |

## prov-sync—Provision Synchronize

|                    |                                                                                                                                                                                                                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Copies active parameters from the current unit to the remote unit.                                                                                                                                                                                                                                   |
| <b>Format</b>      | <b>prov-sync::</b>                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | No arguments are required.                                                                                                                                                                                                                                                                           |
| <b>Example</b>     | <pre>mml:sys&gt;prov-sync:: Billing and Measurements Server - BAMS-00 2004-09-08 16:56:18  /* Transferring file /opt/CiscoBAMS/files/alm_parms.CTL ... */  /* Transferring file /opt/CiscoBAMS/files/msc_parm.CTL ... */  /* Transferring file /opt/CiscoBAMS/files/msc.CTL ... */ B  COMPLD ;</pre> |

## quit—Quit

|                    |                                                                                          |
|--------------------|------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Quits the MML session.                                                                   |
| <b>Format</b>      | <b>quit</b>                                                                              |
| <b>Description</b> | none                                                                                     |
| <b>Example</b>     | <pre>mml:sys&gt;quit Billing and Measurements Server - BAMS-00 2004-09-22 14:12:03</pre> |

## r—Repeat

|                    |                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Executes a previously entered command.                                                                                                                                                                |
| <b>Format</b>      | <b>r</b> : [n]                                                                                                                                                                                        |
| <b>Description</b> | Here <i>n</i> is a numeric value.                                                                                                                                                                     |
| <b>Example</b>     | <pre>mm1:3&gt;r:2 Billing and Measurements Server - BAMS-00 2004-09-08 11:58:36 B  COMPLD ; mm1:3&gt;prov-rtrv:sigpath: Billing and Measurements Server - BAMS-00 2004-09-08 11:58:36 B  RTRV ;</pre> |

## rtrv-arms—Retrieve Alarms

|                    |                                                                                                                                                                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Displays the active alarms or events at the system level (for system-level alarms) or at the node level (for node-level alarms).                                                                                                                                                                          |
| <b>Format</b>      | <b>rtrv-arms</b>                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | This command retrieves only clearable alarms currently maintained in the alarm history file and defined with the alarmslist configuration. It does not retrieve event information generated, for example, by table lookup and other configuration errors. No tag IDs are required, just the command verb. |
| <b>Example</b>     | <pre>mm1:3&gt;rtrv-arms Billing and Measurements Server - BAMS-00 2004-09-08 13:20:09 B  RTRV 08/05/04 13:20:03 *C MSC030: Alarm/Event test message ; B  COMPLD ;</pre>                                                                                                                                   |

## rtrv-circuit—Retrieve Circuits

This command is only available at node level, and only on systems that have been configured in PGW Dynamic Mode (i.e., where PGW\_DYNAMIC\_UPDATE=TRUE). For more information, see the [“Setting the PGW Dynamic Update Mode” section on page 2-20](#).

|                    |                                                  |
|--------------------|--------------------------------------------------|
| <b>Purpose</b>     | Displays the available circuits (at node level). |
| <b>Format</b>      | <b>rtrv-circuit</b>                              |
| <b>Description</b> | No tag IDs are required, just the command verb.  |

**Example**

```
mml:1:node01>rtrv-circuit:all:
Billing and Measurements Server - BAMS-00 2004-09-28 15:43:36
B RTRV
 "CKTS:trunkgrp=1,circuits=124"
 "CKTS:trunkgrp=2,circuits=124"
 "CKTS:trunkgrp=3,circuits=124"
 "CKTS:trunkgrp=4,circuits=96"
 "CKTS:trunkgrp=5,circuits=96"
 "CKTS:trunkgrp=6,circuits=96"
 "CKTS:trunkgrp=7,circuits=96"
 "CKTS:trunkgrp=8,circuits=96"
;
mml:1:node01>rtrv-circuit::trunkgrp="2"
Billing and Measurements Server - BAMS-00 2004-09-28 15:43:43
B RTRV
 "CKTS:trunkgrp=2,circuits=124"
;
mml:1:node01>rtrv-circuit::trunkgrp=7
Billing and Measurements Server - BAMS-00 2004-09-28 15:43:48
B RTRV
 "CKTS:trunkgrp=7,circuits=96"
;
```

## rtrv-configs—Retrieve Configuration

|                    |                                                                                                                                                                                                                                                                                    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Displays the available configurations.                                                                                                                                                                                                                                             |
| <b>Format</b>      | <b>rtrv-configs</b>                                                                                                                                                                                                                                                                |
| <b>Description</b> | The configurations are maintained in the /opt/CiscoBAMS/files/mml subdirectory. When you start a provisioning session, your changes are written to this directory. You can use this command to retrieve the current configuration. No tag IDs are required, just the command verb. |

**Example**

```
mml:3>rtrv-configs
Billing and Measurements Server - BAMS-00 2004-09-12 13:23:08
B COMPLD

 /* Current session: ACTIVE */

 /* Available Configurations: */

 /* /opt/CiscoBAMS/files/s03/mml/bams_system, Mon Jul 12 11:45:48 2004
 */
;
```

## rtrv-file—Retrieve File

|                    |                                                                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Displays the contents of a UNIX text file.                                                                                                                                                                |
| <b>Format</b>      | <b>rtrv-file::filename</b>                                                                                                                                                                                |
| <b>Description</b> | The value of <i>filename</i> is any existing filename. You need to specify the full UNIX filename that includes the directory path, unless the file exists in the current directory (/opt/CiscoBAMS/bin). |

**Example**

```
mml:sys>rtrv-file::collect_defs
Billing and Measurements Server - BAMS-00 2004-09-08 13:42:53
B RTRV
#
Collection variables
#

REDUNDANCY_MODE=1; export REDUNDANCY_MODE
;
```

## rtrv-ne—Retrieve Network

|                    |                                                                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Displays attributes (for example, polling status) of the network elements.                                                                                                                                                           |
| <b>Note</b>        | There is an 8-second interval between system start and POL task start. Within this interval, the status shows ACTIVE or STANDBY, even though the POL task has not started. Once the POL task starts, the polling status is accurate. |
| <b>Format</b>      | <b>rtrv-ne</b>                                                                                                                                                                                                                       |
| <b>Description</b> | No tag IDs are required, just the command verb.                                                                                                                                                                                      |

**Example**

```

mml:sys>rtrv-ne
Billing and Measurements Server - BAMS-00 2004-10-07 11:15:03
B RTRV
 "Type: BAMS"
 "Hardware platform: sun4u sparc SUNW,Ultra-250"
 "Vendor: "Cisco Systems, Inc.""
 "Location: Billing and Measurements Server - BAMS-00"
 "Version: "3.20"
 "System Status: OOS"
 "Polling Status[s01 (test01)]: OOS"
 "s01 (test01) Node Status: ACTIVATED"
 "Polling Status[s02 (test02)]: OOS"
 "s02 (test02) Node Status: ACTIVATED"
 "Polling Status[s03 (node03)]: OOS"
 "s03 (node03) Node Status: DEACTIVATED"
 "Polling Status[s04 (node04)]: OOS"
 "s04 (node04) Node Status: DEACTIVATED"
 "Polling Status[s05 (node05)]: OOS"
 "s05 (node05) Node Status: DEACTIVATED"
 "Polling Status[s06 (node06)]: OOS"
 "s06 (node06) Node Status: DEACTIVATED"
 "Polling Status[s07 (node07)]: OOS"
 "s07 (node07) Node Status: DEACTIVATED"
 "Polling Status[s08 (node08)]: OOS"
 "s08 (node08) Node Status: DEACTIVATED"
 "Local hostname: "
 "Unit ID: BAMS-00"
 "BAMS-00 hostname: "
 "BAMS-01 hostname: "
 "Mode: Simplex"
;

```

**Example**

```

mml:node01>rtrv-ne
Billing and Measurements Server - BAMS-00 2004-09-06 14:43:17
B RTRV
 "Type: BAMS"
 "Hardware platform: sun4u sparc SUNW,Ultra250"
 "Vendor: "Cisco Systems, Inc.""
 "Location: Billing and Measurements Server - BAMS-00"
 "Version: "3.20"
 "Polling Status[s01 (node01)]: OOS"
 "s02 (node02) Node Status: ACTIVATED"
 "VSC1 seqno: 000001"
 "VSC2 seqno: 000001"
 "Local hostname: "
 "Unit ID: BAMS-00"
 "BAMS-00 hostname: "
 "BAMS-01 hostname: "
 "Measurement Interval: 10 minutes"
 "VSC Configuration: Switched"
;

```

## rtrv-session—Retrieve Session

|                    |                                                 |
|--------------------|-------------------------------------------------|
| <b>Purpose</b>     | Displays the current provisioning session.      |
| <b>Format</b>      | <b>rtrv-session</b>                             |
| <b>Description</b> | No tag IDs are required, just the command verb. |
| <b>Example</b>     |                                                 |

```

mml:3>rtrv-session
Billing and Measurements Server - BAMS-00 2004-09-08 13:56:52
B COMPLD

/* Current Session: active */
;

```

## rtrv-softw—Retrieve Software

|                    |                                                          |
|--------------------|----------------------------------------------------------|
| <b>Purpose</b>     | Displays the status of software processes.               |
| <b>Format</b>      | <b>rtrv-softw:</b> [ <i>process name</i>   <b>all</b> ]  |
| <b>Description</b> | The value of <i>process name</i> is any valid task name. |
| <b>Example</b>     |                                                          |

```
mm1:3>rtrv-softw:all
Billing and Measurements Server - BAMS-00 2004-08-06 14:45:00
B RTRV
"MGR-03 RUNNING"
"ALM-03 RUNNING"
"POL-03 RUNNING"
"FMT-03 RUNNING"
"COR-03 RUNNING"
"AGB-03 RUNNING"
"ASC-03 RUNNING"
"EXT-03 RUNNING"
"CTB-03 RUNNING"
"P01-03 RUNNING"
"NIC-03 RUNNING"
"BIN-03 RUNNING"
"ACC-03 RUNNING"
B COMPLD
;
```

**Example**

```
mml:sys>rtrv-softw:all
Billing and Measurements Server - BAMS-00 2004-09-22 14:25:18

NODE: system

B RTRV
"MGR-00 RUNNING"
"ALM-00 RUNNING"
"bamsP3MIBagt-00 RUNNING"
>NNL-00 RUNNING"
"MGR-00 RUNNING"
"MSCmain-00 RUNNING"
"mscParmP3MIBagt-00 RUNNING"
"mscP3MIBagt-00 RUNNING"
"pollP3MIBagt-00 RUNNING"
"nodeParmP3MIBagt-00 RUNNING"

NODE: 1

B RTRV
"MGR-01 RUNNING"
"ALM-01 RUNNING"
"POL-01 RUNNING"
"FMT-01 RUNNING"
"COR-01 RUNNING"
"AGB-01 RUNNING"
"ASC-01 RUNNING"
"EXT-01 RUNNING"
"CTB-01 RUNNING"
"P01-01 RUNNING"
"NIC-01 RUNNING"
"BIN-01 RUNNING"
"ACC-01 RUNNING"
B COMPLD
```

## rtrv-syslog—Retrieve Syslog

**Purpose** Displays the system log (syslog) continuously.

**Format** `rtrv-syslog::[cont]`

**Description** No tag IDs are required, just the command verb.

**Note** The **cont** command option displays the system log continuously. Press **Ctrl-C** to escape out of the display.

### Example

```
mml:sys>rtrv-syslog::
Billing and Measurements Server - BAMS-00 2004-09-08 17:22:39
08/06/04 23:35:51 MSC233: Executing system command: '/opt/CiscoBAMS/bin/msc_
08/06/04 23:35:51 MSC233:+pre_del.sh ebaf*'
08/06/04 23:35:51 MSC233: Executing system command: '/opt/CiscoBAMS/bin/msc_
08/06/04 23:35:51 MSC233:+pre_del.sh ext*csv'
08/06/04 23:35:51 MSC233: Executing system command: '/opt/CiscoBAMS/bin/msc_
08/06/04 23:35:51 MSC233:+pre_del.sh p01_*bin'
08/06/04 23:35:51 MSC902: Block: total=493688 free=92923 used=400765 utiliza
08/06/04 23:35:51 MSC902:+tion: 81% partition: /opt
08/06/04 23:35:51 MSC904: Inode: total=256576 free=254624 used=1952 utilizat
08/06/04 23:35:51 MSC904:+ion: 0% partition: /opt
08/06/04 23:35:51 MSC906: Inodes matching path(s) and prefix(es) in partitio
08/06/04 23:35:51 MSC906:+n /opt: 28
08/06/04 23:45:50 MSC001: MSC version W3.02 (CISCO) cleaning disk
```

## set-alm—Set Alarm

**Purpose** Generates an alarm message. Use this command to set a test alarm that is written to the syslog. (For details about clearing alarms, see the [“clr-alm—Clear Alarm” section on page 4-7.](#))

**Format** `set-alm:taskname:msgnumber=nnn,level=n`

**Description** The value of *taskname* is any valid BAMS task name.

The value of *nnn* is a three-character message number.

The value of *n* is a valid single-character threshold level (0, 1, or 2).

**Note** This command works only for alarms maintained in the `alarmlist.CTL` file in the `/opt/CiscoBAMS/files` directory.

### Example

```
mml:3>set-alm:MSC:msgnumber="030",level=0
Billing and Measurements Server - BAMS-00 2004-09-08 14:13:13
B COMPLD
;
```

## set-node—Set Node

|                    |                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Sets the node number. Use this command to change from the system level to the node level, or to change from one node to another node.                                                                                                                                                             |
| <b>Format</b>      | <b>set-node:node# nodename sys:</b>                                                                                                                                                                                                                                                               |
| <b>Description</b> | The value of <i>node#</i> is any integer between 1 and 8.<br>The value of <i>nodename</i> is any valid node name.<br>sys displays the system level.                                                                                                                                               |
| <b>Note</b>        | When 1 is specified as the node number, the MML prompt changes from mml:sys> to mml:1>. Exit out of any provisioning sessions before changing the node number. The prompt displays the node name when it is defined. The prompt always displays the node number, except when system is specified. |

**Example**

```
mml:sys>set-node:1:
Billing and Measurements Server - BAMS-00 2004-09-08 14:45:27
mml:1:node01>
```

## set-nodename—Set Node Name

|                    |                                                                                                                                                                                                                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Sets the node name for a node.                                                                                                                                                                                                                                                                                                                 |
| <b>Format</b>      | <b>set-nodename:node#:name=nodename</b>                                                                                                                                                                                                                                                                                                        |
| <b>Description</b> | The value of <i>node#</i> is any integer between 1 and 8.<br>The value of <i>nodename</i> must be a valid UNIX filename, because this name is used to create a directory link in the data directory. The maximum length of <i>nodename</i> is 40 characters.<br>This command must be executed within an MML editing session at the node level. |
| <b>Note</b>        | You can use the <b>set-nodename</b> command to modify any existing node names. You cannot use the command to modify the system name.                                                                                                                                                                                                           |

**Example**

```
mml:sys>set-nodename:1:name="boston"
Billing and Measurements Server - BAMS-00 2004-09-08 14:45:27
mml:1>
```

## sta-softw—Start Software

|                    |                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Starts the system application.                                                                                                               |
| <b>Format</b>      | <b>sta-softw</b>                                                                                                                             |
| <b>Description</b> | No tag IDs are required, just the command verb.                                                                                              |
| <b>Note</b>        | An alternative way to start the software is to use the UNIX <b>start_system</b> command, which is found in the /opt/CiscoBAMS/bin directory. |
| <b>Example</b>     | <pre>mml:sys&gt;sta-softw Billing and Measurements Server - BAMS-00 2004-09-08 14:14:41 B  COMPLD ;</pre>                                    |

## stp-softw—Stop Software

|                    |                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Stops the system application.                                                                                                                                         |
| <b>Format</b>      | <b>stp-softw::confirm</b>                                                                                                                                             |
| <b>Description</b> | No tag IDs are required, just the command verb.                                                                                                                       |
| <b>Note</b>        | You can execute this command only at the system level.                                                                                                                |
| <b>Note</b>        | An alternative way to stop the software is to use the UNIX <b>stop_system</b> command, which is found in the /opt/CiscoBAMS/bin directory.                            |
| <b>Example</b>     | <pre>mml:sys&gt;stp-softw::confirm Billing and Measurements Server - BAMS-00 2004-09-08 14:16:34 B  COMPLD  Terminating BAMS  waiting for MGR to shut down... ;</pre> |

## sw-ovr—Switch Over

- Purpose** Forces a manual rotation of the BAMS unit designated to poll the VSC. (You can execute this command only on the active polling unit.)
- Format** `sw-ovr`
- Description** You can use the `sw-ovr` command to rotate polling from the active BAMS unit to the standby unit in the event of a switch failover. The command is executed immediately on the local BAMS unit. On the remote BAMS unit, the rotation takes effect at the next poll attempt. Poll attempts are typically set at 5-minute intervals.



**Caution** Do not execute this command while polling is taking place; it will fail.

No tag IDs are required, just the command verb.

**Note** Successful execution of this command causes a POL105 message to be written to the syslog (see [Appendix A, “Troubleshooting Cisco BAMS”](#)).

### Example

```
mml:sys>sw-ovr
Billing and Measurements Server - BAMS-00 2004-09-22 13:26:19
B COMPLD
;
```





# CHAPTER 5

## Using BAMS Tag IDs

---

Revised: March 10, 2011, OL-11618-18

### Introduction

This chapter provides general reference information to help you understand how to update BAMS tables by using BAMS tag IDs.

For information about the MML commands that you use with the tag IDs, see [Chapter 4, “Using MML Commands.”](#)



Note

---

MML commands, tag IDs and field names are differentiated from the surrounding text by being set in a Courier typeface. This makes them appear as they would on a computer screen. User input is shown in a bold font, and system responses are shown in a plain font. Text strings that you enter with MML commands are enclosed in quotes. Integers are shown without quotes.

---

### Command Notation

The command notation follows the Backus-Naur conventions.

### Command Syntax

The command syntax follows the Bellcore TL1 conventions.

### Tag IDs and Field Names

Tag IDs are aliases for BAMS tables. You use them in conjunction with MML commands to modify or delete table records or data. Some tag IDs contain defined parameter sets used to provision the BAMS tables. The field default values are recommended values, unless noted otherwise.



Note

---

Tag IDs and field names are not case sensitive. However, values are case sensitive.

---

## Updating the Alarm Parameters Table

Use the ALM-PARMS tag ID to update the Alarm Parameters table. Use the `maxlines` field to set the size of the system log (syslog) file. The default value is 10,000 lines. When the `maxlines` threshold is surpassed, BAMS begins deleting lines from the syslog, starting with the oldest entries.



### Note

BAMS creates `oldlog` and `oldloga` as backup system logs by default. You can configure the number of backup logs for a higher value (a maximum of 26) in the `sym_defs` file. The number of logs you create affects the available disk space.

Use the `msgdisclvl` field to set the level (for example, minor, major, critical) of alarms written to the syslog. Use the `msgfwdlvl` field to set the level (for example, critical) of alarms forwarded to a network management platform.

Example:

```
mml:sys>prov-add:ALM-PARMS:maxlines=50000,msgdisclvl=1,msgfwdlvl=2
Billing and Measurements Server - BAMS-00 2004-10-08 15:11:49
B COMPLD
 "ALM-PARMS"
 ;
```

In this example, the `maxlines` field was set to 50000, the `msgdisclvl` field was set to 1 (that is, major), and the `msgfwdlvl` field was set to 2 (that is, minor).

## ALM-PARMS Tag ID

[Table 5-1](#) lists field names and values that can be specified with the ALM-PARMS tag ID.

**Table 5-1** Fields in the Alarm Parameters Table

| Field Name            | Description                                           | Values                         | Range           |
|-----------------------|-------------------------------------------------------|--------------------------------|-----------------|
| <code>maxlines</code> | Maximum number of lines in the syslog file (numeric). | Any number, for example, 10000 | 1 through 99999 |

Table 5-1 Fields in the Alarm Parameters Table (continued)

| Field Name | Description                                                                                                                                                                                                                                                                          | Values                                                                                            | Range            |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------|
| msgdisclvl | <p>Message discrimination level (numeric). Used to specify the messages that are written to the syslog file.</p> <p><b>Note</b> Any alarms at the selected value or lower are displayed (for example, a value of 2 displays all minor, major, and critical alarms).</p>              | <p>Critical = 0</p> <p>Major = 1</p> <p>Minor = 2</p> <p>Warning = 3</p> <p>Informational = 5</p> | 0, 1, 2, 3, or 5 |
| msgfwdlvl  | <p>Message forward level (numeric). Used to specify the messages that are trapped and forwarded to a network management platform.</p> <p><b>Note</b> Any alarms at the selected value or lower are forwarded (for example, a value of 1 forwards all major and critical alarms).</p> | <p>Critical = 0</p> <p>Major = 1</p> <p>Minor = 2</p> <p>Warning = 3</p> <p>Informational = 5</p> | 0, 1, 2, 3, or 5 |

## Updating the BIN1110 Table



### Note

This table is only required for systems that are configured to produce 1110 Binary output. For more information, see [Chapter 9, “Configuring BAMS for NICS Output”](#).

Use the BIN1110 tag ID to update the BIN1110 table. This table allows you to disable or enable the generation of 1060 CDBs in TLV (tag, length, value) format, as well as to specify the suffix of the 1110 Binary output. By default, the system generates 1060, 1090, 1100, and 1110 CDB types, and appends the BIN suffix to the output files.

Example:

```
mmml:1>prov-add:BIN1110:enable1060=1,filesuffix=BIN
Billing and Measurements Server - BAMS-00 2004-09-28 15:59:29
B COMPLD
 "BIN1110"
;
```

In this example, the enable1060 field was set to 1, and the filesuffix field was set to BIN.

## BIN1110 Tag ID

[Table 5-8](#) lists field names and values that can be specified with the BIN1110 tag ID.

**Table 5-2** Fields in the BIN1110 Table

| Field Name | Description                                                                                                                                                                                                                                                     | Values                                |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| enable1070 | This numeric parameter enables or disables the generation of 1070 CDBs.<br><b>Note</b> The BIN task no longer generates 1070 output. This field is no longer used.                                                                                              | Enabled = 1<br>Disabled = 0 (default) |
| enable1060 | This numeric parameter enables or disables the generation of 1060 CDBs.                                                                                                                                                                                         | Enabled = 1 (default)<br>Disabled = 0 |
| filesuffix | This parameter allows you to specify the suffix of the output file. The suffix may be up to 8 characters long.<br><b>Note</b> If you change the default filesuffix value, ensure that you add the file pattern with the new suffix to the MSC Parameters table. | BIN (default)                         |

## Updating the Country Table

Use the COUNTRY tag ID to update the Country table. The Country table maintains country codes.

Example:

```
mm1:3>prov-add:COUNTRY:countrycode=001,countryname="USA"
Billing and Measurements Server - BAMS-00 2004-10-08 15:20:35
B COMPLD
 "COUNTRY"
 ;
```

In this example, the countrycode field was set to 001, and the countryname field was set to USA.

## COUNTRY Tag ID

Table 5-3 lists field names and values that can be specified with the COUNTRY tag ID.

**Table 5-3** Fields in the Country Table

| Field Name  | Description            | Values                                    |
|-------------|------------------------|-------------------------------------------|
| countrycode | Country code (numeric) | The 5-digit country code                  |
| countryname | Country name (string)  | The country name, a maximum of 40 letters |

## Updating the Map Type Table

Use the MAPTYPE tag ID to update the Map Type table. The Map Type table defines which structure code to generate and which call type to assign for each call category.

Example:

```
mm1:3>prov-add:MAPTYPE:maptype="FLAT",calltype="1",answered="502",unanswered="20"
Billing and Measurements Server - BAMS-00 2004-10-08 15:25:50
B COMPLD
 "MAPTYPE"
 ;
```

In this example, the maptype field was set to flat, the calltype field was set to 1, the answered field was set to 502, and the unanswered field was set to 20.

## MAPTYPE Tag ID

Table 5-4 lists field names and values that can be specified with the MAPTYPE tag ID.



**Note**

The Maptype table should contain one record entry for each maptype value. The default system contains the entries. The user should not add or delete any entries, only modify them by specifying different field values with the Rating Type tag ID. The values are case sensitive.



**Note**

A value of -1 in the answered or unanswered field means that a BAF record is not generated for that case.

Table 5-4 Fields in the Map Types Table

| Field Name | Description         | Values                                                                                                      | Range                      |
|------------|---------------------|-------------------------------------------------------------------------------------------------------------|----------------------------|
| maptype    | Map type (string)   | FLAT<br>MESSAGE<br>INTRALATA<br>INTERLATAORIGINATING<br>INTERLATATERMINATING<br>INTERLATATANDEM<br>TOLLFREE | A maximum of 24 characters |
| calltype   | Call type (string)  | 1, 6, 110, 119, 141                                                                                         | A maximum of 3 digits      |
| answered   | Answered (string)   | -1, 1, 2, 20, 21, 360, 500, 502, 625, 653<br><br><b>Note</b> A value of -1 does not generate a record.      | A maximum of 4 digits      |
| unanswered | Unanswered (string) | -1, 1, 2, 20, 21, 360, 500, 502, 625, 653<br><br><b>Note</b> A value of -1 does not generate a record.      | A maximum of 4 digits      |

## Updating the Mass Storage Control Parameters Table

Use the MSC-PARMS tag ID to update the Mass Storage Control (MSC) Parameters table. This table maintains definitions of conditions that generate alarms or events, based on parameters such as file type, size, and age.

Example:

```
mml:sys>prov-add:MSC-PARMS:type="baf*",polled=0,alarm=5,agealarm=30,agelevel=2,delage=30,
delalarm=6
Billing and Measurements Server - BAMS-00 2004-10-08 15:30:20
B COMPLD
 "MSC-PARMS"
;
```

In this example the type field was set to baf\*, the polled field was set to 0, the alarm field was set to 5, the agealarm field was set to 30, the agelevel field was set to 2, the delage field was set to 30, and the delalarm field was set to 6.

## MSC-PARMS Tag ID

Table 5-5 lists field names and values that can be specified with the MSC-PARMS tag ID.

**Table 5-5** Fields in the Mass Storage Control Parameters Table

| Field Name | Description                                                                                                                                                                           | Values                                                                                                                 | Range                      |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------|
| active     | Enables/disables cleanup task (string)                                                                                                                                                | Y = Yes, N = No                                                                                                        | Y or N                     |
| dir        | Directory (string)                                                                                                                                                                    | /opt/CiscoBAMs/data                                                                                                    |                            |
| subdirs    | Enables/disables cleanup of subdirectories (string)                                                                                                                                   | Y = Yes, N = No                                                                                                        | Y or N                     |
| type       | File prefix or suffix to be monitored (string)<br><br><b>Note</b> If you change a default file prefix or suffix in another table, ensure that you add the new file pattern here also. | For example:<br><br>cdr*<br>baf*<br>acc*<br>CDR*<br>cdr*BIN<br>esem*<br>p01_*bin<br>QOS_STAT*                          | A maximum of 23 characters |
| polled     | Polled/unpolled flag (numeric)                                                                                                                                                        | Polled = 1<br>Unpolled = 2<br>Header = 3                                                                               | 1 through 3                |
| alarm      | Alarm level to generate when you are deleting files (numeric)                                                                                                                         | Critical = 0<br>Major = 1<br>Minor = 2<br>Warning = 3<br>Manual = 4<br>Informational = 5<br>Debug = 6                  | 0 through 6                |
| agealarm   | Number of days to wait before file is considered aged (numeric)                                                                                                                       | Any appropriate number                                                                                                 | 0 through 99               |
| agelevel   | Alarm level to generate when the file reaches its age limit (numeric)                                                                                                                 | Critical = 0<br>Major = 1<br>Minor = 2<br>Warning = 3<br>Reserved for future use = 4<br>Informational = 5<br>Debug = 6 | 0 through 6                |

**Table 5-5** Fields in the Mass Storage Control Parameters Table (continued)

| Field Name | Description                                                         | Values                                                                                                                 | Range        |
|------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------|
| delage     | Number of days to wait before the system deletes the file (numeric) | Any appropriate number                                                                                                 | 0 through 99 |
| delalarm   | Alarm level to generate when deleting aged files (numeric)          | Critical = 0<br>Major = 1<br>Minor = 2<br>Warning = 3<br>Reserved for future use = 4<br>Informational = 5<br>Debug = 6 | 0 through 6  |

## Updating the Mass Storage Control Thresholds Table

Use the MSC-THRES tag ID to update the Mass Storage Control Thresholds table. This table maintains the system-level MSC thresholds that determine when the MSC task generates alarms based on disk-capacity thresholds, and when it begins and stops deleting specific types of files to free up disk space.

Example:

```
mml:sys>prov-add:MSC-THRES:interval=15,put=80,plt=60,uut=95,iut=950000,mil=80,
mal=85,crl=90
Billing and Measurements Server - BAMS-00 2004-10-08 15:34:02
B COMPLD
 "MSC-THRES"
;
```

In this example the interval field was set to 15, the put field was set to 80, the plt field was set to 60, the uut field was set to 95, the iut field was set to 950000, the mil field was set to 80, the mal field was set to 85, and the crl field was set to 90.

## MSC-THRES Tag ID

Table 5-6 lists field names and values that can be specified with the MSC-THRES tag ID.

**Table 5-6** *Fields in the Mass Storage Control Thresholds Table*

| Field Name | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Value  | Range                |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------------------|
| interval   | The run interval (in minutes). Identifies when the Mass Storage Control (MSC) task operates in the background and deletes available eligible files in the specified directories. This field requires a numeric value. A typical value is 30 minutes.                                                                                                                                                                                                            | 10     | 1 through 9999       |
| put        | The polled upper threshold (put) value. Identifies the disk capacity level (percent) at which the MSC task begins to delete polled files.<br><br><b>Note</b> Polled files are files that have been polled from BAMS by a polling computer and renamed to identify them as such. Unpolled files are files that have not been polled yet.<br><br>This field requires a numeric value. A typical value is 60 percent.                                              | 80     | 1 through 100        |
| plt        | The polled lower threshold (plt) value. Identifies the disk capacity level (percent) at which the MSC task stops deleting polled files. This field requires a numeric value. A typical value is 40 percent.                                                                                                                                                                                                                                                     | 60     | 1 through 100        |
| uut        | The unpolled upper threshold (uut) value. Identifies the disk capacity level (percent) at which the MSC task begins to delete unpolled data files. The MSC continues to delete these files until the disk capacity level drops below the threshold value.<br><br><b>Note</b> This value should be set high. For example, a value of 100% ensures that no unpolled files are deleted.<br><br>This field requires a numeric value. A typical value is 80 percent. | 95     | 1 through 100        |
| iut        | The inode upper threshold (iut). Defines an upper limit expressed by the maximum number of inodes, which is roughly equivalent to the number of files. When the maximum number is exceeded, the MSC task begins to delete files until the disk capacity level drops below the threshold value. This field requires a numeric value.                                                                                                                             | 950000 | 1000 through 1000000 |

**Table 5-6** *Fields in the Mass Storage Control Thresholds Table (continued)*

| Field Name | Description                                                                                                                                                                                                                                                                                                                                                        | Value | Range         |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| mil        | The minor alarm level value (a percentage of the disk). Indicates when the MSC task will generate a minor alarm. If the disk is still occupied by files (up to the threshold disk level) after the MSC task background cleanup routine is run, a minor alarm, such as MSC032, is generated. This field requires a numeric value. A typical value is 60 percent.    | 80    | 1 through 100 |
| mal        | The major alarm level value (a percentage of the disk). Indicates when the MSC task will generate a major alarm. If the disk is still occupied by files (up to the threshold disk level) after the MSC task background cleanup routine is run, a major alarm, such as MSC031, is generated. This field requires a numeric value. A typical value is 70 percent.    | 85    | 1 through 100 |
| crl        | The critical alarm level value (a percentage of the disk). Indicates when the MSC task will generate a minor alarm. If the disk is still occupied by files (up to the threshold disk level) after the MSC task background cleanup routine is run, a minor alarm, such as MSC030, is generated. This field requires a numeric value. A typical value is 80 percent. | 90    | 1 through 100 |

## Updating the Node Parameters Table

Use the NODEPARMS tag ID to update the Node Parameters table. This table maintains node configuration information such as output types (for example, ASCII, BAF, NICS, P01) and measurements.

Example:

```
mm1:1:node1>prov-add:NODEPARMS:activate=1,statoutput=1,bafoutput=1,asciibafoutput=1,
asciioutput=2,lookupinfo=1,bafinfo=1,dynamicaccumes=0,sup-zero-counts=0,interval-minutes=
15,nailed-cfg=0,p01output=0,p01prefix="p01_",enable-h323=0,extasciioutput=0,nicsoutput=0,
bin1110output=0,qosoutput=0,
Billing and Measurements Server - BAMS-00 2004-10-19 15:51:44
B COMPLD
 "NODEPARMS "
 ;
```

In this example, the activate field was set to 1, the statoutput field was set to 1, the bafoutput field was set to 1, the asciibafoutput field was set to 1, the asciioutput field was set to 2, the lookupinfo field was set to 1, the bafinfo field was set to 1, the dynamicaccumes field was set to 0, the sup-zero-counts field was set to 0, the interval-minutes field was set to 15, the nailed-cfg field was set to 0, the p01output field was set to 0, the p01prefix field was set to p01\_, the enable-h323 field was set to 0, the extasciioutput field was set to 0, the nicsoutput field was set to 0, and the bin1110output field was set to 0.



### Caution

Modifying the interval-minutes or nailed-cfg parameters automatically triggers a restart of the node-level processing tasks, resulting in measurement anomalies and the generating of associated traps.

## NODEPARMS Tag ID

Table 5-7 lists field names and values that can be specified with the NODEPARMS tag ID.

**Table 5-7** Fields in the Node Parameters Table

| Field Name | Description                                                                                                                                                                                                                                                                                                   | Value                                                                       | Range  |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------|
| activate   | This numeric parameter activates polling for a node. If the parameter is enabled, BAMS actively attempts to poll data files from the switch. After polling, BAMS processes all data. If this parameter is disabled, the BAMS polling function is turned off, and BAMS does not poll any data from the switch. | Enabled = 1 (default for node 1)<br>Disabled = 0 (default for nodes 2 to 8) | 0 or 1 |
| statoutput | Statistics output mode (numeric). This parameter enables or disables the generation of the measurement files.                                                                                                                                                                                                 | Enabled = 1 (default)<br>Disabled = 0                                       | 0 or 1 |

Table 5-7 Fields in the Node Parameters Table (continued)

| Field Name     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Value                                                                                             | Range       |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------|
| bafoutput      | BAF output mode (numeric). This parameter enables or disables the generation of the BAF output files. When the parameter is enabled, BAMS converts the CDR records from the switch to BAF format, and places these files in the BAF subdirectory under each node's data directory (for example, <code>opt/CiscoBAMS/data/s0x/BAF</code> ).                                                                                                                                                                                                                                                                                            | Enabled = 1<br>Disabled = 0 (default)                                                             | 0 or 1      |
| asciibafoutput | This parameter enables or disables the generation of the BAF output files in readable ASCII format. When enabled, BAMS converts the CDR records from the switch to ASCII BAF format, and places these files in the ASCIIBAF subdirectory under each node's data directory (for example, <code>opt/CiscoBAMS/data/s0x/ASCIIBAF</code> ).                                                                                                                                                                                                                                                                                               | Disabled = 0 (default)<br>Enabled = 1                                                             | 0 through 1 |
| asciioutput    | ASCII output mode (numeric). This parameter enables or disables the generation of the ASCII output files. When the parameter is enabled, BAMS converts the CDR records from the switch to ASCII format, and places these files in the ASCII subdirectory under each node's data directory (for example, <code>opt/CiscoBAMS/data/s0x/ASCII</code> ).                                                                                                                                                                                                                                                                                  | Disabled = 0<br>Enabled = 1 (ANSI output)<br>Enabled = 2 (ITU output) (default)                   | 0 through 2 |
| lookupinfo     | Look up info mode (numeric). This parameter enables or disables messages to the node syslog of errors associated with table lookup failures. Lookup failures are always displayed in the files <code>/opt/CiscoBAMS/files/sxx/AUG_cor_ac.log</code> and <code>/opt/CiscoBAMS/files/sxx/AUG_cor_ag.log</code> .<br><br>If the lookupinfo parameter is enabled, these messages are also logged to the node syslog so that the operator is readily notified. Normally the node syslog contains information on the total number of lookup errors per file. Enabling this parameter displays detailed information about each lookup error. | Trunk Group Enabled = 1 (default)<br>NPA-NXX Enabled = 2<br>Both Enabled = 3<br>Both Disabled = 0 | 0 through 3 |

Table 5-7 Fields in the Node Parameters Table (continued)

| Field Name      | Description                                                                                                                                                                                                                                                                                                                                                                                                 | Value                                                                                                                          | Range       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------|
| bafinfo         | BAF info mode (numeric). This parameter enables or disables messages to the node syslog concerning errors associated with the CDR-to-BAF (CTB) process. The CTB process outputs call records in BAF format. This parameter should be enabled if bafoutput is enabled.                                                                                                                                       | Enabled = 1<br>Disabled = 0 (default)                                                                                          | 0 or 1      |
| dynamicaccumes  | Dynamic accumulation mode (numeric). For more information, see the <a href="#">“Configured vs. Dynamic Trunk Group Output”</a> section on page 12-35.<br><br><b>Note</b> If you change this value during the day, the measurements will be inaccurate for the remainder of the day. As well, dynamic trunk measurements are not kept if the mode is set to “2” (that is, report defined trunk groups only). | Report configured trunks only = 2<br>Report dynamic trunks only = 1<br>Report both configured and dynamic trunks = 0 (default) | 0 through 2 |
| sup-zero-counts | Zero count suppression (numeric). For more information, see the <a href="#">“Zero Counts”</a> section on page 12-34.                                                                                                                                                                                                                                                                                        | Enabled = 1<br>Disabled = 0 (default)                                                                                          | 0 or 1      |

Table 5-7 Fields in the Node Parameters Table (continued)

| Field Name       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Value                                 | Range        |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|--------------|
| interval-minutes | <p>This numeric parameter sets the measurements file interval (in minutes). By default, BAMS always creates hourly and daily measurements files as long as the statoutput parameter is enabled. This parameter specifies the interval if files are to be created at less than 1-hour intervals.</p> <p>The value of this parameter must be greater than and not equal to the value of the MGC CDR dump interval value in the dmprSink.dat file. For more information, see the <a href="#">“Configuring the Cisco MGC for Using BAMS”</a> section on page 2-1.</p> <p><b>Note</b> Modifying this parameter while the system is running triggers an automatic restart of the processing tasks for the current node. Such a restart could affect the accuracy of the current measurements. A restart also creates alarms and traps that state that the processing tasks have been terminated and are being restarted (MGR801).</p> | 5, 10, 15, 20, 30<br>(Default = 15)   | 5 through 30 |
| nailed-cfg       | <p>Enabling this numeric parameter specifies that the switch has been set to a nailed configuration. Disabling this parameter specifies that the switch has been set to a switched configuration.</p> <p><b>Note</b> Modifying the parameter nailed-cfg while the system is running triggers an automatic restart of the processing tasks for the current node. Such a restart could affect the accuracy of the current measurements. A restart also creates alarms and traps that state that the processing tasks have been terminated and are being restarted (MGR801).</p>                                                                                                                                                                                                                                                                                                                                                   | Enabled = 1 (default)<br>Disabled = 0 | 0 or 1       |

Table 5-7 Fields in the Node Parameters Table (continued)

| Field Name      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Value                                                                                                                            | Range         |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------|
| p01output       | This parameter enables or disables the generation of the p01 output files by the P01 node task. These files are generated and stored in the directory /opt/CiscoBAMS/data/sxx/p001, where xx=node number. If you enable P01 output, you can filter out certain types of calls (that is, answered, noanswer, busy and other), based on the cause code from the MGC data record. For more information, see the <a href="#">“Updating the P01 Filter Table”</a> section on page 5-17. | Enabled = 1<br>Disabled = 0 (default)                                                                                            | 0 or 1        |
| p01prefix       | This string parameter specifies the file prefix of the p01 output files stored in /opt/CiscoBAMS/data/sxx/p001.                                                                                                                                                                                                                                                                                                                                                                    | p01_ (default)<br><b>Note</b> A value of NULL or empty means that the p01 output file will have the same name as the input file. | 23 characters |
| enable-H323     | This numeric parameter enables or disables the H.323 measurements. For a complete listing of H.323 measurements, see the <a href="#">“Noncarrier Measurements”</a> section on page 12-11.                                                                                                                                                                                                                                                                                          | Enabled = 1<br>Disabled = 0 (default)                                                                                            | 0 or 1        |
| extasciiooutput | This parameter enables or disables the generation of Extendable ASCII data.                                                                                                                                                                                                                                                                                                                                                                                                        | Disabled = 0 (default)<br>Enabled = 1 (ANSI output)<br>Enabled = 2 (ITU output)                                                  | 0 through 2   |
| nicsoutput      | This parameter enables or disables the generation of Non-Intercompany Settlement System (NICS) data.                                                                                                                                                                                                                                                                                                                                                                               | Disabled = 0 (default)<br>Enabled = 1 (ANSI output)<br>Enabled = 2 (ITU output)                                                  | 0 through 2   |
| bin1110output   | This parameter enables or disables the generation of 1110 Binary data.                                                                                                                                                                                                                                                                                                                                                                                                             | Disabled = 0 (default)<br>Enabled = 1 (ANSI output)<br>Enabled = 2 (ITU output)                                                  | 0 through 2   |
| qosoutput       | This parameter enables or disables the generation of QoS output.                                                                                                                                                                                                                                                                                                                                                                                                                   | Disabled = 0 (default)<br>Enabled = 1 (ANSI output)<br>Enabled = 2 (ITU output)                                                  | 0 through 2   |

## Updating the NPANXX Table

Use the NPANXX tag ID to update the NPANXX table. This table allows you to assign a zone ID and a local access transport area (LATA) to each NPA-NXX.

Example:

```
mml:1>prov-add:NPANXX:npanxx=301829,lata=00001,zone=0000001
Billing and Measurements Server - BAMS-00 2004-10-08 15:52:29
B COMPLD
 "NPANXX"
 ;
```

In this example, the npanxx field was set to 301829, the lata field was set to 00001, and the zone field was set to 0000001.

## NPANXX Tag ID

[Table 5-8](#) lists field names and values that can be specified with the NPANXX tag ID.

**Table 5-8** Fields in the NPANXX Table

| Field Name | Description           | Values                                               |
|------------|-----------------------|------------------------------------------------------|
| npanxx     | NPA and NXX (numeric) | The 6-digit NPANXX number                            |
| lata       | LATA (numeric)        | The 5-digit LATA number to which this NPANXX belongs |
| zone       | Zone ID (numeric)     | The 1- through 8-digit zone ID for a given Cisco MGC |

## Updating the P01 Filter Table

Use the P01FILTER tag ID to determine the type of calls that should be filtered from the P01 output, based on the cause code of the MGC data record. You enable P01 output with the NODEPARMS tag ID. For more information, see the [“Updating the Node Parameters Table”](#) section on page 5-11.

Example:

```
mm1:1:node1>prov-rtrv:p01filter:
Billing and Measurements Server - BAMS-00 2004-10-11 09:35:57
B RTRV
"P01FILTER:answered=1,noanswer=1,busy=1,other=1"
```

In this example, the answered field was set to 1, the noanswer field was set to 1, the busy field was set to 1, and the other field was set to 1.

For more information about P01 filtering, see [Chapter 8, “Configuring BAMS for P01 Output.”](#)

## P01FILTER Tag ID

[Table 5-9](#) lists field names and values that can be specified with the P01FILTER tag ID.

**Table 5-9** *Fields in the P01 Filtering Table*

| Field Name | Description                                                                                                 | Values                                | Range  |
|------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------|--------|
| answered   | Answered call filter (numeric). This parameter enables (1) or disables (0) the filtering of answered calls. | Enabled = 1<br>Disabled = 0 (default) | 0 or 1 |
| noanswer   | Noanswer call filter (numeric). This parameter enables (1) or disables (0) the filtering of noanswer calls. | Enabled = 1<br>Disabled = 0 (default) | 0 or 1 |
| busy       | Busy call filter (numeric). This parameter enables (1) or disables (0) the filtering of busy calls.         | Enabled = 1<br>Disabled = 0 (default) | 0 or 1 |
| other      | Other call filter (numeric). This parameter enables (1) or disables (0) the filtering of other calls.       | Enabled = 1<br>Disabled = 0 (default) | 0 or 1 |

## Updating the Poll Table

Use the POLL tag ID to update the Poll table. This table allows you to configure BAMS polling parameters such as hostname, remote directory and file prefix and suffix information.

Example:

```
mmnl:1>prov-add:POLL:host-name1="newyork1",rem-dir1="/opt/CiscoMGC/var/bam",
file-prefix1="cdr*",file-suffix1=".bin",action="R",interval=1,timeout=1,maxtries=2,
protocol="ftp"
Billing and Measurements Server - BAMS-00 2004-10-08 15:56:05
B COMPLD
 "POLL"
 ;
```

In this example, the host-name1 field was set to newyork1, the rem-dir1 field was set to /opt/CiscoMGC/var/bam, the file-prefix1 field was set to cdr\*, the file-suffix1 field was set to .bin, the action field was set to R, the interval field was set to 1, the timeout field was set to 1, the maxtries field was set to 2, and the protocol field was set to FTP.

## POLL Tag ID

Table 5-10 lists field names and values that can be specified with the POLL tag ID.

**Table 5-10** Fields in the Poll Table

| Field Name   | Description                                                                                         | Values                                                                                      | Range                      |
|--------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------|
| host-name1   | Host name for Cisco MGC1 (string)                                                                   | Name of the host                                                                            | A maximum of 15 characters |
| rem-dir1     | Remote directory for Cisco MGC1 (string)                                                            | Full text path of the directory                                                             | A maximum of 42 characters |
| file-prefix1 | Prefix of data files on Cisco MGC1 (string)                                                         | cdr*                                                                                        | A maximum of 10 characters |
| file-suffix1 | Suffix of files on Cisco MGC1 (string)                                                              | .bin                                                                                        | A maximum of 10 characters |
| host-name2   | Host name for Cisco MGC2 (string)<br><b>Note</b> Required only if a second MGC is operational.      | Name of the second host                                                                     | A maximum of 15 characters |
| rem-dir2     | Directory name on Cisco MGC2 (string)<br><b>Note</b> Required only if a second MGC is operational.  | Full text path of the directory, for example, opt/CiscoMGC/var/bam or opt/TransPath/var/bam | A maximum of 42 characters |
| file-prefix2 | Prefix of data files on Cisco MGC2 (string)                                                         | cdr                                                                                         | A maximum of 10 characters |
| file-suffix2 | Suffix of files on Cisco MGC2 (string)<br><b>Note</b> Required only if a second MGC is operational. | .bin                                                                                        | A maximum of 10 characters |

Table 5-10 Fields in the Poll Table (continued)

| Field Name | Description                                                                    | Values                                                         | Range          |
|------------|--------------------------------------------------------------------------------|----------------------------------------------------------------|----------------|
| action     | Action after polling (delete/rename) (string)                                  | Delete = D<br>Rename = R<br>Rename to .finished on the MGC.    | D or R         |
| interval   | Polling interval (in minutes) (numeric)                                        | 1 through 99<br>5 minutes is the recommended setting.          | 1 through 99   |
| timeout    | Timeout for file transfer (in minutes) (numeric)                               | 1 through 9999                                                 | 1 through 9999 |
| maxtries   | Maximum number of tries on each file (numeric)                                 | 1 through 10                                                   | 1 through 10   |
| protocol   | The protocol that controls the transfer of polling files between PGW and BAMS. | FTP = FTP file transfer (default)<br>SFTP = SFTP file transfer | FTP or SFTP    |

**Note**

When BAMS collects a CDR file from the Cisco MGC, it renames that file on the Cisco MGC with a .finished suffix. For purposes of polling efficiency, if BAMS is not able to rename the polled file “.finished”, it does not retry but instead generates an SNMP trap based on the POL115 message.

When a downstream polling computer collects a file from the BAMS unit, it renames that file on the BAMS unit to .finished. The Mass Storage Control (MSC) task maintains disk space and periodically checks polled and unpolled files on the BAMS unit, that is, files that have or have not been polled by a downstream polling computer.

## Updating the Rating Exception Table

Use the RATE-EXC tag ID to update the Rating Exception table. The values in the Rating Exception table override the relationships (in terms of call category) that were defined with the NPANXX tag ID. This table allows you to support special billing arrangements.

Example:

```
mm1:1>prov-add:RATE-EXC:orgnpanxx=301829, trmnpanxx=301831, ratetype="FLAT"
Billing and Measurements Server - BAMS-00 2004-10-08 15:59:12
B COMPLD
 "RATE-EXC"
 ;
```

In this example, the orgnpanxx field was set to 301829, the trmnpanxx field was set to 301831, and the ratetype field was set to FLAT.

## RATE-EXC Tag ID

Table 5-11 lists field names and values that can be specified with the Rating Exception tag ID.

**Table 5-11** Fields in the Rating Exception Table

| Field Name | Description                       | Values                                    | Range                      |
|------------|-----------------------------------|-------------------------------------------|----------------------------|
| orgnpanxx  | Originating NPA and NXX (numeric) | 6-digit NPANXX number                     | A maximum of 6 digits      |
| trmnpanxx  | Terminating NPA and NXX (numeric) | 6-digit NPANXX number                     | A maximum of 6 digits      |
| ratetype   | Rating type (string)              | FLAT<br>MESSAGE<br>INTRALATA<br>INTERLATA | A maximum of 24 characters |

## Updating the Rating Type Table

Use the RATING-TYPE tag ID to update the Rating Type table. The Rating Type table defines the relationships (in terms of call category) between different zones. This table is directional. That is, calling from Zone 1 to Zone 2 might be categorized one way, and calling in the reverse direction might be categorized another way.

Example:

```
mml:1>prov-add:RATING-TYPE:orgzone=123, trmzone=123, ratetype="FLAT"
Billing and Measurements Server - BAMS-00 2004-10-08 15:58:19
B COMPLD
 "RATING-TYPE"
;
```

In this example, the orgzone field was set to 123, the trmzone field was set to 123, and the ratetype field was set to FLAT.

## RATING-TYPE Tag ID

Table 5-12 lists field names and values that can be specified with the RATING-TYPE tag ID.

**Table 5-12** Fields in the Rating Type Table

| Field Name | Description                | Values                                    | Range                      |
|------------|----------------------------|-------------------------------------------|----------------------------|
| orgzone    | Originating zone (numeric) | 8-digit originating zone                  | A maximum of 8 digits      |
| trmzone    | Terminating zone (numeric) | 8-digit terminating zone                  | A maximum of 8 digits      |
| ratetype   | Rating type (string)       | FLAT<br>MESSAGE<br>INTRALATA<br>INTERLATA | A maximum of 24 characters |

## Updating the Nailed Connection Table

In a nailed environment, use the SIGPATH tag ID to update the Nailed Connection table. This table maintains nailed connections for the Cisco SC2200 configuration.

Trunk groups are populated in the Cisco MGC call detail records based on table lookups of read-in hexadecimal values for signal path. On Cisco SC2200 applications, sigpath ID is used as a reference for trunk groups. Trunk group numbers are as follows: BAF (1 through 9999), ITU (4096), and ANSI (1684). On a nailed application, you must have a SIGPATH association for every circuit that must be added.

The maximum number of records defined in the Nailed Connection table is 100,000.

Example:

```
mm1:1>prov-add:sigpath:sigpath=0x50-0x60,trunkgrp=0-16
Billing and Measurements Server - BAMS-00 2004-10-08 16:02:37
B COMPLD
 "SIGPATH"
 ;
```

In this example, the sigpath field was set to the range 0x50–0x60, and the trunkgrp field range was set to 0–16.

## SIGPATH Tag ID

[Table 5-13](#) lists field names and values that can be specified with the SIGPATH tag ID.



Note

The sigpath and trunkgrp fields are independent keys, therefore they must follow a one-to-one mapping. BAMS does not allow duplicate entries in either column.

**Table 5-13** Fields in the Nailed Connection Table

| Field Name | Description                                                                                                                                                                                                    | Values                     | Range                 |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------|
| sigpath    | Signal path (numeric)                                                                                                                                                                                          | 8-digit hexadecimal number | A maximum of 8 digits |
| trunkgrp   | Trunk group (numeric)<br><b>Note</b> BAF records store only the 4 least-significant decimal digits of the trunk group value. Cisco MGC End of Call 1110 ASCII records and measurements support the full range. | 0 through 65535            | 0 through 65535       |

## Updating the Skip CDB Table

Use the SKIPCDB tag ID to update the Skip CDB table. This table maintains a list of CDBs produced by the Cisco MGC that BAMS should not process. By default this table contains two values: 1020 and 1070.

Example:

```
mml:1>prov-add:SKIPCDB:id=1020
Billing and Measurements Server - BAMS-00 2004-10-08 16:02:37
B COMPLD
;
mml:1>prov-add:SKIPCDB:id=1070
Billing and Measurements Server - BAMS-00 2004-10-08 16:02:51
B COMPLD
;
```

In this example, the id field was set to 1020, and again to 1070.

## SKIPCDB Tag ID

Table 5-14 lists the field name that can be specified with the SKIPCDB tag ID.

**Table 5-14** Fields in the Skip CDB Table

| Field Name | Description                                                                                                                                                        | Values                 | Range                                         |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------------|
| id         | A CDB identifier is used to identify any new CDB that the Cisco MGC is producing and that BAMS should skip in its processing. Please contact Cisco for assistance. | Default: 1020 and 1070 | Up to 10-digit numeric value ( $2^{31} - 1$ ) |

## Updating the Skip CDE Table

Use the SKIPCDE tag ID to update the Skip CDE table. This table maintains a list of CDEs produced by the Cisco MGC that BAMS should not process. By default this table is empty.

Example:

```
mml:1>prov-add:SKIPCDE:id=5000
Billing and Measurements Server - BAMS-00 2004-10-08 16:02:37
B COMPLD
;
```

In this example, the id field was set to 5000.

## SKIPCDE Tag ID

Table 5-15 lists field names and values that can be specified with the SKIPCDE tag ID.

**Table 5-15** *Fields in the Skip CDE Table*

| Field Name | Description                                                                                                                                                        | Values         | Range                                         |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------|
| id         | A CDE identifier is used to identify any new CDE that the Cisco MGC is producing and that BAMS should skip in its processing. Please contact Cisco for assistance. | Default: empty | Up to 10-digit numeric value ( $2^{31} - 1$ ) |

## Updating the Switch Information Table

Use the SWITCHINFO tag ID to update the Switch Information table. This table must be populated if BAF output has been enabled. For more information, see Chapter 6, “Configuring BAMS for BAF Output.”

The values maintained in this table are customer-specific and must be obtained from Telcordia. Refer to the Telcordia/Bellcore document GR-478-CORE for more detailed descriptions of these fields.

Example:

```
mm1:1:node01>prov-ed:switchinfo:sensortype="118",sensorid="999999",recoffctype="118",
recoffcid="999999"
Billing and Measurements Server - BAMS-00 2004-09-15 10:15:19
B COMPLD
 "SWITCHINFO"
 ;
```

In this example, the sensortype field was set to 118, the sensorid field was set to 999999, the recoffctype field was set to 118, and the recoffcid field was set to 999999.

## SWITCHINFO Tag ID

Table 5-16 lists field names and values that can be specified with the SWITCHINFO tag ID.

**Table 5-16** *Fields in the Switch Information Table*

| Field Name  | Description           | Values      | Range                                       |
|-------------|-----------------------|-------------|---------------------------------------------|
| sensortype  | Sensor type           | Default = 0 | See Telcordia/Bellcore document GR-478-CORE |
| sensorid    | Sensor ID             | Default = 0 | See Telcordia/Bellcore document GR-478-CORE |
| recoffctype | Recording office type | Default = 0 | See Telcordia/Bellcore document GR-478-CORE |
| recoffcid   | Recording office ID   | Default = 0 | See Telcordia/Bellcore document GR-478-CORE |

## Updating the Threshold Crossing Alarms Table

Use the TCA-TBL tag ID to update the Threshold Crossing Alarms (TCA) table.

Each TAG/TRK (where TAG is a user-defined value, and TRK is the trunk) can have a maximum of 43 measurements. A global TCA can be set up with a maximum of 43 measurements. Any TAG/TRK that does not have a specific TCA is checked against the global TCA.

For eight measurements, you can specify TAG/TRK/IC, where TAG is a user-defined value, TRK is the trunk, and IC is the interexchange carrier.

You need to know the carrier codes (for example, 0288 for AT&T). Enter three-digit codes as four digits with a 0 as the first digit. Refer to [Chapter 12, “Obtaining Measurements,”](#) for additional information.

A special measurement group can be specified to apply to all TAG/TRK measurement groups that are not otherwise specified. This measurement group is identified by the name “global/0,” where the TAG is “global” and the trunk group is “0.”

If there is no global/0 defined, any measurement that does not have a specific threshold set for it is not checked. The measurement is still reported in the acc\_x, acc\_r, acc\_h, or acc\_d file, but no alarm is generated, regardless of the value.

If global/0 is defined, it is used when no specific thresholds have been specified for a trunk group. If you set thresholds for a specific TAG/TRK, only the specified values are checked. Any unspecified measurements within the TAG/TRK are ignored.



Note

---

When setting up a global TCA for a trunk group, do not use a global measurement change for trunk groups where measurements are not used.

---

In [Table 5-17](#), peg counts refer to statistics. Any number can be specified for the threshold values; the only limit is the field length. The condition values are as follows:

0 = Ignore, 1 = Less than, 2 = Equal, 3 = Greater than, and 4 = Not equal.

None of the fields shown in [Table 5-17](#) are required fields. Each threshold is based on user-defined alarms. If you specify a value parameter, you must also specify its corresponding condition parameter, and vice versa. For each defined record, the id record field must be populated.



Note

---

When setting up a TCA for all trunk groups, do not use a global measurement change for trunk groups where measurements are not used.

---

Once you use the **prov-add** command for all trunk groups, use the **prov-ed** command for all other trunk group changes.

Example (one trunk group):

```
mm1:1>prov-add:tca-tbl:id="1/800",igr-call-att-cond=3,igr-call-att=5
```

```
Billing and Measurements Server - BAMS-00 2004-10-06 15:45:32
B COMPLD
 "TCA-TBL"
;
```

In this example, the id field was set to 1/800, the igr-call-att-cond field was set to 3, and the igr-call-att field was set to 5.

Example (all trunk groups):

```
mml:1>prov-add:tca-tbl:id="global/0",igr-call-att-cond=3,igr-call-att=5
```

```
Billing and Measurements Server - BAMS-00 2004-10-06 15:45:32
B COMPLD
 "TCA-TBL"
;
```

In this example, the id field was set to global/0, the igr-call-att-cond field was set to 3, and the igr-call-att field was set to 5.



**Note**

To suppress a threshold condition, specify a value of 0 (ignore) with the **prov-ed** command. Do not use the **prov-dlt** command, because it deletes all thresholds for the specified id.

## TCA-TBL Tag ID

Table 5-17 lists field names and values that can be specified with the Threshold Crossing Alarm (TCA-TBL) tag ID.

**Table 5-17** Fields in the Threshold Crossing Alarms Table

| Field Name           | Description                                                                                                                                              | Values                     |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| id                   | User-defined tag/trunk group/interconnect carrier (string)<br><b>Note</b> Do not include the trunk group prefix (from the TRUNKGRP table) in this field. | A maximum of 43 characters |
| igr-ans-calls        | Answered ingress calls (numeric)                                                                                                                         | Any number                 |
| igr-ans-calls-cond   | Answered ingress calls threshold condition (numeric)                                                                                                     | 0 through 4                |
| igr-call-att-cond    | Call attempts incoming threshold condition (numeric)                                                                                                     | 0 through 4                |
| igr-call-att         | Call attempts incoming threshold value (numeric)                                                                                                         | Any number                 |
| egr-ans-calls        | Answered egress calls (numeric)                                                                                                                          | Any number                 |
| egr-ans-calls-cond   | Answered egress calls threshold condition (numeric)                                                                                                      | 0 through 4                |
| egr-call-att-cond    | Call attempts outgoing threshold condition (numeric)                                                                                                     | 0 through 4                |
| egr-call-att         | Call attempts outgoing threshold value (numeric)                                                                                                         | Any number                 |
| egr-call-blkd-cond   | Outgoing calls blocked threshold condition (numeric)                                                                                                     | 0 through 4                |
| egr-call-blkd        | Outgoing calls blocked threshold value                                                                                                                   | Any number                 |
| ttl-ans-calls        | Total answered calls (numeric)                                                                                                                           | Any number                 |
| ttl-ans-calls-cond   | Total answered calls threshold condition (numeric)                                                                                                       | 0 through 4                |
| ttl-failed-cong-cond | Failed calls congestion threshold condition (numeric)                                                                                                    | 0 through 4                |
| ttl-failed-cong      | Failed calls congestion threshold value (numeric)                                                                                                        | Any number                 |
| igr-term-norm-cond   | Successful calls incoming threshold condition (numeric)                                                                                                  | 0 through 4                |
| igr-term-norm        | Successful calls incoming threshold value (numeric)                                                                                                      | Any number                 |
| egr-term-norm-cond   | Successful calls outgoing threshold condition (numeric)                                                                                                  | 0 through 4                |

Table 5-17 Fields in the Threshold Crossing Alarms Table (continued)

| Field Name                | Description                                                                  | Values      |
|---------------------------|------------------------------------------------------------------------------|-------------|
| egr-term-norm             | Successful calls outgoing threshold value (numeric)                          | Any number  |
| igr-pct-trk-use-cond      | Percent trunk group usage incoming threshold condition (numeric)             | 0 through 4 |
| igr-pct-trk-use           | Percent trunk group usage incoming threshold value (numeric)                 | Any number  |
| egr-pct-trk-use-cond      | Percent trunk group usage outgoing threshold condition (numeric)             | 0 through 4 |
| egr-pct-trk-use           | Percent trunk group usage outgoing threshold value (numeric)                 | Any number  |
| t1l-maint-use-cond        | Maintenance usage per trunk group threshold condition (numeric) <sup>1</sup> | 0 through 4 |
| t1l-maint-use             | Maintenance usage per trunk group threshold value (numeric) <sup>1</sup>     | Any number  |
| t1l-erlangs-cond          | Total traffic erlangs threshold condition (numeric)                          | 0 through 4 |
| t1l-erlangs               | Total traffic erlangs threshold value (numeric)                              | Any number  |
| t1l-term-norm-cond        | Total calls terminated normally threshold condition (numeric)                | 0 through 4 |
| t1l-term-norm             | Total calls terminated normally threshold value (numeric)                    | Any number  |
| t1l-term-abnorm-cond      | Calls terminated abnormally threshold condition (numeric)                    | 0 through 4 |
| t1l-term-abnorm           | Calls terminated abnormally threshold value (numeric)                        | Any number  |
| t1l-term-failed-mgw-cond  | Calls terminated, failed MGW or NAS threshold condition (numeric)            | 0 through 4 |
| t1l-term-failed-mgw       | Calls terminated, failed MGW or NAS threshold value (numeric)                | Any number  |
| t1l-calls-rejected-cond   | Calls rejected threshold condition (numeric)                                 | 0 through 4 |
| t1l-calls-rejected        | Calls rejected threshold value (numeric)                                     | Any number  |
| t1l-rejected-dialnum-cond | Calls rejected, unknown dialed number threshold condition (numeric)          | 0 through 4 |
| t1l-rejected-dialnum      | Calls rejected, unknown dialed number threshold value (numeric)              | Any number  |
| t1l-rejected-other-cond   | Calls rejected, other reasons threshold condition (numeric)                  | 0 through 4 |
| t1l-rejected-other        | Calls rejected, other reasons threshold value (numeric)                      | Any number  |
| egr-ofl-blkd-cond         | Overflow, outgoing attempts blocked threshold condition (numeric)            | 0 through 4 |
| egr-ofl-blkd              | Overflow, outgoing attempts blocked threshold value (numeric)                | Any number  |

Table 5-17 Fields in the Threshold Crossing Alarms Table (continued)

| Field Name                  | Description                                                     | Values      |
|-----------------------------|-----------------------------------------------------------------|-------------|
| ttl-traffic-usage-pegs-cond | Total traffic usage pegs threshold condition (numeric)          | 0 through 4 |
| ttl-traffic-usage-pegs      | Total traffic usage pegs threshold value (numeric)              | Any number  |
| egr-tndm-att-cond           | Tandem routing attempts, outgoing threshold condition (numeric) | 0 through 4 |
| egr-tndm-att                | Tandem routing attempts, outgoing threshold value (numeric)     | Any number  |
| egr-tndm-cmplt-cond         | Tandem completions, outgoing threshold condition (numeric)      | 0 through 4 |
| egr-tndm-cmplt              | Tandem completions, outgoing threshold value (numeric)          | Any number  |
| igr-tndm-att-cond           | Tandem routing attempts, incoming threshold condition (numeric) | 0 through 4 |
| igr-tndm-att                | Tandem routing attempts, incoming threshold value (numeric)     | Any number  |
| igr-tndm-cmplt-cond         | Tandem completions, incoming threshold condition (numeric)      | 0 through 4 |
| igr-tndm-cmplt              | Tandem completions, incoming threshold value (numeric)          | Any number  |
| egr-tndm-dur-cond           | Tandem duration, outgoing threshold condition (numeric)         | 0 through 4 |
| egr-tndm-dur                | Tandem duration, outgoing threshold value (numeric)             | Any number  |
| igr-tndm-dur-cond           | Tandem duration, incoming threshold condition (numeric)         | 0 through 4 |
| igr-tndm-dur                | Tandem duration, incoming threshold value (numeric)             | Any number  |
| igr-conv-dur-cond           | Conversation duration, incoming threshold condition (numeric)   | 0 through 4 |
| igr-conv-dur                | Conversation duration, incoming threshold value (numeric)       | Any number  |
| egr-conv-dur-cond           | Conversation duration, outgoing threshold condition (numeric)   | 0 through 4 |
| egr-conv-dur                | Conversation duration, outgoing threshold value (numeric)       | Any number  |
| igr-setup-dur-cond          | Setup duration, incoming threshold condition (numeric)          | 0 through 4 |
| igr-setup-dur               | Setup duration, incoming threshold value (numeric)              | Any number  |
| egr-setup-dur-cond          | Setup duration, outgoing threshold condition (numeric)          | 0 through 4 |
| egr-setup-dur               | Setup duration, outgoing threshold value (numeric)              | Any number  |
| igr-teardown-dur-cond       | Teardown duration, incoming threshold condition (numeric)       | 0 through 4 |

Table 5-17 Fields in the Threshold Crossing Alarms Table (continued)

| Field Name            | Description                                                      | Values      |
|-----------------------|------------------------------------------------------------------|-------------|
| igr-teardown-dur      | Teardown duration, incoming threshold value (numeric)            | Any number  |
| egr-teardown-dur-cond | Teardown duration, outgoing threshold condition (numeric)        | 0 through 4 |
| egr-teardown-dur      | Teardown duration, outgoing threshold value (numeric)            | Any number  |
| egr-ic-calls-cond     | IC destined calls threshold condition (numeric)                  | 0 through 4 |
| egr-ic-calls          | IC destined calls threshold value (numeric)                      | Any number  |
| egr-ic-nockt-cond     | IC destined calls, no circuit threshold condition (numeric)      | 0 through 4 |
| egr-ic-nockt          | IC destined calls, no circuit threshold value (numeric)          | Any number  |
| t1l-ic-usage-cond     | IC usage threshold condition (numeric)                           | 0 through 4 |
| t1l-ic-usage          | IC usage threshold value (numeric)                               | Any number  |
| t1l-route1-cond       | Route 1 threshold condition (numeric)                            | 0 through 4 |
| t1l-route1            | Route 1 threshold value (numeric)                                | Any number  |
| t1l-route2-cond       | Route 2 threshold condition (numeric)                            | 0 through 4 |
| t1l-route2            | Route 2 threshold value (numeric)                                | Any number  |
| t1l-route3-cond       | Route 3 threshold condition (numeric)                            | 0 through 4 |
| t1l-route3            | Route 3 threshold value (numeric)                                | Any number  |
| egr-scfl-h323-cond    | Successful H.323 terminating threshold condition (numeric)       | 0 through 4 |
| egr-scfl-h323         | Successful H.323 terminating threshold value (numeric)           | Any number  |
| igr-scfl-h323-cond    | Successful H.323 originating threshold condition (numeric)       | 0 through 4 |
| igr-scfl-h323         | Successful H.323 originating threshold value (numeric)           | Any number  |
| egr-uncscfl-h323-cond | Unsuccessful H.323 terminating threshold condition (numeric)     | 0 through 4 |
| egr-uncscfl-h323      | Unsuccessful H.323 terminating threshold value (numeric)         | Any number  |
| igr-uncscfl-h323-cond | Unsuccessful H.323 originating threshold condition (numeric)     | 0 through 4 |
| igr-uncscfl-h323      | Unsuccessful H.323 originating threshold value (numeric)         | Any number  |
| t1l-ic-sel-noind-cond | Total carrier select no indication threshold condition (numeric) | 0 through 4 |
| t1l-ic-sel-noind      | Total carrier select no indication threshold value (numeric)     | Any number  |

Table 5-17 Fields in the Threshold Crossing Alarms Table (continued)

| Field Name                  | Description                                                                         | Values      |
|-----------------------------|-------------------------------------------------------------------------------------|-------------|
| ttl-ic-sel-pr-nipt-cond     | Total carrier select presubscribed not input threshold condition (numeric)          | 0 through 4 |
| ttl-ic-sel-pr-nipt          | Total carrier select presubscribed not input threshold value (numeric)              | Any number  |
| ttl-ic-sel-pr-input-cond    | Total carrier select presubscribed input threshold condition (numeric)              | 0 through 4 |
| ttl-ic-sel-pr-input         | Total carrier select presubscribed input threshold value (numeric)                  | Any number  |
| ttl-ic-sel-pr-wni-cond      | Total carrier select presubscribed with no indication threshold condition (numeric) | 0 through 4 |
| ttl-ic-sel-pr-wni           | Total carrier select presubscribed with no indication threshold value (numeric)     | Any number  |
| ttl-ic-sel-no-pr-cond       | Total carrier select not presubscribed threshold condition (numeric)                | 0 through 4 |
| ttl-ic-sel-no-pr            | Total carrier select not presubscribe threshold value (numeric)                     | Any number  |
| egr-scfl-isup-cond          | Successful ISUP terminating pegs condition (numeric)                                | 0 through 4 |
| egr-scfl-isup               | Successful ISUP terminating pegs value (numeric)                                    | Any number  |
| igr-scfl-isup-cond          | Successful ISUP originating pegs condition (numeric)                                | 0 through 4 |
| igr-scfl-isup               | Successful ISUP originating pegs value (numeric)                                    | Any number  |
| egr-unsfcfl-isup-cond       | Unsuccessful ISUP terminating pegs condition (numeric)                              | 0 through 4 |
| egr-unsfcfl-isup            | Unsuccessful ISUP terminating pegs value (numeric)                                  | Any number  |
| igr-unsfcfl-isup-cond       | Unsuccessful ISUP originating pegs condition (numeric)                              | 0 through 4 |
| igr-unsfcfl-isup            | Unsuccessful ISUP originating pegs value (numeric)                                  | Any number  |
| egr-isdn-su-msg-delay-cond  | ISDN terminating setup message delay pegs condition (numeric)                       | 0 through 4 |
| egr-isdn-su-msg-delay       | ISDN terminating setup message delay pegs value (numeric)                           | Any number  |
| igr-isdn-su-msg-delay-cond  | ISDN originating setup message delay pegs condition (numeric)                       | 0 through 4 |
| igr-isdn-su-msg-delay       | ISDN originating setup message delay pegs value (numeric)                           | Any number  |
| ttl-avlbl-cic-cond          | Total number of available CICs threshold condition (numeric)                        | 0 through 4 |
| ttl-avlbl-cic               | Total number of available CICs threshold value (numeric)                            | Any number  |
| ttl-call-att-cond (numeric) | Total number of call attempts condition (numeric)                                   | Any number  |
| ttl-call-att (numeric)      | Total number of call attempts (numeric)                                             | Any number  |

**Table 5-17** *Fields in the Threshold Crossing Alarms Table (continued)*

| Field Name                         | Description                                                                                      | Values   |
|------------------------------------|--------------------------------------------------------------------------------------------------|----------|
| igr-ans-seize-ratio-cond (numeric) | Percentage of incoming seized calls threshold condition (numeric)                                | 1 to 100 |
| igr-ans-seize-ratio (numeric)      | Percentage of incoming seized calls (numeric)                                                    | 1 to 100 |
| egr-ans-seize-ratio-cond (numeric) | Percentage of outgoing answer seizure ratio threshold condition (numeric)                        | 1 to 100 |
| egr-ans-seize-ratio (numeric)      | Percentage of outgoing seized calls (numeric)                                                    | 1 to 100 |
| tll-ans-seize-ratio-cond (numeric) | Percentage of seized answered calls at end of measurement interval threshold condition (numeric) | 1 to 100 |
| tll-ans-seize-ratio (numeric)      | Percentage of seized answered calls at end of measurement interval                               | 1 to 100 |

1. This value is disabled and if populated, no alarm is generated.

## Updating the Tollfree Table

Use the TOLLFREE tag ID to update the Tollfree table. The Tollfree table maintains the toll-free prefixes.

Example:

```
mml:1>prov-add:TOLLFREE:digits=800
Billing and Measurements Server - BAMS-00 2004-10-08 16:25:17
B COMPLD
 "TOLLFREE"
;
```

In this example, the digits field was set to 800.

## TOLLFREE Tag ID

[Table 5-18](#) lists the field name that can be specified with the TOLLFREE tag ID.

**Table 5-18** *Fields in the Tollfree Table*

| Field Name | Description                                                                                                                                          | Values                                                                   | Range                  |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|------------------------|
| digits     | This numeric prefix identifies a toll-free call. Default values are 800, 877, 888, 1800, 1877, and 1888. Additional values can be entered if needed. | 800, 877, 888, 1877, 1800, 1888, any valid NPA, three or four characters | A maximum of 12 digits |

## Updating the Trunk Group Table

Use the TRUNKGRP tag ID to update the Trunk Group table. The Trunk Group table provides information about each trunk group. This information determines if a call is originating or terminating. In addition, the default NPA is taken from here if only 7 digits are populated in the calling or called phone numbers.



### Note

When BAMS is configured in PGW Dynamic Update mode (for example, when PGW\_DYNAMIC\_UPDATE=TRUE), the circuits field does not appear in the Trunk Group table. For more information, see the [“Setting the PGW Dynamic Update Mode” section on page 2-20](#).

## PGW Dynamic Update Mode = True

In this mode the circuits field is not included in the Trunk Group table. For more information, see the [“Setting the PGW Dynamic Update Mode” section on page 2-20](#).

### Non-BAF Mode Example (where ORGNPA and TRMNPA are not required):

```
mm1:3>Prov-add:trunkgrp:trunkgrp=1000,connection="T"
mm1:3>Prov-ed:trunkgrp:trunkgrp=1000,prefix="abc"
```

### BAF Mode Example (where ORGNPA and TRMNPA are required):

```
mm1:3>PROV-ADD:TRUNKGRP:trunkgrp=1000,connection="T",ORGNPA="123",TRMNPA="456"
mm1:3>PROV-ADD:TRUNKGRP:trunkgrp=1000,connection="T",ORGNPA="123",TRMNPA="456",
prefix="abc"
```

## TRUNKGRP—Trunk Group Table

[Table 5-19](#) lists field names and values that can be specified with the TRUNKGRP tag ID.

*Table 5-19 Fields in the Trunk Group Table*

| Field Name | Description                                                                                                                                                                                                                                  | Values          | Range           |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|
| trunkgrp   | Trunk group (numeric). This field is mandatory.<br><br><b>Note</b> BAF records store only the 4 least-significant decimal digits of the trunk group value. Cisco MGC End of Call 1110 ASCII records and measurements support the full range. | 0 through 65535 | 0 through 65535 |

Table 5-19 Fields in the Trunk Group Table

| Field Name | Description                                                                                                                                                                                                                                                                                                                                                                               | Values                                                    | Range                             |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------|
| connection | <p>Connection (string). This field is mandatory. This value is used for BAF output mapping. If BAF output is not enabled, you can use either value.</p> <p><b>Note</b> A Direct (D) connection refers to calls terminated locally (directly) on the VSC. A Tandem (T) connection is a call collected over a long distance or remote tandem switching system and forwarded to the VSC.</p> | <p>Direct = D (for direct or local)</p> <p>Tandem = T</p> | D or T                            |
| orgnpa     | Originating NPA (numeric). This field is optional. For local 7-digit calls, this value is prepended to create a 10-digit number.                                                                                                                                                                                                                                                          | The 3-digit originating NPA                               | A maximum of 3 digits             |
| trmnpa     | Terminating NPA (numeric). This field is optional. For local 7-digit calls, this value is prepended to create a 10-digit number.                                                                                                                                                                                                                                                          | The 3-digit terminating NPA                               | A maximum of 3 digits             |
| prefix     | Trunk group prefix (string). This field is optional. If you populate this field, the trunk group prefix is prepended to the trunkgrp field value, and both are displayed in statistics output and NICS output.                                                                                                                                                                            | The trunk group prefix.                                   | A maximum of 3 letters (A–Z, a–z) |

## Updating the Trunk Group Prefix Table



### Note

This table is only required for systems that are configured to produce NICS output. For more information, see [Chapter 8, “Configuring BAMS for P01 Output.”](#)

Use the TKGPREFIX tag ID to update the Trunk Group Prefix table. The Trunk Group Prefix table provides information about each trunk group prefix. This table is used by the NIC task to produce NICS output. For each record to be processed, the NIC task does a TKGPREFIX table lookup based on the trunk group prefix of the ingress and egress trunks. If the prefix is found, the ingress and/or egress trunk type is assigned. By default this table is empty.

Example:

```
mm1:1>prov-add:TKGPREFIX:prefix="ABC",type=1
Billing and Measurements Server - BAMS-00 2004-10-08 16:26:06
B COMPLD
 "TKGPREFIX"
 ;
```

In this example, the prefix field was set to ABC and the type field was set to 1 (that is, PSTN).



Note

To correctly provision the Trunk Group Prefix table, each unique value of the prefix field from the Trunk Group table (TRUNKGRP tag ID) must have an entry in the Trunk Group Prefix table that defines the trunk group type (PSTN, SIP, PGW, etc.).

## TKGPREFIX—Trunk Group Prefix Table

Table 5-20 lists field names and values that can be specified with the TKGPREFIX tag ID.

**Table 5-20** Fields in the Trunk Group Prefix Table

| Field Name | Description                           | Values                                            | Range                                                                        |
|------------|---------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------|
| prefix     | Trunk group prefix (string)           | The trunk group prefix. Each value must be unique | A maximum of 3 letters (A–Z, a–z)                                            |
| type       | The trunk group prefix type (numeric) | The trunk group prefix type                       | 1 through 5:<br>1 = PSTN<br>2 = PGW<br>3 = SIP<br>4 = HIS<br>5 = HIS-NETCHAT |

## Updating the Zone Information Table

Use the ZONE-INFO tag ID to update the Zone Information table. This table maintains zone membership information.

Example:

```
mm1:1>prov-add:ZONE-INFO:zone=456,info="zone2"
Billing and Measurements Server - BAMS-00 2004-10-08 16:27:08
B COMPLD
 "ZONE-INFO"
 ;
```

In this example, the zone field was set to 456, and the info field was set to zone2.

## ZONE-INFO Tag ID

Table 5-21 lists field names and values that can be specified with the ZONE-INFO tag ID.

**Table 5-21** *Fields in the Zone Information Table*

| Field Name | Description                                                                               | Values               | Range                      |
|------------|-------------------------------------------------------------------------------------------|----------------------|----------------------------|
| zone       | The zone ID number (numeric)<br><b>Note</b> Not required. Useful for reference purposes.  | The zone ID          | A maximum of 8 digits      |
| info       | The zone description (string)<br><b>Note</b> Not required. Useful for reference purposes. | The zone description | A maximum of 80 characters |



## CHAPTER 6

# Configuring BAMS for BAF Output

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Revised: March 10, 2011, OL-11618-18

## Overview

This chapter describes how to configure the Cisco Billing and Measurements Server (BAMS) for Bellcore AMA (Automatic Message Accounting) Format (BAF) records. BAMS provides a mediation interface for Cisco Media Gateway Controller (MGC) systems. The purpose of BAMS is to provide enhanced data collection and processing functions, which correspond to those found in a traditional Class 4 tandem switch. BAMS does not include presentation graphics or database query functions; rather, it is designed to produce output billing and measurement feeds for downstream systems that can provide these functions.



Note

---

You enable BAF output with the NODEPARMS tag ID. For more information, see the [“NODEPARMS Tag ID” section on page 5-11](#).

---

BAMS must be correctly configured with the following information:

- Billing design information
  - Billing zones
  - Zone relationships
  - Call types
  - Calling exceptions
  - Call type and structure code mapping for output records
- NPA-NXX LATA information
  - Zone assignment
  - LATA assignment
  - Toll-free prefix assignment
- Trunk group information
  - SigPathID
  - Trunk group connections
- International routing information

- Country codes

**Note**

Before configuring BAMS to generate billing and measurements, you should familiarize yourself with Chapters 3 to 9 of this guide.

**Note**

BAMS performs only limited data validation on the information provisioned into its tables. It is important that you enter data carefully and understand the algorithms and their implementation.

BAMS values entered through the MML command-line interface are case sensitive; the verbs and keywords are not.

## Generating BAF Records

The following section explains how BAF records are generated from Cisco MGC switch data.

## Interworking of BAMS Configuration Tables

The first step in using BAMS is understanding the billing area that must be covered. Are there special cases for billing within the area? Are there banded areas with special rating? Do some number prefixes receive different treatment? Are special billing records required for these (or other) circumstances?

The answers to these questions are important in creating zones that are used to define interactions between different origination and termination NPA-NXX combinations. These interactions also determine the call types that are used to decide which BAF record to use for billing output. See the “[Call Area Provisioning Example](#)” section on page 6-7 for more details.

Once the billing area information has been gathered, it can be tabulated as shown in [Table 6-1](#).

**Table 6-1 Datafill Information Example**

| From |        |      | To   |        |      | Results in Map Type |
|------|--------|------|------|--------|------|---------------------|
| LATA | NPANXX | Zone | LATA | NPANXX | Zone |                     |
| 1    | 202344 | 1    | 1    | 202345 | 1    | FLAT                |
| 1    | 202344 | 1    | 1    | 202223 | 2    | FLAT                |
| 2    | 202767 | 5    | 2    | 202333 | 3    | MESSAGE             |
| 3    | 703298 | 8    | 1    | 202268 | 1    | INTERLATA           |

## Prerequisites for BAF Records

The following steps are required before Bellcore AMA Format (BAF) and Cisco Media Gateway Controller (MGC) End of Call 1110 ASCII records can be generated:

1. The Billing and Measurements Server (BAMS) collects the individual call data blocks (CDBs) generated by the Cisco MGC. This is performed by the Polling (POL) task.



**Note** The prefix of the files polled by the POL task is the input prefix for FMT, the initial processing task. Changing the parameter file-prefix1 or file-prefix2 in the Poll table automatically changes the input prefix of the FMT task. This change takes effect on the next startup of the system.

2. BAMS correlates the CDBs into a merged call structure. This is performed by the Correlation (COR) task.
3. Each call type is categorized. This is performed by the Augmentation (AUG) task. The AUG task is involved in the output of BAF records, as well as the BAF-to-CDR conversion task (CTB).
4. The ASCII Conversion (ASC) task outputs Cisco MGC End of Call 1110 ASCII files.

**Caution**

In North America, if the network numbering plan does not conform to the North American Numbering Plan, BAMS will malfunction (the AGS and AGB processes will stop) while processing BAF CDRs.

## Identifying Call Types

Identification of call-type information is key to generating BAF records. The call type determines the structure code and the call-type tables of the BAF record. Because the Cisco MGC generates partial information in the CDBs, additional data within the CDBs is required for the unique identification of each call scenario. BAMS provides the logic that determines the call type.

Note the following:

- Each Cisco MGC serves a set of home NPA-NXXs.
- Each output BAF record needs to be put into a call category (for example, Flat rate, Message rate, IntraLATA, InterLATA, Toll-Free, and so forth). The call category is important because it dictates the BAF structure code and call-type fields.

Perform the following steps to identify call-type categories:

- Step 1** Use the ZONE-INFO tag ID to define zone IDs. (For details, see the [“Updating the Zone Information Table” section on page 5-33.](#))
- Step 2** Use the NPANXX tag ID to assign a zone ID and a LATA to each NPA-NXX. The zone narrowly defines an area within the LATA as a call category. LATAs are centrally managed, and the system assumes that you are using the correct source for the population of the LATA (for example, using Bellcore LERG tables). Note that the LERG tables are not part of BAMS. (For details, see the [“Updating the NPANXX Table” section on page 5-16.](#))
- Step 3** Use the RATING-TYPE tag ID to establish the calling relationships between zones. This tag ID determines the call category (for example, flat rate, message rate, and so on). (For details, see the [“Updating the Rating Type Table” section on page 5-20.](#))
- Step 4** Use the RATE-EXC tag ID to override certain call-category relationships defined with the NPANXX tag ID. (For details, see the [“Updating the Rating Exception Table” section on page 5-19.](#))
- Step 5** Use the TRUNKGRP tag ID to determine if a call is originating or terminating. (For details, see the [“Updating the Trunk Group Table” section on page 5-31.](#))

- Step 6** Use the MAPTYPE tag ID to specify which structure code to generate and which call type to assign each call category. (For details, see the “Updating the Map Type Table” section on page 5-5.)

## Default BAF Structure Codes and Call Types

Table 6-2 defines the default BAF structure codes and call types. The table lists the call categories, call types, and answered and unanswered structure codes.

**Table 6-2 BAF Structure Codes and Call Types**

| Call Category    | Call Type | Answered Structure Code | Unanswered Structure Code                            |
|------------------|-----------|-------------------------|------------------------------------------------------|
| FLAT             | 1         | 502                     | 21                                                   |
| MESSAGE          | 1         | 20                      | 21                                                   |
| INTRALATA        | 6         | 1                       | 2                                                    |
| INTERLATA_ORIG   | 110       | 625                     | 625                                                  |
| INTERLATA_TERM   | 119       | 625                     | 653                                                  |
| INTERLATA_TANDEM | 110       | 625                     | 625                                                  |
| TOLL_FREE        | 141       | 360                     | -1 (A value of -1 means “do not generate a record.”) |

## Example of BAF Structure Codes and Call Types Created from BAF Provisioning

The following example is a formatted printout of a binary record.

```

===== BAF RECORD =====
(000)Record Length : 97
(00)Hex Identifier : aa
(0)Structure Code : 40625c
(1)Call Type : 110c
(2)Sensor Type : 118c
(3)Sensor ID : 0012345c
(4)Record Office Type : 118c
(5)Record Office ID : 0067890c
(6)Connect Date : 00713c
(7)Timing Indicator : 00000c
(8)Study Indicator : 0000000c
(9)Off Hook Indicator : 0c
(10)Traffic sampld Ind : 0c
(11)Operator Action : 0c
(12)Service Feature : 000c
(13)Originating NPA : 703c
(14)Originating number : 7654321c
(15)Overseas Indicator : 0c
(16)Terminating NPA : 00804c
(17)Terminating number : 7654321c
(18)Connect Time : 1611272c
(19)Elapsed Time : 000000021c
(57)IC/INC Prefix : 00000c
(6)Carrier Conn Date : 00713c
(18)Carrier Conn Time : 1611260c
(19)Carrier Elpsd Time : 000000020c

```

```

(58)IC/INC Call Status : 010c
(83)Trunk Group Number : 38004c
(59)Route Indicator : 1c
(85)Dial Indicator : 0c
(60)ANI/CPN Indicator : 3c
===== Modules =====
Module 104 (Trunk ID)
(244)TrunkID : 380030234c
Module 104 (Trunk ID)
(244)TrunkID : 680042113c
Module 000 (Final Module)

===== End of BAF Record =====

```

## Exception and Special Processing

### Overriding Call Types

In some cases, a carrier might want to override a call type. Some examples include:

- Calls between a subset of NPA-NXXs in two different zones being treated differently from all other NPA-NXXs in the same zones
- InterLATA calls being treated as intraLATA calls for record-generation purposes

Use the RATE-EXC tag ID to override the default call-type classification. For more information, see the [“RATE-EXC Tag ID” section on page 5-20](#).

### Processing 7-Digit Numbers

If only 7 digits are populated in the calling and called numbers, the system acts as if each incoming trunk group visible to BAMS has a default NPA and prefixes this NPA to each 7-digit number. The full NPA-NXX is required for BAMS to perform the zone analysis. Each trunk has a default originating and terminating NPA, defined in the orgnpa and trmnpa fields, in the Trunk Group table. These fields are used only if the incoming number is 7 digits.

### Processing Toll-Free Calls

A toll-free call can be identified if its dialed number prefix is contained in the Tollfree table. The default toll-free prefixes are: 800, 877, 888, 1800, 1877, and 1888. Toll-free calls have their own call-type category. A zone analysis is still performed, but the call type is overridden with the toll-free call type.

### Processing International Calls

Records for international calls are processed like all other records, using zone analysis. Based on the default case, international numbers are classified as interLATA calls.

## Processing LNP Calls

Local number portability (LNP) calls are processed like all other records, using zone analysis. The only special processing involved is the propagation of BAF module 720. This module is generated in response to the presence of the `lnp_dip` field in the CDB.

## Processing Transit/Tandem Calls

InterLATA calls can originate at, terminate at, or pass through the Cisco MGC generating the BAF records. Originating records are distinguished from terminating records by the appropriate use of the BAF calltype field in the Map Type table. BAMS identifies a call as an originating interLATA call if only the egress trunk group is populated. Similarly, BAMS identifies a terminating call as an interLATA call if only the ingress trunk group is populated.

However, it is also possible for a call to transit, or pass through the Cisco MGC. If the ingress and egress fields are populated, this call can be identified. BAMS does not support BAF record types for tandem calls. Rather, BAMS separates interLATA calls into three subcategories: originating, terminating, and tandem. The Map Type table provides user-configurable record types. By default, structure code 625/call type 110 is used for interLATA tandem calls.

# BAF Output Provisioning Example

The following example shows a BAF output provisioning script.

```
set-node:1:
prov-sta::srcver="new",dstver="baf",confirm
set-nodename::name="london"
prov-add:poll:host-name1="va-lewis",rem-dir1="/opt/CiscoMGC/var/bam",file-prefix1="cdr*",file-suffix1=".bin",action="R",interval=1,timeout=5,maxtries=3,host-name2="va-clark",rem-dir2="/opt/CiscoMGC/var/bam",file-prefix2="cdr*",file-suffix2=".bin",protocol="ftp"
prov-add:SWITCHINFO:sensortype="118",sensorid="999999",recoffctype="118",recoffcid="999999"
"
prov-add:TRUNKGRP:trunkgrp=2002,connection="D",orgnpa=120,trmpa=120
prov-add:TRUNKGRP:trunkgrp=2017,connection="T",orgnpa=121,trmpa=120
prov-add:ZONE-INFO:zone=1,info="zones 1-10 same dpc as w/2002"
prov-add:ZONE-INFO:zone=11,info="zones 11-18 same dpc as w/2017"
prov-add:NPANXX:npnxxx=120200,lata=1,zone=1
prov-add:NPANXX:npnxxx=120201,lata=1,zone=1
prov-add:NPANXX:npnxxx=120202,lata=1,zone=2
prov-add:NPANXX:npnxxx=120203,lata=1,zone=3
prov-add:NPANXX:npnxxx=120204,lata=1,zone=4
prov-add:NPANXX:npnxxx=120205,lata=1,zone=5
prov-add:NPANXX:npnxxx=120206,lata=1,zone=6
prov-add:NPANXX:npnxxx=120207,lata=1,zone=7
prov-add:NPANXX:npnxxx=120208,lata=1,zone=8
prov-add:NPANXX:npnxxx=121700,lata=2,zone=11
prov-add:NPANXX:npnxxx=121701,lata=2,zone=11
prov-add:NPANXX:npnxxx=121702,lata=2,zone=12
prov-add:NPANXX:npnxxx=121703,lata=2,zone=13
prov-add:NPANXX:npnxxx=121704,lata=2,zone=14
prov-add:NPANXX:npnxxx=121705,lata=2,zone=15
prov-add:NPANXX:npnxxx=121706,lata=2,zone=16
prov-add:NPANXX:npnxxx=121707,lata=2,zone=17
prov-add:NPANXX:npnxxx=121708,lata=2,zone=18
prov-add:MAPTYPE:matype="FLAT",calltype="1",answered="502",unanswered="20"
prov-add:MAPTYPE:matype="MESSAGE",calltype="1",answered="20",unanswered="20"
prov-add:MAPTYPE:matype="INTRALATA",calltype="6",answered="1",unanswered="1"
```

```

prov-add:MAPTYPE:maptype="INTERLATAORIGINATING", calltype="110", answered="625", unanswered="
625"
prov-add:MAPTYPE:maptype="INTERLATATERMINATING", calltype="119", answered="625", unanswered="
653"
prov-add:MAPTYPE:maptype="INTERLATATANDEM", calltype="110", answered="625", unanswered="625"
prov-add:MAPTYPE:maptype="TOLLFREE", calltype="141", answered="360", unanswered="-1"
prov-add:RATING-TYPE:orgzone=1, trmzone=11, ratetype="FLAT"
prov-add:RATING-TYPE:orgzone=2, trmzone=12, ratetype="MESSAGE"
prov-add:RATING-TYPE:orgzone=3, trmzone=13, ratetype="INTRALATA"
prov-add:RATING-TYPE:orgzone=4, trmzone=14, ratetype="INTERLATA"
prov-add:RATING-TYPE:orgzone=5, trmzone=15, ratetype="INTERLATA"
prov-add:RATING-TYPE:orgzone=6, trmzone=16, ratetype="FLAT"
prov-add:RATING-TYPE:orgzone=7, trmzone=17, ratetype="FLAT"
prov-add:RATING-TYPE:orgzone=7, trmzone=18, ratetype="FLAT"
prov-add:P01FILTER:answered=1, noanswer=1, busy=1, other=1
prov-add:NODEPARMS:activate=1, statoutput=0, bafoutput=1, asciihafoutput=1, asciioutput=0,
lookupinfo=1, bafinfo=1, dynamicaccumes=0, sup-zero-counts=0, interval-minutes=15,
nailed-cfg=0, p01output=0, p01prefix="p01_", enable-h323=0, extasciioutput=0, nicsoutput=0,
bin1110output=0, qosoutput=0,
prov-add:TOLLFREE:digits=1800
prov-add:TOLLFREE:digits=800
prov-add:TOLLFREE:digits=1888
prov-add:TOLLFREE:digits=888
prov-add:TOLLFREE:digits=1877
prov-add:TOLLFREE:digits=877
prov-add:SKIPPCDB:id=1020
prov-dply:

```

## Call Area Provisioning Example

Figure 6-1 shows a hypothetical BAMS provisioning scenario. A fictional metropolitan city, River City, has been designed to include multiple call zones, local access and transport areas (LATAs), and numerous central offices.

## Designing a Billing Plan

Before any provisioning is done, a plan must be developed that determines how BAMS constructs billing records for the implementation in question. Many different methods can be used to accomplish a desired result. BAMS is designed to allow a customer to design billing applications that are unique to any configuration.



### Caution

Customer billing-system expert inputs are necessary for anyone wishing to configure BAMS for BAF. The information in the following sections is provided by way of example only.

## Assumptions Used in This Example

In Figure 6-1, some origination points can call to any point within the metropolitan area, with no toll charged. A call type is determined by BAMS as a relationship between zones. BAMS can be configured to specify that a certain call type produces, or does not produce, a billing record. Obviously, the downstream billing system can determine which records are billable and which are informational only.

Keep in mind the following general information about the metropolitan area shown in Figure 6-1:

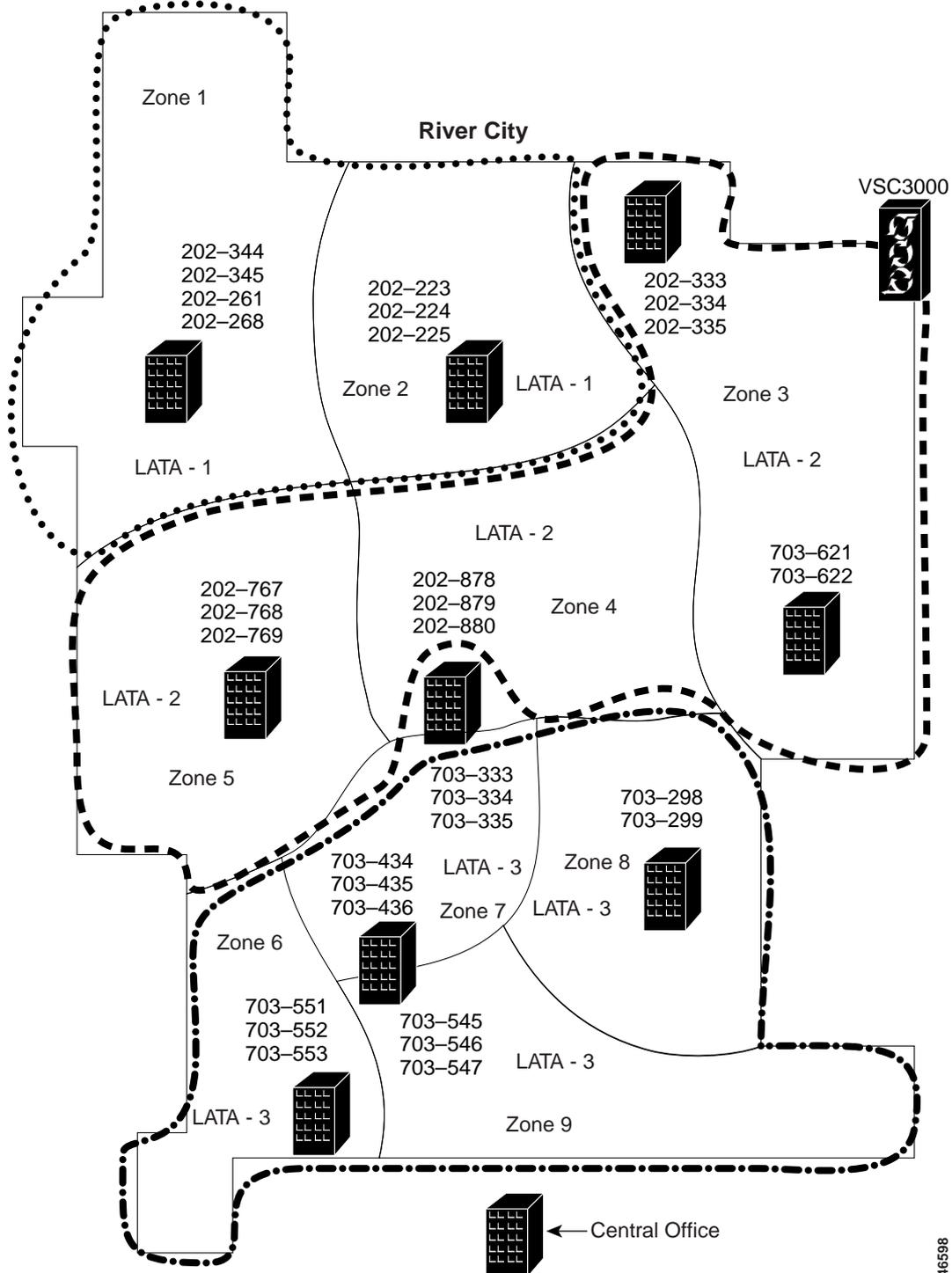
- There are three LATAs, labeled 1, 2, and 3.

- Any zone that is adjacent to another zone within the same LATA is marked as FLAT.
- Calls that cross LATAs are marked as interLATA.
- A call that originates and terminates in zones that are not adjacent, but that are in the same LATA, is designated as MESSAGE to indicate a banded billing rate.

From the North American Bell System, the concept of LATAs is a traditional boundary concept that is supported by BAMS. These are geographic regions, defined by NPANXX containment. BAF output sometimes requires LATA assignment for certain record types. Because BAMS is not geared toward local exchange routing guide (LERG) data, a downstream system could use the LATA designation for other purposes.

LERG data is not resident on BAMS.

Figure 6-1 River City Metropolitan Example



46598

## Zone Membership

Each NPANXX combination that is supported within the metropolitan area must be a member of a zone. Otherwise, the unknown call origination or termination point is considered to be out of the calling area, and the call is tagged as INTERLATAORIGINATING or INTERLATATERMINATING.



Note

Zoning provides a mechanism for differentiating between rating types (for example, flat rate and message calls).

In the example in [Figure 6-1](#), the following commands would be used to assign zone membership in zone 1:

```
prov-add:NPANXX:npanxx=202344,zone=1,lata=1
prov-add:NPANXX:npanxx=202345,zone=1,lata=1
prov-add:NPANXX:npanxx=202261,zone=1,lata=1
prov-add:NPANXX:npanxx=202268,zone=1,lata=1
```

As a further example, the following commands would be used to assign zone membership in zone 9:

```
prov-add:NPANXX:npanxx=703545,zone=9,lata=3
prov-add:NPANXX:npanxx=703546,zone=9,lata=3
prov-add:NPANXX:npanxx=703547,zone=9,lata=3
```

## Free Calling Between Zones

Assume that the billing design in this example states that, if a call originates in one zone and is intended for an adjacent zone, the call type should be FLAT. The following commands implement FLAT for adjacent zones. Note that the calling plan must be implemented in both directions, because zone A might be allowed to call zone B for free, but not the other way around.

```
prov-add:RATING-TYPE:ORGZONE=1,TRMZONE=2,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=2,TRMZONE=1,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=1,TRMZONE=5,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=5,TRMZONE=1,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=1,TRMZONE=4,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=4,TRMZONE=1,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=2,TRMZONE=3,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=3,TRMZONE=2,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=2,TRMZONE=4,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=4,TRMZONE=2,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=3,TRMZONE=4,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=4,TRMZONE=3,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=3,TRMZONE=8,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=8,TRMZONE=3,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=8,TRMZONE=4,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=4,TRMZONE=8,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=8,TRMZONE=7,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=7,TRMZONE=8,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=8,TRMZONE=9,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=9,TRMZONE=8,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=4,TRMZONE=7,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=7,TRMZONE=4,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=5,TRMZONE=4,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=4,TRMZONE=5,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=6,TRMZONE=5,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=5,TRMZONE=6,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=6,TRMZONE=7,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=7,TRMZONE=6,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=6,TRMZONE=9,RATETYPE="FLAT"
```

```
prov-add:RATING-TYPE:ORGZONE=9,TRMZONE=6,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=9,TRMZONE=7,RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=7,TRMZONE=9,RATETYPE="FLAT"
```

## Banded Message Rates

In [Figure 6-1](#), many zones are not adjacent to other zones. The following commands set up MESSAGE rate call types for calls from zone 6 and zone 8, which are not adjacent to each other but are in the same LATA. In the example shown in [Figure 6-1](#), many zone relationships of this type could occur.

```
prov-add:RATING-TYPE:ORGZONE=6,TRMZONE=8,RATETYPE="MESSAGE"
prov-add:RATING-TYPE:ORGZONE=8,TRMZONE=6,RATETYPE="MESSAGE"
```

## Configuring Trunk Groups for InterLATA Calls

Calls that cross LATA boundaries are normally considered toll calls, unless the zones are adjacent or an exception case is entered with the RATE-EXC tag ID. Because the default call type is interLATA (when either originating or terminating NPANXX is not found in the Zone Information table), the only provisioning required is on the ingress or egress trunk group.

For BAF billing records, the connectivity of the ingress or egress trunk determines the BAF direction of the calls. When configured properly, BAMS marks interLATA calls as INTERLATAORIGINATING or INTERLATATERMINATING. Because many telephone plan areas require only 7-digit dialing, the Trunk Group table is also used to populate default originating and terminating NPAs when fewer than 10 digits are received for the A number or the B number. Finally, each trunk group has multiple circuits, and the count of the number of circuits is captured in the Trunk Group table for different measurement calculations.

Although there are many trunk groups, in the example shown in [Figure 6-1](#), we configure only a few trunk groups for Direct (to an end office) and a few trunk groups for Tandem (to an access tandem type office). All trunk groups must be provisioned in the table for proper BAMS operation. Only a small sample is shown here:

```
prov-add:TRUNKGRP:trunkgrp=123,connection="D",orgnpa=703,trmnpa=202
prov-add:TRUNKGRP:trunkgrp=124,connection="T",orgnpa=703,trmnpa=201
prov-add:TRUNKGRP:trunkgrp=223,connection="D",orgnpa=703,trmnpa=202
prov-add:TRUNKGRP:trunkgrp=227,connection="T",orgnpa=703,trmnpa=408
```

## Configuring Adjacent Area Codes

Adjacent area codes present no problem to BAMS, because the key for the various lookup tables is based on the entire NPA-NXX (6-digit) string. Trunk groups must be provisioned, and, in the case of fewer than 10-digit dialing, they must indicate default originating and terminating NPAs.

## Configuring IntraLATA Calls

Cases might occur where a billing design does not use FLAT, or designates calls for adjacent zones to something other than flat rate so that the downstream system can treat those calls differently. The following example shows configuration for intraLATA calls between zones within the same LATA:

```
prov-add:RATING-TYPE:orgzone=5, trmzone=4, ratetype="INTRALATA"
prov-add:RATING-TYPE:orgzone=5, trmzone=6, ratetype="INTRALATA"
prov-add:RATING-TYPE:orgzone=5, trmzone=6, ratetype="INTRALATA"
```

```
prov-add:RATING-TYPE:orgzone=5, trmzone=6, ratetype="INTRALATA"
```

## Configuring Toll-Free Calls

Different countries have different designations for toll-free dialing. For this reason, BAMS maintains the Tollfree table for the NPANXX combinations that are considered toll free.



### Note

Any 800, 888, or 877 NPA results in a toll-free BAF record, overriding any zone or rating type designations.

Standard North American entries are provided here:

```
prov-add:TOLLFREE:digits=1800
prov-add:TOLLFREE:digits=1877
```

## Configuring a Metropolitan Calling Plan

Suppose that one set of NPANXXs could call FLAT to any zone in [Figure 6-1](#). This could happen if you set up an overlay zone that covers the entire area. The LATA field would be set up for each NPANXX, as appropriate.

To configure a metropolitan calling plan, perform the following steps:

**Step 1** Set up zone membership, zone 10 for the overlay:

```
prov-add:NPANXX:npnxxx=202388, zone=10, lata=1
prov-add:NPANXX:npnxxx=703488, zone=10, lata=3
```

**Step 2** Set up zone relationships so that the super-zone can call any other zone as FLAT, and any other zone can call the super-zone as FLAT.

```
prov-add:RATING-TYPE:ORGZONE=10, TRMZONE=1, RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=10, TRMZONE=2, RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=10, TRMZONE=3, RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=10, TRMZONE=4, RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=10, TRMZONE=5, RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=10, TRMZONE=6, RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=10, TRMZONE=7, RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=10, TRMZONE=8, RATETYPE="FLAT"
prov-add:RATING-TYPE:ORGZONE=10, TRMZONE=9, RATETYPE="FLAT"
```

## Configuring for a Rating Exception

Sometimes cases occur in which a particular NPANXX calling another NPANXX needs to be classified as a rating exception. For these cases, you can place an entry in the Rating Exception table, as follows:

```
prov-add:RATE-EXC:orgnpanxxx=202344, trmpanxxx=703299, ratetype="FLAT"
prov-add:RATE-EXC:orgnpanxxx=703299, trmpanxxx=202344, ratetype="FLAT"
```

## BAMS Provisioning Worksheets

Start from a worksheet for provisioning BAF by providing the following information:

**Step 1** Determine if the network is switched or is nailed up.



**Note** For a nailed up (Cisco SC2200) connection, define the field values in the Nailed Connection table using the SIGPATH tag ID. The fields are SIGPATH and TRUNKGRP. The SIGPATH parameter is a hex entry and should be prefixed by 0x.

**Step 2** Enter switch data in the Switch Information table. (Refer to the [“SWITCHINFO Tag ID” section on page 5-23.](#))

**Step 3** Define the Trunk Group table. You need to determine if each trunk is tandem or direct, default NPA for originating, or default NPA for terminating.



**Note** Define the Zone Information table by entering a number and a description for each zone.

**Step 4** Assign an NPANXX to each zone. (Refer to the [“NPANXX Tag ID” section on page 5-16.](#))

**Step 5** Assign a rate type (zone to zone). (Refer to the [“RATING-TYPE Tag ID” section on page 5-20.](#))

**Step 6** Define the structure code/call type for every rate type. (Refer to the [“MAPTYPE Tag ID” section on page 5-5.](#))

**Step 7** Define the toll-free NPAs. (Refer to the [“TOLLFREE Tag ID” section on page 5-30.](#))

**Step 8** Define rating exception cases. (Refer to the [“RATE-EXC Tag ID” section on page 5-20.](#))

**Step 9** Define the country codes. (Refer to the [“COUNTRY Tag ID” section on page 5-5.](#))

## BAF Configuration Parameters

### Updating BAF Structure Codes

Use the MAPTYPE tag ID to update selected BAF structure codes, such as category codes and call types. Refer to the [“MAPTYPE Tag ID” section on page 5-5](#) for field name descriptions and values.

Example:

```
prov-rtrv:MAPTYPE:
prov-ed:MAPTYPE:maptype=map type mnemonic,answered=new structure code,unanswered=new
structure code,calltype=new BAF call type number
```

## Adding a New Zone ID

Use the ZONE-INFO tag ID to add new zone IDs. Refer to the [“ZONE-INFO Tag ID”](#) section on page 5-34 for field name descriptions and values.

Example:

```
prov-rtrv:ZONE-INFO:
prov-add:ZONE-INFO:zone=<zone number>,desc="<description>"
```

## Adding a New NPANXX (Zone Membership)

Use the NPANXX tag ID to add new NPANXX information. Refer to the [“NPANXX Tag ID”](#) section on page 5-16 for field name descriptions and values.

Example:

```
prov-rtrv:NPANXX:npnxxx=<areacode and exchange 6 digits>
prov-add:NPANXX:npnxxx=<6digits>,lata=<lata number>,zone=<zonenumber>
```



## CHAPTER 7

# Configuring BAMS for ASCII Output and Measurements

---

Revised: March 10, 2011, OL-11618-18

## Overview

This chapter describes how to configure the Cisco Billing and Measurements Server (BAMS) for ASCII output and measurements.



Note

---

You enable ASCII and/or measurements output with the NODEPARMS tag ID. For more information, see the [“NODEPARMS Tag ID” section on page 5-11](#).

---

## ASCII Output

Many mediation systems depend on input data that is preformatted as ASCII. You can configure BAMS to create ASCII records. In addition to requiring ASCII records for billing purposes, the same mediation systems might require bearer-level measurements that are produced on BAMS. In order to satisfy both requirements, BAMS can produce ASCII output that mirrors what is currently produced on the Cisco MGC.

To enable ASCII record generation on BAMS, set the parameter `asciioutput` in the NODEPARMS tag ID to a value of 1 for ANSI output or 2 for ITU output. See [Chapter 2, “Setup and Installation,”](#) for further details.

BAMS creates ASCII 1110 records when a call has terminated. Filenames are identical to the names that are currently used on the Cisco MGC and BAMS, with the suffix changed to “csv” (that is, comma-separated values). For example, if a Tag-Length Value (TLV) billing file on the Cisco MGC is named `cdr_20000714195130_000777.bin` on the Cisco MGC, any file that is produced as a result of processing this file is named `cdr_20000714195130_000777.csv`. Some files are created with zero records, when no calls terminate during the processing of a TLV file from the Cisco MGC.

All fields for records 1110 and 1060 are written in comma-separated format. Tag 6000 (Virtual Switch Controller [VSC] ID) is collected from the 1090 Call Detail Block (CDB). The fields are written in the exact order specified in [Table 7-1](#). When a field was not created by the Cisco MGC, because the field did not apply to the type of call recorded, a blank field or zero field is inserted as a place holder.

A normalized set of fields, or CDEs, is written for every record type, even if that record type does not contain a particular field. In this way, the end user can quickly import the CDR ASCII file into a database with standard data-importing tools. If more fields are added at a later time, they are appended to the end of the record, so you can ignore them, or modify their database import structure by simply adding fields to the end of the layout.

The accuracy selection for time points is configurable in seconds or milliseconds. When you are using ASCII output from BAMS, either choice is possible, because a place holder for each type has been provided in the ASCII formatting layout. For each type of time point, two entries are contained in the output format, one for seconds and one for milliseconds of granularity.

A downstream mediation or billing system can parse these ASCII records easily. Each record is prefixed in the ASCII file with a record identifier field. For example, an 1110 record would begin this way: 1110,1234,5678,2222

**Table 7-1 ASCII Output Field Ordering: ANSI and ITU**

| Field | Tag                       | Description             | Format                |
|-------|---------------------------|-------------------------|-----------------------|
| 1     | 1060,<br>1090, or<br>1110 | CDB (record) identifier | Decimal               |
| 2     | 4000                      | CDB Version             | Decimal               |
| 3     | 4001                      | CDB Timepoint           | Seconds (decimal)     |
| 4     | 4002                      | Call Reference ID       | Hex                   |
| 5     | 4003                      | IAM Timepoint           | Seconds (decimal)     |
| 6     | 4004                      | ACM Timepoint           | Seconds (decimal)     |
| 7     | 4005                      | ANM Timepoint           | Seconds (decimal)     |
| 8     | 4008                      | Originating Trunk Group | Decimal               |
| 9     | 4009                      | Originating Member      | Decimal               |
| 10    | 4010                      | Calling Number          | Text                  |
| 11    | 4011                      | Charged Number          | Text                  |
| 12    | 4012                      | Dialed Number           | Text                  |
| 13    | 4014                      | Called Number           | Text                  |
| 14    | 4015                      | Terminating Trunk Group | Decimal               |
| 15    | 4016                      | Terminating Member      | Decimal               |
| 16    | 4028                      | First Release Source    | Decimal               |
| 17    | 4031                      | VSC Info Field          | Hex                   |
| 18    | 4100                      | IAM Timepoint rcvd ms   | Seconds, milliseconds |
| 19    | 4101                      | IAM Timepoint sent ms   | Seconds, milliseconds |
| 20    | 4102                      | ACM Timepoint rcvd ms   | Seconds, milliseconds |
| 21    | 4103                      | ACM Timepoint sent ms   | Seconds, milliseconds |
| 22    | 4104                      | ANM Timepoint rcvd ms   | Seconds, milliseconds |
| 23    | 4105                      | ANM Timepoint sent ms   | Seconds, milliseconds |
| 24    | 4106                      | First REL Timepoint ms  | Seconds, milliseconds |
| 25    | 4107                      | Second REL Timepoint ms | Seconds, milliseconds |

Table 7-1 ASCII Output Field Ordering: ANSI and ITU (continued)

| Field | Tag     | Description                                                                                          | Format                                                                                                                 |
|-------|---------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 26    | 4108    | RLC Timepoint rcvd ms                                                                                | Seconds, milliseconds                                                                                                  |
| 27    | 4109    | RLC Timepoint sent ms                                                                                | Seconds, milliseconds                                                                                                  |
| 28    | 2000    | ANSI Calling Party Category                                                                          | Decimal                                                                                                                |
| 29    | 2001    | ANSI User Service Information                                                                        | Hex                                                                                                                    |
| 30    | 2003    | ANSI Calling Number Nature of Address                                                                | Decimal                                                                                                                |
| 31    | 2004    | ANSI Charged Number Nature of Address                                                                | Decimal                                                                                                                |
| 32    | 2005    | ANSI Dialed Number Nature of Address                                                                 | Decimal                                                                                                                |
| 33    | 2007    | ANSI Called Number Nature of Address                                                                 | Decimal                                                                                                                |
| 34    | 2008    | ANSI Reason Code                                                                                     | Decimal                                                                                                                |
| 35    | 2013    | ANSI Transit Network Selection                                                                       | Hex                                                                                                                    |
| 36    | 2015    | ANSI Carrier Selection Parameter                                                                     | Decimal                                                                                                                |
| 37    | 3000    | ITU Calling Party Category                                                                           | Decimal                                                                                                                |
| 38    | 3001    | ITU User Service Information                                                                         | Hex                                                                                                                    |
| 39    | 3003    | ITU Calling Number Nature of Address                                                                 | Decimal                                                                                                                |
| 40    | N.A.    | Blank                                                                                                | N.A.                                                                                                                   |
| 41    | 3005    | ITU Dialed Number Nature of Address                                                                  | Decimal                                                                                                                |
| 42    | 3007    | ITU Called Number Nature of Address                                                                  | Decimal                                                                                                                |
| 43    | 3008    | ITU Reason Code                                                                                      | Hex<br><b>Note</b> The format for field 43 for ASCII output is Hex. For Extendable ASCII output the format is Decimal. |
| 44    | 6000    | VSC ID                                                                                               | Text                                                                                                                   |
| 45    | Derived | Subscriber Duration (4106 minus (whichever is greater: 4104 or 4105))                                | Seconds, milliseconds                                                                                                  |
| 46    | Derived | Network Usage Duration (whichever is greater: 4108 or 4109) minus (whichever is less: 4100 or 4101)) | Seconds, milliseconds                                                                                                  |
| 47    | 4060    | Redirecting Number                                                                                   | Decimal                                                                                                                |
| 48    | 5000    | Global Call Id                                                                                       | Text                                                                                                                   |

## Correlation of Billing Information

BAMS collects information about calls with the various Primary Interexchange Carrier (PIC) CDBs; therefore, at any point in time, some calls are terminating and some calls are just being set up. BAMS must collect the information from the various records, just as with a BAF output, and then output records only upon receipt of either a long-call duration record or a call termination event.

## Files and Records

The ASCII file contains the following records:

090 - File Header

110 - End of Call Record

060 - Long Call Duration Event

These files and records are written as if they had been produced from the Cisco MGC. The most significant information from the 1090 records is the VSC ID, and the time stamp and other information on that record should match corresponding entries in the 1090 record from the file that triggered the current file processing.

## Extendable ASCII Output

Extendable ASCII is based on ASCII output, but it includes four supplementary fields. These fields are appended to the end of a standard comma-separated value ASCII record, to create a new extendable ASCII record.



Note

In the table below, the field index is a reference to the field in the comma-separated billing output record. New fields 109 through 132 have been added in BAMS 3.30. CDE tags 4234 and 4235 were present in BAMS 3.20 but are only used in CDB 1071. They will not be generated on any billing outputs.

To enable extendable ASCII record generation on BAMS, use the NODEPARMS tag ID to set the extascioutput parameter to a value of 1 for ANSI output, or 2 for ITU output. See [“Configuring Node Parameters” section on page 2-17](#) for further details. For file-naming conventions, see the [“Table A-6Extendable ASCII Filename Elements” section on page A-6](#).

## Extendable ASCII Output Format

The following table illustrates the additional fields that are appended to a standard ASCII record. Each record is prefixed in the extendable ASCII file with a record identifier field (for example, an 1110 record would begin like this: 1110,1234,5678,2222). For details about the first 48 fields in an extendable ASCII record, see the [“ASCII Output” section on page 7-1](#).



Note

The format of Field 43, Tag 3008, ITU Reason Code for ASCII output is *hexadecimal*. The format of Field 43, Tag 3008, ITU Reason Code for Extendable ASCII output is *decimal*.

**Table 7-2 Extendable ASCII Output Field Ordering: ANSI and ITU**

| Field | Tag  | Description                       | Format              |
|-------|------|-----------------------------------|---------------------|
| 49    | 2002 | ANSI Originating Line Information | Hex                 |
| 50    | 4201 | Ingress SIP URL                   | 1 to 256 characters |
| 51    | 4202 | Egress SIP URL                    | 1 to 256 characters |
| 52    | 4203 | SIP Callid                        | 1 to 256 characters |

Table 7-2 Extendable ASCII Output Field Ordering: ANSI and ITU (continued)

| Field | Tag  | Description                                                | Format          |
|-------|------|------------------------------------------------------------|-----------------|
| 53    | 4204 | Source IP Address                                          | String          |
| 54    | 4205 | Ingress Media Device Address                               | String          |
| 55    | 4206 | Egress Media Device Address                                | String          |
| 56    | 4207 | Initial Codec                                              | String          |
| 57    | 4208 | Final Codec                                                | String          |
| 58    | 4209 | Ingress Media Device Port Number                           | String          |
| 59    | 4210 | Egress Media Device Port Number                            | String          |
| 60    | 4052 | Originating Gateway Primary Select                         | Decimal integer |
| 61    | 4053 | Terminating Gateway Primary Select                         | Decimal integer |
| 62    | 4061 | Tariff Rate                                                | Decimal integer |
| 63    | 4062 | Scale Factor                                               | Decimal integer |
| 64    | 4063 | Test Line Indicator                                        | Decimal integer |
| 65    | 4078 | Charge Band Number                                         | Decimal integer |
| 66    | 4079 | Furnish Charging Number                                    | String          |
| 67    | 4080 | Original Called Number                                     | String          |
| 68    | 4081 | T.38 Fax Call                                              | String          |
| 69    | 4082 | Charge Unit Number                                         | Decimal integer |
| 70    | 4034 | Ingress Originating Point Code                             | Decimal         |
| 71    | 4035 | Ingress Destination Point Code                             | Decimal         |
| 72    | 4036 | Egress Originating Point Code                              | Decimal         |
| 73    | 4037 | Egress Destination Point Code                              | Decimal         |
| 74    | 4046 | Ingress Packet Info                                        | Decimal         |
| 75    | 4047 | Egress Packet Info                                         | Decimal         |
| 76    | 4068 | Ingress BearChanId                                         | Decimal         |
| 77    | 4072 | Egress BearChanId                                          | Decimal         |
| 78    | 4083 | Charge Indicator                                           | Decimal         |
| 79    | 4084 | Outgoing Calling Party Number                              | Text            |
| 80    | 4085 | MCID Request Indicator                                     | Decimal         |
| 81    | 4086 | MCID Response Indicator                                    | Decimal         |
| 82    | 4087 | Ingress MGCP DLCX (Delete Connection)<br>return code value | Decimal         |
| 83    | 4088 | Egress MGCP DLCX (Delete Connection)<br>return code value  | Decimal         |
| 84    | 4089 | Network Translated Address Indicator                       | Decimal         |
| 85    | 4090 | Reservation Request Accepted                               | Decimal         |
| 86    | 4091 | Reservation Request Error Count                            | Decimal         |
| 87    | 4092 | ATM Ingress Configured Profile                             | Text            |

Table 7-2 Extendable ASCII Output Field Ordering: ANSI and ITU (continued)

| Field | Tag  | Description                                                                    | Format                                                                                                        |
|-------|------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 88    | 4093 | ATM Egress Configured Profile                                                  | Text                                                                                                          |
| 89    | 4094 | ATM Negotiated Profile                                                         | Text                                                                                                          |
| 90    | 4095 | Route List Name                                                                | Text                                                                                                          |
| 91    | 4096 | Route Name                                                                     | Text                                                                                                          |
| 92    | 4097 | MGCP Script Response String                                                    | Text                                                                                                          |
| 93    | 4211 | Originating VPN ID                                                             | Text                                                                                                          |
| 94    | 4212 | Terminating VPN ID                                                             | Text                                                                                                          |
| 95    | 4213 | Meter Pulses Received                                                          | Decimal                                                                                                       |
| 96    | 4214 | Meter Pulses Sent                                                              | Decimal                                                                                                       |
| 97    | 4215 | Charge Tariff Info                                                             | Decimal; CDE minimum length 8 characters, CDE maximum length 68 characters (MGC Billing Specification Rev 86) |
| 98    | 4216 | Advice of Charge Indicator                                                     | Decimal                                                                                                       |
| 99    | 4217 | Short Call Indicator                                                           | Decimal                                                                                                       |
| 100   | 4218 | Charge Limit Exceeded                                                          | Decimal                                                                                                       |
| 101   | 4219 | CALL Recovered Indication                                                      | Decimal                                                                                                       |
| 102   | 4220 | Partial CLI                                                                    | Hex                                                                                                           |
| 103   | 4221 | Service Activation                                                             | Decimal                                                                                                       |
| 104   | 4222 | PRI AOC Invoke Type                                                            | Decimal                                                                                                       |
| 105   | 4223 | PRI AOC – S Charge Information                                                 | Decimal; CDE minimum length 6 characters, CDE maximum length 68 characters (MGC Billing Specification Rev 86) |
| 106   | 4224 | PRI AOC – D Charge Information                                                 | Decimal; CDE minimum length 10characters, CDE maximum length 70 characters (MGC Billing Specification Rev 86) |
| 107   | 4225 | PRI AOC – E Charge Information                                                 | Decimal; CDE minimum length 10characters, CDE maximum length 70 characters (MGC Billing Specification Rev 86) |
| 108   | 4226 | PRI AOC Invoke Failure                                                         | Decimal                                                                                                       |
| 109   | 4227 | Route Optimization/Path Replacement Action                                     | Hexadecimal                                                                                                   |
| 110   | 4228 | Route Optimization/Path Replacement call reference of associated call instance | Hexadecimal                                                                                                   |
| 111   | 4229 | Route Optimization/Path Replacement trunk group information                    | Decimal                                                                                                       |
| 112   | 4230 | Route Optimization/Path Replacement channel information                        | Decimal                                                                                                       |

Table 7-2 Extendable ASCII Output Field Ordering: ANSI and ITU (continued)

| Field | Tag  | Description                                          | Format                                        |
|-------|------|------------------------------------------------------|-----------------------------------------------|
| 113   | 4231 | Route Optimization Switchover Timestamp              | Decimal                                       |
| 114   | 4232 | Rejecting Location Label                             | String                                        |
| 115   | 4233 | Rejecting Location Label Direction                   | Hexadecimal                                   |
| 116   | 4236 | H323 Destination                                     | String                                        |
| 117   | 4237 | Ingress Redirecting Number                           | String                                        |
| 118   | 4238 | Currently undefined in BAMS 3.30                     |                                               |
| 119   | 4239 | Service Usage Data                                   | Hexadecimal                                   |
| 120   | 4240 | Indicates whether or not CNAM is invoked.            | Decimal integer:<br>0 = NO QUERY<br>1 = QUERY |
| 121   | 4242 | Terminating Remote SIP Host                          | String                                        |
| 122   | 4243 | Terminating Local SIP Host                           | String                                        |
| 123   | 4244 | License Reject License Protocol                      | String                                        |
| 124   | 4245 | License Rejecting Direction                          | Hexadecimal                                   |
| 125   | 4013 | LRN number                                           | String                                        |
| 126   | 2018 | ANSI Egress Calling number Nature of Address         | Hexadecimal                                   |
| 127   | 2019 | ANSI Egress Redirecting number Nature of Address     | Hexadecimal                                   |
| 128   | 2020 | ANSI Egress Original Called Number Nature of Address | Hexadecimal                                   |
| 129   | 3018 | ITU Egress Calling number Nature of Address          | Hexadecimal                                   |
| 130   | 3019 | ITU Egress Redirecting number Nature of Address      | Hexadecimal                                   |
| 131   | 3020 | ITU Egress Original Called Number Nature of Address  | Hexadecimal                                   |

## Redirecting Number and Display Name Enhancement

The Redirecting number and Display name enhancement enables the Cisco BAMS software to deposit Display Name (tag 4059) to Extendable ASCII output.

# Operational Measurements

## Defining Bucket Size

The bucket size refers to the measurements interval that is set up during installation through use of the NODEPARMS tag ID.

To change the system settings for the measurement intervals, for example, to take measurements every 5 minutes, you can update the Node Parameters table.

Refer to the [“Updating the Node Parameters Table” section on page 5-11](#) for further details.

## Setting Up the TCA Table

Use the TCA-TBL tag ID to set up the Threshold Crossing Alarms (TCA) table. The table is used to define the types of measurements that BAMS traps and makes available to downstream processes. Refer to the [“TCA-TBL Tag ID” section on page 5-25](#) for TCA-TBL tag ID field names, and to [Chapter 12, “Obtaining Measurements,”](#) for required values and a detailed description of the measuring process.

When a measurement threshold is crossed, an alarm is generated. This alarm is automatically cleared when the measurement statistics fall below the boundary. You set up the conditions to be monitored using the TCA-TBL tag ID. The following example shows which parameters you would set to achieve a specific result:

|                   |                                                                                                                                                                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Objective</b>  | Generate a threshold alarm for trunk group 008 that exceeds 10 egress call attempts during a specified interval.                                                                                                                          |
| <b>Parameters</b> | <ul style="list-style-type: none"> <li>• id/trkgrp = 0</li> <li>• Egress call attempt condition = 3 (greater than)</li> <li>• Egress call attempt value = 10</li> </ul>                                                                   |
| <b>Result</b>     | A threshold alarm is generated every time the call attempts exceed 10 in the interval. This alarm is set only once until it is cleared. It is cleared when the number of egress call attempts in the measurement interval drops below 10. |



Note

---

Set up only those measurement conditions in the TCA table that you are interested in monitoring (that is, not all table values need to be provisioned).

---



# CHAPTER 8

## Configuring BAMS for P01 Output

---

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### Overview

This chapter describes how to configure the Cisco Billing and Measurements Server (BAMS) for P01 billing records. You enable P01 output with the NODEPARMS tag ID. For more information, see the [“NODEPARMS Tag ID” section on page 5-11](#).

### P01 Output

P01 output files are created by the P01 task. These files are stored in the p001 subdirectory of the data directory. The file layout of the P01 output format includes a header record, call detail record(s), and a trailer record. This data format is binary and is not viewable by a standard text viewer. The P01 file-naming conventions are explained in [“File-Naming Conventions” section on page A-4](#).

### Customized MML Parameters

By default, BAMS generates ASCII output records when processing MGC input data. To turn on the generation of P01 data files, set the p01 output parameter in the Node Parameters table to 1.

The P01 filename format is based on the filename of the raw data files from the MGC:

```
<p01prefix><raw MGC data filename>
```

The default P01 prefix is p01\_. You can change this prefix by modifying the p01prefix parameter in the Node Parameters table. For example, suppose that an input MGC file is named cdr\_200012252359\_012345.bin. The output P01 file is named p01\_cdr\_200012252359\_012345.bin. Setting this parameter to NULL creates an output filename that is the same as the input filename.

Examples:

Change the filename prefix of P01 files to “info\_”:

```
$ mml
```

```
Copyright (C) 1998-2004, Cisco Systems, Inc.
mml:1>prov-sta::srcver=active,dstver=example,confirm
Billing and Measurements Server - BAMS-00 2004-07-27 13:59:06
B COMPLD
```

```

;
mml:1>prov-ed:nodeparms:p01prefix="info_"
Billing and Measurements Server - BAMS-00 2004-07-27 13:59:37
B COMPLD
 "NODEPARMS"
;
mml:1>prov-rtrv:nodeparms:
Billing and Measurements Server - BAMS-00 2004-07-27 14:00:03
B RTRV
NODEPARMS:statoutput=1,bafoutput=0,asciioutput=0,lookupinfo=1,bafinfo=0,p01output=1,
qosoutput=0,

p01prefix="info_"
;
mml:1>prov-dply:
Billing and Measurements Server - BAMS-00 2004-07-27 14:00:23
B COMPLD
;
mml:1>quit

```

Turn off the generation of P01 files:

```
$ mml
```

```

Copyright (C) 1998-2004, Cisco Systems, Inc.
mml:1>prov-sta::srcver=active,dstver=example,confirm
Billing and Measurements Server - BAMS-00 2004-07-27 13:59:06
B COMPLD
;
mml:1>prov-ed:nodeparms:p01output=0
Billing and Measurements Server - BAMS-00 2004-07-27 13:59:57
B COMPLD
 "NODEPARMS"
;
mml:1>prov-rtrv:nodeparms:
Billing and Measurements Server - BAMS-00 2004-07-27 14:00:03
B RTRV
NODEPARMS:statoutput=1,bafoutput=0,asciioutput=0,lookupinfo=1,bafinfo=0,p01output=0,
qosoutput=0,

p01prefix="info_"
;
mml:1>prov-dply:
Billing and Measurements Server - BAMS-00 2004-07-27 14:00:23
B COMPLD
;
mml:1>quit

```

## Filtering Calls Based on Cause Codes

You can configure the P01 program to filter out certain types of calls based on the cause code of the original MGC data record. The P01FILTER tag ID has four parameters that define the call type: ANSWERED, NOANSWER, BUSY, and OTHER. You can set these parameters to 1 to output CDR records of the specified call type, or to 0 to filter the specified records from the output. The call types are defined by the cause code values (see [Table 8-1](#)).

**Table 8-1** P01 Call Types and Cause Codes

| Cause Code      | P01 Call Type |
|-----------------|---------------|
| 16, 31          | ANSWERED      |
| 19              | NOANSWER      |
| 17              | BUSY          |
| ALL OTHER CODES | OTHER         |

You can use the **prov-ed** command in conjunction with the P01FILTER tag ID to edit the default filtering values. For more information about configuring P01 filtering, see the [“Updating the P01 Filter Table” section on page 5-17](#).

The following example shows how to turn off all output except for answered calls:

```
$ mml
mml:1> prov-sta::srcver=active,dstver=example,confirm
Billing and Measurements Server - BAMS-00 2004-07-27 14:02:02
B COMPLD
;
mml:1>prov-rtrv:p01filter:
Billing and Measurements Server - BAMS-00 2004-07-27 14:02:12
B RTRV
 "P01FILTER:answered=1,noanswer=1,busy=1,other=1"
;
mml:1>prov-ed:p01filter:noanswer=0,busy=0,other=0
Billing and Measurements Server - BAMS-00 2004-07-27 14:02:42
B COMPLD
 "P01FILTER"
;
mml:1>prov-rtrv:p01filter:
Billing and Measurements Server - BAMS-00 2004-07-27 14:02:51
B RTRV
 "P01FILTER:answered=1,noanswer=0,busy=0,other=0"
;
mml:1>prov-dply::
Billing and Measurements Server - BAMS-00 2004-07-27 14:02:56
B COMPLD
;
```

## P01 Data Format

Table 8-2, Table 8-3, and Table 8-4 define the header, call detail, and trailer data records of the P01 output format. The field name, length, description, format/contents, and MGC mapping for the P01 header record are described in Table 8-2.

**Table 8-2 P01 Header Record**

| Field | Field Name        | Length (Bytes) | Description                 | Format/Contents                        | MGC Mapping                                   |
|-------|-------------------|----------------|-----------------------------|----------------------------------------|-----------------------------------------------|
| 1     | Length            | 2              | Record length               | BCD / (= 60)                           |                                               |
| 2     | Record identifier | 1              | Record identifier           | BCD / (= 00)                           |                                               |
| 3     | Switch ID         | 30             | Switch name                 | ASCII, left aligned filled with spaces | Tag 6000                                      |
| 4     | Creation date     | 4              | Logical block creation date | BCD                                    | Tag 4001 is converted from UTC to Local time. |
| 5     | Creation time     | 3              | Logical block creation date | BCD                                    | Tag 4001 is converted from UTC to Local time. |
| 6     | Spare             | 20             | Spare                       | (filled with HEX 0xFF)                 |                                               |

The field name, length, description, format/contents, and MGC mapping for the P01 call detail record are described in Table 8-3.

**Table 8-3 P01 Call Detail Record**

| Field | Field Name         | Length (Bytes) | Description        | Format/Contents              | MGC Mapping                                                                                                                                                                                                              |
|-------|--------------------|----------------|--------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Length             | 2              | Record length      | BCD (= 110)                  | Fixed                                                                                                                                                                                                                    |
| 2     | Record type        | 1              | Record type        | BCD (= 11)                   | Fixed                                                                                                                                                                                                                    |
| 3     | Called number      | 12             | Called number      | BCD (left aligned, filler F) | Tag 4012                                                                                                                                                                                                                 |
| 4     | Called number type | 2              | Called number type | BCD                          | Derived from tag 3005 (Dialed Number Nature of Address) and populated as follows: <ul style="list-style-type: none"> <li>NoA = international: "0"</li> <li>NoA = national: "1"</li> <li>NoA = subscriber: "2"</li> </ul> |

Table 8-3 P01 Call Detail Record (continued)

| Field | Field Name              | Length (Bytes) | Description                               | Format/Contents                          | MGC Mapping                                                                                                                                                                                                                                                                                                                                                                                         |
|-------|-------------------------|----------------|-------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5     | Calling category        | 2              | Calling category                          | BCD                                      | Derived from tag 3000 (Calling Party Category) populated as follows: <ul style="list-style-type: none"> <li>• CPC unknown: "0"</li> <li>• Operator, language French: "1"</li> <li>• Operator language English: "2"</li> <li>• Operator language German: "3"</li> <li>• Operator language Russian: "4"</li> <li>• Operator language Spanish: "5"</li> <li>• ...</li> <li>• Payphone: "15"</li> </ul> |
| 6     | Conversation start date | 4              | Conversation start date                   | BCD, format yyyymmdd                     | Tag 4104 or 4105 is converted from UTC to Local time.                                                                                                                                                                                                                                                                                                                                               |
| 7     | Conversation start time | 4              | Conversation start time                   | BCD, format hhmmss                       | Tag 4104 or 4105 is converted from UTC to Local time.                                                                                                                                                                                                                                                                                                                                               |
| 8     | Conversation duration   | 5              | Conversation duration (tenths of seconds) | BCD                                      | Derived, 4106 minus 4104 or 4105                                                                                                                                                                                                                                                                                                                                                                    |
| 9     | Call type               | 2              | Call typology                             | BCD                                      | If (Tag 4069 = 1) then callType = 7; else callType = 4                                                                                                                                                                                                                                                                                                                                              |
| 10    | Destination             | 12             | Real number used for call                 | BCD (left-aligned, filler "F")           | Tag 4014                                                                                                                                                                                                                                                                                                                                                                                            |
| 11    | Destination type        | 2              | Destination number type                   | BCD                                      | Derived from tag 3007 (Called Number Nature of Address) and populated as follows: <ul style="list-style-type: none"> <li>• NoA = international: "0"</li> <li>• NoA = national: "1"</li> <li>• NoA = subscriber: "2"</li> <li>• NoA = other values: "1"</li> </ul>                                                                                                                                   |
| 12    | Incoming trunk          | 13             | Incoming trunk ID                         | ASCII (left-aligned, filled with spaces) | BAMS augmented                                                                                                                                                                                                                                                                                                                                                                                      |

Table 8-3 P01 Call Detail Record (continued)

| Field | Field Name           | Length (Bytes) | Description          | Format/Contents                | MGC Mapping                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------|----------------------|----------------|----------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13    | Outgoing trunk       | 13             | Outgoing trunk ID    | ASCII                          | This field is populated according to the following conditions: <ul style="list-style-type: none"> <li>For switched mode; that is, if NODEPARMS nailed-cfg = 0, this field is populated with the Egress Trunk Group, which is derived from tag 4015, but only when the trunk group is present in the trunk group table. The field is left blank if the trunk group is not present in the trunk group table.</li> <li>For nailed mode; that is, if NODEPARMS nailed-cfg = 1, this field is populated with FF.</li> </ul> |
| 14    | Calling number       | 12             | Calling number       | BCD (left-aligned, filler "F") | Tag 4010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 15    | Calling number type  | 2              | Calling number type  | BCD                            | Derived from tag 3003 (Calling Number Nature of Address) as follows: <ul style="list-style-type: none"> <li>NoA = international: "0"</li> <li>NoA = national: "1"</li> <li>NoA = subscriber: "2"</li> <li>NoA = other values: "1"</li> </ul>                                                                                                                                                                                                                                                                           |
| 16    | Bearer capability    | 2              | Bearer capability    | BCD                            | Derived from tag 3001 (User Service Information) as follows: <ul style="list-style-type: none"> <li>Speech 3.1 kHz: "0"</li> <li>Audio 3.1 kHz: "1"</li> <li>Digital 64 kbit/s: "2"</li> <li>Audio 7 kHz: "6"</li> </ul>                                                                                                                                                                                                                                                                                               |
| 17    | Call result          | 2              | Call result          | BCD                            | Derived from the last seven bits of tag 3008 as follows: <ul style="list-style-type: none"> <li>Call successful with answer: "1"</li> <li>Call successful without answer (no reply): "4"</li> <li>Call successful, user busy: "5"</li> </ul>                                                                                                                                                                                                                                                                           |
| 18    | Teleservice          | 2              | Teleservice          | BCD                            | This field hard coded to the value "4"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 19    | Call connection type | 2              | Call connection type | BCD                            | Logic based on Field 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 20    | DST indicator        | 1              | DST indicator        | BCD                            | BAMS augmented                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

**Table 8-3 P01 Call Detail Record (continued)**

| Field | Field Name               | Length (Bytes) | Description                           | Format/Contents            | MGC Mapping |
|-------|--------------------------|----------------|---------------------------------------|----------------------------|-------------|
| 21    | Partial record           | 1              | Partial record                        | BCD (= "0")                | Default 0   |
| 22    | LCE-id                   | 3              | LCE-id                                | BCD (filled with HEX "FF") | Hex FF      |
| 23    | Call identity number     | 3              | Call identity number                  | BCD (filled with HEX "FF") | Hex FF      |
| 24    | Restart/reload indicator | 1              | Restart/reload indicator (future use) | BCD (filled with HEX "FF") | Hex FF      |
| 25    | Spare                    | 5              | Spare                                 | Filled with HEX "FF"       | Hex FF      |

The field name, length, description, format/contents, and MGC mapping for the P01 tail record are described in [Table 8-4](#).

**Table 8-4 P01 Tail Record**

| Field | Field Name        | Length (Bytes) | Description                              | Format/Contents      | MGC Mapping                  |
|-------|-------------------|----------------|------------------------------------------|----------------------|------------------------------|
| 1     | Length            | 2              | Record length                            | BCD (= 18)           | 18                           |
| 2     | Record identifier | 1              | Record identifier                        | BCD (= 90)           | 90                           |
| 3     | CDR number        | 5              | Number of CDR contained in logical block | BCD                  | Counted and inserted in BAMS |
| 4     | Spare             | 10             | Spare                                    | Filled with HEX "FF" | FF                           |





## CHAPTER 9

# Configuring BAMS for NICS Output

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Revised: March 10, 2011, OL-11618-18

## Overview

This chapter describes the NICS billing record output by the Cisco Billing and Measurements Server (BAMS). You enable NICS output with the NODEPARMS tag ID. For more information, see the [“NODEPARMS Tag ID” section on page 5-11](#).

Once you have configured your system for NICS output you also need to populate the prefix field in the Trunk Group table (see the [“TRUNKGRP—Trunk Group Table” section on page 5-31](#)), and the fields in the Trunk Group Prefix table (see the [“TKGPREFIX—Trunk Group Prefix Table” section on page 5-33](#)).

## NICS Output

NICS output files are created by the NIC task. These files are stored in the NICS subdirectory of the `/data/nodename` directory (for example, `/data/s0x/NICS`). The fields generated in the NICS output are explained in [Table 9-1](#). The NICS file-naming conventions are explained in [“File-Naming Conventions” section on page A-4](#).

## NICS Data Format

[Table 9-1](#) defines the field name, format, length, PGW 2200 CDB, CDE tag numbers and derivation mapping, and padding and alignment for NICS output.

Table 9-1 NICS Output Field Ordering

| Field | Field Name                         | Format                                  | PGW 2200 CDB, CDE Tag Numbers and Derivation                                                                                                                                                                                                                                                                                                                                                               | Padding and Alignment               |
|-------|------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1     | Record Sequence Number (RSN)       | (1-25 digits), number in decimal format | No direct mapping.<br>BAMS generates the RSN on its own as a 64-bit integer, starting from 1.<br>First record, RSN = 1.<br>Second record, RSN=2, ...<br>The Nth record,<br>RSN = N, ...<br>The RSN is not reset when BAMS restarts or when BAMS generates a new output file.                                                                                                                               | None                                |
| 2     | Call Event ID                      | char (26)                               | Char (1-6), softswitch group ID, first 6 characters of tag 6000 from 1090 CDB.<br>Char (7-14), date in YYYYMMDD format, using value from tag 4100/4101 in CDB 1010 or 1030, uses 4001 if neither is available.<br>Char (15-23), time in HHMMSSmmm format.<br>Char (24-26), the sequence number, decimal format left padded by 0. Uses the last 3 digits of the following number:<br>(tag4002) & 0xffffffff |                                     |
| 3     | NICS Identifier (a.k.a. Switch id) | char (10)                               | CDE tag 6000 from CDB 1090. Tag 6000 may contain up to 32 characters, only up to the first 10 characters are used                                                                                                                                                                                                                                                                                          | None                                |
| 4     | Call Direction                     | number 1                                | No direct mapping available, not required, always populated with the digit "0"                                                                                                                                                                                                                                                                                                                             | None                                |
| 5     | Link ID                            | number 1                                | All 1030 CDBs:<br>0 1040 CDBs without any previous 1060s<br>0 the first 1060, 1 the second and later 1060, 2 1040 with any previous 1060s, 3                                                                                                                                                                                                                                                               | None                                |
| 6     | Calling Party Cat                  | char(3)                                 | Same as tag 3000 or tag 2000 in 1010 or 1030 CDB, whichever is present. In decimal format, such as 000, 013, etc. Defaults to "000" if no tag 2000 or 3000 is found.                                                                                                                                                                                                                                       | Right aligned, zero padded on left. |
| 7     | Origin Line Info                   |                                         | Same as tag 2002 or 3002 in 1010 or 1030 CDB. In decimal format, such as 000, 013, etc., defaults to "000" if no 3002 or 2002 is found.                                                                                                                                                                                                                                                                    | Right aligned, zero padded on left. |
| 8     | Jurisdiction                       | char(6)                                 | Populated with NUL.                                                                                                                                                                                                                                                                                                                                                                                        | None                                |

Table 9-1 NICS Output Field Ordering (continued)

| Field | Field Name                    | Format                           | PGW 2200 CDB, CDE Tag Numbers and Derivation                                                                                                                 | Padding and Alignment         |
|-------|-------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 9     | Called NAI                    | number, 3 digits, decimal format | Tag 3007 or 2007 from 1010 or 1030 CDB.                                                                                                                      | Right aligned, padded by 0    |
| 10    | Calling NAI                   | number, 3 digits, decimal format | Tag 2017 or 3017 from 1010 or 1030 CDB, if present, else<br>Tag 2003 or 3003 from 1010 or 1030 CDB, if present, else<br>if tags are not present, set to 000. | Right aligned, padded by 0    |
| 11    | Charge NAI                    | number, 3 digits, decimal format | Tag 2004 from 1010 or 1030 CDB, defaults to 000 if tag is not available.                                                                                     | Right aligned, padded by 0    |
| 12    | Caller Presentation           | char (2)                         | Always 00.                                                                                                                                                   |                               |
| 13    | Media Type                    | char (2)                         | Always 00.                                                                                                                                                   |                               |
| 14    | Connection Date               | char (8)                         | Tag 4100 from 1010 or 1030 CDB.<br>Format: YYYYMMDD                                                                                                          |                               |
| 15    | Connection Time               | char (9)                         | Tag 4100 from 1010 or 1030 CDB.<br>Format: HHMMSSmmm                                                                                                         |                               |
| 16    | Answer Indicator              | number (1)                       | If both tags 4104 and 4105 are present in 1030 or 1010 CDB, the digit is 1. Otherwise the digit is 0.                                                        | None                          |
| 17    | Call Termination Code         | number (3), decimal              | Same as in tag 2008 or 3008 CDE. For example, "016", "031", defaults to NUL for long-duration records.                                                       | Right aligned, padded by "0". |
| 18    | Originating Country Code      | number (5)                       | Always NUL, not required.                                                                                                                                    | None                          |
| 19    | Outgoing Calling Party Number | char (40)                        | CDE 4060 if present, else<br>CDE 4084 if present, else<br>CDE 4010 if present, else<br>if tags are not present, set to NUL. <sup>1</sup>                     | None                          |
| 20    | Dialed Country Code           | number (5)                       | Always NUL, not required.                                                                                                                                    | None                          |
| 21    | Dialed Number                 | char (40)                        | CDE 4012 or CDE 4014 from 1010 or 1030 CDB. <sup>2</sup>                                                                                                     | None                          |
| 22    | Terminating Country Code      | number (5)                       | Always NUL, not required.                                                                                                                                    | None                          |
| 23    | Terminating Number            | char (40)                        | CDE 4014 from 1010 or 1030 CDB.                                                                                                                              | None                          |
| 24    | Charge Number                 | char (40)                        | CDE 4011.                                                                                                                                                    | None                          |

Table 9-1 NICS Output Field Ordering (continued)

| Field | Field Name                         | Format      | PGW 2200 CDB, CDE Tag Numbers and Derivation                                                                                                                                                                                                                                                                                                                     | Padding and Alignment                      |
|-------|------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| 25    | Elapsed Time                       | char (10)   | The earlier of 4106 or 4107 from CDB 1040/1030 minus the later of 4104 or 4105 from 1010/1030 CDB or the time stamp (4001) of the last 1060 CDB.<br><br>For long durations, this field uses the time stamp of the current 1060 (4001) minus the later of 4104/4105 from the 1010 CDB and the 4001 from the previous 1060 CDB (if any).<br><br>Format: HHHMMSSmmm | Right aligned for each subfield, 0 padded. |
| 26    | Carrier ID Code                    | char (4)    | CDE 2014 from 1010/1030, in decimal format, default NUL.                                                                                                                                                                                                                                                                                                         | None                                       |
| 27    | Ingress carrier connection date    | char (8)    | 4103 from 1010/1030 CDB.<br><br>Format: YYYYMMDD                                                                                                                                                                                                                                                                                                                 | None                                       |
| 28    | Ingress carrier connection time    | char (9)    | 4103 from 1010/1030 CDB.<br><br>Format: HHMMSSmmm                                                                                                                                                                                                                                                                                                                | None                                       |
| 29    | Ingress carrier disconnection date | char (8)    | If (CDE 4028 != 1), it uses earlier of CDE 4107 and 4106, otherwise it uses the later of the two.<br><br>Format: YYYYMMDD<br><br>NUL for long-duration records.                                                                                                                                                                                                  | None                                       |
| 30    | Ingress carrier disconnection time | char (9)    | If (CDE 4028 != 1), it uses earlier of CDE 4107 and 4106, otherwise it uses the later of the two.<br><br>Format: HHMMSSmmm<br><br>NUL for long-duration records.                                                                                                                                                                                                 |                                            |
| 31    | Ingress Remote Point Code          | char (9)    | CDE 4034 from 1010 or 1030.                                                                                                                                                                                                                                                                                                                                      |                                            |
| 32    | Ingress CIC ID                     | number (4)  | CDE 4068 from 1010 or 1030, default 0000                                                                                                                                                                                                                                                                                                                         | Right aligned, zero padded                 |
| 33    | Ingress – Access Device ID         | number (10) | Always 0000000000                                                                                                                                                                                                                                                                                                                                                | Right aligned, zero padded                 |
| 34    | Ingress Module                     | number (4)  | Always 0000                                                                                                                                                                                                                                                                                                                                                      | Right aligned, zero padded                 |
| 35    | Ingress Line                       | number (4)  | Always 0000                                                                                                                                                                                                                                                                                                                                                      | Right aligned, zero padded                 |
| 36    | Ingress Channel                    | number (4)  | Always 0000                                                                                                                                                                                                                                                                                                                                                      | Right aligned, zero padded                 |

Table 9-1 NICS Output Field Ordering (continued)

| Field | Field Name               | Format     | PGW 2200 CDB, CDE Tag Numbers and Derivation                                                                                                                                               | Padding and Alignment                                                                        |
|-------|--------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| 37    | Ingress trunk group name | char (8)   | CDE 4008 from 1010 or 1030 and the prefix value from the Trunk Group table.<br><br>For example, if the trunk group is 1001 and the prefix is "SIP", this field is "SIP1001"                | None                                                                                         |
| 38    | Ingress trunk name       | number (8) | CDE 4009 from 1010 or 1030                                                                                                                                                                 | None                                                                                         |
| 39    | Ingress Protocol         | char (10)  | CDE 4069 from 1010/1030. Values:<br><br>0 = ISDN_PRI<br>1 = SS7<br>2 = DPNSS<br>3 = CAS<br>4 = ASN<br>5 = Unknown<br>6 = EISUP<br>7 = H323<br>8 = SIP<br>9 = MGCP<br><br>Default = Unknown | None                                                                                         |
| 40    | Ingress Coding           | char (16)  | Use value from CDE 4207. This CDE is available from 1010, 1030 or 1040. The latest value is always used.                                                                                   | None                                                                                         |
| 41    | Ingress Audio Cap        | char (16)  | Always NUL.                                                                                                                                                                                |                                                                                              |
| 42    | Ingress – IP Address     | char (15)  | Use value from CDE 4205. This CDE is available from 1010, 1030 or 1040. The latest value is always used.                                                                                   | Three characters for each dot-separated field of the IP address. Right aligned, zero padded. |
| 43    | Ingress RTP Port         | number (6) | Use value from CDE 4209. This CDE is available from 1010, 1030 or 1040. The latest value is always used.                                                                                   | Right aligned, zero padded                                                                   |
| 44    | Ingress Pkts sent        | number (9) | Always 000000000                                                                                                                                                                           | Right aligned, zero padded                                                                   |

Table 9-1 NICS Output Field Ordering (continued)

| Field | Field Name                | Format     | PGW 2200 CDB, CDE Tag Numbers and Derivation                                                                                                                                                                                                                                         | Padding and Alignment      |
|-------|---------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| 45    | Ingress Pkts rcv          | number (9) | Always 000000000                                                                                                                                                                                                                                                                     | Right aligned, zero padded |
| 46    | Ingress Pkts dropped      | number (9) | Always 000000000                                                                                                                                                                                                                                                                     | Right aligned, zero padded |
| 47    | End Date                  | char (8)   | Derived from the earlier of CDE 4106 or 4107 in 1010 or 1030 CDB.<br>For long distance, this field uses the time stamp of the current CDB (CDE 4001).<br>Format: YYYYMMDD                                                                                                            |                            |
| 48    | End Time                  | char (9)   | Derived from the earlier of CDE 4106 or 4107 in 1010 or 1030 CDB.<br>For long distance, this field uses the time stamp of the current CDB (CDE 4001).<br>Format: HHMMSSmmm                                                                                                           |                            |
| 49    | Answer Date               | char (8)   | For the first record (Link_ID = 0 or 1), the value is derived from 4104 in 1010 or 1030; if 4104 is not present, it uses 4100 in 1010 or 1030.<br>For the second and later record of the same call, it uses the time stamp (CDE 4001) of the previous 1060 CDB.<br>Format: YYYYMMDD  |                            |
| 50    | Answer Time               | char (9)   | For the first record (Link_ID = 0 or 1), the value is derived from 4104 in 1010 or 1030; if 4104 is not present, it uses 4100 in 1010 or 1030.<br>For the second and later record of the same call, it uses the time stamp (CDE 4001) of the previous 1060 CDB.<br>Format: HHMMSSmmm |                            |
| 51    | Carrier Select Info       | number (2) | CDE 2015 from 1010 or 1030, default 00                                                                                                                                                                                                                                               |                            |
| 52    | Routing select            | number (2) | Route index, first two octets of CDE 4045 from 1010, default 00                                                                                                                                                                                                                      | Right aligned, zero padded |
| 53    | Egress Remote PC          | char (9)   | CDE 4037 from 1010 or 1030.                                                                                                                                                                                                                                                          |                            |
| 54    | Egress CIC                | number (4) | CDE 4072 from 1010 or 1030, default 0000                                                                                                                                                                                                                                             | Right aligned, zero padded |
| 55    | Egress – Access Device ID | char (10)  | Always NUL.                                                                                                                                                                                                                                                                          | None                       |

Table 9-1 NICS Output Field Ordering (continued)

| Field | Field Name              | Format     | PGW 2200 CDB, CDE Tag Numbers and Derivation                                                                                                                                                  | Padding and Alignment                                                                               |
|-------|-------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| 56    | Egress Module           | char (4)   | Always NUL.                                                                                                                                                                                   |                                                                                                     |
| 57    | Egress Line             | char (4)   | Always NUL.                                                                                                                                                                                   |                                                                                                     |
| 58    | Egress Channel          | char (4)   | Always NUL.                                                                                                                                                                                   |                                                                                                     |
| 59    | Egress trunk group name | char (8)   | CDE 4015 from 1010 or 1030, and the prefix value from the Trunk Group table.<br><br>For example, if the trunk group is 2001 and the prefix is "P", this field is "P2001".                     | None                                                                                                |
| 60    | Egress trunk name       | number (8) | CDE 4016 from 1010 or 1030.                                                                                                                                                                   |                                                                                                     |
| 61    | Egress Protocol         | char (10)  | CDE 4073 from 1010 or 1030. Values:<br><br>0 = ISDN_PRI<br>1 = SS7<br>2 = DPNSS<br>3 = CAS<br>4 = ASN<br>5 = Unknown<br>6 = EISUP<br>7 = H323<br>8 = SIP<br>9 = MGCP<br><br>Default = Unknown |                                                                                                     |
| 62    | Egress Coding           | char (16)  | Use value from CDE 4208. This CDE is available from 1010, 1030 or 1040. The latest value is always used.                                                                                      |                                                                                                     |
| 63    | Egress Audio Cap        | char (16)  | Always NUL.                                                                                                                                                                                   |                                                                                                     |
| 64    | Egress – IP Address     | char (15)  | Use value from CDE 4206. This CDE is available from 1010, 1030 or 1040. The latest value is always used.                                                                                      | Three characters for each dot-separated field of the IP address fields. Right aligned, zero padded. |
| 65    | Egress RTP Port         | number (6) | Use value from CDE 4210. This CDE is available from 1010, 1030 or 1040. The latest value is always used.                                                                                      | Right aligned, zero padded                                                                          |

Table 9-1 NICS Output Field Ordering (continued)

| Field | Field Name                        | Format     | PGW 2200 CDB, CDE Tag Numbers and Derivation                                                                           | Padding and Alignment      |
|-------|-----------------------------------|------------|------------------------------------------------------------------------------------------------------------------------|----------------------------|
| 66    | Egress Pkts sent                  | number (9) | Always 000000000                                                                                                       |                            |
| 67    | Egress Pkts recv                  | number (9) | Always 000000000                                                                                                       | Right aligned, zero padded |
| 68    | Egress Pkts dropped               | number (9) | Always 000000000                                                                                                       | Right aligned, zero padded |
| 69    | Egress carrier connection date    | char (8)   | 4103 from 1010 or 1030.<br>Format: YYYYMMDD                                                                            | None                       |
| 70    | Egress carrier connection time    | char (9)   | 4103 from 1010 or 1030.<br>Format: HHMMSSmmm                                                                           | None                       |
| 71    | Egress carrier disconnection date | char (8)   | If (CDE 4028 == 1), it uses earlier of CDE 4106 and 4107, otherwise it uses the later of the two.<br>Format: YYYYMMDD  | None                       |
| 72    | Egress carrier disconnection time | char (9)   | If (CDE 4028 == 1), it uses earlier of CDE 4106 and 4107, otherwise it uses the later of the two.<br>Format: HHMMSSmmm | None                       |
| 73    | Services                          |            | Not used, always NUL.                                                                                                  | None                       |

- The Outgoing Calling Party Number (OCgPN) is derived from CDE 4060, unless tag 4060 is not available. If tag 4060 is not available, the value of OCgPN is derived from CDE 4084, unless tag 4084 is not available. If tag 4084 is not available, the value of OCgPN is derived from CDE tag 4010.

(Note: OTkgType denotes the Egress Trunk Group Prefix Type.)

BAMS uses the calling party nature of address indicator to determine the prefix to the Calling Party Number. (CgPN.NOA is derived from CDE tag 2017 or 3017 from CDB 1010 or 1030, if present, else CgPN.NOA is derived from CDE tag 2003 or 3003 from CDB 1010 or 1030, if present.)

For Field 19 of NICS output, BAMS modifies the Calling Party Number (originating number) according to the following rules:

(Note: OTkgType denotes the Egress Trunk Group Prefix Type.)

If an OTkgType is not defined, BAMS uses the OCgPN.

If the OTkgType is SIP, BAMS uses the OCgPN without modification.

If the OTkgType is not SIP, BAMS performs the following modifications:

If CgPN.NOA is set to 4 (international), BAMS changes the prefix to 00.

BAMS inspects at the first two digits—there are three cases: 00, 0X, or XX (X is a non-zero digit). BAMS does not change the number if the prefix is 00. BAMS pre-appends the number with a 0 if the prefix is 0X. BAMS pre-appends the number with 00 if the prefix is XX. In all cases, the resulting number is 00XXXXXXXXXX.

If CgPN.NOA is set to 3 (national), BAMS changes the prefix to 0.

BAMS inspects the first digit only and pre-appends with 0 if the digit is not 0.

2. BAMS derives the Dialed Number from CDE 4012 and the Terminating Number from CDE 4014.

For Field 21 of NICS output, BAMS modifies the Dialed Number according to the following rules. BAMS applies the rules to each individual billing record based on the Ingress Trunk Group Prefix Type (InTkgtType).

(Note: BAMS identifies the InTkgtType by looking up the Trunk Group Type in the TKGPREFIX table and uses the Ingress Trunk Group Prefix of the Ingress Trunk Group to generate the billing record. The Ingress Trunk Group Prefix is defined in the TRUNKGRP table for the Ingress Trunk Group.)

If InTkgtType is not defined, BAMS uses the DialedNumber.

If InTkgtType is not SIP, PSTN, HSI-NETCHAT, nor PGW, BAMS uses the DialedNumber and removes the prefix 141, if that prefix is present.

If InTkgtType is SIP, BAMS uses the DialedNumber and removes the prefix "+", if that prefix is present. This prefix might be removed by the FMT task, so this field is always numeric in all outputs.

If InTkgtType is PSTN, BAMS uses TermNumber.

If InTkgtType is PGW, BAMS uses TermNumber.

If InTkgtType is HSI-NETCHAT, BAMS uses DialedNumber.





# CHAPTER 10

## Configuring BAMS for 1110 Binary Output

Revised: March 10, 2011, OL-11618-18

### Overview

This chapter describes the 1110 Binary billing record output by the Cisco Billing and Measurements Server (BAMS). You enable 1110 Binary output with the NODEPARMS tag ID. For more information, see the [“Updating the Node Parameters Table” section on page 5-11](#).

Once you have configured your system for 1110 Binary output you may also need to adjust the default output values in the BIN1110 table (see the [“Updating the BIN1110 Table” section on page 5-4](#)). By default, a system configured to generate 1110 Binary output produces 1060 CDBs, and the output files have a BIN suffix.



Note

Default 1110 Binary output also includes 1090 (file header), 1100 (file footer), and 1110 (maintenance) CDB types.

### 1110 Binary Output

1110 Binary output files are created by the BIN task. These files are stored in the BIN1110 subdirectory of the /data/nodename directory (for example, /data/s0x/BIN1110). The fields contained in the BIN1110 output are explained in [Table 10-1](#), [Table 10-2](#), and [Table 10-3](#). The 1110 Binary file-naming conventions are explained in [“File-Naming Conventions” section on page A-4](#).

#### File Header (CDB 1090) Data Format

[Table 10-1](#) defines the file header’s tag, description, and information source.

**Table 10-1** File Header (CDB 1090) Field Ordering

| Tag  | Description                 | Information Source                                    |
|------|-----------------------------|-------------------------------------------------------|
| 4000 | CDB version                 | 1                                                     |
| 4001 | CDB timepoint               | Time written                                          |
| 4002 | Universal Call reference ID | Always 0, to be compatible with all other CDB layouts |

**Table 10-1** File Header (CDB 1090) Field Ordering (continued)

| Tag  | Description                | Information Source |
|------|----------------------------|--------------------|
| 6001 | File start time            |                    |
| 6000 | Host Cisco MGC ID          |                    |
| 6004 | Cisco MGC software version |                    |

## File Footer (CDB 1100) Data Format

[Table 10-2](#) defines the file footer's tag, description, and information source.

**Table 10-2** File Footer (CDB 1100) Field Ordering

| Tag  | Description                 | Information Source                                                                                                                |
|------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| 4000 | CDB version                 | 1                                                                                                                                 |
| 4001 | CDB timepoint               |                                                                                                                                   |
| 4002 | Universal reference ID      | Always 0, to be compatible with all other CDB layouts                                                                             |
| 6002 | File end time               |                                                                                                                                   |
| 6003 | Total number of CDB records | BAMS modifies this tag to match the number of records in the BAMS output. This tag counts both the header CDB and the footer CDB. |
| 6000 | Host Cisco MGC ID           |                                                                                                                                   |
| 6004 | Cisco MGC software version  |                                                                                                                                   |

## 1110 and 1060 CDB Data Format

[Table 10-3](#) defines the possible CDE fields; it does not refer to the actual offset of the CDE in the CDB because some CDE tags may not be present in the output.

**Table 10-3** 1110 and 1060 Field Index

| Index | ANSI PGW CDE Tags |                                    | ITU PGW CDE Tags |                                    | Source CDB                                        | In 1060? |
|-------|-------------------|------------------------------------|------------------|------------------------------------|---------------------------------------------------|----------|
|       | Tag               | Description                        | Tag              | Description                        |                                                   |          |
| 1     | 5000              | Unique Call Id (Mistral and Later) | 5000             | Unique Call Id (Mistral and later) | 1030, 1040 for 1110 output. 1060 for 1060 output. | Y        |
| 2     | 4000              | CDB Version                        | 4000             | CDB Version                        | 1030, 1040 for 1110 output. 1060 for 1060 output. | Y        |
| 3     | 4001              | CDB Timepoint                      | 4001             | CDB Timepoint                      | 1030, 1040 for 1110 output. 1060 for 1060 output. | Y        |
| 4     | 4002              | Call Reference ID                  | 4002             | Call Reference ID                  | 1030, 1040 for 1110 output. 1060 for 1060 output. | Y        |

Table 10-3 1110 and 1060 Field Index (continued)

| Index | ANSI PGW CDE Tags |                                                | ITU PGW CDE Tags |                                                    | Source CDB                                              | In 1060? |
|-------|-------------------|------------------------------------------------|------------------|----------------------------------------------------|---------------------------------------------------------|----------|
| 5     | 4100              | IAM/ Setup timepoint received - milliseconds   | 4100             | IAM/ Setup timepoint received - milliseconds       | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 6     | 4101              | IAM/ Setup timepoint sent - milliseconds       | 4101             | IAM/ Setup timepoint sent - milliseconds           | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 7     | 4102              | ACM/alert timepoint received - milliseconds    | 4102             | ACM/alert timepoint received - milliseconds        | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 8     | 4103              | ACM/alert timepoint sent - milliseconds        | 4103             | ACM/alert timepoint sent - milliseconds            | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 9     | 4104              | ANM/Ans. timepoint - received - milliseconds   | 4104             | ANM/Ans. timepoint - received - milliseconds       | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 10    | 4105              | ANM/Ans. timepoint - sent - milliseconds       | 4105             | ANM/Ans. timepoint - sent - milliseconds           | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 11    | 4106              | First REL/Release timepoint - milliseconds     | 4106             | First REL/Release timepoint - milliseconds         | 1030 or 1040                                            | N        |
| 12    | 4107              | 2nd REL/Release timepoint - milliseconds       | 4107             | 2nd REL/Release timepoint - milliseconds           | 1030 or 1040                                            | N        |
| 13    | 4108              | RLC/Rel complete timepoint sent - milliseconds | 4108             | RLC/Rel complete timepoint sent - milliseconds     | 1030 or 1040                                            | N        |
| 14    | 4109              | RLC/Rel complete timepoint rcvd - milliseconds | 4109             | RLC/Rel complete timepoint received - milliseconds | 1030 or 1040                                            | N        |
| 15    | 4008              | Originating Trunk Group                        | 4008             | Originating Trunk Group                            | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 16    | 4009              | Originating member                             | 4009             | Originating member                                 | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 17    | 4010              | Calling number                                 | 4010             | Calling number                                     | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 18    | 4011              | Charged number                                 | 4011             | Charged number                                     | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |

Table 10-3 1110 and 1060 Field Index (continued)

| Index | ANSI PGW CDE Tags |                                     | ITU PGW CDE Tags |                                     | Source CDB                                              | In 1060? |
|-------|-------------------|-------------------------------------|------------------|-------------------------------------|---------------------------------------------------------|----------|
| 19    | 4012              | Dialed number                       | 4012             | Dialed number                       | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 20    | 4014              | Called number                       | 4014             | Called number                       | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 21    | 4015              | Terminating Trunk Group             | 4015             | Terminating Trunk Group             | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 22    | 4016              | Terminating member                  | 4016             | Terminating member                  | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 23    | 4028              | First release source                | 4028             | First release source                | 1030 or 1040                                            | N        |
| 24    | 4052              | Originating Gateway Primary Select  | 4052             | Originating Gateway Primary Select  | 1010                                                    | N        |
| 25    | 4053              | Terminating Gateway Primary Select  | 4053             | Terminating Gateway Primary Select  | 1010                                                    | N        |
| 26    | 4060              | Redirecting Number                  | 4060             | Redirecting Number                  | From 1010 or 1030, and from 1060 only if no 1010 found. | Y        |
| 27    | 4061              | Tariff Rate                         | 4061             | Tariff Rate                         | 1030 or 1040                                            | N        |
| 28    | 4062              | Scale Factor                        | 4062             | Scale Factor                        | 1030 or 1040                                            | N        |
| 29    | 4063              | Test Line Indicator                 | 4063             | Test Line Indicator                 | 1010 or 1030                                            | N        |
| 30    | 4201              | Ingress SIP URL (Mistral and Later) | 4201             | Ingress SIP URL (Mistral and Later) | 1010 or 1030                                            | N        |
| 31    | 4202              | Egress SIP URL (Mistral and Later)  | 4202             | Egress SIP URL (Mistral and Later)  | 1010 or 1030                                            | N        |
| 32    | 4203              | SIP Callid                          | 4203             | SIP Callid                          | 1010 or 1030                                            | N        |
| 33    | 4204              | Source IP Address                   | 4204             | Source IP Address                   | 1010 or 1030                                            | N        |
| 34    | 4205              | Ingress Media Device Address        | 4205             | Ingress Media Device Address        | 1010 or 1030                                            | N        |
| 35    | 4206              | Egress Media Device Address         | 4206             | Ingress Media Device Address        | 1010 or 1030                                            | N        |
| 36    | 4207              | Initial Codec                       | 4207             | Initial Codec                       | 1010 or 1030                                            | N        |
| 37    | 4208              | Final Codec                         | 4208             | Final Codec                         | 1010, 1040 or 1030                                      | N        |

Table 10-3 1110 and 1060 Field Index (continued)

| Index | ANSI PGW CDE Tags |                                  | ITU PGW CDE Tags |                                  | Source CDB   | In 1060? |
|-------|-------------------|----------------------------------|------------------|----------------------------------|--------------|----------|
| 38    | 4209              | Ingress Media Device Port Number | 4209             | Ingress Media Device Port Number | 1010 or 1030 | N        |
| 39    | 4210              | Egress Media Device Port Number  | 4210             | Egress Media Device Port Number  | 1010 or 1030 | N        |
| 40    | 2000              | CPC                              | 3000             | CPC                              | 1010 or 1030 | N        |
| 41    | 2001              | User Service Information         | 3001             | User Service Information         | 1010 or 1030 | N        |
| 42    | 2002              | Originating Line Information     |                  |                                  | 1010 or 1030 | N        |
| 43    | 2003              | Calling number NOA               | 3003             | Calling number NOA               | 1010 or 1030 | N        |
| 44    | 2004              | Charged number NOA               |                  | Does not exist for ITU           | 1010 or 1030 | N        |
| 45    | 2005              | Dialed number NOA                | 3005             | Dialed number NOA                | 1010 or 1030 | N        |
| 46    | 2007              | Called Number NOA                | 3007             | Called Number NOA                | 1010 or 1030 | N        |
| 47    | 2008              | Reason code                      | 3008             | Reason code                      | 1030 or 1040 | N        |
| 48    | 2013              | Transit Network Selection        | 3013             | Transit Network Selection        | 1010 or 1030 | N        |
| 49    | 2015              | Carrier Selection Parm           |                  |                                  | 1010 or 1030 | N        |
| 50    | 2017              | Redirecting Number NOA)          | 3017             | Redirecting Number NOA           | 1010 or 1030 | N        |
| 51    | 4078              | Charge Band Number               | 4078             | Charge Band Number               | 1030 or 1040 | N        |
| 52    | 4079              | Furnish Charging Number          | 4079             | Furnish Charging Number          | 1030 or 1040 | N        |
| 53    | 4080              | Original Called Number           | 4080             | Original Called Number           | 1010 or 1030 | N        |
| 54    | 4081              | T.38 Fax Call                    | 4081             | T.38 Fax Call                    | 1030 or 1040 | N        |
| 55    | 4082              | Charge Unit Number               | 4082             | Charge Unit Number               | 1030 or 1040 | N        |
| 56    | 4034              | Ingress Originating Point Code   | 4034             | Ingress Originating Point Code   | 1010 or 1030 | N        |
| 57    | 4035              | Ingress Destination Point Code   | 4035             | Ingress Destination Point Code   | 1010 or 1030 | N        |

Table 10-3 1110 and 1060 Field Index (continued)

| Index | ANSI PGW CDE Tags |                                                         | ITU PGW CDE Tags |                                                         | Source CDB         | In 1060? |
|-------|-------------------|---------------------------------------------------------|------------------|---------------------------------------------------------|--------------------|----------|
| 58    | 4036              | Egress Originating Point Code                           | 4036             | Egress Originating Point Code                           | 1010 or 1030       | N        |
| 59    | 4037              | Egress Destination Point Code                           | 4037             | Egress Destination Point Code                           | 1010 or 1030       | N        |
| 60    | 4046              | Ingress Packet Info                                     | 4046             | Ingress Packet Info                                     | 1040 or 1030       | N        |
| 61    | 4047              | Egress Packet Info                                      | 4047             | Egress Packet Info                                      | 1040 or 1030       | N        |
| 62    | 4068              | Ingress BearChanId                                      | 4068             | Ingress BearChanId                                      | 1010 or 1030       | Y        |
| 63    | 4072              | Egress BearChanId                                       | 4072             | Egress BearChanId                                       | 1010 or 1030       | Y        |
| 64    | 4083              | Charge Indicator                                        | 4083             | Charge Indicator                                        | 1010 or 1030       | N        |
| 65    | 4084              | Outgoing Calling Party Number                           | 4084             | Outgoing Calling Party Number                           | 1010 or 1030       | N        |
| 66    | 4085              | MCID Request Indicator                                  | 4085             | MCID Request Indicator                                  | 1010 or 1030       | N        |
| 67    | 4086              | MCID Response Indicator                                 | 4086             | MCID Response Indicator                                 | 1010 or 1030       | N        |
| 68    | 4087              | Ingress MGCP DLCX (Delete Connection) return code value | 4087             | Ingress MGCP DLCX (Delete Connection) return code value | 1040 or 1030       | N        |
| 69    | 4088              | Egress MGCP DLCX (Delete Connection) return code value  | 4088             | Egress MGCP DLCX (Delete Connection) return code value  | 1040 or 1030       | N        |
| 70    | 4089              | Network Translated Address Indicator                    | 4089             | Network Translated Address Indicator                    | 1010 or 1030       | N        |
| 71    | 4090              | Reservation Request Accepted                            | 4090             | Reservation Request Accepted                            | 1010, 1040 or 1030 | N        |
| 72    | 4091              | Reservation Request Error Count                         | 4091             | Reservation Request Error Count                         | 1040 or 1030       | N        |
| 73    | 4092              | ATM Ingress Configured Profile                          | 4092             | ATM Ingress Configured Profile                          | 1010 or 1030       | N        |
| 74    | 4093              | ATM Egress Configured Profile                           | 4093             | ATM Egress Configured Profile                           | 1010 or 1030       | N        |
| 75    | 4094              | ATM Negotiated Profile                                  | 4094             | ATM Negotiated Profile                                  | 1010 or 1030       | N        |
| 76    | 4095              | Route List Name                                         | 4095             | Route List Name                                         | 1010 or 1030       | N        |

Table 10-3 1110 and 1060 Field Index (continued)

| Index | ANSI PGW CDE Tags |                                            | ITU PGW CDE Tags |                                            | Source CDB   | In 1060? |
|-------|-------------------|--------------------------------------------|------------------|--------------------------------------------|--------------|----------|
| 77    | 4096              | Route Name                                 | 4096             | Route Name                                 | 1010 or 1030 | N        |
| 78    | 4097              | MGCP Script Response String                | 4097             | MGCP Script Response String                | 1040         | N        |
| 79    | 4098              | Originating Leg DSP Statistics             | 4098             | Originating Leg DSP Statistics             | 1030 or 1040 | N        |
| 80    | 4099              | Terminating Leg DSP Statistics             | 4099             | Terminating Leg DSP Statistics             | 1030 or 1040 | N        |
| 81    | 4211              | Originating VPN ID                         | 4211             | Originating VPN ID                         | 1010 or 1030 | N        |
| 82    | 4212              | Terminating VPN ID                         | 4212             | Terminating VPN ID                         | 1010 or 1030 | N        |
| 83    | 4213              | Meter Pulses Received                      | 4213             | Meter Pulses Received                      | 1040         | N        |
| 84    | 4214              | Meter Pulses Sent                          | 4214             | Meter Pulses Sent                          | 1040         | N        |
| 85    | 4215              | Charge Tariff Info                         | 4215             | Charge Tariff Info                         | 1040         | N        |
| 86    | 4216              | Advice of Charge Indicator                 | 4216             | Advice of Charge Indicator                 | 1040         | N        |
| 87    | 4217              | Short Call Indicator                       | 4217             | Short Call Indicator                       | 1040         | N        |
| 88    | 4218              | Charge Limit Exceeded                      | 4218             | Charge Limit Exceeded                      | 1040         | N        |
| 89    | 4219              | CALL Recovered Indication                  | 4219             | CALL Recovered Indication                  | 1040         | N        |
| 90    | 4220              | Partial CLI                                | 4220             | Partial CLI                                | 1010 or 1030 | Y        |
| 91    | 4221              | Service Activation                         | 4221             | Service Activation                         | 1030 or 1040 | N        |
| 92    | 4222              | PRI AOC Invoke Type                        | 4222             | PRI AOC Invoke Type                        | 1030 or 1040 | N        |
| 93    | 4223              | PRI AOC - S Charge Information             | 4223             | PRI AOC - S Charge Information             | 1030 or 1040 | N        |
| 94    | 4224              | PRI AOC - D Charge Information             | 4224             | PRI AOC - D Charge Information             | 1030 or 1040 | N        |
| 95    | 4225              | PRI AOC - E Charge Information             | 4225             | PRI AOC - E Charge Information             | 1030 or 1040 | N        |
| 96    | 4226              | PRI AOC Invoke Failure                     | 4226             | PRI AOC Invoke Failure                     | 1030 or 1040 | N        |
| 97    | 4227              | Route Optimization/Path Replacement action | 4227             | Route Optimization/Path Replacement action | 1040         | N        |

Table 10-3 1110 and 1060 Field Index (continued)

| Index | ANSI PGW CDE Tags |                                                                                  | ITU PGW CDE Tags |                                                                                  | Source CDB   | In 1060? |
|-------|-------------------|----------------------------------------------------------------------------------|------------------|----------------------------------------------------------------------------------|--------------|----------|
| 98    | 4228              | Route Optimization / Path Replacement call reference of associated call instance | 4228             | Route Optimization / Path Replacement call reference of associated call instance | 1040         | N        |
| 99    | 4229              | Route Optimization / Path Replacement trunk group information                    | 4229             | Route Optimization / Path Replacement trunk group information                    | 1040         | N        |
| 100   | 4230              | Route Optimization / Path Replacement channel information                        | 4230             | Route Optimization / Path Replacement channel information                        | 1040         | N        |
| 101   | 4231              | Route Optimization Switchover Timestamp                                          | 4231             | Route Optimization Switchover Timestamp                                          | 1040         | N        |
| 102   | 4232              | Rejecting Location Label                                                         | 4232             | Rejecting Location Label                                                         | 1030         | N        |
| 103   | 4233              | Rejecting Location Label Direction                                               | 4233             | Rejecting Location Label Direction                                               | 1030         | N        |
| 104   | 4236              | H323 Destination                                                                 | 4236             | H323 Destination                                                                 | 1030 or 1040 | N        |
| 105   | 4237              | Ingress Redirecting Number                                                       | 4237             | Ingress Redirecting Number                                                       | 1010 or 1030 | Y        |
| 107   | 4239              | Service Usage Data                                                               | 4239             | Service Usage Data                                                               | 1030 or 1040 | N        |
| 109   | 4242              | Terminating Remote SIP Host                                                      | 4242             | Terminating Remote SIP Host                                                      | 1010 or 1030 | N        |
| 110   | 4243              | Terminating Local SIP Host                                                       | 4243             | Terminating Local SIP Host                                                       | 1010 or 1030 | N        |
| 111   | 4244              | License Reject License Protocol                                                  | 4244             | License Reject License Protocol                                                  | 1030         | N        |
| 112   | 4245              | License Rejecting Direction                                                      | 4245             | License Rejecting Direction                                                      | 1030         | N        |
| 113   | 4013              | LRN number                                                                       | 4013             | LRN number                                                                       | 1010 or 1030 | Y        |
| 114   | 2018              | ANSI Egress Calling number Nature of Address                                     | 3018             | ANSI Egress Calling number Nature of Address                                     | 1010 or 1030 | Y        |

*Table 10-3 1110 and 1060 Field Index (continued)*

| Index | ANSI PGW CDE Tags |                                                               | ITU PGW CDE Tags |                                                               | Source CDB   | In 1060? |
|-------|-------------------|---------------------------------------------------------------|------------------|---------------------------------------------------------------|--------------|----------|
| 115   | 2019              | ANSI Egress<br>Redirecting number<br>Nature of Address        | 3019             | ANSI Egress<br>Redirecting<br>number Nature of<br>Address     | 1010 or 1030 | Y        |
| 116   | 2020              | ANSI Egress<br>Original Called<br>Number Nature of<br>Address | 3020             | ANSI Egress<br>Original Called<br>Number Nature of<br>Address | 1010 or 1030 | Y        |





# CHAPTER 11

## Configuring BAMS for QoS Output

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Revised: March 10, 2011, OL-11618-18

### Introduction

Cisco BAMS Release 3.30 can generate QoS output from a gateway statistics. BAMS produces an output record that corresponds to a completed call. BAMS generates one QoS output file for each CDR input file. If an input file contains no completed calls, BAMS generates an empty QoS file.

A new output task produces the QoS output. The AUG task is modified to create the additional output file (when enabled) that becomes the input file to the new QoS output task.

### QoS Output Control

BAMS 3.30 can generate QoS output in either ANSI or ITU format. The mode is determined by the new “QoS” parameter in the NODEPARMS table.

*Table 11-1 QOS NODEPARM Parameter*

| QoS Value | Output                              |
|-----------|-------------------------------------|
| 0         | QOS output suppressed               |
| 1         | QOS output enabled with ANSI output |
| 2         | QOS output enabled with ITU output  |

The following MML command adds the QoS parameter to the NODEPARMS table.

#### Example

```
mml:1:node1>prov-add:NODEPARMS:qosoutput=1
```

### File Location for Gateway Statistics Output

The QOS output files are stored in the directory `/opt/CiscoBAMS/data/s0X/QOS_STAT`.

## File Naming

A QoS (gateway statistics) output file is generated for each PGW CDR file. The generated file name is in the format QOS\_STAT\_YYYYMMDDhhmmss\_XXXXXX.csv. In this format:

- YYYYMMDDhhmmss is date-time in UTC format contained in CDE tag 6001 of the corresponding CDR file header.
  - YYYY—year
  - MM—month
  - DD—day of the month
  - hh—hour
  - mm—minute
  - ss—second

For example, 04/16/2005 13:45:27 UTC would generate 20050416134527.

- XXXXXX is the file sequence number, which is the same as the PGW file sequence number. For example, 000123.

## File Format

The QOS file is composed of QOS records. The records are separated by a line feed character (0xA). Each file can contain 0 (zero) or more records. One record is generated for each 1030 or 1040 CDB in the input file. One record is generated for every call. One output file is generated for each input file.

## Record Format

Each line feed terminated record is composed of 238 fields. The fields are separated by the character ',' (comma). To avoid corrupting the record format, any comma detected in the input stream is converted to a ' ' (space 0x20) character.

## Fields

*Table 11-2 Input Tag to QoS Output Field Mapping*

| Field Index | Source CDE Tag or DSP tag | Description of field    | Field Output Format   |
|-------------|---------------------------|-------------------------|-----------------------|
| 1           | 5000                      | Global Call Id          | 128 bit Hex           |
| 2           | 4002                      | Call Reference ID       | 64 bit Hex            |
| 3           | 4106                      | First REL Timepoint ms  | Seconds, milliseconds |
| 4           | 4107                      | Second REL Timepoint ms | Seconds, milliseconds |
| 5           | 4108                      | RLC Timepoint rcvd ms   | Seconds, milliseconds |
| 6           | 4109                      | RLC Timepoint sent ms   | Seconds, milliseconds |
| 7           | 4046-P:PS                 | Ingress Packets sent    | Integer               |
| 8           | 4046-P:PR                 | Ingress Packets rcv     | Integer               |
| 9           | 4046-P:PL                 | Ingress Packets Lost    | Integer               |

Table 11-2 Input Tag to QoS Output Field Mapping (continued)

| Field Index | Source CDE Tag or DSP tag | Description of field                         | Field Output Format |
|-------------|---------------------------|----------------------------------------------|---------------------|
| 10          | 4046-P:OS                 | Ingress Octet Sent                           | Integer             |
| 11          | 4046-P:OR                 | Ingress Octet Recv                           | Integer             |
| 12          | 4046-P:JI                 | Ingress Jitter                               | Integer             |
| 13          | 4046-P:LA                 | Ingress Latency                              | Integer             |
| 14          | 4046-P:R1                 | Ingress Reservd1                             | N/A                 |
| 15          | 4046-P:R2                 | Ingress Reserved2                            | N/A                 |
| 16          | 4047-P:PS                 | Egress Packets sent                          | Integer             |
| 17          | 4047-P:PR                 | Egress Packets recv                          | Integer             |
| 18          | 4047-P:PL                 | Egress Packets Lost                          | Integer             |
| 19          | 4047-P:OS                 | Egress Octet Sent                            | Integer             |
| 20          | 4047-P:OR                 | Egress Octet Recv                            | Integer             |
| 21          | 4047-P:JI                 | Egress Jitter                                | Integer             |
| 22          | 4047-P:LA                 | Egress Latency                               | Integer             |
| 23          | 4047-P:R1                 | Egress Reservd1                              | N/A                 |
| 24          | 4047-P:R2                 | Egress Reserved2                             | N/A                 |
| 25          | 4098-DSP/TX:PK            | Ingress tx packets                           | Integer             |
| 26          | 4098-DSP/TX: SG           | Ingress signaling paks                       | Integer             |
| 27          | 4098-DSP/TX: NS           | Ingress noise packets                        | Integer             |
| 28          | 4098-DSP/TX: DU           | Ingress tx duration                          | Integer             |
| 29          | 4098-DSP/TX: VO           | Ingress voice tx duration                    | Integer             |
| 30          | 4098-DSP/RX: PK           | Ingress voice paks                           | Integer             |
| 31          | 4098-DSP/RX: SG           | Ingress signaling paks                       | Integer             |
| 32          | 4098-DSP/RX: CF           | Ingress comfort noise paks                   | Integer             |
| 33          | 4098-DSP/RX: RX           | Ingress rx duration                          | Integer             |
| 34          | 4098-DSP/RX: VO           | Ingress voice rx duration                    | Integer             |
| 35          | 4098-DSP/RX: BS           | Ingress bad sequence                         | Integer             |
| 36          | 4098-DSP/RX: BP           | Ingress bad protocol                         | Integer             |
| 37          | 4098-DSP/RX: LP           | Ingress late paks                            | Integer             |
| 38          | 4098-DSP/RX: EP           | Ingress early paks                           | Integer             |
| 39          | 4098-DSP/PD: CU           | Ingress playout delay current                | Integer             |
| 40          | 4098-DSP/PD: MI           | Ingress playout delay min                    | Integer             |
| 41          | 4098-DSP/PD: MA           | Ingress playout delay max                    | Integer             |
| 42          | 4098-DSP/PD: CO           | Ingress playout delay<br>clock_offset        | Integer             |
| 43          | 4098-DSP/PD: IJ           | Ingress playout delay interarrival<br>jitter | Integer             |

Table 11-2 Input Tag to QoS Output Field Mapping (continued)

| Field Index | Source CDE Tag or DSP tag | Description of field                            | Field Output Format |
|-------------|---------------------------|-------------------------------------------------|---------------------|
| 44          | 4098-DSP/PE: PC           | Ingress playout error predictive concealment    | Integer             |
| 45          | 4098-DSP/PE: IC           | Ingress playout error interpolative concealment | Integer             |
| 46          | 4098-DSP/PE: SC           | Ingress playout error silence concealment       | Integer             |
| 47          | 4098-DSP/PE: RM           | Ingress playout error retroactive mem update    | Integer             |
| 48          | 4098-DSP/PE: BO           | Ingress playout error buffer overflow           | Integer             |
| 49          | 4098-DSP/PE: EE           | Ingress playout error talkspurt end point error | Integer             |
| 50          | 4098-DSP/LE: TP           | Ingress Level tx power in 0.1 dBm               | Integer             |
| 51          | 4098-DSP/LE: TX           | Ingress Level tx mean in 0.1 dBm                | Integer             |
| 52          | 4098-DSP/LE: RP           | Ingress Level rx power in 0.1 dBm               | Integer             |
| 53          | 4098-DSP/LE: RM           | Ingress Level rx mean in 0.1 dBm                | Integer             |
| 54          | 4098-DSP/LE: BN           | Ingress Level background noise                  | Integer             |
| 55          | 4098-DSP/LE: ER           | Ingress Level erl level                         | Integer             |
| 56          | 4098-DSP/LE: AC           | Ingress Level acom level                        | Integer             |
| 57          | 4098-DSP/LE: TA           | Ingress Level curr tx act                       | Integer             |
| 58          | 4098-DSP/LE: RA           | Ingress Level curr rx act                       | Integer             |
| 59          | 4098-DSP/ER: RD           | Ingress error_stats rx dropped                  | Integer             |
| 60          | 4098-DSP/ER: TD           | Ingress error_stats tx dropped                  | Integer             |
| 61          | 4098-DSP/ER: RC           | Ingress error_stats rx control                  | Integer             |
| 62          | 4098-DSP/ER: TC           | Ingress error_stats tx control                  | Integer             |
| 63          | 4098-DSP/IC: IC           | Ingress ICPIF value for measuring voice quality | Integer             |
| 64          | 4098-DSP/EC:CI            | Ingress Codec ID                                | Text                |
| 65          | 4098-DSP/EC:FM            | Ingress Frame size in ms                        | Integer             |
| 66          | 4098-DSP/EC:FP            | Ingress Frames per packet                       | Integer             |
| 67          | 4098-DSP/EC:VS            | Ingress VAD enabled flag                        | Integer             |
| 68          | 4098-DSP/EC:GT            | Ingress TX Gain (linear)                        | Integer             |
| 69          | 4098-DSP/EC:GR            | Ingress RX Gain (linear)                        | Integer             |
| 70          | 4098-DSP/EC:JD            | Ingress Jitter Buffer Mode                      | Integer             |

Table 11-2 Input Tag to QoS Output Field Mapping (continued)

| Field Index | Source CDE Tag or DSP tag | Description of field                        | Field Output Format |
|-------------|---------------------------|---------------------------------------------|---------------------|
| 71          | 4098-DSP/EC:JN            | Ingress Jitter buffer nominal playout delay | Integer             |
| 72          | 4098-DSP/EC:JM            | Ingress Jitter buffer minimum playout delay | Integer             |
| 73          | 4098-DSP/EC:JX            | Ingress Jitter buffer max playout delay     | Integer             |
| 74          | 4098-DSP/KF:KF            | Ingress K-factor MOS-k (inst)               | Integer             |
| 75          | 4098-DSP/KF:AV            | Ingress Average MOS-k                       | Integer             |
| 76          | 4098-DSP/KF:MI            | Ingress Minimum MOS-k                       | Integer             |
| 77          | 4098-DSP/KF:BS            | Ingress Baseline MOS-k (Max)                | Integer             |
| 78          | 4098-DSP/KF:NB            | Ingress Number of bursts                    | Integer             |
| 79          | 4098-DSP/KF:FL            | Ingress Average frame loss rate             | Integer             |
| 80          | 4098-DSP/KF:NW            | Ingress Number of windows in average MOS    | Integer             |
| 81          | 4098-DSP/KF:VR            | Ingress MOS K-factor Version ID             | Integer             |
| 82          | 4098-DSP/CS:CR            | Ingress Conceal Ratio (instantaneous)       | Integer             |
| 83          | 4098-DSP/CS:AV            | Ingress Average CR                          | Integer             |
| 84          | 4098-DSP/CS:MX            | Ingress Maximum CR                          | Integer             |
| 85          | 4098-DSP/CS:CT            | Ingress Concealment Time                    | Integer             |
| 86          | 4098-DSP/CS:TT            | Ingress Total time (duration)               | Integer             |
| 87          | 4098-DSP/CS:OK            | Ingress OK seconds                          | Integer             |
| 88          | 4098-DSP/CS:CS            | Ingress Concealed seconds                   | Integer             |
| 89          | 4098-DSP/CS:SC            | Ingress Severely concealed seconds          | Integer             |
| 90          | 4098-DSP/CS:TS            | Ingress Conceal threshold                   | Integer             |
| 91          | 4098-DSP/CS:DC            | Ingress Dead connection indication          | Integer             |
| 92          | 4098-DSP/RF:ML            | Ingress R-factor MOS-LQE                    | Integer             |
| 93          | 4098-DSP/RF:MC            | Ingress R-factor MOS-CQE                    | Integer             |
| 94          | 4098-DSP/RF:R1            | Ingress R-factor LQ profile 1               | Integer             |
| 95          | 4098-DSP/RF:R2            | Ingress R-factor LQ profile 2               | Integer             |
| 96          | 4098-DSP/RF:IF            | Ingress Ie_eff                              | Integer             |
| 97          | 4098-DSP/RF:ID            | Ingress Idd                                 | Integer             |
| 98          | 4098-DSP/RF:IE            | Ingress Codec baseline IE score             | Integer             |
| 99          | 4098-DSP/RF:BL            | Ingress Codec baseline BPL                  | Integer             |
| 100         | 4098-DSP/RF:R0            | Ingress R0 default                          | Integer             |

Table 11-2 Input Tag to QoS Output Field Mapping (continued)

| Field Index | Source CDE Tag or DSP tag | Description of field                           | Field Output Format |
|-------------|---------------------------|------------------------------------------------|---------------------|
| 101         | 4098-DSP/RF:VR            | Ingress R-factor Version ID                    | Integer             |
| 102         | 4098-DSP/UC:U1            | Ingress User conceal seconds 1 count (UCS1)    | Integer             |
| 103         | 4098-DSP/UC:U2            | Ingress User conceal seconds 2 count (UCS2)    | Integer             |
| 104         | 4098-DSP/UC:T1            | Ingress UCS1 threshold in ms                   | Integer             |
| 105         | 4098-DSP/UC:T2            | Ingress UCS2 threshold in ms                   | Integer             |
| 106         | 4098-DSP/DL:RT            | Ingress Round trip delay                       | Integer             |
| 107         | 4098-DSP/DL:ED            | Ingress End system delay                       | Integer             |
| 108         | 4099-DSP/TX:PK            | Egress tx packets                              | Integer             |
| 109         | 4099-DSP/TX: SG4098-      | Egress signaling paks                          | Integer             |
| 110         | 4099-DSP/TX: 4098-NS      | Egress noise packets                           | Integer             |
| 111         | 4099-DSP/TX: DU           | Egress tx duration                             | Integer             |
| 112         | 4099-DSP/TX: VO           | Egress voice tx duration                       | Integer             |
| 113         | 4099-DSP/RX: PK           | Egress voice paks                              | Integer             |
| 114         | 4099-DSP/RX: SG           | Egress signaling paks                          | Integer             |
| 115         | 4099-DSP/RX: CF           | Egress comfort noise paks                      | Integer             |
| 116         | 4099-DSP/RX: RX           | Egress rx duration                             | Integer             |
| 117         | 4099-DSP/RX: VO           | Egress voice rx duration                       | Integer             |
| 118         | 4099-DSP/RX: BS           | Egress bad sequence                            | Integer             |
| 119         | 4099-DSP/RX: BP           | Egress bad protocol                            | Integer             |
| 120         | 4099-DSP/RX: LP           | Egress late paks                               | Integer             |
| 121         | 4099-DSP/RX: EP           | Egress early paks                              | Integer             |
| 122         | 4099-DSP/PD: CU           | Egress playout delay current                   | Integer             |
| 123         | 4099-DSP/PD: MI           | Egress playout delay min                       | Integer             |
| 124         | 4099-DSP/PD: MA           | Egress playout delay max                       | Integer             |
| 125         | 4099-DSP/PD: CO           | Egress playout delay clock_offset              | Integer             |
| 126         | 4099-DSP/PD: IJ           | Egress playout delay interarrival jitter       | Integer             |
| 127         | 4099-DSP/PE: PC           | Egress playout error predictive concealment    | Integer             |
| 128         | 4099-DSP/PE: IC           | Egress playout error interpolative concealment | Integer             |
| 129         | 4099-DSP/PE: SC           | Egress playout error silence concealment       | Integer             |
| 130         | 4099-DSP/PE: RM           | Egress playout error retroactive mem update    | Integer             |

Table 11-2 Input Tag to QoS Output Field Mapping (continued)

| Field Index | Source CDE Tag or DSP tag | Description of field                           | Field Output Format |
|-------------|---------------------------|------------------------------------------------|---------------------|
| 131         | 4099-DSP/PE: BO           | Egress playout error buffer overflow           | Integer             |
| 132         | 4099-DSP/PE: EE           | Egress playout error talkspurt end point error | Integer             |
| 133         | 4099-DSP/LE: TP           | Egress Level tx power in units of 0.1 dBm      | Integer             |
| 134         | 4099-DSP/LE: TX           | Egress Level tx mean in units of 0.1 dBm       | Integer             |
| 135         | 4099-DSP/LE: RP           | Egress Level rx power in units of 0.1 dBm      | Integer             |
| 136         | 4099-DSP/LE: RM           | Egress Level rx mean in units of 0.1 dBm       | Integer             |
| 137         | 4099-DSP/LE: BN           | Egress Level background noise                  | Integer             |
| 138         | 4099-DSP/LE: ER           | Egress Level erl level                         | Integer             |
| 139         | 4099-DSP/LE: AC           | Egress Level acom level                        | Integer             |
| 140         | 4099-DSP/LE: TA           | Egress Level curr tx act                       | Integer             |
| 141         | 4099-DSP/LE: RA           | Egress Level curr rx act                       | Integer             |
| 142         | 4099-DSP/ER: RD           | Egress error_stats rx dropped                  | Integer             |
| 143         | 4099-DSP/ER: TD           | Egress error_stats tx dropped                  | Integer             |
| 144         | 4099-DSP/ER: RC           | Egress error_stats rx control                  | Integer             |
| 145         | 4099-DSP/ER: TC           | Egress error_stats tx control                  | Integer             |
| 146         | 4099-DSP/IC: IC           | Egress ICPIF value for measuring voice quality | Integer             |
| 147         | 4099-DSP/EC:CI            | Egress Codec ID                                | Text                |
| 148         | 4099-DSP/EC:FM            | Egress Frame size in ms                        | Integer             |
| 149         | 4099-DSP/EC:FP            | Egress Frames per packet                       | Integer             |
| 150         | 4099-DSP/EC:VS            | Egress VAD enabled flag                        | Integer             |
| 151         | 4099-DSP/EC:GT            | Egress TX Gain (linear)                        | Integer             |
| 152         | 4099-DSP/EC:GR            | Egress RX Gain (linear)                        | Integer             |
| 153         | 4099-DSP/EC:JD            | Egress Jitter Buffer Mode                      | Integer             |
| 154         | 4099-DSP/EC:JN            | Egress Jitter buffer nominal playout delay     | Integer             |
| 155         | 4099-DSP/EC:JM            | Egress Jitter buffer minimum playout delay     | Integer             |
| 156         | 4099-DSP/EC:JX            | Egress Jitter buffer max playout delay         | Integer             |
| 157         | 4099-DSP/KF:KF            | Egress K-factor MOS-k (inst)                   | Integer             |
| 158         | 4099-DSP/KF:AV            | Egress Average MOS-k                           | Integer             |
| 159         | 4099-DSP/KF:MI            | Egress Minimum MOS-k                           | Integer             |

Table 11-2 Input Tag to QoS Output Field Mapping (continued)

| Field Index | Source CDE Tag or DSP tag | Description of field                       | Field Output Format |
|-------------|---------------------------|--------------------------------------------|---------------------|
| 160         | 4099-DSP/KF:BS            | Egress Baseline MOS-k (Max)                | Integer             |
| 161         | 4099-DSP/KF:NB            | Egress Number of bursts                    | Integer             |
| 162         | 4099-DSP/KF:FL            | Egress Average frame loss rate             | Integer             |
| 163         | 4099-DSP/KF:NW            | Egress Number of windows in average MOS    | Integer             |
| 164         | 4099-DSP/KF:VR            | Egress MOS K-factor Version ID             | Integer             |
| 165         | 4099-DSP/CS:CR            | Egress Conceal Ratio (instantaneous)       | Integer             |
| 166         | 4099-DSP/CS:AV            | Egress Average CR                          | Integer             |
| 167         | 4099-DSP/CS:MX            | Egress Maximum CR                          | Integer             |
| 168         | 4099-DSP/CS:CT            | Egress Concealment Time                    | Integer             |
| 169         | 4099-DSP/CS:TT            | Egress Total time (duration)               | Integer             |
| 170         | 4099-DSP/CS:OK            | Egress OK seconds                          | Integer             |
| 171         | 4099-DSP/CS:CS            | Egress Concealed seconds                   | Integer             |
| 172         | 4099-DSP/CS:SC            | Egress Severely concealed seconds          | Integer             |
| 173         | 4099-DSP/CS:TS            | Egress Conceal threshold                   | Integer             |
| 174         | 4099-DSP/CS:DC            | Egress Dead connection indication          | Integer             |
| 175         | 4099-DSP/RF:ML            | Egress R-factor MOS-LQE                    | Integer             |
| 176         | 4099-DSP/RF:MC            | Egress R-factor MOS-CQE                    | Integer             |
| 177         | 4099-DSP/RF:R1            | Egress R-factor LQ profile 1               | Integer             |
| 178         | 4099-DSP/RF:R2            | Egress R-factor LQ profile 2               | Integer             |
| 179         | 4099-DSP/RF:IF            | Egress Ie_eff                              | Integer             |
| 180         | 4099-DSP/RF:ID            | Egress Idd                                 | Integer             |
| 181         | 4099-DSP/RF:IE            | Egress Codec baseline IE score             | Integer             |
| 182         | 4099-DSP/RF:BL            | Egress Codec baseline BPL                  | Integer             |
| 183         | 4099-DSP/RF:R0            | Egress R0 default                          | Integer             |
| 184         | 4099-DSP/RF:VR            | Egress R-factor Version ID                 | Integer             |
| 185         | 4099-DSP/UC:U1            | Egress User conceal seconds 1 count (UCS1) | Integer             |
| 186         | 4099-DSP/UC:U2            | Egress User conceal seconds 2 count (UCS2) | Integer             |
| 187         | 4099-DSP/UC:T1            | Egress UCS1 threshold in ms                | Integer             |
| 188         | 4099-DSP/UC:T2            | Egress UCS2 threshold in ms                | Integer             |
| 189         | 4099-DSP/DL:RT            | Egress Round trip delay                    | Integer             |
| 190         | 4099-DSP/DL:ED            | Egress End system delay                    | Integer             |

**Table 11-2** *Input Tag to QoS Output Field Mapping (continued)*

| Field Index | Source CDE Tag or DSP tag | Description of field                                 | Field Output Format |
|-------------|---------------------------|------------------------------------------------------|---------------------|
| 191         | 4087                      | Egress MGCP DLCX Return Code                         | 8 bit Hex           |
| 192         | 4088                      | Egress MGCP DLCX Return Code                         | 8 bit Hex           |
| 193         | 4205                      | Egress Media Device Address                          | String, 0-256 bytes |
| 194         | 4206                      | Egress Media Device Address                          | String, 0-256 bytes |
| 195         | 4207                      | Initial Codec                                        | String, 0-12 bytes  |
| 196         | 4208                      | Final Codec                                          | String, 0-12 bytes  |
| 197         | 4209                      | Egress Media Device Port                             | String, 0-6 bytes   |
| 198         | 4210                      | Egress Media Device Port                             | String, 0-6 bytes   |
| 199         | 4227                      | Route Optimization/Path Replacement Action           | 8 bit Hex           |
| 200         | 4228                      | Route Optimization/Path Replacement Call Reference   | 64 bit Hex          |
| 201         | 4229                      | Route Optimization/Path Replacement Trunk Group Info | 16 bit Hex          |
| 202         | 4230                      | Route Optimization/Path Replacement Channel Info     | 16 bit Hex          |
| 203         | 4231                      | Route Optimization Switchover Timestamp              | 32 bit Hex          |
| 204         | 4008                      | Originating Trunk Group                              | Integer             |
| 205         | 4010                      | Calling Party Number                                 | String              |
| 206         | 4014                      | Called Party Number                                  | String              |
| 207         | 4015                      | Terminating Trunk Group                              | Integer             |
| 208         | 4034                      | Ingress Orig. Point Code                             | 32 bit Hex          |
| 209         | 4035                      | Ingress Term. Point Code                             | 32 bit Hex          |
| 210         | 4036                      | Egress Orig. Point Code                              | 32 bit Hex          |
| 211         | 4037                      | Egress Term. Point Code                              | 32 bit Hex          |
| 212         | 4038                      | Ingress Media Gateway ID                             | 16 bit Hex          |
| 213         | 4039                      | Egress Media Gateway ID                              | 16 bit Hex          |
| 214         | 4048                      | Directional Flag                                     | 8 bit Hex           |
| 215         | 4066                      | Ingress SigPath ID                                   | 32 bit Hex          |
| 216         | 4067                      | Ingress Span ID                                      | 32 bit Hex          |
| 217         | 4068                      | Ingress BearChan ID                                  | 32 bit Hex          |
| 218         | 4069                      | Ingress Protocol ID                                  | 8 bit Hex           |
| 219         | 4070                      | Egress SigPath ID                                    | 32 bit Hex          |
| 220         | 4071                      | Egress Span ID                                       | 32 bit Hex          |
| 221         | 4072                      | Egress BearChan ID                                   | 32 bit Hex          |

**Table 11-2** *Input Tag to QoS Output Field Mapping (continued)*

| Field Index | Source CDE Tag or DSP tag | Description of field         | Field Output Format   |
|-------------|---------------------------|------------------------------|-----------------------|
| 222         | 4073                      | Egress Protocol ID           | 8 bit Hex             |
| 223         | 4081                      | T.38 Fax Call                | 8 bit Hex             |
| 224         | 4084                      | Outgoing Called Party Number | String                |
| 225         | 4095                      | Route List Name              | String                |
| 226         | 4096                      | Route Name                   | String                |
| 227         | 4100                      | IAM Timepoint Received       | Seconds, milliseconds |
| 228         | 4101                      | IAM Timepoint Sent           | Seconds, milliseconds |
| 229         | 4102                      | ACM Timepoint Received       | Seconds, milliseconds |
| 230         | 4103                      | ACM Timepoint Sent           | Seconds, milliseconds |
| 231         | 4104                      | ANM Timepoint Received       | Seconds, milliseconds |
| 232         | 4105                      | ANM Timepoint Sent           | Seconds, milliseconds |
| 233         | 4201                      | Ingress SIP URL              | String                |
| 234         | 4202                      | Egress SIP URL               | String                |
| 235         | 4203                      | SIP Call ID                  | String                |
| 236         | 4204                      | Source IP Address            | String                |
| 237         | 4211                      | Originating VPN ID           | String                |
| 238         | 4212                      | Terminating VPN ID           | String                |

## Source CDE Tag or DSP Tag Definition

**Table 11-3** *Source CDE Tag or DSP Tag Definition*

| Source CDE Tag/DSP Tag Type | Description                                                                                                                                 |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| CDE TAG                     | The entire value of the CDE is be taken and formatted to the output field.                                                                  |
| CDE TAG-P.Subfield          | The value is the specified subfield of the PGW CDE Tag is taken and formatted to the output field.                                          |
| CDE TAG DSP/Subfield        | The value is obtained by parsing the content of the corresponding PGW CDE for the subfield string. The value is then found following the =. |

## Field Output Format Definition

**Table 11-4** *Field Output Format Definition*

| Field Output Format    | Description                                                                                                                                                                                                                             |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Text:                  | A free form text string. Any commas in the original data are replaced by a space character.                                                                                                                                             |
| Seconds, milliseconds: | float, format ssssssssss.mmm, number of seconds since 0:00 1/1/1970. For example, 1133444451.456.                                                                                                                                       |
| 8 bit hexadecimal      | An 8 bit hexadecimal integer, 3F                                                                                                                                                                                                        |
| 16 bit hexadecimal     | A 16 bit hexadecimal integer, A12B                                                                                                                                                                                                      |
| 32 bit hexadecimal     | A 32 bit hexadecimal integer, 234a346b                                                                                                                                                                                                  |
| 64 Bit hexadecimal     | A 64 bit hexadecimal integer, 4360834000000015                                                                                                                                                                                          |
| 128 bit hexadecimal    | A 128 bit hexadecimal integer, 00139339c064b11d30000000ab4c009.                                                                                                                                                                         |
| Integer                | Integer: 32 bit decimal integer. For example, 1012333410. For DSP tags, the format stated is for reference only. BAMS will collect data from the CDEs as if the field contains strings. No formatting/translation is performed by BAMS. |

## Missing Input Fields

For any missing input field that maps to an output field, the output field is left blank. No data is written but the comma separator is written. The comma separator for the missing field follows the comma separator of the previous field.





## CHAPTER 12

# Obtaining Measurements

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## Introduction

The Statistics module on the Cisco Billing and Measurements Server (BAMS) computes, augments, generates, and maintains performance indicators. Performance indicators amount to a history of traffic statistics on a telephone or data network. Counters are calculated for various events (for example, number of call attempts, call duration) for a particular time period. Each counter is associated with a time stamp and a key formed by the concatenation of several fields copied out of the Call Detail Record (CDR) being processed.

Counters that correspond to the same key within the same time period are added together, producing an accumulated count. For this reason, performance indicators are also known as accumulators. That is, “accumulators” and “counters” are used interchangeably to refer to performance indicators.

BAMS maintains counters for three different interval categories (real time, hourly, and daily intervals).

BAMS also maintains a flat file for each collection interval. In order for information to be timely, as soon as an interval boundary is reached, the buckets for that interval are written to disk. As the measurements are written, each measurement is checked against a user-defined threshold value and test condition.

## New Measurements in BAMS Release 3.30

Cisco BAMS 3.30 introduces 11 new measurements. Some of these new measurements are recorded when a call is received, several are recorded at a specified interval, and two are recorded daily only.

## Per Received-Call Measurements

[Table 12-1](#) lists the new measurements for BAMS 3.30 that are recorded each time a call is received.

Table 12-1 Per Received-Call Measurements

| Index | Name                    | Time Point                                         | Mnemonic          | Formula for Derivation and Mapping                                                              | Support in nailed mode? | Threshold Crossing Support? |
|-------|-------------------------|----------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------|-------------------------|-----------------------------|
| 57    | Answered Calls Incoming | 1010 received, tag 4104 and 4105 both populated    | BAM: IGR CALL ANS | Pegged when a 1010 CDB is recorded with 4008, 4104 and 4105 populated                           | Yes                     | Yes                         |
| 58    | Answered Calls Outgoing | 1010 received, tag 4104 and 4105 both populated    | BAM:EGR CALL ANS  | Pegged when a 1010 CDB is recorded with 4015, 4104 and 4105 populated                           | No                      | Yes                         |
| 59    | Answered Calls Total    | 1010 received, tag 4104 and 4105 both populated    | BAM: TTL CALL ANS | This equals the sum of “IGR CALL ANS” (Index # 57) and “EGR CALL ANS” (#58) for the trunk group | No                      | Yes                         |
| 60    | Call Attempts Total     | 1010 or 1030 received, tag 4100 and 4101 populated | BAM: TTL CALL ATT | This equals the sum of “IGR CALL ATT” (#1) and “EGR CALL ATT (#2) for the trunk group           | No                      | Yes                         |

## Per Interval Measurements

Table 12-2 lists the new measurements for BAMS 3.30 that are recorded at the end of each reporting interval.

Table 12-2 Per Interval Measurements

| Index | Name                          | Time Point                                         | Mnemonic     | Formula for Derivation and Mapping                                                                                                                                                                                                | Support in nailed mode? | Threshold Crossing Support? |
|-------|-------------------------------|----------------------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------|
| 61    | Answer Seizure Ratio Incoming | Calculated only at the end of measurement interval | BAMS:IGR ASR | This is calculated as percentage of "IGR CALL ANS" (#57) divided by "IGR CALL ATT" (#1), precision to 1 digit after the decimal point. For example, $92/96 = 95.8\%$ . If the "IGR CALL ATT" is 0, then the value should be 100%. | No                      | Yes                         |

Table 12-2 Per Interval Measurements (continued)

| Index | Name                          | Time Point                                         | Mnemonic     | Formula for Derivation and Mapping                                                                                                                                                                                                 | Support in nailed mode? | Threshold Crossing Support?                                          |
|-------|-------------------------------|----------------------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------------|
| 62    | Answer Seizure Ratio Outgoing | Calculated only at the end of measurement interval | BAMS:EGR ASR | This is calculated as percentage of “EGR CALL ANS” (#58) divided by “EGR CALL ATT” (#2), precision to 1 digit after the decimal point. For example, $92/96 = 95.8\%$ . If the “EGR CALL ATT” is 0, then the value should be 100%.  | No                      | Yes, only whole number percentages are supported (for example 75%).  |
| 63    | Answer Seizure Ratio Total    | Calculated only at the end of measurement interval | BAMS:TTL ASR | This is calculated as percentage of “TTL CALL ANS” (#59) divided by “TTL CALL ATT” (#60), precision to 1 digit after the decimal point. For example, $92/96 = 95.8\%$ . If the “TTL CALL ATT” is 0, then the value should be 100%. | No                      | Yes, only whole number percentages are supported (for example, 75%). |

## Daily Measurements

Two of the new measurements introduced in BAMS 3.30 are reported daily only: Busy Hour and Busy Period. Because there is no database, the values recorded for each hour or period during a day are retained only for one additional hour or one additional period in case any pings arrive late. However, after the value for an hour or a period is updated and reported, if these values are not greater than the values previously recorded, they are released.

As a consequence of the brief retention of recorded measurements, BAMS cannot examine the measurement values recorded for each hour and each period during a day to determine which hour or period was busiest.

Instead, BAMS 3.30 saves the values recorded for the busiest hour and busiest period, as of the current time, as the day proceeds. As the measurement value for each hour and period is recorded, it is compared with the values currently retained. If they are not greater, they are released. By this process, at the end of the day, BAMS will have identified the busiest hour and busiest period during the day and the value of each.

[Table 12-3](#) lists the new measurements for BAMS 3.30 that are recorded only at the end of each day.

Table 12-3 Daily Measurements

| Index | Name        | Time Point                             | Mnemonic    | Formula for Derivation and Mapping                                                                                                                                                                                                      | Support in nailed mode? | Threshold Crossing Support? |
|-------|-------------|----------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------|
| 64    | Busy Hour   | Calculated only at the end of the day. | BAMS:TTL BH | The hour during the day in which the hourly “TTL ERLANG” (#13) is greatest. This is displayed in the format of HHMM (in UTC). For example, 1400. This is based on the BAMS hourly measurements from the acc_h files.                    | Yes                     | No                          |
| 65    | Busy Period | Calculated only at the end of the day. | BAMS:TTL BP | The measurement interval during the day in which “TTL ERLANG” (#13) is greatest among all acc_r files. This is displayed in the format of HHMM UTC, for the starting time of the interval. For example, with 15 minute intervals, 1415. | Yes                     | No                          |

## Measurements Based on Current and New Stored Values

Most of the new measurements for BAMS 3.30 are based on values that are also captured for preexisting measurements. Only two of the new measurements require data that must be stored separately.

Therefore, BAMS 3.30 does not allocate additional memory to store data that will be used to calculate both new measurements as well as existing measurements. The calculation for the new measurement values is performed when it is time to output the measurement value rather than when the CDR is initially analyzed.

Although most of the new measurements do not require additional storage, the new output must be threshold checked. Additional threshold-crossing flags are allocated to the new measurements. The threshold trunk groups are expanded to store the threshold-crossing value and condition for each measurement that requires threshold checking.

The measurements Busy Hour and Busy Period do not require this additional threshold-checking mechanism.

## Measurements That Capture New Data

Two of the new measurements, Answered Calls Incoming, and Answered Calls Outgoing, require capturing and storing real-time hourly and daily counts. BAMS 3.30 records the hour and period of the day during which the highest number of Answered Calls Incoming and Answered Calls Outgoing occurs. BAMS records the Busy Hour and Busy Period and the count for both measurements. These values are stored in the base of the trunk group along with the circuit counts and flags.

## Non-Integer Measurements

For all releases of Cisco BAMS prior to BAMS 3.30, all measurements were recorded as integer values. BAMS 3.30 extends to an additional decimal place the value it records for the measurements Answer Seizure Ratio Incoming and Answer Seizure Ratio Outgoing.

Because system thresholds are set to integer values, measurements that pertain to such thresholds are rounded and recorded to the nearest whole integer value. Therefore, a threshold-crossing condition is evaluated by comparing the specified integer value for the threshold and the recorded integer value of the corresponding measurement. Non-integer threshold values are not supported.

## Measurement Matrix

[Table 12-4](#) presents the measurement matrix for all BAMS 3.30 measurements.

**Table 12-4 BAMS Measurement Matrix**

| #  | Measurement Name                           | Predefined No 1071 | Predefined w/1071 | Dynamic  | MGCP   | Support in Nailed | Threshold Crossing |
|----|--------------------------------------------|--------------------|-------------------|----------|--------|-------------------|--------------------|
| 1  | Call Attempts Incoming                     |                    |                   |          |        |                   |                    |
| 2  | Call Attempts Outgoing                     |                    |                   |          | No Peg |                   |                    |
| 3  | <del>Incoming Peg Count</del> <sup>1</sup> |                    |                   |          |        |                   |                    |
| 4  | <del>Outgoing Peg Count</del> <sup>2</sup> |                    |                   |          |        |                   |                    |
| 5  | Outgoing attempts blocked                  |                    |                   |          | No Peg |                   |                    |
| 6  | <del>Failed Calls</del> <sup>3</sup>       |                    |                   |          |        |                   |                    |
| 7  | Failed Calls - Congestion                  |                    |                   |          |        |                   |                    |
| 8  | Successful Calls Incoming                  |                    |                   |          |        |                   |                    |
| 9  | Successful CALLS Outgoing                  |                    |                   |          | No Peg |                   |                    |
| 10 | Percent Trunk Group Usage Incoming         | Suppress           |                   | Suppress |        |                   |                    |

Table 12-4 BAMS Measurement Matrix (continued)

| #  | Measurement Name                        | Predefined No 1071 | Predefined w/1071 | Dynamic  | MGCP   | Support in Nailed | Threshold Crossing |
|----|-----------------------------------------|--------------------|-------------------|----------|--------|-------------------|--------------------|
| 11 | Percent Trunk Group Usage Outgoing      | Suppress           |                   | Suppress | No Peg |                   |                    |
| 12 | Maintenance Duration per Trunk Group    | Suppress           |                   | Suppress |        |                   |                    |
| 13 | Total Traffic in Erlangs                |                    |                   |          |        |                   |                    |
| 14 | Total Calls Terminated Normally         |                    |                   |          |        |                   |                    |
| 15 | Calls Terminated Abnormally             |                    |                   |          |        |                   |                    |
| 16 | Calls Terminated, failed MGW or NAS     |                    |                   |          |        |                   |                    |
| 17 | Calls Rejected                          |                    |                   |          |        |                   |                    |
| 18 | Calls Rejected, unknown Dialed Number   |                    |                   |          |        |                   |                    |
| 19 | Calls Rejected, other reasons           |                    |                   |          |        |                   |                    |
| 20 | Overflow, outgoing attempts blocked     |                    |                   |          | No Peg |                   |                    |
| 21 | Total sum of usage pegs per trunk group |                    |                   |          |        |                   |                    |
| 22 | Tandem routing attempts, outgoing       |                    |                   | Suppress | No Peg |                   |                    |
| 23 | Tandem completions, outgoing            |                    |                   | Suppress | No Peg |                   |                    |
| 24 | Tandem attempts, incoming               |                    |                   | Suppress |        |                   |                    |
| 25 | Tandem completions, incoming            |                    |                   | Suppress |        |                   |                    |
| 26 | Tandem duration, outgoing               |                    |                   | Suppress |        |                   |                    |
| 27 | Tandem duration, incoming               |                    |                   | Suppress |        |                   |                    |
| 28 | IC destined calls                       |                    |                   |          |        |                   |                    |
| 29 | Ic destined calls, no circuit           |                    |                   |          |        |                   |                    |
| 30 | IC usage                                |                    |                   |          |        |                   |                    |
| 31 | Conversation Duration Ingress           |                    |                   |          |        |                   |                    |
| 32 | Conversation Duration Egress            |                    |                   |          | No Peg |                   |                    |
| 33 | Setup Duration Ingress                  |                    |                   |          |        |                   |                    |
| 34 | Setup Duration Egress                   |                    |                   |          | No Peg |                   |                    |
| 35 | Teardown Duration Ingress               |                    |                   |          |        |                   |                    |
| 36 | Teardown Duration Egress                |                    |                   |          | No Peg |                   |                    |
| 37 | Call Routing I Peg                      |                    |                   |          |        |                   |                    |
| 38 | Call Routing II Peg                     |                    |                   |          |        |                   |                    |
| 39 | Call Routing III Peg                    |                    |                   |          |        |                   |                    |
| 40 | Carrier Select No Indication            |                    |                   | Suppress |        |                   |                    |

Table 12-4 BAMS Measurement Matrix (continued)

| #  | Measurement Name                                               | Predefined No 1071 | Predefined w/1071 | Dynamic  | MGCP   | Support in Nailed | Threshold Crossing |
|----|----------------------------------------------------------------|--------------------|-------------------|----------|--------|-------------------|--------------------|
| 41 | Carrier Select PreSubscribed Not Input                         |                    |                   | Suppress |        |                   |                    |
| 42 | Carrier Select PreSubscribed and Input                         |                    |                   | Suppress |        |                   |                    |
| 43 | Carrier Select PreSubscribed with No Indication                |                    |                   | Suppress |        |                   |                    |
| 44 | Carrier ID Code Not PreSubscribed but Input by Customer        |                    |                   | Suppress |        |                   |                    |
| 45 | Successful H.323 terminating peps                              |                    |                   |          |        |                   |                    |
| 46 | Successful H.323 originating peps                              |                    |                   |          |        |                   |                    |
| 47 | Unsuccessful H.323 terminating peps                            |                    |                   |          |        |                   |                    |
| 48 | Unsuccessful H.323 originating peps                            |                    |                   |          |        |                   |                    |
| 49 | Successful ISUP terminating peps                               |                    |                   |          |        |                   |                    |
| 50 | Successful ISUP originating peps                               |                    |                   |          |        |                   |                    |
| 51 | Unsuccessful ISUP terminating peps                             |                    |                   |          |        |                   |                    |
| 52 | Unsuccessful ISUP originating peps                             |                    |                   |          |        |                   |                    |
| 53 | ISDN Terminating Setup Message Delay peps                      |                    |                   |          |        |                   |                    |
| 54 | ISDN Originating Setup Message Delay peps                      |                    |                   |          |        |                   |                    |
| 55 | Number of defined CICs during the measurement period           | Suppress           |                   | Suppress |        |                   |                    |
| 56 | Average number of available CICs during the measurement period | Suppress           |                   | Suppress |        |                   |                    |
| 57 | Answered Calls incoming                                        |                    |                   |          |        |                   |                    |
| 58 | Answered Calls outgoing                                        |                    |                   |          | No Peg | Suppress          |                    |
| 59 | Answered Calls total                                           |                    |                   |          |        | Suppress          |                    |
| 60 | Call Attempts total                                            |                    |                   |          |        | Suppress          |                    |
| 61 | Answer Seizure Ratio incoming                                  |                    |                   |          |        |                   |                    |
| 62 | Answer Seizure Ratio outgoing                                  |                    |                   |          | No Peg | Suppress          |                    |

Table 12-4 BAMS Measurement Matrix (continued)

| #  | Measurement Name           | Predefined No 1071 | Predefined w/1071 | Dynamic | MGCP | Support in Nailed | Threshold Crossing |
|----|----------------------------|--------------------|-------------------|---------|------|-------------------|--------------------|
| 63 | Answer Seizure Ratio total |                    |                   |         |      | Suppress          |                    |
| 64 | Busy Hour                  |                    |                   |         |      |                   | No                 |
| 65 | Busy Period                |                    |                   |         |      |                   | No                 |

1. No longer supported (these are duplicates of other measurements)
2. No longer supported (these are duplicates of other measurements)
3. No longer supported (these are duplicates of other measurements)

## Noncarrier and Carrier-Based Measurements

Each measurement value represents an accumulation of activity that took place during the measurement interval. At any point in time, three intervals are being collected in parallel, in real-time, hourly, and daily. Measurement values are organized into measurement groups. There are two types of measurement groups: noncarrier and carrier-based. For each noncarrier group, 45 different measurements are accumulated. For each carrier-based group, eight different measurements are accumulated.

### Types of Measurement Intervals

The Accumulation (ACC) task generates measurements for one variable, real-time interval, or period and two fixed-time intervals. At any moment in time, two collection windows are open for updating, the current window called “N,” and the most recent window called “N–1.” Each N and N–1 collection window consists of real-time, hourly, and daily counters. The two open windows are necessary because the Cisco Media Gateway Controller (MGC) does not produce a CDR at the first Initial Address Message (IAM) or seizure. Instead, it produces the CDR at the time of answer or abandonment of the call.

Because of the particular time points that are recorded by the Cisco MGC, an event might not be reported until after the collection interval has been closed, even though the event should have been credited to that interval. The one exception to the two-window rule is at startup, where only the current window is open. That remains the case until after the first interval boundary is crossed.

### Real-Time Intervals

You can configure the real-time interval to any of the following durations: 5 minutes, 10 minutes, 15 minutes, 20 minutes, or 30 minutes. The default real-time interval is 15 minutes. All real-time measurements are stored in files whose names have the prefix `acc_r`.

### Hourly Intervals

The hourly interval contains the sum of all of the real-time intervals that took place during the hour. For this reason, 60 minutes must be evenly divisible by the real-time interval length. All hourly measurements are stored in files whose names have the prefix `acc_h`.

## Daily Intervals

The daily interval contains the sum of all of the hourly intervals that took place during the day. All daily measurements are stored in files whose names have the prefix `acc_d`.

## Noncarrier Measurements

Noncarrier measurements are organized by trunk group. [Table 12-5](#) lists these measurements and their mnemonics. It also describes each measurement's trigger time point and tag, derivation, and mapping.



Note

For a list of which measurements are suppressed or not pegged based on the `PGW_DYNAMIC_UPDATE` value, see [“Setting the PGW Dynamic Update Mode”](#) section on [page 2-20](#).

**Table 12-5 Noncarrier Measurements**

| Measurement               | Trigger Time Point and Tag                       | Mnemonic               | Derivation and Mapping                                                                                                                                                   |
|---------------------------|--------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Call Attempts Incoming    | 1010 or 1030 received, Tag 4100 or 4101          | BAM:IGR CALL ATT       | Pegged when a 1010 CDB is recorded w/4008 or when 1030 recorded w/4008                                                                                                   |
| Call Attempts Outgoing    | 1010 or 1030 received, Tag 4100 or 4101          | BAM:EGR CALL ATT       | Pegged when a 1010 CDB is recorded w/4015 or when 1030 recorded w/4015. Suppressed in MGCP Dial or MGCP Scripting calls.                                                 |
| Outgoing Attempts Blocked | 1030 or 1040 received, Tag 4100 or 4101          | BAM:EGR CALL BLKD      | 4015 populated, 1030 or 1040 with (Cause Code) Tag {2008,3008} == {21, 25, 27, 29, 34, 38, 41, 42, 44, 46, 47, 53, 63}. Suppressed in MGCP Dial or MGCP Scripting calls. |
| Failed Calls-Congestion   | 1030 or 1040 received, Tag 4100 or 4101          | BAM:TTL FAILED CONGEST | Peg for all 1030 or 1040 where {2008 or 3008} == {42, 44, 47}                                                                                                            |
| Successful Calls Incoming | 1040 or 1030 received, later of Tag 4106 or 4107 | BAM:IGR TERM NORM      | Peg for all 1040 CDB or 1030 CDB where 4008 is populated and {2008 or 3008} == {16,17,18,19, 31}                                                                         |
| Successful Calls Outgoing | 1040 or 1030 received, later of Tag 4106 or 4107 | BAM:EGR TERM NORM      | Pegged when 1040 or 1030 CDB recorded w/4015 populated and {2008 or 3008} == {16,17,18,19, 31}. Suppressed in MGCP Dial or MGCP Scripting calls.                         |

Table 12-5 Noncarrier Measurements (continued)

| Measurement                        | Trigger Time Point and Tag                                                                     | Mnemonic            | Derivation and Mapping                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Percent Trunk Group Usage Incoming | Starts when 1010 received (Tag 4100 or 4101). Closes when interval is closed or 1040 received. | BAM:IGR PCT TRK USE | Measured as a percentage of time that circuits are occupied based on the total number of circuits belonging to a trunk group over the provisioned interval of measurement. Any circuit on Tag 4008 triggers this measurement from CDB Tag 1010. The starting time point is the earlier of 4100 or 4101, the end timepoint is in the 1040 CDB, the later of tag 4108 or 4109. Suppressed before 1071 CDB is received on trunk group when the PGW_DYNAMIC_UPDATE flag is set to true. Also suppressed for dynamically added trunk groups.                                                        |
| Percent Trunk Group Usage Outgoing | Starts when 1010 received (Tag 4100 or 4101). Closes when interval is closed or 1040 received. | BAM:EGR PCT TRK USE | Measured as a percentage of time that circuits are occupied based on the total number of circuits belonging to a trunk group over the provisioned interval of measurement. Any circuit on Tag 4015 triggers this measurement from CDB Tag 1010. The starting time point is the earlier of 4100 or 4101, the end timepoint is in the 1040 CDB, the later of tag 4108 or 4109. Suppressed before 1071 CDB is received on trunk group when the PGW_DYNAMIC_UPDATE flag is set to true. Also suppressed in MGCP Dial or MGCP Scripting mode. Always suppressed for dynamically added trunk groups. |

When the measurement Percent Trunk Group Usage (PCT TRK USE) is specified, it is possible for the measurement to be recorded in the real-time acc\_r file but not recorded in the hourly acc\_h or daily acc\_d files. For example, trunk group usage that is as low as 1% for a real-time duration set for 10, 15, or 30 minutes, will be recorded in the acc\_r file. However, such low usage will fall below 1% for the greater hourly and daily time periods and, therefore, will not be recorded in the acc\_h or acc\_d files. Similarly, a measurement can meet the minimum usage percentage to be recorded in the real-time and hourly files but not the daily file.

Table 12-5 Noncarrier Measurements (continued)

| Measurement                          | Trigger Time Point and Tag                                                                             | Mnemonic            | Derivation and Mapping                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maintenance Duration per Trunk Group | Starts when 1071 received (Tag 4100 or 4101). Closes when interval is closed or another 1071 received. | BAM:TTL MAINT USE   | Only available with PGW release 9.4(1) or later and if the PGW_DYNAMIC_UPDATE flag is set to true. Measured as a percentage of time that circuits are occupied based on the total number of circuits belonging to a trunk group over the provisioned interval of measurement. When the 1071 CDB contains the number of circuits unavailable for a trunk group, BAMS is able to track the number of circuits out of service. Only available if the PGW_DYNAMIC_UPDATE flag is set to true and trunk group is configured in the Trunk Group table, suppressed before 1071 is received. Always suppressed for dynamically added trunk groups. |
| Total Traffic in Erlangs             | Starts when 1010 received (Tag 4100 or 4101). Closes when interval is closed or 1040 received          | BAM:TTL ERLANGS     | Measured as Erlangs for both Ingress and Egress for a trunk group. Use total seconds duration, from 1010 CDB, use timepoint in earlier of 4100 or 4101. For the end of the duration, use the later of 4108 or 4109. Erlangs = (total seconds) / (seconds in measured interval)<br><br>Example: For a one-hour measurement, with 99,000 secs measured, the formula would be $(99,000)/(3600\text{secs}) = 27.5$ Erlangs.<br><br>If the same measurement occurred over a 15-minute interval, the formula would be $(99,000)/(900\text{secs}) = 110$ Erlangs.                                                                                 |
| Total Calls Terminated Normally      | 1040 received (Tag 4106 or 4107)                                                                       | BAM:TTL TERM NORM   | Pegged when 1040 CDB recorded and release code in the set {16,17,18,19, 31}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Calls Terminated Abnormally          | 1030 or 1040 received (Tag 4106 or 4107)                                                               | BAM:TTL TERM ABNORM | Pegged for any 1040 where {2008 or 3008} != {16,17,18,19, 31} or for 1030 CDB with any release code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

Table 12-5 Noncarrier Measurements (continued)

| Measurement                             | Trigger Time Point and Tag                   | Mnemonic                   | Derivation and Mapping                                                                                                                                                                               |
|-----------------------------------------|----------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Calls Terminated, Failed MGW or NAS     | 1030 or 1040 received (Tag 4106 or 4107)     | BAM:TTL TERM FAILED MGW    | Pegged for any 1030 or 1040 CDB where {2008 or 3008} == {29}                                                                                                                                         |
| Calls Rejected                          | 1030 CDB received (Tag 4100 or 4101)         | BAM:TTL CALLS REJECTED     | Pegged for any 1030 CDB where {2008 or 3008} == {21}                                                                                                                                                 |
| Calls Rejected, Unknown Dialed Number   | 1030 CDB received (Tag 4100 or 4101)         | BAM:TTL REJECTED DIALNUM   | Pegged for any 1030 CDB where {2008 or 3008} == {1, 5, 22, 28}                                                                                                                                       |
| Calls Rejected, Other Reasons           | 1030 CDB received (Tag 4100 or 4101)         | BAM:TTL REJECTED OTHER     | Pegged for any 1030 CDB where {2008 or 3008} != {1,5,16,17,18,19,21,22,28,29}                                                                                                                        |
| Overflow, Outgoing Attempts Blocked     | 1030 CDB received (Tag 4100 or 4101)         | BAM:EGR OFL BLKD           | Pegged for 1030 CDB where 4015 is populated and {2008 or 3008} == {27, 34, 41, 42, 44, 47, 53, 63}. Suppressed in MGCP Dial or MGCP Scripting calls.                                                 |
| Total Sum of Usage Pegs per Trunk Group | 1010 or 1030 CDB received (Tag 4100 or 4101) | BAM:TTL TRAFFIC USAGE PEGS | Pegged for any 1010 or 1030 CDB.                                                                                                                                                                     |
| Tandem Routing Attempts, Outgoing       | 1010 or 1030 CDB received (Tag 4100 or 4101) | BAM:EGR TANDEM ATT         | Pegged when Tag 4015 (trunk group) is marked T (tandem connection) for 1010 or 1030 CDB. Always suppressed for dynamically added trunk groups. Also suppressed in MGCP Dial or MGCP Scripting calls. |
| Tandem Completions, Outgoing            | 1010 CDB received (Tag 4100 or 4101)         | BAM:EGR TANDEM COMPLT      | Pegged when Tag 4015 (trunk group) is marked T (tandem connection) for 1010 CDB. Always suppressed for dynamically added trunk groups. Also suppressed in MGCP Dial or MGCP Scripting calls.         |
| Tandem Attempts, Incoming               | 1010 or 1030 CDB received (Tag 4100 or 4101) | BAM:IGR TANDEM ATT         | Pegged when Tag 4008 (trunk group) is marked T (tandem connection) for 1010 or 1030 CDB. Always suppressed for dynamically added trunk groups.                                                       |
| Tandem Completions, Incoming            | 1010 CDB received (Tag 4100 or 4101)         | BAM:IGR TANDEM COMPLT      | Pegged when Tag 4008 (trunk group) is marked T (tandem connection) for 1010 CDB. Always suppressed for dynamically added trunk groups.                                                               |

Table 12-5 Noncarrier Measurements (continued)

| Measurement                   | Trigger Time Point and Tag                                                                                        | Mnemonic               | Derivation and Mapping                                                                                                                                                                                                                                                 |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tandem Duration, Outgoing     | 1010 CDB received (Tag 4100 or 4101)                                                                              | BAM:EGR TANDEM DUR     | Duration measured when Tag 4015 (trunk group) is marked T (tandem connection) for 1010 CDB. Always suppressed for dynamically added trunk groups.                                                                                                                      |
| Tandem Duration, Incoming     | Starts when 1010 received (Tag 4100 or 4101). Closes when interval is closed or 1040 received (tag 4108 or 4109). | BAM:IGR TANDEM DUR     | Duration measured when Tag 4008 (trunk group) is marked T (tandem connection) for 1010 CDB. Start with earlier of timepoint in 4100 or 4101 of 1010 CDB, end with later of 4108 or 4109 in 1040 CDB. Always suppressed for dynamically added trunk groups.             |
| Conversation Duration Ingress | Starts when 1010 received (Tag 4100 or 4101). Closes when interval is closed or 1040 received (tag 4108 or 4109). | BAM:IGR CONV DURATION  | Duration measured from the later of tag 4104 or 4105 in the 1010 CDB, till the earlier of tag 4106 or 4107, when tag 4008 is populated with valid trunk group number.                                                                                                  |
| Conversation Duration Egress  | Starts when 1010 received (Tag 4100 or 4101). Closes when interval is closed or 1040 received (tag 4108 or 4109). | BAM:EGR CONV DURATION  | Duration measured from the later of tag 4104 or 4105 in the 1010 CDB, till the earlier of tag 4106 or 4107, when tag 4015 is populated with valid trunk group number. Suppressed in MGCP Dial or MGCP Scripting calls.                                                 |
| Setup Duration Ingress        | 1010 or 1030 CDB received (Tag 4100 or 4101)                                                                      | BAM:IGR SETUP DURATION | Duration measured from timepoint in earlier of tag 4100 or 4101 of 1010 CDB, end with later of 4102 or 4103 in 1010 CDB. For 1030 CDB, start with earlier of 4100 or 4101, end with earlier of 4106 or 4107, when tag 4008 is populated with valid trunk group number. |

Table 12-5 Noncarrier Measurements (continued)

| Measurement               | Trigger Time Point and Tag                   | Mnemonic                  | Derivation and Mapping                                                                                                                                                                                                                                                                                                  |
|---------------------------|----------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Setup Duration Egress     | 1010 or 1030 CDB received (Tag 4100 or 4101) | BAM:EGR SETUP DURATION    | Duration measured from timepoint in earlier of tag 4100 or 4101 of 1010 CDB, end with later of 4102 or 4103 in 1010 CDB. For 1030 CDB, start with earlier of 4100 or 4101, end with earlier of 4106 or 4107, when tag 4015 is populated with valid trunk group number. Suppressed in MGCP Dial or MGCP Scripting calls. |
| Teardown Duration Ingress | 1030 or 1040 CDB received (Tag 4106 or 4107) | BAM:IGR TEARDOWN DURATION | Duration measured from timepoint in earlier of 4106 or 4107, end with later of 4108 or 4109, when tag 4008 is populated with valid trunk group number.                                                                                                                                                                  |
| Teardown Duration Egress  | 1030 or 1040 CDB received (Tag 4106 or 4107) | BAM:EGR TEARDOWN DURATION | Duration measured from timepoint in earlier of 4106 or 4107, end with later of 4108 or 4109, when tag 4015 is populated with valid trunk group number. Suppressed in MGCP Dial or MGCP Scripting calls.                                                                                                                 |
| Call Routing I Peg        | 1030 or 1010 CDB received (Tag 4100 or 4101) | BAM:TTL CALL ROUTING I    | Pegged when ingress and egress traffic terminations are maintained by the same gateway. When tag 4038 and tag 4039 are equal and neither tag 4069 nor 4073 equal 6 (EISUP).                                                                                                                                             |
| Call Routing II Peg       | 1030 or 1010 CDB received (Tag 4100 or 4101) | BAM:TTL CALL ROUTING II   | Pegged when ingress and egress traffic terminations are maintained by the different gateways, but under control of the same MGC. When tag 4038 and tag 4039 are not equal and neither tag 4069 nor 4073 equal 6.                                                                                                        |
| Call Routing III Peg      | 1030 or 1010 CDB received (Tag 4100 or 4101) | BAM:TTL CALL ROUTING III  | Pegged when one side of a call originates or terminates under the control of a gateway connected to the MGC, but the other side of the call terminates in another network not under the control of the MGC. When either tag 4069 or 4073 equal 6.                                                                       |

Table 12-5 Noncarrier Measurements (continued)

| Measurement                         | Trigger Time Point and Tag           | Mnemonic                      | Derivation and Mapping                                                                                                                                                                                   |
|-------------------------------------|--------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Successful H.323 Terminating Pegs   | 1010 CDB received (Tag 4100 or 4101) | BAM:EGR<br>SUCCESSFUL H.323   | Pegged when a 1010 CDB is received with a tag 4073 with a value of 7.<br><br><b>Note</b> The H.323 measurements are output only when the enable-H323 parameter is set to 1 in the Node Parameters table. |
| Successful H.323 Originating Pegs   | 1010 CDB received (Tag 4100 or 4101) | BAM:IGR<br>SUCCESSFUL H.323   | Pegged when a 1010 CDB is received with a tag 4069 with a value of 7.<br><br><b>Note</b> The H.323 measurements are output only when the enable-H323 parameter is set to 1 in the Node Parameters table. |
| Unsuccessful H.323 Terminating Pegs | 1030 CDB received (Tag 4100 or 4101) | BAM:EGR<br>UNSUCCESSFUL H.323 | Pegged when a 1030 CDB is received with a tag 4073 with a value of 7.<br><br><b>Note</b> The H.323 measurements are output only when the enable-H323 parameter is set to 1 in the Node Parameters table. |
| Unsuccessful H.323 Originating Pegs | 1030 CDB received (Tag 4100 or 4101) | BAM:IGR<br>UNSUCCESSFUL H.323 | Pegged when a 1030 CDB is received with a tag 4069 of value 7.<br><br><b>Note</b> The H.323 measurements are output only when the enable-H323 parameter is set to 1 in the Node Parameters table.        |
| Successful ISUP Terminating Pegs    | 1010 CDB received (Tag 4100 or 4101) | BAM:EGR<br>SUCCESSFUL ISUP    | Pegged when a 1010 CDB is received with a tag 4073 of value 0.                                                                                                                                           |
| Successful ISUP Originating Pegs    | 1010 CDB received (Tag 4100 or 4101) | BAM:IGR<br>SUCCESSFUL ISUP    | Pegged when a 1010 CDB is received with a tag 4069 of value 0.                                                                                                                                           |
| Unsuccessful ISUP Terminating Pegs  | 1030 CDB received (Tag 4100 or 4101) | BAM:EGR<br>UNSUCCESSFUL ISUP  | Pegged when a 1030 CDB is received with a tag 4073 of value 0.                                                                                                                                           |
| Unsuccessful ISUP Originating Pegs  | 1030 CDB received (Tag 4100 or 4101) | BAM:IGR<br>UNSUCCESSFUL ISUP  | Pegged when a 1030 CDB is received with a tag 4069 of value 0.                                                                                                                                           |

*Table 12-5 Noncarrier Measurements (continued)*

| Measurement                               | Trigger Time Point and Tag                   | Mnemonic                     | Derivation and Mapping                                                                                                                                                                                                                       |
|-------------------------------------------|----------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ISDN Terminating Setup Message Delay Pegs | 1010 or 1030 CDB received (Tag 4100 or 4101) | BAM:EGR ISDN SETUP MSG DELAY | Pegged when a 1010 or 1030 CDB is received with a tag 4073 with a value of 0, when the setup duration > 3000 ms. The setup duration is measured from timepoint in earlier of tag 4100 or 4101 of 1010 CDB, end with later of 4102 or 4103.   |
| ISDN Originating Setup Message Delay Pegs | 1010 or 1030 CDB received (Tag 4100 or 4101) | BAM:IGR ISDN SETUP MSG DELAY | Pegged when a 1010 or 1030 CDB is received with a tag 4069 having a value of 0, when the setup duration > 3000 ms. The setup duration is measured from timepoint in earlier of tag 4100 or 4101 of 1010 CDB, end with later of 4102 or 4103. |

Table 12-5 Noncarrier Measurements (continued)

| Measurement                                                    | Trigger Time Point and Tag    | Mnemonic            | Derivation and Mapping                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------|-------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Number of Defined CICs during the Measurement Period           | Start of measurement interval | BAM:TTL CIC DEFINED | <p>Number of circuits provisioned in the Trunk Group table when the PGW_DYNAMIC_UPDATE flag is set to false. Or the value for the number of circuits in the trunk group received from the latest 1071 CDB when the PGW_DYNAMIC_UPDATE flag is set to true.</p> <p>Suppressed before 1071 CDB is received on trunk group when the PGW_DYNAMIC_UPDATE flag is set to true. Always suppressed for dynamically added trunk groups.</p> <p><b>Note</b> No corresponding threshold crossing alert exists for this measurement.</p> |
| Average Number of Available CICs during the Measurement Period | 1071 received                 | BAM:TTL AVLBL CIC   | <p>Total – maintDuration / intervalLength</p> <p>Where, total = Total number of circuits; maintDuration = total maintenance duration (see “TTL MAINT USE” in Table 12-5 for details); intervalLength = total number of seconds for the measurement period.</p> <p>Only available if the PGW_DYNAMIC_UPDATE flag is set to true and trunk group is configured in the Trunk Group table. Suppressed before 1071 CDB is received on trunk group. Always suppressed for dynamically added trunk groups.</p>                      |

## Carrier-Based Measurements

Carrier-based measurements are grouped by Trunk Group/Interexchange Carrier (IC). [Table 12-6](#) lists these measurements with their mnemonics. It also describes each measurement's trigger time point and tag, derivation, and mapping.

**Table 12-6** Carrier Measurements

| Measurement                            | Trigger Time Point and Tag                   | Mnemonic                                 | Derivation and Mapping                                                                                                                                                                         |
|----------------------------------------|----------------------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IC Destined Calls                      | 1010 CDB received (Tag 4100 or 4101)         | BAM:IC:XXXX IC EGR CALLS                 | Pegged per IC for CDB 1010 where Tag 2014 is populated with a valid carrier id.                                                                                                                |
| IC Destined Calls, No Circuit          | 1030 CDB received (Tag 4100 or 4101)         | BAM: IC:XXXX IC EGR NO CKT               | Pegged per IC for 1030 CDB where Tag 2008 = {42, 44, 47}                                                                                                                                       |
| IC Usage                               | 1010 CDB received (Tag 4100 or 4101)         | BAM:IC:XXXX TTL DURATION                 | Duration measured per IC when CDB 1010 tag 2014 is populated with a valid carrier id. Start with earlier of timepoint in 4100 or 4101 of 1010 CDB, end with later of 4108 or 4109 in 1040 CDB. |
| Carrier Select No Indication           | 1030 or 1010 CDB received (Tag 4100 or 4101) | BAM:TTL CARRIERSELECT NO INDICATION      | Pegged when Tag 2015 != {1,2,3,4} and marked "T" for tandem connected in the Trunk Group table. Output by trunk group and carrier. Always suppressed for dynamically added trunk groups.       |
| Carrier Select PreSubscribed Not Input | 1030 or 1010 CDB received (Tag 4100 or 4101) | BAM:TTL CARRIERSELECT PRESUBSCRIBED NIPT | Pegged when Tag 2015 = { 1 } and marked "T" for tandem connected in the Trunk Group table. Output by trunkgroup and carrier. Always suppressed for dynamically added trunk groups.             |
| CarrierSelect PreSubscribed and Input  | 1030 or 1010 CDB received (Tag 4100 or 4101) | BAM:TTL CARRIERSELECT PRESUBSCRIBED INPT | Pegged when Tag 2015 = { 2 } and marked "T" for tandem connected in the Trunk Group table. Output by trunkgroup and carrier. Always suppressed for dynamically added trunk groups.             |

Table 12-6 Carrier Measurements (continued)

| Measurement                                                   | Trigger Time Point and Tag                            | Mnemonic                                      | Derivation and Mapping                                                                                                                                                                                  |
|---------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CarrierSelect<br>PreSubscribed with<br>No Indication          | 1030 or 1010<br>CDB received<br>(Tag 4100 or<br>4101) | BAM:TTL<br>CARRIERSELECT<br>PRESUBSCRIBED WNI | Pegged when Tag 2015 =<br>{ 3 } and marked "T" for<br>tandem connected in the Trunk<br>Group table. Output by<br>trunkgroup and carrier.<br>Always suppressed for<br>dynamically added trunk<br>groups. |
| Carrier Id Code Not<br>PreSubscribed but<br>Input by Customer | 1030 or 1010<br>CDB received<br>(Tag 4100 or<br>4101) | BAM:TTL<br>CARRIERSELECT<br>NOTPRESUBSCRIBED  | Pegged when Tag 2015 =<br>{ 4 } and marked "T" for<br>tandem connected in the Trunk<br>Group table. Output by<br>trunkgroup and carrier.<br>Always suppressed for<br>dynamically added trunk<br>groups. |

## Storage of Measurements

Both carrier-based and noncarrier measurements are stored internally in groups. Each group consists of all the measurements that belong to a particular key. These measurements are then put in subgroups according to interval. Each measurement group contains real-time, hourly, and daily measurements. There are two types of keys or measurement groups. These are noncarrier measurements and carrier-based measurements. Regardless of group type, measurements are held in memory for performance reasons. Up to two time periods for each key can reside in memory simultaneously. These are the current time period and the one preceding the current time period. Because memory is somewhat volatile, the counters must be written to disk to prevent loss of data. At the end of each real-time time period, the contents of memory are written to disk. This disk file is then available to be read at the next startup.

## Noncarrier Measurement Production

Noncarrier measurements consist of 45 measurements or accumulators for each of the three intervals kept in memory. This results in 135 measurements for the current time period, plus a possible additional 135 measurements for the preceding time period.

## Carrier-Based Measurement Production

Carrier measurements consist of eight measurements or accumulators for each of the three intervals kept in memory. This results in 24 measurements for the current time period, plus a possible additional 24 measurements for the preceding time period.

## Memory Allocation

Depending on the operating mode, the system either preallocates counters for all of the configured measurement groups or it allocates counters as activity is detected in each measurement group.

## Threshold Crossing Alarms

### TCA Table

The Threshold Crossing Alarms (TCA) table contains values and conditions for each measurement that you wish to link to an alarm. These values and conditions are organized by trunk group or Trunk Group/IC (measurement group). Enter the measurement groups that are of concern. You need not populate every value and condition for a specified measurement group. A global measurement group can be specified to be used for all measurement groups that are not specifically entered.

### Threshold String Values

Table 12-7 lists the condition value strings and the threshold value strings that you use to identify the condition and threshold values you set in an MML provisioning session with the TCA-TBL tag ID. For more information, see the “Updating the Threshold Crossing Alarms Table” section on page 5-24.

**Table 12-7 Threshold String Values**

| Threshold                            | Condition Value String | Threshold Value String | Entered By |
|--------------------------------------|------------------------|------------------------|------------|
| Call Attempts Incoming               | igr-call-att-cond      | igr-call-att           | TAG/TRK    |
| Call Attempts Outgoing               | egr-call-att-cond      | egr-call-att           | TAG/TRK    |
| Outgoing Attempts Blocked            | egr-call-blkd-cond     | egr-call-blkd          | TAG/TRK    |
| Failed Calls Congestion              | tfl-failed-cong-cond   | tfl-failed-cong        | TAG/TRK    |
| Successful Calls Incoming            | igr-term-norm-cond     | igr-term-norm          | TAG/TRK    |
| Successful Calls Outgoing            | egr-term-norm-cond     | egr-term-norm          | TAG/TRK    |
| Percent Trunk Group Usage Incoming   | igr-pct-trk-use-cond   | igr-pct-trk-use        | TAG/TRK    |
| Percent Trunk Group Usage Outgoing   | egr-pct-trk-use-cond   | egr-pct-trk-use        | TAG/TRK    |
| Maintenance Duration per Trunk Group | tfl-maint-use-cond     | tfl-maint-use          | TAG/TRK    |
| Total Traffic Erlangs                | tfl-erlangs-cond       | tfl-erlangs            | TAG/TRK    |
| Total Calls Terminated Normally      | tfl-term-norm-cond     | tfl-term-norm          | TAG/TRK    |

Table 12-7 Threshold String Values (continued)

| Threshold                                                                                 | Condition Value String      | Threshold Value String | Entered By |
|-------------------------------------------------------------------------------------------|-----------------------------|------------------------|------------|
| Calls Terminated Abnormally                                                               | tfl-term-abnorm-cond        | tfl-term-abnorm        | TAG/TRK    |
| Calls Terminated, Failed MGW or NAS                                                       | tfl-term-failed-mgw-cond    | tfl-term-failed-mgw    | TAG/TRK    |
| Calls Rejected                                                                            | tfl-calls-rejected-cond     | tfl-calls-rejected     | TAG/TRK    |
| Calls Rejected, Unknown Dialed Number                                                     | tfl-rejected-dialnum-cond   | tfl-rejected-dialnum   | TAG/TRK    |
| Calls Rejected, Other Reasons                                                             | tfl-rejected-other-cond     | tfl-rejected-other     | TAG/TRK    |
| Overflow, Outgoing Attempts Blocked                                                       | egr-ofl-blkd-cond           | egr-ofl-blkd           | TAG/TRK    |
| Total Sum of Usage Pegs per Trunk Group (not including maintenance pegs for Release 2.xx) | tfl-traffic-usage-pegs-cond | tfl-traffic-usage-pegs | TAG/TRK    |
| Tandem Routing Attempts, Outgoing                                                         | egr-tndm-att-cond           | egr-tndm-att           | TAG/TRK    |
| Tandem Completions, Outgoing                                                              | egr-tndm-cmplt-cond         | egr-tndm-cmplt         | TAG/TRK    |
| Tandem Routing Attempts, Incoming                                                         | igr-tndm-att-cond           | igr-tndm-att           | TAG/TRK    |
| Tandem Completions, Incoming                                                              | igr-tndm-cmplt-cond         | igr-tndm-cmplt         | TAG/TRK    |
| Tandem Duration, Outgoing                                                                 | egr-tndm-dur-cond           | egr-tndm-dur           | TAG/TRK    |
| Tandem Duration, Incoming                                                                 | igr-tndm-dur-cond           | igr-tndm-dur           | TAG/TRK    |
| IC Destined Calls, Outgoing                                                               | egr-ic-calls-cond           | egr-ic-calls           | TAG/TRK/IC |
| IC Destined Calls, No Circuit                                                             | egr-ic-nockt-cond           | egr-ic-nockt           | TAG/TRK/IC |
| IC Usage                                                                                  | tfl-ic-usage-cond           | tfl-ic-usage           | TAG/TRK/IC |
| Conversation Duration, Incoming                                                           | igr-conv-dur-cond           | igr-conv-dur           | TAG/TRK    |

Table 12-7 Threshold String Values (continued)

| Threshold                                                     | Condition Value String  | Threshold Value String | Entered By |
|---------------------------------------------------------------|-------------------------|------------------------|------------|
| Conversation Duration, Outgoing                               | egr-conv-dur-cond       | egr-conv-dur           | TAG/TRK    |
| Setup Duration, Incoming                                      | igr-setup-dur-cond      | igr-setup-dur          | TAG/TRK    |
| Setup Duration, Outgoing                                      | egr-setup-dur-cond      | egr-setup-dur          | TAG/TRK    |
| Tear Down Duration, Incoming                                  | igr-teardown-dur-cond   | igr-teardown-dur       | TAG/TRK    |
| Tear Down Duration, Outgoing                                  | egr-teardown-dur-cond   | igr-teardown-dur       | TAG/TRK    |
| Call Routing I Peg Total                                      | tfl-route-1-cond        | tfl-route-1            | TAG/TRK    |
| Call Routing II Peg Total                                     | tfl-route-2-cond        | tfl-route-2            | TAG/TRK    |
| Call Routing III Peg Total                                    | tfl-route-3-cond        | tfl-route-3            | TAG/TRK    |
| Total Carrier Select No Indication                            | tfl-ic-sel-noind-cond   | tfl-ic-sel-noind       | TAG/TRK/IC |
| Total Carrier Select Presubscribed Not Input                  | tfl-ic-sel-pr-nipt-cond | tfl-ic-sel-pr-nipt     | TAG/TRK/IC |
| Total Carrier Select Presubscribed and Input                  | tfl-ic-sel-pr-inpt-cond | tfl-ic-sel-pr-inpt     | TAG/TRK/IC |
| Total Carrier Select Presubscribed with No Indication         | tfl-ic-sel-pr-wni-cond  | tfl-ic-sel-pr-wni      | TAG/TRK/IC |
| Total Carrier Id Code Not Presubscribed but Input by Customer | tfl-ic-sel-no-pr-cond   | tfl-ic-sel-no-pr       | TAG/TRK/IC |

Table 12-7 Threshold String Values (continued)

| Threshold                                  | Condition Value String | Threshold Value String | Entered By                                                                                                                              |
|--------------------------------------------|------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Successful H.323 Terminating Peg           | egr-scfl-h323-cond     | egr-scfl-h323          | TAG/TRK<br><b>Note</b> The H.323 measurements are checked only when the enable-H323 parameter is set to 1 in the Node Parameters table. |
| Successful H.323 Originating Peg           | igr-scfl-h323-cond     | igr-scfl-h323          | TAG/TRK<br><b>Note</b> The H.323 measurements are checked only when the enable-H323 parameter is set to 1 in the Node Parameters table. |
| Unsuccessful H.323 Terminating Peg         | egr-unscfl-h323-cond   | egr-unscfl-h323        | TAG/TRK<br><b>Note</b> The H.323 measurements are checked only when the enable-H323 parameter is set to 1 in the Node Parameters table. |
| Unsuccessful H.323 Originating Peg         | igr-unscfl-h323-cond   | igr-unscfl-h323        | TAG/TRK<br><b>Note</b> The H.323 measurements are checked only when the enable-H323 parameter is set to 1 in the Node Parameters table. |
| Total Successful Terminating ISUP Requests | egr-scfl-isup-cond     | egr-scfl-isup          | TAG/TRK                                                                                                                                 |
| Unsuccessful Terminating ISUP Requests     | egr-unscfl-isup-cond   | egr-unscfl-isup        | TAG/TRK                                                                                                                                 |
| Successful ISUP Originating Requests       | igr-scfl-isup-cond     | igr-scfl-isup          | TAG/TRK                                                                                                                                 |

**Table 12-7 Threshold String Values (continued)**

| Threshold                                     | Condition Value String     | Threshold Value String | Entered By |
|-----------------------------------------------|----------------------------|------------------------|------------|
| Unsuccessful ISUP Originating Requests        | igr-unsfcfl-isup-cond      | igr-unsfcfl-isup       | TAG/TRK    |
| Terminating ISUP Setup Message Response Delay | egr-isdn-su-msg-delay-cond | egr-isdn-su-msg-delay  | TAG/TRK    |
| Originating ISUP Setup Message Response Delay | igr-isdn-su-msg-delay-cond | igr-isdn-su-msg-delay  | TAG/TRK    |
| Total Number of Available CICs                | tfl-avlbl-cic-cond         | tfl-avlbl-cic          | TAG/TRK    |
| Answered Calls Incoming                       | igr-ans-calls-cond         | igr-ans-calls          | TAG/TRK    |
| Answered Calls Outgoing                       | egr-ans-calls-cond         | egr-ans-calls          | TAG/TRK    |
| Answered Calls Total                          | tfl-ans-calls-cond         | tfl-ans-calls          | TAG/TRK    |
| Call Attempts Total                           | tfl-call-att-cond          | tfl-call-att           | TAG/TRK    |
| Answer Seizure Ratio Incoming                 | igr-ans-seize-ratio-cond   | igr-ans-seize-ratio    | TAG/TRK    |
| Answer Seizure Ratio Incoming                 | egr-ans-seize-ratio-cond   | egr-ans-seize-ratio    | TAG/TRK    |
| Answer Seizure Ratio Incoming                 | tfl-ans-seize-ratio-cond   | tfl-ans-seize-ratio    | TAG/TRK    |

## Threshold Crossing Conditions

Each threshold crossing condition is a code that checks the difference (if any) between the user-specified value and the current real-time measurement value. The condition is specified as a number between 0 and 4. Any other value is invalid. [Table 12-8](#) defines the meaning of each condition value.

### Condition Value Relationship

[Table 12-8](#) lists condition values used for measurements.

**Table 12-8 Condition Values**

| Value | Condition Description |
|-------|-----------------------|
| 0     | Ignore                |
| 1     | Less Than (<)         |
| 2     | Equal To (=)          |

**Table 12-8 Condition Values (continued)**

| Value | Condition Description |
|-------|-----------------------|
| 3     | Greater Than (>)      |
| 4     | Not Equal To (!=)     |

## Threshold Values

With the TCA-TBL tag ID, you specify the threshold value and the condition value so that they generate an alarm if a specific measurement condition is reached. For example, for a given measurement, if the condition is set to 4 and the threshold value is set to 10, an alarm is generated if the measurement value is greater than 10. Threshold values are specified as positive integers.

## Trunk Group Identification (Threshold Key)

Each threshold specification (threshold value and condition value) must be associated with a measurement group. If the Entered By tag specifies TAG/TRK, the measurement is organized by the trunk group number. If the Entered By tag specifies TAG/TRK/IC, the measurement is organized by trunk group number and an interexchange-carrier number. A special measurement group can be specified to apply to all TAG/TRK measurement groups that are not otherwise specified. This measurement group is identified by the name “global/0,” where the TAG is “global” and the trunk group is “0.”

## Processing Logic

The same logic is used for processing all accumulation periods: computation is based on the time stamps from call detail records generated by the switch. The distinguishing factor among the different accumulation periods is the time period in which two events are considered to occur for the same counter. Counts for any given event are added to the accumulators for the time period that matches the time stamp of the event. More specifically, [Table 12-6](#) identifies the time point for each event that is used to match the accumulator time period.

Three different levels at which statistics can be generated are as follows:

- Using the CDR details
- Using the aggregate CDRs
- Using the correlated CDRs

There are advantages and disadvantages to each of the above approaches. Statistics computed from CDR details result in more frequent updates, and thus a finer granularity of reporting. However, more records must also be processed. Thus, the volume of connections and the length of the switch-reporting interval can dramatically drive up the amount of processing required to make the statistics available. Conversely, computing statistics from aggregated or correlated CDRs provides a more efficient computation, but less timely statistics.

The following section applies to all accumulation types, periods, and levels.

## Statistics Subsystem Functions

The Statistics subsystem provides the following functionality:

- Obtains the chain of aggregated CDR details.

- Receives the CDR details in time order from the Augmentation (AUG) task. The CDRs arrive in two types of files: `aug_acei` and `aug_acbc`. The `aug_acei` files contain complete CDRs taken from `fmt` files. For each `fmt` file, at least one `aug_acei` file exists. An `aug_acbc` file exists for each threshold crossing. The `aug_acbc` files contain all partial CDRs (CDRs that did not complete during the interval).
- Assigns the usage in real-time, hourly, and daily intervals. For cumulative count fields, a call that began before the start of the interval and has not ended adds the full length of the real-time interval to the count. Any CDR that begins in the interval (but has not ended) adds the time from the start of CDR to the end of the interval. Any CDR that ends in the interval (but did not start in the interval) adds the time from the start of the interval to the end time of the CDR. Any CDR that both begins and ends in the same interval adds the delta between the start and end time of the CDR.
- Calculates hourly counters.
- Monitors check points at the end of every file interval (complete reading of all `aug_acei` files and the `aug_acbc` file for the given interval).
- Summarizes the hourly counters and produces daily counters. These tables should be stored in table sets.
- Manages the daily counters so that counters older than a specified retention period are purged regularly.

At any moment in time, two collection intervals are open for updating, the current interval, called “N,” and the most recent interval, called “N–1.” The two open intervals are necessary because the Cisco MGC does not produce a CDR at the first IAM or seizure; rather, it creates the first indication of a call at answer or abandonment. Because of the particular time points that are recorded by the Cisco MGC, there are some cases where an event is not reported until after the collection interval has been closed, yet the event should be credited to that interval. A bucket or interval shall never be credited for more than the total duration that is available during that interval, regardless of when the indication of the call was received.

A flat file is maintained for each collection interval. In order to provide timely information, buckets for an interval (the current interval, or N) are written as soon as an interval boundary is reached. At the same time, the previous interval (N–1), which may have been updated because of late reports for call abandonment, is rewritten to disk and is not updated again. Very late reports are written to the oldest collection period that is still open, which is always the N–1 interval. The one exception to this rule is at startup, when only the current period is open, until after the first interval boundary is crossed.

## Keys and Counters

Keys and counters are stored in memory and written to a checkpoint file on a regular basis.

The key is a unique sequence number used to identify the specific collection of counters. The key fields are the trunk group number and the IC. [Table 12-9](#) lists the key field names and their descriptions.

**Table 12-9 Key Field Name Descriptions**

| Field       | Description                                                                                                                                                                                                                                                                                                                              |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Trunk Group | <p>Taken from the sigpath to trunkgroup configuration.</p> <ul style="list-style-type: none"> <li>For Ingress, use the Terminating Trunk Group.</li> <li>For Egress, use the Originating Trunk Group.</li> </ul> <p>The values are 1–9999 for BAF, 4096 for ITU, and 1684 for ANSI. The default is 0 if no information is available.</p> |
| IC          | Carrier ID: 2014.                                                                                                                                                                                                                                                                                                                        |

## Counter Sets

Each counter set is made up of three groups of counters, one group for real time, one for hourly, and one for daily. The counters in each group represent running tallies of the specified statistics. Each group of counters represents only the current interval of the counter type (current real time interval, the current hour, the current day). Each counter statistic is credited to the time period in which it occurred. Note that there are different time periods. Hourly counters keep track of the statistics on hourly boundaries. If an event spans multiple hours, one counter for each hour spanned is created. For example, if a call is established at 11:50 and is disconnected at 12:15, one counter for the 11:00 hour is created with 10 minutes of conversation time credited to it, and a second one is created for the 12:00 hour with 15 minutes of conversation time.

Similarly, daily counters credit statistics on daily boundaries.

## Frequency of Statistics

In addition to the rollup hourly and 24-hour statistics, which are tabulated with any of the previous options, the system also supports 5-, 10-, 15-, 20-, and 30-minute (real-time), hourly, and daily statistics.



### Note

You can configure the measurements interval by editing the interval-minutes field in the Node Parameters table. For more information, see the [“Updating the Node Parameters Table”](#) section on page 5-11.

## Statistics Output

After statistics have been collected, they are output to a flat file. For each real-time interval, an acc\_rYYYYMMDDHHMM00 file is created. For each hourly interval, an acc\_hYYYYMMDDHH0000 file is created. For each daily interval, an acc\_dYYYYMMDD000000 file is created. These files are stored in the opt/CiscoBAMS/data/s0x/Measurements directory.



### Note

All times are in Universal Coordinated Time, which is taken from the CDR record.

The output files are generated as soon as the ACC task has finished processing the aug\_acbc file (last file) for the given interval. This means that the ACC task generates a flat file for the real-time interval at the end of each set of files for the real-time interval (5, 10, 15, 20, or 30 minutes). The hourly output file is generated when the last interval file is processed for that hour. The daily output file is generated as soon as the last interval file for the day is processed. Each file is created on a real-time, 1-hour, and 24-hour basis. Each file contains all of the statistics gathered in the previous period.

In the following section, the term “trunk groups” is used to represent both TAG/Trunk Group and TAG/Trunk Group/IC.

Statistics are generated from CDBs produced by the Cisco MGC. Since the output is reported by TAG/Trunk Group or by TAG/Trunk Group/IC, measurements are produced only for trunk groups that have call activity starts (unless the system is running in configured mode and trunk groups are specified). Therefore, when the system is started, the statistics output files are empty until call activity begins. Regardless of call activity, the appropriate acc\_x files are generated. These files can, however, be empty.



Note

If CDB files produced by the Cisco MGC software on a Cisco PGW are not available for processing, the acc\_x files will not be written for that interval.

Over the course of the day, the system continues to add to the trunk groups that are reported on, as call activity is received. Once added, a trunk group is reported on in every interval that follows, until the end of the day. At midnight, the system generates the acc\_d (daily) file. This file contains all of the activity for the day for any trunk group that had call activity during the 24-hour period. Once the daily counts have been reported, the system attempts to clear out as many trunk groups from memory as possible. This step eliminates the need to report on trunk groups that are no longer active. The system purges any trunk group that does not currently have a threshold alarm asserted. These trunks groups must be retained so that the system does not assert additional alarms before the current alarm clears. If the system is running in configured mode, trunks specified in the Trunk Group table are not purged either.

Acc\_x files produced after midnight contain only trunk groups that have had call activity after midnight and trunk groups that have threshold crossing alarms asserted. If the system is running in configured mode, trunks specified in the Trunk Group table are also reported.

Since the data is stored in flat files, you can configure MSC to purge outdated statistics.

Example from a MGC acc\_h file:

```
0,972477302,3600,203,"occurrences","BAM:EGR CALL ATT","TG8004"
```

## Statistics Output Format

The format for the statistics output mirrors the SS7-type statistics format created on the Cisco MGC. The format is comma-delimited, and appears in the order shown in [Table 12-10](#).

**Table 12-10 Output Format Order**

| Column  | Description                                                                                                                | Comments              |
|---------|----------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Field 1 | Record release level (version, 0 (zero) initially).                                                                        | Constant:<br>Set to 0 |
| Field 2 | Time when the measurement interval started. The time is based on UNIX time format (seconds elapsed since January 1, 1970). |                       |
| Field 3 | Elapsed time of collection interval, in seconds.                                                                           |                       |
| Field 4 | The value of the measurement at the end of the interval.                                                                   |                       |
| Field 5 | Measurement unit.                                                                                                          |                       |

Table 12-10 Output Format Order (continued)

| Column                                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Comments          |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|--------------|-------------------|---------------|-------------------------------|--------------|-------------|---------------------------------|-------------------------------------|-----------------------------------------|-----------------------------------------|--|-------|--------------------------------------|-----------------------------------------|--|-------|-------------------------------------|------------------------------------------|--|---------------|------------------------------------|------------------------------------------|--|-----------------------|--|
| Field 6                                 | <p>The measurement category. The direction is identified by EGR for egress, IGR for ingress, or TTL for total. The measurements are either carrier-based or noncarrier-based. The measurement name is one of the following:</p> <p><b>Carrier-based Measurements</b></p> <table border="0"> <thead> <tr> <th data-bbox="512 514 869 546"><b>Field Name</b></th> <th data-bbox="869 514 1378 546"><b>Full Name</b></th> </tr> </thead> <tbody> <tr> <td data-bbox="512 546 869 577">IC EGR CALLS</td> <td data-bbox="869 546 1378 577">IC Destined Calls</td> </tr> <tr> <td data-bbox="512 577 869 609">IC EGR NO CKT</td> <td data-bbox="869 577 1378 609">IC Destined Calls, No Circuit</td> </tr> <tr> <td data-bbox="512 609 869 640">TTL DURATION</td> <td data-bbox="869 609 1378 640">IC Duration</td> </tr> <tr> <td data-bbox="512 640 869 672">TTL CARRIERSELECT NO INDICATION</td> <td data-bbox="869 640 1378 672">Total Carrier Select, No Indication</td> </tr> <tr> <td data-bbox="512 672 869 703">TTL CARRIERSELECT PRESUBSCRIBED NO NIPT</td> <td data-bbox="869 672 1378 703">Total Carrier Select Presubscribed, Not</td> </tr> <tr> <td data-bbox="512 703 869 735"></td> <td data-bbox="869 703 1378 735">Input</td> </tr> <tr> <td data-bbox="512 735 869 766">TTL CARRIERSELECT PRESUBSCRIBED INPT</td> <td data-bbox="869 735 1378 766">Total Carrier Select, Presubscribed and</td> </tr> <tr> <td data-bbox="512 766 869 798"></td> <td data-bbox="869 766 1378 798">Input</td> </tr> <tr> <td data-bbox="512 798 869 829">TTL CARRIERSELECT PRESUBSCRIBED WNI</td> <td data-bbox="869 798 1378 829">Total Carrier Select, Presubscribed with</td> </tr> <tr> <td data-bbox="512 829 869 861"></td> <td data-bbox="869 829 1378 861">No Indication</td> </tr> <tr> <td data-bbox="512 861 869 892">TTL CARRIERSELECT NOTPRESUBSCRIBED</td> <td data-bbox="869 861 1378 892">Total Carrier ID Code, Not PreSubscribed</td> </tr> <tr> <td data-bbox="512 892 869 924"></td> <td data-bbox="869 892 1378 924">but Input by Customer</td> </tr> </tbody> </table> | <b>Field Name</b> | <b>Full Name</b> | IC EGR CALLS | IC Destined Calls | IC EGR NO CKT | IC Destined Calls, No Circuit | TTL DURATION | IC Duration | TTL CARRIERSELECT NO INDICATION | Total Carrier Select, No Indication | TTL CARRIERSELECT PRESUBSCRIBED NO NIPT | Total Carrier Select Presubscribed, Not |  | Input | TTL CARRIERSELECT PRESUBSCRIBED INPT | Total Carrier Select, Presubscribed and |  | Input | TTL CARRIERSELECT PRESUBSCRIBED WNI | Total Carrier Select, Presubscribed with |  | No Indication | TTL CARRIERSELECT NOTPRESUBSCRIBED | Total Carrier ID Code, Not PreSubscribed |  | but Input by Customer |  |
| <b>Field Name</b>                       | <b>Full Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
| IC EGR CALLS                            | IC Destined Calls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
| IC EGR NO CKT                           | IC Destined Calls, No Circuit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
| TTL DURATION                            | IC Duration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
| TTL CARRIERSELECT NO INDICATION         | Total Carrier Select, No Indication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
| TTL CARRIERSELECT PRESUBSCRIBED NO NIPT | Total Carrier Select Presubscribed, Not                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
|                                         | Input                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
| TTL CARRIERSELECT PRESUBSCRIBED INPT    | Total Carrier Select, Presubscribed and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
|                                         | Input                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
| TTL CARRIERSELECT PRESUBSCRIBED WNI     | Total Carrier Select, Presubscribed with                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
|                                         | No Indication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
| TTL CARRIERSELECT NOTPRESUBSCRIBED      | Total Carrier ID Code, Not PreSubscribed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |
|                                         | but Input by Customer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |                  |              |                   |               |                               |              |             |                                 |                                     |                                         |                                         |  |       |                                      |                                         |  |       |                                     |                                          |  |               |                                    |                                          |  |                       |  |

Table 12-10 Output Format Order (continued)

| Column                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Comments   |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
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| Field 6<br>(continued) | <p><b>Noncarrier-based Measurements</b></p> <table border="0"> <thead> <tr> <th>Field Name</th> <th>Full Name</th> </tr> </thead> <tbody> <tr> <td>IGR CALL ATT</td> <td>Call Attempts Incoming</td> </tr> <tr> <td>EGR CALL ATT</td> <td>Call Attempts Outgoing</td> </tr> <tr> <td>EGR CALL BLKD</td> <td>Outgoing Attempts Blocked</td> </tr> <tr> <td>TTL FAILED CONGEST</td> <td>Failed Calls Congestion</td> </tr> <tr> <td>IGR TERM NORM</td> <td>Successful Calls Incoming</td> </tr> <tr> <td>EGR TERM NORM</td> <td>Successful Calls Outgoing</td> </tr> <tr> <td>IGR PCT TRK USE</td> <td>Percent Trunk Group Usage Incoming</td> </tr> <tr> <td>EGR PCT TRK USE</td> <td>Percent Trunk Group Usage Outgoing</td> </tr> <tr> <td>TTL MAINT USE</td> <td>Percent Trunk Group Maintenance Usage</td> </tr> <tr> <td>TTL ERLANGS</td> <td>Total Traffic in Erlangs</td> </tr> <tr> <td>TTL TERM NORM</td> <td>Total Calls Terminated Normally</td> </tr> <tr> <td>TTL TERM ABNORM</td> <td>Total Calls Terminated Abnormally</td> </tr> <tr> <td>TTL TERM FAILED MGW</td> <td>Total Calls Terminated, Failed MGW or NAS</td> </tr> <tr> <td>TTL CALLS REJECTED</td> <td>Total Calls Rejected</td> </tr> <tr> <td>TTL REJECTED DIALNUM</td> <td>Total Calls Rejected, Unknown Dialed Number</td> </tr> <tr> <td>TTL REJECTED OTHER</td> <td>Total Calls Rejected, Other Reasons</td> </tr> <tr> <td>EGR OFL BLKD</td> <td>Overflow, Outgoing Attempts Blocked</td> </tr> <tr> <td>TTL TRAFFIC USAGE PEGS</td> <td>Total Sum of Usage Pegs per Trunk Group</td> </tr> <tr> <td>EGR TANDEM ATT</td> <td>Tandem Routing Attempts, Outgoing</td> </tr> <tr> <td>EGR TANDEM COMPLT</td> <td>Tandem Completions, Outgoing</td> </tr> <tr> <td>IGR TANDEM ATT</td> <td>Tandem Attempts, Incoming</td> </tr> <tr> <td>IGR TANDEM COMPLT</td> <td>Tandem Completions, Incoming</td> </tr> <tr> <td>EGR TANDEM DUR</td> <td>Tandem Duration, Outgoing</td> </tr> <tr> <td>IGR TANDEM DUR</td> <td>Tandem Duration, Incoming</td> </tr> <tr> <td>IGR CONV DURATION</td> <td>Conversation Duration, Ingress</td> </tr> <tr> <td>EGR CONV DURATION</td> <td>Conversation Duration, Egress</td> </tr> <tr> <td>IGR SETUP DURATION</td> <td>Setup Duration, Ingress</td> </tr> <tr> <td>EGR SETUP DURATION</td> <td>Setup Duration, Egress</td> </tr> <tr> <td>IGR TEARDOWN DURATION</td> <td>Teardown Duration, Ingress</td> </tr> <tr> <td>EGR TEARDOWN DURATION</td> <td>Teardown Duration Egress</td> </tr> <tr> <td>TTL CALL ROUTING I</td> <td>Call Routing I Peg Total</td> </tr> <tr> <td>TTL CALL ROUTING II</td> <td>Call Routing II Peg Total</td> </tr> <tr> <td>TTL CALL ROUTING III</td> <td>Call Routing III Peg Total</td> </tr> <tr> <td>EGR SUCCESSFUL H.323</td> <td>Successful H.323 Terminating Peg</td> </tr> <tr> <td>IGR SUCCESSFUL H.323</td> <td>Successful H.323 Originating Peg</td> </tr> <tr> <td>EGR UNSUCCESSFUL H.323</td> <td>Unsuccessful H.323 Terminating Peg</td> </tr> <tr> <td>IGR UNSUCCESSFUL H.323</td> <td>Unsuccessful H.323 Originating Peg</td> </tr> </tbody> </table> | Field Name | Full Name | IGR CALL ATT | Call Attempts Incoming | EGR CALL ATT | Call Attempts Outgoing | EGR CALL BLKD | Outgoing Attempts Blocked | TTL FAILED CONGEST | Failed Calls Congestion | IGR TERM NORM | Successful Calls Incoming | EGR TERM NORM | Successful Calls Outgoing | IGR PCT TRK USE | Percent Trunk Group Usage Incoming | EGR PCT TRK USE | Percent Trunk Group Usage Outgoing | TTL MAINT USE | Percent Trunk Group Maintenance Usage | TTL ERLANGS | Total Traffic in Erlangs | TTL TERM NORM | Total Calls Terminated Normally | TTL TERM ABNORM | Total Calls Terminated Abnormally | TTL TERM FAILED MGW | Total Calls Terminated, Failed MGW or NAS | TTL CALLS REJECTED | Total Calls Rejected | TTL REJECTED DIALNUM | Total Calls Rejected, Unknown Dialed Number | TTL REJECTED OTHER | Total Calls Rejected, Other Reasons | EGR OFL BLKD | Overflow, Outgoing Attempts Blocked | TTL TRAFFIC USAGE PEGS | Total Sum of Usage Pegs per Trunk Group | EGR TANDEM ATT | Tandem Routing Attempts, Outgoing | EGR TANDEM COMPLT | Tandem Completions, Outgoing | IGR TANDEM ATT | Tandem Attempts, Incoming | IGR TANDEM COMPLT | Tandem Completions, Incoming | EGR TANDEM DUR | Tandem Duration, Outgoing | IGR TANDEM DUR | Tandem Duration, Incoming | IGR CONV DURATION | Conversation Duration, Ingress | EGR CONV DURATION | Conversation Duration, Egress | IGR SETUP DURATION | Setup Duration, Ingress | EGR SETUP DURATION | Setup Duration, Egress | IGR TEARDOWN DURATION | Teardown Duration, Ingress | EGR TEARDOWN DURATION | Teardown Duration Egress | TTL CALL ROUTING I | Call Routing I Peg Total | TTL CALL ROUTING II | Call Routing II Peg Total | TTL CALL ROUTING III | Call Routing III Peg Total | EGR SUCCESSFUL H.323 | Successful H.323 Terminating Peg | IGR SUCCESSFUL H.323 | Successful H.323 Originating Peg | EGR UNSUCCESSFUL H.323 | Unsuccessful H.323 Terminating Peg | IGR UNSUCCESSFUL H.323 | Unsuccessful H.323 Originating Peg |  |
| Field Name             | Full Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR CALL ATT           | Call Attempts Incoming                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR CALL ATT           | Call Attempts Outgoing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR CALL BLKD          | Outgoing Attempts Blocked                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL FAILED CONGEST     | Failed Calls Congestion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR TERM NORM          | Successful Calls Incoming                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR TERM NORM          | Successful Calls Outgoing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR PCT TRK USE        | Percent Trunk Group Usage Incoming                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR PCT TRK USE        | Percent Trunk Group Usage Outgoing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL MAINT USE          | Percent Trunk Group Maintenance Usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL ERLANGS            | Total Traffic in Erlangs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL TERM NORM          | Total Calls Terminated Normally                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL TERM ABNORM        | Total Calls Terminated Abnormally                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL TERM FAILED MGW    | Total Calls Terminated, Failed MGW or NAS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL CALLS REJECTED     | Total Calls Rejected                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL REJECTED DIALNUM   | Total Calls Rejected, Unknown Dialed Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL REJECTED OTHER     | Total Calls Rejected, Other Reasons                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR OFL BLKD           | Overflow, Outgoing Attempts Blocked                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL TRAFFIC USAGE PEGS | Total Sum of Usage Pegs per Trunk Group                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR TANDEM ATT         | Tandem Routing Attempts, Outgoing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR TANDEM COMPLT      | Tandem Completions, Outgoing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR TANDEM ATT         | Tandem Attempts, Incoming                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR TANDEM COMPLT      | Tandem Completions, Incoming                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR TANDEM DUR         | Tandem Duration, Outgoing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR TANDEM DUR         | Tandem Duration, Incoming                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR CONV DURATION      | Conversation Duration, Ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR CONV DURATION      | Conversation Duration, Egress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR SETUP DURATION     | Setup Duration, Ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR SETUP DURATION     | Setup Duration, Egress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR TEARDOWN DURATION  | Teardown Duration, Ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR TEARDOWN DURATION  | Teardown Duration Egress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL CALL ROUTING I     | Call Routing I Peg Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL CALL ROUTING II    | Call Routing II Peg Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| TTL CALL ROUTING III   | Call Routing III Peg Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR SUCCESSFUL H.323   | Successful H.323 Terminating Peg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR SUCCESSFUL H.323   | Successful H.323 Originating Peg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| EGR UNSUCCESSFUL H.323 | Unsuccessful H.323 Terminating Peg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |
| IGR UNSUCCESSFUL H.323 | Unsuccessful H.323 Originating Peg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |           |              |                        |              |                        |               |                           |                    |                         |               |                           |               |                           |                 |                                    |                 |                                    |               |                                       |             |                          |               |                                 |                 |                                   |                     |                                           |                    |                      |                      |                                             |                    |                                     |              |                                     |                        |                                         |                |                                   |                   |                              |                |                           |                   |                              |                |                           |                |                           |                   |                                |                   |                               |                    |                         |                    |                        |                       |                            |                       |                          |                    |                          |                     |                           |                      |                            |                      |                                  |                      |                                  |                        |                                    |                        |                                    |  |

Table 12-10 Output Format Order (continued)

| Column                 | Description                                                                                                     | Comments                                              |
|------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Field 6<br>(continued) | EGR SUCCESSFUL ISUP                                                                                             | Successful Terminating ISDN User Part (ISUP) Requests |
|                        | EGR UNSUCCESSFUL ISUP                                                                                           | Unsuccessful Terminating ISUP Requests                |
|                        | IGR SUCCESSFUL ISUP                                                                                             | Successful ISUP Originating Requests                  |
|                        | IGR UNSUCCESSFUL ISUP                                                                                           | Unsuccessful ISUP Originating Requests                |
|                        | EGR ISDN SETUP MSG DELAY                                                                                        | Terminating ISUP Setup Message Response Delay         |
|                        | IGR ISDN SETUP MSG DELAY                                                                                        | Originating ISUP Setup Message Response Delay         |
|                        | TTL CIC DEFINED                                                                                                 | Total Number of Defined CICs                          |
|                        | TTL AVLBL CIC                                                                                                   | Total Number of Available CICs                        |
|                        | <b>Note</b> For IC calls, the string "IC:xxxx" where xxxx is the carrier number, precedes the EGR, IGR, or TTL. |                                                       |
| Field 7                | Trunk Group "TG," followed by the zero-padded trunk group number.                                               |                                                       |
| Field 8                | TCA flag "*" if a threshold crossing alarm is asserted for this measurement, otherwise blank.                   |                                                       |

## Threshold Crossing Alarms

Each measurement instance can be monitored with a threshold crossing alarm. Threshold values that are permitted are Ignore, Less Than, Equal To, and Greater Than. The system identifies threshold value sets by the TAG and the trunk group number. Each threshold value set consists of a value and a check or test for each measurement category. Threshold value sets can be partially populated to check only one or any number of categories for a trunk group. Any unpopulated category is treated as an Ignore condition.

If no threshold value set has been specified for a given TAG/trunk group, the measurements are checked against a global threshold value set. Like trunk group-specific threshold value sets, the global threshold value set can be partially populated. There is no requirement to specify a global threshold value set. If none is specified, and no specific threshold value set has been entered, then no threshold checks are performed. If a threshold value set has been specified for a given TAG/trunk group, no global test is performed on any categories in that TAG/trunk group.

As measurements are tested against the threshold value set, each time a measurement crosses the threshold value, a minor alarm is generated (ACC227). The text of the alarm contains the strings defined in [Appendix A, "Troubleshooting Cisco BAMS,"](#) the measured value, the test condition, and the threshold value.

When the threshold is crossed in the opposite direction, a clear alarm is generated containing the same text as the ACC227 alarm. For example, if the test is greater than 5 and the measurement is 8, the minor alarm is generated. If on the next check, the measurement is 10, no new minor alarm is generated. If the measurement drops to 3, the clear alarm is generated. When the system is started, the memory of all alarms is cleared. For example, suppose the measurement is 8 and the system is stopped. When the system first tests the measurement (after restarting), if the value is 8, a minor alarm is generated.

The following special conditions apply to threshold crossing alarms:

- No error is detected if a carrier is applied to a noncarrier-based measurement.

- No error is detected if no carrier is applied to a carrier-based measurement.
- A global threshold exists for TAG/trunk group measurements. The global threshold is specified by “global/0” (as the TAG/trunk group).
- Only those specific thresholds that are entered are checked; all other thresholds are set to ignore.
- If a trunk group-specific threshold is specified, the global thresholds are not checked for that TAG/trunk group.
- A carrier ID of 0 indicates that the carrier should be ignored. Entering abc/8003/0 is the same as entering abc/8003, thus making it a TAG/trunk group specification.
- All thresholds must be entered as integers.
- Conditions must be entered as a value from 0 through 4 (0 = Ignore, 1 = Less Than, 2 = Equal, 3 = Greater Than, 4 = Not Equal)

**Note**

If there is no global/0 defined, any measurement that does not have a specific threshold set for it simply is not checked. The measurement is still reported in the acc\_x file, but no alarm is generated, regardless of the value. If global/0 is defined, it is used when no specific thresholds have been specified for a trunk group. If the user sets thresholds for a specific trunk group, only those values specified are checked. Any unspecified measurements within the TAG/TRK are treated as an ignore condition. A trunk group can have a maximum of 64 measurements. A global TCA can be set up with a maximum of 64 measurements, which are listed in [Table 12-7](#). Any trunk group that does not have a specific threshold crossing alarm (TCA) is checked against the global TCA. For some measurements, users can specify TAG/TRK/IC, where TAG is a user identifier, TRK is the trunk, and IC is the interexchange carrier. The user needs to know the carrier codes, such as 0288 for AT&T. Three-digit codes must be entered as four digits with a leading 0.

## Zero Counts

The ACC task can operate in several different configurations with respect to zero counts. One configuration parameter outputs or suppresses all measurements that are equal to zero. The other configuration parameter selects all dynamic measurement group output or configured measurement group output regardless of activity.

## Zero Count Suppression

Within each trunk group or trunk group/IC (measurement group), some measurements might not accumulate. For instance, if a trunk group is configured as an outgoing trunk, the ingress measurements are never pegged and the ingress durations are never anything other than zero. The ACC task provides a command-line switch to suppress these values. By default, if a measurement group has one measurement that is greater than zero, all measurements for the group are included in the output file. A command-line switch can override this feature and only non-zero values within each measurement group are output. If rounding or truncation causes an output measurement value to be zero, the ACC task treats the measurement as a zero and suppresses it if that feature is active.

## Configured vs. Dynamic Trunk Group Output

Dynamic measurement groups are output only if they contain at least one non-zero measurement since midnight or have an alarm asserted. This is known as dynamic output. In BAMS, an MML option is available to output all configured measurement groups only, regardless of measurement values (configured mode), to output dynamic measurement groups only (dynamic mode), or to output both configured and dynamic measurement groups. (For more information, see the `dynamicaccumes` field in the “[Updating the Node Parameters Table](#)” section on page 5-11.) This is a dynamic parameter that is reread at the start of each measurement interval. The trunk groups are also dynamic and are reloaded at the start of each measurement interval. If BAMS is not set for configured mode (dynamic mode or both) any activity detected on a nonconfigured trunk causes the trunk group to be added dynamically (as if in dynamic mode) and measurements are output.

If a trunk group is removed from the configuration, it no longer generates output if it has no counts accumulated for the day. The trunk group continues to be output if any counts for the day have accumulated. Likewise, if a trunk group is not configured and counts accumulate for that unconfigured trunk group (dynamic addition), the measurements for that trunk group are output for the remainder of the day.

The only distinction between a configured trunk with counts removed and a dynamic trunk with counts is that at the end of the day, the dynamic trunk has its pending alarms cleared if there are any. If a dynamically added trunk has an alarm pending at the end of the day, it continues to be reported into the next day and the alarm clears only when the threshold is crossed in the reverse direction.

Changing the overall mode to dynamic from configured causes any trunk groups with no counts accumulated for the day and no alarms to be removed from the output list. All other trunks are changed to dynamic. At midnight, all trunks are then treated as dynamic in the manner described above.

If the system is changed from dynamic to configured, all of the configured trunks are marked as configured, and any other trunks being reported prior to the mode change remain dynamic. All carrier-based measurements are dynamic. These cannot be preconfigured.

## Rounding of Measurements

All measurements that are output as a percentage are rounded up or down to the nearest percent. This causes any percentage measurement that is less than 0.5 to round down to zero. The displayed value is zero, internally, but the ACC task maintains the decimal portion of the percentage. Under this condition, the ACC task considers the group to have at least one non-zero measurement. If the system is configured to suppress zero counts (with the `NODEPARMS` tag `ID`), the measurement is not displayed.

## Truncation of Measurements

All measurements that are output as a duration are truncated to seconds. The ACC task performs all calculations to the millisecond. The truncation is applied only to the output measurement value. Any real-time duration that contains milliseconds is added to the hourly and daily totals with the milliseconds intact.

## Last Interval Update

### Introduction

Due to the manner in which the VSC produces data, BAMS must sometimes update the measurement data that was output in the previous interval. The VSC does not generate an event when a line is seized. The first event produced is an answer or an abort. Because of this, it is possible for a seizure to take place in one interval, and the answer or abort to take place in the next interval. When this happens, the ACC task determines what pegs or setup durations should be credited to an interval that has already been processed. Then the ACC task applies the measurements to the previously closed interval.

### Preliminary vs. Final Measurements

The measurements for each interval are written twice. The first time the measurement file is written, the values are as accurate as possible, given the data provided by the VSC to that point. This write takes place as quickly as the system can process the data following the detection of data that belongs to the next interval. Because some events might not have been signaled by the VSC (seizure), the counts might not be 100 percent accurate.

When the system detects data from the following interval, the system again processes the measurements. At this time, if events are present for calls that began in an interval prior to the current one, the prior interval measurement data is updated. This is the last time that the ACC task writes to the previous interval. Since during any interval, the ACC task will make the final write to the previous interval before making the preliminary write to the current interval, the data in any output file is final when a measurement file exists for a later interval.

### Interval-Update Rules

BAMS follows these rules when performing last-interval updates:

- Only the interval prior to the current interval can be updated.
- If pegs are detected that apply to an interval older than the previous interval, those pegs are applied to the previous interval. This ensures that the pegs are included in the hourly and daily totals. This also ensures that the sum of the intervals equals the daily and hourly totals.
- If durations are detected that apply to an interval older than the previous interval, those durations are dropped. This prevents any interval from possibly exceeding 100 percent utilization. The duration is not applied to the hourly or daily totals in order to ensure that the sum of the intervals equals the hourly and daily totals.
- On startup, there is no previous interval; therefore, the current interval is treated as the previous interval.
- The previous interval is updated before the preliminary measurements are written for the current interval.
- When a previous interval ends an hour, the hourly measurement file is also updated.
- When a previous interval ends a day, the daily measurement file is also updated.

## Nonprovisioned Trunk Group Measurements

Measurements data is written for calls in which the trunk group is not provisioned in the Trunk Group table on BAMS. However, the following special rules apply to nonprovisioned trunk group measurements.

- When BAMS encounters the nonprovisioned trunk group, pegs are written for that trunk group, including 0 counts until midnight when the memory is cleared.
- Any peg that requires the number of circuits to calculate will be suppressed. The number of circuits are only maintained for trunks defined in the Trunk Group table; therefore, BAMS has no knowledge of the number of circuits when the trunk group is not provisioned.
- Cisco recommends checking the `/opt/CiscoBAMS/files/s0x/FMT_cdr.log` in which nonprovisioned trunk groups are reported. When you detect a nonprovisioned trunk group, configure the trunk group as soon as possible.

## MGCP Dial and MGCP Scripting Handoff Measurements

In MGCP Dial and MGCP Script Handoff calls, the Egress trunk group (4015), Egress SigPath (4070) and Egress BearChan (4072) fields are not populated. Thus, special treatment is required for these calls. A MGCP Dial or MGCP Scripting call is defined as a call where Egress Protocol (CDE Tag 4073 from 1010 or 1030 CDE) equals 9 or 10.

When processing MGCP Dial and MGCP Script calls, BAMS does not peg the following Egress measurements:

- BAM:EGR CALL ATT
- BAM:EGR CALL BLKD
- BAM:EGR TERM NORM
- BAM:EGR PCT TRK USE
- BAM:EGR OFL BLKD
- BAM:EGR TANDEM ATT
- BAM:EGR TANDEM COMPLT
- BAM:EGR CONV DURATION
- BAM:EGR SETUP DURATION
- BAM:EGR TEARDOWN DURATION





# Troubleshooting Cisco BAMS

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Revised: March 10, 2011, OL-11618-18

## Introduction

This appendix provides a discussion of system tasks and messages generated by the Cisco Billing and Measurements Server (BAMS) and their use in troubleshooting. These messages, which can be categorized as alarms or events, are generated by the different software tasks running on BAMS. This appendix also provides information on the file-naming conventions used for files collected or processed by BAMS.

BAMS traps alarms and minor, major, and critical events, and forwards them to the operations management system (OMS).

BAMS writes alarms only to the alarm history file. When an alarm is cleared, its entry is deleted from that file.

Alarms and minor, major, or critical event messages to be forwarded to a message queue and trapped are defined with the Alarm Parameters table (ALM-PARMS tag ID), with the msgfwdlevel field (see the “ALM-PARMS Tag ID” section on page 5-2 for details).



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**Note**

All task messages are written to the system log (syslog) file. We recommend that the operations support personnel monitor the syslog file on a regular basis and note alarms and events that require troubleshooting. The bootstrap function can facilitate this task.

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**Note**

The following alarms are cleared when the alarm condition is removed: CRD502, MGR801, MSC030, MSC031, MSC032, MSC040, MSC041, MSC042, MSC130, MSC131, MSC132, MSC140, MSC141, MSC142, POL327, POL361, POL401, POL402, and POL115.

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# System Tasks

BAMS functions are governed by system tasks. [Table A-1](#) displays BAMS non-SNMP tasks, and [Table A-2](#) displays BAMS SNMP tasks. For information about the messages produced by these system tasks, see the “Generic Messages” section on page A-12.

**Table A-1** *BAMS Non-SNMP Tasks*

| Task      | Explanation                                                                                                                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACC       | The Accumulation task. This task accumulates numerical information on collected usage records.                                                                                                                  |
| ALM       | The Alarm task. This task collects and distributes alarm and event information.                                                                                                                                 |
| AUG (AGB) | The Augmentation task. This task uses lookup information to add value to the collected usage records. Messages related to BAF output are written to the system log with an Augmented BAF (AGB) task identifier. |
| ASC       | The ASCII conversion task. This task converts the Cisco Media Gateway Controller (MGC) call detail record (CDR) files to ASCII files.                                                                           |
| BIN       | The BIN1110 output task. This task generates data in 1110 Binary format.                                                                                                                                        |
| BTP       | The bamstrap task. This task converts alarm messages into traps.                                                                                                                                                |
| COR       | The Correlation task. This task correlates records received from each Cisco MGC in a redundant pair configuration and produces a single-record format.                                                          |
| CRD       | The Check Remote Down task. This task monitors communications between the two BAMS units and checks the status of the remote data collector.                                                                    |
| CTB       | The CDR to Bellcore AMA Format (BAF) conversion task. This task generates CDRs in BAF format.                                                                                                                   |
| DRX       | The Message Receive task. This task is used by one BAMS unit to receive messages from another BAMS unit.                                                                                                        |
| DTX       | The Message Transmit task. This task transmits communications from one data collector to the next.                                                                                                              |
| EXT       | The Extendable ASCII task. This task generates data in extendable ASCII format.                                                                                                                                 |
| FMT       | The Formatting task. This task controls the initial formatting of data collected from the Cisco MGCs.                                                                                                           |
| MGR       | The Manager task. This task manages and spawns all other BAMS tasks.                                                                                                                                            |
| MML (mml) | The Man-Machine Language (MML) task. This task displays the MML interface.                                                                                                                                      |
| MSC       | The Mass Storage Control task. This task manages the user-defined attributes governing the maintenance and removal of files from BAMS.                                                                          |
| NIC       | The NICS output task. This task generates data in NICS format.                                                                                                                                                  |
| NNL       | The Node Name Link task. This task synchronizes MML commands to the remote BAMS unit.                                                                                                                           |
| POL       | The Redundant Unit Polling task. This task collects data from (redundant) Cisco MGC units.                                                                                                                      |

**Table A-1** BAMS Non-SNMP Tasks (continued)

| Task | Explanation                                                                                                                                                             |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RCV  | The Control File Receive task. This task is used by the BAMS unit to receive a control file. This task is executed by the POL task and is not a full-time running task. |
| SXF  | The Send File Transfer task. This task sends a control file to a remote BAMS unit. This task is executed by the POL task and is not a full-time running task.           |

**Table A-2** BAMS SNMP Tasks

| Task             | Explanation                                                                                                                        |
|------------------|------------------------------------------------------------------------------------------------------------------------------------|
| bamsP3MIBagt     | Sends out BAMS alarm messages as SNMP traps.                                                                                       |
| msscP3MIBagt     | Returns parameter values of the MSC Thresholds table.                                                                              |
| mscparmP3MIBagt  | Returns parameter values of the MSC Parameters table.                                                                              |
| nodeparmP3MIBagt | Returns parameter values of the Node Parameters table. This task also returns node name and poll status information for each node. |
| pollP3MIBagt     | Returns parameter values of the Poll table.                                                                                        |

## Procedure to Recover from Active/Active Polling State

The normal state of the redundant BAMS is active/standby, where one unit is actively polling the Cisco MGC and the other unit is in a standby mode. Under certain error conditions, the BAMS unit can enter an active/active polling state. The following procedure explains how to recover from the undesired active/active polling state.

The polling software was designed so the worst-case scenario would be a standby/standby state, because in this state neither BAMS unit is polling and data is accumulating on the VSC. In safeguarding the system so a standby/standby state would not occur, certain race conditions (where a possible standby/standby state might occur) have been taken care of by defaulting to an active/active polling state. There are few cases in which this would happen, but defaulting to an active/active polling state is a safe method of avoiding any critical problems.

The active/active polling state is not a critical state because in this mode, the BAMS unit that has the correct sequence numbers can continue polling, and the other BAMS unit, although in an active state, cannot poll the files that the first BAMS has already polled. Also, the processing would not be interrupted because the BAMS unit that can poll forwards the data to the other BAMS unit for redundant processing.

To reset the system to a normal active/standby state, you must update the system that is not polling and has the incorrect sequence numbers. Updating can be accomplished by executing a rotation (sw-ovr) from active to standby on the BAMS unit that has the correct sequence numbers; that is, the unit that is actually polling files. The rotation from active to standby causes this BAMS unit to go to standby, and the other BAMS unit that was active but was not able to poll is updated with the correct polling sequence numbers. Once the sw-ovr is executed, the active unit can poll the VSC successfully, and a normal active/standby state results.

# File-Naming Conventions

For consistency, the application requires that the data sources follow certain file-naming conventions. The convention is to use a unique prefix per file format, followed by a time stamp that indicates when the file was created or generated on the data source, and a file sequence number.

## Input and Output File-Naming Conventions

The following file-naming conventions are used for BAMS input and output files.

### ASCII BAF Output

The file-naming convention for data collected from the Cisco MGC and converted into ASCII BAF record format is as follows:

*baf\_<raw file prefix>\_YYYYMMDDHHMMSS\_SeqNo.csv*

[Table A-3](#) explains each element of the filename. Note the use of the underscore.

**Table A-3** ASCII BAF Filename Elements

| Element         | Description                                            |
|-----------------|--------------------------------------------------------|
| baf             | Represents the fixed prefix for ASCII BAF output files |
| raw file prefix | Represents the raw filename prefix; for example, cdr_  |
| YYYY            | Represents the year; for example, 2004                 |
| MM              | Represents the month; for example, 05                  |
| DD              | Represents the day; for example, 15                    |
| HH              | Represents the hour; for example, 19                   |
| MM              | Represents the minute; for example, 46                 |
| SS              | Represents the second; for example, 23                 |
| SeqNo           | Represents the sequence number; for example, _000051   |
| .csv            | Represents the suffix                                  |

### BAF Output

The file-naming convention for BAF billing record files is as follows:

*baf\_<raw file prefix>\_YYYYMMDDHHMMSS\_SeqNo.bin*

[Table A-4](#) explains each element of the filename. Note the use of the underscore.

**Table A-4** BAF Billing Record Filename Elements

| Element         | Description                                           |
|-----------------|-------------------------------------------------------|
| baf             | Represents the fixed prefix for BAF output files      |
| raw file prefix | Represents the raw filename prefix; for example, cdr_ |
| YYYY            | Represents the year; for example, 2004                |

**Table A-4** BAF Billing Record Filename Elements (continued)

| Element | Description                                          |
|---------|------------------------------------------------------|
| MM      | Represents the month; for example, 05                |
| DD      | Represents the day; for example, 15                  |
| HH      | Represents the hour; for example, 19                 |
| MM      | Represents the minute; for example, 46               |
| SS      | Represents the second; for example, 23               |
| SeqNo   | Represents the sequence number; for example, _000051 |
| .bin    | Represents the suffix                                |

## Investigating BAMS CDR Output Records

To investigate BAMS billing output records, start by retrieving the archived PGW CDR records, which are located in the node TLV directory. The TLV directory contains most of the information that populates the BAMS output. It is important to notice that the sequence number of the file in the TLV directory may not directly correspond to the sequence number of the BAMS output file. Furthermore, the sequence of individual records recorded in the BAMS file may not be identical to the sequence of records recorded in the TLV file.

## BIN1110 Output

The file-naming convention for data collected from the Cisco MGC and converted into 1110 Binary record format is as follows:

`cdr_YYYYMMDDHHMMSS_SeqNo.BIN`

[Table A-5](#) explains each element of the filename. Note the use of the underscore.

**Table A-5** BIN1110 Filename Elements

| Element | Description                                                    |
|---------|----------------------------------------------------------------|
| cdr_    | Represents the prefix of the files generated by the Cisco MGC. |
| YYYY    | Represents the year; for example, 2004                         |
| MM      | Represents the month; for example, 05                          |
| DD      | Represents the day; for example, 15                            |
| HH      | Represents the hour; for example, 19                           |
| MM      | Represents the minute; for example, 46                         |
| SS      | Represents the second; for example, 23                         |
| SeqNo   | Represents the sequence number; for example, _000051           |
| .BIN    | Represents the suffix (specified in the BIN1110 table)         |

## Extendable ASCII Output

The file-naming convention for data collected from the Cisco MGC and converted into extendable ASCII record format is as follows:

*extasc\_<raw file prefix>\_YYYYMMDDHHMMSS\_SeqNo.csv*

Table A-6 explains each element of the filename. Note the use of the underscore.

**Table A-6** Extendable ASCII Filename Elements

| Element         | Description                                           |
|-----------------|-------------------------------------------------------|
| extasc          | Represents the fixed prefix for EXTASCII output files |
| raw file prefix | Represents the raw filename prefix; for example, cdr_ |
| YYYY            | Represents the year; for example, 2004                |
| MM              | Represents the month; for example, 05                 |
| DD              | Represents the day; for example, 15                   |
| HH              | Represents the hour; for example, 19                  |
| MM              | Represents the minute; for example, 46                |
| SS              | Represents the second; for example, 23                |
| SeqNo           | Represents the sequence number; for example, _000051  |
| .csv            | Represents the suffix                                 |

## Input CDR Files

The file-naming convention for data collected from the Cisco MGC is as follows:

*prefix\_YYYYMMDDHHMMSS\_SeqNo.bin*

Table A-7 explains each element of the filename. Note the use of the underscore.



### Note

After the file is polled from the Cisco MGC, FMT (the first BAMS processing task) renames it according to the GMT timestamp inside the file (CDB tag 400 of the file header record). For this reason there may be a slight discrepancy between the original timestamp in the filename and the timestamp in the BAMS filename. All BAMS tasks that process the file after this point use the GMT-based filename.

**Table A-7** CDR Filename Elements

| Element | Description                                       |
|---------|---------------------------------------------------|
| prefix  | Represents the filename prefix; for example, cdr_ |
| YYYY    | Represents the year; for example, 2004            |
| MM      | Represents the month; for example, 05             |
| DD      | Represents the day; for example, 15               |
| HH      | Represents the hour; for example, 19              |
| MM      | Represents the minute; for example, 46            |
| SS      | Represents the second; for example, 23            |

**Table A-7** CDR Filename Elements (continued)

| Element | Description                                          |
|---------|------------------------------------------------------|
| SeqNo   | Represents the sequence number; for example, _000051 |
| .bin    | Represents the suffix                                |

## MGC End of Call 1110 ASCII Output

The file-naming convention for data collected from the Cisco MGC and converted into ASCII 1110 record format is as follows:

*prefix\_YYYYMMDDHHMMSS\_SeqNo.csv*

[Table A-8](#) explains each element of the filename. Note the use of the underscore.

**Table A-8** ASCII 1110 Filename Elements

| Element | Description                                          |
|---------|------------------------------------------------------|
| prefix  | Represents the filename prefix; for example, cdr_    |
| YYYY    | Represents the year; for example, 2004               |
| MM      | Represents the month; for example, 05                |
| DD      | Represents the day; for example, 15                  |
| HH      | Represents the hour; for example, 19                 |
| MM      | Represents the minute; for example, 46               |
| SS      | Represents the second; for example, 23               |
| SeqNo   | Represents the sequence number; for example, _000051 |
| .csv    | Represents the suffix                                |

## NICS Output

The file-naming convention for data collected from the Cisco MGC and converted into NICS record format is as follows:

*CDR.<switch\_name>.<SeqNo>.YYYYMMDDHHMMSS*

[Table A-9](#) explains each element of the filename. Note the use of the underscore.

**Table A-9** NICS Filename Elements

| Element     | Description                                                                                                                                       |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| CDR.        | Represents the fixed prefix for NICS output files                                                                                                 |
| switch_name | Represents the switch name. It is taken from TAG6000 of the data produced by the PGW (that is, it denotes the configured switch name for the PGW) |
| SeqNo       | Represents the sequence number; for example, 1234                                                                                                 |
| YYYY        | Represents the year; for example, 2004                                                                                                            |
| MM          | Represents the month; for example, 05                                                                                                             |
| DD          | Represents the day; for example, 15                                                                                                               |

**Table A-9** NICS Filename Elements (continued)

| Element | Description                            |
|---------|----------------------------------------|
| HH      | Represents the hour; for example, 19   |
| MM      | Represents the minute; for example, 46 |
| SS      | Represents the second; for example, 23 |

## P01 Output

The file-naming convention for data collected from the Cisco MGC and converted into the P01 record format is as follows:

*p01\_<raw file prefix>\_YYYYMMDDHHMMSS\_SeqNo.bin*

[Table A-10](#) explains each element of the filename. Note the use of the underscore.

**Table A-10** P01 Filename Elements

| Element         | Description                                           |
|-----------------|-------------------------------------------------------|
| p01             | Represents the fixed prefix for P01 output files      |
| raw file prefix | Represents the raw filename prefix; for example, cdr_ |
| YYYY            | Represents the year; for example, 2004                |
| MM              | Represents the month; for example, 05                 |
| DD              | Represents the day; for example, 15                   |
| HH              | Represents the hour; for example, 19                  |
| MM              | Represents the minute; for example, 46                |
| SS              | Represents the second; for example, 23                |
| SeqNo           | Represents the sequence number; for example, _000051  |
| .bin            | Represents the suffix                                 |

## Task Log Files

Log files are used to save debug or status information for a particular task. These files are saved to the /opt/CiscoBAMS/files/s01-s08 individual node directories. Here is the filename format:

*task-identifier.log*

[Table A-11](#) explains each element of the filename. Note the use of the underscore.

**Table A-11** Task Log Filename Elements

| Element         | Description                                                                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------|
| task_identifier | Tag to identify the task to which this log file refers; for example, the FMT task. Sometimes followed by a qualifier; for example, _cdr. |
| .log            | Fixed suffix to indicate that the file is a log file.                                                                                    |

## Task Configuration Files

Task configuration files pass all the necessary command-line switches that are needed by the MGR task to properly execute a particular task. These files are stored in the /opt/CiscoBAMS/files/s01-s08 individual node directories. Here is the filename format:

*task\_identifier{task\_instance}\_cfg*

Table A-12 explains each element of the filename. Note the use of the underscore.

**Table A-12** Task Configuration Filename Elements

| Element         | Description                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| task_identifier | Tag to identify the task to which this configuration file refers.                                                                                |
| task_instance   | Optional instance sequence. For example, if there are two instances of the COR task running, the filenames might be named cor0_cfg and cor1_cfg. |
| _cfg            | Fixed suffix to indicate that the file is a task configuration file.                                                                             |

## Task Parameter Files

Task parameter files contain parameter definitions for a particular task. These files are stored in the /opt/CiscoBAMS/files directory. These files are in ASCII format. The filenames used are shown in Table A-13. Here is the filename format:

*task\_identifier{task\_instance}.cfg*

**Table A-13** Task Parameter Filename Elements

| Element         | Description                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| task_identifier | Tag to identify the task to which this configuration file refers.                                                                                |
| task_instance   | Optional instance sequence. For example, if there are two instances of the COR task running, the filenames might be named cor0.cfg and cor1.cfg. |
| .cfg            | Fixed suffix to indicate that the file is a task configuration file.                                                                             |

## System Log File (syslog)

BAMS stores system activity in the system log file (syslog) in the format explained in Table A-14. Located in the /CiscoBAMS/files directory, the syslog is composed of individual log entries that follow this format example: *MM/DD/YY hh:mm:ss severity message ID: +message text*.

**Table A-14** Syslog Format

| Item            | Description                                     |
|-----------------|-------------------------------------------------|
| <i>MM/DD/YY</i> | The date that BAMS wrote the entry to the file. |
| <i>hh:mm:ss</i> | The time that BAMS wrote the entry to the file. |

**Table A-14 Syslog Format (continued)**

| Item                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>severity</i>     | <p>If indicated, represents the importance level of the message:</p> <ul style="list-style-type: none"> <li>*C indicates a critical event or alarm.</li> <li>** indicates a major event or alarm.</li> <li>* indicates a minor event or alarm.</li> <li>*R indicates a resolved event or alarm.</li> <li>W indicates a warning event.</li> <li>M indicates a manual problem (operator intervention required).</li> <li>Two blank spaces indicate an informational event.</li> <li>DB indicates a debug event.</li> </ul> |
| <i>message ID</i>   | A three-character task name that generated the message, followed by a three-digit code that identifies the particular message.                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>message text</i> | The brief message or description of the alarm or event. If a plus sign (+) is included it indicates that the line is a continuation of the previous line.                                                                                                                                                                                                                                                                                                                                                                |

## Log File History

The syslog file holds a user-specified number of messages. When the syslog file's maximum file size is reached, BAMS changes the name of the syslog file to oldlog and creates a new syslog file.

While only one syslog file can exist at a time, BAMS can retain multiple oldlog files. BAMS creates additional oldlog files in the same manner that it creates syslog files. If an oldlog file exists when it is time to create a syslog, BAMS renames the oldlog file to oldloga. If more than two oldlog files exist, BAMS uses the letters b, c, d, and so on to identify the oldest oldlog file. (For example, oldlogd is older than oldlogc.)

## Message Description

The following categories of information are provided for each system message:

- Message ID
- Text
- Arguments
- Description
- Action

## Message ID

The message ID is a six-character label (three characters followed by three digits) that uniquely identifies each message. The first three characters are the task ID, which identifies the task that generated the message (for example, MGR denotes the Manager task and MSC denotes the Mass Storage Control task). The three digits represent the message number (for example, 013 or 123).

**Note**

In the task message section below, minor, major, critical, and warning alarms are preceded by a one- or two-character signifier (\* = minor, \*\* = major, \*C = critical, and W = Warning) before the message ID. In some cases, such as for MSC alarms, a message may be generated as minor, major, or critical, depending on the system state. In such cases, the range of levels is represented between parentheses: (\*, \*\*, \*C). While informational messages are preceded by two blank spaces in the syslog, they are not preceded by any characters in the task message section.

## Text

The text is the verbal part of the message as it appears on your screen or in the system log file.

## Arguments

Arguments are variable parts of the message (message arguments) and are enclosed in angle brackets (< >). Explanations of arguments are provided.

## Description

The message description explains the event(s) that generated the message.

## Action

The action describes what you should do as a result of the event described in the message. In some cases (for example, informational messages), no action might be required. Actions for error messages (manual, warning, minor, major, and critical) might include steps that should be followed so that you can identify and correct problems. Error actions can also describe how BAMS responds to the specified error condition.

# Alarm Task Messages

The Alarm (ALM) task handles all alarm and event messages that are written to the system log. This includes clearable alarms that are based on user-defined thresholds and are written to an alarm history file.

```
ALM100 ALM Version <version> has started.
```

The <version> argument represents the task version. This message indicates that the ALM task has started. This is an informational message. No action is necessary.

```
* ALM102 <routine> failed on error <UNIX error number>
```

The <routine> argument represents the routine name. The <UNIX error number> argument represents the UNIX error set by the system function. This message indicates that a system failure occurred. Check the UNIX error number for an explanation of this error.

```
** ALM103 <string>() failed on error <number>
```

The <number> represents the UNIX error number. This message indicates that the ALM task encountered a serious error condition. This is a major event. Examine the error number and contact the Cisco Technical Assistance Center.

ALM104 get\_qid (<name>) returned <error> (errno <UNIX error number>)

The <name> argument represents the queue ID (QID). The <error> argument represents the returned error. The <UNIX error number> argument represents the UNIX error set by the system function. This message indicates that BAMS could not get the QID from the acecqid file. Verify that the \$FILES environment variable is located in the acecqid file. Make sure that the read permissions are correct.

\* ALM105 msgget <function> failed (errno <UNIX error number>)

The <function> argument represents the function name. The <UNIX error number> argument represents the UNIX error set by the system function. This message indicates that the ALM task experienced an error. Check the UNIX error number for an explanation of this error.

\* ALM106 Can not load <name>

The <name> argument represents the parameter name. This message indicates that the ALM task experienced an error.

\* ALM108 Cannot access <string> (errno <UNIX error number>)

The <UNIX error number> argument represents the UNIX error set by the system function. This message indicates that the ALM task experienced an error. Check the UNIX error number for an explanation of this error.

\* ALM109 Alarm table is full

The number of alarms set in the BAMS system has exceeded the maximum limit for the system. Use the MML command **rtrv-arms** to view the set alarms. If the maximum limit is reached, it is likely that the alarm ACC227 is being set. Review and modify the measurement alarm threshold definitions in the TCA-TBL table so that the number of measurement alarms being triggered is lowered. You can raise the threshold at which an alarm is generated.

ALM120 Alarm parameters have been updated

This message indicates that alarm parameters have been updated. This is an informational message. No action is necessary.

## Generic Messages

The MGR task controls BAMS operations and uses what is called generic messaging. This means that message numbers can be used by more than one software task (ACC001, BTP001, and MGR001, for example). The text of the message is always the same, although the arguments, if any, might be different. The system messages are numbered from 000 through 399 (not all numbers are used).



### Note

All system messages start with a date and time stamp (not shown below). The standard three-character task identifier is denoted by XXX in the generic messages that follow.

XXX000 <task> Version <number> has started, pid <ID>.

The <task> argument represents the task mnemonic, <version> represents the task version number, and <ID> represents the UNIX process ID. The task logs this message when it is started.

XXX001 <task> Initialization complete.

The <task> argument represents the task mnemonic. The task logs this message when initialization is complete.

XXX002 Task completed, pid <process id>

The <process id> argument represents the UNIX process ID. The task has completed its job successfully.

(\*,\*\*, or \*C) XXX003 Exiting with error code <error code>, pid <process id>

The <error code> argument represents the error code, and <process id> represents the UNIX process ID. The task is ending due to an error. Refer to a previous message from the same task in the syslog to get more detailed information.

- (\*,\*\*,or \*C) XXX004 Terminating on signal <signal code>, pid <process id>  
The <signal code> argument represents the signal code, and <process id> represents the UNIX process ID. The task is ending abnormally due to the receipt of an unexpected signal. Refer to a previous message by the same task in the syslog to get more detailed information.
- XXX005 Sending <message> to <task or task component>  
The <message> argument represents the information or message sent, and <task> represents the task or task component recipient. The task sent information or a message to another task or task component.
- XXX006 Waiting for <message> message  
The <message> argument represents the message being waited for. The task is attempting to receive some information from another task or task component.
- XXX007 Received <item>  
The <item> argument represents the item or message received. The task has received some information from another task or task component.
- XXX008 Processing <item to process>  
The <item to process> argument represents the item to process, such as filename or message type name. The task is processing an item.
- XXX009 Successfully processed <processed item>  
The <processed item> argument represents the processed item. The task has successfully processed the indicated item.
- XXX010 System state is <system state>  
The <system state> argument represents the system state (for example, Running, Booting, Active, or Standby). For a redundant system, this message is displayed by the task, if its actions are dependent on the system state.
- XXX011 SIG setting signal <signal number> handler to <signal handler name>  
The <signal number> argument represents the signal number, and <signal handler name> represents the signal handler name. The task is setting the handler for the given signal.
- XXX012 SHM Creating shared memory key= <shared memory key> size= <size of shared memory requested>  
The <shared memory key> argument represents the shared memory key, and <size of shared memory requested> represents the size of shared memory requested. The task allocates shared memory as a mechanism for interprocess communication.
- XXX013 SHM Attaching to shared memory key= <shared memory key> size= <size of shared memory>  
The <shared memory key> argument represents the shared memory key, and <size of shared memory> represents the size of shared memory. The task attaches to a region in shared memory.
- XXX014 MSGQ Creating message queue key= <message queue key>  
The <message queue key> argument represents the message queue key. The task allocates a message queue as a mechanism for interprocess communication.
- XXX015 SEMA Creating semaphore key= <semaphore key>  
The <semaphore key> argument represents the semaphore key. The task allocates a semaphore as a mechanism for interprocess communication.
- XXX016 DIR Changing to <directory name>  
The <directory name> argument represents the directory name. The task is setting its current work directory.
- XXX017 Renaming <original filename> to <new filename>  
The <original filename> argument represents the original filename, and <new filename> represents the new filename. The task renames (or move) a file, typically to mark it as processed.
- XXX018 Connecting to <remote host address or name> / <port number or service name>

The <remote host address or name> argument represents the remote host address or name, and <port number or service name> represents the port number or service name. The task attempts to connect to the remote host (or server). If the task uses a TCP/IP socket and the second argument is supplied as a service name, the service must be registered in the /etc/services file. In addition, when the host name is used instead of an IP address, the host name must be registered in the /etc/hosts file.

XXX019 Connected to <remote host address or name> / <port number or service name>

The <remote host address or name> argument represents the remote host address or name, and <port number or service name> represents the port number or service name. The task has successfully connected to the named host. At this point, application-layer communication can continue.

XXX020 Disconnecting from <remote host address or name> / <port number or service name>

The <remote host address or name> argument represents the remote host address or name, and <port number or service name> represents the port number or service name. The task closes the connection to the remote server. To find out why the task is disconnecting, check previous messages in the syslog file.

XXX100 Timed out waiting for <description>.

The <description> argument represents the description of what the task was waiting for. The task logs a message when the attempt to receive some information from another task or task component has exceeded a certain time threshold.

(\* , \*\* , or \*C) XXX101 Invalid command-line option, <unsupported character>.

The <unsupported character> argument represents the unsupported character command-line switch. The task was passed an unknown or unsupported command-line argument. The configuration file for the task contains an invalid option. To check all available options, invoke the task using the **-h** option, and check the contents of the configuration file.

(\* , \*\* , or C) XXX102 Unrecoverable failure.

The task cannot recover from an error. Analyze previous or following entries in the syslog file. These messages provide more information about the possible cause of the failure. Contact the Cisco Technical Assistance Center.

(\* , \*\* , \*C) XXX103 SIG errno <error number> setting handler for signal <signal number>

The <error number> argument represents the UNIX error number, and <signal number> represents the signal number. The task failed to set the handler for the given signal. Contact the Cisco Technical Assistance Center if necessary.

(\* , \*\* , \*C) XXX104 SYS errno <error number> on system() for <argument>

The <error number> argument represents the UNIX error number, and <argument> represents the description of the argument passed to the system() call. The task detected an error when passing a command to the UNIX shell. The shell might be unable to find and execute the specified command. Check if the command or script passed to the system call is valid. If it is a script, verify that the execute permissions are set. Another possible reason for a system call to fail is an excessive number of UNIX processes already executing. To see if this is the case, issue the **ps -eaf | pg** command.

(\* , \*\* , \*C) XXX105 SYS errno <error number> on fork() for <description>

The <error number> argument represents the UNIX error number, and <description> indicates why the process is cloning itself. The task failed to clone itself. This might happen if the maximum number of processes in the system has been reached. To see if this is the case, issue the **ps -eaf | pg** command.

(\* , \*\* , \*C) XXX106 ENV variable <name> undefined

The <name> argument represents the name of the undefined environment variable. A variable is undefined in the run-time environment of the task. Check the sym\_defs file if there is no entry for the given environment variable. If there is an entry, see if the variable is exported.

(\* , \*\* , \*C) XXX107 ENV variable <name> is undefined, using default value <default string>

The <name> argument represents the name of the undefined environment variable, and <default string> represents the default string to be used. A variable is undefined in the run-time environment of the task. The task is using a default string value.

(\*, \*\*, \*C)XXX108 ENV variable <name> is undefined, using default value <default string>  
The <name> argument represents the name of the undefined environment variable, and <default string> represents the default string to be used. A variable is undefined in the run-time environment of the task. The task is using a default numeric value.

(\*, \*\*, \*C)XXX109 SHM errno <error number> code <return code> getting key for <name>  
The <error number> argument represents the return code of the function that provides the mapping between shared memory names and the shared memory keys, <return code> represents the UNIX error number, and <name> represents the shared memory name.

The task cannot get the shared memory key value for the given shared memory name. Either the acecmid file is not in the files directory or the named shared memory is not defined in the acecmid file. Contact the Cisco Technical Assistance Center to update this file.

(\*, \*\*, \*C)XXX110 SHM errno <error number> creating key=\$ <memory key>  
The <error number> argument represents the UNIX error number, and <memory key> represents the shared memory key. The task failed to create the shared memory with the given key. A shared memory with the same key might already exist.

(\*, \*\*, \*C)XXX111 SHM errno <error number> attaching to key=\$ <memory key>  
The <error number> argument represents the UNIX error number, and <memory key> represents the shared memory key. The task failed to attach to the shared memory with the given key. The shared memory with the given key might not yet have been created or might have been removed.

(\*, \*\*, \*C)XXX112 SHM chunk not defined for <memory chunk>  
The <memory chunk> argument represents the name of the memory chunk that caused the lookup failure. The task failed to look up a memory chunk in the shared memory region. Check the configuration file in the files directory.

(\*, \*\*, \*C)XXX113 SHM chunk is <assigned memory> bytes for <expected memory> Expecting <chunk size>  
The <assigned memory> argument represents the memory chunk size, <expected memory> represents the expected memory chunk size, and <chunk size> represents the memory chunk size in bytes. The expected memory chunk size of the task does not match the allocated chunk. Check the configuration file in the files directory.

(\*, \*\*, \*C)XXX114 MSGQ errno <error number> code <return code> getting key for queue name  
The <error number> argument represents the UNIX error number, <return code> represents the return code of the function that provides the mapping between the message queue names and message queue keys, and <queue name> represents the message queue name.

The task cannot get the message queue key value for the given message queue name. Either the acecqid file is not in the files directory or the named message queue is not defined in the acecqid file.

(\*, \*\*, \*C)XXX115 MSGQ errno <error number> creating key=\$ <queue key>  
The <error number> argument represents the UNIX error number, and <queue key> represents the message queue key. The task cannot create a message queue with the given key. A message queue with the same key might already exist. Look in /CiscoBAMS/files/acecqid for duplicate key definitions. Contact the Cisco Technical Assistance Center to correct the configuration if duplicates are found.

(\*, \*\*, \*C)XXX116 MSGQ errno <error number> code <return code> on sendlocal() key=\$ <queue key>  
The <error number> argument represents the UNIX error number, <return code> represents the return code of sendlocal(), and <queue key> represents the message queue key.

The task failed to send a message to a task on the same machine. The message queue with the given key might have been removed, or the system-imposed maximum number of pending messages might have been reached. From the UNIX prompt, issue the command **ipcs -qob**. Check if the queue with the given key still exists and if the total QNUM is less than 40.

```
(*, **, *C)XXX117 MSGQ errno <error number> code <return code> on sendremote() key=${<queue key>}
```

The <error number> argument represents the UNIX error number, <return code> represents the return code of sendremote(), and <queue key> represents the message queue key.

The task failed to send a message to a task on a remote machine. The message queue for the task dealing with intermachine communication might have been removed, or the system-imposed maximum number of pending messages might have been reached. From the UNIX prompt, issue the command **ipcs -qob**. Check if the queue with the given key still exists and if the total QNUM is less than 40.

```
(*, **, *C)XXX118 MSGQ errno <error number> code <error number> on recvmmsg() key=${<queue key>}
```

The <error number> argument represents the UNIX error number, <return code> represents the return code of recvmmsg(), and <queue key> represents the message queue key. The task failed to receive a message from a message queue with the given key. The message queue with the given key might have been removed, or the task might have been interrupted.

```
(*, **, *C)XXX119 SEMA errno <error number> code <return code> getting key for <semaphore name>
```

The <error number> argument represents the UNIX error number, <return code> represents the return code of the function that provides the mapping between semaphore names and semaphore keys, and <semaphore name> represents the semaphore name. The task cannot get the semaphore key value for the given semaphore name. Either the accecsid file is not in the files directory, or the named semaphore is not defined in the accecsid file.

```
(*, **, *C)XXX120 SEMA errno <error number> creating key=${<semaphore key>}
```

The <error number> argument represents the UNIX error number, and <semaphore key> represents the semaphore key. The task cannot create the semaphore with the given key. A semaphore with the same key might already exist.

```
(*, **, *C)XXX121 FILE errno <error number> opening <name> for <file open>
```

The <error number> argument represents the UNIX error number, <name> represents the name of the file, and <file open> represents the file open modifier (for example, create, read, or append). The task failed to open the named file using the indicated file open operation.

```
(*, **, *C)XXX122 FILE errno <error number> reading <filename> size <total byte size>
```

The <error number> argument represents the UNIX error number, <filename> represents the filename or item being read, and <total byte size> represents the total byte size available to read. The task failed to read the requested number of bytes.

```
(*, **, *C)XXX123 FILE errno <error number> writing <filename> size <total byte size>
```

The <error number> argument represents the UNIX error number, <filename> represents the filename or item being written, and <total byte size> represents the total byte size available to write. The task failed to write the requested number of bytes. Check if the disk is full and if the file exists.

```
(*, **, *C)XXX124 FILE errno <error number> seeking <filename> offset <offset> whence <flag>.
```

The <error number> argument represents the UNIX error number, <filename> represents the name or description of the input file, <offset> represents the requested offset, and <flag> represents the seek flag (0, 1, or 2). The task failed to move the pointer on the named file.

```
(*, **, *C)XXX125 FILE fprintf() returned <return code>. Expecting <number>.
```

The <return code> argument represents the return code of fprintf(), and <number> represents the number of items requested. The task failed to write the requested number of items.

```
(*, **, *C)XXX126 FILE fscanf() returned <return code>. Expecting <number>
```

The <return code> argument represents the return code of fscanf(), and <number> represents the number of items requested. The task failed to read the requested number of items.

(\* , \*\* , \*C)XXX127 FILE errno <error number> linking <file> to <name>

The <error number> argument represents the UNIX error number, <file> represents the file to link from, and <name> represents the name of the new file link. The task failed to create a link to a file. This might happen when the first file does not exist.

(\* , \*\* , \*C)XXX128 FILE errno <error number> unlinking <unlink>.

The <error number> argument represents the UNIX error number, and <unlink> represents the name of the file to unlink. The task failed to remove a file link. Check if the named file exists. If it does, check the permissions in the file.

(\* , \*\* , \*C)XXX129 FILE errno <error number> renaming <rename> to <new name>

The <error number> argument represents the UNIX error number, <name> represents the original filename, and <new name> represents the new name. The task failed to rename a file.

(\* , \*\* , \*C)XXX130 DIR errno <error number> changing to <directory>.

The <error number> argument represents the UNIX error number, and <directory> represents the directory name. The task failed to set its working directory. Check if the directory exists and if the execute permissions are set.

(\* , \*\* , \*C)XXX131 DIR errno <error number> opening <directory>.

The <error number> argument represents the UNIX error number, and <directory> represents the directory name. The task failed to open the named directory. Check if the directory exists and if the read permissions are set.

(\* , \*\* , \*C)XXX132 DIR errno <error number> reading <error number>

The <error number> argument represents the UNIX error number, and <directory name> represents the directory name. The task failed to read an entry from the named directory. Check if the directory exists and if the read permissions are set.

(\* , \*\* , \*C)XXX133 SCKT errno <error number> creating <protocol> socket for <socket>

The <error number> argument represents the UNIX error number, <protocol> represents the protocol (TCP or UDP), and <socket> represents the use of the socket. The task failed to create an end point for communication (a socket). This can happen if the task has opened too many sockets.

(\* , \*\* , \*C)XXX134 SCKT errno <error number> connecting to <address>/<port number>

The <error number> argument represents the UNIX error number, <address> represents the server name or address, and <port number> represents the service name or port number (as a string).

The task failed to initiate a connection to a server process. This can be due to one of two things: the server name does not have an entry in the /etc/hosts file, or the service name is not in the /etc/services file. If an IP address and a port number are used instead of names and the message still shows up, contact the Cisco Technical Assistance Center.

(\* , \*\* , \*C)XXX135 SCKT errno <error number> binding socket <socket>

The <error number> argument represents the UNIX error number, and <socket> represents the socket descriptor. The task failed to link a name to a socket.

(\* , \*\* , \*C)XXX136 SCKT errno <error number> listening on socket <socket>, qlength=<queue length>

The <error number> argument represents the UNIX error number, <socket> represents the socket descriptor, and <queue length> represents the requested queue length. The task failed to listen for connections on a socket.

(\* , \*\* , \*C)XXX137 SCKT errno <error number> accepting from socket=<socket>

The <error number> argument represents the UNIX error number, and <socket> represents the socket ID. The task failed to accept a connection from a socket.

(\* , \*\* , \*C)XXX138 SCKT errno <error number> reading <description> size <number>

The <error number> argument represents the UNIX error number, <description> represents the description of data to read, and <number> represents the number of bytes to read. The task encountered an error while reading data from a socket.

(\* , \*\* , \*C)XXX139 SCKT errno <error number> writing <description> size <number>

The <error number> argument represents the UNIX error number, <description> represents the description of data to write, and <number> represents the number of bytes to write. The task encountered an error while writing data to a socket.

(\* , \*\* , \*C)XXX140 FILE errno <error number> getting file stat for <name>

The <error number> argument represents the UNIX error number, and <name> represents the name or description of a file. The task failed to get file statistics. Check if the file exists.

(\* , \*\* , \*C)XXX141 MSGQ errno <error number> code <return code> deleting key=\${<queue key>

The <error number> argument represents the UNIX error number, <return code> represents the return code of the routine for deleting the message queue, and <queue key> represents the message queue key. The task failed to delete the message queue with the given key. The message queue might have been deleted manually or by another task.

(\* , \*\* , \*C)XXX142 SHM errno <error number> code <return code> deleting key=\${<queue key>

The <error number> argument represents the UNIX error number, <return code> represents the return code of the routine to delete the shared memory, and <queue key> represents the message queue key. The task failed to delete the shared memory with the given key. The shared memory might have been deleted manually or by another task.

(\* , \*\* , \*C)XXX143 SHM errno <error number> attaching to <name> shared memory

The <error number> argument represents the UNIX error code, and <name> represents the task name of shared memory owner. This alarm message appears only if the task does not explicitly acquire the shared memory ID through get\_mid().

The task failed to attach to the shared memory owned by the given task. The shared memory might not have been created, or it might have been deleted by the owning process. Check if the shared memory owner is executing by issuing the UNIX command **ps -eaf | grep <task>**, where <task> is the owner of the shared memory.

(\* , \*\* , \*C)XXX200 Timed out waiting for <task>

The <task> argument represents the description of what the task was waiting for. The task logs the message when the attempt to receive some information from another task or task component has exceeded a certain time threshold.

(\* , \*\* , \*C)XXX201 Invalid command-line option, <switch>

The <switch> argument represents the unsupported character command-line switch. The task was passed an unknown or unsupported command-line argument. The configuration file for the task contains an invalid option. To check all available options, invoke the task using the **-h** option and check the contents of the configuration file.

(\* , \*\* , \*C)XXX202 Unrecoverable failure

The task cannot recover from an error. Previous or following entries in the log file provide more information on the possible cause of the failure.

(\* , \*\* , \*C)XXX203 SIG errno <error number> setting handler for signal <signal>

The <error number> argument represents the UNIX error number, and <signal> represents the signal number. The task failed to set the handler for the given signal. Contact the Cisco Technical Assistance Center if necessary.

(\* , \*\* , \*C)XXX204 SYS errno <error number> on system() for <argument>

The <error number> argument represents the UNIX error number, and <argument> represents the description of the argument passed to the system() call.

The task detected an error when passing a command to the UNIX shell. The shell may be unable to find and execute the specified command. Check if the command or script passed to the system call is valid. If it is a script, verify that the execute permissions are set. A system() call might also fail if an excessive number of UNIX processes are already executing. To see if this is the case, issue the command **ps -eaf | pg**.

```
(*, **, *C)XXX205 SYS errno <error number> on fork() for <description>
```

The <error number> argument represents the UNIX error number, and <description> represents the description of why the process is cloning itself. The task failed to clone itself. This might happen when the maximum number of processes in the system has been reached. To see if this is the case, issue the command **ps -eaf | pg**.

```
(*, **, *C)XXX206 ENV variable <name> undefined
```

The <name> argument represents the name of the undefined environment variable. A variable is undefined in the run-time environment of the task. Check the sym\_defs file to verify there is an entry for the given environment variable. If there is an entry, verify that the variable is exported.

```
(*, **, *C)XXX207 ENV variable <name> is undefined, using default value <default string>
```

The <name> argument represents the name of the undefined environment variable, and <default string> represents the default string to be used. A variable is undefined in the run-time environment of the task. The task uses a default string value.

```
(*, **, *C)XXX208 ENV variable <variable> is undefined, using default value <default string>
```

The <variable> argument represents the name of the undefined environment variable, and <default string> represents the default string to be used. A variable is undefined in the run-time environment of the task. The task is using a default numeric value.

```
(*, **, *C)XXX209 SHM errno <error number> code <return code> getting key for <memory name>
```

The <error number> represents the UNIX error number, <return code> represents the return code of the function that provides the mapping between shared memory names and shared memory keys, and <memory name> represents the shared memory name.

The task cannot get the shared memory key value for the given shared memory name. Either the acecmid file is not in the files directory or the named shared memory is not defined in the acecmid file. Contact the Cisco Technical Assistance Center if necessary.

```
(*, **, *C)XXX210 SHM errno <error number> creating key=${<memory key>
```

The <error number> argument represents the UNIX error number, and <memory key> represents the shared memory key. The task failed to create the shared memory with the given key. A shared memory with the same key might already exist.

```
(*, **, *C)XXX211 SHM errno <error number> attaching to key=${<memory key>
```

The <error number> argument represents the UNIX error number, and <memory key> represents the shared memory key. The task failed to attach to the shared memory with the given key. The shared memory with the given key might not yet have been created or it might have been removed.

```
(*, **, *C)XXX212 SHM chunk not defined for <lookup failure>
```

The <lookup failure> argument represents the name of the memory chunk that caused the lookup failure. The task failed to look up a memory chunk in the shared memory region. Check the configuration file in the files directory.

```
(*, **, *C)XXX213 SHM chunk is <assigned> bytes for <name>. Expecting <size> bytes
```

The <assigned> argument represents the assigned memory chunk size, <name> represents the memory chunk name, and <size> represents the expected memory chunk size. The expected memory chunk size of the task does not match the allocated chunk. Check the configuration file in the files directory.

```
(*, **, *C)XXX214 MSGQ errno <error number> code <return code> getting key for <queue name>
```

The <error number> argument represents the UNIX error number, <return code> represents the return code of the function that provides the mapping between message queue names and message queue keys, and <queue name> represents the message queue name.

The task cannot get the message queue key value for the given message queue name. Either the acecqid file is not in the files directory or the named message queue is not defined in the acecqid file.

```
(* , ** , *C)XXX215 MSGQ errno <error number> creating key=${<queue key>}
```

The <error number> argument represents the UNIX error number, and <queue key> represents the message queue key. The task cannot create a message queue with the given key. A message queue with the same key might already exist. Look in the `acecqid` file found in the `/CiscoBAMS/files` directory for duplicate key definitions. Contact the Cisco Technical Assistance Center to correct the configuration if you find duplicates.

```
(* , ** , *C)XXX216 MSGQ errno <error number> code <return code> on sendlocal() key=${<queue key>}
```

The <error number> argument represents the UNIX error number, <return code> represents the return code of `sendlocal()`, and <queue key> represents the message queue key.

The task failed to send a message to a task on the same unit. The message queue with the given key might have been removed, or the system-imposed maximum number of pending messages might have been reached. From the UNIX prompt, issue the command **ipcs -qob**. Check if the queue with the given key still exists and if the total QNUM is less than 40.

```
(* , ** , *C)XXX217 MSGQ errno <error number> code <return code> on sendremote() key=${<queue key>}
```

The <error number> argument represents the UNIX error number, <return code> represents the return code of `sendremote()`, and <queue key> represents the message queue key.

The task failed to send a message to a task on a remote unit. The message queue for the task dealing with interunit communication might have been removed, or the system-imposed maximum number of pending messages might have been reached. From the UNIX prompt, issue the command **ipcs -qob** and check that the queue with the given key still exists and that the total QNUM is less than 40.

```
(* , ** , *C)XXX218 MSGQ errno <error number> code <return code> on recvmsg() key=${<queue key>}
```

The <error number> argument represents the UNIX error number, <return code> represents the return code of `recvmsg()`, and <queue key> represents the message queue key. The task failed to receive a message from a message queue with the given key. The message queue with the given key might have been removed, or the task might have been interrupted.

```
(* , ** , *C)XXX219 SEMA errno <error number> code <return code> getting key for <semaphore name>
```

The <error number> argument represents the UNIX error number, <return code> represents the return code of the function that provides the mapping between semaphore names and semaphore keys, and <semaphore name> represents the semaphore name.

The task cannot get the semaphore key value for the given semaphore name. Either the `acecsid` file is not in the `files` directory, or the named semaphore is not defined in the `acecsid` file.

```
(* , ** , *C)XXX220 SEMA errno <error number> creating key=${<semaphore>}
```

The <error number> argument represents the UNIX error number, and <semaphore> represents the semaphore key. The task cannot create the semaphore with the given key. A semaphore with the same key might already exist.

```
(* , ** , *C)XXX221 FILE errno <error number> opening <name> for <file>
```

The <error number> argument represents the UNIX error number, <name> represents the name of the file, and <file> represents the file open modifier (for example, `create`, `read`, or `append`). The task failed to open the named file using the indicated file open operation.

```
(* , ** , *C)XXX222 FILE errno <error number> reading <filename> size <byte size>
```

The <error number> argument represents the UNIX error number, <filename> represents the filename or item being read, and <byte size> represents the total byte size to read. The task failed to read the requested number of bytes.

```
(* , ** , *C)XXX223 FILE errno <error number> writing <byte size> size <filename>
```

The <error number> argument represents the UNIX error number, <byte size> represents the total byte size to write, and <filename> represents the filename or item being written. The task failed to write the requested number of bytes. Check if the disk is full and if the file exists.

(\* , \*\* , \*C)XXX224 FILE errno <error number> seeking <filename> offset <offset> whence <flag>

The <error number> argument represents the UNIX error number, <filename> represents the name or the description of the input file, <offset> represents the requested offset, and <flag> represents the seek flag (0, 1, or 2). The task failed to move the pointer on the named file.

(\* , \*\* , \*C)XXX225 FILE fprintf() returned <return code>. Expecting <number>

The <return code> argument represents the return code of fprintf(), and <number> represents the number of items requested. The task failed to write the requested number of items.

(\* , \*\* , \*C)XXX226 FILE fscanf() returned <return code>. Expecting <number>

The <return code> argument represents the return code of fscanf(), and <number> represents the number of items requested. The task failed to read the requested number of items.

(\* , \*\* , \*C)XXX227 FILE errno <error number> linking <file> to <new file>

The <error number> argument represents the UNIX error number, <file> represents the file to link from, and <new file> represents the name of the new file link. The task failed to create a link to a file. This might happen when the first file does not exist.

(\* , \*\* , \*C)XXX228 FILE errno <error number> unlinking <name>

The <error number> argument represents the UNIX error number, and <name> represents the name of file to unlink. The task failed to remove a file link. Check if the named file exists. If it does, check the permissions in the file.

(\* , \*\* , \*C)XXX229 FILE errno <error number> renaming <name> to <new name>

The <error number> argument represents the UNIX error number, <name> represents the original filename, and <new name> represents the new name. The task failed to rename a file.

(\* , \*\* , \*C)XXX230 DIR errno <error number> changing to <directory name>

The <error number> argument represents the UNIX error number, and <directory name> represents the directory name. The task failed to set its working directory. Check if the directory exists and if the execute permissions are set.

(\* , \*\* , \*C)XXX231 DIR errno <error number> opening <directory name>

The <error number> argument represents the UNIX error number, and <directory name> represents the directory name. The task failed to open the named directory. Check if the directory exists and if the read permissions are set.

(\* , \*\* , \*C)XXX232 DIR errno <error number> reading <directory name>

The <error number> argument represents the UNIX error number, and <directory name> represents the directory name. The task failed to read an entry from the named directory. Check if the directory exists and if the read permissions are set.

(\* , \*\* , \*C)XXX233 SCKT errno <error number> creating <protocol> socket for <use>

The <error number> argument represents the UNIX error number, <protocol> represents the protocol (TCP or UDP), and <use> represents the use of the socket. The task failed to create an end point for communication (a socket). This can happen if the task has opened too many sockets.

(\* , \*\* , \*C)XXX234 SCKT errno <error number> connecting to <name>/<string>

The <error number> argument represents the UNIX error number, <name> represents the server name or address, and <string> represents the service name or port number (as a string).

The task failed to initiate a connection to a server process. Either the server name does not have an entry in the /etc/hosts file, or the service name is not in the /etc/services file. If an IP address and a port number are used instead of names and the message still shows up, contact the Cisco Technical Assistance Center.

(\* , \*\* , \*C)XXX235 SCKT errno <error number> binding socket <descriptor>

The <error number> argument represents the UNIX error number, and <descriptor> represents the socket descriptor. The task failed to bind a name to a socket.

(\*, \*\*, \*C)XXX236 SCKT errno <error number> listening on socket <descriptor>, qlength=<queue length>

The <error number> argument represents the UNIX error number, <descriptor> represents the socket descriptor, and <queue length> represents the requested queue length. The task failed to listen for connections on a socket.

(\*, \*\*, \*C)XXX237 SCKT errno <error number> accepting from socket=<id>

The <error number> argument represents the UNIX error number, and <id> represents the socket ID. The task failed to accept a connection from a socket.

(\*, \*\*, \*C)XXX238 SCKT errno <error number> reading <data> size <bytes>

The <error number> argument represents the UNIX error number, <data> represents the description of data to read, and <bytes> represents the number of bytes to read. The task encountered an error while reading data from a socket.

(\*, \*\*, \*C)XXX239 SCKT errno <error number> writing <data> size <bytes>

The <error number> argument represents the UNIX error number, <data> represents the description of data to write, and <bytes> represents the number of bytes to write. The task encountered an error while writing data to a socket.

(\*, \*\*, \*C)XXX240 FILE errno <error number> getting file stat for <description>

The <error number> argument represents the UNIX error number, and <description> represents the name or description of a file. The task failed to get file statistics. Check if the file exists.

(\*, \*\*, \*C)XXX241 MSGQ errno <error number> code <return code> deleting key=\$<queue key>

The <error number> argument represents the UNIX error number, <return code> represents the return code of the routine for deleting the message queue, and <queue key> represents the message queue key. The task failed to delete the message queue with the given key. The message queue might have been deleted manually or by another task.

(\*, \*\*, \*C)XXX242 (SHM errno <error number> code <return code> deleting key=\$<queue key>

The <error number> argument represents the UNIX error number, <return code> represents the return code of the routine for deleting the shared memory, and <queue key> represents the message queue key. The task failed to delete the shared memory with the given key. The message queue might have been deleted manually or by another task.

(\*, \*\*, \*C)XXX243 SHM errno <error code> attaching to <task name> shared memory

The <error code> argument represents the UNIX error code, and <task name> represents the task name of the shared memory owner.

The task failed to attach to the shared memory owned by the given task. The shared memory might not have been created or might have been deleted by the owning process. Check if the shared memory owner is executing by issuing the UNIX command **ps -eaf | grep <task>**, where <task> is the owner of the shared memory.

(\*, \*\*, \*C)XXX244 SYS errno <error code> on UNIX system call <call>

The <error code> represents the UNIX error code, and <call> represents the system call name. The task encountered an error during a UNIX system call.

# Manager Task-Specific Messages

The Manager (MGR) task-specific error messages are numbered from 400 through 899 (not all numbers are used). The specific tasks use the same range of numbers, but the text of the message is different for each task.

MGR500 Spawning <task>

The <task> argument represents the task name. The MGR task manages the BAMS software. The MGR task starts and stops the other BAMS tasks. This informational message indicates that a task is being started.

MGR501 Sending <signal number> to <task>

The <signal number> argument represents the signal number, and <task> represents the task name. Some communication between UNIX tasks is by signal number. This message indicates that a signal has been sent to a UNIX task.

MGR502 Attempting a restart

This message indicates that the MGR task is attempting to restart the system. The startup messages that follow this message are displayed and are logged in the syslog file.

MGR503 Keepalive internal passed

Keep alive is a security feature that monitors system activity when you log on to the system as an administrator or operator. If control session activity is idle for more than a desired amount of time, the application logs the user out. This message indicates that the keep alive interval has passed.

MGR504 Task <name> will be restarted

The <name> argument represents the task name. The MGR is restarting the displayed task.

MGR505 Invoking task <name>

The <name> argument represents the task name. The MGR is starting the displayed task.

\* MGR600 Function <name> failed, code <rc>, errno:<UNIX error number>

The <name> argument represents the function name, <rc> represents the return code, and <UNIX error number> represents the UNIX error number. The displayed function returned an unexpected return code.

\* MGR601 Too many options for <process>

The <process> argument represents the process name. This message indicates that too many optional parameters are passed to a process listed in the proglis file. The proglis file contains the names of configuration files specific to each task.

Verify the parameters in the configuration file of the offending task. If the configuration file has been modified, remove some of the options within the configuration file or restore the original configuration file.

\*\* MGR700 Too few parameters <total>/<expected> on line <number> of proglis

The <total> argument represents the number of parameters, <expected> represents the number of expected parameters, and <number> represents the line number in the file. The proglis file has an incorrect number of parameters. Contact the Cisco Technical Assistance Center.

\*\* MGR800 Failed spawning <name>

The <name> argument represents the task name. This message indicates that the MGR task is unable to start the displayed task. This message can be caused by a combination of hardware and software problems.

Restart the application software and monitor the system log for the same occurrence. If the problem persists, restart the operating system. If the problem is still present, reinstall the application software.

\*C MGR801 Task <name> has died.

The <name> argument represents the task name. This message indicates that the specified task has stopped responding to the system. The MGR task automatically attempts a restart of the indicated task. Verify the permissions and ownerships on the task that has died. Restart the application and monitor the system log to see if the error persists. If MGR is unable to restart the task, you might need to reinstall the software. To clear this alarm, you must provide a matching text message because multiple MGR801 alarms may be active (each with a different message).



**Note** This alarm is cleared after the error alarm condition is removed.

\*C MGR802 Manager shutting down the application

This message indicates that a task has exited due to the receipt of the specified UNIX signal. The application has been terminated with a software interrupt. A signal 15 indicates that the system received the **stop** command. A signal 11 indicates that a segmentation violation occurred. The MGR task attempts a restart of the application for signals other than signal 15. If the MGR task is unable to restart the application, a UNIX shutdown might be necessary. This error can be associated with a hardware or a software failure.

\*C MGR803 Received unexpected signal number <number>. Exiting

The <number> argument represents the signal number. This error message indicates that the task has exited due to the receipt of the specified UNIX signal. The MGR task should reinitialize the system automatically. Monitor the syslog file during the next hour. If the error message reoccurs, reinstall the software.

\*C MGR804 Disk full. Must be cleaned up manually

The system has a full data directory and the Mass Storage Control task is unable to effect an automatic system cleanup. This type of error can occur if the disk thresholds are set too high.

Change to the /CiscoBAMS/data directory and remove older data files. The Mass Storage Control parameters should be verified and changed as necessary. For more information about setting up or editing MSC parameters, see the [“Setting Up Disk Monitoring Thresholds”](#) section on page 2-18.

## Accumulation Task Messages

The Accumulation (ACC) task accumulates peg counts for measurements. During processing, this task writes messages to the syslog with an ACC task identifier (for example, ACC001).

ACC000 <name> version <number1> has started, pid <number2>

The <name> argument represents the task name. The <number1> argument represents the task version. The <number2> argument represents the process ID number. This message indicates that the ACC task has started. This is an informational message. No action is necessary.

ACC001 <name> terminating with code <errno>

The <name> argument represents the task name. The <errno> argument represents the UNIX error number set by the system function. This message indicates that the ACC task has been ended. See the error number to determine the reason for the error.

ACC002 <name> terminating with signal number <number>

The <name> argument represents the task name. The <number> argument represents the signal number. This message indicates that the ACC task has been ended. See the signal number to determine the reason for the error.

ACC003 <name> terminating normally

The <name> argument represents the task name. This message indicates that the ACC task is ending normally. This is an informational message. No action is necessary.

ACC004 Processing file <name>

The <name> argument represents the filename. This message indicates that the ACC task is processing the displayed file. This is an informational message. No action is necessary.

ACC005 File <name> processed

The <name> argument represents the filename. This message indicates that the ACC task processed the displayed file. This is an informational message. No action is necessary.

ACC010 <number> calls processed

The <number> argument represents the number of processed calls. This message indicates the number of call records that the ACC task has processed. This is an informational message. No action is necessary.

\* ACC019 No flat files to process. Retry in <number> seconds

The <number> argument represents the number of seconds. This message indicates that the ACC task has found no data files to process and is pausing for a period of time before attempting to process additional files. If no \*, \*\*, or \*C is displayed, this message is displayed as an informational message. No action is necessary.

ACC022 Processed call set in <number> seconds

The <number> argument represents the number of seconds. This message indicates the elapsed time to process a single call set (data file). This is an informational message. No action is necessary.

ACC023 <name>: User time=<time1> sec, CPU time=<time2> sec

The <name> argument represents the process name. The <time1> argument represents the CPU time used for executing instructions in user space. The <time2> argument represents the CPU time used for executing instructions in system space. This alarm message indicates the user and CPU time used for processing enclosure files. This is an informational message. No action is necessary.

\* ACC101 File error: <name> on <filename> (<errno>)

The <name> argument represents the name of the failed system call. The <filename> argument represents the filename. The <errno> argument represents the UNIX error number set by the system function. This message indicates that the ACC task encountered an error when performing a system call operation on the specified file. See the UNIX error number for more information.

\*C ACC102 File I/O error: <name> on <filename>, requested: <number1>, got: <number2> (<errno>)

The <name> argument represents the name of the failed system call. The <filename> argument represents the filename. The <number1> argument represents the number of requested bytes. The <number2> argument represents the number of received bytes. The <errno> argument represents the UNIX error number set by the system function. This message indicates that the ACC task encountered an error when performing a file I/O operation. Contact the Cisco Technical Assistance Center.

W ACC204 Duplicate Trunk Group Key <trunk group> IC:<carrier id>

The <trunk group> argument represents the trunk group. The <carrier id> argument represents the carrier identifier. An error occurred when the trunk group key was added. Contact the Cisco Technical Assistance Center.

\*\* ACC206 Undefined environment variable <varname>

The <varname> argument represents the variable name. This message indicates that an expected environment variable has not been defined. Try logging out and logging back in. If this problem persists, verify that the specified environment variable is defined in /CiscoBAMS/bin/sym\_defs. If it is missing, contact the Cisco Technical Assistance Center for directions on how to proceed.

\*\* ACC207 Function <name> failed <errno>

The <name> argument represents the name of the failed function. The <errno> argument represents the UNIX error number set by the system function. This message indicates that an unexpected function failed. Contact the Cisco Technical Assistance Center.

\*C ACC210 The EOF marker missing for the file <filename>

The <filename> argument represents the filename. This message indicates a missing end-of-file marker in the displayed file. Contact the Cisco Technical Assistance Center.

\* ACC221 Old call set received <id> current <interval string>

The <id> argument represents a new call set, and <interval string> represents the current call set. This message appears when a call set older than the current one is received. Contact the Cisco Technical Assistance Center.

\* ACC222 Missing call set expected <next interval string> received <call set id>

The <next interval string> argument represents a new call set, and <call set id> represents the current call set. This message appears when a time gap has been detected in the ACC input stream. Contact the Cisco Technical Assistance Center.

\* ACC223 Can't load interval value from check point file

This message appears when an error is detected during the reading of the checkpoint file. Contact the Cisco Technical Assistance Center.

\* ACC224 Memory allocation failed requested by <function name>

The <function name> argument represents the name of the function requesting memory. Contact the Cisco Technical Assistance Center. This message appears when memory is allocated and none is returned.

ACC225 No Checkpoint file to load

This message appears when the ACC task starts and no checkpoint file is found. This is an informational message. No action is necessary.

ACC226 Check point loaded, last interval was <current interval string>

The <current interval string> argument represents the current interval string loaded from the checkpoint. This message appears when the ACC task starts and the checkpoint file is loaded. This is an informational message. No action is necessary.

\* ACC227 <count direction> <description>, TG <trunk group prefix> <trunk group number> <counter value> <condition> <threshold value> <timestamp>

The <count direction> represents the direction of the count, <description> is a description of the count, <trunk group prefix> represents the trunk group prefix, <trunk group> represents the trunk group, <counter value> represents the counter value, <condition> represents the threshold crossing condition, <threshold value> represents the value of the threshold, and <timestamp> represents the timestamp (that is, @ YYYYMMDDHHMMSS UTC). This message appears when a counter passes a user-determined threshold test or clears. To clear this alarm, you must provide a matching text message, because multiple ACC227 alarms might be active (each with a different message).




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**Note** This alarm is cleared after the alarm condition is removed.

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ACC228 <count direction> <description>, TG <trunk group number> contains an invalid condition

The <count direction> represents the direction of the count, <description> is a description of the count, and <trunk group number> represents the trunk group number. This message appears when a threshold is tested and the condition (<=>) is an unknown test. This is an informational message. No further action is necessary.

\* ACC230 CTL file error: <string>

The <string> argument represents a string from ai\_strerror(). This message displays errors from calls to the Web Application Program Interface (API). Contact the Cisco Technical Assistance Center.

\* ACC231 Threshold file error <key> <threshold name> <value> <text>

The <key> argument represents the id/tag, <threshold name> represents the name of the threshold (for example, "ANSWERED"), <value> represents the value in error, and <text> represents a description of the error condition. This message appears when the threshold file contains an incorrect value. Contact the Cisco Technical Assistance Center.

\* ACC232 Multiple Global thresholds found

On each new call set, ACC reloads the Threshold Crossing Alarms table if the file contains more than one global threshold record that this alarm displays. Contact the Cisco Technical Assistance Center.

\* ACC233 Out of table Space

If ACC attempts to insert a new node in a tree and no space is available, this alarm is displayed. Contact the Cisco Technical Assistance Center.

\* ACC234 Known node can't be found deleting

If ACC attempts to delete a node in a tree and the delete returns null (node not found), this alarm is displayed. Contact the Cisco Technical Assistance Center.

\* ACC235 CTL file <name> value error: <value>

The <name> argument represents the name of the CTL file and the value represents the measurement value. This message displays when the value of the measurement field in the control file is not 0 or 1. Check the configuration file using MML and fix the value.

\* ACC236 Interval minutes must be 5, 10, 15, 20 or 30

This message displays when the ACC task reads an invalid value from the NODEPARMS configuration file for the interval minutes. Check the NODEPARMS configuration file using MML and fix the value.

\* ACC237 Number of Ckts not populated for TD <trunk group>

The <trunk group> number represents the trunk group number. This message displays if the number of circuits for a trunk group has not been defined or has been set to zero. An invalid zero value leads to invalid statistics. If this alarm is generated when the number of circuits is zero, the percentage measurements are reported as 100 percent. At the node level, modify the Trunk Group table (TRUNKGRP tag ID) for the specified trunk group and then assign a non-zero value to the circuits parameter.

## Augmentation BAF Task Messages

The Augmentation BAF (AGB) task controls the augmentation of data through the use of lookup tables. During processing, this task writes messages to the syslog with an AGB (Augmented BAF) task identifier (for example, AGB001).

AGB000 <task> version <version> has started <pid>

The <task> argument represent the task name, <version> represents the task version, and <pid> represents the process identifier. This message indicates that the AUG task has started. This is an informational message. No action is necessary.

AGB001 <task> terminating with <code> <pid>

The <task> argument represents the task name, <code> represents UNIX error code, and <pid> represents the process identifier. This message indicates that the AUG task has ended abnormally. See the UNIX error code for an explanation of the problem.

AGB002 <name> terminating with signal <number1>, pid <number2>

The <name> argument represents the task name, <number1> represents the UNIX signal number, and <number2> represents the UNIX process identifier. This message indicates that the displayed signal ended the task. See the UNIX signal number for an explanation of the problem.

AGB003 <name> terminating normally, pid <number>

The <name> argument identifies the task name, and <number> identifies the process ID number of the task. This message indicates that the task terminated normally. This is an informational message. No action is necessary.

AGB004 Processing file <name>

The <name> argument represents the filename. This message indicates that the AUG task is processing the displayed file. This is an informational message. No action is necessary.

AGB009 Received system signal <signal name>.

The <signal name> argument represents the name of the UNIX signal. The AUG task received a system signal. This is an informational message. No action is necessary.

AGB010 Processed <filename>, total: <number> good: <number> sunerr: <number> semerr <number> lk uperr <number>

The <filename> argument represents the name of the processed file, and <number> represents the total number of call records, the number of good call records, the number of call records with syntax errors, the number of call records with semantic errors, and the number of call records with error lookups, respectively. This message provides summary information of call records being processed. This is an informational message. No action is necessary.

AGB019 No flat files to process. Retry in <number> seconds.

The <number> argument represents the time delay in seconds. There are no data files to process. The task waits and retries in the specified number of seconds. This is an informational message. No action is necessary.

AGB024 Creating <name> table

The <name> argument represents the lookup table name (that is, NPANXX table, Rating Exception table, Rating Type table, or Trunk Group table). The named lookup table is created and loaded into memory. This is an informational message. No action is necessary.

AGB025 Refreshing <name> table.

The <name> argument represents the lookup table name. The lookup table is reloaded. This is an informational message. No action is necessary.

\* AGB100 System call failure: <name> <errno>

The <name> argument represents the name of a failed system call, and <errno> represents the UNIX error number. This message indicates that the AUG task encountered an error when requesting the displayed system call. Look up the UNIX error number. Contact the Cisco Technical Assistance Center.

\* AGB101 File error: <call> on <file> (<code>)

The <call> argument represents the name of the failed system call, <file> represents the name of the file being operated on, and <code> is the UNIX error number. This message indicates an error during the performing of the displayed system call operation. Look up the UNIX error number. A software-related problem is indicated. Contact the Cisco Technical Assistance Center.

\*C AGB102 File I/O error: <call> on <file>, requested <number1>, got <number2>

The <call> argument represents the failed system call, <file> represents the name of the file being operated on, <number1> represents the number of bytes requested, and <number2> represents the number of bytes received. This message indicates an error during performance of the displayed I/O file operation. Check if the disk is full or not. If the disk is not full, a software-related problem is indicated. Contact the Cisco Technical Assistance Center.

\* AGB104 Cannot find file <name> to process

The <name> argument represents the filename. This message indicates that the task is expected to reprocess the named file but did not find it. Contact the Cisco Technical Assistance Center.

\* AGB201 Undefined environment variable <name>

The <name> argument represents the name of the undefined environment variable. This message indicates that an environment variable is not defined. Check the sym\_defs file. Contact the Cisco Technical Assistance Center.

\* AGB202 <index> - Invalid <field>: <value>

The <index> argument represents the call record index, <field> represents the field name in the call record, and <value> indicates the value of the field. This message indicates that the AUG task detected an invalid field value in the call record. The input data has an invalid call reference ID. Check the Cisco MGC raw data, and make sure the call reference ID has the correct format. Contact the Cisco Technical Assistance Center.

\* AGB203 <index> - fail <function> lookup of <field>: <value>

The <index> argument represents the call record index, <function> represents the function name of the table lookup, <field> represents the field name in the call record, and <value> represents the value of the field being looked up. This message indicates a failed table lookup. Make sure the specific value exists in the table. Contact the Cisco Technical Assistance Center.

\* AGB210 CTL file: <name> error: <ai string error>

The <name> argument represents the function name, and <ai string error> represents the error string. This message indicates an error returned by a control file function. Make sure the CTL file exists in the specified directory. Check the existence of the CTL file (\*.CTL) and verify the structure of the control file (\*.CFDT). If the CFDT file is corrupt, copy the default CFDT file. Contact the Cisco Technical Assistance Center.

\* AGB211 CTL file BAF value error: <value>

The <value> argument represents a bad value. This message indicates that the content of the BAF field in the control file is not 0 or 1. Verify sysparm configurations. Make sure the BAF output is set to 0 (disabled) or 1 (enabled). Contact the Cisco Technical Assistance Center.

\* AGB232 #<index> Fail <function> lookup of<field1>:<value1> <field2>:<value2>  
<field3>:<value3>

The <index> argument represents the call record index, <function> represents the function name of the table lookup, <field1> represents the first field name in the call record, <value1> represents the value of the first field, <field 2> represents the second field name in the call record, <value2> represents the value of the second field, <field3> represents the third field name in the call record, and <value3> represents the value of the third field. This message indicates a failed table lookup at the named locations. The system tried to match three field values to the lookup table. Verify the table configuration file, and make sure the field values exist in that configuration file. Contact the Cisco Technical Assistance Center.

\* AGB233 #<index> Fail <function> lookup of <field>:<value>

The <index> argument represents the call record index, <function> represents the function name, <field> represents the field name of the call record, and <value> represents the value of the field being looked up. This message indicates a failed table lookup of this field. Verify that the input raw file used only one field value to match to the lookup table. Contact the Cisco Technical Assistance Center.

\* AGB234 #<index> - Invalid block: <field name>

The <index> argument represents the record index, and <field name> represents field names and values. This message indicates that an invalid block format was encountered in the reading of blocks from the table file. For example, the system expected a six-digit value for NPANXX, but it received only five digits. Verify the field value in the table. Make sure you enter the required value. For field names and descriptions, see the [“Tag IDs and Field Names” section on page 5-1](#).

\* AGB235 #<number> records failed trunk group lookup for file  
cor\_agcdr\_<timestamp>\_<sequence number>.bin

The <number> argument represents the number of records that failed the trunk group lookup, the <timestamp> argument represents the date and time, and the <sequence number> argument represents the file sequence number. This minor alarm indicates that the Trunk Group table is not correctly or fully populated. This error precludes these records from being processed by the measurements function. Fix the Trunk Group table. Refer to the AUG\*log files in the opt/CiscoBAMS/files directory. This file specifies which trunk group should be modified so that these configuration failures do not occur.

AGB236 <number> record(s) default to interlata due to absent NPANXX for file

The <number> argument represents the record number that defaulted to the INTERLATA rating type due to this NPANXX combination not being in the NPANXX tables. This message indicates that the AUG task has started. This is an informational message. No action is necessary.

AGB237 <number> record(s) did not have called and or calling number for files <name>.

The <number> argument represents the number of records and the <name argument> represents the filenames of no-data files encountered during processing. This is an informational message. No action is required.

# ASCII Conversion Task Messages

The ASCII Conversion (ASC) task outputs Cisco MGC End of Call 1110 ASCII records. During processing, this task writes messages to the syslog with an ASC task identifier (for example, ASC001).

ASC000 <task name> version <version> has started pid <process identifier>

The <task name> argument represents the task name, <version> represents the version, and <process identifier> is the UNIX process identifier. This alarm defines what version of the task is running. This is an informational message. No action is required.

ASC001 <task name> terminating with code <return error code>, pid <process id>

The <task name> argument represents the task name, <return error code> represents the error code returned, and <process id> represents the UNIX process identifier. The named task has been terminated abnormally. The code identifies the error encountered by the system. This is an informational message. No action is necessary.

ASC002 <task name> terminating with signal <signal number>, pid <process id>

The <task name> argument represents the task name, <signal number> represents the UNIX signal number, and <process id> is the UNIX process identifier. The named task has been ended by a UNIX signal. This is an informational message. No action is necessary.

ASC003 <task name> terminating normally, pid <process id>

The <task name> argument represents the task name, and <process id> is the UNIX process identifier. The ASC task has terminated normally. This is an informational alarm that appears only in test mode.

ASC004 No file to be processed. Retries in <number> seconds

The <number> argument represents the number of seconds the system waits before reattempting to process files. The task sleeps for the number of seconds displayed before accessing more files. This is an informational message. No action is necessary.

\* ASC101 File error: <data format type> on <system call> <errno>

The <data format type> represents the type of data format; <system call> represents the name of the failed system call or the name of the file being operated on; and <errno> represents the UNIX error number. An error was encountered during the performance of a system call operation. Look up the UNIX error number in the listing at the end of this appendix and contact the Cisco Technical Assistance Center.

\*\* ASC200 Environment variable <name> not found

The <name> argument represents the name of the missing environment variable, for example CONFIG\_DIR, FILES\_DIR, dir\_in or dir\_out. The displayed environment variable was not found. The symbol definition file (sym\_defs) is missing a variable, or the variable must be set before the task is run. Contact the Cisco Technical Assistance Center.

(\*,\*\*) ASC201 Function <name> failed, <errno>

The <name> argument represents the calling function name, and <errno> represents the UNIX error number. This message indicates failure of the displayed function call, that is, Major Events for open\_file, stat (sysParm.CTL), ai\_open ctlfile, minor events for ai\_get\_max\_num\_of\_recs(), ai\_load\_rec(), or ai\_close\_file. Examine the error number. Contact the Cisco Technical Assistance Center.

(\*,\*\*) ASC201 Function <calling function> failed, (<error number>)

The <calling function> represents the calling function, and the <error number> argument represents the UNIX error number. The system encountered a failure trying to make a function call. Examine the system error. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

\*\* ASC202 Invalid AMADEF format, read <error string>, expected <expected string>

The <error string> argument represents the error string found, and the <expected string> argument represents the string that was expected. The system encountered a format problem while trying to read the AMADEF file. The AMADEF file needs to be fixed. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

\* ASC205 Unsupported field <field name>, conversion not defined

The <field name> argument represents the name of the field. The system encountered an AMA field that cannot be processed. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

ASC207 Processed <filename>, converted <num recs>, output = <suffix>

The <filename> argument represents the input filename, <num recs> represents the number of records converted, and <suffix> represents the output file suffix. This message displays processing status information. This is an informational message. No action is necessary.

(\*,\*\*) ASC208 <data type> code <structure code> not found, cannot process record

The <data type> argument represents the type of data and <structure code> represents the structure code or call type. The system is unable to process a record due to missing code and structure code information. Check the AMADEF file. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

\*\* ASC209 Error <return value> reading file: CALLSTRUCT\_MAP

The <return value> represents the value returned. The system encountered a format error reading the callstruct file. Check the CALLSTRUCT\_MAP file. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

## 1110 Binary Task Messages

The 1110 Binary (BIN) task correlates 1010, 1030, 1040, and 1060 CDBs from the Cisco MGC, and generates 1110, and 1060 CDBs. During processing, this task writes messages to the syslog with a BIN task identifier (for example, BIN001).

BIN000 <task> version <version number> has started, pid <process ID>.

The <task> argument represents the task name, <version number> represents the task version number, and <process ID> represents the UNIX process identifier. This message identifies the version of the task that is running. This is an informational message. No action is necessary.

BIN001 <task> terminating with code <return code>, pid <process ID>.

The <task> argument represents the task name, <return code> identifies the terminating signal number encountered by the system, and <process ID> represents the UNIX process identifier. The named task ended abnormally. The code identifies the error encountered by the system. This is an informational message. No action is necessary.

BIN002 <task> terminating with signal <number>, pid <process ID>.

The <task> argument represents the task name, <number> represents the UNIX signal number, and <process ID> represents the UNIX process identifier. The named task was ended by a UNIX signal.

BIN003 <task> terminating normally, pid <process ID>.

The <task> argument represents the task name, and <process ID> represents the UNIX process identifier. The named task ended normally. This is an informational message. No action is necessary.

BIN004 Processing file <filename>

The <filename> represents the name of the file being processed. The task has started processing the named file. This is an informational message. No action is necessary.

BIN009 Received system signal <signal>

The <signal> argument represents the received signal number. The BIN task received a system signal. This is an informational message. No action is necessary.

BIN010 Processed <filename>, IN(total: <number1>) OUT(1060: <number2> 1110: <number3>)

The <filename> argument represents the processed filename, <number1> represents the total number of processed call records, <number2> represents the number of 1060 call records, and <number3> represents the number of 1110 call records. This message displays call process summary information. This is an informational message. No action is necessary.

BIN011 Processed <filename>, Skipped CDEs: <number1> Unknown CDEs: <number2>

The <filename> argument represents the processed filename, <number1> represents the number of skipped CDEs, and <number2> represents the number of unknown CDEs. This message indicates the number of CDEs that were skipped or unknown in a processed file. This is an informational message. No action is necessary.

BIN012 Output file <filename>

The <filename> argument represents the processed filename. This message indicates the name of the output file. This is an informational message. No action is necessary.

BIN019 No flat files to process. Retry in <number> seconds.

The <number> argument represents the number of seconds. This message indicates that no data exists for processing. The BIN task retries in the displayed number of seconds. This is an informational message. No action is necessary.

BIN020 CDB tag <number>, CDB is skipped.

The <number> argument represents the CDB number. This CDB is skipped when the CDB tag is found in the Skip CDB table. This is an informational message. No action is necessary.

BIN021 CDE tag <number>, CDB is skipped

The <number> argument represents the CDE number. This CDE is skipped when the CDE tag is found in the Skip CDE table. This is an informational message. No action is necessary.

BIN024 Creating <name> table

The <name> argument represents the lookup table name (that is, NPANXX table, Rating Exception table, Rating Type table, or Trunk Group table). The named lookup table is created and loaded into memory. This is an informational message. No action is necessary.

BIN025 Refreshing <name> table

The <name> argument represents the lookup table name. The lookup table is reloaded. This is an informational message. No action is necessary.

BIN026 Generated CDB <type> length is <length>.

The <type> argument represents the CDB type. The <length> argument represents the length of the CDB. This is an informational message. No action is necessary.

\* BIN100 System call failure: <call name> (<error number>)

The <call name> represents the name of the failed system call, and <error number> represents the UNIX error number. An error was encountered when this system call was requested. Look up the UNIX error number for more information. Contact the Cisco Technical Assistance Center.

\* BIN101 File error: <call> on <file> (<code>)

The <call> argument represents the name of the failed system call, <file> represents the filename, and <code> represents the UNIX error number. This message indicates that the BIN task encountered an error when performing the displayed system call operation. Look up the error number. Contact the Cisco Technical Assistance Center.

\*C BIN102 File I/O error: <call> on <file>, requested: <number1>, got: <number2> (code)

The <call> argument represents the name of the failed I/O system call, <file> represents the name of the file being operated on, <number1> represents the number of bytes requested, and <number2> represents the number of bytes received, and <code> represents the UNIX error number. The BIN task encountered an error when performing the displayed I/O file operation. Contact the Cisco Technical Assistance Center.

\* BIN201 Undefined environment variable <name>

The <name> represents the name of the environment variable. This message indicates that the displayed environment variable is not defined. Contact the Cisco Technical Assistance Center.

\* BIN202 Input file does not start with header CDB

This message indicates that the BIN task detected an invalid field value in the call record. The BIN task placed the input file in the error directory. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

\* BIN203 Error reading TAG/LEN of TLV errno=<error number>

The <error number> argument represents the UNIX error number. An error occurred during the reading of the TLV (T = Tag field code, L = Length of the field value, V = field Value). The BIN task stops processing this file, renames it as an error file, and begins processing the next input file. Look up the error. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

\* BIN204 Input file is not ended by footer CDB

The system encountered the displayed error. The BIN task placed the input file in the error directory. Contact the Cisco Technical Assistance Center.

\* BIN207 #<index> - <name>: <value> too long, <size> expected.

The <index> argument represents the call record index, the <name> argument represents the field name, the <value> argument represents the field value, and the <size> argument represents the expected field size. This message indicates that the field string exceeded the expected size. Contact the Cisco Technical Assistance Center.

\* BIN210 CTL file: <name>: error: <ai string error>.

The <name> argument represents the control filename, and the <ai string error> argument represents the displayed error string. This message indicates the error returned by a control file function. Contact the Cisco Technical Assistance Center.

\* BIN211 CTL file lookup value error: <value>

The <value> argument represents the measurement value. This message displays when the value of the measurement field in the control file is not 0 or 1. Check the configuration file using MML and fix the value.

\* BIN222 Invalid TLV len:<length> at <position>th chars, CDB len:<size>

The <length> argument represents the incorrect TLV length, <position> represents the TLV position in the CDB, and <size> represents the size of the CDB. The system read an invalid TLV length. The BIN task stops further processing of the input file and renames the input file by prepending "err\_" to the input filename. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

\* BIN223 #<format> - Get <number1> byte record. <number2> bytes record expected.

The <format> argument represents the data format, <number1> represents the size of the call record read, and <number2> represents the size of the call record expected. This message indicates the processed record size.

\* BIN224 Process all CDEs: Error in parsing record.

This message indicates that the BIN task encountered an error during the parsing of this record. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

\* BIN225 Dump\_cde: Unrecognized tag <tag number>

The <tag number> represents the number of the tag. This message indicates that the BIN task encountered an unrecognized tag. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

\* BIN226 Incorrect field length <field value length>.

The <field value length> argument represents the length of the field value. This message indicates that the BIN task encountered an incorrect field length. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

BIN232 <index> - Fail <function> lookup of <field1>: <value1> and <field2>: <value2>

The <index> argument represents the index of the call record, the <function> argument represents the function name of the table lookup, the <field1> argument represents the first field name in the call record, the <value1> argument represents the first value of the field being looked up, the <field2> argument represents the second field name in the call record, and the <value2> argument represents the second value of the field being looked up. This message indicates that the task failed to look up the indicated fields.

BIN233 <index> - Fail <function> lookup of <field>: <value>

The <index> argument represents the index of the call record, the <function> argument represents the function name of the table lookup, the <field> argument represents the first field name in the call record, and the <value> argument represents the first value of the field being looked up. This message indicates that the task failed to look up the indicated fields.

BIN234 #<record index> - Invalid record <field names/values>

The <record index> argument represents the record index, and the <field names/values> argument represents the field names and values. The BIN task encountered an invalid block format while reading blocks from a control file. The message shows which fields are invalid. Use MML to correct the values.

BIN235 <number> record(s) failed <trunk/sigpath> lookup for file <name>

The <number> argument represents the number of records, the <trunk/sigpath> argument represents the trunk group or sigpath, and the <name> argument represents the filename. This message shows the number of lookup failures per file. To find details of a lookup failure, examine the log file /opt/CiscoBAMS/files/sxx/BIN\_cdr.log and search for message BIN233. Correct the appropriate record in the Trunk Group table or in the Nailed Connection table.

BIN236 Setting BIN processing prefix to <prefix>

The <prefix> argument represents the file prefix. The BIN task processes files whose prefixes match the file-prefix1 parameter in the Poll table. If this parameter is not populated, the file-prefix2 parameter is used. If both parameters are empty, the default prefix is cdr. Whenever the Poll table is modified, this message displays the value of the file prefix that BIN uses.

## Correlation Task Messages

The Correlation (COR) task correlates call record data collected from the Cisco MGC. During processing, this task writes messages to the syslog with a COR task identifier (for example, COR001).

COR000 <task> version <version number> has started pid <process ID>.

The <task> argument represents the version task, <version number> represents the task version number, and <process ID> represents the UNIX process identifier. This message defines the version of the task that is running. This is an informational message. No action is necessary.

COR001 <task> terminating with code <return code>, pid <process ID>.

The <task> argument represents the task name, <return code> represents the return code, and <process ID> represents the UNIX process identifier. The named task has ended abnormally. The code identifies the error encountered by the system. This is an informational message. No action is necessary.

COR002 <task> terminating with signal <number>, pid <process ID>.

The <task> argument represents the task name, <signal number> represents the signal number received, and <process ID> is the UNIX process identifier. The named task was ended by a UNIX signal. This is an informational message. No action is necessary.

COR003 <task> terminating normally, pid <process ID>.

The <task> argument represents the task, and <process ID> represents the UNIX process identifier. The named task has ended normally. This is an informational message. No action is necessary.

COR004 No file to be processed. Retries in <number> seconds.

The <number> argument represents the interval, in seconds, between retries—that is, the task sleeps for <number> seconds before accessing more files. This is an informational message. No action is necessary.

COR005 Start processing file <name>.

The <name> argument represents the filename. This message indicates that a file is processing. This is an informational message. No action is necessary.

COR006 Processed file <name>: Output-> Complete:<number1> Incomplete:<number2>  
Ldur:<number3> Hold-> Incomplete:<number4>.

The <name> argument represents the name of file that has finished processing, <number1> represents the number of complete calls output, <number2> represents the number of incomplete calls output, <number3> represents the number of long duration calls output, and <number 4> represents the number of incomplete calls. This message indicates that the displayed file has been processed. This is an informational message. No action is required.

\* COR100 System call failure: <call name> (<error number>)

The <call name> represents the name of the failed system call, and <error number> represents the UNIX error number. An error was encountered when this system call was requested. Look up the UNIX error number for more information. Contact the Cisco Technical Assistance Center.

(\*,\*\*) COR101 File error: <system call> on <filename> (<error number>)

The <system call> argument represents the name of the failed system call, <filename> represents the name of the file being operated on, and <error number> represents the UNIX error number. An error was encountered during performance of a system call operation on the specified file. See the UNIX error number for more information. Contact the Cisco Technical Assistance Center.

\*\* COR200 Environment variable <variable name> not found.

The <variable name> argument represents the name of the environment variable that was not found. This message indicates that the displayed environment variable was not found. Verify that the variable is defined in the sym\_defs file, or make sure that it is set before the task is run. Contact the Cisco Technical Assistance Center.

(\*,\*\*) COR201 Function <function name>() failed, (<error number>)

The <function name> argument represents the calling function name, and <error number> represents the UNIX error number. This message indicates the failure of a function call. See the UNIX error number for more information. Contact the Cisco Technical Assistance Center.

\*\* COR202 Number of CDR memory extensions exceeded <max number>

The <max number> argument represents the maximum number of memory extensions. The maximum number of CDR memory extensions is set too small. Increase the maximum number of CDR memory extensions in the cor\_cfg file in the opt/CiscoBAMS/files directory. In that file, the -m value indicates the size of the extents and measures the number of CDRs to save into the memory, and the -e value indicates the number of extents. Contact the Cisco Technical Assistance Center.

\*\* COR203 Read incomplete block size <filename>, <filename> expected.

The <filename> argument represents the name of the file found and the name of the file expected, respectively. The input file generated by the previous task has an I/O error (either a bad disk block or the disk space is full). The input file is incomplete. COR expected multiple records for each input file. The previous task wrote incomplete records, for example, because of a disk space problem. Contact the Cisco Technical Assistance Center.

\*\* COR204 Invalid CDB type: <name>

The <name> argument represents the filename found. For more information, check the error file called err\_<raw\_file\_name>. This message indicates that an invalid CDB type was encountered. The COR task writes invalid CDBs to that file. Check the Cisco MGC XECFGPARAM.dat file and make sure the MGC CDB type is configured as specified. Contact the Cisco Technical Assistance Center.

\*\* COR205 Exhausted all possible sequence numbers: <filename>

The <file name> argument represents the name of the file. This message indicates that the number of input files in a single interval exceeded 99,999. Contact the Cisco Technical Assistance Center.

\*\* COR206 Multiple boundary crossings in a single file: <filename>

The <filename> argument represents the name of the input file. This message is generated if there are more than two boundary crossings in a data file. Contact the Cisco Technical Assistance Center.

\* COR207 Errors generating boundary crossing file: <filename>

The <file name> argument represents the name of the file. This message indicates that an error was encountered when the boundary crossing file was generated. Contact the Cisco Technical Assistance Center.

COR208 <string> stat file: <filename>

The <string> argument represents an action, such as “Creating” or “Closing,” and <filename> represents the name of the file. This message is generated for the displayed stat file. This is an informational message. No action is necessary.

\* COR210 CTL file: <function name> error: <ai string error>

The <function name> argument represents the name of the function, and <ai string error> represents the error code. This message indicates an error returned by a control file function. Contact the Cisco Technical Assistance Center.

\* COR211 CTL file measurement value error: <value>

The <value> argument represents the incorrect value. This message indicates that the content of the measurement field in the control file is not 0 or 1. Contact the Cisco Technical Assistance Center.

\* COR223 Can't load interval value from check point file

This message indicates an error in the reading of the check point record from the check point file. Delete the check point file, COR\_CHECKPT, located in the opt/CiscoBAMS/files directory. Contact the Cisco Technical Assistance Center.

COR225 No check point file to load

This informational message displays when the COR task starts and there is no check point file to load.

COR226 Check point loaded, last interval was <string>, next seq no <number>

The <string> argument represents the current interval string loaded from the check point, and the <number> argument represents the current interval sequence number. This informational message displays when the COR task starts and the check point file is loaded.

\* COR227 Interval minutes must be 5, 10, 15, 20 or 30

This message displays when the COR task reads an invalid value from the NODEPARMS configuration file for the interval-minutes. Check the NODEPARMS configuration file using MML and fix the value.

COR228 MAINT\_UNBLOCK received for TG without blocks

This informational message displays when a MAINT\_UNBLOCK message is received for a trunk group that has no blocked trunks. The CDB is ignored.

COR229 MAINT CDB received with an invalid maint\_type

This informational message displays when a MAINT CDB is received for a trunk group without a valid maint\_type. The CDB is ignored.

## Check Remote Down Task Messages

The Check Remote Down (CRD) task monitors communications between redundant BAMS units, and verifies whether or not the remote unit is down. During processing, this task writes messages to the syslog with a CRD task identifier (for example, CRD001).

\* CRD500 Cannot attach to shared memory errno: <error number>

The <error number> argument represents the UNIX error number. The system is unable to access the shared memory segment and displays an error message. Look up the UNIX error for further explanation. Contact the Cisco Technical Assistance Center.

\* CRD501 Get Message Queue ID for <message queue name> error, returned <return number>

The <message queue name> represents the name of the message queue, and <return number> represents the number of the returned function. The system is unable to get the message from the sender/receiver message queue and displays the sender/receiver message queue ID. Use the ipcs utility to check the message queue status. Contact the Cisco Technical Assistance Center.

\* CRD502 Redundant polling unit is down.

The redundant polling unit is down. Check the remote BAMS unit. If it is down, contact the Cisco Technical Assistance Center.



**Note** This alarm is cleared when the alarm condition is removed.

\* CRD503 <operation> failed, returned <return number>, errno <error number>

The <operation> argument represents the failed operation, <return number> represents the number of the returned function, and <error number> represents the UNIX error number. The system is unable to send local, send remote, or receive messages and displays an error category and code. Look up the UNIX error. Contact the Cisco Technical Assistance Center.

\* CRD504 Receive message time out

The system experienced a receive message timeout. Check the network connection to the remote BAMS unit. Contact the Cisco Technical Assistance Center.

CRD505 Redundant polling unit is up

The redundant polling unit is back on line. This message is displayed for informational purposes. No action is necessary.

## CDR to BAF Conversion Task Messages

The CDR to BAF Conversion (CTB) task generates BAF output. During processing, this task writes messages to the syslog with a CTB task identifier (for example, CTB001).

CTB000 <version> <version number> has started, pid <process ID>

The <version> argument represents the task version, the <version number> represents the task version number, and <process ID> represents the UNIX process identifier. The system displays a message that the named task has started. This message is displayed for informational purposes. No action is necessary.

CTB001 <task name> terminating with code <return error code>, pid <process id>

The <task name> argument represents the name of the task, <return error code> represents the returned error code, and <process ID> represents the UNIX process identifier. The named task has terminated abnormally. The code identifies the error encountered by the system. Look up the error code. Contact the Cisco Technical Assistance Center.

CTB002 <task name> terminating with signal <signal number>, <process ID>

The <task name> argument represents the name of the task, <signal number> represents the UNIX signal number, and <process ID> represents the UNIX process identifier. The named task was ended by a UNIX signal. This is an informational message. No action is necessary. See the [“Signal Numbers” section on page A-69](#).

CTB003 <name> terminating normally, pid <number>

The <name> argument represents the task name, and <number> represents the process ID number of the task. This message indicates that the task terminated normally. This is an informational message. No action is necessary.

CTB004 No file to be processed. Retries in <n> seconds

The <n> argument represents the number of seconds during which the task sleeps before accessing more files.

\* CTB101 File error <data type> on <system call> (<error number>)

The <data type> argument represents the type of data format, <system call> represents the failed system call, and <error number> represents the UNIX error number. The system encountered an error when performing a system call operation on the specified file. Look up the error number. Contact the Cisco Technical Assistance Center.

\*\* CTB200 Environment variable <variable name> not found

The <variable name> argument represents the name of the environment variable not found. The system encountered a missing or undefined variable. Either the symbol definitions are missing, or the variable must be set before the task is run. Contact the Cisco Technical Assistance Center.

(\*,\*\*) CTB201 Function <calling function> failed, (<error number>)

The <calling function> argument represents the name of the calling function, and <error number> represents the UNIX error number. The system encountered a failure trying to make a function call. Look up the error number. Contact the Cisco Technical Assistance Center.

\*\* CTB202 Invalid AMADEF format, read <error string>, expected <expected string>

The <error string> argument represents the error string found, and <expected string> represents the string expected. The system encountered a format problem while trying to read the AMADEF file. The AMADEF file needs to be fixed. Contact the Cisco Technical Assistance Center.

\* CTB205 Unsupported field <field name>, conversion not defined

The <field name> argument represents the name of the field that is not supported. The system encountered an AMA field that cannot be processed. Contact the Cisco Technical Assistance Center.

CTB207 Processed <filename>, converted <record number> records, output <output filename>

The <filename> argument represents the name of the processed file, <record number> represents the record number, and <output filename> represents the output filename. The system displays the following process information: name of processed file, number of records converted, and output filename. This is an informational message. No action is necessary.

(\*,\*\*) CTB208 <data type> code <structure code> not found, cannot process record

The <data type> argument represents the data type, and <structure code> represents the structure code. The system is unable to process a record due to missing code and structure code information. Check the AMADEF file. A major alarm is generated if an incomplete, on-going call is rejected by the Correlation Task (COR) because an on-going record was not received within 12 hours (based on the `cdb_creation_time` of the latest data). This record does not have an associated map type. In Release 2.64, this cdr is written out to an error file `ebaf*` stored in the error directory, `/opt/CiscoBAMS/data/error`. Contact the Cisco Technical Assistance Center.

\*\* CTB209 Error <return value> reading file: CALLSTRUCT\_MAP

The <return value> represents the error value returned. The system encountered a format error reading the callstruct file. Check the CALLSTRUCT\_MAP file. Contact the Cisco Technical Assistance Center.

## Message Receive Task Messages

The Message Receive (DRX) task is used by one BAMS unit to receive messages from the other unit in a redundant configuration. During processing, this task writes messages to the syslog with a DRX task identifier (for example, DRX001).

DRX000 Message Receive Task version <version number> has started

The <version number> argument represents the task version number. The system displays the message at the start of the named task. This message is an informational message. No action is necessary.

DRX001 Terminating with signal <signal number>

The <signal number> argument represents the UNIX signal number. The system ends the DRX task and displays a signal number. If an operator stops the system, it terminates with signal 15. Look up the [“Signal Numbers” section on page A-69](#). Contact the Cisco Technical Assistance Center.

DRX002 Terminating with exit value <signal number>

The <signal number> argument represents the UNIX signal number. The system terminates the DRX task and displays a signal number. Look up the [“Signal Numbers” section on page A-69](#). Contact the Cisco Technical Assistance Center.

DRX003 Established connection with remote unit

The system has successfully established a connection with the remote unit. This is an informational message. No action is necessary.

DRX004 Closed connection with remote unit

The system has successfully closed the connection with the remote unit. This is an informational message. No action is necessary.

\*\* DRX005 Cannot wait for connections <error number>

The <error number> argument represents the UNIX error number. The system cannot wait for connection and displays a UNIX error. Look up the error number. Contact the Cisco Technical Assistance Center.

\*\* DRX006 Cannot accept connection <error number>

The <error number> argument represents the UNIX error. The system is unable to accept the connection request and displays a UNIX error. Look up the error number. Contact the Cisco Technical Assistance Center.

\*\* DRX007 Cannot read from connection <error number>

The <error number> argument represents the UNIX error number. The system cannot read from the connection and displays a UNIX error. Look up the error number. Contact the Cisco Technical Assistance Center.

DRX008 Cannot route local message queue; <message queue ID>, <return value>, <error number>

The <message queue ID> argument represents the message queue identifier, <return value> represents the returned value, and <error number> represents the UNIX error number. The system is unable to route the local message to the intended destination and displays a UNIX error. Look up the error number. Use the `ipcs` utility to check the message queue status. Contact the Cisco Technical Assistance Center.

\*\* DRX009 Connection broken <error number>. Will reconnect

The <error number> argument represents the UNIX error number. The system displays an error message regarding a broken connection. Look up the error number. Check if the remote BAMS unit system was stopped by the operator. Contact the Cisco Technical Assistance Center.

## Message Transmit Task Messages

The Message Transmit (DTX) task oversees communication transmissions between BAMS units. During processing, this task writes messages to the syslog with a DTX task identifier (for example, DTX001).

DTX000 Message Transmit Task version <version number> has started

The <version number> argument represents the task version number. The system has started the Message Transmit task. This is an informational message. No action is necessary.

DTX001 Terminating with signal <signal number>

The <signal number> argument represents the UNIX signal. The system is terminating this task and displaying a UNIX signal. Look up the signal number. Check if the system was stopped by the operator if signal number = 15. Contact the Cisco Technical Assistance Center.

DTX002 Terminating with exit value <exit value>

The <exit value> argument represents the UNIX exit value. The system is terminating this task and displaying a UNIX exit value. Contact the Cisco Technical Assistance Center.

DTX003 Established connection with remote unit

The system has established a connection to the remote unit. This is an informational message. No action is necessary.

DTX004 Closed connection with remote unit

The system has closed the connection with the remote unit. This is an informational message. No action is necessary.

DTX005 Could not discard queued messages <returned value> (<error number>)

The <returned value> argument represents the return value, and <error number> represents the UNIX error number. The system is unable to discard queued messages and displays a UNIX error code. Look up the error number. Contact the Cisco Technical Assistance Center.

\*\* DTX006 Connect attempt failed <error number>. Will retry later

The <error number> argument represents the UNIX error number. The system is unable to connect and displays a UNIX error. The system tries to establish the connection again later. Look up the error number. Contact the Cisco Technical Assistance Center.

\*\* DTX007 Failed receiving message <return value> (<error number>)

The <return value> argument represents the returned value, and <error number> represents the UNIX error number. The system is unable to receive a message. Look up the error. Check if the remote BAMS unit is down. Contact the Cisco Technical Assistance Center.

\*\* DTX008 Connection broken <error number>. Will re-connect

The <error number> argument represents the UNIX error number. The system reports an interrupted connection to the remote unit and displays a UNIX error. The system attempts to reconnect to the remote unit. Look up the error number. Check the network connection to the remote BAMS unit. See if the operator stopped the remote BAMS unit or if some other error occurred on that unit. Contact the Cisco Technical Assistance Center.

\*\* DTX009 Cannot write to connection.

The system is unable to transmit information. Contact the Cisco Technical Assistance Center.

\*C DTX010 Could not create message queue <return value> (<error number>).

The <return value> argument represents the returned value, and <error number> represents the UNIX error number. The system is unable to create a message queue. Look up the error number. Use the **ipcs** utility to check the message queue status. Contact the Cisco Technical Assistance Center.

\* DTX011 Connect socket for host <first host name> failed, trying host <second host name>

The <first host name> argument represents the primary host name for the remote BAMS unit, and <second host name> represents the secondary name. The system was unable to connect to the remote BAMS unit using the first host name and is now trying to connect to the unit using the second host name. Check the host names. Check if a network problem exists that prevents connection to the host represented by <first host name>. Contact the Cisco Technical Assistance Center.

## Extendable ASCII Task Messages

The Extendable ASCII (EXT) task generates extendable ASCII data. During processing, this task writes messages to the syslog with an EXT task identifier (for example, EXT001).

EXT000 <task name> version <version> has started pid <process identifier>

The <task name> argument represents the task name, <version> represents the version, and <process identifier> is the UNIX process identifier. This alarm defines what version of the task is running. This is an informational message. No action is required.

EXT001 <task name> terminating with code <return error code>, pid <process id>

The <task name> argument represents the task name, <return error code> represents the error code returned, and <process id> represents the UNIX process identifier. The named task has been terminated abnormally. The code identifies the error encountered by the system. This is an informational message. No action is necessary.

EXT002 <task name> terminating with signal <signal number>, pid <process id>

The <task name> argument represents the task name, <signal number> represents the UNIX signal number, and <process id> is the UNIX process identifier. The named task has been ended by a UNIX signal. This is an informational message. No action is necessary.

EXT003 <task name> terminating normally, pid <process id>

The <task name> argument represents the task name, and <process id> is the UNIX process identifier. The EXT task has terminated normally. This is an informational alarm that appears only in test mode.

EXT004 No file to be processed. Retries in <number> seconds

The <number of seconds> argument represents the number of seconds the system waits before reattempting to process files. The task sleeps for the number of seconds displayed before accessing more files. This is an informational message. No action is necessary.

\* EXT101 File error: <data format type> on <system call> <errno>

The <data format type> argument represents the type of data format, <system call> represents the name of the failed system call or the name of the file being operated on; and <errno> represents the UNIX error number. An error was encountered during a system call operation. Look up the UNIX error number in the listing at the end of this appendix and contact the Cisco Technical Assistance Center.

\*\* EXT200 Environment variable <name> not found

The <name> argument represents the name of the missing environment variable, for example CONFIG\_DIR, FILES\_DIR, dir\_in, dir\_out. The displayed environment variable was not found. The symbol definition file (sym\_defs) is either missing a variable, or the variable must be set before the task is run. Contact the Cisco Technical Assistance Center.

(\*,\*\*) EXT201 Function <name> failed, <errno>

The <name> argument represents the calling function name, and <errno> represents the UNIX error number. This message indicates failure of the displayed function call, that is, Major Events for open\_file, stat (sysParm.CTL), ai\_open ctlfile, minor events for ai\_get\_max\_num\_of\_recs(), ai\_load\_rec(), or ai\_close\_file. Examine the error number. Contact the Cisco Technical Assistance Center.

(\*,\*\*) EXT201 Function <calling function> failed, (<error number>)

The <calling function> represents the calling function, and the <error number> argument represents the UNIX error number. The system encountered a failure trying to make a function call. Examine the system error. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

\*\* EXT202 Invalid AMADEF format, read <error string>, expected <expected string>

The <error string> argument represents the error string found, and <expected string> represents the string that was expected. The system encountered a format problem while trying to read the AMADEF file. The AMADEF file needs to be fixed. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

\* EXT205 Unsupported field <field name>, conversion not defined

The <field name> argument represents the name of the field. The system encountered an AMA field that could not be processed. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

EXT207 Processed <filename>, converted <num recs>, output = <suffix>

The <filename> argument represents the input filename, <num recs> represents the number of records converted, and <suffix> represents the output file suffix. This message displays processing status information. This is an informational message. No action is necessary.

(\*,\*\*) EXT208 <data type> code <structure code> not found, cannot process record

The <data type> argument represents the type of data, and <structure code> represents the structure code or call type. The system is unable to process a record due to missing code and structure code information. Check the AMADEF file. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

\*\* EXT209 Error <return value> reading file: CALLSTRUCT\_MAP

The <return value> argument represents the value returned. The system encountered a format error reading the callstruct file. Check the CALLSTRUCT\_MAP file. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

# Formatter Task Messages

The Formatter (FMT) task formats files. FMT processes the polled raw files from the switch and converts them to an aggregated record format that BAMS uses for all processing tasks. FMT renames the timestamp in the filename to match the timestamp in the raw file header record. During processing, this task writes messages to the syslog with an FMT task identifier (for example, FMT001).

FMT000 <task> version <version number> has started pid <process ID>.

The <task> argument represents the task name, <version number> represents the task version number, and <process ID> represents the UNIX process identifier. This message identifies the version of the task that is running. This is an informational message. No action is necessary.

FMT001 <task> terminating with code <return code>, pid <process ID>.

The <task> argument represents the task name, <return code> identifies the terminating signal number encountered by the system, and <process ID> represents the UNIX process identifier. The named task ended abnormally. The code identifies the error encountered by the system. This is an informational message. No action is necessary.

FMT002 <task> terminating with signal <number>, pid <process ID>.

The <task> argument represents the task name, <number> represents the UNIX signal number, and <process ID> represents the UNIX process identifier. The named task was ended by a UNIX signal.

FMT003 <task> terminating normally, pid <process ID>.

The <task> argument represents the task name, and <process ID> represents the UNIX process identifier. The named task ended normally. This is an informational message. No action is necessary.

FMT004 Processing file <filename>

The <filename> represents the name of the file being processed. The task has started processing the named file. This is an informational message. No action is necessary.

FMT009 Received system signal <signal>

The <signal> argument represents the received signal number. The FMT task received a system signal. This is an informational message. No action is necessary.

FMT010 Processed <filename>, total:<number1> good:<number2> fmterr:<number3>  
syterr:<number4> semerr:<number5> skipcdb

The <filename> argument represents the processed filename, <number1> represents the total number of processed call records, <number2> represents the number of good call records, <number3> represents the number of bad format call records, <number4> represents the number of call records with syntax errors, and <number5> represents the number of call records with semantic errors. This message displays call process summary information. This is an informational message. No action is necessary.

FMT011 Processed <filename>, Skipped CDEs: <number1> Unknown CDEs: <number2>

The <filename> argument represents the processed filename, <number1> represents the number of skipped CDEs, and <number2> represents the number of unknown CDEs. This message indicates the number of CDEs that were skipped or unknown in a processed file. This is an informational message. No action is necessary.

FMT012 Output file <filename>

The <filename> argument represents the processed filename. This message indicates the name of the output file. This is an informational message. No action is necessary.

FMT019 [CDR] No flat files to process. Retry in <number> seconds.

The <number> argument represents the number of seconds. This message indicates that no data exists for processing. The FMT task retries in the displayed number of seconds. This is an informational message. No action is necessary.

FMT020 CDB tag <number>, CDB skipped.

The <number> argument represents the CDB number. This CDB is skipped when the CDB tag is found in the Skip CDB table. This is an informational message. No action is necessary.

FMT021 CDE tag <number>, CDB skipped.

The <number> argument represents the CDE number. This CDE is skipped when the CDE tag is found in the Skip CDE table. This is an informational message. No action is necessary.

FMT024 Creating <name> table

The <name> argument represents the lookup table name (that is, NPANXX table, Rating Exception table, Rating Type table, or Trunk Group table). The named lookup table is created and loaded into memory. This is an informational message. No action is necessary.

FMT025 Refreshing <name> table.

The <name> argument represents the lookup table name. The lookup table is reloaded. This is an informational message. No action is necessary.

\* FMT100 System call failure: <name> (<errno>)

The <name> argument represents the name of a failed system call, and <errno> represents the UNIX error number. This message indicates that the FMT task encountered an error when requesting the displayed system call. Look up the UNIX error number. Contact the Cisco Technical Assistance Center.

\* FMT101 File error: <call> on <file> (<code>)

The <call> argument represents the name of the failed system call, <file> represents the filename, and <code> represents the UNIX error number. This message indicates that the FMT task encountered an error when performing the displayed system call operation. Look up the error number. Contact the Cisco Technical Assistance Center.

\*C FMT102 File I/O error: <call> on <file>, requested <number1>, got <number2>

The <call> argument represents the name of the failed I/O system call, <file> represents the name of the file being operated on, <number1> represents the number of bytes requested, and <number2> represents the number of bytes received. The FMT task encountered an error when performing the displayed I/O file operation. Contact the Cisco Technical Assistance Center.

\* FMT201 Undefined environment variable <name>

The <name> represents the name of the environment variable. This message indicates that the displayed environment variable is not defined. Contact the Cisco Technical Assistance Center.

\* FMT202 Input file does not start with header CDB

This message indicates that the FMT task detected an invalid field value in the call record. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

\* FMT203 Error reading TAG/LEN of TLV errno=<error number>

The <error number> argument represents the UNIX error number. An error occurred during the reading of the TLV (T = Tag field code, L = Length of the field value, V = field Value). The FMT task stops processing this file, renames it as an error file, and begins processing the next input file. Look up the error. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

\* FMT204 Input file is not ended by footer CDB

The system encountered the displayed error. Contact the Cisco Technical Assistance Center.

\* FMT207 #<index> - <name>: <value> too long, <size> expected.

The <index> argument represents the call record index, the <name> argument represents the field name, the <value> argument represents the field value, and the <size> argument represents the expected field size. This message indicates that the field string exceeded the expected size. Contact the Cisco Technical Assistance Center.

\* FMT210 CTL file: <name>:<error>.

The <name> argument represents the control filename, and the <error> argument represents the displayed error string. This message indicates the error returned by a control file function. Contact the Cisco Technical Assistance Center.

\* FMT211 CTL file measurement value error: <value>

The <value> argument represents the incorrect value. This message indicates that the content of the measurement field in the control file is not 0 or 1. Contact the Cisco Technical Assistance Center.

\* FMT212 CTL file lookup value error: <value>

The <value> argument represents the measurement value. This message displays when the value of the measurement field in the control file is not 0 or 1. Check the configuration file using MML and fix the value.

(\*,\*\*) FMT221 Function <function name>() failed, (<error number>)

The <function name> argument represents the calling function name, and <error number> represents the UNIX error number. This message indicates the failure of a function call. See the UNIX error number for more information. Contact the Cisco Technical Assistance Center.

\* FMT222 Invalid TLV len:<length> at <position>th chars, CDB len:<size>

The system read in invalid TLV length. The <length> argument represents the incorrect TLV length, <position> represents the TLV position in the CDB, and <size> represents the size of the CDB. The FMT task stops further processing of the input file and renames the input file by prepending "err\_" to the input filename. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

\* FMT224 Process all CDBs: Error in parsing record.

This message indicates that the FMT task encountered an error during the parsing of this record. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

\* FMT225 Dump\_cde: Unrecognized tag <tag number>

The <tag number> represents the number of the tag. This message indicates that the FMT task encountered an unrecognized tag. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

\* FMT226 Incorrect field length <field value length>.

The <field value length> argument represents the length of the field value. This message indicates that the FMT task encountered an incorrect field length. Verify the Cisco MGC input file. Contact the Cisco Technical Assistance Center.

FMT232 <index> - Fail <function> lookup of <field1>: <value1> and <field2>: <value2>

The <index> argument represents the index of the call record, the <function> argument represents the function name of the table lookup, the <field1> argument represents the first field name in the call record, the <value1> argument represents the first value of the field being looked up, the <field2> argument represents the second field name in the call record, and the <value2> argument represents the second value of the field being looked up. This message indicates that the task failed to look up the indicated fields.

FMT234 #<record index> - Invalid record <field names/values>

The <record index> argument represents the record index, and the <field names/values> argument represents the field names and values. This message is generated if bafoutput (Node Parameters table) is enabled and the FMT task encounters an invalid block format while reading blocks from a control file. The message shows which fields are invalid. Use MML to correct the values.

FMT235 <number> record(s) failed <table> lookup for file <name>

The <number> argument represents the number of records, the <table> argument represents either the Trunk Group table (TRUNKGRP) or the NAILED Connection table (SIGPATH), and the <name> argument represents the filename. This message shows the number of lookup failures per file. To find details of a lookup failure, examine the log file /opt/CiscoBAMS/files/sxx/FMT\_cdr.log and search for FMT [23470] messages.

Correct the appropriate record in the Trunk Group table (TRUNKGRP) or in the Nailed Connection table (SIGPATH).

#### Example:

The following example represents an FMT [23470] message from a /opt/CiscoBAMS/files/sxx/FMT\_cdr.log file.

```
FMT [23470] #1 - Fail Trunk Group lookup of Orig_trk_grp: 1002
```

The example of an FMT\_cdr.log file message includes the following elements:

- [23470]—the process ID of the process on the BAMS node
- #1—the record number
- Orig\_trk\_grp—the Trunk Group parameter
- 1002—the value that failed lookup



**Note** The process ID changes whenever the FMT task restarts.

FMT236 Setting FMT processing prefix to <prefix>

The <prefix> argument represents the file prefix. The FMT task processes files whose prefixes match the file-prefix1 parameter in the Poll table. If this parameter is not populated, the file-prefix2 parameter is used. If both parameters are empty, the default prefix is cdr. Whenever the Poll table is modified, this message displays the value of the file prefix that FMT uses.

## CDR Binary Error Lookup Files

Cisco BAMS generates error lookup (elkup) files when the FMT process encounters lookup failures for a trunk group, NAILED\_CONN (SIGPATH), NPA\_NXX, RATE\_TYPE, or RATE\_EXEC, and cannot perform data conversion. The elkup error files are binary CDR files that are saved in the directory /opt/CiscoBAMS/data/s0x/error on the BAMS server.

For example, the file elkup\_cdr\_20080822155821\_006831.bin in the directory /opt/CiscoBAMS/data/s0x/error indicates that some number of lookups failed for cdr\_20080822155821\_006831.bin. As in the example, for every occurrence, the elkup error file name is formed by the expression elkup\_ as a prefix to the CDR bin file name.

If you login as user “bams,” you can display a translation of the elkup bin file by issuing the command **cdrdump <elkup\_cdr\_bin\_filename>**. The **cdrdump** program is located in the directory /opt/CiscoBAMS/contrib, but can be executed from any directory if the login user is “bams.”

The data displayed in the translated bin file includes an error code that identifies the table for which the lookup failed. [Table A-15](#) maps the error code values to the table lookup types.

**Table A-15 Elkup File Error Code Identification**

| Elkup File Error Code | Error Type                                                                 |
|-----------------------|----------------------------------------------------------------------------|
| 0x000100              | NPA_NXX                                                                    |
| 0x000200              | TRUNKGROUP                                                                 |
| 0x000400              | RATE_TYPE                                                                  |
| 0x000800              | RATE_EXC                                                                   |
| 0x001000              | NAILED_CONN (SIGPATH)                                                      |
| 0x000000              | <b>Note</b> This code indicates that all executed lookups were successful. |

For example, the error code 0x0001200 indicates that the lookup failed for both a NAILED\_CONN (SIGPATH) table and TRUNKGROUP table.

The error code value that appears in the elkup file is derived by adding (using HEX arithmetic) the individual error code values of the failed lookup functions.

Consider the derivation of the error codes in the following two examples.

#### Example 1

1. The error code 0x00001300 results from errors in the NAILED\_CONN (0x1000), TRUNKGRP (0x200), and NPA\_NXX (0x100) lookup tables.

$$0x1000 + 0x200 + 0x100 = 0x00001300$$

#### Example 2

2. The error code 0x00000d00 results from errors in both the NPA\_NXX (0x100), RATE\_TYPE (0x400), and RATE\_EXC (0x800) lookup tables.

$$0x100 + 0x400 + 0x800 = 0x00000d00$$

To correct lookup failures, examine the relevant fields in the elkup file and the BAMS tables as described in the following sections.

## NPANXX Table Errors

The elkup file error code 0x001000 indicates that a NPANXX table lookup failed. To identify the table entries that are missing or that have failed lookup, check the file FMT\_cdr.log in the directory /opt/CiscoBAMS/files/s0x. Specifically, in the FMT\_cdr.log file, search for FMT235 messages, which identify the table for which a number of lookup errors occurred. To find details of a lookup failure, examine the log file /opt/CiscoBAMS/files/sxx/FMT\_cdr.log and search for FMT [23470] messages.

If the BAF output has been turned on, there is a lookup failure of the npanxx of either the called\_number or calling\_number from the elkup record. This npanxx value should be populated in the table NPANXX.

See the section “[Formatter Task Messages](#)” in this appendix.

To display the provisioned NPA\_NXX table entries, issue the MML command **prov-rtrv:NPANXX:**

To reprovision an NPANXX table entry issue the MML command **prov-add**.

See the section “[Updating the NPANXX Table](#)” in Chapter 5.

## Trunk Group Table Errors

The elkup file error code 0x000200 indicates that a TRUNKGROUP table lookup failed. To identify the table entries that are missing or that have failed lookup, check the file FMT\_cdr.log in the directory /opt/CiscoBAMS/files/s0x. Specifically, in the FMT\_cdr.log file, search for FMT235 messages, which identify the table for which a number of lookup errors occurred. To find details of a lookup failure, examine the log file /opt/CiscoBAMS/files/sxx/FMT\_cdr.log and search for FMT [23470] messages.

The following sample display was extracted from a FMT\_cdr.log file. The data confirms a specific trunk group lookup failure.

```
09/05/08 00:09:47 FMT [6890] #9525 - Fail Trunk Group lookup of Orig_trk_grp: 7000
09/05/08 00:09:47 FMT [6890] #9526 - Fail Trunk Group lookup of Orig_trk_grp: 7000
09/05/08 00:09:47 FMT [6890] #9527 - Fail Trunk Group lookup of Orig_trk_grp: 7000
09/05/08 00:09:47 FMT [6890] #9528 - Fail Trunk Group lookup of Orig_trk_grp: 7000
09/05/08 00:09:47 FMT [6890] #9529 - Fail Trunk Group lookup of Orig_trk_grp: 7000
09/05/08 00:09:47 FMT [6890] #9530 - Fail Trunk Group lookup of Orig_trk_grp: 7000
09/05/08 00:09:47 FMT [6890] #9531 - Fail Trunk Group lookup of Orig_trk_grp: 7000
09/05/08 00:09:47 FMT [6890] #9532 - Fail Trunk Group lookup of Orig_trk_grp: 7000
09/05/08 00:09:47 FMT [6890] #9533 - Fail Trunk Group lookup of Orig_trk_grp: 7000
```

For trunk group errors, you should examine the values of `orig_trk_grp`, `term_trk_grp`, and `maint_trk_grp` in the `elkup` record. If any of these are populated, a corresponding entry should be present in the table `TRUNKGRP`. A lookup error indicates that at least one of the fields (`orig`, `term`, or `maint`) failed the `TRUNKGRP` lookup.

See the section [“Formatter Task Messages”](#) in this appendix.

To display the provisioned `TRUNKGRP` table entries, issue the MML command **prov-rtrv:TRUNKGRP:**

To reprovision a `TRUNKGRP` table entry issue the MML command **prov-add.**

See the section [“Updating the Trunk Group Table”](#) in Chapter 5.

## Rating Type Table Errors

The `elkup` file error code `0x000400` indicates that a `RATING-TYPE` table lookup failed. To identify the table entries that are missing or that have failed lookup, check the file `FMT_cdr.log` in the directory `/opt/CiscoBAMS/files/s0x`. Specifically, in the `FMT_cdr.log` file, search for `FMT235` messages, which identify the table for which a number of lookup errors occurred. To find details of a lookup failure, examine the log file `/opt/CiscoBAMS/files/sxx/FMT_cdr.log` and search for `FMT [23470]` messages.

If the `BAF` output is turned on, the field `call_rate_type` is populated from either the table `RATE_TYPE`. If the error was `RATE_TYPE_LOOKUP`, then lookup of the fields `igr_call_zone_id` or `egr_call_zone_id` from the `elkup` record failed in the table `RATE_TYPE`.

See <Cross reference the section [“Formatter Task Messages”](#) in this appendix.

To display the provisioned `RATING-TYPE` table entries, issue the MML command **prov-rtrv:RATING-TYPE:**

To reprovision a `RATING-TYPE` table entry issue the MML command **prov-add.**

See the section [“Updating the Rating Type Table”](#) in Chapter 5.

## Rating Exception Table Errors

The `elkup` file error code `0x000800` indicates that a `RATE-EXC` table lookup failed. To identify the table entries that are missing or that have failed lookup, check the file `FMT_cdr.log` in the directory `/opt/CiscoBAMS/files/s0x`. Specifically, in the `FMT_cdr.log` file, search for `FMT235` messages, which identify the table for which a number of lookup errors occurred. To find details of a lookup failure, examine the log file `/opt/CiscoBAMS/files/sxx/FMT_cdr.log` and search for `FMT [23470]` messages.

In this case, if the `BAF` output has been turned on, the field `call_rate_type` is populated from either the table `RATE_EXC`. If the error was `RATE_EXC_LOOKUP`, then the lookup of the `npanxx` of either the `called_number` or `calling_number` from the `elkup` record failed in the table `RATE_EXC`.

See the [“Formatter Task Messages”](#) section on page A-42.

To display the provisioned `RATE-EXC` table entries, issue the MML command **prov-rtrv:RATE-EXC:**

To reprovision a `RATE-EXC` table entry issue the MML command **prov-add.**

See the [“Updating the Rating Exception Table”](#) section on page 5-19.

## Nailed Connection Table Errors

The elkup file error code 0x000800 indicates that a SIGPATH table lookup failed. To identify the table entries that are missing or that have failed lookup, check the file FMT\_cdr.log in the directory /opt/CiscoBAMS/files/s0x. Specifically, in the FMT\_cdr.log file, search for FMT235 messages, which identify the table for which a number of lookup errors occurred. To find details of a lookup failure, examine the log file /opt/CiscoBAMS/files/sxx/FMT\_cdr.log and search for FMT [23470] messages.

If the BAMS system is in the nailed configuration mode, you should examine the values of igr\_sigpath\_id, egr\_sigpath\_id, and maint\_sigpath\_id in the elkup record. If any of these are populated, a corresponding entry should be present in the table NAILED\_CONN. A lookup error indicates that at least one of the fields (igr, egr, or maint) failed the NAILED\_CONN lookup.

See the “[Formatter Task Messages](#)” section on page A-42.

To display the provisioned SIGPATH table entries, issue the MML command **prov-rtrv:SIGPATH:**

To reprovision a SIGPATH table entry issue the MML command **prov-add: sigpath.**

See the “[Updating the Nailed Connection Table](#)” section on page 5-21.

## Booting Into Single User Mode Errors

When booting into single user mode using jumpstart\_0910\_sparc.iso, you may see the following error:

```
format
Searching for disks...WARNING: /pci@0/pci@0/pci@2/scsi@0/sd@0,0 (sd0):
 Corrupt label - bad geometry

 Label says 585925000 blocks; Drive says 585805824 blocks
WARNING: /pci@0/pci@0/pci@2/scsi@0/sd@0,0 (sd0):
 Corrupt label - bad geometry

 Label says 585925000 blocks; Drive says 585805824 blocks
done

c1t0d0: configured with capacity of 278.99GB
You can do following steps to fix this error
```

- 
- Step 1** Boot into single user mode with the 09/10 sparc OEM disk from oracle.
  - Step 2** Label the volume and click O.K. button to reboot and install from jumpstart\_0910\_sparc\_T5120\_sata.iso successfully
- 

## Man-Machine Language Messages

The Man-Machine Language (MML) task supports the command-line interface. This task also displays syntax error messages if the operator makes a mistake entering a command. The syntax error messages in the following paragraphs are generally not written to the syslog file.

\* MML600 Missed ';' in MML\_REC\_MAP file, line number <#>

The <#> argument indicates which line has a problem. The system encountered a syntax error in the record map file found in the opt/CiscoBAMS/files directory. Each line in the record map file has a maximum of 3 semicolon-separated fields. Use vi to look at the file and insert the semicolon field separator, if it is missing. Contact the Cisco Technical Assistance Center

\* MML601 Open control file <name> failed

The <name> argument represents the name of the control file that the MML task could not open. The system was unable to open the displayed control file. Verify that the specified control file exists in the opt/CiscoBAMS/files directory, and that the group permissions (775) and ownership (bams) are properly set up. Contact the Cisco Technical Assistance Center.

\* MML603 Load record <number> failed

The <number> argument represents the record number. The system was unable to load the displayed record. Contact the Cisco Technical Assistance Center.

\* MML604 Set field <name> failed for record <number>

The <name> argument represents the field name that the MML task could not set, and <number> represents the call record number. The system was unable to set a field name for the displayed record. Contact the Cisco Technical Assistance Center.

\* MML605 Update record <number> failed

The <number> argument represents the number of the record that the MML task was unable to update. The system was unable to update the displayed record. Contact the Cisco Technical Assistance Center.

\* MML606 Close control file <name> failed

The <name> argument represents the name of the control file that the MML task was unable to close. The system was unable to close the displayed control file. Contact the Cisco Technical Assistance Center.

(\*,\*\*,\*C) MML608 Get number of keys failed

The system was unable to get the number of keys. Contact the Cisco Technical Assistance Center.

(\*,\*\*, \*C) MML609 Missing row number or key field  
The system encountered a missing row number or key field. Contact the Cisco Technical Assistance Center.

(\*,\*\*, \*C) MML610 Get number of fields failed  
The system experienced the displayed failure. Contact the Cisco Technical Assistance Center.

(\*,\*\*, \*C) MML611 Get field names failed  
The system experienced the displayed failure. Contact the Cisco Technical Assistance Center.

\* MML612 Get field names error, NULL field name encountered  
The system experienced the displayed failure. Contact the Cisco Technical Assistance Center.

\* MML613 Get fields <name> failed for record <number>  
The <name> argument represents the name of the field that the MML task was unable to get, and <number> represents the record number. The system was unable to get the displayed fields for the displayed record. Contact the Cisco Technical Assistance Center.

\*\* MML614 Error finding type for field <name>. May have problem with CFDT file.  
The <name> argument represents the field name. This message indicates an error encountered in finding the displayed field name type. There might be a problem in the configuration file. Contact the Cisco Technical Assistance Center.

(\*,\*\*, \*C) MML615 Get key names failed  
The system experienced the displayed failure. Contact the Cisco Technical Assistance Center.

(\*,\*\*, \*C) MML616 Get max number of records failed  
The system experienced the displayed failure. Contact the Cisco Technical Assistance Center.

(\*,\*\*, \*C) MML617 Max number of records should be greater than 0  
The system experienced the displayed failure. Contact the Cisco Technical Assistance Center.

\*C MML618 Dir <destination directory> could not be created.  
The <destination directory> variable represents the destination directory name. The system was unable to create a destination directory. Contact the Cisco Technical Assistance Center.

\* MML619 System call <name> failed. errno=<error number>  
The <name> argument represents the name of the failed system call, and <error number> represents the UNIX error number. A system call failed. Look up the error number. Contact the Cisco Technical Assistance Center.

MML621 Successful prov-dply from <source directory>.  
The <source directory> argument represents the file location specified with the **prov-dply** command. This is an informational message. No action is necessary.

(\*, \*\*, \*C) MML622 File <number> could not be opened for <filename>.  
The <number> argument represents the record number, and <filename> represents the control filename. The file might not exist or might have become corrupt. Check the file. Contact the Cisco Technical Assistance Center for further assistance.

MML623 Read record <number> failed for control <file>.  
The <number> argument represents the record number, and <filename> represents the control filename. The control file might be in use. Try again in a few minutes. Contact the Cisco Technical Assistance Center for further assistance.

# Mass Storage Control Task Messages

The Mass Storage Control (MSC) task monitors and conserves disk space on the BAMS units. It generates alarms when disk occupancy passes user-defined thresholds based on file prefixes found in specified data directories, and deletes files to free disk space.

Polled files are files that have been polled by a polling computer. Unpolled files are files that have not been polled yet. The MSC task can be set up to delete polled files when the percentage of disk space occupied by these files exceeds the user-defined thresholds. For example, if the polled upper threshold is set at 80 percent of disk occupancy and the lower polled threshold is set at 60 percent, the MSC task begins deleting polled files from oldest to newest when the total polled file size exceeds the 80 percent upper threshold. It stops deleting these files when it falls below the lower threshold. The unpolled threshold value is usually set high, for example, 90 percent, to avoid losing unpolled data. An alarm is generated to alert the user that the disk is filling up.

During processing, this task writes messages to the syslog with an MSC task identifier (for example, MSC001).

MSC001 MSC version <version> cleaning disk

The <version> argument represents the version number of the MSC task. The MSC task periodically deletes user-specified files from the disk at user-defined intervals so that the disk does not fill up and cause system failure. This message indicates that the MSC task is currently working. This is an informational message. No action is necessary.

\* MSC003 <string1> error <UNIX error number> on <string2>

The <string1> argument represents the path or full filename and statistics. The <UNIX error number> argument represents the UNIX error set by the system function. The <string2> argument represents the path, or full filename, and statistics. This message indicates that an error occurred while the MSC task was searching for files to set up for deletion. An informational message is recorded in the system log file if the MSC task cannot obtain information on the file. A minor event is recorded if an error occurs while the MSC task attempts to retrieve information on the number of inodes, free disk space, and other similar information.

Check the UNIX error number to determine the reason for the error. Log in to BAMS and source the `sym_defs` file. Use the **make nodes** and **make home** commands, restart BAMS, and monitor the system log file to see if the error persists. If it does, restart BAMS to clear system resources.

\* MSC006 Error <UNIX error number> opening <file>

The <UNIX error number> argument represents the UNIX error set by the system function. The <file> argument represents the filename. This message indicates that an error occurred while BAMS was attempting to locate a file within the subdirectories of the `/CiscoBAMS/data` directory.

Check the UNIX error number to determine the reason for the error. Verify that the `msct.parm` file exists and that the permissions are correct. Contact the Cisco Technical Assistance Center.

\* MSC007 Invalid parameter file

This message indicates that the parameter file for the MSC task has a problem. The file might be corrupted or it might have an invalid parameter that was saved during MSC maintenance.

Verify that the `msct.parm` file exists and that the permissions are correct. Verify the information in the file. Contact the Cisco Technical Assistance Center.

MSC008 Maximum number of files exceeded

This message indicates that the MSC task attempted to clean up the disk by deleting files specified by the data storage attributes and has found that there are too many files on the disk. This is an informational message. No action is necessary.

Log in to BAMS and check disk usage. Delete data files from BAMS manually. The data storage attributes might not be set correctly; check them to ensure that this situation does not recur.

MSC009 Error <UNIX error number> opening DISK\_STATS file

The <UNIX error number> argument represents the UNIX error set by the system function. This message indicates that BAMS tried to open the DISK\_STATS file and encountered the specified UNIX error. The DISK\_STATS file shows the amount of disk space currently being used on BAMS.

Log in to BAMS and use the **ls** command (**ls DISK\_STATS**) to check if the DISK\_STATS file is on the disk.

\* MSC010 Undefined environment variable: <variable>

The <variable> argument represents the undefined variable. This message indicates that the MSC task encountered an error while attempting to run the housekeeping utility for deleting older data files. The data storage utility verifies that the path for the data directory is defined and can get the specific attributes from the msct.parm file.

Verify that the /CiscoBAMS/data directory is defined in the sym\_defs file (located in the /CiscoBAMS/bin directory). Verify that the filenames set in the deletion list are correct (they are case-sensitive).

\* MSC012 Cannot convert regular expression <reg>

The <reg> argument represents the regular expression. This message indicates that BAMS could not recognize the displayed regular expression attribute. Verify the expression used on the MSC menu through the user interface. Contact the Cisco Technical Assistance Center.

\* MSC014 regBAMS() returned NULL for pattern <reg>

The <reg> argument represents the regular expression. This message indicates that BAMS provided a null value in place of the displayed regular expression. Verify the expression used on the MSC menu through the user interface.

(\*,\*\*,\*C) MSC015 <file> is <number> days old, exceeded <max number> day limit

The <file> argument represents the name of the file. The <number> argument represents the number of days that the file has resided on the system, and the <max number> argument represents the user-defined file aging limit. The file aging limit (0 to 99 days) is set with the agealarm parameter in MSC-PARMS. This message indicates that BAMS has identified the displayed file as being too old to remain on the system. Contact the Cisco Technical Assistance Center.

(\*,\*\*,\*C) MSC016 <file> is <number> days old, exceeded <max number> day limit DELETED.

The <file> argument represents the name of the file. The <number> argument represents the number of days that the file has resided on the system and the <max number> argument represents the user-defined deletion age. The file deletion age (0 to 99 days) is set with the delage parameter in MSC-PARMS. This message indicates that BAMS has identified the displayed file as being too old to remain on the system and has deleted the file. Contact the Cisco Technical Assistance Center.

(\*,\*\*,\*C) MSC017 Disk block utilization <number> percent.

The <number> argument represents the number of blocks as a user-defined percentage of the disk block utilization. This minor, major, or critical alarm level is set with the mil, mal, or crl parameter in the MSC Thresholds table. This message identifies the number of blocks used in the file system. The alarm level depends on the percentage of disk block usage. No action is necessary, unless there is a very high percentage of disk block usage. In that case, contact the Cisco Technical Assistance Center.

(\*,\*\*,\*C) MSC018 Disk inode utilization <number> percent

The <number> argument represents the number of inodes as a percentage of the total number of inodes. This inode upper threshold is set with the iut parameter in the MSC Thresholds table. This message identifies the number of blocks used in the file system. The alarm level depends on the percentage of inode usage. No action is necessary, unless there is a very high percentage of inode usage. In that case, contact the Cisco Technical Assistance Center.

MSC019 MSC waiting <number> minutes before starting.

The <number> argument represents the number of minutes the task will wait before starting. This is set with the interval parameter in the MSC Thresholds table. The task waits the displayed number of minutes before starting. This is an informational message. No action is necessary.

\* MSC020 Access error trying to access <directory path>

The <directory path> argument represents the directory path. Search permission has been denied on a component of the path prefix. Verify the directory path and try again. Contact the Cisco Technical Assistance Center.

\* MSC021 Not a valid directory <directory path>

The <directory path> argument represents the directory path that is not valid. A component of the path prefix of <directory path> is not a directory. Verify the directory path and try again. Contact the Cisco Technical Assistance Center.

\* MSC022 The directory does not exist <directory path>

The <directory path> argument represents the missing directory or file. Either a component of the path prefix or the file referred to by path does not exist. Verify the directory path and try again. Contact the Cisco Technical Assistance Center.

\*C MSC030 Data Disk block utilization <number> percent

The <number> argument represents the threshold value as a percentage of disk utilization. This critical alarm level is set with the `crl` parameter in the MSC Thresholds table. This message reports on disk usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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\*\* MSC031 Data Disk block utilization <number> percent

The <number> argument represents the threshold value as a percentage of disk utilization. This major alarm level is set by the `mal` parameter in the MSC Thresholds table. This message reports on disk usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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\* MSC032 Data Disk block utilization <number> percent

The <number> argument represents the threshold value as a percentage of disk utilization. This minor alarm level is set with the `mil` parameter in the MSC Thresholds table. This message reports on disk usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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\*C MSC040 Data Disk inode utilization <number> percent

The <number> argument represents the threshold value as a percentage of disk inode utilization. This critical alarm level is set with the `crl` parameter in the MSC Thresholds table. This message reports on disk inode usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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\*\* MSC041 Data Disk inode utilization <number> percent

The <number> argument represents the threshold value as a percentage of disk inode utilization. This major alarm level is set with the `mal` parameter in the MSC Thresholds table. This message reports on disk inode usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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\* MSC042 Data Disk inode utilization <number> percent

The <number> argument represents the threshold value as a percentage of disk inode utilization. This minor alarm level is set with the mil parameter in the MSC Thresholds table. This message reports on disk inode usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



**Note** This alarm is cleared after the error alarm condition is removed.

\*, \*\*, \*C MSC044 <filename> is <number of days> days old, exceeded <number> day limit, DELETED

The <filename> argument represents the full name of the file, <number of days> represents the number of days the file has aged, and <number> represents the aging limit in days. This message indicates that the displayed file age has exceeded the aging limit, as set in the MSC Thresholds table, and the file has been deleted.

\*, \*\*, C MSC045 <filename> is <number of days> old, exceeded <number> day warning age

The <filename> argument represents the full name of the file, <number of days> represents the number of days the file has aged, and <number> represents the aging limit in days. This message indicates that the displayed file age has exceeded the warning limit defined in the MSC Thresholds table.

\*, \*\*, \*C MSC046 Disk block utilization: <number> percent, <filename> DELETED

The <filename> argument represents the full name of the file, and <number> represents the disk block utilization as a percentage of the total available disk space. This message indicates that the displayed file was deleted because the disk usage exceeded the block threshold defined in the MSC Thresholds table.

\*, \*\*, \*C MSC047 Disk inode utilization: <number> percent, <filename> DELETED

The <filename> argument represents the full name of the file, and <number> represents the inode utilization as a percentage of the total available inodes. This message indicates that the displayed file was deleted because the inode usage exceeded the inode threshold, as set with the iut parameter in the MSC Thresholds table.

\*, \*\*, \*C MSC048 Total inodes: <number> exceeded <maxnumber> inode limit, <filename> DELETED

The <filename> argument represents the full name of the file, and <number> represents the inode utilization as a percentage of the total available inodes, <maxnumber>. This message indicates that the displayed file was deleted because the inode usage exceeded the inode limit, as set with the iut parameter in the MSC Thresholds table.

\*, \*\*, \*C MSC049 Disk block utilization: <number> percent in partition, <partition>

The <partition> argument represents the partition name, and <number> represents the disk block utilization as a percentage of the available partition disk space. This message indicates that the partition thresholds, as defined in the MSC Thresholds table, were exceeded.

MSC100 Update MSC task parameters

The parameters in the MSC configuration file have been updated and saved to disk. Someone has logged on as an administrative user and has modified the MSC parameters. Administrative users have access to all of the operator-level features, and they can modify system parameters and disk files. This is an informational message. No action is necessary.

\* MSC101 Error <UNIX error number> running script: <name>

The <UNIX error number> argument represents the UNIX error set by the system function. The <name> argument represents the script name. This message indicates that the MSC task experienced an error while running the displayed script from the command line. Look up the error number. Contact the Cisco Technical Assistance Center.

\*C MSC130 Archive Disk block utilization <number> percent

The <number> argument represents the threshold value as a percentage of disk utilization. This critical alarm level is set with the crl parameter in the MSC Thresholds table. This message reports on disk usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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\*\* MSC131 Dir Entry 1: Archive Disk block utilization <number> percent  
The <number> argument represents the threshold value as a percentage of disk utilization. “Dir Entry 1:” refers to the archive disk partition. This major alarm level is set with the mal parameter in the MSC Thresholds table. This message reports on disk usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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\* MSC132 Dir Entry 1: Archive Disk block utilization <number> percent  
The <number> argument represents the threshold value as a percentage of disk utilization. “Dir Entry 1:” refers to the archive disk partition. This minor alarm level is set with the mil parameter in the MSC Thresholds table. This message reports on disk usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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\*C MSC140 Dir Entry 1: Archive Disk inode utilization <number> percent  
The <number> argument represents the threshold value as a percentage of disk inode utilization. “Dir Entry 1:” refers to the archive disk partition. This critical alarm level is set with the crl parameter in the MSC Thresholds table. This message reports on disk inode usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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\*\* MSC141 Dir Entry 1: Archive Disk inode utilization <number> percent  
The <number> argument represents the threshold value as a percentage of disk inode utilization. “Dir Entry 1:” refers to the archive disk partition. This major alarm level is set with the mal parameter in the MSC Thresholds table. This message reports on disk inode usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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\* MSC142 Dir Entry 1: Archive Disk inode utilization <number> percent  
The <number> argument represents the threshold value as a percentage of disk inode utilization. “Dir Entry 1:” refers to the archive disk partition. This minor alarm level is set with the mil parameter in the MSC Thresholds table. This message reports on disk inode usage when thresholds are exceeded. Contact the Cisco Technical Assistance Center.



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**Note** This alarm is cleared after the error alarm condition is removed.

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# NIC Conversion Task Messages

The NIC task outputs NICS format billing records. During processing, this task writes messages to the syslog with a NIC task identifier (for example, NIC001).

NIC000 <task name> version <version> has started pid <process identifier>

The <task name> argument represents the task name, <version> represents the version, and <process identifier> is the UNIX process identifier. This alarm defines what version of the task is running. This is an informational message. No action is required.

NIC001 <task name> terminating with code <return error code>, pid <process id>

The <task name> argument represents the task name, <return error code> represents the error code returned, and <process id> represents the UNIX process identifier. The named task has been terminated abnormally. The code identifies the error encountered by the system. This is an informational message. No action is necessary.

NIC002 <task name> terminating with signal <signal number>, pid <process id>

The <task name> argument represents the task name, <signal number> represents the UNIX signal number, and <process id> is the UNIX process identifier. The named task has been ended by a UNIX signal. This is an informational message. No action is necessary.

NIC003 <task name> terminating normally, pid <process id>

The <task name> argument represents the task name, and <process id> is the UNIX process identifier. The NIC task has terminated normally. This is an informational alarm that appears only in test mode.

NIC004 No file to be processed. Retries in <number> seconds

The <number> argument represents the number of seconds the system waits before reattempting to process files. The task sleeps for the number of seconds displayed before accessing more files. This is an informational message. No action is necessary.

\* NIC101 File error: <data format type> on <system call> <errno>

The <data format type> represents the type of data format; <system call> represents the name of the failed system call or the name of the file being operated on; and <errno> represents the UNIX error number. An error was encountered during the performance of a system call operation. Look up the UNIX error number in the listing at the end of this appendix and contact the Cisco Technical Assistance Center.

\* NIC102 Cannot attach to shared memory, errno <errno>

The <errno> argument represents the UNIX error number. The attach-to-shared-memory operation failed. Look up the UNIX error number in the listing at the end of this appendix and contact the Cisco Technical Assistance Center.

\*\* NIC200 Environment variable <name> not found

The <name> argument represents the name of the missing environment variable, for example CONFIG\_DIR, FILES\_DIR, dir\_in, or dir\_out. The displayed environment variable was not found. The symbol definition file (sym\_defs) is missing a variable, or the variable must be set before the task is run. Contact the Cisco Technical Assistance Center.

(\*,\*\*) NIC201 Function <name> failed, <errno>

The <name> argument represents the calling function name, and <errno> represents the UNIX error number. This message indicates failure of the displayed function call, that is, Major Events for open\_file, stat (sysParm.CTL), ai\_open ctlfile, minor events for ai\_get\_max\_num\_of\_recs(), ai\_load\_rec(), or ai\_close\_file. Examine the error number. Contact the Cisco Technical Assistance Center.

(\*,\*\*) NIC201 Function <calling function> failed, (<error number>)

The <calling function> represents the calling function, and the <error number> argument represents the UNIX error number. The system encountered a failure trying to make a function call. Examine the system error. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

\*\* NIC202 Invalid AMADEF format, read <error string>, expected <expected string>

The <error string> argument represents the error string found, and the <expected string> argument represents the string that was expected. The system encountered a format problem while trying to read the AMADEF file. The AMADEF file needs to be fixed. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

\* NIC205 Unsupported field <field name>, conversion not defined

The <field name> argument represents the name of the field. The system encountered an AMA field that cannot be processed. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

NIC207 Processed <filename>, converted <num recs>, output = <suffix>

The <filename> argument represents the input filename, <num recs> represents the number of records converted, and <suffix> represents the output file suffix. This message displays processing status information. This is an informational message. No action is necessary.

(\*,\*\*) NIC208 <data type> code <structure code> not found, cannot process record

The <data type> argument represents the type of data and <structure code> represents the structure code or call type. The system is unable to process a record due to missing code and structure code information. Check the AMADEF file. Contact the Cisco Technical Assistance Center for help in checking the system configuration and making any necessary modifications.

\* NIC209 Switch name not available in data, set switch name to NULL

The switch name is not available in the data records. The switch name is used to create the NIC output file, so this field is missing (set to NULL) in the file name. Check the data configuration on the switch.

\* NIC210 Remote RSN: <seqno1>, local RSN: <seqno2>, setting local value to remote value

The <seqno1> argument represents the remote NICS record sequence number (RSN), and <seqno2> represents the local NICS record sequence number. The RSN value of the remote BAMS unit was greater than the local unit. The system is setting the local value to remote. There is a chance that the RSN values for the NICS files from the two BAMS units do not match. If there has been a rotation of the polling of the NICS files from the BAMS units in the past day, there may be a gap or duplication of the RSN values of the NICS records.

\* NIC211 Remote RSN file <name> not received from remote BAMS

The <name> argument represents the filename of the remote RSN file. The remote RSN file was not received from the remote BAMS unit. The NIC task will wait 1 hour for this file. The RSN synchronization will be performed again at midnight (GMT) of the next day. There is a chance that the RSN values for the NICS files from the two BAMS units do not match. If there has been a rotation of the polling of the NICS files from the BAMS units in the past day, there may be a gap or duplication of the RSN values of the NICS records.

\* NIC212 RSN sync files are different. Cannot sync RSN values. Local:<name1>, remote:<name2>

The <name1> argument represents the filename of the first file of the day of the local machine, and <name2> represents the filename of the first file of the day of the remote machine. The NIC task will synchronize the NICS record sequence numbers for the first file of each day. If these files are not the same, the RSN synchronization will be aborted. The RSN synchronization will be performed again at midnight (GMT) of the next day. There is a chance that the RSN values for the NICS files from the two BAMS units do not match. If there has been a rotation of the polling of the NICS files from the BAMS units in the past day, there may be a gap or duplication of the RSN values of the NICS records.

NIC213 File <name> not found. Resetting RSN to 1

The <name> arguments represents the name of the file (that is, a NICS RSN sequence number file - NICS\_RSN). The RSN seqno file was not found. The system reset the RSN to 1.

NIC214 NIC program waiting up to 1 hour for record sequence number (RSN) sync file from remote BAMS: <path>

The <path> argument represents the pathname of the remote RSN file. The NIC task is looking for the remote RSN file to synchronize the RSN values.

NIC215 RSN sync aborted. Remote BAMS is detected down

The RSN synchronization will be attempted again at midnight (GMT) of the next day. Check the remote BAMS unit to see why it is detected down.

## Node Name Link Task Messages

The Node Name Link (NNL) task synchronizes MML commands to the remote BAMS unit. During processing, this task writes messages to the syslog with an NNL task identifier (for example, NNL001).

NNL101 NNL version 1.01 has started pid <pid>

The <pid> argument represents the process identifier. The NNL task has been started. This is an informational message. No action is necessary.

NNL102 NNL terminating with signal <signal number>

The <signal number> argument represents the UNIX signal number. The NNL task is stopping. This is an informational message. No action is necessary.

NNL500 Node <number>: changing nodename <oldname> to <newname>

The <number> argument represents the node number. The <oldname> and <newname> arguments represent the old node name and the new node name, respectively. The node name has been modified through the MML command **set-nodename**. The node name on the local unit has been changed by the MML command. The node name on the remote unit is synchronized by the NNL task. This is an informational message. No action is necessary.

NNL514 Generate alarm <alarm ID> for node <node number>. Level = <alarm level>

An alarm was generated from the user interface (mml) of the remote BAMS units. The NNL task generates the same alarm on the local BAMS unit.

## Redundant Unit Polling Task Messages

The Redundant Unit Polling (POL) task collects data from the Cisco MGCs. During processing, this task writes messages to the syslog with a POL task identifier (for example, POL001).

POL000 Entering <name>()

The <name> argument represents the function name. The named function has been entered. This is an informational message. No action is necessary.

POL001 Leaving <name>()

The <name> argument represents the function name. The named function has been left. This is an informational message. No action is necessary.

POL002 Assertion failed in <name>, line <number>

The <name> argument represents the function name and the <number> argument represents the line number. An assertion failed in the named function. This is an informational message. No action is necessary.

POL100 POL Version <version number> for site <site number> has started

The <version number> argument represents the software or task version, and <site number> represents the polling site number. The POL task has been started. This is an informational message. No action is necessary.

POL104 Polling VSC unit <MGC node name>

The <MGC node name> argument represents the name of the Cisco MGC. The POL task has started to poll the named Cisco MGC unit. This is an informational message. No action is necessary.

\*POL105 Polling unit rotates from unit <from unit number> to <to unit number> successfully  
The <from unit number> argument represents the number of the unit that was actively polling before the polling unit rotation and the <to unit number> argument represents the number of the unit that was the standby unit before the polling unit rotation. The unit responsible for polling has rotated as displayed.

POL107 File <filename> received from unit <from unit number> successfully  
The <filename> argument represents the name of the file that was successfully received from the polling unit and the <from unit number> represents the remote polling unit number. The POL task has received a file as displayed. This is an informational message. No action is necessary.

POL108 Retry #<retry times> will start in <number>  
The <retry times> argument represents the number of times the task has retried to poll the site, and the <number> argument represents the number of seconds the task waits before attempting to poll the site again. The POL task retries to poll the data. This is an informational message. No action is necessary.

POL109 Successfully polled <filename> with size <file size>  
The <filename> argument represents the name of the file that was successfully polled and the <file size> argument represents the size of the polled file. The POL task has polled the named file. This is an informational message. No action is necessary.

POL110 Cannot update CTLFILE from polling unit to standby unit  
The task performed an illegal operation in attempting to update the control file. Check the task permissions and times. The control file is locked if either unit is actively polling, and it can be modified only when both units are at rest.

POL111 This is standby unit  
The identified unit is not the current polling unit. This is an informational message. No action is necessary.

POL112 Polling VSC host <host name1> failed, trying host <host name2>  
The <host name1> argument represents the name of the first Cisco MGC host line polled and the <host name2> argument represents the name of the Cisco MGC host for the second Ethernet card. The system's attempt to poll the first Cisco MGC host failed, and it is now trying to poll the Cisco MGC host for the second Ethernet card. This is an informational message. No action is necessary.

\* POL113 Node is inactive, session terminated  
Polling has been disabled. This minor message occurs once when a node is provisioned from the active state to the inactive state with the activate parameter in the Node Parameters table. Once this alarm is set, it is not cleared until the node is once again activated or the user clears it. Investigate to make sure that node de-activation was intentional because switch files will no longer be polled for this node. Clear the alarm through the mml command **clr-alm**. If polling should not have been deactivated, then set the activate parameter in the Node Parameters table to ENABLE (1), and the alarm will be cleared automatically.

POL114 Rename operation failed for file <filename> on polled unit <unit number>  
The <filename> argument represents the file that could not be renamed and the <unit number> argument represents the polled unit number. After a successful poll of a file from the VSC, BAMS was not able to rename the file with a \*.finished suffix. Check the polling directory on the VSC units to make sure the login user for the VSC has sufficient permissions to delete and rename files within this directory. The POL task does not reattempt to rename or delete files after they have already been successfully polled, so you must manually rename or delete these files on the VSC machines.

\*\* POL115 Rename operation failed on polled unit <unit number>, this alarm must be manually cleared

The <unit number> argument represents the polled unit number. This major alarm is generated the first time that a file rename operation fails. It is not generated again until this alarm has been manually cleared by the operator and the rename operation fails again. Check the polling directory on the VSC units to make sure the login user for the VSC has sufficient permissions to delete and rename files within this directory. The POL task does not reattempt to rename or delete files after they have already been successfully polled, so you must manually rename or delete these files on the VSC machines. This alarm must be manually cleared through use of the MML command **clr-alm**.

POL116 Search unit <unit number> for files matching <file pattern>

The <unit number> argument represents the BAMS unit number, and the <file pattern> argument represents the polled file pattern. On the *active* polling unit, this message is displayed for each polling session. This message indicates the unit number of the polled unit. Also shown is the file pattern of the polled file, consisting of the file-prefix, start sequence number, and file-suffix parameters. No action is necessary.

POL201 POL session ended normally

The poll session ended. This is an informational message. No action is necessary.

POL202 POL session from BAMS unit <unit number> starts

The <unit number> argument represents the BAMS unit number. The poll session has started. This is an informational message. No action is necessary.

\* POL203 chgno executed, unit: <unitno> old: <seqno> new: <seqno>

The <unit no> represents the unit number of the BAMS unit, <seqno> represents the old sequence number, and the second <seqno> represents the new sequence number. The sequence number has changed. This is recorded as a minor event for audit purposes only.

\* POL204 chgno cannot execute, POL record is in use

The sequence number cannot be changed, because the control file is in use. Try again later.

\* POL300 Environment variable <environment variable name> is undefined

The <environment variable name> argument represents the name of the environment variable. The named environment variable is not defined. Contact the Cisco Technical Assistance Center.

\* POL302 regcmp returned NULL for pattern <pattern>

The <pattern> argument represents the polling pattern. This message indicates that an error occurred in a regular expression comparison and that the file pattern does not match. Verify the polling parameters and file prefix and suffix values. Contact the Cisco Technical Assistance Center.

\* POL305 Invalid operation: <operation number>

The <operation number> argument represents the invalid operation. The system was unable to perform the specified FTP or SFTP operation; it is not valid. Contact the Cisco Technical Assistance Center.

\* POL306 Cannot open <filename>

The <filename> argument represents the name of the file that cannot be opened. The system is unable to open the named file. This message indicates that the polling task cannot open the named file on the BAMS unit. Check the directory permissions and file ownership. Contact the Cisco Technical Assistance Center.

\* POL307 Poll failed for <filename>

The <filename> argument represents the name of the file that could not be polled. The system was unable to poll the named file. Manually test whether FTP is working. Create a test file on the Cisco MGC and manually FTP or SFTP it to the BAMS unit. This message might indicate a Cisco MGC or network problem. Contact the Cisco Technical Assistance Center.

\* POL308 Cannot get file status of <filename>

The <filename> argument represents the name of the file. The system was unable to obtain a file status for the named file. Check if the named file exists on the local BAMS unit. Check the file, directory, and ownership permissions. Contact the Cisco Technical Assistance Center.

\* POL309 File size incorrect for polling <filename>

The <filename> argument represents the name of the file to be polled. The polling file size is not correct. The polling task compares the size of the named file with what is expected from the Cisco MGC. Check whether a test file can be transferred by FTP or SFTP to the BAMS unit from the Cisco MGC. If the file size is different, a network problem is indicated. Contact the Cisco Technical Assistance Center.

\* POL312 Failed updating control record file

The POL task was unable to update the control record file. This message indicates that the control file is locked. Use the **who** command to check if another user is logged in and might have opened the control file. Check the MML command history in the MML daily log file. Contact the Cisco Technical Assistance Center.

\* POL321 Cannot open directory file <directory name>

The <directory name> represents the name of the directory. The POL task cannot open the directory. If the problem persists, contact the Cisco Technical Assistance Center.

\* POL322 Parent process: system() call \`<command name>` failed, errno=<error number>

The <command name> argument represents the name of the command on which the system call failed, and the <error number> argument represents the UNIX error number. The parent POL task displays an error code for a failed system call. Look up the UNIX error. Contact the Cisco Technical Assistance Center.

\* POL323 Child process: system() call \`<command name>` failed, errno=<error number>

The <command name> argument represents the name of the command on which the system call failed, and the <error number> argument represents the UNIX error number. The child POL task displays an error code for a failed system call. Look up the UNIX error. Contact the Cisco Technical Assistance Center.

\* POL325 fork() failed

The system reports a fork failure for the named site. This message indicates the task cannot create a child process. Restart the application. If the problem persists, contact the Cisco Technical Assistance Center.

\* POL326 Login failed for VSC unit <MGC node name>, please check ID/passwd

The <MGC node name> argument represents the MGC node name. The login has failed for the Cisco MGC unit. Check the user ID and password. Contact the Cisco Technical Assistance Center.

\* POL327 Login failed for VSC unit <MGC node name>, please check ID/passwd

The <MGC node name> argument represents the name of the Cisco MGC node. The system was unable to log in to the named Cisco MGC unit. Check the user ID and password. Check **setpollpwd**. Contact the Cisco Technical Assistance Center. To clear this alarm, you must provide a matching text message, because multiple POL327 alarms can be active (each with a different message).




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**Note** This alarm is cleared after the alarm condition is removed.

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\* POL328 File <filename> send to redundant poll unit failed

The <filename> argument represents the name of the file intended to be sent. The system was unable to send the named file to the redundant unit. Check that FTP is working on the BAMS unit. Create a test file on the Cisco MGC and manually FTP or SFTP it to the BAMS unit. If the attempt is unsuccessful, there might be a network problem. Contact the Cisco Technical Assistance Center.

POL329 File <filename> sent to redundant poll unit successfully

The <filename> argument represents the name of the file sent. In a redundant system, after a Cisco MGC file is polled by one BAMS unit, it is processed by that unit and is also sent to the redundant BAMS unit for processing. This is an informational message. No action is necessary.

POL330 Cannot open XFR directory, errno <error number>

The <error number> argument represents the error number. The polling task cannot open the XFR directory to transfer files to the redundant BAMS unit. Check the error. If the problem persists, contact the Cisco Technical Assistance Center.

- \* POL331 Polling unit rotates from unit <from unit number> to <to unit number> failed  
The <from unit number> argument represents the polling unit that was actively polling just before the unit rotation and the <to unit number> argument represents the unit that was on standby. The system was unable to perform the requested polling unit rotation. Check the network connection between the BAMS units. Perform an FTP or SFTP test. Contact the Cisco Technical Assistance Center.
- \* POL332 Polling unit rotates from unit <from unit number> to <to unit number>, but CTLFILE transfer failed  
The <from unit number> argument represents the polling unit that was actively polling just before the unit rotation and <to unit number> represents the unit that was on standby. The POL task was able to perform the requested polling unit rotation, but it was unable to transfer the necessary control file information. Check the network and perform an FTP or SFTP test. Contact the Cisco Technical Assistance Center.
- \* POL333 Error in linking to <directory name> directory, errno <error number>  
The <directory name> argument represents the directory name. The <error number> argument represents the UNIX error code. The POL task was unable to perform the requested file linking operation. Check the permissions for the specified directory. Contact the Cisco Technical Assistance Center.
- \* POL334 Cannot attach to shared memory, errno <error number>  
The <error number> argument represents the UNIX error code. The POL task was unable to access the shared device memory. Use the `ipcs` utility to check the shared memory status. Contact the Cisco Technical Assistance Center.
- \* POL335 Rotate cannot be executed in non-polling unit  
The POL task was unable to rotate the requested unit that was on standby at the time. The system only allows polling unit rotation from the current polling unit to the standby unit.
- \* POL336 File <filename> received from unit <from unit number> failed  
The <filename> argument represents the name of the file that the system was unable to receive and the <from unit number> argument represents the unit number of the sending device. The POL task was unable to receive a file from the named unit and site. Perform an FTP or SFTP test. Contact the Cisco Technical Assistance Center.
- \* POL338 Site number invalid or not specified  
The POL task is unable to validate the site number; it might be undefined. Check polling parameters, and ensure that the site exists. Contact the Cisco Technical Assistance Center.
- \* POL340 No data in 3 consecutive polling sessions  
The POL task was unable to execute the requested polling operation in three consecutive attempts. Check the Cisco MGC and verify the existence of data. Use the `chgno` command to check the sequence numbers on the BAMS units. Contact the Cisco Technical Assistance Center.
- \* POL341 Cannot access shared memory, MGR may not have started  
The polling tasks cannot get the contents of the shared memory. If the problem persists, contact the Cisco Technical Assistance Center.
- \* POL342 Cannot <access> xfr directory <directory name>, errno <error number>  
The <access> argument represents the operation, <directory name> represents the name of the directory, and <error number> represents the error number. The polling task is unable to perform the named operation on the xfr directory. Check the error message. If the problem persists, contact the Cisco Technical Assistance Center.
- \* POL343 Cannot <operation> site data directory <directory>, errno <error number>  
The <operation> argument represents the attempted system operation, <directory> represents the site data directory, and <error number> represents the UNIX error number. The POL task is unable to perform the specified system operation on the site data directory and displays a UNIX error code. Look up the error. Check the permissions of the BAMS user to access or create this directory. Contact the Cisco Technical Assistance Center.

\* POL353 Cannot read record in file <control filename>.CTL

The <control filename> argument represents the control filename. The POL task was unable to access the requested record. The record might be locked by another process. Determine what other process is using and locking the record. Contact the Cisco Technical Assistance Center.

\* POL356 Record already in use in file <control filename>.CTL

The <control filename> argument represents the control filename. This record is already locked by another process. Try again later. If the problem persists, contact the Cisco Technical Assistance Center.

\* POL358 Invalid REDUNDANCY\_MODE

The symbol definitions contain an invalid redundancy mode specification. Check the sym\_defs configuration file in the opt/CiscoBAMS/bin directory. The Redundancy mode value should be 2 for redundant and 1 for simplex configuration. Run the **change\_mode** command in the opt/CiscoBAMS/bin directory if the setting is wrong. Contact the Cisco Technical Assistance Center.

\* POL359 Cannot rotate unit in simplex mode

The POL task is unable to rotate polling units, because the system is operating in simplex (single-unit) mode, which does not permit a polling unit rotation. Contact the Cisco Technical Assistance Center.

\* POL360 Open control file <filename> failed

The <filename> argument represents the name of the control file. The POL task is unable to open the control file. Check permissions of the control file and ownership. Contact the Cisco Technical Assistance Center.

\* POL361 Polling config record is blank in <filename>

The <file name> argument represents the name of the control file. The polling configuration record is blank. Check the polling configuration file and verify that polling configuration file is populated for this site. Contact the Cisco Technical Assistance Center.



---

**Note** This alarm is cleared after the alarm condition is removed.

---

\* POL362 Sequence number is blank for config record in <filename>.CTL

The <filename> argument represents the name of the control file. The sequence number is blank. Use the **chgno** command to specify the sequence number to poll. Contact the Cisco Technical Assistance Center.

\* POL363 Cannot open <directory name> directory, errno <error number>

The <directory name> argument represents the name of the polled directory, and <error number> represents the UNIX error. The POL task cannot open the named directory and returns a UNIX error number. Check the UNIX error number and permissions on the directory.

\* POL364 <function name> error for CTL file <filename>: <error message>

The <function name> argument represents the name of the webapi function, <filename> represents the name of the CTL file, and <error message> represents the error message. The webapi function returns an error for the displayed CTL file. Contact the Cisco Technical Assistance Center.

\*C POL401 Max FTP failures for one file reached

The POL task has exceeded the maximum FTP failure threshold specified for a single file polling operation. Contact the Cisco Technical Assistance Center *immediately* and request that personnel there check the network and perform an FTP or SFTP test.



---

**Note** This alarm is cleared after the alarm condition is removed.

---

\*C POL402 Cannot connect to unit <unit name>

The <unit name> argument represents the name of the unit the system is attempting to poll. The system is unable to connect to the specified unit. Contact the Cisco Technical Assistance Center *immediately* and request that personnel there check the network and perform an FTP or SFTP test. To clear this alarm, you must provide a matching text message, because multiple POL402 alarms can be active (each with a different message).



**Note** This alarm clears after the alarm condition is removed, or the system connects to either the principal (hostname) or the backup (hostname\_b) site.

\*C POL403 Standby/Standby state detected. BAMS unit <unit number> will go active, seqno1: <sequence number 1> seqno2: <sequence number 2>

The <unit number> represents the unit number of the BAMS unit, <sequence number 1> represents the first sequence number, and <sequence number 2> represents the second sequence number. If a standby/standby condition is detected where both BAMS units are in the standby state for three consecutive intervals, the POL task of BAMS unit 0 goes active. This message is generated to indicate this condition. No action is required. BAMS has automatically recovered from a problem condition (standby/standby state).

## Control File Receive Task Messages

The Control File Receive (RCV) task receives control files. During processing, this task writes messages to the syslog with an RCV task identifier (for example, RCV001).

\*RCV501 Error loading record <error number>

The <error number> argument represents the UNIX error code. The RCV task is unable to load a control record. Look up the error number. Contact the Cisco Technical Assistance Center.

\* RCV502 Invalid operation <operation number>

The <operation number> argument represents the operation number. The RCV task has performed an invalid operation. Contact the Cisco Technical Assistance Center.

\* RCV503 Cannot open <filename>

The <filename> argument represents the name of the file that could not be opened. The RCV task is unable to open the named file. Verify that the file exists and that the file directory can be written to by user bams. Contact the Cisco Technical Assistance Center.

\* RCV507 FTP failed for <filename>

The <filename> argument represents the name of the file that the RCV task could not operate on. The RCV task is unable to perform an FTP or SFTP operation on the named file. Check if the control file name exists on the remote BAMS unit. Check the network connection to the remote BAMS unit and perform an FTP or SFTP test. Contact the Cisco Technical Assistance Center.

\* RCV508 Cannot get file status of <filename>

The <filename> argument represents the name of the file. The RCV task is unable to get a file status for the named file. Check if the control file exists on the local BAMS unit and if the user has read permissions on the file. Contact the Cisco Technical Assistance Center.

\* RCV509 File size incorrect for FTP <filename>

The <filename> argument represents the name of the file. The RCV task is unable to match the file size for the named file. Perform an FTP or SFTP test. If the file sizes match, contact the Cisco Technical Assistance Center.

\* RCV520 Cannot connect to unit <unit host name>

The <unit host name> argument represents the name of the unit host. The RCV task is unable to connect to the other unit. Check the network connection to <unit host name>. Contact the Cisco Technical Assistance Center.

\* RCV521 Cannot open directory file <directory name>

The <directory name> argument represents the name of the directory. The RCV task is unable to open the named directory file. Check if the user has permission to read directory <directory name>. Contact the Cisco Technical Assistance Center.

\* RCV522 system () call failed, errno = <error number>

The <error number> argument represents the UNIX error number. A system call has failed and the system displays a UNIX error. Look up the error number. Contact the Cisco Technical Assistance Center.

\* RCV524 Max FTP failures for one file reached

The RCV task has failed to FTP a file after the maximum number of tries. Check the network connection to the remote BAMS unit and perform an FTP or SFTP test. Contact the Cisco Technical Assistance Center.

\* RCV525 fork() failed

The RCV task experienced a fork failure at the named site. Contact the Cisco Technical Assistance Center.

\* RCV527 Login failed for unit <unit host name>, please check ID/passwd

The <unit host name> argument represents the name of the unit host. The login has failed for the other BAMS unit. Check the user ID and password using **setbamunit**. Contact the Cisco Technical Assistance Center.

RCV528 Receive control information from redundant poll unit host <unit host 1> failed, trying host <unit host 2>

The <unit host 1> argument represents the name of the first unit host, and <unit host 2> represents the name of the unit host for the second Ethernet card. The RCV task was unable to receive the control file from the displayed host. Check the network connection to the remote BAMS <unit host 1> and perform an FTP or SFTP test.

## Send File Transfer Task Messages

The Send File Transfer (SXF) task sends control files to a redundant BAMS unit. During processing, this task writes messages to the syslog with an SXF task identifier (for example, SXF001).

\* SXF037 Error loading control record, returned <return value>

The <return value> argument represents the system-returned error value. The SXF task experienced an error loading a control record and returned an error value. Contact the Cisco Technical Assistance Center.

SXF041 Send control information to redundant poll unit host <unit host name> failed, trying host <unit host name of second ethernet card>

The <unit host name> argument represents the first unit host name polled, and <unit host name of second ethernet card> represents the unit host name of the second Ethernet card. The SXF task failed in its attempt to send the control record and is trying another line. Check the network connection to the remote BAMS <unit host name> and perform an FTP or SFTP test.

\* SXF502 stat () on <filename> failed, errno <error number>

The <filename> argument represents the name of the file, and <error number> represents the UNIX error number. Check the UNIX error.

\* SXF503 <filename> size incorrect: remote=<remote size>, local=<standard buffer size>  
The <filename> argument represents the name of the file, <remote size> represents the size on the remote unit, and <standard buffer size> represents the standard buffer size on the local unit. Check the network status. A communication problem exists between the two BAMS units. Check whether the Ethernet connection is good. Verify that the setbamunit utility has the correct parameters.

\* SXF510 Attempt #<number> to rename or transfer <filename> failed  
The <number> argument represents the number of communication attempts, and <filename> represents the name of file to be transferred or renamed. Check the network status. A communication problem exists between the two BAMS units. Check whether the Ethernet connection is good. Verify that the setbamunit utility has the correct parameters.

\* SXF640 <directory filename> No such file or directory.  
The <directory filename> argument represents the directory file name. Verify the path exists on the remote unit.

## UNIX Error Numbers

Table A-16 lists the UNIX error numbers that might appear within system messages that BAMS tasks write to the syslog.

**Table A-16** UNIX Error Numbers

| Number | Reason                         |
|--------|--------------------------------|
| 1      | Not super-user                 |
| 2      | No such file or directory      |
| 3      | No such process                |
| 4      | Interrupted system call        |
| 5      | I/O error                      |
| 6      | No such device or address      |
| 7      | Arg list too long              |
| 8      | Exec format error              |
| 9      | Bad file number                |
| 18     | Cross-device link              |
| 19     | No such device                 |
| 20     | Not a directory                |
| 21     | Is a directory                 |
| 22     | Invalid argument               |
| 23     | File table overflow            |
| 24     | Too many open files            |
| 25     | Inappropriate ioctl for device |
| 26     | Text file busy                 |
| 27     | File too large                 |
| 28     | No space left on device        |
| 29     | Illegal seek                   |

**Table A-16** *UNIX Error Numbers (continued)*

| Number | Reason                                  |
|--------|-----------------------------------------|
| 30     | Read only file system                   |
| 31     | Too many links                          |
| 32     | Broken pipe                             |
| 33     | Math argument out of domain of function |
| 34     | Math result not representable           |
| 35     | No message of desired type              |
| 36     | Identifier removed                      |
| 37     | Channel number out of range             |
| 38     | Level 2 not synchronized                |
| 39     | Level 3 halted                          |
| 40     | Level 3 reset                           |
| 41     | Link number out of range                |
| 42     | Protocol driver not attached            |
| 43     | No CSI structure available              |
| 44     | Level 2 halted                          |
| 45     | Deadlock condition                      |
| 46     | No record locks available               |
| 47     | Operation canceled                      |
| 48     | Operation not supported                 |
| 49     | Disk quota exceeded                     |
| 50     | Invalid exchange                        |
| 51     | Invalid request descriptor              |
| 52     | Exchange full                           |
| 53     | No anode                                |
| 54     | Invalid request code                    |
| 55     | Invalid slot                            |
| 56     | File locking deadlock error             |
| 57     | Bad font file format                    |
| 60     | Device not a stream                     |
| 61     | No data (for no delay I/O)              |
| 62     | Timer expired                           |
| 63     | Out of streams resources                |
| 64     | Machine is not on the network           |
| 65     | Package not installed                   |
| 66     | The object is remote                    |
| 67     | The link has been severed               |

**Table A-16** UNIX Error Numbers (continued)

| Number | Reason                                          |
|--------|-------------------------------------------------|
| 68     | Advertise error                                 |
| 69     | Srmount error                                   |
| 70     | Communication error on send                     |
| 71     | Protocol error                                  |
| 74     | Multihop attempted                              |
| 77     | Trying to read unreadable message               |
| 78     | Path name is too long                           |
| 79     | Value too large to be stored in data type       |
| 80     | Given log. name not unique                      |
| 81     | F.D. invalid for this operation                 |
| 82     | Remote address changed                          |
| 83     | Cannot access a needed shared library           |
| 84     | Accessing a corrupted shared library            |
| 85     | .lib section in a.out corrupted                 |
| 86     | Attempting to link in too many libraries        |
| 87     | Attempting to execute a shared library          |
| 88     | Illegal byte sequence                           |
| 89     | Unsupported file system operation               |
| 90     | Symbolic link loop                              |
| 91     | Restartable system call                         |
| 92     | If pipe/FIFO, do not sleep in stream head       |
| 93     | Directory not empty                             |
| 94     | Too many users (for UFS)                        |
| 95     | Socket operation on non-socket                  |
| 96     | Destination address required                    |
| 97     | Message too long                                |
| 98     | Protocol wrong type of socket                   |
| 99     | Protocol not available                          |
| 120    | Protocol not supported                          |
| 121    | Socket type not supported                       |
| 122    | Operation not supported on socket               |
| 123    | Protocol family not supported                   |
| 124    | Address family not supported by protocol family |
| 125    | Address already in use                          |
| 126    | Cannot assign requested address                 |
| 127    | Network is down                                 |

**Table A-16** *UNIX Error Numbers (continued)*

| Number | Reason                                      |
|--------|---------------------------------------------|
| 128    | Network is unreachable                      |
| 129    | Network dropped connection because of reset |
| 130    | Software caused connection abort            |
| 131    | Connection reset by peer                    |
| 132    | No buffer space available                   |
| 133    | Socket is already connected                 |
| 134    | Socket is not connected                     |
| 143    | Cannot send after socket shutdown           |
| 144    | Too many references: can't splice           |
| 145    | Connection timed out                        |
| 146    | Connection refused                          |
| 147    | Host is down                                |
| 148    | No route to host                            |
| 149    | Operation already in progress               |
| 150    | Operation now in progress                   |
| 151    | Stale NFS file handle                       |

## Signal Numbers

[Table A-17](#) displays the signal numbers that might appear within system messages that BAMS tasks write to the syslog.

**Table A-17** *Signal Numbers*

| Number | Name    | Reason                                      |
|--------|---------|---------------------------------------------|
| 1      | SIGHUP  | Hangup                                      |
| 2      | SIGINT  | Interrupt (rubout)                          |
| 3      | SIGQUIT | Quit (ASCII FS)                             |
| 4      | SIGILL  | Illegal instruction (not reset when caught) |
| 5      | SIGTRAP | Trace trap (not reset when caught)          |
| 6      | SIGIOT  | IOT instruction                             |
| 7      | SIGEMT  | EMT instruction                             |
| 8      | SIGFPE  | Floating-point exception                    |
| 9      | SIGKILL | Kill (cannot be caught or ignored)          |
| 10     | SIGBUS  | Bus error                                   |
| 11     | SIGSEGV | Segmentation violation                      |
| 12     | SIGSYS  | Bad argument to system call                 |

**Table A-17** *Signal Numbers (continued)*

| Number | Name       | Reason                                       |
|--------|------------|----------------------------------------------|
| 13     | SIGPIPE    | Write on a pipe with no one to read it       |
| 14     | SIGALRM    | Alarm clock                                  |
| 15     | SIGTERM    | Software termination signal from kill        |
| 16     | SIGUSR1    | User-defined signal 1                        |
| 17     | SIGUSR2    | User-defined signal 2                        |
| 18     | SIGCLD     | Child status change                          |
| 18     | SIGCHLD    | Child status change alias (POSIX)            |
| 19     | SIGPWR     | Power-fail restart                           |
| 20     | SIGWINCH   | Window size change                           |
| 21     | SIGURG     | Urgent socket condition                      |
| 22     | SIGPOLL    | Pollable event condition                     |
| 22     | SIGIO      | Socket I/O possible (SIGPOLL alias)          |
| 23     | SIGSTOP    | Stop (cannot be caught or ignored)           |
| 24     | SIGSTP     | User stop requested from tty                 |
| 25     | SIGCONT    | Stop process has been continued              |
| 26     | SIGTTIN    | Background tty read attempted                |
| 27     | SIGTTOU    | Background tty write attempted               |
| 28     | SIGVTALRM  | Virtual time expired                         |
| 29     | SIGPROF    | Profiling timer expired                      |
| 30     | SIGXCPU    | Exceeded CPU limit                           |
| 31     | SIGXFSZ    | Exceeded file size limit                     |
| 32     | SIGWAITING | Process's lwps are blocked                   |
| 33     | SIGLWP     | Special signal used by thread library        |
| 34     | SIGFREEZE  | Special signal used by CPR                   |
| 35     | SIGTHAW    | Special signal used by CPR                   |
| 36     | SIGCANCEL  | Thread cancellation signal used by libthread |
| 37     | SIGTMIN    | First (highest-priority) real-time signal    |
| 44     | SIGRTMAX   | Last (lowest-priority) real-time signal      |



# APPENDIX B

## Upgrading to BAMS Release 3.30

---

Revised: March 10, 2011, OL-11618-18

### Introduction

To upgrade Cisco BAMS software to Cisco BAMS 3.30, you must upgrade from BAMS 3.20. If you wish to upgrade from BAMS 3.13 to BAMS 3.30, you must first upgrade from BAMS 3.13 to BAMS 3.20.

From BAMS 3.30, you cannot roll back to BAMS 3.20 because the hard disk is reformatted during an upgrade to BAMS 3.30. Therefore, to go back to 3.20, you must re-install Solaris 8 and BAMS 3.20, and then restore the backup files from BAMS 3.20.

You cannot upgrade to BAMS 3.30 from BAMS 3.10 or earlier releases.



#### Caution

---

Before upgrading to a new BAMS release, ensure that you have backed up the latest configuration and data files. For more information, see the [“System Backup and Recovery”](#) section on page 1-3.

---



#### Note

---

Before beginning this upgrade procedure, read the entire appendix to familiarize yourself with all of the steps you will be required to perform.

---

## Upgrading a Simplex BAMS 3.20 on Solaris 8 to BAMS 3.30 on Solaris 10

To perform an upgrade from a Cisco BAMS 3.20 simplex system running on a Sun Solaris 8 operating system to Cisco BAMS 3.30 running on the Solaris 10 operating system, complete the following steps:

#### Step 1

---

For each platform on which you wish to install BAMS 3.30, collect the following information from your system administrator (the recommended defaults are provided):

- Platform hostname
- Platform IP address, network mask and default gateway IP address
- Root password
- BAMS 3.30 license keys for each unit to be upgraded

- Host names and IP addresses of the PGW 2200 units
- Home directory for new user accounts (default: /opt/CiscoBAMS/local)
- The location for the directory /opt/CiscoBAMS/data in which to insert all data files created by the application. This is usually a separate disk or file system (default: /opt/CiscoBAMS).

**Step 2** Log into the simplex BAMS unit to be upgraded as bams user and execute the MML command **stp-softw::confirm** to stop the BAMS software:

```
mml:sys>stp-softw::confirm
```

The command returns a response similar to the following:

```
Billing and Measurements Server - BAMS-00 2007-05-02 12:16:02
B COMPLD
```

```
Terminating BAMS
```

```
waiting for MGR to shut down...
```

```

;
mml:sys>
```

**Step 3** Quit the MML utility.

**Step 4** Log out as bams user.

**Step 5** Log in as root user.

**Step 6** Ensure that no other user is currently logged in on this BAMS unit and using the bams user account.

**Step 7** Change directory to the location of the script for uninstalling the software:

```
$ cd /opt/install
```

**Step 8** Run the uninstall script:

```
$ bams uninstall
```




---

**Note** See the [“Uninstalling BAMS” section on page 2-3](#).

---

**Step 9** Issue the command **pkgrm CiscoBAMS**.

Enter y (yes) when the system prompts you to save the current active configuration. Enter n (no) when the system asks you if you wish to remove the data and directories. The following example shows this series of interactions:

```
pkgrm CiscoBAMS
```

```
The following package is currently installed:
```

```
 CiscoBAMS Cisco BAMS for VSCs
 (sparc) 3.20
```

```
Do you want to remove this package? y
```

```
Removing installed package instance <CiscoBAMS>
```

```
This package contains scripts which will be executed with super-user
permission during the process of removing this package.
```

```
Do you want to continue with the removal of this package [y,n,?,q] y
```

```
Verifying package dependencies.
```

```
...
```

```
** Examining mml directories in BAMS node 08:
```

```
Newest directory /opt/CiscoBAMS/files/s08/mml/bams_system automatically saved.
```

```

** clean_mml.sh finished.

Would you like the current active configuration to be saved as the restore
configuration? [y,n] y

Saving current active BAMS configuration...
...
Uninstalling the BAMS application...
Deleting the userid bams.
Deleting the group bams.
Would you like to remove the data directories? [y,n] n
Would you like to remove the archive directories? [y,n] n
...
Removal of <CiscoBAMS> was successful.

```

- Step 10** Issue the following command to create a tar file of the /opt/CiscoBAMS directory and subdirectories: with the following command:

```

#
cd /opt
#
tar cvf cisco320bams0.tar /opt/CiscoBAMS/*

```

- Step 11** Issue the following command to create a tar file of the /usr/tmp directory and subdirectories:

```

#
cd /opt
#
tar cvf usrtmpbams0.tar /usr/tmp/*

```

- Step 12** Create a backup copy of the two tar files that you created with Step 10 and Step 11. Copy the tar files to another server or computer by using FTP in binary mode.

- Step 13** Install the Solaris 10 operating system.



**Note** For information on installing the Solaris 10 operating system and disk partitioning, see the *Cisco Media Gateway Controller Software Release 9 Installation and Configuration Guide*, for Release 9.7(3).

- Step 14** Restore and extract (that is, copy and unzip) the two tar files that you backed up with Step 12, as shown in the following example:

```

#
cd /opt
#
ftp backup_server_ip_address
ftp > binary
ftp > get cisco320bams0.tar
ftp > lcd /usr/tmp
ftp > get usrtmpbams0.tar
ftp > quit
#
ls -l
total 42214
drwxr-xr-x 3 root bin 512 Apr 27 17:48 SUNWits
drwxr-xr-x 4 root bin 512 May 2 18:33 SUNWmlib
drwxr-xr-x 5 root sys 512 Apr 27 18:30 SUNWrtvc
-rw-r--r-- 1 root other 14920192 May 2 12:53 cisco320bams0.tar
#
tar xvf cisco320bams0.tar
cd /usr/tmp
tar xvf usrtmpbams0.tar

```

- Step 15** While you are logged in as root, install the Cisco BAMS software from the CD-ROM labeled “Cisco Billing and Measurements Server (BAMS)” according to the instructions provided in the [“Installing Cisco BAMS”](#) section on page 2-4.



**Caution** The installation and migration of BAMS 3.30 must complete successfully, without a single error, before you can continue. Review all of the information displayed on the screen to ensure that no error or failure occurred. Login as bams user and issue the appropriate MML commands to ensure that the configuration for all sites was properly migrated by the BAMS 3.30 installation process. If you discover any error, you must resolve it at this point before continuing to the next step.

- Step 16** After you confirm that the configuration migrated successfully, determine whether you wish to enable QoS output. For instructions on how to enable QoS output refer to [Chapter 11, “Configuring BAMS for QoS Output.”](#)



**Note** If you enable QoS output for any node, ensure that you also configure the “type” parameter in Mass Storage Control (MSC) Parameters table to maintain the new file type named QOS\_STAT\*csv. (Refer to [“Updating the Mass Storage Control Parameters Table”](#) section on page 5-6.) Also, refer to [“Setting Disk Usage Thresholds”](#) section on page 2-20 and [“Updating the Node Parameters Table”](#) section on page 5-11 for more information on configuring MSC and Node parameters.

- Step 17** Ensure that the IP addresses and network names of all the PGW 2200 units are defined in the file /etc/hosts.

- Step 18** Log out as root user.

- Step 19** Log in as bams user.

- Step 20** Install the license key for the BAMS 3.30 node in the directory /opt/CiscoBAMS/license.

- Step 21** Because SFTP is the preferred transfer protocol between BAMS and the Cisco PGW 2200, configure SFTP on the BAMS unit as described in the [“Enabling SFTP on Cisco BAMS and the Cisco PGW 2200”](#) section on page 2-7.



**Note** To enable SFTP, you must also set the “protocol” parameter in the Poll table to SFTP.

Example:

```
mml:1:node01>prov-ed:poll:protocol="SFTP"
```



**Caution** If you are migrating from BAMS 3.20 and you had QoS output enabled, for BAMS 3.30, you must enable the qosoutput parameter in the Nodeparms table.

Example:

```
mml:1:node01>prov-ed:NODEPARMS:qosoutput=[1|2]
```

For more information about enabling QoS output, see [Chapter 11, “Configuring BAMS for QoS Output.”](#)

- Step 22** While still logged in as bams user, start the BAMS application by issuing the MML command **sta-softw** as shown in the following example:

```
mml:sys>sta-softw
Billing and Measurements Server - BAMS-00 2007-04-03 13:47:27
B COMPLD
;
mml:sys>
```

- Step 23** Confirm that the BAMS system starts to collect and process data properly.
- Step 24** Monitor the BAMS node until you are sure that the unit is working properly.

## Upgrading Redundant BAMS Systems from BAMS 3.20 on Solaris 8 to BAMS 3.30 on Solaris 10

To perform an upgrade for redundant BAMS systems running Cisco BAMS 3.20 running on the Sun Solaris 8 operating system to Cisco BAMS 3.30 running on the Solaris 10 operating system, complete the following steps:

- Step 1** For each node on which you wish to install BAMS 3.30, collect the following information from your system administrator (the recommended defaults are provided):
- Platform hostname
  - Platform IP address, network mask, and default gateway IP address
  - Root password
  - BAMS 3.30 license keys for each node to be upgraded
  - Host names and IP addresses of the Cisco PGW 2200 units
  - Home directory for new user accounts (default: /opt/CiscoBAMS/local)
  - The location for the directory /opt/CiscoBAMS/data in which to insert all data files created by the application. This is usually a separate disk or file system (default: /opt/CiscoBAMS).



**Note** To exemplify this procedure, the redundant BAMS units are name bams0 and bams1. All nodes that are in Standby polling mode are on bams0. All nodes that are in Active polling mode are on bams1.

- Step 2** Log in as bams user on both systems and ensure that all the nodes that are in active polling mode reside on a single unit.



**Note** To check a node for active polling mode, issue the MML command **rtrv-ne** at the system-level prompt, as shown in the following example:

```
mml:sys> rtrv-ne
```

Refer to the [“rtrv-ne—Retrieve Network” section on page 4-22](#) for additional information on the MML **rtrv-ne** command.

If some nodes are active on one unit (for example, bams0) when the other nodes are active on the other unit (bams1), perform a switch over of the active nodes from one unit to the other so that all nodes on the first unit become *Standby* while all nodes on the other unit become *Active*. Refer to the section “sw-ovr—Switch Over” in Chapter 4 for additional information on the MML command **sw-ovr**.

For the remaining of this procedure, we will refer by the name bams0 to one of the BAMS units being upgraded, while bams1 will be used to refer to the other unit of this redundant pair of BAMS units.

For the remaining of this procedure, we will assume that at the beginning of the Upgrade all nodes were put on Standby polling mode on bams0, and that all nodes were put on Active polling mode on bams1.

**Step 3** Begin the BAMS 3.30 upgrade by upgrading the Standby unit bams0.

Log out of bams1.

**Step 4** Confirm that all nodes on bams0 are Standby.

**Step 5** Stop the BAMS software on bams0 by issuing the MML command **stp-softw::confirm** as shown in the following example.

```
mml:sys>stp-softw::confirm
Billing and Measurements Server - BAMS-00 2007-05-02 12:16:02
B COMPLD

Terminating BAMS

waiting for MGR to shut down...
/
mml:sys>
```

**Step 6** On bams0, quit the **mml** utility.

**Step 7** While logged in as bams user on bams0, run the **change\_mode** program and set bams0 to Simplex mode to prevent it from synchronizing with the remote unit during the upgrade process, as shown in the following example:

```
$ pwd
/opt/CiscoBAMS/bin
$
$ change_mode

The change_mode program sets the BAMS configuration to simplex or
redundant. Do you want to continue (y/n)? y

Enter mode of operation:
1. Simplex BAMS mode
2. Redundant BAMS mode

Enter mode [1-2] : 1
```

**Step 8** Log out as bams user from bams0.

**Step 9** Log in as root user on bams0.

**Step 10** Ensure that no other user is currently logged in on bams0 and using the bams user account.

**Step 11** Change directory to the location of the script for uninstalling the software:

```
$ cd /opt/install
```

**Step 12** Run the uninstall script:

```
$ bams uninstall
```



**Note** See the [“Uninstalling BAMS” section on page 2-3](#).

**Step 13** Issue the command **pkgrm CiscoBAM**, as shown in the following example:

Enter y (yes) when the system prompts you to save the current active configuration. Enter n (no) when the system asks you if you wish to remove the data and archive directories. The following example shows this series of interactions:

```
pkgrm CiscoBAM

The following package is currently installed:
 CiscoBAMS Cisco BAMS for VSCs
 (sparc) 3.20

Do you want to remove this package? y

Removing installed package instance <CiscoBAMS>

This package contains scripts which will be executed with super-user
permission during the process of removing this package.

Do you want to continue with the removal of this package [y,n,?,q] y
Verifying package dependencies.
...
** Examining mml directories in BAMS node 08:
Newest directory /opt/CiscoBAMS/files/s08/mml/bams_system automatically saved.

** clean_mml.sh finished.

Would you like the current active configuration to be saved as the restore confi
guration? [y,n] y

Saving current active BAMS configuration...
...
Uninstalling the BAMS application...
Deleting the userid bams.
Deleting the group bams.
Would you like to remove the data directories? [y,n] n
Would you like to remove the archive directories? [y,n] n
...
Removal of <CiscoBAMS> was successful.
```

**Step 14** Create a tar file of the /opt/CiscoBAMS directory and subdirectories on bams0 by issuing the commands shown in the following example:

```
#
cd /opt
#
tar cvf cisco320bams0.tar /opt/CiscoBAMS/*
```

**Step 15** On bams0, create a tar file of the /usr/tmp directory and subdirectories by issuing the commands shown in the following example:

```
#
cd /opt
#
tar cvf usrtmpbams0.tar /usr/tmp/*
```

**Step 16** Create a backup copy of the two tar files that you created with Step 14 and Step 15. Copy the tar files to another server or computer by using FTP in binary mode.

**Step 17** On bams0, install the Solaris 10 operating system.



**Note** For information on installing the Solaris 10 operating system and disk partitioning, see the *Cisco Media Gateway Controller Software Release 9 Installation and Configuration Guide*, for Release 9.7(3).

**Step 18** Restore and extract the two tar files that you backed up with Step 16, as shown in the following example:



**Note** Ensure that you are logged in as root.

```
#
cd /opt
#
ftp backup_server_ip_address
ftp > binary
ftp > get cisco320bams0.tar
ftp > lcd /usr/tmp
ftp > get usrtmpbams0.tar
ftp > quit
#
ls -l
total 42214
drwxr-xr-x 3 root bin 512 Apr 27 17:48 SUNWits
drwxr-xr-x 4 root bin 512 May 2 18:33 SUNWmlib
drwxr-xr-x 5 root sys 512 Apr 27 18:30 SUNWrtvc
-rw-r--r-- 1 root other 14920192 May 2 12:53 cisco320bams0.tar
#
tar xvf cisco320bams0.tar
cd /usr/tmp
tar xvf usrtmpbams0.tar
```

**Step 19** While you are logged in as root, install the Cisco BAMS software from the CD-ROM labeled “Cisco Billing and Measurements Server (BAMS)” according to the instructions provided in the [“Installing Cisco BAMS” section on page 2-4](#).



**Caution**

The installation and migration of BAMS 3.30 must complete successfully, without a single error, before you can continue. Review all of the information displayed on the screen to ensure that no error or failure occurred. Login as bams user and issue the appropriate MML commands to ensure that the configuration for all sites was properly migrated by the BAMS 3.30 installation process. If you discover any error, you must resolve it at this point before continuing to the next step (upgrading bams1).

**Step 20** After you confirm that the configuration migrated successfully, determine whether you wish to enable QoS output. For instructions on how to enable QOS output refer to [Chapter 11, “Configuring BAMS for QoS Output.”](#)



**Note**

If you enable QOS output for any node, ensure that you also configure the “type” parameter in Mass Storage Control (MSC) Parameters table to maintain the new file type named QOS\_STAT\*csv. (Refer to [“Updating the Mass Storage Control Parameters Table” section on page 5-6](#).) Also, refer to [“Setting Disk Usage Thresholds” section on page 2-20](#) and [“Updating the Node Parameters Table” section on page 5-11](#) for more information on configuring MSC and Node parameters.

After you verify that the installation and migration procedures completed successfully on bams0, you can start the upgrade of bams1.

- Step 21** Log in on bams1 as bams user and execute the MML command **stp-softw::confirm** to stop the BAMS software on bams1.
- Step 22** On bams1, quit the **mml** utility.
- Step 23** While logged in as bams user on bams1, run the **change\_mode** program and set bams1 to Simplex mode to prevent it from synchronizing with the remote unit during the upgrade process, as shown in the following example:

```
$ pwd
/opt/CiscoBAMS/bin
$
$ change_mode
```

```
The change_mode program sets the BAMS configuration to simplex or
redundant. Do you want to continue (y/n)? y
```

```
Enter mode of operation:
1. Simplex BAMS mode
2. Redundant BAMS mode
```

```
Enter mode [1-2] : 1
```

- Step 24** Log out as bams user from bams1.
- Step 25** Log in as root user on bams1.
- Step 26** Ensure that no other user is currently logged in on bams1 using the bams user account.
- Step 27** To uninstall BAMS 3.20 from bams1, issue the commands **./bams uninstall** and **pkgrm CiscoBAM**, as shown in the following example.

Enter y (yes) when the system prompts you to save the current active configuration. Enter n (no) when the system asks you if you wish to remove the data and archive directories. The following example shows this series of interactions:

```
./bams uninstall
pkgrm CiscoBAM
```

```
The following package is currently installed:
CiscoBAMS Cisco BAMS for VSCs
 (sparc) 3.20
```

```
Do you want to remove this package? y
```

```
Removing installed package instance <CiscoBAMS>
```

```
This package contains scripts which will be executed with super-user
permission during the process of removing this package.
```

```
Do you want to continue with the removal of this package [y,n,?,q] y
Verifying package dependencies.
```

```
...
** Examining mml directories in BAMS node 08:
Newest directory /opt/CiscoBAMS/files/s08/mml/bams_system automatically saved.
```

```
** clean_mml.sh finished.
```

```
Would you like the current active configuration to be saved as the restore
configuration? [y,n] y
```

```

Saving current active BAMS configuration...
...
Uninstalling the BAMS application...
Deleting the userid bams.
Deleting the group bams.
Would you like to remove the data directories? [y,n] n
Would you like to remove the archive directories? [y,n] n
...
Removal of <CiscoBAMS> was successful.

```

**Step 28** On bams1, create a tar file of the /opt/CiscoBAMS directory and subdirectories by issuing the commands shown in the following example:

```

#
cd /opt
#
tar cvf cisco320bams1.tar /opt/CiscoBAMS/*

```

**Step 29** On bams1, create a tar file of the /usr/tmp directory and subdirectories by issuing the commands shown in the following example:

```

#
cd /opt
#
tar cvf usrtmpbams1.tar /usr/tmp/*

```

**Step 30** Create a backup copy of the two tar files you created in Step 25 and Step 26 on another computer. Copy the tar files to another server or computer by using FTP in binary mode.

**Step 31** On bams1, install the Solaris 10 operating system.

**Step 32** Restore and extract the two tar files that you backed up with Step 27, as shown in the following example:




---

**Note** Ensure that you are logged in as root.

---

```

#
cd /opt
#
ftp backup_server_ip_address
ftp > binary
ftp > get cisco320bams1.tar
ftp > lcd /usr/tmp
ftp > get usrtmpbams1.tar
ftp > quit
#
ls -l
total 42214
drwxr-xr-x 3 root bin 512 Apr 27 17:48 SUNWits
drwxr-xr-x 4 root bin 512 May 2 18:33 SUNWmlib
drwxr-xr-x 5 root sys 512 Apr 27 18:30 SUNWrtvc
-rw-r--r-- 1 root other 14920192 May 2 12:53 cisco320bams1.tar
#
tar xvf cisco320bams1.tar
cd /usr/tmp
tar xvf usrtmpbams1.tar

```

**Step 33** While you are logged in as root on bams1, install the Cisco BAMS software from the CD-ROM labeled “Cisco Billing and Measurements Server (BAMS)” according to the instructions provided in the [“Installing Cisco BAMS” section on page 2-4](#).

**Caution**

The installation and migration of BAMS 3.30 must complete successfully, without a single error, before you can continue. Review all of the information displayed on the screen to ensure that no error or failure occurred. Login as bams user and issue the appropriate MML commands to ensure that the configuration for all sites was properly migrated by the BAMS 3.30 installation process. If you discover any error, you must resolve it at this point before continuing to the next step.

- Step 34** After you confirm that the configuration migrated successfully, determine whether you wish to enable QoS output. For instructions on how to enable QoS output refer to [Chapter 11, “Configuring BAMS for QoS Output.”](#)

**Note**

If you enable QoS output for any node, ensure that you also configure the “type” parameter in Mass Storage Control (MSC) Parameters table to maintain the new file type named QOS\_STAT\*csv. (Refer to “Updating the Mass Storage Control Parameters Table” section on page 5-6.) Also, refer to “Setting Disk Usage Thresholds” section on page 2-20 and “Updating the Node Parameters Table” section on page 5-11 for more information on configuring MSC and Node parameters.

- Step 35** Log out as root user on bams1.

- Step 36** Log in as bams user on bams1.

- Step 37** On bams1, execute the command **change\_mode** and set bams1 to redundant mode as shown in the following example:

```
$ change_mode

The change_mode program sets the BAMS configuration to simplex or
redundant. Do you want to continue (y/n)? y

Enter mode of operation:
1. Simplex BAMS mode
2. Redundant BAMS mode

Enter mode [1-2] : 2

Specify the transfer protocol between the BAMS units:
1. FTP
2. SFTP

Enter mode [1-2] : 2
```

- Step 38** On bams1, modify the UNITNO environment variable to define the unit number as 1 in the file /opt/CiscoBAMS/bin/sym\_defs, as shown in the following example:

```
$ cd /opt/CiscoBAMS/bin
$
$ vi sym_defs
```

Find the following line in the file sym\_def:

```
UNITNO=0; export UNITNO
```

Change the UNITNO value to 1:

```
UNITNO=1; export UNITNO
```

- Step 39** Log out as bams user on bams1.

- Step 40** Log in as the root user on bams1 and ensure the IP addresses and network names of the other bams unit and the PGW 2200 units are defined in the file /etc/hosts.
- Step 41** On bams1, verify that the file /etc/hosts contains a line with the IP address and host name of the remote BAMS unit.
- Step 42** Log in as root user on bams0 and verify that the IP addresses and network names of the other bams unit and the PGW 2200 units are defined in the file /etc/hosts.
- Step 43** On bams0, verify that the file /etc/hosts contains a line with the IP address and host name of the remote BAMS unit.
- Step 44** Log out as root user on both BAMS units.
- Step 45** On bams1, log in as bams user.
- Step 46** On bams1, from the directory /opt/CiscoBAMS/bin directory, issue the command **setbamunit** to configure the hostname, login ID, and password parameters for both BAMS units. All parameters should be defined. The parameters bam-name0 and bam-name1 should correspond to the node names of the BAMS units defined in the file /etc/hosts.
- Step 47** On bams1, configure the login information for the PGW 2200 unit(s) by executing the command **setpollpwd -s#**. The character # in this command corresponds to the number of each node (1 through 8) that is polled by this BAMS unit.
- Step 48** On bams1, install the new BAMS 3.30 license key for this unit in the directory /opt/CiscoBAMS/license.
- Step 49** On bams1, configure SFTP as described in the [“Enabling SFTP on Cisco BAMS and the Cisco PGW 2200” section on page 2-7](#).
- Step 50** On bams0, log in as bams user.
- Step 51** On bams0, from the directory /opt/CiscoBAMS/bin, execute the command **setbamunit** to configure the hostname, login ID, and password parameters for both BAMS units. All parameters should be defined. The parameters bam-name0 and bam-name1 should correspond to the node names of the BAMS units defined in the file /etc/hosts.
- Step 52** On bams0, configure the login information for the PGW 2200 unit(s) by executing the command **setpollpwd -s#**. In this command, the character # correspond to the number of each node (1 through 8) that is polled by this BAMS unit.
- Step 53** On bams0, install the new BAMS 3.30 license key for this unit in the directory /opt/CiscoBAMS/license.
- Step 54** On bams0, configure SFTP as described in the [“Enabling SFTP on Cisco BAMS and the Cisco PGW 2200” section on page 2-7](#).
- Step 55** On bams0, execute the command **change\_mode** and set bams0 unit to redundant mode, as shown in the following example:

```
$ change_mode
```

```
The change_mode program sets the BAMS configuration to simplex or
redundant. Do you want to continue (y/n)? y
```

```
Enter mode of operation:
```

- ```
1. Simplex BAMS mode
2. Redundant BAMS mode
```

```
Enter mode [1-2] : 2
```

```
Specify the transfer protocol between the BAMS units:
```

- ```
1. FTP
2. SFTP
```

```
Enter mode [1-2] : 2
```

- Step 56** On bams1, while still logged in as bams user, start the BAMS application by issuing the MML command **sta-softw**, as shown in the following example:

```
mml:sys>sta-softw
Billing and Measurements Server - BAMS-00 2007-04-03 13:47:27
B COMPLD
;
mml:sys>
```

- Step 57** Confirm that bams1 starts to collect and process data properly.

- Step 58** On bams0, while still logged in as bams user, start the BAMS application by issuing the MML command **sta-softw**, as shown in the following example:

```
mml:sys>sta-softw
Billing and Measurements Server - BAMS-00 2007-04-03 13:47:27
B COMPLD
;
mml:sys>
```

- Step 59** Monitor both BAMS units until you are sure that both units are working properly and synchronized with bams1 as the Active unit and bams0 as the Standby unit.

- Step 60** Finally, issue the MML command **sw-ovr** to switch over all the nodes from bams1 into bams0 and to ensure that bams0 continues to collect and process data properly.





## Backing up and Restoring BAMS

---

Revised: March 10, 2011, OL-11618-18

### Backup Utility

The BAMS utility, **bamsbackup**, can be used to back up the current configuration files, all executable files and intermediate files (that is, incompletely processed files in the /output directories and checkpoint files). You can also specify whether to back up the billing files (BAMS output files and the archived CDR files from the PGW). You can specify to back up to a regular file or a tape device.



**Tip**

---

Before you start the backup utility, check the directory /opt/CiscoBAMS/bin for the file ADMs. It should be present before starting **bamsbackup**.

---

**Format**            **bamsbackup** [ -y ] [ -b | -n ] [ -f filename | -t device\_name ]

**Description**      The value of **-y** is do not prompt user to confirm backup.  
The value of **-b** is back up billing files.  
The value of **-n** is do not back up billing files.  
The value of **-f filename** is back up to regular file named *filename*.  
The value of **-t device\_name** is back up to tape device named *device*.

**Note**      Only one of the -b/-n or -f/-t flags can be used in the same command.

**Example**

```

$ bamsbackup

-b or -n parameter must be specified to indicate whether billing files
are to be backed up:

b) Back up billing files
n) Do not back up billing files
q) Quit

Enter selection (b,n,q): b

-f or -t parameter must be specified to indicate backup to file or tape
device:

f) Backup to file
t) Backup to tape device
q) Quit

Enter selection (f,t,q): f
Enter backup filename: /tmp/bamsbackup.12252004.cpio
Backup filename specified: /tmp/bamsbackup.12252004.cpio

The program /opt/CiscoBAMS/bin/bamsbackup will archive the following to
the file /tmp/bamsbackup.12252004.cpio:

1) Current BAMS configuration files
2) All BAMS executables
3) All BAMS intermediate files
4) All BAMS billing output files

Do you want to continue with bamsbackup (y/n)? y

/opt/CiscoBAMS/bin
/opt/CiscoBAMS/bin/ACC
/opt/CiscoBAMS/bin/ADMal
.
.
.
229280 blocks
Backup successful.

Program /opt/CiscoBAMS/bin/bamsbackup complete. All files archived to
/tmp/bams
backup.12252004.cpio

```

# Restore Utility

The **bamsrestore** utility restores BAMS 3.20 and later releases from any previously backed up files.

The restore utility prompts you to back up the current files, and proceeds only after a confirmation to do so.

The restore utility provides an option to restore files from a backup file or a tape device. The utility also provides an option to restore the billing output files.



Tip

---

Before you start the restore utility, check the directory `/opt/CiscoBAMS/bin` for the file `ADMss`. It should be present before starting **bamsrestore**.

---

**Format** `bamsrestore [ -y ] [ -i | -k ] [ -b | -n ] [ -f filename | -t device_name ]`

**Description** The value of **-y** is confirm (that is, the user is not reminded to restore current files).

The value of **-i** is restore intermediate files (applicable only if restoring the same BAMS version).

The value of **-k** is keep intermediate files, do not restore intermediate files (applicable only if restoring the same BAMS version).

The value of **-b** is restore billing files.

The value of **-n** is do not restore billing files.

The value of **-f filename** is restore from regular file named *filename*.

The value of **-t device\_name** is restore from tape device named *device*.

**Note** Only one of the `-i/-k`, `-b/-n` or `-f/-t` flags can be used on the command line. If the `-y` flag is not provided, the utility reminds you about backing up current files and prompts for confirmation.

**Example**

```

$ bamsrestore

-b or -n parameter must be specified to determine whether billing files are
restored:

b) Restore billing files
n) Do not restore billing files
q) Quit

Enter selection (b,n,q): b

-i or -k parameter must be specified to determine whether intermediate
files are restored:

i) Restore intermediate files
k) Keep current intermediate files. Do not restore intermediate files q)
Quit

Enter selection (i,k,q): k

-f or -t parameter must be specified to indicate restore from file or tape
device:

f) Restore from file
t) Restore from tape device
q) Quit

Enter selection (f,t,q): f
Enter restore filename: /tmp/bamsbackup.12252004.cpio
Restore filename: /tmp/bamsbackup.12252004.cpio

Current BAMS Version = 3.20
/opt/CiscoBAMS/bin/ADMss
229280 blocks
BAMS restore VERSION = 3.20
Current BAMS Version 3.20 is the same as the restore version of 3.20.

The program /opt/CiscoBAMS/bin/bamsrestore will restore the following from
the file /tmp/bamsbackup.12252004.cpio:

1) Current BAMS configuration files
2) All BAMS executables
3) All BAMS billing output files

* Current BAMS intermediate files will be kept. Intermediate files
* will not be restored from /tmp/bamsbackup.12252004.cpio

Before restoring from /tmp/bamsbackup.12252004.cpio, the current BAMS files
should be backed up using the utility 'bamsbackup'.

Do you want to continue with bamsrestore (y/n)? y

Saving current intermediate files since restore from FILES_DIR will
overwrite these
/opt/CiscoBAMS/files/s01/acc_checkpoint
/opt/CiscoBAMS/files/s01/cor_checkpoint
/opt/CiscoBAMS/files/s02/acc_checkpoint
20 blocks
Restoring files from /tmp/bamsbackup.12252004.cpio ...229280 blocks
Restore successful.

```

**Example  
(continued)**

```
Restoring current intermediate files since these were temporarily
overwritten by the restore from FILES_DIR
/opt/CiscoBAMS/files/s01/acc_checkpt
/opt/CiscoBAMS/files/s01/cor_checkpt
```

```
.
.
.
20 blocks
```

```
For listing of files restored from /tmp/bamsbackup.12252004.cpio, see:
/tmp/bamsrestore.list.20041006143211
```

```
Program /opt/CiscoBAMS/bin/bamsrestore complete
```

## Restoring the Same BAMS Release as the Current BAMS

The restore utility prompts you whether to restore the intermediate files and billing files.

If you want to restore intermediate files, the restore utility removes the current intermediate files in the output directory and the checkpoint files, then restores intermediate files from the backup version.

If you do not want to restore intermediate files, then only executable and configuration files are restored. The current intermediate files are not touched.

## Restoring a Different BAMS Release than the Current BAMS

The restore utility removes the current intermediate files in the output directory and the checkpoint files, then restores intermediate files from the backup version.





## Installing Solaris 10 Version 0708-V02 on Sun Netra T5220

---

Revised: March 10, 2011, OL-11618-18

### Overview

This section provides information about the procedures that you must complete in order to perform the following tasks:

- Enable RAID 0 on a Sun Netra T5220 platform.
- Install the Solaris 10 (0708) image on the Sun Netra T5220 platform on which you intend to install the Cisco BAMS 3.30 software.

**Note**

If you wish to run the Cisco Media Gateway Controller (MGC) Node Manager to recognize the traps sent from a Cisco BAMS, you must install Cisco BAMS 3.30 Patch 308 with the Solaris 10 (Version 0708-V02) operating system on the Sun Netra T5220 server.

**Note**

If you configure RAID, you can enhance the performance of Cisco BAMS. However, RAID 0 is optional. If you wish to configure RAID 0, you must configure it before you install the Solaris 10 Jumpstart image.

**Caution**

When you install Cisco BAMS 3.30, you must also install the most recent patch of the software. If you fail to install the patch, the software might experience a COR failure.

After you successfully install the Solaris 10 image on the Netra T5220 host machine, you can proceed to install the Solaris 10 Environment patches, the Cisco BAMS 3.30 Base Build, and the latest Cisco BAMS 3.30 patch.

This document does not cover installation of Solaris 10 Environment patches, the Cisco BAMS 3.30 Base Build, nor Cisco BAMS 3.30 patches. See the following documents for installation instructions:

- Solaris 10 Environment Patch—*Cisco Media Gateway Controller Software Installation and Configuration (Release 9.7)*, [Chapter 2, Installing the Sun Solaris 10 Operating System \(Loading the Sun Solaris 10 Operating Environment\)](#)



**Note** If you enable RAID 0 on the Sun Netra T5220 platform, do not install the Sun environment patch CSCOh027.

- BAMS 3.30 Base Build installation—[Chapter 2, “Setup and Installation.”](#)
- BAMS 3.30 Patches download—<http://www.cisco.com/pcgi-bin/swsrch/SWSearch.cgi>

## Hardware Compatibility

The Sun Solaris 10 operating system (Version 0708-V02) referred to in this appendix should be run on a Sun Netra T5220 platform.



**Note** To run the Solaris operating system successfully, without errors, the Sun Netra T5220 must run the required version of firmware, which is 6.7.0, OBP 4.30.0. If the currently installed firmware is an older version, you must upgrade the firmware to the required version. The required version is included in Sun Netra T5220 Patch 139436-01. You must also install Patch 137141-01.

## Checking the Installed Version of Firmware

The following examples show how to check the currently installed version of the firmware on a Sun Netra T5220 server:

### Example 1

```
prtconf -v
OBP 4.30.0 2008/12/11 12:16
```

### Example 2

```
#.
sc> showhost
System Firmware 6.7.0 Netra[TM] T5220 2008/12/11 14:56
```

```
Host flash versions:
 OBP 4.30.0 2008/12/11 12:16
 Hypervisor 1.7.0 2008/12/11 13:43
 Netra[TM] T5220 POST 4.30.0 2008/12/11 12:46
```

```
sc> console
```

## Installing Patch 137141-01

After you install the Sun operating system, you must download the patch from <http://www.sunsolve.sun.com/> and place it in the path `/var/spool/patch/`.

Install the required patch by issuing the following command.

```
patchadd /var/spool/patch/137141-01
```

## Precautions

This section presents precautions you should consider before you perform any of the following installation procedures. When you begin to perform one of the installation procedures, you cannot back out.

- Upgrading an existing Cisco BAMS 3.30 installation to a new Sun Netra T5220 host machine:
  - See the Cisco BAMS 3.30 upgrade procedure in [Appendix B, “Upgrading to BAMS Release 3.30,”](#) *Cisco Billing and Measurements Server User Guide, Release 3.30*
  - Cisco recommends that you perform a full backup before you perform an upgrade procedure. See [Appendix B, “Upgrading to BAMS Release 3.30,”](#) *Cisco Billing and Measurements Server User Guide, Release 3.30*



### Caution

Do not perform the installation procedures provided in this appendix while the host machine is processing live traffic. If you attempt to install a new operating system, you will delete all existing software and data from the machine. If you have questions, contact Cisco TAC.

- New Solaris jumpstart installation—If you are performing a new installation, you need not complete a backup of an operating system installation. You can proceed to configure RAID 0 and then the operating system installation.



### Note

To perform the procedures in this appendix, you should be experienced in basic UNIX commands.

## Prerequisite Checklist

Before you start the procedures in this appendix, complete the tasks listed in the following checklist.

1. Ensure that the Cisco BAMS 3.30 hardware components are installed according to the manufacturer’s recommendations.
2. Verify that you have the correct CD.
3. If required, perform a data backup if the machine was running the Cisco BAMS 3.30 software prior to this operating system installation/upgrade.
4. Complete the following tasks for a new operating system installation only (that is, not for an operating system upgrade):
  - a. Ensure that you have a Network Installation Data Sheet (NIDS) provided by Cisco. This will contain the following information necessary to place the jumpstarted Cisco BAMS on the network after the CD installation.
    - nodename
    - hosts
    - netmasks
    - hostname.<primary interface>
    - Default Gateway IP address
5. Set up a console port through which you can perform the jumpstart/upgrade procedure.

## RAID 0 Setup (Optional)

RAID 0 enables you to construct a logical volume made up of two or more physical disks, to increase the performance of Cisco BAMS. The Sun Netra T5220 server on-board disk controller supports both RAID 0 and RAID 1 volumes.

Configure a RAID 0 volume on Netra T5220 by initializing the volume across two or four physical disks. This means that the Cisco BAMS billing, measurements, and intermediate files data is written across each physical disk in turn or striping the files across the disks. Configuring a RAID 0 volume improves the performance of Cisco BAMS but it does not provide redundancy. Therefore, you incur an increased risk of data loss. If a single disk fails, the entire volume fails and you must delete the volume and reconstruct it.



**Caution**

To minimize data loss, if you enable RAID 0, you must configure Cisco BAMS in redundant mode.

Cisco recommends enabling RAID 0 only when the Cisco BAMS is connected to a Cisco PGW2200 Softswitch that is running a high volume of calls per second, which requires improved performance.

All disks in a RAID 0 volume must be the same size.

For a Cisco BAMS that is in service and running on a Sun Netra T5220 without RAID, if you reinstall the server with RAID 0, all the data and the operating system will be deleted. Therefore, before you attempt to reinstall the server with RAID 0, back up all the data and transfer the files to another server.

## Setting Up a RAID 0 Volume

To set up RAID 0, complete the following steps.

- 
- Step 1** Connect to the Cisco BAMS through a console port.
  - Step 2** Load the appropriate version of the CD-ROM labeled Cisco Solaris 10 Operating Software Startup Disk for Sparc-based Platforms into the CD-ROM drive.
  - Step 3** If the system is currently running, log in as root.
  - Step 4** Use the **halt** command or **init 0** command to instruct Netra T5220 to return the OK prompt:

**# halt**

```
Oct 28 00:13:40 sh-netra-T5220 halt: halted by root
Oct 28 00:13:41 sh-netra-T5220 syslogd: going down on signal 15
SNMP Research DR-Web EMANATE Agent Version 16.1.0.44
Copyright 1989-2005 SNMP Research, Inc.
syncing file systems... done
Program terminated
```

- Step 5** At the OK prompt, boot to the single-user mode with the Solaris 10 jumpstart image CD inserted in the disk drive:

**ok boot cdrom -s**

Text similar to the following is displayed.

```
SC Alert: Host System has Reset

SC Alert: CRITICAL ALARM is set
```

```

Netra T5220, No Keyboard
Copyright 2008 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.28.6, 16256 MB memory available, Serial #76865034.
Ethernet address 0:14:4f:94:de:a, Host ID: 8494de0a.

Boot device: /pci@7c0/pci@0/pci@1/pci@0/ide@8/cdrom@0,0:f File and args: -s
SunOS Release 5.10 Version Generic_120011-14 64-bit
Copyright 1983-2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
Booting to milestone "milestone/single-user:default".
Configuring devices.
Using RPC Bootparams for network configuration information.
Attempting to configure interface e1000g3...
Skipped interface e1000g3
Attempting to configure interface e1000g2...
Skipped interface e1000g2
Attempting to configure interface e1000g1...
Skipped interface e1000g1
Attempting to configure interface e1000g0...
Configured interface e1000g0
Requesting System Maintenance Mode
SINGLE USER MODE
#

```

- Step 6** When the boot process completes, issue the **raidctl** command to display the installed hard disks (in this example, disk 0.1.0 and 0.3.0).

```
raidctl
```

```
Controller: 0
Disk: 0.1.0
Disk: 0.3.0
```

- Step 7** Create the RAID 0 volume with the two disks identified in Step 6.



**Note**

Ensure that there is no useful data on the disk because all data will be lost.

```

raidctl -C "0.1.0 0.3.0" -r 0 0
Creating RAID volume will destroy all data on spare space of member disks, proceed
(yes/no)? yes
/pci@780/pci@0/pci@9/scsi@0 (mpt0):
 Physical disk 0 created.
/pci@780/pci@0/pci@9/scsi@0 (mpt0):
 Physical disk 1 created.
/pci@780/pci@0/pci@9/scsi@0 (mpt0):
 Volume 1 created.
/pci@780/pci@0/pci@9/scsi@0 (mpt0):
 Volume 1 is |enabled||optimal|
/pci@780/pci@0/pci@9/scsi@0 (mpt0):
 Volume 1 is |enabled||optimal|
Volume c0t1d0 is created successfully!
Volume Size Stripe Status Cache RAID
 Sub Size Size Level

c0t1d0 N/A 64K OPTIMAL OFF RAID0
 0.1.0 N/A GOOD
 0.3.0 N/A GOOD

```

**Step 8** Issue the command **raidctl -l** to display the RAID configuration. The information displayed in the following example shows that the preceding command created RAID volume c0t1d0.

```
raidctl -l
Controller: 0
 Volume:c0t1d0
 Disk: 0.1.0
 Disk: 0.3.0
```

To display RAID status, you need to include the name of the RAID volume in `raidctl -l` command

```
raidctl -l c0t1d0
Volume Size Stripe Status Cache RAID
 Sub Disk Size Status Level

c0t1d0 273.3G 64K OPTIMAL N/A RAID0
 0.3.0 136.6G GOOD
 0.1.0 136.6G GOOD
```



**Note** The data displayed in this example indicates that the status of RAID volume c0t1d0 is good.

**Step 9** To label the RAID volume after you have set it up, start the **format** utility and select the disk name that represents the configured RAID volume.



**Note** Ignore warnings returned to the **format** utility that indicate the existence of a single disk only, which is the RAID volume.

```
format

Searching for disks...done

AVAILABLE DISK SELECTIONS:
 0. c0t1d0 <SUN146G cyl 14087 alt 2 hd 24 sec 848>
 /pci@780/pci@0/pci@9/scsi@0/sd@1,0
Specify disk (enter its number): 0
selecting c0t1d0
[disk formatted]
```

```
FORMAT MENU:
disk - select a disk
type - select (define) a disk type
partition - select (define) a partition table
current - describe the current disk
format - format and analyze the disk
repair - repair a defective sector
label - write label to the disk
analyze - surface analysis
defect - defect list management
backup - search for backup labels
verify - read and display labels
save - save new disk/partition definitions
inquiry - show vendor, product and revision
volname - set 8-character volume name
!<cmd> - execute <cmd>, then return
quit
```

**Step 10** Issue the **type** command at the `format>` prompt. Select 0 to autoconfigure the volume.

```
format> type

AVAILABLE DRIVE TYPES:
 0. Auto configure
 1. Quantum ProDrive 80S
 2. Quantum ProDrive 105S
 3. CDC Wren IV 94171-344
 4. SUN0104
 5. SUN0207
 6. SUN0327
 7. SUN0340
 8. SUN0424
 9. SUN0535
 10. SUN0669
 11. SUN1.0G
 12. SUN1.05
 13. SUN1.3G
 14. SUN2.1G
 15. SUN2.9G
 16. Zip 100
 17. Zip 250
 18. Peerless 10GB
 19. SUN146G
 20. other
Specify disk type (enter its number)[19]: 0
c0t1d0: configured with capacity of 272.99GB
<LSILOGIC-LogicalVolume-3000 cyl 65533 alt 2 hd 32 sec 273>
selecting c0t1d0
[disk formatted]
```

**Step 11** Issue the **label** command to write the new label to the disk.

```
format> label
Ready to label disk, continue? yes
```

**Step 12** To verify that the new label has been written, issue the **disk** command, which prints the disk list.

```
format> disk

AVAILABLE DISK SELECTIONS:
 0. c0t1d0 <LSILOGIC-LogicalVolume-3000 cyl 65533 alt 2 hd 32 sec 273>
 /pci@780/pci@0/pci@9/scsi@0/sd@1,0
Specify disk (enter its number)[0]: 0
selecting c0t1d0
[disk formatted]
format>
```




---

**Note** The information displayed in this example indicates that the disk `c0t2d0` has the type `LSILOGIC-LogicalVolume`.

---

**Step 13** Exit the **format** utility.

The RAID volume is now ready for installation of the Solaris 10 Jumpstart image.

- Step 14** Issue the command **init 0** to generate the Ok prompt.

## Deleting a RAID Volume

You can use the procedure in this section to delete a RAID volume when it is not required. When you delete a RAID volume, all the data on the disks is lost and you must reinstall the Solaris 10 operating system. If your Cisco BAMS is in service, and running on a Sun Netra T5220 server, perform a data backup and transfer the files to another server before you delete the RAID volume.

- Step 1** Connect to the Cisco BAMS through a console port.
- Step 2** Load the appropriate version of the CD-ROM labeled “Cisco Solaris 10 Operating Software Startup Disk for Sparc-based Platforms” into the CD-ROM drive.
- Step 3** If the system is currently running, log in as root.

Issue the **halt** command or **init 0** command to instruct Sun Netra T5220 to generate the OK prompt:

```
halt
Oct 28 00:13:40 sh-netra-T5220 halt: halted by root
Oct 28 00:13:41 sh-netra-T5220 syslogd: going down on signal 15
SNMP Research DR-Web EMANATE Agent Version 16.1.0.44
Copyright 1989-2005 SNMP Research, Inc.
syncing file systems... done
Program terminated
```

- Step 4** At the OK prompt, boot to the single-user mode with the Solaris 10 jumpstart image CD inserted in the disk drive:

```
ok boot cdrom -s

SC Alert: Host System has Reset

SC Alert: CRITICAL ALARM is set
|

Netra T5220, No Keyboard
Copyright 2008 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.28.6, 16256 MB memory available, Serial #76865034.
Ethernet address 0:14:4f:94:de:a, Host ID: 8494de0a.

Boot device: /pci@7c0/pci@0/pci@1/pci@0/ide@8/cdrom@0,0:f File and args: -s
SunOS Release 5.10 Version Generic_120011-14 64-bit
Copyright 1983-2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
Booting to milestone "milestone/single-user:default".
Configuring devices.
Using RPC Bootparams for network configuration information.
Attempting to configure interface e1000g3...
Skipped interface e1000g3
Attempting to configure interface e1000g2...
Skipped interface e1000g2
Attempting to configure interface e1000g1...
Skipped interface e1000g1
Attempting to configure interface e1000g0...
Configured interface e1000g0
Requesting System Maintenance Mode
SINGLE USER MODE
```

#

- Step 5** When the boot completes, enter the command **raidctl** to display the configured RAID volume (in this example, the system displays the volume c0t1d0).

```
raidctl
Controller: 0
 Volume:c0t1d0
 Disk: 0.1.0
 Disk: 0.3.0
```

- Step 6** Delete RAID Volume c0t1d0 by issuing the command **raidctl -d cot1d0**.

**Note**


---

Ensure that there is no useful data on the disk because all data will be lost.

---

```
raidctl -d c0t1d0
Deleting RAID volume c0t1d0 will destroy all data it contains; proceed (yes/no)? yes
/pci@780/pci@0/pci@9/scsi@0 (mpt0):
 Volume 1 deleted.
/pci@780/pci@0/pci@9/scsi@0 (mpt0):
 Physical disk 0 deleted.
/pci@780/pci@0/pci@9/scsi@0 (mpt0):
 Physical disk 1 deleted.
WARNING: /pci@780/pci@0/pci@9/scsi@0/sd@3,0 (sd5):
 Corrupt label; wrong magic number

Volume c0t1d0 is deleted successfully!
```

- Step 7** Issue the command **raidctl** to verify that the volume was deleted.

```
raidctl
Controller: 0
Disk: 0.1.0
Disk: 0.3.0
```

- Step 8** Issue the command **init 0** to derive the OK prompt and restart the operating system installation.

```
init 0
syncing file systems... done
Program terminated
Ok
```

**Note**


---

If you encounter the error message “Configuration over device node failed when deleting 2nd volume,” issue the command **devfsadm** to access the second disk.

---

- Step 9** Perform Steps 8–13 in the section [“Setting Up a RAID 0 Volume”](#) to complete labeling the disks and to continue with the installation
- 

## New Solaris 10 Installation

After you setup RAID 0 (optional) successfully, complete the following steps to install the Solaris 10 jumpstart image.

- Step 1** Connect to the Cisco BAMS through a console port.
- Step 2** Load the appropriate version of the CD-ROM labeled “Cisco Solaris 10 Operating Software Startup Disk for Sparc-based Platforms” into the CD-ROM drive.
- Step 3** If the system is currently running, log in as root. Instruct the system to generate the ok prompt by issuing the command **init 0**.

```
init 0
```

- Step 4** Boot the system from the CD-ROM drive by entering the appropriate command

```
ok boot cdrom - install
```

The system displays text similar to the following:

```
SC Alert: Host System has Reset

SC Alert: CRITICAL ALARM is set
\
Netra T5220, No Keyboard
Copyright 2008 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.28.6, 16256 MB memory available, Serial #76865034.
Ethernet address 0:14:4f:94:de:a, Host ID: 8494de0a.

Boot device: /pci@7c0/pci@0/pci@1/pci@0/ide@8/cdrom@0,0:f File and args: - install
SunOS Release 5.10 Version Generic_120011-14 64-bit
Copyright 1983-2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
Configuring devices.
Using RPC Bootparams for network configuration information.
Attempting to configure interface e1000g3...
Skipped interface e1000g3
Attempting to configure interface e1000g2...
Skipped interface e1000g2
Attempting to configure interface e1000g1...
Skipped interface e1000g1
Attempting to configure interface e1000g0...
Configured interface e1000g0
Setting up Java. Please wait...
Beginning system identification...
Searching for configuration file(s)...
Search complete.
Discovering additional network configuration...
Completing system identification...
Starting remote procedure call (RPC) services: done.
System identification complete.
Starting Solaris installation program...
Searching for JumpStart directory...
<<< using cdrom install_config >>>
Checking rules.ok file...
Using profile: any_machine
Using finish script: any_finish
Executing JumpStart preinstall phase...
Searching for SolStart directory...
Checking rules.ok file...
Using begin script: install_begin
Using finish script: patch_finish
Executing SolStart preinstall phase...
Executing begin script "install_begin"...
Begin script install_begin execution completed.

Processing profile
```

```
- Selecting cluster (SUNWCrnet)
- Selecting package (SUNWadmfw)
- Selecting package (SUNWcpc)
- Selecting package (SUNWcpcu)
- Selecting package (SUNWcstl)
- Selecting package (SUNWless)
- Selecting package (SUNWlucfg)
- Selecting package (SUNWlur)
- Selecting package (SUNWluu)
- Selecting package (SUNWmkcd)
- Selecting package (SUNWmipu)
- Selecting package (SUNWmipr)
- Selecting package (SUNWocf)
- Selecting package (SUNWocfr)
- Selecting package (SUNWspnego)
- Selecting package (SUNWter)
- Selecting package (SUNWtnfc)
- Selecting package (SUNWucbt)
- Selecting package (SUNWvld)
- Selecting package (SUNWvldu)
- Selecting package (SUNWzsh)
- Selecting package (SUNWsacom)
- Selecting package (SUNWxwdv)
- Selecting package (SUNWctpls)
- Selecting package (SUNWgssdh)
- Selecting package (SUNWm64cf)
- Selecting package (SUNWj5rt)
- Selecting package (SUNWxwplt)
- Selecting package (SUNWxwplr)
- Selecting package (SUNWdtcor)
- Selecting package (SUNWxwice)
- Selecting package (SUNWxwrtl)
- Selecting package (SUNWxwfnt)
- Selecting package (SUNWlibC)
- Selecting package (SUNWmfrun)
- Selecting package (SUNWi15rf)
- Selecting package (SUNWadmfr)
- Selecting package (SUNWrsg)
- Selecting package (SUNWsadmi)
- Selecting package (SUNWsasnm)
- Selecting package (SUNWmibii)
- Selecting package (SUNWxi18n)
- Selecting package (SUNWtoo)
- Selecting package (SUNWsprot)
- Selecting package (SUNWbip)
- Selecting package (SUNWbind)
- Selecting package (SUNWbindr)
- Selecting package (SUNWgzip)
- Selecting package (SUNWzip)
- Selecting package (SUNWbash)
- Selecting package (SUNWtcsh)
- Selecting package (SUNWgss)
- Selecting package (SUNWgssc)
- Selecting package (SUNWgssk)
- Selecting package (SUNWqos)
- Selecting package (SUNWqosu)
- Selecting package (SUNWmdb)
- Selecting package (SUNWmdbr)
- Selecting package (SUNWmdbdm)
- Selecting package (SUNWnfsckr)
- Selecting package (SUNWnfschr)
- Selecting package (SUNWnfsctu)
- Selecting package (SUNWifp)
- Selecting package (SUNWged)
```

```

- Selecting package (SUNW1394)
- Selecting package (SUNWqfed)
- Selecting package (SUNWaccr)
- Selecting package (SUNWaccu)
- Selecting package (SUNWus)
- Selecting package (SUNWrsgk)
- Selecting package (SUNWzebrar)
- Selecting package (SUNWzebrau)
- Selecting package (SUNWeurf)
- Selecting package (SUNWgcmn)
- Selecting package (SUNWeuodf)
- Selecting package (SUNWxwacx)
- Selecting package (SUNWpoolr)
- Selecting package (SUNWpool)
- Selecting package (SUNWluzone)
- Selecting package (SUNWzoner)
- Selecting package (SUNWzoneu)
- Selecting package (SUNWbtool)
- Selecting package (SUNWdtrc)
- Selecting package (SUNWdtrp)
- Selecting package (SUNWfss)
- Selecting package (SUNWinst)
- Selecting package (SUNWipc)
- Selecting package (SUNWqus)
- Selecting package (SUNWqusu)
- Selecting package (SUNWrcmdc)
- Selecting package (SUNWtdmr)
- Selecting package (SUNWtltk)
- Selecting package (SUNWtnetc)
- Selecting package (SUNWtnfd)
- Selecting package (SUNWtnetd)
- Selecting package (SUNWtnetr)
- Selecting package (SUNWsshcu)
- Selecting package (SUNWsshdr)
- Selecting package (SUNWsshdu)
- Selecting package (SUNWsshr)
- Selecting package (SUNWsshu)
- Selecting package (SUNWatfsr)
- Selecting package (SUNWatfsu)
- Selecting package (SUNWrcmdr)
- Selecting package (SUNWrcmds)
- Selecting package (SUNWxcu4)
- Selecting package (SUNWglmr)
- Selecting package (SUNWi2cr)
- Selecting package (SUNWpstl)
- Selecting package (SUNWbart)
- Selecting package (SUNWpiclu)
- Selecting package (SUNWpiclr)
- Selecting package (SUNWopensslr)
- Selecting package (SUNWopenssl-commands)
- Selecting all disks
- Configuring boot device
- Using disk (c0t1d0) for "rootdisk"
- Configuring / (c0t1d0s0)
- Configuring /var (c0t1d0s1)
- Configuring swap (c0t1d0s3)
- Configuring (c0t1d0s4)
- Configuring (c0t1d0s6)
- Configuring /opt (c0t1d0s5)

```

Verifying disk configuration

Verifying space allocation

```
- Total software size: 396.45 Mbytes
```

Preparing system for Solaris install

Configuring disk (c0t1d0)

- Creating Solaris disk label (VTOC)

Creating and checking UFS file systems

- Creating / (c0t1d0s0)  
 - Creating /var (c0t1d0s1)  
 - Creating /opt (c0t1d0s5)

Beginning Solaris software installation

Starting software installation

|                            |        |        |            |
|----------------------------|--------|--------|------------|
| SUNWlucfg.....done.        | 396.37 | Mbytes | remaining. |
| SUNWcsu.....done.          | 381.64 | Mbytes | remaining. |
| SUNWcsr.....done.          | 377.45 | Mbytes | remaining. |
| SUNWcs1.....done.          | 363.40 | Mbytes | remaining. |
| SUNWcnetr.....done.        | 363.34 | Mbytes | remaining. |
| SUNWkvm200.v.....done.     | 363.16 | Mbytes | remaining. |
| SUNWkvm.v.....done.        | 362.64 | Mbytes | remaining. |
| SUNWcart200.v.....done.    | 362.55 | Mbytes | remaining. |
| SUNWcar.v.....done.        | 362.46 | Mbytes | remaining. |
| SUNWcakrnT5220.v.....done. | 362.41 | Mbytes | remaining. |
| SUNWcakr.v.....done.       | 354.15 | Mbytes | remaining. |
| SUNWckr.....done.          | 342.16 | Mbytes | remaining. |
| SUNWcsd.....done.          | 341.89 | Mbytes | remaining. |
| SUNWpr.....done.           | 340.81 | Mbytes | remaining. |
| SUNWt1s.....done.          | 332.14 | Mbytes | remaining. |
| SUNWxwrt1.....done.        | 331.97 | Mbytes | remaining. |
| SUNWxwice.....done.        | 331.69 | Mbytes | remaining. |
| SUNWzlib.....done.         | 331.32 | Mbytes | remaining. |
| SUNWbzip.....done.         | 331.05 | Mbytes | remaining. |
| SUNWlibmsr.....done.       | 327.77 | Mbytes | remaining. |
| SUNWlibms.....done.        | 327.73 | Mbytes | remaining. |
| SUNWxwfmt.....done.        | 316.02 | Mbytes | remaining. |
| SUNWxwdv.....done.         | 315.97 | Mbytes | remaining. |
| SUNWxwplr.....done.        | 315.91 | Mbytes | remaining. |
| SUNWperl584core.....done.  | 310.46 | Mbytes | remaining. |
| SUNWperl584usr.....done.   | 289.32 | Mbytes | remaining. |
| SUNWesu.....done.          | 287.36 | Mbytes | remaining. |
| SUNWcpp.....done.          | 287.25 | Mbytes | remaining. |
| SUNWdtcor.....done.        | 287.22 | Mbytes | remaining. |
| SUNWxwplt.....done.        | 264.79 | Mbytes | remaining. |
| SUNWlibC.....done.         | 259.03 | Mbytes | remaining. |
| SUNWctpls.....done.        | 258.95 | Mbytes | remaining. |
| SUNWmfrun.....done.        | 248.86 | Mbytes | remaining. |
| SUNWj5rt.....done.         | 165.44 | Mbytes | remaining. |
| SUNWlexpt.....done.        | 164.86 | Mbytes | remaining. |
| SUNWlxml.....done.         | 160.73 | Mbytes | remaining. |
| SUNWkrbr.....done.         | 160.64 | Mbytes | remaining. |
| SUNWkrbu.....done.         | 158.07 | Mbytes | remaining. |
| SUNWgssc.....done.         | 158.01 | Mbytes | remaining. |
| SUNWgss.....done.          | 157.63 | Mbytes | remaining. |
| SUNWgcmn.....done.         | 157.60 | Mbytes | remaining. |
| SUNWtdmr.....done.         | 157.49 | Mbytes | remaining. |
| SUNWt1tk.....done.         | 154.43 | Mbytes | remaining. |
| SUNWtnetc.....done.        | 154.26 | Mbytes | remaining. |
| SUNWtnetd.....done.        | 154.17 | Mbytes | remaining. |
| SUNWtnetr.....done.        | 154.12 | Mbytes | remaining. |
| SUNWtnfc.....done.         | 153.55 | Mbytes | remaining. |
| SUNWtnfd.....done.         | 153.46 | Mbytes | remaining. |
| SUNWtoo.....done.          | 152.34 | Mbytes | remaining. |
| SUNWaudd.....done.         | 151.67 | Mbytes | remaining. |

```

SUNWusb.....done. 150.19 Mbytes remaining.
SUNWusbs.....done. 150.10 Mbytes remaining.
SUNWuacm.....done. 150.03 Mbytes remaining.
SUNWucht.....done. 150.00 Mbytes remaining.
SUNWudaplr.....done. 149.98 Mbytes remaining.
SUNWudaplu.....done. 149.72 Mbytes remaining.
SUNWib.....done. 148.00 Mbytes remaining.
SUNWipoib.....done. 147.86 Mbytes remaining.
SUNWtavor.....done. 147.06 Mbytes remaining.
SUNWudapltu.....done. 146.59 Mbytes remaining.
SUNWudapltr.....done. 146.34 Mbytes remaining.
SUNWuedg.....done. 146.16 Mbytes remaining.
SUNWugen.....done. 146.09 Mbytes remaining.
SUNWuksp.....done. 145.99 Mbytes remaining.
SUNWukspfw.....done. 145.94 Mbytes remaining.
SUNWopenssl-libraries.....done. 138.92 Mbytes remaining.
SUNWwbsup.....done. 138.56 Mbytes remaining.
SUNWinstall-patch-utils-root.....done. 138.52 Mbytes remaining.
SUNWpkgcmdsr.....done. 138.48 Mbytes remaining.
SUNWproduct-registry-root.....done. 138.46 Mbytes remaining.
SUNWwsr2.....done. 138.12 Mbytes remaining.
SUNWpkgcmdsu.....done. 135.12 Mbytes remaining.
SUNWswmt.....done. 134.35 Mbytes remaining.
SUNWuprl.....done. 134.26 Mbytes remaining.
SUNWgzip.....done. 134.16 Mbytes remaining.
SUNWocfr.....done. 134.09 Mbytes remaining.
SUNWocf.....done. 133.51 Mbytes remaining.
SUNWxi18n.....done. 132.51 Mbytes remaining.
SUNWvld.....done. 132.46 Mbytes remaining.
SUNWxge.....done. 131.87 Mbytes remaining.
SUNWvldu.....done. 131.81 Mbytes remaining.
SUNWnfscr.....done. 130.38 Mbytes remaining.
SUNWgssk.....done. 130.13 Mbytes remaining.
SUNWrsgk.....done. 130.05 Mbytes remaining.
SUNWnfscr.....done. 129.90 Mbytes remaining.
SUNWnfscu.....done. 129.33 Mbytes remaining.
SUNWeurf.....done. 125.03 Mbytes remaining.
SUNWi15rf.....done. 124.89 Mbytes remaining.
SUNWmdr.....done. 122.44 Mbytes remaining.
SUNWmdu.....done. 121.72 Mbytes remaining.
SUNWadmcr.....done. 119.58 Mbytes remaining.
SUNWadmfr.....done. 119.56 Mbytes remaining.
SUNWadmfw.....done. 118.85 Mbytes remaining.
SUNWadmlib-sysid.....done. 118.59 Mbytes remaining.
SUNWadmr.....done. 118.50 Mbytes remaining.
SUNWadmap.....done. 117.57 Mbytes remaining.
SUNWlur.....done. 116.24 Mbytes remaining.
SUNWluu.....done. 115.00 Mbytes remaining.
SUNWbip.....done. 114.82 Mbytes remaining.
SUNWrcmdc.....done. 113.92 Mbytes remaining.
SUNWrcmds.....done. 113.62 Mbytes remaining.
SUNWxwacx.....done. 113.44 Mbytes remaining.
SUNWzfskr.....done. 112.51 Mbytes remaining.
SUNWzfsr.....done. 111.30 Mbytes remaining.
SUNWsmapi.....done. 110.62 Mbytes remaining.
SUNWzfsu.....done. 108.96 Mbytes remaining.
SUNWxcu4.....done. 107.74 Mbytes remaining.
SUNWsprt.....done. 106.22 Mbytes remaining.
SUNWcslr.....done. 89.74 Mbytes remaining.
SUNWrsg.....done. 89.61 Mbytes remaining.
SUNWgssdh.....done. 89.29 Mbytes remaining.
SUNWidnl.....done. 88.73 Mbytes remaining.
SUNWluxop.....done. 87.97 Mbytes remaining.
SUNWses.....done. 87.87 Mbytes remaining.

```

|                       |       |        |            |
|-----------------------|-------|--------|------------|
| SUNWssad.....done.    | 87.54 | Mbytes | remaining. |
| SUNWifp.....done.     | 87.26 | Mbytes | remaining. |
| SUNWinst.....done.    | 86.77 | Mbytes | remaining. |
| SUNWintgige.....done. | 86.43 | Mbytes | remaining. |
| SUNWipc.....done.     | 86.38 | Mbytes | remaining. |
| SUNWipfr.....done.    | 86.31 | Mbytes | remaining. |
| SUNWipfu.....done.    | 85.03 | Mbytes | remaining. |
| SUNWnistr.....done.   | 84.89 | Mbytes | remaining. |
| SUNWnisu.....done.    | 82.52 | Mbytes | remaining. |
| SUNWzebrar.....done.  | 82.37 | Mbytes | remaining. |
| SUNWzebrau.....done.  | 77.22 | Mbytes | remaining. |
| SUNWzip.....done.     | 77.03 | Mbytes | remaining. |
| SUNWzoner.....done.   | 76.97 | Mbytes | remaining. |
| SUNWluzone.....done.  | 76.82 | Mbytes | remaining. |
| SUNWpoolr.....done.   | 76.76 | Mbytes | remaining. |
| SUNWpool.....done.    | 75.91 | Mbytes | remaining. |
| SUNWtecla.....done.   | 75.28 | Mbytes | remaining. |
| SUNWzoneu.....done.   | 74.26 | Mbytes | remaining. |
| SUNWzsh.....done.     | 71.13 | Mbytes | remaining. |
| SUNWiscsir.....done.  | 70.42 | Mbytes | remaining. |
| SUNWiscsiu.....done.  | 69.86 | Mbytes | remaining. |
| SUNWloc.....done.     | 69.35 | Mbytes | remaining. |
| SUNWcpcu.....done.    | 68.75 | Mbytes | remaining. |
| SUNWfmdr.....done.    | 68.69 | Mbytes | remaining. |
| SUNWfmd.....done.     | 63.22 | Mbytes | remaining. |
| SUNWmdb.....done.     | 57.60 | Mbytes | remaining. |
| SUNWmdbr.....done.    | 54.46 | Mbytes | remaining. |
| SUNWpiclu.....done.   | 50.41 | Mbytes | remaining. |
| SUNWl394.....done.    | 49.63 | Mbytes | remaining. |
| SUNWbash.....done.    | 48.90 | Mbytes | remaining. |
| SUNWaccr.....done.    | 48.81 | Mbytes | remaining. |
| SUNWaccu.....done.    | 48.43 | Mbytes | remaining. |
| SUNWced.v.....done.   | 47.76 | Mbytes | remaining. |
| SUNWcpc.v.....done.   | 47.68 | Mbytes | remaining. |
| SUNWiopc.v.....done.  | 47.37 | Mbytes | remaining. |
| SUNWbtool.....done.   | 46.02 | Mbytes | remaining. |
| SUNWldomr.v.....done. | 45.06 | Mbytes | remaining. |
| SUNWldomu.v.....done. | 44.94 | Mbytes | remaining. |
| SUNWn2cp.v.....done.  | 44.77 | Mbytes | remaining. |
| SUNWniumx.v.....done. | 44.71 | Mbytes | remaining. |
| SUNWnxge.v.....done.  | 43.99 | Mbytes | remaining. |
| SUNWust1.v.....done.  | 43.85 | Mbytes | remaining. |
| SUNWust2.v.....done.  | 43.74 | Mbytes | remaining. |
| SUNWatfsr.....done.   | 43.67 | Mbytes | remaining. |
| SUNWatfsu.....done.   | 43.38 | Mbytes | remaining. |
| SUNWbart.....done.    | 43.32 | Mbytes | remaining. |
| SUNWbindr.....done.   | 43.25 | Mbytes | remaining. |
| SUNWbind.....done.    | 39.67 | Mbytes | remaining. |
| SUNWdtrc.....done.    | 34.37 | Mbytes | remaining. |
| SUNWcfcl.....done.    | 34.23 | Mbytes | remaining. |
| SUNWcfclr.....done.   | 34.21 | Mbytes | remaining. |
| SUNWcfpl.....done.    | 33.83 | Mbytes | remaining. |
| SUNWcfplr.....done.   | 33.78 | Mbytes | remaining. |
| SUNWchxge.....done.   | 33.54 | Mbytes | remaining. |
| SUNWjfca.....done.    | 32.70 | Mbytes | remaining. |
| SUNWjfcau.....done.   | 32.61 | Mbytes | remaining. |
| SUNWcry.....done.     | 30.98 | Mbytes | remaining. |
| SUNWcryr.....done.    | 30.54 | Mbytes | remaining. |
| SUNWcstl.....done.    | 30.39 | Mbytes | remaining. |
| SUNWjss.....done.     | 26.03 | Mbytes | remaining. |
| SUNWkey.....done.     | 25.62 | Mbytes | remaining. |
| SUNWless.....done.    | 25.45 | Mbytes | remaining. |
| SUNWlibsasl.....done. | 24.86 | Mbytes | remaining. |
| SUNWlldap.....done.   | 24.66 | Mbytes | remaining. |

```

SUNWdtrp.....done. 24.16 Mbytes remaining.
SUNWluxopr.....done. 23.48 Mbytes remaining.
SUNWefcl.....done. 22.78 Mbytes remaining.
SUNWefcr.....done. 22.73 Mbytes remaining.
SUNWefcu.....done. 22.68 Mbytes remaining.
SUNWfctl.....done. 22.22 Mbytes remaining.
SUNWemlxs.....done. 18.07 Mbytes remaining.
SUNWemlxu.....done. 17.29 Mbytes remaining.
SUNWerid.....done. 17.11 Mbytes remaining.
SUNWeuodf.....done. 16.99 Mbytes remaining.
SUNWm64cf.....done. 16.93 Mbytes remaining.
SUNWfcprt.....done. 16.86 Mbytes remaining.
SUNWmdbdm.....done. 16.81 Mbytes remaining.
SUNWfchbar.....done. 16.78 Mbytes remaining.
SUNWfchba.....done. 15.19 Mbytes remaining.
SUNWfcip.....done. 14.99 Mbytes remaining.
SUNWfcmbd.....done. 14.78 Mbytes remaining.
SUNWfcp.....done. 14.48 Mbytes remaining.
SUNWmibii.....done. 14.35 Mbytes remaining.
SUNWsasnm.....done. 13.47 Mbytes remaining.
SUNWsadmi.....done. 12.47 Mbytes remaining.
SUNWsaacom.....done. 12.15 Mbytes remaining.
SUNWmipr.....done. 12.06 Mbytes remaining.
SUNWmipu.....done. 11.78 Mbytes remaining.
SUNWmkcd.....done. 10.48 Mbytes remaining.
SUNWfcm.....done. 10.33 Mbytes remaining.
SUNWfss.....done. 10.22 Mbytes remaining.
SUNWmpapir.....done. 10.09 Mbytes remaining.
SUNWmpapi.....done. 9.98 Mbytes remaining.
SUNWmpathadm.....done. 9.89 Mbytes remaining.
SUNWmpathadmr.....done. 9.85 Mbytes remaining.
SUNWmpsvplr.....done. 9.00 Mbytes remaining.
SUNWged.....done. 8.75 Mbytes remaining.
SUNWopenssl-commands.....done. 8.37 Mbytes remaining.
SUNWopensslr.....done. 8.32 Mbytes remaining.
SUNWpd.....done. 7.61 Mbytes remaining.
SUNWpiclr.....done. 7.58 Mbytes remaining.
SUNWqos.....done. 7.36 Mbytes remaining.
SUNWqfed.....done. 7.14 Mbytes remaining.
SUNWqlc.....done. 5.91 Mbytes remaining.
SUNWqlcu.....done. 5.85 Mbytes remaining.
SUNWqosu.....done. 5.73 Mbytes remaining.
SUNWqus.....done. 5.49 Mbytes remaining.
SUNWqusu.....done. 5.46 Mbytes remaining.
SUNWrcmdr.....done. 5.38 Mbytes remaining.
SUNWrge.....done. 5.22 Mbytes remaining.
SUNWroute.....done. 4.90 Mbytes remaining.
SUNWrpcib.....done. 4.75 Mbytes remaining.
SUNWsolnm.....done. 4.72 Mbytes remaining.
SUNWspnego.....done. 4.62 Mbytes remaining.
SUNWsshcu.....done. 4.18 Mbytes remaining.
SUNWsshdr.....done. 4.11 Mbytes remaining.
SUNWsshdu.....done. 3.69 Mbytes remaining.
SUNWsshr.....done. 3.58 Mbytes remaining.
SUNWsshu.....done. 3.00 Mbytes remaining.
SUNWtcsh.....done. 2.62 Mbytes remaining.
SUNWter.....done. 1.00 Mbytes remaining.

```

Completed software installation

Solaris 10 software installation partially failed

Solaris 10 packages partially installed  
SUNWxwft

```
Customizing system files
 - Mount points table (/etc/vfstab)
 - Network host addresses (/etc/hosts)
 - Environment variables (/etc/default/init)

Cleaning devices

Customizing system devices
 - Physical devices (/devices)
 - Logical devices (/dev)

Installing boot information
 - Installing boot blocks (c0t1d0s0)
 - Installing boot blocks (/dev/rdisk/c0t1d0s0)

Installation log location
 - /a/var/sadm/system/logs/install_log (before reboot)
 - /var/sadm/system/logs/install_log (after reboot)

Installation complete
Executing SolStart postinstall phase...
Executing finish script "patch_finish"...

Finish script patch_finish execution completed.
Executing JumpStart postinstall phase...
Executing finish script "any_finish"...

any_finish started with SI_CONFIG_DIR = /tmp/install_config
any_finish completed

Finish script any_finish execution completed.

The begin script log 'begin.log'
is located in /var/sadm/system/logs after reboot.

The finish script log 'finish.log'
is located in /var/sadm/system/logs after reboot.

syncing file systems... done
rebooting...

SC Alert: Host System has Reset

SC Alert: CRITICAL ALARM is set
\

Netra T5220, No Keyboard

Copyright 2008 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.28.6, 16256 MB memory available, Serial #76865034.
Ethernet address 0:14:4f:94:de:a, Host ID: 8494de0a.

Boot device: /pci@780/pci@0/pci@9/scsi@0/disk@1,0:a File and args:
SunOS Release 5.10 Version Generic_120011-14 64-bit
Copyright 1983-2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
Hostname: vtghost
Configuring devices.
Loading smf(5) service descriptions: 40/108
108/108
/dev/rdisk/c0t1d0s5 is clean
Creating new rsa public/private host key pair
```

```
Creating new dsa public/private host key pair
```

```
vtghost console login: Oct 28 02:34:16 vtghost svc.startd[7]:
application/cde-printinfo:default failed: transitioned to maintenance (see 'svcs -xv' for
details)
```

```
vtghost console login: root
Password:
Oct 28 02:36:24 vtghost login: ROOT LOGIN /dev/console
Sun Microsystems Inc. SunOS 5.10 Generic January 2005
```

**Note**

The following two error messages will be recorded in the installation log:

```
“Solaris 10 software installation partially failed”
“application/cde-printinfo:default failed”
```

Please ignore these messages as the software will be installed during installation of the Core-finish script.

## Configuring Your Host

To configure your host, complete the following steps.

- Step 1** Log in as root with the default password, vtghost. The system displays text similar to the following:

```
Oct 28 02:36:24 vtghost login: ROOT LOGIN /dev/console
Sun Microsystems Inc. SunOS 5.10 Generic January 2005

#
```

- Step 2** To reconfigure the system, enter the command the **sys-unconfig** and press Enter. The system displays text similar to the following:

```
#WARNING
#
#This program will unconfigure your system. It will cause it
#to revert to a "blank" system - it will not have a name or know
#about other systems or networks.
#
#This program will also halt the system.
#
#Do you want to continue (y/n) ?
```

**Step 3** To continue the reconfiguration process, enter `y` and press Enter.

The system displays text similar to the following:

```
svc.startd: The system is coming down. Please wait.
svc.startd: 69 system services are now being stopped.
Oct 28 02:52:18 vtghost syslogd: going down on signal 15
svc.startd: The system is down.
syncing file systems... done
Program terminated
SC Alert: CRITICAL ALARM is set
terminated
{3} ok
```

**Step 4** Reboot your system using the method identified for your platform type.

For Sparc-based platforms, enter the command **boot** and press Enter to reboot the system.

The system displays information similar to the following:

```
{8} ok boot

SC Alert: Host System has Reset

SC Alert: CRITICAL ALARM is set
|

Netra T5220, No Keyboard

Copyright 2008 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.28.6, 16256 MB memory available, Serial #76865034.
Ethernet address 0:14:4f:94:de:a, Host ID: 8494de0a.

Boot device: /pci@780/pci@0/pci@9/scsi@0/disk@1,0:a File and args:
SunOS Release 5.10 Version Generic_120011-14 64-bit
Copyright 1983-2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
Hostname: unknown
Configuring devices.
/dev/rdisk/c0t1d0s5 is clean
```

**Step 5** If you are installing on a Sparc-based platform, you must select your terminal type when a screen similar to the following is displayed:

What type of terminal are you using?

- 1) ANSI Standard CRT
- 2) DEC VT52
- 3) DEC VT100
- 4) Heathkit 19
- 5) Lear Siegler ADM31
- 6) PC Console
- 7) Sun Command Tool
- 8) Sun Workstation
- 9) Televideo 910
- 10) Televideo 925
- 11) Wyse Model 50
- 12) X Terminal Emulator (xterms)
- 13) CDE Terminal Emulator (dtterm)
- 14) Other

Type the number of your choice and press Return:

Enter the number that corresponds to the terminal you are using and press Enter. For example, if you are using an X terminal emulator, type 12 and press Enter.

The system displays information similar to the following:

Please specify the keyboard layout from the list below.  
> To make a selection, use the arrow keys to highlight the option and press Return to mark it [X].

```
keyboard Layout

^ [] Serbia-And-Montenegro
| [] Slovenian
| [] Slovakian
| [] Spanish
| [] Swedish
| [] Swiss-French
| [] Swiss-German
| [] Taiwanese
| [] TurkishQ
| [] TurkishF
| [] UK-English
- [X] US-English
```

```
Creating new rsa public/private host key pair
Creating new dsa public/private host key pair
Configuring network interface addresses: e1000g0 e1000g1 e1000g2 e1000g3.
in.rdisc: No interfaces up
```

Text similar to the following is displayed:

Network Connectivity

Specify Yes if the system is connected to the network by one of the Solaris or vendor network/communication Ethernet cards that are supported on the Solaris CD. See your hardware documentation for the current list of supported cards.  
Specify No if the system is connected to a network/communication card that is not supported on the Solaris CD, and follow the instructions listed under Help.

Networked

```

[X] Yes
[] No
```

-----  
F2\_Continue F6\_Help

- Step 6** Use the arrow keys to navigate, and press the spacebar to make your selection. Verify that you selected Yes and press F2 to continue.

The system displays text similar to the following:

Configure Multiple Network Interfaces

Multiple network interfaces have been detected on this system. Specify all of the network interfaces you want to configure.

Note: You must choose at least one interface to configure.

Network interfaces

```

[] e1000g0
[] e1000g1
[] e1000g2
[] e1000g3
```

```

F2_Continue F6_Help
```

**Note**

The current screen might show a different interface, depending on the platform and PCI card that are installed. The interface configuration prompts do not provide an option to return to a previous step or to exit the interface configuration. If you enter an incorrect value, power down the BAMS; then power up the BAMS, and return to Step 4.

**Step 7** Select the interface(s) you want to configure and press F2 to continue.

If you chose to configure a single interface, proceed to Step 9.

If you chose to configure multiple interfaces, proceed to Step 8.

**Step 8** Before you configure multiple interfaces, the system displays text similar to the following:

```
Primary Network Interface
On this screen you must specify which of the following network adapters is the system's
primary network interface. Usually the correct choice is the lowest number. However, do
not guess; ask your system administrator if you're not sure.
> To make a selection, use the arrow keys to highlight the option and press Return to mark
it [X].
```

```
Primary network interface

[X] e1000g0
[] e1000g1
[] e1000g2
```

```

Esc-2_Continue Esc-6_Help
```

Select your primary network interface and press Esc-2 to continue.

**Step 9** For this step, specify whether or not you want the network interface to use DHCP. The system displays text similar to the following:

```
DHCP for e1000g0
```

```
Specify whether or not this network interface should use DHCP to configure itself. Choose
Yes if DHCP is to be used, or No if the network interface is to be configured manually.
NOTE: DHCP support will not be enabled, if selected, until after the system reboots.
Use DHCP for e1000g0
```

```

[] Yes
[X] No
```

```

Esc-2_Continue Esc-6_Help
```

**Step 10** Verify that you selected No and press Esc-2 to continue.

The system displays text similar to the following:

```
Host Name for e1000g0
```

```
Enter the host name which identifies this system on the network. The name must be unique
within your domain; creating a duplicate host name will cause problems on the network
after you install Solaris.
```

A host name must have at least one character; it can contain letters, digits, and minus signs (-).

Host name for e1000g0

-----  
Esc-2\_Continue      Esc-6\_Help

**Caution**

If you are configuring your system with multiple interfaces, remember that each interface must have a unique name. If you enter the identical name for multiple interfaces, the installation script enters a loop, which requires you to reboot your system.

**Step 11** Type the host name of the target Netra machine, and press Esc-2 to continue.

The system displays text similar to the following:

IP Address for e1000g0

Enter the Internet Protocol (IP) address for this network interface. It must be unique and follow your site's address conventions, or a system/network failure could result. IP addresses contain four sets of numbers separated by periods (for example 129.200.9.1).

IP address for e1000g0

IP address:

-----  
Esc-2\_Continue      Esc-6\_Help

**Step 12** Enter the IP address of this interface in dotted decimal format and press Esc-2 to continue.

The system displays text similar to the following:

Subnet for e1000g0

On this screen you must specify whether this system is part of a subnet. If you specify incorrectly, the system will have problems communicating on the network after you reboot.  
> To make a selection, use the arrow keys to highlight the option and press Return to mark it [X].

System part of a subnet

-----  
 Yes

No

-----  
Esc-2\_Continue      Esc-6\_Help

Note If you need to modify your IP addresses after you have installed Sun Solaris 10, there are three files you need to update, instead of the two files required in previous releases of Sun Solaris operating system software. The following files must be edited to in order to modify the IP address for an interface:

```
/etc/inet/hosts
/etc/hostname.inf_name
/etc/inet/ipnodes
```

Where inf\_name is the name of the interface, such as e1000g0.

- Step 13** Verify that you selected Yes. (Use the arrow keys to move the cursor to Yes and press the spacebar to select it). Press Esc-2 to continue.

The system displays text similar to the following:

```
Netmask for e1000g0
```

```
On this screen you must specify the netmask of your subnet. A default netmask is shown; do not accept the default unless you are sure it is correct for your subnet. A netmask must contain four sets of numbers separated by periods (for example 255.255.255.0).
```

```
Netmask for e1000g0 255.255.255.0
```

```

Esc-2_Continue Esc-6_Help
```

- Step 14** Enter the site-specific Subnet Mask for the subnet. Press Esc-2 to continue.

The system displays text similar to the following:

```
IPv6 for e1000g0
```

```
Specify whether or not you want to enable IPv6, the next generation Internet Protocol, on this network interface. Enabling IPv6 will have no effect if this machine is not on a network that provides IPv6 service. IPv4 service will not be affected if IPv6 is enabled.
```

```
> To make a selection, use the arrow keys to highlight the option and press Return to mark it [X].
```

```
Enable IPv6 for e1000g0
```

```

[] Yes
```

```
[X] No
```

```

Esc-2_Continue Esc-6_Help
```



**Note** The system takes approximately 30 seconds to process this selection. A countdown appears in the display after you enter your selection.

- Step 15** Verify that No is selected and press F2 to continue.

Text similar to the following is displayed:

```
Set the Default Route for e1000g0
```

```
To specify the default route, you can let the software try to detect one upon reboot, you can specify the IP address of the router, or you can choose None. Choose None if you do not have a router on your subnet.
```

```
> To make a selection, use the arrow keys to select your choice and press Return to mark it [X].
```

```
Default Route for e1000g0
```

```

[X] Detect one upon reboot
```

```
[] Specify one
```

```
[] None
```

```

Esc-2_Continue Esc-6_Help
```

**Step 16** Verify that you selected “Specify one” and press Esc-2 to continue.

Text similar to the following is displayed.

```
Default Route IP Address for e1000g0
Enter the IP address of the default route. This entry will be placed in the
/etc/defaultrouter file and will be the default route after you reboot (example
129.146.89.225).
```

```
Router IP Address for e1000g0
```

```

Esc-2_Continue Esc-6_Help
```

**Step 17** Enter the Router IP address of this interface in dotted decimal format and press Esc-2 to continue.

Text similar to the following is displayed:

```
Confirm Information for e1000g0
> Confirm the following information. If it is correct, press F2; to change any
information, press F4.
```

```
Primary network interface: e1000g0
Secondary network interfaces: e1000g1, e1000g2
System part of a subnet: Yes
Netmask: 255.255.255.224
Enable IPv6: No
Default Route: Specify one
Router IP Address: 10.74.49.1
```

```
Esc-2_Continue Esc-4_Change Esc-6_Help
```

**Step 18** Confirm that the information displayed is correct. Press Esc-2 to accept the information and continue, or press Esc-4 to go back and make changes.



**Note**

---

The system takes approximately 30 seconds to process this selection. A countdown appears in the display after you enter your choice.

---

If you chose to configure a single interface, proceed to Step 20.

If you chose to configure multiple interfaces, proceed to Step 19.

**Step 19** Repeat steps 9 through 18 for your next interface. Repeat these steps until you have configured all of your interfaces.

**Step 20** Respond to the prompts included in the following displayed text.

```
Configure Security Policy:
```

```
Specify Yes if the system will use the Kerberos security mechanism.
Specify No if this system will use standard UNIX security.
```

```
Configure Kerberos Security
```

```

[] Yes
[X] No
```

```
Esc-2_Continue Esc-4_Change Esc-6_Help
```

**Step 21** Verify that you selected No and press Esc-2 to continue.

Text similar to the following is displayed:

```
Confirm Information
```

```
> Confirm the following information. If it is correct, press F2; to change any
information, press F4.
```

```

Esc-2_Continue Esc-4_Change Esc-6_Help
```

**Step 22** Confirm that you entered No to the preceding prompt. Press Esc-2 to continue.

Text similar to the following is displayed:

```
Name Service
```

```
On this screen you must provide name service information. Select the name service that
will be used by this system, or None if your system will either not use a name service at
all, or if it will use a name service not listed here.
```

```
> To make a selection, use the arrow keys to highlight the option and press Return to mark
it [X].
```

```
Name service
```

```

[X] NIS+
[] NIS
[] DNS
[] LDAP
[] None
```

```

Esc-2_Continue Esc-6_Help
```

**Step 23** Use the arrow keys to move the cursor to None and press the spacebar to select it. Press Esc-2 to continue.

Text similar to the following is displayed:

```
Confirm Information
```

```
> Confirm the following information. If it is correct, press F2; to
change any information, press F4.
```

```
Name service: None
```

```
Esc-2_Continue Esc-4_Change Esc-6_Help
```

**Step 24** Enter the names of the search domains for this system and press Esc-2 to continue.

Text similar to the following is displayed:

```
NFSv4 Domain Name
```

```
NFS version 4 uses a domain name that is automatically derived from the system's
naming services. The derived domain name is sufficient for most configurations. In
a few cases, mounts that cross domain boundaries might cause files to appear to be
owned by "nobody" due to the lack of a common domain name.
```

```
The current NFSv4 default domain is: "
```

```
NFSv4 Domain Configuration
```

```

[X] Use the NFSv4 domain derived by the system
[] Specify a different NFSv4 domain
```

```
Esc-2_Continue Esc-6_Help
```

**Step 25** Confirm that you responded to the preceding prompts correctly. Press Esc-2 to continue.

Text similar to the following is displayed.

```
Confirm Information for NFSv4 Domain
> Confirm the following information. If it is correct, press F2; to
change any information, press F4.
```

```

Esc-2_Continue Esc-4_Change Esc-6_Help
```

**Step 26** Confirm that you responded to the preceding prompts correctly. Press Esc-2 to continue.

Text similar to the following is displayed:

```
Time Zone
On this screen you must specify your default time zone. You can specify a time zone
in three ways: select one of the continents or oceans from the list, select other -
offset from GMT, or other - specify time zone file.
> To make a selection, use the arrow keys to highlight the option and press
Return to mark it [X].
```

```
Continents and Oceans

```

```
- [] Africa
| [] Americas
| [] Antarctica
| [] Arctic Ocean
| [] Asia
| [] Atlantic Ocean
| [] Australia
| [] Europe
| [] Indian Ocean
v [] Pacific Ocean
```

```

Esc-2_Continue Esc-6_Help
```

**Step 27** Select the time zone in which the system is located.



**Note** The following two steps show how to set the time zone. The example shows Eastern Standard Time in the United States.

- a. Use the arrow keys to move the cursor to Americas and press the spacebar to select it. Press Esc-2 to continue.

Text similar to the following is displayed.

```
Country or Region
> To make a selection, use the arrow keys to highlight the option and press Return to mark
it [X].
```

```
Countries and Regions

```

```
- [] United States
| [] Anguilla
| [] Antigua & Barbuda
| [] Argentina
| [] Aruba
```

```

| [] Bahamas
| [] Barbados
| [] Belize
| [] Bolivia
| [] Brazil
| [] Canada
| [] Cayman Islands
| [] Chile
v [] Colombia

```

```

Esc-2_Continue Esc-6_Help

```

- b. Use the arrow keys to move the cursor to United States and press the spacebar to select it. Press Esc-2 to continue.

Text similar to the following is displayed:

```

Time Zone
> To make a selection, use the arrow keys to highlight the option and press Return to mark
it [X].

```

```
Time zones
```

```

- [] Eastern Time
| [] Eastern Time - Michigan - most locations
| [] Eastern Time - Kentucky - Louisville area
| [] Eastern Time - Kentucky - Wayne County
| [] Eastern Time - Indiana - most locations
| [] Eastern Time - Indiana - Starke County
| [] Eastern Time - Indiana - Pulaski County
| [] Eastern Time - Indiana - Crawford County
| [] Eastern Time - Indiana - Switzerland County
| [] Central Time
| [] Central Time - Indiana - Daviess, Dubois, Knox, Martin & Perry Count
| [] Central Time - Indiana - Pike County
| [] Central Time - Michigan - Dickinson, Gogebic, Iron & Menominee Count
v [] Central Time - North Dakota - Oliver County

```

```

Esc-2_Continue Esc-6_Help

```

- c. Use the arrow keys to move the cursor to your time zone (in this example, “Eastern Time” is selected). Press the space bar to select it. Press Esc-2 to continue.

Text similar to the following is displayed:

```
Date and Time
```

```
> Accept the default date and time or enter new values.
```

```
Date and time: 2008-10-28 04:40
```

```
Year (4 digits) : 2008
```

```
Month (1-12) : 10
```

```
Day (1-31) : 28
```

```
Hour (0-23) : 04
```

```
Minute (0-59) : 40
```

```
Esc-2_Continue Esc-6_Help

```

**Step 28** Enter the correct date and time and press F2 to continue.

Text similar to the following is displayed:

```
Confirm Information
> Confirm the following information. If it is correct, press F2; to change any
information, press F4
.
Time zone: Eastern Time
(US/Eastern)
Date and time: 2008-10-28 04:40:00
Esc-2_Continue Esc-4_Change Esc-6_Help
```

**Step 29** Confirm that you responded to the preceding prompts correctly. Press F2 to continue.

Text similar to the following is displayed:

```
Root Password

Please enter the root password for this system. The root password may contain alphanumeric
and special characters. For security, the password will not be displayed on the screen as
you type it.
> If you do not want a root password, leave both entries blank.
Root password:
Root password:

Esc-2_Continue Esc-6_Help
```

**Step 30** Enter your root password twice and press Esc-2 to continue.

Text similar to the following might be displayed:

```
System identification is completed.

rebooting system due to change(s) in /etc/default/init

syncing file systems... done
rebooting...

SC Alert: Host System has Reset

SC Alert: CRITICAL ALARM is set
/

Netra T5220, No Keyboard

Copyright 2008 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.28.6, 16256 MB memory available, Serial #76865034.
Ethernet address 0:14:4f:94:de:a, Host ID: 8494de0a.

Boot device: /pci@780/pci@0/pci@9/scsi@0/disk@1,0:a File and args:
SunOS Release 5.10 Version Generic_120011-14 64-bit
Copyright 1983-2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
Hostname: sh-netra-T5220

/dev/rdisk/c0t1d0s5 is clean

sh-netra-T5220 console login: Oct 28 04:42:45 sh-netra-T5220 svc.startd[7]:
application/cde-printinfo:default failed: transitioned to maintenance (see 'svcs -xv' for
details)
```

```
sh-netra-T5220 console login:
```

- Step 31** If you want to enable root access to the Cisco BAMS, complete the following steps:
- a. Edit the `/etc/default/login` file, and make the following changes:
    - Comment out the line starting with “CONSOLE=” by inserting a “#” in front of this line.
    - Add the line “svcadm enable telnet” if you want to enable telnet.
    - Add the line “svcadm enable rlogin” if you want to enable remote login.
  - b. Save your changes to this file.

**Caution**

Step 31 is optional. Telnet and rlogin might expose your platform to security risk. Turn them on only if required.

## Platform-Specific Installation Procedure

Complete the following steps to install files specific to your Cisco platform:

- Step 1** Log in as root with the default password, vtghost.
- Step 2** Reinsert the CD into the CD-ROM drive.
- Step 3** Mount the CD-ROM in the `cdrom` directory by entering the following command:

```
mount -F hsfs -o ro /dev/dsk/devname /cdrom For example mount -F hsfs -o ro
/dev/dsk/c1t0d0s0 /cdrom
```

**Note**

The devname is the device name for the primary CD-ROM drive. The device name might vary depending on your hardware platform. To verify the device name on your Netra T5220, issue the Solaris command `iostat -En`.

- Step 4** Run the script `core_finish` by entering the appropriate command.

For Sparc-based platforms:

```
./cdrom/core_finish/core_finish.sh
```

- Step 5** The script prompts you to enter the name of your host twice. Enter the name of your host and press Enter each time.

**Note**

When you enter the name of your host at this time you do not set the UNIX host name value. The value you enter is used to set up the crash directory `/var/hostname/crash`. The system returns a response similar to the following:

```
sh-netra-T5220 is the hostname of this box; enter hostname that applies to your specific
case
```

Text similar to the following is displayed:

```
CORE CD installation finishing procedure started
```

```

Please enter this host node name:
sh-netra-T5220
Re-enter this host node name:
sh-netra-T5220
Using 'sh-netra-T5220' for this host
Start installation of core extra packages

Processing package instance <SUNWxfnt> from </cdrom/Solaris_10/Product>

X Window System platform required fonts(sparc) 6.6.2.7400,REV=0.2004.12.15

This appears to be an attempt to install the same architecture and
version of a package which is already installed. This installation
will attempt to overwrite this package.

Copyright 2005 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
Using </usr> as the package base directory.
Processing package information.
Processing system information.
 366 package pathnames are already properly installed.

Installing X Window System platform required fonts as <SUNWxfnt>

Installing part 1 of 1.
[verifying class <fontsdire>]
[verifying class <fontsalias>]
[verifying class <encodingsdire>]
[verifying class <ttmapsdire>]

Installation of <SUNWxfnt> was successful.
Adding <SUNWvts>

Processing package instance <SUNWvts> from </opt/xtrapkgs>

SunVTS Framework(sparc) 7.0,REV=2007.11.22.17.02
Executing checkinstall script.
Copyright 2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
Using </usr> as the package base directory.
Processing package information.
Processing system information.

Installing SunVTS Framework as <SUNWvts>

Installing part 1 of 1.
11804 blocks

Installation of <SUNWvts> was successful.
Adding <SUNWvtsr>

Processing package instance <SUNWvtsr> from </opt/xtrapkgs>

SunVTS Framework (Root)(sparc) 7.0,REV=2007.11.22.17.02
Using </> as the package base directory.
Processing package information.
Processing system information.
 1 package pathname is already properly installed.

Installing SunVTS Framework (Root) as <SUNWvtsr>

Installing part 1 of 1.
Copyright 2007 Sun Microsystems, Inc. All rights reserved.

```

```
Use is subject to license terms.
6 blocks

Installation of <SUNWvtst> was successful.
Adding <SUNWvtsts>

Processing package instance <SUNWvtsts> from </opt/xtrapkgs>

SunVTS Core Installation Tests(sparc) 7.0,REV=2007.11.22.17.02
Executing checkinstall script.
Copyright 2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
Using </usr> as the package base directory.
Processing package information.
Processing system information.
 11 package pathnames are already properly installed.

Installing SunVTS Core Installation Tests as <SUNWvtsts>

Installing part 1 of 1.
97583 blocks

Installation of <SUNWvtsts> was successful.
Adding <SUNWexplo>

Processing package instance <SUNWexplo> from </opt/xtrapkgs>

Sun(TM) Explorer Data Collector(all) 5.10,REV=2007.09.20.19.12
Executing checkinstall script.
Copyright 1996-2007 Sun Microsystems, Inc.
All rights reserved.
Using </opt> as the package base directory.
Processing package information.
Processing system information.

Installing Sun(TM) Explorer Data Collector as <SUNWexplo>

Executing preinstall script.
Installing part 1 of 1.
/opt/SUNWexplo/LICENSEREADME/LICENSE.txt
/opt/SUNWexplo/LICENSEREADME/THIRDPARTYLICENSEREADME.txt
/opt/SUNWexplo/bin/capture.sparc
/opt/SUNWexplo/bin/core_check.sh
/opt/SUNWexplo/bin/curl.i386
/opt/SUNWexplo/bin/curl.sparc
/opt/SUNWexplo/bin/diskinfo.i386
/opt/SUNWexplo/bin/diskinfo.sparc
/opt/SUNWexplo/bin/exp_defaults
/opt/SUNWexplo/bin/explorer
/opt/SUNWexplo/bin/explorer_notify_update
/opt/SUNWexplo/bin/instinfo_config
/opt/SUNWexplo/bin/j2se_config
/opt/SUNWexplo/bin/mktime.i386
/opt/SUNWexplo/bin/mktime.sparc
/opt/SUNWexplo/bin/rprtfru.sparc
/opt/SUNWexplo/bin/se3kxtr.ksh
/opt/SUNWexplo/bin/snapshot
/opt/SUNWexplo/bin/st_diag.i386
/opt/SUNWexplo/bin/st_diag.sparc
/opt/SUNWexplo/bin/sunone_config
/opt/SUNWexplo/bin/sunone_ps
/opt/SUNWexplo/doc/CHANGES
/opt/SUNWexplo/doc/README
/opt/SUNWexplo/doc/README.j2se_config
```

```

/opt/SUNWexplo/doc/README.man
/opt/SUNWexplo/doc/README.sunone_config
/opt/SUNWexplo/java/fruid-scappclient.jar
/opt/SUNWexplo/java/libfru.jar
/opt/SUNWexplo/lib/AMERICAS_countries.1
/opt/SUNWexplo/lib/AMERICAS_countries.2
/opt/SUNWexplo/lib/AMERICAS_countries.3
/opt/SUNWexplo/lib/AMERICAS_countries_codes
/opt/SUNWexplo/lib/APAC_countries.1
/opt/SUNWexplo/lib/APAC_countries.2
/opt/SUNWexplo/lib/APAC_countries.3
/opt/SUNWexplo/lib/APAC_countries.4
/opt/SUNWexplo/lib/APAC_countries_codes
/opt/SUNWexplo/lib/EMEA_countries.1
/opt/SUNWexplo/lib/EMEA_countries.2
/opt/SUNWexplo/lib/EMEA_countries.3
/opt/SUNWexplo/lib/EMEA_countries.4
/opt/SUNWexplo/lib/EMEA_countries.5
/opt/SUNWexplo/lib/EMEA_countries.6
/opt/SUNWexplo/lib/EMEA_countries.7
/opt/SUNWexplo/lib/EMEA_countries.8
/opt/SUNWexplo/lib/EMEA_countries_codes
/opt/SUNWexplo/lib/ca-bundle.crt
/opt/SUNWexplo/lib/crontab.txt
/opt/SUNWexplo/lib/exp_check
/opt/SUNWexplo/lib/exp_common
/opt/SUNWexplo/lib/exp_file
/opt/SUNWexplo/lib/exp_ftp
/opt/SUNWexplo/lib/exp_https
/opt/SUNWexplo/lib/exp_j2se
/opt/SUNWexplo/lib/exp_mail
/opt/SUNWexplo/lib/exp_main
/opt/SUNWexplo/lib/exp_postproc
/opt/SUNWexplo/lib/exp_sunone
/opt/SUNWexplo/lib/exp_tools
/opt/SUNWexplo/lib/exp_transport
/opt/SUNWexplo/lib/libfru.so <symbolic link>
/opt/SUNWexplo/lib/libfru.so.1
/opt/SUNWexplo/lib/libfrujni.so <symbolic link>
/opt/SUNWexplo/lib/libfrujni.so.1
/opt/SUNWexplo/lib/libfrureg.so <symbolic link>
/opt/SUNWexplo/lib/libfrureg.so.1
/opt/SUNWexplo/lib/libfrurmi.so <symbolic link>
/opt/SUNWexplo/lib/libfrurmi.so.1
/opt/SUNWexplo/lib/libfruutils.so <symbolic link>
/opt/SUNWexplo/lib/libfruutils.so.1
/opt/SUNWexplo/lib/locale/C/LC_MESSAGES/explorer.mo
/opt/SUNWexplo/lib/locale/C/LC_MESSAGES/explorer.po
/opt/SUNWexplo/lib/snapshot.conf
/opt/SUNWexplo/lib/uu2b64
/opt/SUNWexplo/man/man1m/explorer.1m
/opt/SUNWexplo/man/man4/explorer.4
/opt/SUNWexplo/man/man5/explorer.5
/opt/SUNWexplo/tools/1280extended
/opt/SUNWexplo/tools/Tx000
/opt/SUNWexplo/tools/alomextended
/opt/SUNWexplo/tools/b1600extended
/opt/SUNWexplo/tools/b1600switch
/opt/SUNWexplo/tools/cluster
/opt/SUNWexplo/tools/cmdline
/opt/SUNWexplo/tools/crypto
/opt/SUNWexplo/tools/cst
/opt/SUNWexplo/tools/disks
/opt/SUNWexplo/tools/emc

```

```
/opt/SUNWexplo/tools/etc
/opt/SUNWexplo/tools/fcal
/opt/SUNWexplo/tools/firelink
/opt/SUNWexplo/tools/fma
/opt/SUNWexplo/tools/fru
/opt/SUNWexplo/tools/hds
/opt/SUNWexplo/tools/ilomextended
/opt/SUNWexplo/tools/indy
/opt/SUNWexplo/tools/init
/opt/SUNWexplo/tools/instinfo
/opt/SUNWexplo/tools/iplanet <symbolic link>
/opt/SUNWexplo/tools/ipmi
/opt/SUNWexplo/tools/ipmiextended
/opt/SUNWexplo/tools/j2se
/opt/SUNWexplo/tools/ldap
/opt/SUNWexplo/tools/lic
/opt/SUNWexplo/tools/lp
/opt/SUNWexplo/tools/lvm
/opt/SUNWexplo/tools/messages
/opt/SUNWexplo/tools/nbu
/opt/SUNWexplo/tools/nbu_extended
/opt/SUNWexplo/tools/ndd
/opt/SUNWexplo/tools/netconnect
/opt/SUNWexplo/tools/netinfo
/opt/SUNWexplo/tools/nhas
/opt/SUNWexplo/tools/patch
/opt/SUNWexplo/tools/pci
/opt/SUNWexplo/tools/photon
/opt/SUNWexplo/tools/pkg
/opt/SUNWexplo/tools/proc
/opt/SUNWexplo/tools/quorumserv
/opt/SUNWexplo/tools/samfs
/opt/SUNWexplo/tools/sanextended
/opt/SUNWexplo/tools/sap
/opt/SUNWexplo/tools/sbu
/opt/SUNWexplo/tools/scextended
/opt/SUNWexplo/tools/se3k
/opt/SUNWexplo/tools/se3kextended
/opt/SUNWexplo/tools/se61xx
/opt/SUNWexplo/tools/se6320
/opt/SUNWexplo/tools/se6920
/opt/SUNWexplo/tools/sf15k_ndd
/opt/SUNWexplo/tools/sf15k_sc
/opt/SUNWexplo/tools/smfextended
/opt/SUNWexplo/tools/sonoma
/opt/SUNWexplo/tools/srsextended
/opt/SUNWexplo/tools/ssa
/opt/SUNWexplo/tools/ssp
/opt/SUNWexplo/tools/st25xx
/opt/SUNWexplo/tools/storade
/opt/SUNWexplo/tools/storedge
/opt/SUNWexplo/tools/stortools
/opt/SUNWexplo/tools/sunjes
/opt/SUNWexplo/tools/sunone
/opt/SUNWexplo/tools/sunray
/opt/SUNWexplo/tools/sysconfig
/opt/SUNWexplo/tools/syslogs
/opt/SUNWexplo/tools/t3
/opt/SUNWexplo/tools/t3extended
/opt/SUNWexplo/tools/tape
/opt/SUNWexplo/tools/test
/opt/SUNWexplo/tools/u4ft
/opt/SUNWexplo/tools/ufsextended
/opt/SUNWexplo/tools/var
```

```

/opt/SUNWexplo/tools/vtsst
/opt/SUNWexplo/tools/vxfs
/opt/SUNWexplo/tools/vxvm
/opt/SUNWexplo/tools/xscfextended
[verifying class <none>]
Executing postinstall script.
/usr/bin/catman is not available for use
Please run: catman -w -M /opt/SUNWexplo/man manually

Installation of <SUNWexplo> was successful.
Adding <SUNWexplu>

Processing package instance <SUNWexplu> from </opt/xtrapkgs>

Sun(TM) Explorer Data Collector Config Files(all) 5.10,REV=2007.09.20.19.12
Executing checkinstall script.
Copyright 1996-2007 Sun Microsystems, Inc.
All rights reserved.
Using </> as the package base directory.
Processing package information.
Processing system information.
 2 package pathnames are already properly installed.

Installing Sun(TM) Explorer Data Collector Config Files as <SUNWexplu>

Installing part 1 of 1.
/etc/opt/SUNWexplo/LICENSEREADME/LICENSE.txt
/etc/opt/SUNWexplo/t3files.txt
[verifying class <none>]
Modifying /etc/opt/SUNWexplo/1280input.txt
Modifying /etc/opt/SUNWexplo/alominput.txt
Modifying /etc/opt/SUNWexplo/b1600input.txt
Modifying /etc/opt/SUNWexplo/b1600switchinput.txt
Modifying /etc/opt/SUNWexplo/ilominput.txt
Modifying /etc/opt/SUNWexplo/indyinput.txt
Modifying /etc/opt/SUNWexplo/ipmiinput.txt
Modifying /etc/opt/SUNWexplo/saninput.txt
Modifying /etc/opt/SUNWexplo/scinput.txt
Modifying /etc/opt/SUNWexplo/se3kinput.txt
Modifying /etc/opt/SUNWexplo/se6320input.txt
Modifying /etc/opt/SUNWexplo/se6920input.txt
Modifying /etc/opt/SUNWexplo/srscinput.txt
Modifying /etc/opt/SUNWexplo/t3input.txt
Modifying /etc/opt/SUNWexplo/tapeinput.txt
Modifying /etc/opt/SUNWexplo/xscfinput.txt
[verifying class <build>]
Executing postinstall script.

Installation of <SUNWexplu> was successful.
Adding <SUNWpsr>

Processing package instance <SUNWpsr> from </opt/xtrapkgs>

Solaris Print - LP Server, (root)(sparc) 13.1,REV=2005.01.21.15.53
Using </> as the package base directory.
Processing package information.
Processing system information.
 11 package pathnames are already properly installed.

Installing Solaris Print - LP Server, (root) as <SUNWpsr>

Executing preinstall script.
Copyright 2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.

```

```
Installing part 1 of 1.
19 blocks
[verifying class <renameold>]
[verifying class <preserve>]
[verifying class <manifest>]
Executing postinstall script.

Installation of <SUNWpsr> was successful.
Adding <SUNWpccr>

Processing package instance <SUNWpccr> from </opt/xtrapkgs>

Solaris Print - Client, (root)(sparc) 13.1,REV=2005.01.21.15.53
Using </> as the package base directory.
Processing package information.
Processing system information.
 10 package pathnames are already properly installed.

Installing Solaris Print - Client, (root) as <SUNWpccr>

Installing part 1 of 1.
Copyright 2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
2 blocks
[verifying class <preserve>]
[verifying class <manifest>]
Executing postinstall script.

Installation of <SUNWpccr> was successful.
Adding <SUNWpcu>

Processing package instance <SUNWpcu> from </opt/xtrapkgs>

Solaris Print - Client, (usr)(sparc) 13.1,REV=2005.01.21.15.53
Using </> as the package base directory.
Processing package information.
Processing system information.
 4 package pathnames are already properly installed.

Installing Solaris Print - Client, (usr) as <SUNWpcu>

Installing part 1 of 1.
Copyright 2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
545 blocks

Installation of <SUNWpcu> was successful.
Adding <SUNWpsu>

Processing package instance <SUNWpsu> from </opt/xtrapkgs>

Solaris Print - LP Server, (usr)(sparc) 13.1,REV=2005.01.21.15.53
Using </> as the package base directory.
Processing package information.
Processing system information.
 12 package pathnames are already properly installed.

Installing Solaris Print - LP Server, (usr) as <SUNWpsu>

Installing part 1 of 1.
Copyright 2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
3157 blocks
```

```

Installation of <SUNWpsu> was successful.
Adding <SMCsudo>

Processing package instance <SMCsudo> from </opt/xtrapkgs>

sudo(sparc) 1.6.9p12
Todd Miller et al
Using </usr/local> as the package base directory.
Processing package information.
Processing system information.
 2 package pathnames are already properly installed.

Installing sudo as <SMCsudo>

Installing part 1 of 1.
/usr/local/bin/sudo
/usr/local/bin/sudoedit
/usr/local/doc/sudo/BUGS
/usr/local/doc/sudo/CHANGES
/usr/local/doc/sudo/HISTORY
/usr/local/doc/sudo/INSTALL
/usr/local/doc/sudo/INSTALL.configure
/usr/local/doc/sudo/LICENSE
/usr/local/doc/sudo/PORTING
/usr/local/doc/sudo/README
/usr/local/doc/sudo/README.LDAP
/usr/local/doc/sudo/TROUBLESHOOTING
/usr/local/doc/sudo/UPGRADE
/usr/local/etc/sudoers
/usr/local/libexec/sudo_noexec.la
/usr/local/libexec/sudo_noexec.so
/usr/local/man/man1m/sudo.1m
/usr/local/man/man1m/sudoedit.1m
/usr/local/man/man1m/visudo.1m
/usr/local/man/man4/sudoers.4
/usr/local/sbin/visudo
[verifying class <none>]

Installation of <SMCsudo> was successful.
Adding <SMClsof>

Processing package instance <SMClsof> from </opt/xtrapkgs>

lsof(sparc) 4.77
Vic Abell
Using </usr/local> as the package base directory.
Processing package information.
Processing system information.
 3 package pathnames are already properly installed.

Installing lsof as <SMClsof>

Installing part 1 of 1.
/usr/local/bin/lsof
/usr/local/bin/sparcv7/lsof
/usr/local/bin/sparcv9/lsof
/usr/local/doc/lsof/00.README.FIRST <attribute change only>
/usr/local/doc/lsof/00CREDITS
/usr/local/doc/lsof/00DCACHE
/usr/local/doc/lsof/00DIALECTS
/usr/local/doc/lsof/00DIST
/usr/local/doc/lsof/00FAQ
/usr/local/doc/lsof/00LSOF-L
/usr/local/doc/lsof/00MANIFEST

```

```

/usr/local/doc/lsof/00PORTING
/usr/local/doc/lsof/00QUICKSTART
/usr/local/doc/lsof/00README
/usr/local/doc/lsof/00TEST
/usr/local/doc/lsof/00XCONFIG
/usr/local/doc/lsof/lsof.man
/usr/local/man/man8/lsof.8
[verifying class <none>]

Installation of <SMClsof> was successful.
SUNW,Netra-T5220

SUNW,Netra-T5220 needs LOM packages
spawn pkgadd -d . SUNWlomr

Processing package instance <SUNWlomr> from </opt/lompkgs>

LOMlite driver (root)(sparc) 2.0,REV=2000.08.22.14.14
Copyright 2000 Sun Microsystems, Inc. All rights reserved.
Executing checkinstall script.
Using </> as the package base directory.
Processing package information.
Processing system information.
 7 package pathnames are already properly installed.
Verifying package dependencies.
Verifying disk space requirements.
Checking for conflicts with packages already installed.
Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <SUNWlomr> [y,n,?] y

Installing LOMlite driver (root) as <SUNWlomr>

Installing part 1 of 1.
20 blocks
i.drivers (INFO): Starting
i.drivers (INFO): Installing /opt/lompkgs/SUNWlomr/reloc/platform/sun4u/kernel/drv/lom
i.drivers (INFO): Installing /opt/lompkgs/SUNWlomr/reloc/platform/sun4u/kernel/drv/lomp
i.drivers (INFO): Installing
/opt/lompkgs/SUNWlomr/reloc/platform/sun4u/kernel/drv/sparcv9/lom
i.drivers (INFO): Installing
/opt/lompkgs/SUNWlomr/reloc/platform/sun4u/kernel/drv/sparcv9/lomp
i.drivers (INFO): Installing
/opt/lompkgs/SUNWlomr/reloc/platform/sun4u/kernel/drv/sparcv9/lompv
i.drivers (INFO): Identified drivers 'lom lomp lomv'
i.drivers (INFO): Cleaning up old driver 'lom'...
i.drivers (INFO): Cleaning up old driver 'lomp'...
i.drivers (INFO): Cleaning up old driver 'lomv'...
i.drivers (INFO): Cleaning up old driver 'lomh'...

i.drivers (INFO): Adding driver 'lomp'...
 driver = 'lomp'
 aliases = ''
 link = 'lomp'
 spec = 'lomp'

Adding devlink entry 'type=ddi_pseudo;name=lomp lomp'
adding driver with aliases '' perm '* 0644 root sys'
Cannot find module (lomp).
i.drivers (ERROR): Failed to add driver, status 1

```

```

i.drivers (INFO): Adding driver 'lomv'...
 driver = 'lomv'
 aliases = 'SUNW,lomv'
 link = 'SUNW,lomv lomv'
 spec = '\M0'

Adding devlink entry 'type=ddi_pseudo;name=SUNW,lomv \M0'
Adding devlink entry 'type=ddi_pseudo;name=lomv \M0'
adding driver with aliases 'SUNW,lomv' perm '* 0644 root sys'
Cannot find module (lomv).
i.drivers (ERROR): Failed to add driver, status 1

i.drivers (INFO): Adding driver 'lom'...
 driver = 'lom'
 aliases = 'SUNW,lomh SUNW,lom'
 link = 'SUNW,lomh SUNW,lom'
 spec = 'lom'

Adding devlink entry 'type=ddi_pseudo;name=SUNW,lomh lom'
Adding devlink entry 'type=ddi_pseudo;name=SUNW,lom lom'
adding driver with aliases 'SUNW,lomh SUNW,lom' perm '* 0644 root sys'
Cannot find module (lom).
i.drivers (ERROR): Failed to add driver, status 1
i.drivers (ERROR): Failed with status 1

pkgadd: ERROR: class action script did not complete successfully

Installation of <SUNWlomr> failed.
spawn pkgadd -d . SUNWlomu

Processing package instance <SUNWlomou> from </opt/lompkgs>

LOmlite Utilities (usr)(sparc) 2.0,REV=2000.08.22.14.14
Copyright 2000 Sun Microsystems, Inc. All rights reserved.
Using </> as the package base directory.
Processing package information.
Processing system information.
 4 package pathnames are already properly installed.
Verifying package dependencies.
WARNING:
 The <SUNWlomr> package "LOmlite driver (root)" is a
 prerequisite package and is not completely installed.

Do you want to continue with the installation of <SUNWlomou> [y,n,?] y
Verifying disk space requirements.
Checking for conflicts with packages already installed.
Checking for setuid/setgid programs.

Installing LOmlite Utilities (usr) as <SUNWlomou>

Installing part 1 of 1.
2333 blocks

Installation of <SUNWlomou> was successful.
Validating patches...

Loading patches installed on the system...

Done!

Loading patches requested to install.

Done!

```

The following requested patches have packages not installed on the system

Package SUNWlomm from directory SUNWlomm in patch 110208-22 is not installed on the system. Changes for package SUNWlomm will not be applied to the system.

Package SUNWclomu from directory SUNWclomu in patch 110208-22 is not installed on the system. Changes for package SUNWclomu will not be applied to the system.

Package SUNWdlomu from directory SUNWdlomu in patch 110208-22 is not installed on the system. Changes for package SUNWdlomu will not be applied to the system.

Package SUNWelomu from directory SUNWelomu in patch 110208-22 is not installed on the system. Changes for package SUNWelomu will not be applied to the system.

Package SUNWflomu from directory SUNWflomu in patch 110208-22 is not installed on the system. Changes for package SUNWflomu will not be applied to the system.

Package SUNWhlomu from directory SUNWhlomu in patch 110208-22 is not installed on the system. Changes for package SUNWhlomu will not be applied to the system.

Package SUNWilomu from directory SUNWilomu in patch 110208-22 is not installed on the system. Changes for package SUNWilomu will not be applied to the system.

Package SUNWjloму from directory SUNWjloму in patch 110208-22 is not installed on the system. Changes for package SUNWjloму will not be applied to the system.

Package SUNWklomu from directory SUNWklomu in patch 110208-22 is not installed on the system. Changes for package SUNWklomu will not be applied to the system.

Package SUNWslomu from directory SUNWslomu in patch 110208-22 is not installed on the system. Changes for package SUNWslomu will not be applied to the system.

Checking patches that you specified for installation.

Done!

Approved patches will be installed in this order:

110208-22

Checking installed patches...

Verifying sufficient filesystem capacity (dry run method)...

Installing patch packages...

Patch 110208-22 has been successfully installed.

See /var/sadm/patch/110208-22/log for details

Executing postpatch script...

postpatch (INFO): Starting

postpatch (INFO): Identified drivers 'lom lomp lomv'

postpatch (INFO): Cleaning up old driver 'lom'...

Cleaning up old devlink entry 'type=ddi\_pseudo;name=SUNW,lom lom'

postpatch (INFO): Cleaning up old driver 'lomp'...

Cleaning up old devlink entry 'type=ddi\_pseudo;name=lomp lomp'

postpatch (INFO): Cleaning up old driver 'lomv'...

Cleaning up old devlink entry 'type=ddi\_pseudo;name=SUNW,lomv \M0

type=ddi\_pseudo;name=lomv \M0'

postpatch (INFO): Cleaning up old driver 'lomh'...

Cleaning up old devlink entry 'type=ddi\_pseudo;name=SUNW,lomh lom'

postpatch (INFO): Adding driver 'lomp'...

driver = 'lomp'

aliases = ''

link = 'lomp'

spec = 'lomp'

Adding devlink entry 'type=ddi\_pseudo;name=lomp lomp'

adding driver with aliases '' perm '\* 0644 root sys'

Cannot find module (lomp).

postpatch (ERROR): Failed to add driver, status 1

```

postpatch (INFO): Adding driver 'lomv'...
 driver = 'lomv'
 aliases = 'SUNW,lomv'
 link = 'SUNW,lomv lomv'
 spec = '\M0'

Adding devlink entry 'type=ddi_pseudo;name=SUNW,lomv \M0'
Adding devlink entry 'type=ddi_pseudo;name=lomv \M0'
adding driver with aliases 'SUNW,lomv' perm '* 0644 root sys'
Cannot find module (lomv).
postpatch (ERROR): Failed to add driver, status 1

postpatch (INFO): Adding driver 'lom'...
 driver = 'lom'
 aliases = 'SUNW,lomh SUNW,lom'
 link = 'SUNW,lomh SUNW,lom'
 spec = 'lom'

Adding devlink entry 'type=ddi_pseudo;name=SUNW,lomh lom'
Adding devlink entry 'type=ddi_pseudo;name=SUNW,lom lom'
adding driver with aliases 'SUNW,lomh SUNW,lom' perm '* 0644 root sys'
Cannot find module (lom).
postpatch (ERROR): Failed to add driver, status 1
postpatch (ERROR): Failed with status 1

The postpatch script exited with return code 1.
Backing out patch:
Validating patches...

Loading patches installed on the system...

Done!

Checking patches that you specified for removal.

Done!

Approved patches will be removed in this order:

110208-22

The installation of patch 110208-22 was interrupted.
Patchadd needs to be re-invoked to ensure proper installation of the patch.

Patchrm is terminating.
WARNING: patchrm returned <14>
See /tmp/patchadd-16626830/log.110208-22 for more details.

Patchadd is terminating.
Installing 126868-01...
Installation of 126868-01 succeeded. Return code 0.
Installing 118815-06...
Installation of 118815-06 succeeded. Return code 0.
Installing 119254-50...
Installation of 119254-50 succeeded. Return code 0.
Installing 126661-02...
Installation of 126661-02 succeeded. Return code 0.
Installing 125476-02...
Installation of 125476-02 succeeded. Return code 0.
Installing 125378-03...
Installation of 125378-03 succeeded. Return code 0.
Installing 121002-04...
Installation of 121002-04 succeeded. Return code 0.
Installing 120222-23...

```

```
Installation of 120222-23 succeeded. Return code 0.
Installing 125731-02...
Installation of 125731-02 succeeded. Return code 0.
Installing 119059-38...
Installation of 119059-38 succeeded. Return code 0.
Installing 119783-05...
Installation of 119783-05 succeeded. Return code 0.
Installing 120272-16...
Installation of 120272-16 succeeded. Return code 0.
Installing 128491-01...
Installation of 128491-01 succeeded. Return code 0.
Installing 125166-07...
Installation of 125166-07 succeeded. Return code 0.
Installing 125369-13...
Installation of 125369-13 succeeded. Return code 0.
Installing 127737-01...
Installation of 127737-01 succeeded. Return code 0.
Installing 125081-14...
Installation of 125081-14 succeeded. Return code 0.
Installing 128028-03...
Installation of 128028-03 succeeded. Return code 0.
Installing 127739-03...
Installation of 127739-03 succeeded. Return code 0.
Installing 124256-05...
Installation of 124256-05 succeeded. Return code 0.
Installing 127111-06...
Installation of 127111-06 succeeded. Return code 0.
Installing 125251-02...
Installation of 125251-02 succeeded. Return code 0.
The following patches were installed:
 126868-01
 118815-06
 119254-50
 126661-02
 125476-02
 125378-03
 121002-04
 120222-23
 125731-02
 119059-38
 119783-05
 120272-16
 128491-01
 125166-07
 125369-13
 127737-01
 125081-14
 128028-03
 127739-03
 124256-05
 127111-06
 125251-02
Check details in /opt/0708patches_log.1892
Completed installation of core extra packages
Start core hardening
Changing EEPROM settings..
eeprom: OPROMSETOPT: Invalid argument
diag-level: invalid property.
Enable recording of failed login attempts
 Dump content: kernel pages
 Dump device: /dev/dsk/c0t1d0s3 (swap)
Savecore directory: /var/crash/sh-netra-T5220
 Savecore enabled: yes
Completed core hardening
```

```

CORE CD installation completed
Ejecting CORE CD...
Rebooting ..
Oct 28 04:57:47 sh-netra-T5220 reboot: rebooted by root
Oct 28 04:57:47 sh-netra-T5220 syslogd: going down on signal 15
syncing file systems... done
rebooting...

SC Alert: Host System has Reset

SC Alert: CRITICAL ALARM is set
-
Netra T5220, No Keyboard
Copyright 2008 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.28.6, 16256 MB memory available, Serial #76865034.
Ethernet address 0:14:4f:94:de:a, Host ID: 8494de0a.

Boot device: disk0 File and args:
SunOS Release 5.10 Version Generic_127111-06 64-bit
Copyright 1983-2007 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.
Hostname: sh-netra-T5220
Configuring devices.
Loading smf(5) service descriptions: 6/6
/dev/rdisk/c0t1d0s5 is clean

sh-netra-T5220 console login: root
Password:
Last login: Tue Oct 28 04:42:56 on console
Sun Microsystems Inc. SunOS 5.10 Generic January 2005
#

```

- Step 6** The Sun Netra T5220 platform is ready for Solaris 10 Environment patch and BAMS installation. To continue the rest of the installation, refer to [Cisco Media Gateway Controller Software Release 9.7 Installation and Configuration Guide](#) and [Cisco Billing and Measurements Server User Guide, Release 3.30](#)

**Note**


---

When you complete the installation, the Kernel operating system version should be SunOS 5.10 Generic\_127127-11. To verify the version, issue the command **uname -a**.

---



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