



Release Notes for Cisco AS5800 Universal Access Servers for Cisco IOS Release 12.1 T

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These release notes for the Cisco AS5800 universal access servers describe the enhancements provided in Cisco IOS Release 12.1(5)T. These release notes are updated as needed.

For a list of the software caveats that apply to Cisco IOS Release 12.1(5)T, see *Caveats for Cisco IOS Release 12.1 T* that accompanies these release notes. The caveats document is updated for every maintenance release and is located on Cisco.com and the Documentation CD-ROM.

Use these release notes with *Cross-Platform Release Notes for Cisco IOS Release 12.1* on Cisco.com and the Documentation CD-ROM.

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Introduction

modem Wide Area Network (WAN) aggregation systems that provide digital and analog call termination. They are intended to be used as a service provider dial point-of-presence (POP) or centralized enterprise dial gateway. The Cisco AS5800 consists of a dial shelf and one or two router shelves:

- The Cisco DS5814 (dial shelf) has 14 slots and can support 1 or 2 dial shelf controller cards and up to 12 feature cards to provide full analog modem, and ISDN coverage. Analog calls are terminated by a feature card that is loaded with integrated modems.

ISDN calls are terminated onboard the trunk card on High-Level Data Link Control (HDLC) controllers. The E1 trunk, T1 trunk, and the CT3 trunk cards include channel service units (CSUs) and have either 12 E1 ports, 12 T1 ports, or 28 T1 ports (within the CT3 trunk) that can operate as Primary Rate Interfaces (PRIs), inter-machine trunks (IMTs), or channelized interfaces in any combination. The specific trunk card limitations are described in Table 2, Part 1.



Note T1 and E1 cards are not supported in the same box.

- The Cisco RS7206VXR (router shelf) contains a network processing engine, an I/O controller, and the egress interfaces, such as High-Speed Serial Interface (HSSI), Fast Ethernet (FE), Gigabit Ethernet (GE), and Asynchronous Transfer Mode (ATM), and supports either 280W AC-input or 280W DC-input redundant power. The router shelf also may contain one or two dial shelf interconnect port adapters each with a single RJ-45 receptacle, which is used to connect the router shelf to the Cisco 5814 dial shelf. The interconnect port adapter connects directly to the dial shelf controller card on the dial shelf via a Cisco-proprietary cable, customized with jack screws to secure the connection. You must use this specially designed cable that ships with your interconnect port adapter. Each router shelf can only be connected to one dial shelf controller card. If the dial shelf configured in split mode, it must be connected to two separate router shelves.



Note The router shelf is only supported for routing data to and from the dial shelf. The router should not be used with multiple port adapter interfaces to route LAN traffic between multiple networks.

The AC-input power shelf is an optional component of the Cisco AS5800 and is used to convert AC-input power into DC-output power for the DC-powered Cisco 5814 dial shelf. The AC-input power shelf contains two AC-input power supplies.

The AC-input to DC-output connection supplies –48V DC-output power to the dial shelf power entry modules (PEMs). The PEMs receive the –48V and transmit power to the filter module. Power flows through the filter module to the backplane, where it is distributed to the dial shelf controller card(s) and feature cards.

The AC-input power shelf includes two 2,000 W, AC-input power supplies that plug into a common power backplane in the AC-input power shelf. A single AC-input power supply is capable of powering a fully configured Cisco 5814 dial shelf. The second power supply provides full redundancy.

Cisco AS5800/Voice Gateway

The Cisco AS5800/Voice Gateway enables highly scalable deployment of toll-quality voice and fax services over data networks. Enhanced with Cisco's IOS software and Service Node (SN) capabilities, the Cisco AS5800 supports features such as prepaid and postpaid calling card, 800 call redirect, voice activated dialing, and voice and fax mail.

The Cisco AS5800 is specifically designed to meet the demands of large service providers such as Post, Telephone, and Telegraphs (PTTs), regional bell operating companies (RBOCs), inter-exchange carriers (IXCs), and large Internet telephony service providers (ITSPs). The physical architecture of the Cisco AS5800 product enhances reliability, availability, and serviceability. Critical features to dial POP administrators include minimizing downtime, service costs, and time to deployment.

The Cisco AS5800 supports up to 1344 voice ports in a single system, thus offering the highest concentration of VoIP Digital Signal Processors (DSPs) available in a single voice gateway. The Cisco AS5800 offers breakthrough voice quality, density, and scalability, while continuing to provide the rich set of access, VoIP, and QoS services that are part of Cisco IOS software.

Cisco AS5800 Voice Feature Card

The Cisco AS5800 Voice Feature card is a full featured voice processing card that supports 192 DSP-based voice ports. Voice processing capabilities include Voice Activity Detection (VAD), comfort noise generation, adaptive jitter buffering, programmable 16 and 32 msec echo cancellation, programmable frame size, and Dual Tone Multiple Frequency (DTMF) detection and generation. The Cisco AS5800 Voice Feature card offers industry-leading DSP density and a wide range of VoIP codecs, including G.711, G.729, G.729a, G.723.1, and Group III real-time fax support, on any port at any time.

For more information on the Cisco AS5800, refer to the *Cisco AS5800 Universal Access Server Operations, Administration, Maintenance, and Provisioning Guide*.

For information on new features and Cisco IOS commands supported by Cisco IOS Release 12.1, see the “New and Changed Information” section on page 14 and the “Related Documentation” section on page 28.

System Requirements

This section describes the system requirements for Cisco IOS Release 12.1 T:

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Memory Requirements

Memory requirements for the Cisco AS5800 are presented in Table 1.

Table 1 Cisco AS5800 Memory Requirements

System Components	Feature Set	Image Name	Software Image	Minimum Flash	Minimum DRAM
Cisco AS5800	IP Standard	IP Plus	c5800-p4-mz	16 MB	<ul style="list-style-type: none"> 128 MB for NPE-200 256 MB for NPE-300
Dial Shelf: Cisco 5814		IP Plus	dsc-c5800-mz	8 MB	<ul style="list-style-type: none"> 32 MB¹
Cisco AS5800	Service Provider Standard	Service Provider IPsec 56	c5800-p456i-mz	16 MB	<ul style="list-style-type: none"> 128 MB for NPE-200 256 MB for NPE-300

1. Cisco IOS Release 12.1(5)T may be used with the older RS7206 (NPE-200 based) router shelf as long as the shelf has 128M of DRAM installed.

Hardware Supported

Cisco IOS Release 12.1 T supports the Cisco AS5800:

- Cisco DS5814
- Cisco RS7206
- Cisco RS7206 VXR

For detailed descriptions of the new hardware features, see the “New and Changed Information” section on page 14. Table 2, parts 1 and 2, details the supported interfaces, cards, options, NPE support, and port adapters.

Table 2, Part 1 Supported Hardware for the Cisco AS5800

Interfaces, Cards, Options, and Support	Description
Interfaces	12-port T1 or E1 termination card
	1- port channelized T3 (CT3) termination card
Modem Cards	72-port modem card (HMM) ¹
	144-port modem card (DMM) ²
	324-port modem card (UPC)
Voice Feature Cards (VFCs) ³	96-port voice card (96VOX)
	192-port voice card (192VOX)
	192-port medium complexity voice card (192-MC-VOX)
	336-port medium complexity voice card (336-MC-VOX)
Dial Shelf	DS5814 Dial Shelf
	Dial Shelf Controller (DSC) card

Table 2, Part 1 Supported Hardware for the Cisco AS5800 (continued)

Interfaces, Cards, Options, and Support	Description
Optional AC-input Power Shelves	Two AC-input power supplies
Router Shelf Support	<p>RS7206VXR (NPE-300 based) Router Shelf</p> <p>RS7206 (NPE-200 based) Router Shelf</p> <p>With any Cisco AS5800 software image, the maximum hardware configuration with an RS7206 is one CT3 or two T1/E1 trunk cards and three UPCs, five DMMs or 10 HMMs for a maximum of 28 24 T1 / 24 E1 controllers and 720 modems.</p> <p>If a larger configuration is desired, a second RS7206 router shelf can be configured in split-shelf mode, or a single RS7206 VXR may be used to support up to 1344 modem sessions. Configurations above 1344 modem sessions require two RS7206VXR router shelves in split-shelf mode.</p> <p>The Cisco AS5800/Voice Gateway can support 672 voice calls per RS7206VXR router shelf. 1344 voice calls require two RS7206VXR router shelves configured in split-shelf mode. RS7206 router shelves do not support voice services.</p>

- 72-port modem card requires 32M DRAM.
- 144-port modem card requires 64M DRAM.
- High-complexity voice cards (with codecs G.723.1, G.728, or G.729) require greater resources to perform complex coding and decoding that results in Voice-handling capacity reduction. Medium-complexity voice cards (with codecs G.711, G.726, or G.729a) can manage twice the number of Voice channels than high-complexity voice cards can.

Table 2, Part 2 Supported Hardware for the Cisco AS5800

Router Shelf	Port Adapter	Description
RS7206 Router Shelf	PA-100VG	Single-Port 100 VG Port Adapter
	PA-12E/2FE	Dual-Wide Ethernet-switch Port Adapter
	PA-1C-E	1-Port ESCON Channel Port Adapter
	PA-2CE1/PRI-120	2-Port Channelized E1/PRI Port Adapter, 120 ohm
	PA-2CE1/PRI-75	2-Port Channelized E1/PRI Port Adapter, 75 ohm
	PA-2CT1/PRI	2-Port Channelized T1/PRI Port Adapter
	PA-2E3	2-Port E3 Serial Port Adapter with E3 DSU
	PA-2FEISL-FX	2-Port Fast Ethernet/ISL 100BaseTx Port Adapter
	PA-2FEISL-TX	2-Port Fast Ethernet/ISL 100BaseFx Port Adapter
	PA-2H	Port Adapter, 2-Port HSSI
	PA-4B-U	4-Port BRI Port Adapter, U Interface
	PA-4E	Port Adapter, 4-Port Ethernet, 10BT
	PA-4R	Port Adapter, 4-Port Token Ring (Older Hermon Based)
	PA-4R-DTR	Port Adapter, 4-Port Token Ring (Hawkeye Based)
	PA-4R-FDX	Port Adapter, 4 Port Token Ring 4/16Mbps, Full Duplex
	PA-4T+	Port Adapter, 4-Port Serial, 5IN1
PA-5EFL	Port Adapter, 5-Port Ethernet, 10FL	

Table 2, Part 2 Supported Hardware for the Cisco AS5800 (continued)

Router Shelf	Port Adapter	Description
RS7206 Router Shelf (continued)	PA-8B-S/T	8-Port BRI Port Adapter, S/T Interface
	PA-8E	Port Adapter, 8-Port Ethernet, 10BT
	PA-8T-232	Port Adapter, 8-Port Serial, 232
	PA-8T-V35	Port Adapter, 8-Port Serial, V.35
	PA-8T-X21	Port Adapter, 8-Port Serial, X.21
	PA-A1-OC3MM	1-Port ATM OC3 Multi-Mode Port Adapter
	PA-A1-OC3SM	1-Port ATM OC3 Single Mode Intermediate Reach Port Adapter
	PA-A2-4E1XC-E3ATM	CES Port Adapter E3/E1 120 ohms
	PA-A2-4E1XC-OC3SM	CES OC3 Port Adapter 4E1 Ports 120 ohms
	PA-A2-4T1C-OC3SM	ATM CES Port Adapter, 4T1 CES Ports and 1 OC3 ATM SM Port
	PA-A2-4T1C-T3ATM	ATM CES Port Adapter, 4T1 CES Ports and 1 T3 ATM Port
	PA-A3-E3	1-Port ATM Enhanced E3 Port Adapter
	PA-A3-OC3MM	1-Port ATM Enhanced OC3c/STM1 Multi-Mode
	PA-A3-OC3SMI	1-Port ATM Enhanced OC3c/STM1 Single Mode
	PA-A3-OC3SML	1-Port ATM Enhanced OC3c/STM1 Single Mode
	PA-A3-T3	1-Port ATM Enhanced DS3 Port Adapter
	PA-CT3/4T1	Channelized DS3 Port Adapter with 4 T1
	PA-E3	1-Port E3 Serial Port Adapter with E3 DSU
	PA-F/FD-MM	Port Adapter, 1-Port FDDI Full Duplex Multi-Mode
	PA-F/FD-SM	Port Adapter, 1-Port FDDI Full Duplex Single-Mode
	PA-FE-FX	Port Adapter, 1-Port FE, 100FX
	PA-FE-TX	Port Adapter, 1-Port FE, 100TX
	PA-F-MM	Port Adapter, 1-Port FDDI Multi-Mode
	PA-F-SM	Port Adapter, 1-Port FDDI Single Mode
	PA-H	Port Adapter, 1-Port HSSI
	PA-POS-OC3MM	1-Port Packet/SONET OC3c/STM1 Multi-Mode Port Adapter
	PA-POS-OC3SMI	1-Port Packet/SONET OC3c/STM1 Single Mode (IR) Port Adapter
	PA-POS-OC3SML	1-Port Packet/SONET OC3c/STM1 Single Mode (LR) Port Adapter
	PA-T3	1-Port T3 Serial Port Adapter with T3 DSUs
	PA-T3+	1-Port T3 Serial Port Adapter Enhanced
	SA-COMP/1	Service Adapter, Compression (64 VCs Stac)
	SA-COMP/4	Service Adapter, Compression (256 VCs Stac)
	RS7206VXR Router Shelf	PA-100VG
PA-12E/2FE		Dual-Wide Ethernet-Switch Port Adapter
PA-1C-E		1-Port ESCON Channel Port Adapter
PA-2E3		2-Port E3 Serial Port Adapter with E3 DSU

Table 2, Part 2 Supported Hardware for the Cisco AS5800 (continued)

Router Shelf	Port Adapter	Description
RS7206VXR Router Shelf (continued)	PA-2FEISL-FX	2-Port Fast Ethernet/ISL 100BaseTx Port Adapter
	PA-2FEISL-TX	2-Port Fast Ethernet/ISL 100BaseFx Port Adapter
	PA-2H	Port Adapter, 2-Port HSSI
	PA-4B-U	4-Port BRI Port Adapter, U Interface
	PA-4E	Port Adapter, 4-Port Ethernet,10BT
	PA-4R-DTR	Port Adapter, 4-Port Token Ring (Hawkeye Based)
	PA-4T+	Port Adapter, 4-Port Serial,5in1
	PA-5EFL	Port Adapter, 5-Port Ethernet,10FL
	PA-8B-S/T	8-Port BRI Port Adapter, S/T Interface
	PA-8E	Port Adapter, 8-Port Ethernet,10BT
	PA-8T-232	Port Adapter, 8-Port Serial,232
	PA-8T-V35	Port Adapter, 8-Port Serial,V.35
	PA-8T-X21	Port Adapter, 8-Port Serial,X.21
	PA-A1-OC3MM	1-Port ATM OC3 Multi-Mode Port Adapter
	PA-A1-OC3SM	1-Port ATM OC3 Single Mode Intermediate Reach Port Adapter
	PA-A2-4E1XC-E3ATM	CES Port Adapter E3/E1 120 ohms
	PA-A2-4E1XC-OC3SM	CES OC3 Port Adapter 4E1 Ports 120 ohms
	PA-A2-4T1C-OC3SM	ATM CES Port Adapter, 4T1 CES Ports and 1 OC3 ATM SM Port
	PA-A2-4T1C-T3ATM	ATM CES Port Adapter, 4T1 CES Ports and 1 T3 ATM Port
	PA-A3-E3	1-Port ATM Enhanced E3 Port Adapter
	PA-A3-OC3MM	1-Port ATM Enhanced OC3c/STM1 Multi-Mode
	PA-A3-OC3SMI	1-Port ATM Enhanced OC3c/STM1 Single Mode
	PA-A3-OC3SML	1-Port ATM Enhanced OC3c/STM1 Single Mode
	PA-A3-T3	1-Port ATM Enhanced DS3 Port Adapter
	PA-E3	1-Port E3 Serial Port Adapter with E3 DSU
	PA-FE-FX	Port Adapter, 1-Port FE, 100FX
	PA-FE-TX	Port Adapter, 1-Port FE,100TX
	PA-GE	One-Port Gigabit Ethernet PA for 7200VXR
	PA-H	Port Adapter, 1-Port HSSI
	PA-MC-8E1/120	8-Port Multichannel E1 Port Adapter
	PA-POS-OC3MM	1-Port Packet/SONET OC3c/STM1 Multi-Mode Port Adapter
	PA-POS-OC3SMI	1-Port Packet/SONET OC3c/STM1 Single Mode (IR) Port Adapter
	PA-POS-OC3SML	1-Port Packet/SONET OC3c/STM1 Single Mode (LR) Port Adapter
	PA-T3	1-Port T3 Serial Port Adapter with T3 DSUs
PA-T3+	1-Port T3 Serial Port Adapter Enhanced	

Table 2, Part 3 Supported Hardware for the Cisco AS5800

Router Shelf	Port Adapter	Description
RS7206 Router Shelf	PA-100VG	Single-Port 100 VG Port Adapter
	PA-12E/2FE	Dual-Wide Ethernet-switch Port Adapter
	PA-1C-E	1-Port ESCON Channel Port Adapter
	PA-2CE1/PRI-120	2-Port Channelized E1/PRI Port Adapter, 120 ohm
	PA-2CE1/PRI-75	2-Port Channelized E1/PRI Port Adapter, 75 ohm
	PA-2CT1/PRI	2-Port Channelized T1/PRI Port Adapter
	PA-2E3	2-Port E3 Serial Port Adapter with E3 DSU
	PA-2FEISL-FX	2-Port Fast Ethernet/ISL 100BaseTx Port Adapter
	PA-2FEISL-TX	2-Port Fast Ethernet/ISL 100BaseFx Port Adapter
	PA-2H	Port Adapter, 2-Port HSSI
	PA-4B-U	4-Port BRI Port Adapter, U Interface
	PA-4E	Port Adapter, 4-Port Ethernet,10BT
	PA-4R	Port Adapter, 4-Port Token Ring (Older Hermon Based)
	PA-4R-DTR	Port Adapter, 4-Port Token Ring (Hawkeye Based)
	PA-4R-FDX	Port Adapter, 4 Port Token Ring 4/16Mbps, Full Duplex
	PA-4T+	Port Adapter, 4-Port Serial,5IN1
	PA-5EFL	Port Adapter, 5-Port Ethernet,10FL
	PA-8B-S/T	8-Port BRI Port Adapter, S/T Interface
	PA-8E	Port Adapter, 8-Port Ethernet,10BT
	PA-8T-232	Port Adapter, 8-Port Serial,232
	PA-8T-V35	Port Adapter, 8-Port Serial,V.35
	PA-8T-X21	Port Adapter, 8-Port Serial,X.21
	PA-A1-OC3MM	1 Port ATM OC3 Multi-Mode Port Adapter
	PA-A1-OC3SM	1 Port ATM OC3 Single Mode Intermediate Reach Port Adapter
	PA-A2-4E1XC-E3ATM	CES Port Adapter E3/E1 120 ohms
	PA-A2-4E1XC-OC3SM	CES OC3 Port Adapter 4E1 Ports 120 ohms
	PA-A2-4T1C-OC3SM	ATM CES Port Adapter, 4T1 CES Ports and 1 OC3 ATM SM Port
	PA-A2-4T1C-T3ATM	ATM CES Port Adapter, 4T1 CES Ports and 1 T3 ATM Port
	PA-A3-E3	1-Port ATM Enhanced E3 Port Adapter
	PA-A3-OC3MM	1-Port ATM Enhanced OC3c/STM1 Multi-Mode
	PA-A3-OC3SMI	1-Port ATM Enhanced OC3c/STM1 Single Mode
	PA-A3-OC3SML	1-Port ATM Enhanced OC3c/STM1 Single Mode
	PA-A3-T3	1-Port ATM Enhanced DS3 Port Adapter
	PA-CT3/4T1	Channelized DS3 Port Adapter with 4 T1
	PA-E3	1 Port E3 Serial Port Adapter with E3 DSU
	PA-F/FD-MM	Port Adapter,1-Port FDDI Full Duplex Multi-Mode

Table 2, Part 3 Supported Hardware for the Cisco AS5800 (continued)

Router Shelf	Port Adapter	Description
RS7206 Router Shelf (continued)	PA-F/FD-SM	Port Adapter,1-Port FDDI Full Duplex Single-Mode
	PA-FE-FX	Port Adapter,1-Port FE, 100FX
	PA-FE-TX	Port Adapter,1-Port FE,100TX
	PA-F-MM	Port Adapter,1-Port FDDI Multi-Mode
	PA-F-SM	Port Adapter,1-Port FDDI Single Mode
	PA-H	Port Adapter,1-Port HSSI
	PA-POS-OC3MM	1-Port Packet/SONET OC3c/STM1 Multi-Mode Port Adapter
	PA-POS-OC3SMI	1-Port Packet/SONET OC3c/STM1 Single Mode (IR) Port Adapter
	PA-POS-OC3SML	1-Port Packet/SONET OC3c/STM1 Single Mode (LR) Port Adapter
	PA-T3	1-Port T3 Serial Port Adapter with T3 DSUs
	PA-T3+	1-Port T3 Serial Port Adapter Enhanced
	SA-COMP/1	Service Adapter, Compression (64 VCs Stac)
	SA-COMP/4	Service Adapter, Compression (256 VCs Stac)
RS7206VXR Router Shelf	PA-100VG	Single Port 100VG Port Adapter
	PA-12E/2FE	Dual-Wide Ethernet-Switch Port Adapter
	PA-1C-E	1 Port ESCON Channel Port Adapter
	PA-2E3	2 Port E3 Serial Port Adapter with E3 DSU
	PA-2FEISL-FX	2 port Fast Ethernet/ISL 100BaseTx Port Adapter
	PA-2FEISL-TX	2 port Fast Ethernet/ISL 100BaseFx Port Adapter
	PA-2H	Port Adapter, 2-Port HSSI
	PA-4B-U	4 Port BRI Port Adapter, U Interface
	PA-4E	Port Adapter, 4-Port Ethernet,10BT
	PA-4R-DTR	Port Adapter, 4-Port Token Ring (Hawkeye Based)
	PA-4T+	Port Adapter, 4-Port Serial,5in1
	PA-5EFL	Port Adapter, 5-Port Ethernet,10FL
	PA-8B-S/T	8 Port BRI Port Adapter, S/T Interface
	PA-8E	Port Adapter, 8-Port Ethernet,10BT
	PA-8T-232	Port Adapter, 8-Port Serial,232
	PA-8T-V35	Port Adapter, 8-Port Serial,V.35
	PA-8T-X21	Port Adapter, 8-Port Serial,X.21
	PA-A1-OC3MM	1 Port ATM OC3 Multi-Mode Port Adapter
	PA-A1-OC3SM	1 Port ATM OC3 Single Mode Intermediate Reach Port Adapter
	PA-A2-4E1XC-E3ATM	CES Port Adapter E3/E1 120 ohms
	PA-A2-4E1XC-OC3SM	CES OC3 Port Adapter 4E1 Ports 120 ohms
	PA-A2-4T1C-OC3SM	ATM CES Port Adapter, 4T1 CES Ports and 1 OC3 ATM SM Port
	PA-A2-4T1C-T3ATM	ATM CES Port Adapter, 4T1 CES Ports and 1 T3 ATM Port

Table 2, Part 3 Supported Hardware for the Cisco AS5800 (continued)

Router Shelf	Port Adapter	Description
RS7206VXR Router Shelf (continued)	PA-A3-E3	1-Port ATM Enhanced E3 Port Adapter
	PA-A3-OC3MM	1-Port ATM Enhanced OC3c/STM1 Multi-Mode
	PA-A3-OC3SMI	1-Port ATM Enhanced OC3c/STM1 Single Mode
	PA-A3-OC3SML	1-Port ATM Enhanced OC3c/STM1 Single Mode
	PA-A3-T3	1-Port ATM Enhanced DS3 Port Adapter
	PA-E3	1 Port E3 Serial Port Adapter with E3 DSU
	PA-FE-FX	Port Adapter, 1-Port FE, 100FX
	PA-FE-TX	Port Adapter, 1-Port FE, 100TX
	PA-GE	One-Port Gigabit Ethernet PA for 7200VXR
	PA-H	Port Adapter, 1-Port HSSI
	PA-POS-OC3MM	1-Port Packet/SONET OC3c/STM1 Multi-Mode Port Adapter
	PA-POS-OC3SMI	1-Port Packet/SONET OC3c/STM1 Single Mode (IR) Port Adapter
	PA-POS-OC3SML	1-Port Packet/SONET OC3c/STM1 Single Mode (LR) Port Adapter
	PA-T3	1 Port T3 Serial Port Adapter with T3 DSUs
PA-T3+	1 Port T3 Serial Port Adapter Enhanced	

Determining the Software Version

To determine the version of Cisco IOS software running on your Cisco AS5800, log in to the Cisco AS5800 and enter the **show version EXEC** command:

```
router> show version
Cisco Internetwork Operating System Software
IOS (tm) 12.1 T Software (c5800-p4-mz), Version 12.1(5)T, RELEASE SOFTWARE
```

Upgrading to a New Software Release

For general information about upgrading to a new software release, refer to *Upgrading the Cisco IOS Software Release in Cisco Routers and Modems* located at:

http://www.cisco.com/warp/public/130/upgrade_index.shtml

For specific information about upgrading AS5800 IOS software, modem and firmware upgrades, and split dial shelf, refer to the “Provisioning” chapter in the *Cisco AS5800 Operations, Administration, Maintenance, and Provisioning Guide (OAM&P)* at:

http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/as5800/sw_conf/58_oamp/prov.htm

Microcode and Modem Code Software

Microcode software images are bundled with the system software image—with the exception of the Channel Interface Processor (CIP) microcode (all system software images). Bundling eliminates the need to store separate microcode images. When the router starts, the system software unpacks the microcode software bundle and loads the proper software on all the interface processor boards.

You could have received a later version of modem code than the one bundled with the Cisco IOS software. The modem code in Flash memory is mapped to the modems. Unless you fully understand how Cisco IOS software uses modem code, it is important to keep the factory configuration.

The modem code release notes are on Cisco.com and the Documentation CD-ROM.

On Cisco.com at:

Technical Documents: Access Servers and Access Routers: Access Servers: Cisco AS5800: Configuration Documents for Cisco AS5800: Port Firmware

On the Documentation CD-ROM at:

Cisco Product Documentation: Access Servers and Access Routers: Access Servers: Cisco AS5800: Configuration Documents for Cisco AS5800: Port Firmware

To obtain the latest Cisco IOS software release compatible with Cisco MICA portware, refer to the *Cisco AS5x00 MICA 6-Port and 12-Port Modem Module Portware/Cisco IOS Software Compatibility Matrixes* at

http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/5300/sw_conf/sw_ports/compmat/mca12prt.htm.

Feature Set Tables

The Cisco IOS software is packaged in feature sets consisting of software images—depending on the platform. Each feature set contains a specific set of Cisco IOS features.



Caution

Cisco IOS images with strong encryption (including, but not limited to 168-bit (3DES) data encryption feature sets) are subject to United States government export controls and have limited distribution. Strong encryption images to be installed outside the United States are likely to require an export license. Customer orders may be denied or subject to delay due to United States government regulations. When applicable, purchaser/user must obtain local import and use authorizations for all encryption strengths. Please contact your sales representative or distributor for more information, or send an e-mail to export@cisco.com.

Table 3 lists the features and feature sets supported by the Cisco AS5800 in Cisco IOS Release 12.1 T and uses the following conventions:

- Yes—The feature is supported in the software image.
- No—The feature is not supported in the software image.

**Note**

This table might not be cumulative or list all the features in each image. You can find the most current Cisco IOS documentation on Cisco.com. These electronic documents may contain updates and modifications made after the hardcopy documents were printed. If you have a Cisco.com login account, you can find image and release information regarding features prior to Cisco IOS Release 12.1 T by using the Feature Navigator tool at: <http://www.cisco.com/go/fn>.

Table 3 Feature List by Feature Set for the Cisco AS5800

Features	In ¹	Software Images by Feature Set	
		IP Plus	IPsec 56
New Features in 12.1(5)T			
AutoInstall Using DHCP for LAN Interfaces	(5)	Yes	Yes
Calling Line Identification Screening—Call Discriminator	(5)	Yes	Yes
Deutsche Telekom Phase I	(5)	Yes	Yes
Dial Modifiers	(5)	Yes	Yes
Dialer DNIS-Group Range	(5)	Yes	Yes
Interface Index Persistence	(5)	Yes	Yes
Interworking Signaling Enhancements for H.323 VoIP	(5)	Yes	Yes
Monitoring Resource Availability on Cisco AS5x00 Universal Access Servers	(5)	Yes	Yes
NAT—Support for NetMeeting Directory (Internet Locator Service—ILS)	(5)	Yes	Yes
Parser Cache	(5)	Yes	Yes
Radius Tunnel Attribute Extensions	(5)	Yes	Yes
Sticky IP	(5)	Yes	Yes
VoIP Call Admission Control using RSVP	(5)	Yes	Yes
New Features in 12.1(3)T			
AAA Session MIB	(3)	Yes	Yes
Circuit Interface Identification MIB	(3)	Yes	Yes
Cisco AAA Server MIB and Additional Enhancements for the Cisco AS5300 and Cisco AS5800	(3)	Yes	Yes
Event MIB	(3)	Yes	Yes
Fax Relay Packet Loss Concealment	(3)	Yes	Yes
Individual SNMP Trap Support	(3)	Yes	Yes
Monitoring Resource Availability on Cisco AS5300 Universal Access Servers	(3)	Yes	Yes

Table 3 Feature List by Feature Set for the Cisco AS5800 (continued)

Features	In ¹	Software Images by Feature Set	
		IP Plus	IPsec 56
Network Side ISDN PRI Signaling, Trunking and Switching	(3)	Yes	Yes
Preauthentication with ISDN PRI and Channel-Associated Signaling	(3)	Yes	Yes
TCP Clear Performance Optimization	(3)	Yes	Yes
Hardware			
AS58-324UPC-CC	(3)	Yes	Yes
IP Routing			
Asynchronous Serial Traffic over UDP		Yes	Yes
LAN Support			
CLI String Search		Yes	Yes
Dynamic Multiple Encaps for Dial-In over ISDN		Yes	Yes
L2TP Dialout		Yes	Yes
Parse Bookmarks		Yes	Yes
SS7		Yes	Yes
Management			
Dial Shelf Controller Redundancy		Yes	Yes
Process MIB		Yes	Yes
SNMP Version 3		Yes	Yes
Miscellaneous			
Cisco IOS DHCP Server		Yes	Yes
OS_IFSS		Yes	Yes
Security			
AAA Server Group Deadtimer	(2)	Yes	Yes
AAA Server Group Enhancements	(2)	Yes	Yes
Preauthentication with ISDN PRI	(2)	Yes	Yes
Resource Pool Management with Direct Remote Services		Yes	Yes
WAN Services			
Layer 2 Tunneling Protocol (L2TP)		Yes	Yes

1. The number in the “In” column indicates the Cisco IOS release when the interface was introduced. For example, (4) means an interface was introduced in Cisco IOS Release 12.1(4). If a cell in this column is empty, the interface was included in the initial base release.

New and Changed Information

The following sections list the new hardware and software features supported by the Cisco AS5800 for Cisco IOS Release 12.1 T.

New Hardware Features in Cisco IOS Release 12.1(5)T

There are no new hardware feature in the Cisco AS5800 for Cisco IOS Release 12.1(5)T.

New Software Features in Cisco IOS Release 12.1(5)T

The following new software features are supported by the Cisco AS5800 for Cisco IOS Release 12.1(5)T.

AutoInstall Using DHCP for LAN Interfaces (CSCdr88175)

The AutoInstall Using DHCP for LAN Interfaces feature replaces the use of the Bootstrap Protocol (BOOTP) with the use of the Dynamic Host Configuration Protocol (DHCP) for Cisco IOS AutoInstall over LAN interfaces. AutoInstall is a Cisco IOS software feature that provides for the configuration of a new routing device automatically when the device is initialized. DHCP (defined in RFC 2131) is based on the Bootstrap Protocol, which provides the framework for passing configuration information to hosts on a TCP/IP network. DHCP adds the capability of automatic allocation of reusable network addresses and additional configuration options. In Cisco IOS release 12.1(5)T, the IP address procurement phase of the AutoInstall process is now accomplished using DHCP for Ethernet, Token Ring, and FDDI interfaces. Before this release, IP addresses for LAN interfaces were obtained using BOOTP during the AutoInstall process. The AutoInstall Using DHCP for LAN Interfaces feature also allows the routing device to recognize IP address allocation messages coming from regular BOOTP servers, providing a seamless transition for those devices already using BOOTP servers for AutoInstall. Additionally, this feature allows for the uploading of configuration files using unicast Trivial File Transfer Protocol (TFTP).

For further details, please see:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t5/dt_dhcpa.htm

Dial-on-Demand Authentication Enhancements (CSCdp96375)

The following enhancements to dial-on-demand authentication are provided with this feature:

- The NAS IP address plus a configured suffix can be sent to the RADIUS server as a username for authentication.
- A password other than the default password “cisco” can be sent to the RADIUS server for authentication.
- The username for two-way authentication will specified by a new vendor-specific attribute (VSA), “outbound:send-name=<string>”.

This feature also introduces modifications to the **dialer aaa** command, which provides username configuration capability for dial-on-demand.

IGMP Version 3

Internet Group Management Protocol (IGMP) is a protocol used by IPv4 systems to report IP multicast group memberships to neighboring multicast routers. On networks with hosts directly attached, IGMP Version 3 (IGMPv3) adds support for “source filtering,” which enables a multicast receiver to signal to a router which groups it wants to receive multicast traffic from, and from which source(s) this traffic is expected. Based on this membership information, Cisco IOS software only forwards traffic that is requested by the host (or by other routers via Protocol Independent Multicast [PIM]) to that network. In addition to restricting traffic on the network of the receiver host, IGMPv3 membership information can be propagated to multicast routing protocols to enable the forwarding of traffic from permitted sources or to restrict traffic from denied sources along the entire multicast data delivery path.

In the Source Specific Multicast (SSM) feature, introduced in Cisco IOS Release 12.1(5)T, hosts must explicitly include sources when joining a multicast group (this is known as “channel subscription”). IGMPv3 is the industry-designated standard protocol for hosts to signal channel subscriptions in SSM. In deployment cases where IGMPv3 cannot be used (for example, if it is not supported by the receiver host or its applications), there are two other mechanisms to enable SSM: URL Rendezvous Directory (URD) and IGMP v3lite. Both of these features were introduced with SSM in Cisco IOS Release 12.1(5)T.

Interactive Voice Response Version 2.0 on Cisco VoIP Gateways

IVR Version 2.0 is the fourth release of IVR and TCL scripting on Cisco IOS VoIP gateways. The Cisco IVR feature (first made available in Cisco IOS Release 12.0(3)T and 12.0(7)T) provides IVR capabilities using TCL scripts.

IVR Version 2.0 is made up of several separate components which are described individually in the section that follows. These new features include:

- Real Time Streaming Protocol (RTSP) client implementation
- New Tool Command Language (TCL) verbs to utilize RTSP scripting features
- IVR prompt playout and digit collection on IP call legs
- Performance improvements and TCL infrastructure changes
- IVR application MIB for network management

These features add scalability and enable the IVR scripting functionality on VoIP legs. In addition, support for RTSP enables VoIP gateways to play messages from RTSP-compliant announcement servers.

Interface Index Persistence

One of the most commonly used identifiers in SNMP-based network management applications is the Interface Index (ifIndex) value. IfIndex is a unique identifying number associated with a physical or logical interface; as far as most software is concerned, the ifIndex is the “name” of the interface. Although there is no requirement in the relevant Requests for Comments (RFC) that the correspondence between particular ifIndex values and their interfaces be maintained across reboots, applications such as device inventory, billing, and fault detection increasingly depend on the maintenance of this correspondence.

Cisco IOS Release 12.1(5)T adds support for an ifIndex value that can persist across reboots, enabling users to avoid the workarounds previously required for consistent interface identification. The Interface Index Persistence feature allows for greater accuracy when collecting and processing network management data by uniquely identifying input and output interfaces for traffic flows and SNMP

statistics. Relating each interface to a known entity (such as an ISP customer) enables network management data to be used more effectively. See the following document for further information: <http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t5/dt5ifidx.htm>.

Interface Range Specification

The Interface Range Specification feature allows specification of a range of interfaces to which subsequent commands are applied and supports definition of macros that contain an interface range. The Interface Range Specification feature is implemented with the **range** keyword, which is used with the **interface** command. In the interface configuration mode with the **range** keyword, all entered commands are applied to all interfaces within the range until you exit interface configuration mode.

Interworking Signaling Enhancements for H.323 VoIP

The Interworking Signaling Enhancements for H.323 VoIP feature enables Voice over IP (VoIP) networks to properly signal the setup and tear-down of calls when interworking with Public Switched Telephone Networks (PSTNs). These enhancements ensure that in-band tones and announcements are generated when needed so that the voice path is cut-through at the appropriate point of call setup and that early alerting (ringing) does not occur. In addition, support for network-side ISDN and the reducing of speech clipping is addressed.

Monitoring Resource Availability on Cisco AS5300, AS5400, and AS5800 Universal Access Servers

This feature module describes enhancements to improve visibility into the line and modem status for the network access server (NAS).

NAS modem health is supported by the following features:

- DS-0 Busyout Traps
- ISDN PRI Requested Channel Not Available Traps
- Modem Health Traps
- Show Controllers Timeslots
- DS-1 Loopback Traps

These features have been developed to monitor the NAS health conditions at the digital signal level zero (DS-0) level, Primary Rate Interface (PRI) bearer channel level, and modem level.

This combined set of features provides the following benefits:

- Improved visibility into the line status for the NAS for comprehensive health monitoring and notification capability.
- Improved troubleshooting and diagnostics for large dial networks.

NAT—Support for NetMeeting Directory (Internet Locator Service—ILS)

Microsoft NetMeeting is a Windows-based application that enables multiuser interaction and collaboration from a user's PC over the Internet or an intranet. Support for the NetMeeting Directory (ILS) allows connections by name from the directory built into the NetMeeting application. Destination IP addresses do not need to be known in order for a connection to be made.

Parser Cache

The Parser Cache feature optimizes the parsing (translation) of Cisco IOS software configuration command lines by remembering how to parse recently encountered command lines. This feature was developed to improve the scalability of the Cisco IOS software command-line interface (CLI) parser when processing large configuration files. This improvement is especially useful for those cases in which thousands of virtual circuits must be configured for interfaces, or hundreds of access control lists (ACLs) are required. The parser chain cache can rapidly recognize and translate configuration lines that differ slightly from previously used configuration lines (for example, pvc 0/100, pvc 0/101, and so on). Testing indicates an improvement to load time of between 30% and 36% for large configuration files when using the parser cache.

The parser cache is enabled by default on all platforms using Cisco IOS 12.1(5)T or later. A new command, **[no] parser cache**, allows the disabling or reenabling of this feature.

PIM Dense Mode State Refresh

The PIM Dense Mode State Refresh feature keeps the pruned state in PIM dense mode from timing out by periodically forwarding a control message down the source-based distribution tree. The control message refreshes the prune state on the outgoing interfaces of each router in the distribution tree.

Preauthentication Enhancements for Callback

The Preauthentication Enhancements for Callback feature allows users to dial into the NAS without being charged. This enables telecommuters, and other remote network users who dial in, to have the charges applied back to the NAS into which they are dialing.

Two Cisco VSAs for preauthentication will be added to Attribute 26 as follows:

```
cisco-avpair = "preauth:send-name=<string>"
```

```
cisco-avpair = "preauth:send-secret=<string>"
```

Preauthentication with ISDN PRI and Channel-Associated Signalling Enhancements (CSCdp96375)

This feature supports the use of new RADIUS VSAs. These RADIUS VSAs are configured in the RADIUS preauthentication profiles to specify preauthentication behavior. They may also be used, for instance, to specify whether subsequent authentication should occur and, if so, what authentication method should be used. Enhancements for this feature include:

- Attribute 6 can be set to Service-Type = Framed-User
- Support for new VSAs "preauth:send-name" with text and "preauth:send-secret" with text.

Prepaid Distributed Calling Card via Packet Telephony

Support for the Debit Card feature was extended to the Cisco AS5800 Universal Access Server. The Debit Card feature allows service providers to offer calling service with debit accounting. The Debit Card feature and RADIUS-specific enhancements also support Vendor-Specific Attributes (VSA). The Debit Card for Packet Telephony on the Cisco AS5800 works in tandem with the Cisco Interactive Voice Response (IVR) feature. The IVR voice scripts have been modified to use Tool Command Language (TCL) scripts.

The feature components consist of IVR functionality in Cisco IOS software that works in connection with an integrated third-party billing system. This includes the ability to maintain per-user credit balance information through a RADIUS interface to the Cisco IOS software. When these features are implemented, the billing system and IOS software functions enable a carrier to authorize voice calls and to debit individual user accounts in real time at the edges of a voice over IP network, without requiring external service nodes.

RADIUS Attribute 66 (Tunnel-Client-Endpoint) Enhancements (CSCdp96375)

The RADIUS Attribute 66 (Tunnel-Client-Endpoint) Enhancements feature enables the user to specify the hostname of the NAS in attribute 66, rather than the IP address. This feature frees the user from having to remember the numerical IP address of the NAS, and may also provide a small measure of security by protecting the numerical IP address of the NAS.

RADIUS Attribute 8 (Framed-IP-Address) in Access Requests

The RADIUS Attribute 8 (Framed-IP-Address) in Access Requests feature makes it possible for a network access server (NAS) to provide the RADIUS server with a hint of the user IP address in advance of user authentication. An application can be run on the RADIUS server to use this hint and build a table (map) of user names and addresses. Using the mapping information, service applications can begin preparing user login information to have available upon successful user authentication.

RADIUS Tunnel Attribute Extensions

The RADIUS Tunnel Attribute Extensions feature introduces RADIUS attribute 90 (Tunnel-Client-Auth-ID) and RADIUS attribute 91 (Tunnel-Server-Auth-ID). Both attributes help support the provision of compulsory tunneling in virtual private networks (VPNs) by allowing the user to specify authentication names for the network access server (NAS) and the RADIUS server.

Once a NAS has set up communication with a RADIUS sever, you can enable a tunneling protocol. Some applications of tunneling protocols are voluntary, but others involve compulsory tunneling; that is, a tunnel is created without any action from the user and without allowing the user any choice in the matter. In those cases, new RADIUS attributes are needed to carry the tunneling information from the NAS to the RADIUS server to establish authentication. Attributes 90 and 91 support Layer 2 Forwarding (L2F) and Layer 2 Tunneling Protocol (L2TP).

Attributes 90 and 91 must be included if the RADIUS sever accepts the request and the desired authentication name is different from the default.

Attributes 90 and 91 should be included in an accounting request that contains Acct-Status-Type attributes with values of either start or stop and that pertains to a tunneled session.

Router-Port Group Management Protocol (CSCdp11190)

The Router-Port Group Management Protocol (RGMP) feature introduces a Cisco protocol that restricts IP multicast traffic in switched networks. RGMP is a Layer 2 protocol that enables a router to communicate to a switch (or a networking device that is functioning as a Layer 2 switch) the multicast group for which the router would like to receive or forward traffic.

SDLC SNRM Timer and Window Size Enhancements

The SDLC SNRM Timer and Window Size Enhancements feature introduces a new window size setting for Synchronous Data Link Control (SDLC) configurations, and a new timeout setting for the Set Normal Response (SNRM) frame. These enhancements change the operation of SDLC processing on a multidrop line.

Window Size Setting

Before this feature, all SDLC addresses on the multidrop had the same window count. Now the window count can be configured on a Physical Unit or SDLC address level. This enhancement gives a controller a different window size than other devices on the interface, and allows devices attached to the multidrop to be sized individually.

Timeout Setting for SNRM frame

Cisco IOS software SDLC implementation currently uses a common response timer (T1) for all outstanding commands. Calculating the maximum frame size and line speed produces a minimum time of 3.5 seconds for receiving acknowledgments; thus, polling stations used for link activation use this 3.5-second timer. This is a problem on a multidrop, because stations that do not respond to the SNRM will have 3.5 seconds of downtime-waiting before the next station that is active is polled. This enhancement reduces the time to stations that are waiting idle, as opposed to those that are active.

Settlement Plus Roaming and PKI Multiple Roots on Cisco Access Platforms (Settlements for Packet Voice, Phase 2)

The Cisco gateway based Settlement protocol interacts between carriers to create a single authentication at initialization. Two new features, Roaming and Multiple Roots have been added in Cisco IOS Release 12.1(5)T to enhance the OSP. The VoIP/Open Settlement Protocol (OSP) feature offers the ability to authorize, route calls, and billings between two different ISPs via a trusted third party, the settlement clearing house, which is the OSP server. Cisco has built this OSP client on Cisco 2600 series, Cisco 3600 series, Cisco AS5300, and Cisco AS5800 platforms, and partnered with a few companies (TransNexus, GRIC, etc.) that provide OSP servers. The code for this feature is an encrypted image.

VoIP Call Admission Control Using RSVP

The VoIP Call Admission Control Using RSVP feature synchronizes Resource Reservation Protocol (RSVP) procedures with H.323 Version 2 (Fast Connect) setup procedures to guarantee that the required Quality of Service (QoS) for VoIP calls is maintained across the IP network. Before Cisco IOS Release 12.1(3)XI, VoIP gateways used H.323 Version 1 (Slow Connect) procedures when initiating calls requiring bandwidth reservation. This feature, which is enabled by default, allows gateways to use H.323 Version 2 (Fast Connect) for all calls, including those requiring RSVP.

New Hardware Features in Cisco IOS Release 12.1(3a)T1

There are no new hardware feature in the Cisco AS5800 for Cisco IOS Release 12.1(3a)T1.

New Software Features in Cisco IOS Release 12.1(3a)T1

The following new software features are supported by the Cisco AS5800 for Cisco IOS Release 12.1(3a)T1:

AAA Session MIB

Customers are demanding the ability to both monitor and terminate their authenticated client connections via SNMP. Furthermore, customers are requesting that the client data provided be directly related to the accounting information reported by AAA to either Radius or Tacacs. Moreover, additional real-time information such as idle times are also requested for this feature in order to provide the ability to terminate calls with no activity present.

This feature allows Cisco's customers to extend and expand their ability to monitor end users by providing access to some client data objects via SNMP.

Circuit Interface Identification MIB

The Circuit Interface MIB consists of a single table, with each row being a sequence of two objects: Circuit Interface Description (cciDescr) and Circuit Interface Status (cciStatus). The cciDescr object is used to identify circuits using a textual description of up to 255 characters specified by the user. (Note that MIB objects are modified using network management system (NMS) applications, and can not be configured using the Cisco IOS command-line interface.) When the row is created by a user, a value is set for the cciDescr object. The table is indexed by ifIndex from the IF-MIB. The cciStatus is the RowStatus object for the rows in the table. The cciStatus object can be set to only two values by the user: createAndGo(4), which creates a new row, and destroy(6), which removes an existing row. If the row is created successfully, the cciStatus will be active(1). When creating a new row, the user should set the cciDescr object along with the cciStatus in a single **snmp set pdu** command. If the row is already active, only the cciDescr object can be modified. The other option is to delete the row first by setting the cciStatus to destroy(6) and then recreate the row with a new value for cciDescr. When creating a new row, the ifIndex is validated first. If the ifIndex value is not valid, the row is not created and an error code is returned. Similarly, if ,when an interface is deleted, there was a corresponding row in this table, that row will be deleted automatically.

After an identifying description is created for an interface by a user, the description (the cciDescr object) will be sent along with the other varbinds as part of linkup and linkdown trap notifications.

For further details, see the CISCO-CIRCUIT-INTERFACE-MIB.my file, available from the Cisco Connection Online MIB site at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

Cisco AAA Server MIB and Additional Enhancements for the Cisco AS5300 and Cisco AS5800

Addition to show caller Command

The **show caller** command combines the output of the existing call-related show commands. This command displays connection status in summary or in detail. The summary field has been added (summary) to display the total number of calls, including the number of ISDN and Analog calls, since the last reload. This summary counter is cumulative of all calls since the NAS has been up, where other counters indicate the current number of calls in the NAS.

Using the **show caller** command provides the following benefits:

- Displays statistics or debug information for connections using a single command
- Replaces the need to know and use the various show commands
- Provides network management across all Cisco platforms

Cisco AAA Server MIB

This MIB provides statistics reflecting the state of AAA Server operation within the device and AAA communications with external servers.

The Cisco AAA Server MIB provides the following information:

- Distinct statistics for each AAA function
- Status of servers providing AAA functions
- Identities of external AAA servers

A server is defined as a logical entity that provides any of the three AAA functions. A TACACS+ server consists of all three functions with a single IP address and single TCP port. A RADIUS server can consist of the authentication/accounting pair with a single IP address but distinct UDP ports, or it may be just one of authentication or accounting.

Modification to reload Command for the Cisco AS5800

On the Cisco AS5800 only, to request that the Dial Shelf Controller (DSC) [or Dial Shelf Controllers in a redundant configuration] be reloaded at the same time as a reload on the Router Shelf, use the **reload components all** command. Formerly, to reload a Cisco AS5800, separate reload commands were needed for both the DSC and the Router Shelf.

Point-to-Point Password Authentication Protocol Refusal

This new command allows refusal of a peer's request to remote (Point-to-Point Protocol [PPP]) authenticate using Password Authentication Protocol (PAP).

Event MIB

The Event MIB is an asynchronous notification mechanism standardized for use by network management systems using Simple Network Management Protocol (SNMP). The Event MIB provides the ability to monitor Management Information Base (MIB) objects on a local or remote system using SNMP and initiate simple actions whenever a trigger condition is met. By allowing notifications based on events, the Network Management System (NMS) does not need to constantly poll managed devices to find out if something has changed.

Support of the Event MIB has been added to Cisco IOS software to work with a variety of network management systems and, when combined with the currently integrated Expression MIB support, provides a flexible and efficient way to monitor complex conditions on network devices. By allowing SNMP notifications to take place only when a specified condition occurs, Event MIB support reduces the load on affected devices, significantly improving the scalability of network management solutions.

For documentation, see

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t3/dtevent.htm>

Fax Relay Packet Loss Concealment

This feature improves the current real-time fax over IP (commonly known as fax relay) implementation in Cisco gateways, allowing fax transmissions to work reliably over higher packet loss conditions.

In addition, this feature includes enhanced real-time fax debug capabilities and statistics. These debugs and statistics will give better visibility into the real-time fax operation in the gateway, allowing for improved field diagnostics and troubleshooting.

These improvements include configuration of fax relay ECM (Error Correction Mode) on the VoIP dial peer. ECM provides for error-free page transmission. This mode is available on fax machines that include memory for storage of the page data (usually high-end fax machines).

Individual SNMP Trap Support

The Individual SNMP Trap Support feature adds the ability to enable or disable SNMP system management notifications (traps) individually. SNMP traps that can be specified are “authentication”, “linkup”, “linkdown”, and “coldstart”. This feature expands the functionality of the **snmp-server enable traps snmp** command.

For documentation, see

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t3/dtitraps.htm>

Monitoring Resource Availability on Cisco AS5300 Universal Access Servers

This set of features provides enhancements to improve visibility into the line and modem status for the network access server (NAS). The combined features in this document have been developed to monitor the NAS health conditions at the DS0 level, PRI bearer channel level, and modem level.

These features are enabled and disabled by enhanced command-line interface and MIBs.

NAS modem health monitoring is supported by the following features:

- DS0 Busyout Traps
- PRI Requested Channel Not Available Traps
- Modem Health Traps
- Controller Time Slots State

Network Side ISDN PRI Signaling, Trunking, and Switching

The Network Side ISDN PRI Signaling, Trunking, and Switching feature enables Cisco IOS software to replicate the public switched network interface to a PBX that is compatible with the National ISDN (NI) switch type and European Telecommunications Standards Institute (ETSI) Net5 switch type. Routers and PBXs are both traditionally CPE devices with respect to the public switched network interfaces. However, for Voice over IP (VoIP) applications, it is desirable to interface access servers to PBXs with the access server representing the public switched network.

Enterprise organizations use the current VoIP features with Cisco products as a method to reduce costs for long distance phone calls within and outside their organizations. However, there are times that a call cannot go over VoIP and the call needs to be placed using the Public Switched Telephone Network (PSTN). The customer then must have two devices connected to a PBX to allow some calls to be placed using VoIP and some calls to be placed over the PSTN. In contrast, this feature allows Cisco access servers to connect directly to user-side CPE devices such as PBXs and allows voice and data calls to be placed without requiring two different devices to be connected to the PBXs.

The ISDN Network Side PRI Signaling, Trunking, and Switching feature allows Cisco ISDN-enabled access servers to switch calls across interfaces as legacy phone switches do today and to mimic the behavior of the legacy phone switches.

Preauthentication with ISDN PRI and Channel-Associated Signaling

The Preauthentication with ISDN PRI and Channel-Associated Signaling feature allows a Cisco network access server (NAS) to determine if an incoming call may be answered on the basis of the called number, the calling number, or the call type. With an ISDN PRI (Primary Rate Interface), or with Channel-Associated Signaling (CAS), information about an incoming call is available to the NAS before the call is answered. The available call information includes the called station ID (DNIS), the calling station ID (CLID), and the bearer capability (call type).

When an incoming call arrives from the public network switch, but before it is answered, this feature enables the NAS to send the DNIS, CLID, and call type to a RADIUS server for authorization. If the server authorizes the call, then the NAS accepts the call. If the server does not authorize the call, then the NAS sends a disconnect message to the public network switch to reject the call. This feature supports the use of attribute 44 by the RADIUS server application, which allows user authentication based on the CLID at the same time.

This feature also supports the use of new RADIUS attributes. These RADIUS attributes are configured in the RADIUS preauthentication profiles to specify preauthentication behavior. They may also be used, for instance, to specify whether subsequent authentication should occur and, if so, what authentication method should be used.

In the event that the RADIUS server application becomes unavailable, this feature allows a guard timer to be set in the NAS. When the timer expires, the NAS uses a configurable parameter to accept or reject the incoming call without the authorization.

TCP Clear Performance Optimization

This feature provides inbound and outbound performance optimization for America Online (AOL) users of wholesale dialing services.

First introduced in Cisco IOS Release 12.1(1)AA, this feature is designed to provide more efficiency in the data transfers for AOL users who are using a Cisco network access server (the Cisco AS5800) to communicate with a wholesale dial carrier. It permits the Cisco AS5800 platform to support the maximum number of connections provided by two T3 connections (that is, 1344 connections) running the TCP Clear protocol with typical traffic loads.

New Hardware Features in Cisco IOS Release 12.1(2)T

There are no new hardware features in the Cisco AS5800 for Cisco IOS Release 12.1(2)T.

New Software Features in Cisco IOS Release 12.1(2)T

The following new software features are supported by the Cisco AS5800 for Cisco IOS Release 12.1(2)T.

AAA Server Group Deadtimer (CSCdp13160)

The AAA Server Group Deadtimer feature allows each authentication, authorization, and accounting (AAA) server to be fully configured in the server group. Thus, it allows you to direct AAA traffic to separate groups of servers that have different operational characteristics.

With the introduction of this feature, deadtime has been added as a new attribute to the server group structure. In addition, a separate timer has been attached to each server host in every server group. Therefore, when a server is found to be unresponsive after numerous retransmissions and time-outs, the server is assumed to be dead. The timers attached to each server host in all server groups are triggered. In essence, the timers are checked and subsequent requests to a server (once it is assumed dead) are directed to alternate timers, if configured. When the network access server receives a reply from the server, it checks and stops all configured timers (if running) for that server in all server groups.

If the timer has expired, only the server to which the timer is attached is assumed to be alive. This becomes the only server that can be tried for later AAA requests using the server groups to which the timer belongs.

Preauthentication with ISDN PRI (CSCdm82434)

The Preauthentication with ISDN PRI feature allows a Cisco network access server (NAS) to determine if an incoming call may be answered on the basis of the called number, the calling number, or the call type. With an ISDN PRI (Primary Rate Interface), information about an incoming call is available to the NAS before the call is answered. The available call information includes the called station ID (DNIS), the calling station ID (CLID), and the bearer capability (call type).

When an incoming call arrives from the public network switch, but before it is answered, this feature enables the NAS to send the DNIS, CLID, and call type to a RADIUS server for authorization. If the server authorizes the call, then the NAS accepts the call. If the server does not authorize the call, then the NAS sends a disconnect message to the public network switch to reject the call. This feature supports the use of attribute 44 by the RADIUS server application, which allows user authentication based on the CLID at the same time.

This feature also supports the use of new RADIUS attributes. These RADIUS attributes are configured in the RADIUS preauthentication profiles to specify preauthentication behavior. They may also be used, for instance, to specify whether subsequent authentication should occur and, if so, what authentication method should be used.

In the event that the RADIUS server application becomes unavailable, this feature allows a guard timer to be set in the NAS. When the timer expires, the NAS uses a configurable parameter to accept or reject the incoming call without the authorization.

New Hardware Features in Cisco IOS Release 12.1(1) T

There are no new hardware features in the Cisco AS5800 for Cisco IOS Release 12.1(1)T.

New Software Features in Cisco IOS Release 12.1(1) T

The following new software feature is supported by the Cisco AS5800 for Cisco IOS Release 12.1(1)T.

Cisco H.323 Version 2 Phase 2

Cisco H.323 Version 2 Phase 2 upgrades Cisco IOS software by adding several optional features of the H.323 Version 2 specification and facilitates customized extensions to the Cisco Gatekeeper.

- H.323v2 Fast Connect

The Fast Connect feature allows endpoints to establish media channels without waiting for a separate H.245 connection to be opened. This streamlines the number of messages that are exchanged and the amount of processing that must be done before endpoint connections can be established.

- H.245 Tunneling

Through H.245 tunneling, H.245 messages are encapsulated within Q.931 messages without using a separate H.245 TCP connection. When tunneling is enabled, one or more H.245 messages can be encapsulated in any Q.931 message. H.245 tunneling is not supported as a standalone feature; initiation of H.245 tunneling procedures can be initiated only by using the dtmf-relay command, and only from an active Fast Connect call. Furthermore, if dtmf-relay is configured on a Version 2 VoIP dial peer and the active call has been established by using Fast Connect, tunneling procedures initiated by the opposite endpoint are accepted and supported.

H.245 tunneling is backward compatible with H.323 Version 1 configurations.

- H.450.2 Call Transfer

Call Transfer allows an H.323 endpoint to redirect an answered call to another H.323 endpoint. Cisco gateways support H.450.2 Call Transfer as the transferred and transferred-to party. The transferring endpoint must be an H.450-capable terminal; the Cisco gateway cannot act as the transferring endpoint. Gatekeeper-controlled or Gatekeeper-initiated Call Transfer is not supported.



Note

Certain devices are limited in their support of H.450. The Cisco 1700 and ubr820 platforms do not support Interactive Voice Response (IVR). Therefore, these platforms are not able to act as H.450 Transferring endpoints.

- H.450.3 Call Deflection

Call Deflection is a feature under H.450.3 Call Diversion (Call Forwarding) that allows a called H.323 endpoint to redirect the unanswered call to another H.323 endpoint. Cisco gateways support H.450.3 Call Deflection as the originating, deflecting, and deflected-to gateway. The Cisco gateway as the deflecting gateway will support invocation of Call Deflection only by using an incoming PRI QSIG message (a Call Deflection cannot be invoked by using any other trunk type).

- H.450.3 Call Deflection

Call Deflection is a feature under H.450.3 Call Diversion (Call Forwarding) that allows a called H.323 endpoint to redirect the unanswered call to another H.323 endpoint. Cisco gateways support H.450.3 Call Deflection as the originating, deflecting, and deflected-to gateway. The Cisco gateway as the deflecting gateway will support invocation of Call Deflection only by using an incoming PRI QSIG message (a Call Deflection cannot be invoked by using any other trunk type).

- Gateway Support for Voice-Port Description

This feature provides the Gatekeeper with a configurable string that identifies the voice port or T1/E1 span from which an incoming call entered the ingress gateway. This is done using a Cisco proprietary, nonstandard field that has been added to the ARQ message sent by the ingress gateway. The string in the ARQ corresponds to the setting of the voice-port description command.

MIBs

Current MIBs

To download MIB modules, go to the Cisco MIB website on Cisco.com at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

The Cisco AS5800 support the following MIBs:

- AAA-SESSION-MIB
- AAA-SERVER-MIB
- ATM-MIB
- CALL-TRACKER-MIB
- CISCO-ATM2-MIB
- CISCO-ATM-IF-PHYS-MIB
- CISCO-ATM-SIG-DIAG-MIB
- CISCO-BULK-FILE-MIB
- CISCO-C8500-REDUNDANCY-MIB
- CISCO-CALL-HISTORY-MIB.my
- CISCO-CIRCUIT-INTERFACE-MIB
- CISCO-DIAL-CONTROL-MIB
- CISCO-DSP-MGMT-MIB
- CISCO-ENTITY-MIB
- CISCO-ENTITY-FRU-CONTROL-MIB
- CISCO-ENVMON-MIB.my
- CISCO-FRAME-RELAY-MIB
- CISCO-ISDN-MIB
- CISCO-MEMORY-POOL-MIB.my
- CISCO-MODEM-MGMT-MIB
- CISCO-PING-MIB
- CISCO-POP-MGMT-MIB
- CISCO-QUEUE-MIB.my
- CISCO-SMI.my
- CISCO-TC
- CISCO TOKEN RING MIB
- CISCO-SYSLOG-MIB
- CISCO-VPDN-MGMT-MIB
- DIAL-CONTROL-MIB
- ENTITY-MIB

- EXPRESSION-MIB
- FDDI-SMT73-MIB
- FSIP-MIB
- IF-MIB.mib
- OLD-CISCO-CPU-MIB
- OLD-CISCO-CHASSIS-MIB
- OLD-CISCO-IP-MIB
- OLD-CISCO-MEMORY-MIB
- PROCESS-MIB
- RFC-1212.mib
- RFC-1215.mib
- RFC1155-SMI.mib
- RFC1213-MIB.mib
- RFC1354-MIB.mib
- RFC1406-MIB
- RFC1407-MIB
- RFC1398-MIB
- RTT Mon MIB
- SONET-MIB

Important Information

The following section contains important notes about Cisco IOS Release 12.1(5)T that can apply to the Cisco AS5800.

Caveat CSCds50791

When using the 24th channel on a T1 and multilink with maximum calls set to 2 in the Cisco SS7 Interconnect for Access Servers Solution, calls will not complete with Password Authentication Protocol (PAP) authentication while running Cisco IOS Release 12.1(4)T.

This has been resolved in Cisco IOS Release 12.1(5)T.

Last Maintenance Release of Cisco IOS Release 12.1 T

The last maintenance release of the 12.1 T release train is 12.1(5)T. The migration path for customers who need bug fixes for the 12.1 T features is the 12.2 mainline release. The 12.2 mainline release has the complete feature content of 12.1 T and will eventually reach general deployment.

The last maintenance release was renamed from 12.1(4)T to 12.1(5)T to synchronize with its parent software base, the 12.1(5) mainline release, and to reflect that 12.1(5)T has all the bug fixes of the 12.1(5) mainline release. The 12.1 T release train is a superset of the 12.1 mainline release; hence any

defect fixed in the 12.1 mainline is also fixed in 12.1 T. The set of features for 12.1(4)T is the same as that for 12.1(5)T. There was no change in the feature content of the release. The release was renamed so that the releases would be consistent with the Cisco release process.

Caveats

Caveats describe unexpected behavior in Cisco IOS software releases. Severity 1 caveats are the most serious caveats; severity 2 caveats are less serious.

For information on caveats in Cisco IOS Release 12.1 T, see *Caveats for Cisco IOS Release 12.1T*.

All caveats in Cisco IOS Release 12.1 are also in Cisco IOS Release 12.1 T.

For information on caveats in Cisco IOS Release 12.1, see *Caveats for Cisco IOS Release 12.1*, which lists severity 1 and 2 caveats and is located on Cisco.com and the Documentation CD-ROM.



Note

If you have an account with Cisco.com, you can use Bug Navigator II to find caveats of any severity for any release. To reach Bug Navigator II, go to Cisco.com and press **Login**. Then go to **Software Center: Cisco IOS Software: Cisco Bugtool Navigator II**. Another option is to go to <http://www.cisco.com/support/bugtools>.

Related Documentation

The following sections describe the documentation available for the Cisco AS5800. These documents consist of hardware and software installation guides, Cisco IOS configuration and command references, system error messages, and other documents.

Documentation is available as printed manuals or electronic documents.

Use these release notes with these documents:

- Release-Specific Documents, page 28
- Platform-Specific Documents, page 29
- Cisco IOS Software Documentation Set, page 30

Release-Specific Documents

The following documents are specific to Cisco IOS Release 12.1 and are located on Cisco.com and the Documentation CD-ROM:

- *Cross-Platform Release Notes for Cisco IOS Release 12.1*

On Cisco.com at:

Technical Documents: Cisco IOS Software: Cisco IOS Release 12.1: Release Notes: Cross-Platform Release Notes

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software: Cisco IOS Release 12.1: Release Notes: Cross-Platform Release Notes

- Product bulletins, field notices, and other release-specific documents on Cisco.com at:

Technical Documents

- *Caveats for Cisco IOS Release 12.1*

See *Caveats for Cisco IOS Release 12.1* and *Caveats for Cisco IOS Release 12.1 T*, which contain caveats applicable to all platforms for all maintenance releases of Cisco IOS Release 12.1 and Cisco IOS Release 12.1 T.

On Cisco.com at:

Technical Documents: Cisco IOS Software: Cisco IOS Release 12.1: Caveats

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software: Cisco IOS Release 12.1: Caveats



Note If you have an account with Cisco.com, you can use Bug Navigator II to find caveats of any severity for any release. To reach Bug Navigator II, go to Cisco.com and press **Login**. Then go to **Software Center: Cisco IOS Software: Cisco Bugtool Navigator II**. Another option is to go to <http://www.cisco.com/support/bugtools>.

Platform-Specific Documents

These documents are available for the Cisco AS5800 on Cisco.com and the Documentation CD-ROM:

- *Read Me First—Cisco AS5800 Universal Access Server*
- Hardware Installation Documents for Cisco AS5800
- Configuration Documents for Cisco AS5800
- *Cisco AS5800 Universal Access Server Regulatory Compliance and Safety Information*

On Cisco.com at:

Technical Documents: Access Servers and Access Routers: Access Servers: Cisco AS5800

On the Documentation CD-ROM at:

Cisco Product Documentation: Access Servers and Access Routers: Access Servers: Cisco AS5800

Feature Modules

Feature modules describe new features supported by Cisco IOS Release 12.1 T and are updates to the Cisco IOS documentation set. A feature module consists of a brief overview of the feature, benefits, configuration tasks, and a command reference. As updates, the feature modules are available online only. Feature module information is incorporated in the next printing of the Cisco IOS documentation set.

On Cisco.com at:

Technical Documents: Cisco IOS Software Configuration: Cisco IOS Release 12.1: New Feature Documentation

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.1: New Feature Documentation

Cisco IOS Software Documentation Set

The Cisco IOS software documentation set consists of the Cisco IOS configuration guides, Cisco IOS command references, and several other supporting documents that are shipped with your order in electronic form on the Documentation CD-ROM—unless you specifically ordered the printed versions.

Documentation Modules

Each module in the Cisco IOS documentation set consists of two books: a configuration guide and a corresponding command reference. Chapters in a configuration guide describe protocols, configuration tasks, Cisco IOS software functionality, and contain comprehensive configuration examples. Chapters in a command reference provide complete command syntax information. Use each configuration guide with its corresponding command reference.

On Cisco.com and the Documentation CD-ROM, two master hot-linked documents provide information for the Cisco IOS software documentation set.

On Cisco.com at:

Technical Documents: Cisco IOS Software: Cisco IOS Release 12.1: Configuration Guides and Command References

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software: Cisco IOS Release 12.1: Configuration Guides and Command References

Cisco IOS Release 12.1 Documentation Set

Table 4 describes the contents of the Cisco IOS Release 12.1 software documentation set for the AS5800, which is available in electronic form and in printed form if ordered.



Note

You can find the most current Cisco IOS documentation on Cisco.com and the Documentation CD-ROM. These electronic documents may contain updates and modifications made after the hard-copy documents were printed.

On Cisco.com at:

Technical Documents: Cisco IOS Software: Cisco IOS Release 12.1

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software: Cisco IOS Release 12.1

Table 4 Cisco IOS Software Release 12.1 Documentation Set

Books	Major Topics
<ul style="list-style-type: none"> • <i>Cisco IOS Configuration Fundamentals Configuration Guide</i> • <i>Cisco IOS Configuration Fundamentals Command Reference</i> 	<ul style="list-style-type: none"> Cisco IOS User Interfaces Cisco IOS File Management Cisco IOS System Management
<ul style="list-style-type: none"> • <i>Cisco IOS Bridging and IBM Networking Configuration Guide</i> • <i>Cisco IOS Bridging and IBM Networking Command Reference, Volume I</i> • <i>Cisco IOS Bridging and IBM Networking Command Reference, Volume II</i> 	<ul style="list-style-type: none"> Using Cisco IOS Software Overview of SNA Internetworking Bridging IBM Networking
<ul style="list-style-type: none"> • <i>Cisco IOS Dial Services Configuration Guide: Terminal Services</i> • <i>Cisco IOS Dial Services Configuration Guide: Network Services</i> • <i>Cisco IOS Dial Services Command Reference</i> 	<ul style="list-style-type: none"> Preparing for Dial Access Modem Configuration and Management ISDN and Signaling Configuration PPP Configuration Dial-on-Demand Routing Configuration Dial-Backup Configuration Terminal Service Configuration Large-Scale Dial Solutions Cost-Control Solutions Virtual Private Networks X.25 on ISDN Solutions Telco Solutions Dial-Related Addressing Services Interworking Dial Access Scenarios
<ul style="list-style-type: none"> • <i>Cisco IOS Interface Configuration Guide</i> • <i>Cisco IOS Interface Command Reference</i> 	<ul style="list-style-type: none"> Interface Configuration Overview Configuring LAN Interfaces Configuring Serial Interfaces Configuring Logical Interfaces
<ul style="list-style-type: none"> • <i>Cisco IOS IP and IP Routing Configuration Guide</i> • <i>Cisco IOS IP and IP Routing Command Reference</i> 	<ul style="list-style-type: none"> IP Addressing and Services IP Routing Protocols IP Multicast
<ul style="list-style-type: none"> • <i>Cisco IOS AppleTalk and Novell IPX Configuration Guide</i> • <i>Cisco IOS AppleTalk and Novell IPX Command Reference</i> 	<ul style="list-style-type: none"> AppleTalk and Novell IPX Overview Configuring AppleTalk Configuring Novell IPX
<ul style="list-style-type: none"> • <i>Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide</i> • <i>Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference</i> 	<ul style="list-style-type: none"> Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Overview Configuring Apollo Domain Configuring Banyan VINES Configuring DECnet Configuring ISO CLNS Configuring XNS
<ul style="list-style-type: none"> • <i>Cisco IOS Multiservice Applications Configuration Guide</i> • <i>Cisco IOS Multiservice Applications Command Reference</i> 	<ul style="list-style-type: none"> Multiservice Applications Overview Voice Video Broadband

Table 4 Cisco IOS Software Release 12.1 Documentation Set (continued)

Books	Major Topics
<ul style="list-style-type: none"> • <i>Cisco IOS Quality of Service Solutions Configuration Guide</i> • <i>Cisco IOS Quality of Service Solutions Command Reference</i> 	<ul style="list-style-type: none"> Quality of Service Overview Classification Congestion Management Congestion Avoidance Policing and Shaping Signaling Link Efficiency Mechanisms Quality of Service Solutions
<ul style="list-style-type: none"> • <i>Cisco IOS Security Configuration Guide</i> • <i>Cisco IOS Security Command Reference</i> 	<ul style="list-style-type: none"> Security Overview Authentication, Authorization, and Accounting (AAA) Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Other Security Features
<ul style="list-style-type: none"> • <i>Cisco IOS Switching Services Configuration Guide</i> • <i>Cisco IOS Switching Services Command Reference</i> 	<ul style="list-style-type: none"> Cisco IOS Switching Services Overview Cisco IOS Switching Paths Cisco Express Forwarding NetFlow Switching MPLS Switching Multilayer Switching Multicast Distributed Switching Virtual LANs LAN Emulation
<ul style="list-style-type: none"> • <i>Cisco IOS Wide-Area Networking Configuration Guide</i> • <i>Cisco IOS Wide-Area Networking Command Reference</i> 	<ul style="list-style-type: none"> Wide-Area Networking Overview Configuring ATM Configuring Frame Relay Configuring Frame Relay-ATM Interworking Configuring SMDS Configuring X.25 and LAPB
<ul style="list-style-type: none"> • <i>Cisco IOS Configuration Guide Master Index</i> • <i>Cisco IOS Command Reference Master Index</i> • <i>New Features in 12.1-Based Limited Lifetime Releases</i> • <i>New Features in Release 12.1 T</i> • Release Notes (Release note and caveat documentation for 12.1-based releases and various platforms) • <i>Cisco IOS Debug Command Reference</i> • <i>Cisco IOS Dial Services Quick Configuration Guide</i> 	

Obtaining Documentation

World Wide Web

The most current Cisco documentation is available on the World Wide Web at <http://www.cisco.com>. Translated documentation can be accessed at http://www.cisco.com/public/countries_languages.shtml.

Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships 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 as an annual subscription.

Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco Product documentation from the Networking Products MarketPlace:
http://www.cisco.com/cgi-bin/order/order_root.pl
- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:
<http://www.cisco.com/go/subscription>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS(6387).

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.

You can e-mail your comments to bug-doc@cisco.com.

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:

Cisco Systems, Inc.
Document Resource Connection
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

Cisco.com provides a broad range of features and services to help customers and partners streamline business processes and improve productivity. Through Cisco.com, you can find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online technical support, download and test software packages, and order Cisco learning materials and merchandise. Valuable online skill assessment, training, and certification programs are also available.

Customers and partners can self-register on Cisco.com to obtain additional personalized information and services. Registered users can order products, check on the status of an order, access technical support, and view benefits specific to their relationships with Cisco.

To access Cisco.com, go to the following website:

<http://www.cisco.com>

Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

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

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

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

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

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

Contacting TAC by Telephone

If you have a priority level 1 (P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

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

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

This document is to be used in conjunction with the documents listed in the “Related Documentation” section on page 28.

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