General Information

Transaction Language 1 (TL1) is a subset of the input and output messages contained in the International Telecommunications Union (ITU) Man-Machine Language (MML). TL1 provides a standard set of messages that can be used for communicating between operating systems and network elements, and personnel and network elements. For more information about TL1, refer to Telcordia document GR-833-CORE, *Network Maintenance: Network Element and Transport Surveillance Messages*.

This chapter provides information and procedures for getting started with TL1:

- 1.1 Command Syntax, page 1-1
- 1.2 Autonomous Message Syntax, page 1-2
- 1.3 Command Completion Behavior, page 1-3
- 1.4 User Security Levels, page 1-5
- 1.5 Keyboard Shortcuts, page 1-6
- 1.6 Mixed Mode Timing Support, page 1-6
- 1.7 Default Values, page 1-7
- 1.8 Parameter Types, page 1-11

1.1 Command Syntax

TL1 commands conform to the following syntax:

a:b:c:d:e: ... z;

where:

“a” is the command code

“b” is the target identifier (TID)

“c” is the access identifier (AID) or the user identifier (UID)

“d” is the correlation tag (CTAG)

“e: ... z;” are other positions required for various commands

The TID, AID, and CTAG route and control the TL1 command. Other parameters provide additional information required to complete the action requested by the command. TL1 command codes, parameter names and parameter values can be either uppercase or lowercase exclusively or any combination of the two, unless specifically noted in the command description.

The TID is a unique name given to each system when it is installed. The name identifies the particular NE (in this case, the ONS 15454 SDH), to which each command is directed. The value of TID can be any TL1 identifier or text string, but it is limited to 20 characters. An identifier contains any number of letters or digits, but must start with a letter. A text string is any alphanumeric or punctuation character enclosed in double-quotes. The presence of the TID is required in all input commands, but its value can be null (represented by two successive colons). The TID can be null when the operating system directly communicates with the target NE. The recommended value for the TID, when it is used, is the target's common language location identifier (CLLI) code. To establish the TID for a node, use the Provisioning > General tabs in CTC.

The AID is an access code used to identify and address specific objects within the NE. These objects include individual pieces of equipment, transport spans, access tributaries, and other objects.

The CTAG is a unique identifier given to each input command by the user. When the NE responds to a specific command, it includes the command's CTAG in the reply. Including the CTAG eliminates discrepancies about which response corresponds to which command. Valid CTAG values include strings of up to six characters comprised of identifiers (alphanumeric, beginning with a letter) or decimal numerals (a string of decimal digits with an optional non-trailing ".").

The following specification characters are used throughout this document as vehicles for defining the syntax:

- < > enclose a symbol specifier, for example <CTAG>.
- [ ] enclose an optional symbol, for example [<TID>].
- " " enclose a literal character, for example an output format "SLOT-7:PLUGIN,TC,,,,,,,:\"EQUIPMENT PLUG-IN\",TCC"
- ^ is a space, a literal blank character used only in examples of messages.

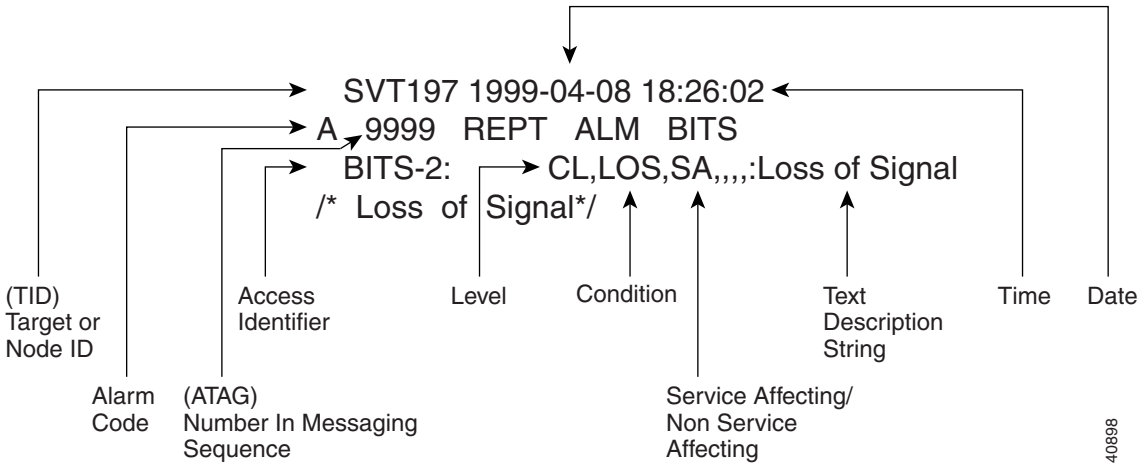
1.2 Autonomous Message Syntax

Autonomous messages are used to report alarms, configuration changes or condition changes. Many of these messages, such as those relating to alarm conditions, are spontaneously triggered by the NE itself without intervention. Other messages, such as those relating to the reporting of periodic condition states or performance data values are scheduled by the NE user via other commands. Because you do not issue autonomous messages to the NE, they do not include input formats or input examples.

The autonomous TL1 messages are included in the *Cisco ONS 15454 SDH TL1 Command Guide*. Figure 1-1 shows the autonomous message format. The autonomous message tag (ATAG) is used for message sequencing. The number is incremented by one for each autonomous message sent by the NE. Cisco NEs use whole numbers 0000 to 9999.

Note Some autonomous messages (REPT DBCHG and REPT EVT SESSION, for example) differ slightly from the format shown in the third line of Figure 1-1.

Figure 1-1 Autonomous Message Format



1.2.1 Alarm Codes

The alarm code indicates the severity of the autonomous message. Valid values for alarm codes in decreasing order of severity are as follows:

- *C Critical alarm
- ** Major alarm
- *^ Minor alarm
- A^ Non-alarm message

Critical, Major, and Minor correspond to the reporting of alarmed events. The Non-alarm message designation is used when the NE is reporting non-alarmed events, periodic measurements, or results of previously-scheduled diagnostics or audits. If multiple alarms are reported in the same message, the alarm code represents the highest severity of those being reported.

The following is an example of an output message that includes the Critical alarm code:

```
  AB7-56 1970-01-01 16:02:10
*C 100.100 REPT ALM EQPT
  “SYSTEM:CR,HITEMP,NSA,,,,:\“High Temperature\”,TCC”
```

1.3 Command Completion Behavior

When you enter a TL1 command, one of three completion codes will be returned. The completion codes are: completed (COMPLD), partial (PRTL), and deny (DENY). You can specify an explicit, implicit, or explicit with implicit list as explained in the following sections.

1.3.1 General Rules

Note The command completion behavior does not apply to RTRV-CRS, RTRV-ALM, and RTVR-COND commands.

1.3.1.1 Explicit List of AIDs - No Wildcards

If a set of AIDs is explicitly listed, including a set of just one AID, then each AID must complete successfully to return a COMPLD message. If more than one AID is in the set and at least one AID succeeds but all do not, then a PRTL with errors for each failed AID is returned. If all AIDs in the set fail, a DENY with errors for each failed AID is returned.

SLOT-1
FAC-2-1&FAC-3-3&FAC-4-2

1.3.1.2 Implicit List of AIDs - Single AID With Wildcard

If a set of AIDs is implied by the use of the ALL modifier on a single AID, then follow the same rules as in the "1.3.1.1 Explicit List of AIDs - No Wildcards" section on page 1-4. The caveat is that the implicit list only includes AIDs that apply to the command:

SLOT-ALL
FAC-1-ALL
VC-3-ALL

where Slot 3 contains an STM-4 and the command is ED-VC3 but VC-3-4 and VC-3-7 are VC-4. The set implied by VC-3-ALL only contains VC-3-{1,2,3,10,11,12} and will not return an error for VC-3-{4,5,6,7,8,9}. Disregard the VC-4 in this case because the modifier of the command specifies that the user is only interested in VC-3 paths. The rule specified in this section applies to the implicit set of {1,2,3,10,11,12}.

1.3.1.3 Explicit List Grouped With Implicit List

If the set of AIDs is comprised of two subsets, one set including explicitly stated AIDs and the other set implied by one or more AID(s) with the ALL modifier, then follow the rules of the"1.3.1.1 Explicit List of AIDs - No Wildcards" section on page 1-4 and the "1.3.1.2 Implicit List of AIDs - Single AID With Wildcard" section on page 1-4, respectively.

FAC-1-1&FAC-2-ALL
FAC-3-ALL&FAC-7-ALL
VC-2-ALL&VC-12-1&VC-13-2&VC-14-ALL

1.3.2 Command Completion Behavior for Retrieval of Cross-Connections

When you enter a RTRV-CRS command, one of three completion codes will be returned. The completion codes are: COMPLD, PRTL, and DENY. You can specify an explicit, implicit, or explicit with implicit list as explained in the following sections.

1.3.2.1 Explicit List of AIDs - No Wildcards

For an explicit list of AIDs on a RTRV-CRS command, an error code will be returned for each AID that fails validation (for example, the user specifies VC-N-13 when SLOT-N only contains an STM-4) or for each AID where no matching cross-connection is found. To determine the completion code, follow the rules from the "1.3.1.1 Explicit List of AIDs - No Wildcards" section on page 1-4. If the result is either PRTL or COMPLD, then a list of matching cross-connections will accompany the response.

1.3.2.2 Implicit List of AIDs - Single AID With Wildcard

If a set of AIDs is implied by the use of the ALL modifier on a single AID, then follow the same AID expansion rule as defined in the example from the "1.3.1.2 Implicit List of AIDs - Single AID With Wildcard" section on page 1-4. Apply the following rules to the set:

1. If all valid AIDs match, COMPLD is returned with a matching list of cross-connections.
2. If some valid AIDs match but not all, COMPLD is returned with a matching list of cross-connections.
3. If all valid AIDs fail to match, DENY is returned.

RTRV-CRS-VC3:[<TID>]:VC-9-ALL:<CTAG>; where VC-9-ALL maps to VC-9-{1,2,3,10,11,12} because there is a single-port STM-4 card in Slot 3 with VC-4 defined for VC-9-4 and VC-9-7. Traverse The set is traversed and returns only the VC-3 cross-connections that exist using end points in that set. If no cross-connections are retrieved, COMPLD is returned.

1.3.2.3 Explicit List Grouped With Implicit List

When you have determined the implicit list, apply the rules from the "1.3.2.2 Implicit List of AIDs - Single AID With Wildcard" section on page 1-5 to the implicit list and the rules from the "1.3.2.1 Explicit List of AIDs - No Wildcards" section on page 1-5 to the explicit list. Apply the following logic to the results from the two subsets:

1. Explicit list returns COMPLD, implicit list returns COMPLD, return COMPLD plus matching list
2. Explicit list returns COMPLD, implicit list returns DENY, return PRTLwith errors plus matching list
3. Explicit list returns PRTL, implicit list returns COMPLD, return PRTL with errors plus matching lists
4. Explicit list returns PRTL, implicit list returns DENY, return PRTL with errors plus matching list
5. Explicit list returns DENY, implicit list returns COMPLD, return PRTL with errors plus matching list
6. Explicit list returns DENY, implicit list returns DENY, return DENY with errors

1.4 User Security Levels

User security levels limit the amount of time a user can leave the system idle before the TL1 session is locked to prevent unauthorized users from making changes. Higher security levels have shorter time outs. Starting with Release 4.0, time outs can be provisioned (by a Superuser) from CTC. If provisioned, it only affects users who are not currently logged in. A user that is logged in has to log out and log back

in before the new timeouts will take affect. A Superuser can provision security levels via TL1 with the SET-ATTR-SECUDFLT command. Security levels are listed with each command and message in the *Cisco ONS 15454 SDH TL1 Command Guide*.

Table 1-1 shows security levels and their default time outs.

Table 1-1 Security Default Time Outs

Security Level	Default Time Outs
Retrieve	Unlimited
Maintenance	60 minutes
Provisioning	30 minutes
Superuser	15 minutes

1.5 Keyboard Shortcuts

TL1 has the ability to store previously issued commands so that they can be recalled for future use. A maximum of 20 commands are stored. All types of commands are stored, including invalid commands. If the session is a GNE session, it will store commands sent to both the gateway network element (GNE) and the end-point network element (ENE).

- Pressing **Ctrl-R** recalls the last command issued. Each time Ctrl-R is pressed, a previously-issued command is displayed.
- Pressing **Ctrl-F** recalls commands in the forward direction.

Once a command has been recalled, you can use the Backspace key to edit the command as necessary. Cursor keys (for example, left and right arrows) are not permitted for editing.

Note Command recall keys are only available when using a serial port session or an interactive telnet session (for example, Telnet <hostname> 3083).

The CTC TL1 session has its own means for recalling previously issued commands as described in the "2.1.1 Open a TL1 session" section on page 2-2.

1.6 Mixed Mode Timing Support

Although TL1 supports mixed mode timing, Cisco strongly advises against its implementation. Mixed mode timing is not a recommended timing mode because of the inherent risk of creating timing loops. Refer to Telcordia document GR-436-CORE, *Digital Network Synchronization Plan* for recommended synchronization planning. Refer to the *Cisco ONS 15454 SDH Procedure Guide* for information about setting up ONS 15454 SDH timing. For further assistance contact the Cisco Technical Assistance Center (TAC) at www.cisco.com or call (800) 553-2447 for unresolved problems.

1.7 Default Values

1.7.1 MS-SPRing

Table 1-2 MS-SPRing Default Values

MS-SPRing	Default
RVRTV	Y
RVTM	5.0 minutes
SRVRTV	Y
SRVTM	5.0 minutes

1.7.2 Cross-Connections

Table 1-3 Cross-Connections Default Values

Cross-Connections	Default
CCT	2WAY for both VCp and VC11 cross-connections

1.7.3 Environment

Table 1-4 Environment Default Values

Environment	Default
OPR-EXT-CONT	CONTTYPE is set as one provisioned in the respective AID and there is not default for it. It is only used as a filter if entered. DUR is always taken as CONT.
RTRV-ATTR-CONT	There is no default for CONTTYPE. It is only used as a filter if entered.
RTRV-ATTR-ENV	There is no default for both NTFCNCDE and ALMTYPE, which are only used as filters if entered.
RTRV-EXT-CONT	CONTTYPE defaults to the control type associated with the AID.
SET-ATTR-ENV	NTFCNCDE defaults to NR. ALMTYPE defaults to NULL. ALMMSG defaults to \“Env Alarm Input 1\”.

1.7.4 Equipment

Table 1-5 Equipment Default Values

Equipment	Default
ALW-SWTOPROTN-EQPT, INH-SWTOPROTN-EQPT and ALW-SWTOWKG-EQPT, ING-SWTOWKG-EQPT	DIRN defaults to BTH
ENT-EQPT	PROTID, PRTYPE, RVRTV and RVTM defaults to NULL
SW-DX-EQPT	MODE defaults to NORM
SW-TOPROTN-EQPT and SW-TOWKG-EQPT	MODE defaults to NORM DIRN defaults to BTH

1.7.5 Performance

Table 1-6 Performance Default Values

Performance	Default
INIT-REG-<MOD2>	LOCN defaults to NEND (near end)
RTRV-PM-<MOD2>	LOCN defaults to NEND TMPER defaults to 15 minutes
RTRV-TH-<MOD2>	MONTYPE defaults to CVL for STM MONTYPE defaults to ESP for VCp MONTYPE defaults to UASV for VC11 LOCN defaults to NEND TMPER defaults to 15 minutes
SET-PMMODE-<VC_PATH>	PMSTATE defaults to ON
SET-TH-<MOD2>	LOCN defaults to NEND TMPER defaults to 15 minutes

1.7.6 Ports

Table 1-7 Ports Default Values

Ports	Default
STM Line	DCC defaults to N TMGREF defaults to N SYNCMSG defaults to Y SENDDUS defaults to N PJMON defaults to 0 SFBER defaults to 1E-4 SDBER defaults to 1E-7 MODE defaults to SDH PST defaults to OOS

1.7.7 SDH Line Protection

Table 1-8 SDH Line Protection Default Values

SDH Line Protection	Default
EX-SW-<STM>	ST (switch type) is optional. For MS-SPRing protection switch only ST defaults to MS-SPRing switch type
STM Line Protection	PROTID defaults to the protecting port of the protection group (SLOT-#(OCN)PORT-#). It is a string that can have a maximum length of 32 characters RVRTV defaults to N (non-revertive mode) RVTM defaults to 5.0 minutes PSDIRN defaults to UNI
OPR-PROTNSW-<STM>	ST (switch type) is optional. For MS-SPRing protection switch only ST defaults to MS-SPRing switch type

1.7.8 VC Paths

Table 1-9 VC Paths Default Values

VC Paths	Default
VC Path	SFBER, SDBER, RVRTV, and RVTM apply to SNCP VC paths only SFBER defaults to 1E-4 SDBER defaults to 1E-6 RVRTV defaults to N RVTM defaults to empty because RVRTV is N when SNCP VCp is created J1 is implemented on DS3i-N-12, STM1, STM16 AND STM64 cards TRCMODE defaults to the OFF mode EXPTRC defaults to a copy of the provisioned string or NULL when TRCMODE is OFF mode EXPTRC defaults to the user entered string when the TRCMODE is MANUAL mode EXPTRC defaults to a copy of the acquired received string or NULL if the string has not been acquired when the TRCMODE is AUTO mode INCTRC defaults to the incoming string (NULL) when the TRCMODE is under OFF mode INCTRC defaults to a copy of the received string or NULL if the string has not been received when the TRCMODE is under MANUAL or AUTO mode

1.7.9 Synchronization

Table 1-10 Synchronization Default Values

Synchronization	Default
BITS	LINECDE defaults to B8ZS FMT defaults to ESF SYNCMSG defaults to Y PST defaults to OOS
NE-SYNCN	TMMDE defaults to EXTERNAL SSMGEN defaults to GEN1 QRES defaults to SAME-AS-DUS RVRTV defaults to Y RVTM defaults to 5.0 minutes
SYNCN	PRI/SEC QREF defaults to PRS PRI STATUS defaults to ACT SEC STATUS defaults to STBY THIRD QREF defaults to ST3 STATUS defaults to STBY

1.7.10 Testing

Table 1-11 Testing Default Values

Testing	Default
OPR-LPBK	LPBKTYPE defaults to FACILITY
RLS-LPBK	LPBKTYPE defaults to current existing loopback type

1.8 Parameter Types

This section provides a description of all message parameter types defined for the TL1 messages used in the ONS 15454 SDH. Individual parameters are listed within each command description.

1.8.1 ATAG Description

The autonomous message tag (ATAG) is used for message sequencing. There are four streams of autonomous messages and each stream corresponds to a sequence. The sequence numbers increment by one for each autonomous message within that stream. The format and range of ATAG differs for each stream. The four streams are:

1. Alarmed events:

   These include REPT ALM and REPT EVT (except REPT EVT SESSION) messages as well as the REPT SW autonomous message.

   ATAG Format: x.y
   where
   x – sequence number of this alarmed event. This is an integer in the range of 0–9999.
   y – sequence number of the previous alarmed event which is related to this alarmed event. This is an integer in the range of 0-9999.

   If there is no such previous related event, then y will be the same as x. For example, the first time an alarm is raised you will receive the autonomous message:

   TID-000 1998-06-20 14:30:00
   * 1346.1346 REPT ALM T1
   “FAC-1-1:MN,LOS,NSA,,,,:\“Loss Of Signal\”,DS1-14”
   ;

   When this alarmed event/condition is cleared, you will receive the autonomous message:

   TID-000 1998-06-20 14:31:00
   A 1349.1346 REPT ALM T1
   “FAC-1-1:CL,LOS,NSA,,,,:\“Loss Of Signal\”,DS1-14”
   ;

2. Database change messages:

   The REPT DBCHG message falls into this category.

   ATAG Format: x
   where:
   x – sequence number of the database change update message. This is an integer in the range of 0–9999. For example:

   TID-000 1998-06-20 14:30:00
   A 96 REPT DBCHG
   “TIME=18-01-05,DATE=1970-01-01,SOURCE=2,USERID=CISCO15,
   DBCHGSEQ=96:ENT-EQPT:SLOT-3”
   ;

Note The ATAG is the same as the DBCHGSEQ field in the REPT DBCHG output.

3. PM Reports:

   The REPT PM messages fall into this category.

   ATAG format: x
   where:
   x – sequence number of the PM report. This is an integer in the range of 0–9999. For example:

   TID-000 1998-06-20 14:30:00
   A5 REPT PM DS1
   “FAC-3-1:CVL,10,PRTL,NEND,BTH,15-MIN,05-25,14-46”
   ;

   This sequence number is global across all existing PM schedules.

4. Autonomous messages specific to a TL1 session. These messages are usually related to the security aspect of the TL1 session. Only the autonomous messages REPT EVT SESSION and CANC fall under this category. This is an integer in the range 0–9999.

   For example:

   TID-000 1998-06-20 14:30:00
   A 1 CANC
   “User”
   ;

1.8.2 CTAG Description

The CTAG is included in each command by the user and is repeated by the NE in the response to allow the user to associate the command and response messages. The valid values for a CTAG are strings of up to 6 characters comprised of identifiers (alphanumeric, beginning with a letter) or non-zero decimal numbers (a string of decimal digits with an optional non-trailing “.”).

A zero in the response field is valid when indicating an error; for example, issuing a semi-colon by itself results in:

TID-000 1998-06-20 14:30:00
M 0 DENY IISP
/* Input, Garbage */
;

1.8.3 TID Description

The TID is the name of the NE where the command is addressed. TID is the Telcordia name for the system.

1.8.4 Parameter Notes

1. If a parameter is set to a value that is inconsistent with something already in the database, and that value is not changed to a consistent value then the command will be denied.
2. If a parameter is set to a value that is consistent with what is already in the database, but another parameter in the same command is incompatible, then the command will be denied.
3. The correct way to issue a command where parameters might be in conflict is to:
   a. Issue that command and change all relevant parameters to compatible values,
   b. Issue the command again to change the target values.

   For example, OC-N is syncmsg=y, to change SDH to y, ED-OCN needs to be called to set syncmsg=N, and called again to set SDH=y.
4. The attribute defaults have also been presented under RTRV commands, and they can be retrieved only if the RTRV commands follow the card/entity original provision.
5. The default for an optional field of an ED command is either the provisioned default value or the last provisioned value in the previous ED command.