



# Release Notes for Cisco ONS 15600 Release 6.0.1

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July 2008



**Note**

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The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN," refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

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Release notes address closed (maintenance) issues, caveats, and new features for the Cisco ONS 15600. For detailed information regarding features, capabilities, hardware, and software introduced with this release, refer to Release 6.0 of the *Cisco ONS 15600 Procedure Guide*, *Cisco ONS 15600 Reference Manual*, *Cisco ONS SONET TLI Command Guide*, and *Cisco ONS 15600 Troubleshooting Guide*. For the most current version of the Release Notes for Cisco ONS 15600 Release 6.0.1, visit the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/ong/15600/600relnt/index.htm>

Cisco also provides Bug Toolkit, a web resource for tracking defects. To access Bug Toolkit, visit the following URL:

<http://tools.cisco.com/Support/BugToolKit/action.do?hdnAction=searchBugs>

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# Changes to the Release Notes

This section documents supplemental changes that have been added to the *Release Notes for Cisco ONS 15600 Release 6.0.1* since the production of the Cisco ONS 15600 System Software CD for Release 6.0.1.

No changes have been added to the release notes for Release 6.0.1.

## Caveats

Review the notes listed below before deploying the ONS 15600. Caveats with DDTS tracking numbers are known system limitations that are scheduled to be addressed in a subsequent release. Caveats without DDTS tracking numbers are provided to point out procedural or situational considerations when deploying the product.

## Hardware

### ONS-SE-2G-xx.x

The ONS-SE-2G-xx.x complies with performance criteria for all intrafacility fiber cables and connectors per Telcordia GR-326-CORE, Issue 3 Sept 1999. Cisco recommends the following approved suppliers for intrafacility fiber cables to use with this product:

- Volex
- Fitel
- Sumitomo
- Fujikura
- Tyco

## Maintenance and Administration



### Caution

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VxWorks is intended for qualified Cisco personnel only. Customer use of VxWorks is not recommended, nor is it supported by Cisco's Technical Assistance Center. Inappropriate use of VxWorks commands can have a negative and service affecting impact on your network. Please consult the troubleshooting guide for your release and platform for appropriate troubleshooting procedures. To exit without logging in, enter a Control-D (hold down the Control and D keys at the same time) at the Username prompt. To exit after logging in, type "logout" at the VxWorks shell prompt.

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### CSCeh84908

A CTC client session can disconnect from an ONS node during simultaneous deletion of large numbers of VT level circuits (3000+). Connectivity to the node will recover without any user action. If the condition persists, restart the CTC session to reconnect. This issue is under investigation.

## CSCei44592

You can have no more than 113 DCC links in one area ID. For example, with 128 DCC Links provisioned within one area ID, 14 DCC links gray out in CTC. To avoid this issue divide the 128 DCCs into multiple area IDs (at least two). This issue is resolved in Release 7.0.

## CSCei14295

After restoring a previously backed up database, the restoral of the PM history database is not time-based, but rather, position-based. The PM history database is stored or retrieved to or from position-dependent time slots from the present PM period. Thus, PM history backed up 24 hours prior to the restore will show the PM history without acknowledging the missing day. This issue will be resolved in a future release.

## CSCeg57163

ONS platforms support only a single OSPF virtual link. This issue will be resolved in a future release.

## CSCdy58342

Network connectivity could be lost if a backbone area becomes segmented into multiple GNEs. This occurs only if multiple ONS 15600 nodes and routers are connected to the same LAN in OSPF area 0. If a link between two routers breaks, the CTC session connected to Router 1 will not be able to communicate with the ONS 15600 connected to Router 2. To resolve, you must repair the link between the routers or provide another form of redundancy in the network. This is as designed.

## CSCdz07098

If OSPF on LAN is enabled with an area ID that is the same as the area ID of any of the DCC Links, CTC will not be able to discover any of the DCC Connected Nodes. To avoid this issue, set the OSPF on LAN area ID to an area other than any of those already occupied by a DCC link. This is as designed.

## CSCdy25142

Equipment alarms are always reported based on the activity of the particular card, without taking card redundancy into consideration. Thus, an equipment alarm such as CTNEQPT-PB-0 may be raised against a line card as CR(SA) even though the traffic is protected. This issue will not be resolved.

## CSCeb49407

Choosing certain qualities of RES settings in the CTC Provisioning tab, Timing subtab, may trigger a reference failure. Specifically, this can occur if you select the quality of RES level such that any of the following are true.

- ST3 < RES < ST3E
- ST4 < RES < SMC
- RES < ST4

When you then input an actual reference signal lower than ST3E quality, the failure is triggered. This issue will not be resolved.

## Optical IO Cards

### CSCef20813

No graphical representations of LEDs for ASAP ports are displayed in the CTC card view. SD and SF LED representations are also absent from the CTC node view for some legacy OCn cards. There are no plans to resolve this issue.

### CSCei37179

Rarely, when an ASAP card is participating in a DCC tunnel, and working and protect spans both fail, the ASAP card might stop responding, sometimes followed by a reset. When this occurs there is no resulting traffic loss, and protection switching continues to function. To recover ASAP card responsiveness a soft reset of the card might be necessary. This issue is resolved in Release 7.0.

### CSCsb46157

When the first and second ports of a PIM are provisioned as GIGE and, at a minimum, the second port is in a circuit, or, when the third and fourth ports of a PIM are provisioned as GIGE and, at a minimum, the fourth port is in a circuit, packets might be dropped on a soft reset of the associated ASAP card. To prevent this, avoid provisioning a GIGE port next to another GIGE port. This issue is resolved in Release 6.1.

## BLSR Functionality

### CSCeh49665

Connections might still exist after circuit deletions on BLSR DRI rings for which the primary node is isolated. For BLSR DRI rings with several types of DRI circuits, if you isolate the primary node by deleting the database, reseating the I/O cards, then delete all BLSR DRI circuits, the SSXCs still show connections. To avoid this issue, do not delete or create BLSR DRI circuits when a node on the BLSR DRI ring is isolated. This issue will not be resolved.

## Interoperability

### CSCdx61916

If, using CTC, you attempt to create a protected VT1.5 circuit that originates on one ONS 15327/454 that is connected to the ONS 15600 via path protection to another ONS 15327/454 that is connected to the ONS 15600 via 1+1 or BLSR, the circuit creation request will be denied because of mixed protection domains. CTC is currently incapable of routing VT circuits across the ONS 15600 when mixed protection schemes are involved. VT traffic can be routed across the ONS 15600 when mixed protection schemes are involved by performing the following:

- 
- Step 1** On the ONS 15600, create an STS level cross connect with the requisite path selectors.
  - Step 2** Use CTC to create a VT circuit from the source node to the trunk ports that interface to the 15600.

- Step 3** Use CTC to create a VT circuit between the destination node and the trunk ports that interface with the 15600.
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**Note**

While this workaround provides the ability to route VT traffic across the ONS 15600 when mixed protection domains exist, the traffic must be managed as three separate circuits instead of one single end-to-end circuit.

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This issue will not be resolved.

## CSCdy68110

When you attempt to configure VT circuits on a test configuration consisting of two ONS 15454 nodes and one ONS 15600 node, when both ONS 15454s are connected to the ONS 15600 node using a dual path protection connection configuration, and when the ONS 15600 node serves as an intermediate node between the two ONS 15454 nodes, you may be unable to create a VT circuit from one ONS 15454 to the ONS 15600 and then to the other ONS 15454. VT Tunnels are created, but the VT circuit is not created. A mixed protection domain error message is raised when this occurs. To avoid this issue, create the VT tunnels manually, so that the two tunnels do not create a topology where the working and protect tunnels share the same I/O card. After the tunnels have been created, the VT circuit can be successfully added. This issue will not be resolved.

## CSCdx94969

Physical PM parameters can not be retrieved through the SNMP interface. MIBs released with the ONS 15600 do not have entries for the following physical PM parameters.

- LBC
- OPR
- OPT

The standard SONET Generic MIB does not have entries for these. To work around this issue, use CTC to retrieve the values. SNMP support for these parameters may be considered for a future release.

## CSCdy54737

The following PM parameters can not be retrieved through SNMP.

- **Line:**
  - FC-L
- **Path:**
  - FC-P
  - PPJC-Pdet
  - NPJC-Pdet
  - PPJC-Pgen
  - NPJC-Pgen
- **Protection groups:**

- PSC
- PSD
- **Far End counts for line and path**
- **1-Day PM counts**

To retrieve these counts, use CTC. SNMP support for these parameters may be considered for a future release.

## Bridge and Roll

### CSCei37364

When a rollTo leg is not receiving a good signal, and because of this the rollPending alarm is not cleared, there is no alarm indicating the reason that the RollPending alarm fails to clear. This issue is resolved in Release 7.0.

### CSCdy14265

The manual bridge and roll feature allows you to perform the END command once the roll operation transitions from a ROLL PENDING to ROLL condition, even if the roll to port has an invalid signal. To avoid traffic impact, ensure that the roll-to line is alarm-free. If an alarm exists, you can choose to do nothing and wait for the alarm to clear, to delete the roll, or to proceed in spite of the alarm. This issue will not be resolved.

## TL1

### CSCeh88565

When the Cisco ONS 15600 is supporting 500 TL1 sessions and there is a sustained high level of management traffic the active TSC might reset. This issue is visible when the Cisco ONS 15600 is supporting 500 TL1 ENE logins to DCC-linked network nodes such as the Cisco ONS 15454. In a laboratory test it was observed that an alarm flood (approximately 70000 alarm messages) in the network would overload the active TSC and cause it to reset. The standby TSC transitions to active and the node recovers. To avoid this issue configure TL1 sessions to throttle the amount of alarm data that is sent across the management network. For example, when a TL1 session starts, the REPT^ALM and REPT^EVT messages are allowed by default. The TL1 command "INH-MSG-ALL" will inhibit all REPT-ALM and REPT^EVT autonomous messages from being transmitted. This issue is resolved in Release 7.0.

### CSCeb46234

A TL1 user cannot preprovision IO cards when a filler card is in the slot. Removal of the filler card will clear the slot and allow the TL1 user to preprovision the IO card. This is by design.

# Resolved Caveats for Release 6.0.1

The following caveats were resolved in Release 6.0.x.

## Upgrades

### CSCee60276

Some circuits might be displayed as PARTIAL after one or more ONS 15600 nodes is upgraded to Release 5.0.x. This can occur when the ONS 15600 interoperates with ONS 15454, 15327, or 15310 nodes in the same network, and there exist circuits with their source on the ONS 15454/15327/15310 nodes and drops on the ONS 15600 nodes. If this occurs, run “Circuit Reconfigure” on the affected PARTIAL circuits. This issue will not occur for upgrades from Release 5.0.x to 6.0.x. For further documentation of this circumstance, see the *Upgrading Cisco ONS 15600 Release 6.0* document.

### CSCeg34361

Revert fails if the internal subnet differs from that in the revert database. This issue is seen in a revert from a 5.0.x release to Release 5.0. This issue is not seen in reverts from Release 5.0.x to 1.x. This issue is resolved in Release 6.0.

### CSCeh16339

Clicking the Cancel button from the CTC network view, Software tab during a software download does not stop the download, but gives the appearance in the network view, Software tab that it has. This symptom only occurs if you click the Cancel button after the software has been copied to the node, and during the “Copying to Standby TSC” phase of the software download. To avoid this issue, cancel the software download from the node view, Software tab instead of from the network view, Software tab when canceling during the “Copying to Standby TSC” phase of the software download. This issue is resolved in Release 6.0.

## Optical Cards

### CSCeg12963

On an OC-48 port of an ASAP card, use of the ED-STs9c TL1 command to create a dual TAP port is only accepted for STS-x-y-z-4/16/28, and is incorrectly denied for the first, and the rest of all the STSs. To work around this issue, when creating an STS-9c dual tap on an OC-48 ASAP port, start the tap on the STS 4, STS 16, or STS 28 boundary. This issue is resolved in Release 6.0.

## Common Control Cards

### CSCeg16339

Performing a TSC soft reset on an ONS 15600 with a large BLSR and circuit configuration sometimes causes subordinate I/O cards to soft reset. This issue is resolved in Release 6.0.

## BLSR Functionality

### CSCsb60780

The wrong ACT/STBY state is reported for BLSR facilities using the TL1 RTRV-OCn command. After a ring or span switch, the TL1 RTRV-OCn command might return incorrect ACT/STBY states for the affected BLSR facilities. To recover from this situation, soft reset the TSC or soft reset both matrix cards. This issue is resolved in Releases 6.0.1, 6.1, and 7.0.

### CSCeh35448

Rarely, a line card might reboot after multiple times creating and deleting a BLSR with circuits provisioned for PCA and DRI. If you have a BLSR with circuits provisioned for PCA and DRI, and you then delete the circuits, delete the BLSR, and reenter the same ring ID and facilities (as the BLSR you just deleted), it is possible to see a line card reboot. This issue is resolved in Release 6.0.

### CSCeh11972

Soft resetting both SSXC cards at the same time while the BLSR is in wait to restore results in a one-second hit. This also causes an out of sync condition where the ring appears switched on the GUI interface and CID-MISMATCH alarms are possibly declared. This issue can occur on a ring that is still switched and for which wait to restore period is active. Avoid soft resetting both SSXC cards at the same time when a wait to restore is active. Soft resets should only be performed when rings are in a steady state (switched or idle). If this out of sync condition occurs, a manual or forced switch on the affected rings will be required to resynchronize the system. This issue is resolved in Release 6.0.

### CSCeb56502

A circuit remains in the roll\_pending state after a roll attempt is cancelled on a path roll in a two-fiber BLSR, where the path has an active protection switch at the circuit destination node. To recover from this situation, restart CTC. This issue is resolved in Release 6.0.

## Path Protection Functionality

### CSCei64765

Rarely, path protection switching can fail to switch ports in IO Slots 2-4 or 12-14. This issue might occur for path protection selectors after any of the following:

- An IO or TSC card insertion

- An IO or TSC hard reset
- A system power failure

This issue does not occur for cards in IO Slots 1 or 11. This issue can occur for cards in IO Slots 2-4 or 12-14.

There is no workaround for ports on IO Slots 2-4 and 12-14. The possibility for the occurrence is less than 1% under an IO or TSC hard reset or system power failure. This issue is resolved in Releases 5.0.7 and 6.0.1.

## CSCec15064

A path protection/SNCP circuit with a defect signal present (for example, AIS-P or AIS-V) on the protect path will produce RDI-P or RDI-V upstream of the detection point, but these signals will not be detected or indicated. This issue is resolved in Release 6.0.

## TL1 Functionality

### CSCeg14663

The response from the TL1 command, RTRV-NE-IPMAP, contains two rows (one duplicate) of information for each DCC connected port that has provisioned BLSR protection. This issue is resolved in Release 6.0.

### CSCsh41324

When running release 4.1.4, if a circuit is created within CTC and if that circuit is retrieved via TL1, all looks as expected. However, after the software is upgraded to release 6 and later, the circuit retrieve does not show the same value as before. For example FAC-4-1 changes to FAC-4-0. Workaround is to manually reset the active TSC after the upgrade.

## New Features and Functionality

This section highlights new features and functionality for Release 6.0.x. For detailed documentation of each feature, consult the user documentation.

## New Hardware

### OC-48 DWDM SFPs for the 15600-ASAP-4PIO

With Release 6.0.x the OC-48/STM16 supports 32 DWDM channel SFPs that can be plugged into the four port 15600-ASAP-4PIO. The following parameters are common across all 32 SFPs.

- Receiver Wavelength: 1260 to 1620 nm
- Minimum Overload: -9 dBm
- Maximum Reflectance of Receiver, measured at Rs: -27 dB

- Maximum Receiver Power, Damage Threshold: +5 dBm
- Transmitter Output Power Min/Max (dBm): 0 to +4 dBm

For further details, including a list of the SFPs by their name and associated operating wavelengths consult the user documentation.

## New Software Features

### Bridge and Roll TL1 Bulk Roll

Release 6.0.x TL1 bridge and roll features support for bulk rolling. Bulk rolling enables you to roll a subset of cross-connections from one port/facility to another port/facility.

The following TL1 commands specifically support bulk rolls. These commands support line-level rolling/bulk rolling and cannot be used for path-level rolling. For a complete list of TL1 commands supporting bridge and roll, as well as examples for each of the supported features, including bulk roll, consult the user documentation.

#### **DLT-BULKROLL-<OCN\_TYPE>**

This command deletes an attempted rolling operation or completes an attempted rolling operation. The rolls that are created using the ENT-BULKROLL-<OCN\_TYPE> command can be deleted using the DLT-BULKROLL-<OCN\_TYPE> command.

#### **ED-BULKROLL-<OCN\_TYPE>**

This command edits information about rolling traffic from one end point to another without interrupting service. This command can use the CMDMDE option to force a valid signal. The only parameter that can be edited is CMDMDE. The time slots cannot be edited.

#### **ENT-BULKROLL-<OCN\_TYPE>**

This command enters information about rolling traffic from one end-point to another without interrupting service.

#### **RTRV-BULKROLL-<OCN\_TYPE>**

This command retrieves roll data parameters.

### Four-Fiber BLSR

Release 6.0.x supports four-fiber BLSR for the ONS 15600. A four-fiber BLSR doubles the bandwidth you would have obtained from using a two-fiber BLSR. Because they allow span switching as well as ring switching, four-fiber BLSRs increase the reliability and flexibility of traffic protection. In a four-fiber BLSR two fibers are allocated for working traffic and two fibers for protection. To implement a four-fiber BLSR, you can install either two or four OC-48 or OC-192 cards at each BLSR node. For further details consult the user documentation.

## Enhanced Security Features

### Security Policy Enhancements

With Release 6.0.x the range of days over which you can enforce disabling of inactive users has increased. The previous range was 45 to 90 days. The new range is 1 to 99 days.

With Release 6.0.x enforced single concurrent user session applies to EMS, TL1, telnet, SSH, sftp, and ftp. This support applied only to EMS and TL1 in previous releases.

In Release 6.0.x you can set how many characters difference must exist between a user's old password and the next new password in a range of one to five characters.

## Secure Shell Encryption and Node Access Security

In previous releases the ONS platforms supported SSH version 2 (SSHv2) as an alternative to the ability to telnet into a node (shell access). In Release 6.0.x SSH encrypts all traffic (including passwords) to effectively eliminate unwanted monitoring of node activity. SSHv2 also supports access to the line card shell via shelf controller (that is, via relay).

In Release 6.0.x all HTTP access to a node (for example, database backup, bulk PM retrieval, or software download) allows the use of HTTPS.

In previous releases any service type supported by ONS software could access ONS nodes. In Release 6.0.x node access can be controlled by service type. Each service type from which you can access a node in Release 6.0.x is configurable to support a choice of access states. The available states are non-secure (the default), secure (via SSHv2), and disabled (deny access from this service type). The SSHv2 secure state is supported for shell and ftp (using sftp), TL1, and EMS access types. Only nonsecure and disabled nodes are supported for SNMP access.

## RADIUS Security

As of Release 6.0 users with Superuser security privileges can configure nodes to use Remote Authentication Dial In User Service (RADIUS) authentication. Cisco Systems uses a strategy known as authentication, authorization, and accounting (AAA) for verifying the identity of, granting access to, and tracking the actions of remote users.

### RADIUS Authentication

RADIUS is a system of distributed security that secures remote access to networks and network services against unauthorized access. RADIUS comprises three components:

- A protocol with a frame format that makes use of User Datagram Protocol (UDP)/IP
- A server
- Clients

The server runs on a central computer, while clients reside in the dial-up access servers and can be distributed throughout the network.

An ONS node operates as a client of RADIUS. The client is responsible for passing user information to designated RADIUS servers, and then acting on the response that is returned. RADIUS servers are responsible for receiving user connection requests, authenticating the user, and returning all configuration information necessary for the client to deliver service to the user. RADIUS servers can act as proxy clients to other kinds of authentication servers. Transactions between the client and RADIUS server are authenticated through the use of a shared secret, which is never sent over the network. User passwords are sent encrypted between the client and RADIUS server. This eliminates the possibility that someone illicitly monitoring an unsecured network might detect a user's password.

An ONS node acting as a RADIUS client can request authentication from up to ten hierarchically arranged RADIUS servers. RADIUS security provisioning features are located in the Provisioning > Security > RADIUS tabs. For further details and operation of RADIUS security features consult the user documentation.

**RADIUS Session Time Limits**

Release 6.0.x RADIUS supports RADIUS session time limits. This feature applies only when a RADIUS server is used for authentication. When RADIUS indicates that a session is to have a time limit, that session is terminated immediately after the time expires. There is no local database support for session time limits. Rather, when EMS users are forcibly logged out by the RADIUS server, they are presented with a notification dialog box indicating that they have been forcibly logged out due to session time expiration. Similarly, when a TL1 user is logged out, an autonomous REPT\_EVT\_SESSION is sent. After a TL1 user is logged out, the next command the user enters receives a DENY response with a reason code of PLNA (Login Not Active).

**AAA Server Enable/Disable**

In Release 6.0.x RADIUS a Superuser can turn AAA server authentication on or off. When AAA server authentication is turned off, the local security policy and settings are employed for user authentication. When AAA server authentication is enabled, it applies to all NE management services, overriding local settings where the two conflict.

**Note**


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The following security policy features are not available when AAA server authentication is used:

- Idle user timeout (RADIUS user session timeouts are employed instead)
  - Single session per user
  - Forced password change at first login (global policy)
  - Forced password change at next login (individual user)
  - Password change prevention
  - Excess failed login attempt lockout
  - Password reuse prevention
  - Inactive account disable
  - Password expiration
- 

AAA server authentication can be set in the node view > Provisioning > Defaults tabs. The default for AAA server authentication is OFF.

**Audit Trail Enhancements**

The following features enhance your ability to monitor node and network activity through use of the audit trail in Release 6.0.x.

- Archival of the audit trail in TL1, with a supporting archival failure transient alarm, AUD-ARCHIVE-FAIL
- Tracking of all Release 6.0.x supported failed login types (incorrect password, disabled account, locked account, single login per user per node denial)
- Shell session login, logout, and activity trail
- Tracking of FTP/sftp logins and logouts
- Sustained audit trail for all logins and logouts whether or not an AAA server is used for user authentication
- Tracking of all user attempts to log in to the node

- When a login is denied, the audit trail records the reason (type of login failure)

## CTC Enhanced Security Support



### Note

All of the security options and settings described in this section are available to Superuser level users. For specific security levels for any given feature, consult the user documentation.

CTC provides several user-configurable security features in the following subtabs under the The CTC node view Security tab.

- Users
- Active Logins
- Policy
- Access
- RADIUS

The Active Logins, Policy, Access, and RADIUS tabs support new features for Release 6.0.x, as described below.

### Active Logins

The Active logins tab supports session management for Release 6.0.x. The Active Logins tab displays current login status information for the network. In previous releases the Active Logins tab displayed only which users were logged in, and the IP address from which each user was logged in. As of Release 6.0.x, in addition to user names and IP addresses, the Active Logins tab displays the specific node to which the user is logged in, the type of session used to log in, the date and time each user logged in, and the last date/time each user was active during the login. You can refresh the Last Activity Time by clicking the Retrieve Last Activity Time button. You also have the option to log out selected sessions. This feature logs out any selected sessions immediately, and interrupts any activities associated with those sessions. When you log out an active user session you have the option to lock the user out (from future sessions) prior to the logout.

In Release 6.0.x the following services are monitored in the Active Logins tab.

- TL1
- EMS
- FTP
- sftp
- telnet shell sessions (via serial port only; not the debug port)
- SSH shell sessions

### Policy

The Policy tab supports user security policy options. The Policy tab provides security policy settings and options. In previous releases the Policy tab provided the following functionality, in five display areas, in which settings could be applied:

- Idle User Timeout—Sets the hours and minutes a user can remain idly logged in before a timeout will occur; settings are provided for each user level.

- **User Lockout**—Sets the number of times a user can fail an attempt to log in before a lockout will occur, with an option to enforce manual unlocking of the user name by a Superuser, or alternatively, to set the lockout duration in minutes and seconds. Login failure types include:
  - Incorrect password
  - Disabled account
  - Locked account
  - Single login per user per node denial
- **Password Change**—Sets the number of unique passwords that must be used before a single password can be reused. Sets the option to disable changing of passwords for a fixed, user-configurable number of days. Sets the option to require a password change on first login to a new account.
- **Password Aging**—Enables you to optionally set a fixed number of days for each user security level (after which time a warning will be issued to create a new password), and to set a fixed number of days after which the password will actually expire and the user will no longer be able to log in.
- **Other**—Sets the option to enforce a single concurrent session per user (EMS and TL1 only). Also sets the option to enforce disabling of inactive users for users inactive a specified number of days; for example, if this feature is checked, with 90 days selected, a user ID that has not logged in for 90 days or more will be unable to log in again.

With Release 6.0.x, in the “Other” area, enforced single concurrent user session applies to EMS, TL1, telnet, SSH, HTTP, sftp, and ftp, and also, the range of days over which you can enforce disabling of inactive users has increased. The new range is 1 to 99 days.

Release 6.0.x also adds a new Password Change configuration that sets how many characters difference must exist between the old password and the new password in a range of one to five characters.

## Node Access

The Access tab supports node access options, including enhanced SSH secure connection support for Release 6.0.x. The Access tab provides settings and options for each type of access that can be used to reach the node. In previous releases, the Access tab included the following three areas for applying node access settings and options.

- **LAN Access**—Sets the option of None, Front only, Backplane only, or Front and Backplane. Also includes a “Restore Timeout” setting, configurable in minutes.
- **Shell Access**—Sets a choice between Telnet, with a configurable port number, and SSH, with a fixed port number.
- **Other**—Sets the PM clearing privilege as Provisioning or Superuser.

With Release 6.0.x the Access tab provides four new areas, plus functional changes to the Shell Access area, for a total of seven areas in which settings can be applied as follows.

- **LAN Access**—(Same as in previous releases.) Sets the option of None, Front only, Backplane only, or Front and Backplane. Also includes a “Restore Timeout” setting, configurable in minutes.
- **Serial Craft Access**—Sets the option to enable or disable the shelf controller serial craft port.
- **Shell Access**—Sets the Access security state for shell logins as Disable, Nonsecure, or Secure. Sets the configurable Telnet Port. Sets the option to Enable Shell Password.
- **EMS Access**—Sets the Access security state for EMS logins as Nonsecure or Secure. Sets the Corba IIOP Listener Port.
- **TL1 Access**—Sets the Access security state for TL1 logins as Disable, Nonsecure, or Secure.
- **SNMP Access**—Sets the Access security state for SNMP logins as Disable or Nonsecure.

- Other—(Same as in previous releases.) Sets the PM clearing privilege as Provisioning or Superuser.

## RADIUS

The RADIUS tab is new for Release 6.0.x, and supports the new RADIUS security features, including RADIUS server management, authentication, accounting, and management of shared secrets. The RADIUS tab provides an area for setting the options to:

- Enable RADIUS Authentication
- Enable RADIUS Accounting
- Enable the given node as the final Authentication when no RADIUS server is reachable

The RADIUS tab also provides a display area for RADIUS servers, in order of authentication preference. This area displays the IP Address, Shared Secret, Authentication Port, and Accounting Port for each RADIUS server.

In the RADIUS tab you can create a RADIUS server by clicking the Create button. The RADIUS tab also provides the following additional actions, which can be performed upon selected server(s).

- Edit
- Delete
- Move up (in order of Authentication)
- Move down (in order of Authentication)

For information on using and configuring RADIUS features in Release 6.0.x consult the user documentation.

## IP and OSI on DCC

As of Release 6.0, IP and OSI can coexist on DCC on a Cisco ONS network, addressing legacy OSI via NSIF Mediation, and allowing migration into IP via G.7712. IP on DCC provides security through strong encryption, SSH, SSL, and HTTPS; centralized control and strong authentication (AAA); RADIUS; communication to Layer 2 and Layer 3 devices (IP + Optical); and pseudo wire, in support of the interworking function between IP and OSI. The ability to address IP/OSI issues gives you flexibility for the future, while working within existing DCN/DCC/OSS infrastructure.

Release 6.0.x uses PPP, a Layer 2 encapsulation protocol, with high-level data link control (HDLC) datagram encapsulation to transport IP and OSI data, and link control protocol (LCP) to establish, configure, and test the point-to-point connections. CTC automatically enables IP over PPP whenever you create an SDCC or LDCC. The SDCC or LDCC can also be provisioned to support OSI over PPP. Link access protocol on the D channel (LAP-D), a data link protocol used in the OSI protocol stack, provides provisionable parameters when you elect to provision an ONS SDCC as OSI only.

Release 6.0.x TCP/IP and OSI networking employs the following additional features, described in detail in the user documentation.

## OSI Connectionless Network Service

OSI connectionless network service is implemented by using the Connectionless Network Protocol (CLNP) and Connectionless Network Service (CLNS). CLNP and CLNS are described in the ISO 8473 standard.

## OSI Routing

OSI routing uses a set of routing protocols that allow end system and intermediate system information collection and distribution; a routing information base; and a routing algorithm (shortest path first).

## TARP

TID Address Resolution Protocol (TARP) is used when TL1 target identifiers (TIDs) must be translated to network service access point (NSAP) addresses.

## TCP/IP and OSI Mediation

Two mediation processes, T-TD and FT-TD, facilitate TL1 networking and file transfers between NEs and ONS client computers running TCP/IP and OSI protocol suites.

## OSI Virtual Routers

Release 6.0.x supports three OSI virtual routers, provisionable on the Provisioning > OSI > Routers tab.

## IP-over-CLNS Tunnels

IP-over-CLNS tunnels are used to encapsulate IP for transport across OSI NEs. Release 6.0.x supports two tunnel types, Generic Routing Encapsulation (GRE) and Cisco IP.

## OSI Provisioning in CTC

The following OSI features are provisionable in the CTC node view, Provisioning tab. For full explanations of CTC provisioning for OSI, consult the user documentation.

- OSI setup
- TARP configuration, static TDC, and MAT
- Router setup and subnets
- Tunnels
- Communication channels

## FLT Secondary State

Release 6.0.x introduces a new secondary service state (SST), Fault (FLT). The FLT secondary state is defined as follows:

- FLT (Fault) The entity has a raised alarm or condition.

The FLT SST is an extension to the existing ONS state model. As such, the FLT state is a Telcordia GR-1093 secondary state. It identifies that the affected entity is OOS because it is faulty. The FLT secondary state affects the service state only. The AdminState (the state you manage the entity into) is not affected. The FLT SST is the result of autonomous action; you cannot manage an entity into the FLT SST. The FLT SST is for retrieval purposes only. An entity's service state will transition into the OOS-AU or OOS-AUMA (AU for autonomous) service state if alarms or conditions are present. The FLT SST is appended to the existing secondary state for the entity when an alarm or condition exists.

## Equipment FLT Service State

Some Equipment alarms will not generate an FLT SST transition. If a state already exists to represent the equipment condition, FLT will not be added to the secondary state list:

- MEA–Mismatch of equipment is represented as MEA SST
- IMPROPRMVL–Improper Removal is represented as UEQ SST
- No FLT will be added, and there will be no alarms, when equipment is in AINS

## FLT SST with Ports

In pre-6.0 releases, an IS-NR port with an LOS alarm remains as IS-NR service state. There is no service state change to reflect the port is down. A new PST-PSTQ service state is introduced in Release 6.0.x to reflect a port in MT state that is alarmed, OOS-AUMA (Autonomous, Management).

Any port alarm that results in the AINS countdown being inhibited will result in an FLT SST transition for the port. Loopback alarms will not result in an FLT SST transition, as there is a LPBK state to represent this information. There is NO FLT SST in the DSBLD state, as all alarms are cleared in the DSBLD state.

## Connection FLT Service State

FLT SST connection changes are the same as for port changes. As with the port, the connection with an alarm in pre-6.0 releases has a service state of IS-NR. A new PST-PSTQ pair is introduced in Release 6.0.x to reflect a cross connect in maintenance with an alarm, OOS-AUMA (Autonomous, Management). Any connection alarm that results in the AINS countdown being inhibited will result in the FLT SST transition for the connection. There is no FLT SST in the DSBLD state, as all alarms are cleared in the DSBLD state.

## CTC Launcher

Release 6.0.x introduces the CTC Launcher utility, CtcLauncher.jar. The CTC Launcher utility can be used to launch CTC and manage an ONS node running Release 6.0.x or higher.

CTC Launcher provides two connection options. First, it can be used to access ONS NEs that have IP connectivity to the CTC computer (supported for the ONS 15600). Second, CTC Launcher can establish connectivity to ONS NEs that reside behind a third party, OSI-based GNE (supported for other ONS platforms). To create a connection through the OSI-based GNE, CTC Launcher creates a TL1 tunnel. This tunnel is similar to the static IP-over-CLNS tunnels that are available in CTC Release 6.0.x. (For information about IP-over-CLNS tunnels, refer to the Release 6.0 ONS product documentation.) However, unlike the static IP-over-CLNS tunnels, the TL1 tunnel does not require provisioning on the third party GNE, the DCN routers, or the ONS NEs. The tunnel connection is created using the CTC Launcher. It can then be managed using CTC.



### Note

To establish a TL1 tunnel, the ONS node behind the GNE must be running Release 6.0 or higher.

Prior to using the CTC Launcher utility, the CTC jar files must be precached, either from the installation CD, using the LDCACHE utility, or from the node, by launching CTC from a web browser. For installation instructions for the CTC Launcher utility, consult the readme file. The CtcLauncher.jar utility and the CtcLauncher-README.txt file are located in the CtcLauncher directory on the R6.0.x software CD. For additional information about CTC Launcher, refer to the CTC Launcher Application Guide. To access the application guide:

- 
- Step 1** Go to <http://www.cisco.com>.
  - Step 2** Choose Technical Support & Documentation.
  - Step 3** Choose Optical Networking.
  - Step 4** Choose the ONS 15300, ONS 15400, or ONS 15600 product category.
  - Step 5** Choose the Configuration Guides category.
  - Step 6** Click the CTC Launcher Application Guide link under the appropriate product.
- 

## TL1

### TL1 Open GNE

TL1 supports the ability to act as a GNE or ENE to an OEM IP DCN (foreign) connected node that also uses TL1. To accomplish TL1 GNE-ENE interoperability, the DCN communication path between the GNE and ENE employs PPP and OSPF in a non-proprietary manner, while ensuring that these connections remain secure. Open GNE TL1 functionality enables you to configure DCC terminations to interoperate with a system on the far end that does not support proprietary PPP vendor extensions or OSPF types.

#### Open GNE Commands

The following commands support TL1 open GNE. For input and output formats and parameters, plus examples of how to use each command, consult the user documentation.

##### **RTRV-TADRMAP**

- RETRIEVE-TID\_ADDRESS\_MAP

This command is used to instruct a Gateway NE to return the entries of the TADRMAP. One row is used for each displayed TID name.

##### **DLT-TADRMAP**

- DELETE-TID\_ADDRESS\_MAP

This command is used to instruct a Gateway NE to delete an entry in the table which maps the TIDs of the subtending NEs to their addresses. The OSs will address the subtending NEs using the TID in TL1 messages and a Gateway NE will address these NEs using IP Addresses or NSAPs. This table, which resides in a Gateway NE, correlates a TID and an address.

##### **ENT-TADRMAP**

- ENTER-TID\_ADDRESS\_MAP

This command is used to instruct a Gateway NE to create an entry in the table which maps the TIDs of the subtending NEs to their addresses. The OSs will address the subtending NEs using the TID in TL1 messages and a Gateway NE will address these NEs using IP Addresses or NSAPs. This table, which resides in a Gateway NE, correlates a TID and an address. This command requires that at least one of (IPADDR or NSAP) be specified.

**ENT-TUNNEL-PROXY**

- ENTER-TUNNEL\_PROXY

This command is used to create a proxy tunnel.

**DLT-TUNNEL-PROXY**

- DELETE-TUNNEL\_PROXY

This command is used to delete a proxy tunnel.

**RTRV-TUNNEL-PROXY**

- RETRIEVE-TUNNEL\_PROXY

This command is used to view the proxy tunnels contained in the NE proxy table.

**ENT-TUNNEL-FIREWALL**

- ENTER-TUNNEL\_FIREWALL

This command is used to create a firewall tunnel.

**DLT-TUNNEL-FIREWALL**

- DELETE-TUNNEL\_FIREWALL

This command is used to delete a firewall tunnel.

**RTRV-TUNNEL-FIREWALL**

- RETRIEVE-TUNNEL\_FIREWALL

This command is used to view the firewall tunnels contained in the NE proxy table.

**Changed Commands for Open GNE**

The following previously-existing TL1 commands support new parameters for open GNE.

**ED-<OCN\_TYPE>**

- foreignFarEnd—Input parameter used to indicate that the far end NE on the DCC is a foreign NE.
- foreignIPAddress—Input parameter specifying the IP Address of the far end Node on the DCC. Used only if foreignFarEnd is 'Y'.

**RTRV-<OCN\_TYPE>**

- foreignFarEnd—Output parameter used to indicate that the far end NE on the DCC is a foreign NE.
- foreignIPAddress—Output parameter specifying the IP Address of the far end Node on the DCC. Used only if foreignFarEnd is 'Y'.

The following command has been modified to support open GNE as described.

**REPT^DBCHG**

Generate an update after an addition to or deletion from the TADRMAP or an addition or deletion of a firewall or proxy tunnel. The ENT-TADRMAP, DLT-TADRMAP, ENT-TUNNEL-PROXY, DLT-TUNNEL-PROXY, ENT-TUNNEL-FIREWALL, and DLT-TUNNEL-FIREWALL commands each generate an appropriate REPT^DBCHG message.

## TL1 Command Changes

### New Commands

The following new TL1 commands are added for Release 6.0.x.

- ALW-CONSOLE-PORT
- DLT-BULKROLL
- DLT-ROLL
- DLT-ROUTE-GRE
- DLT-TADRMAP
- DLT-TUNNEL-FIREWALL
- DLT-TUNNEL-PROXY
- ED-BULKROLL
- ED-PROTOCOL
- ED-ROLL
- ENT-BULKROLL
- ENT-ROUTE-GRE
- ENT-TADRMAP
- ENT-TUNNEL-FIREWALL
- ENT-TUNNEL-PROXY
- INH-CONSOLE-PORT
- RTRV-AUDIT-LOG
- RTRV-BULKROLL
- RTRV-TUNNEL-FIREWALL
- RTRV-TUNNEL-PROXY
- RTRV-FFP
- RTRV-ROLL
- RTRV-ROUTE-GRE
- RTRV-TADRMAP

### Command Syntax Changes

The syntax of the following commands is changed in Release 6.0.x.



#### Note

---

These changes apply to all ONS platforms.

---

**COPY-IOSCFG** syntax:

```
COPY-IOSCFG[:<TID>]:<aid>:<CTAG>::SRC=<src>,DEST=<dest>;
```

Is changed to:

```
COPY-IOSCFG[:<TID>]:<aid>:<CTAG>::SRC=<src>,DEST=<dest>[,FTTD=<fttd>];
```

**COPY-RFILE** syntax:

```
COPY-RFILE[:<TID>]:<src>:<CTAG>::TYPE=<xfertype>,[SRC=<srcurl>],[DEST=<desturl>],[OVWRT=<ovwrt>],[FTTD=<fttd>];
```

Is changed to:

```
COPY-RFILE[:<TID>][:<src>]:<CTAG>::TYPE=<xfertype>,[SRC=<srcurl>],[DEST=<desturl>],[OVWRT=<ovwrt>],[FTTD=<fttd>];
```

**DLT-ROUTE** syntax:

```
DLT-ROUTE[:<TID>]::<CTAG>::<DESTIP>,<IPMASK>;
```

Is changed to:

```
DLT-ROUTE[:<TID>]::<CTAG>::<DESTIP>;
```

**ED-10GIGE** syntax:

```
ED-10GIGE[:<TID>]:<aid>:<CTAG>[::NAME=<portname>],[MACADDR=<macaddr>],[MFS=<mfs>],[CMDMDE=<cmdmde>][:<pst>[,<sst>]];
```

Is changed to:

```
ED-10GIGE[:<TID>]:<aid>:<CTAG>[::NAME=<portname>],[MACADDR=<macaddr>],[MFS=<mfs>],[CMDMDE=<cmdmde>],[FREQ=<freq>],[LOSSB=<lossb>][:<pst>[,<sst>]];
```

**ED-BITS** syntax:

```
ED-BITS[:<TID>]:<aid>:<CTAG>[::LINECDE=<linecde>],[FMT=<fmt>],[SABIT=<sabit>],[IMPEDANCE=<impedance>],[LBO=<lbo>],[SYNCSMSG=<syncmsg>],[AISTHRSHLD=<aisthrshld>],[BITSFAC=<bitsfac>],[ADMSSM=<admssm>][:<pst>];
```

Is changed to:

```
ED-BITS[:<TID>]:<aid>:<CTAG>[::LINECDE=<linecde>],[FMT=<fmt>],[SABIT=<sabit>],[LBO=<lbo>],[SYNCSMSG=<syncmsg>],[AISTHRSHLD=<aisthrshld>],[BITSFAC=<bitsfac>],[ADMSSM=<admssm>][:<pst>];
```

**ED-CRS-STP-PATH** syntax:

```
ED-CRS-STP-PATH:<src>,<dst>:<CTAG>[::ADD=<add>],[REMOVE=<remove>],[CKTID=<cktid>],[CMDMDE=<cmdmde>][:<pst>[,<sst>]]
```

Is changed to:

```
ED-CRS-STP-PATH:<src>,<dst>:<CTAG>[::cct][:ADD=<add>],[REMOVE=<remove>],[CKTID=<cktid>],[CMDMDE=<cmdmde>][:<pst>[,<sst>]]
```

**ED-E1** syntax:

```
ED-E1[:<TID>]:<aid>:<CTAG>[::LINECDE=<linecde>],[FMT=<fmt>],[TACC=<tacc>],[TAPTYPE=<tatype>],[SFBER=<sfber>],[SDBER=<sdber>],[SOAK=<soak>],[NAME=<name>],[CMDMDE=<cmdmde>][:<pst>[,<sst>]];
```

Is changed to:

```
ED-E1[:<TID>]:<aid>:<CTAG>[::LINECDE=<linecde>],[FMT=<fmt>],[TACC=<tacc>],[TAPTYPE=<tatype>],[SFBER=<sfber>],[SDBER=<sdber>],[SOAK=<soak>],[NAME=<name>],[CMDMDE=<cmdmde>],[SYNCSMSG=<syncmsg>],[SENDDUS=<senddus>],[ADMSSM=<admssm>],[SABIT=<sabit>][:<pst>[,<sst>]];
```

**ED-EC1** syntax:

```
ED-EC1[:<TID>]:<aid>:<CTAG>[::PJMON=<pjmon>],[LBO=<lbo>],[SOAK=<soak>],[SFBER=<sfber>],[SDBER=<sdber>],[NAME=<name>],[CMDMDE=<cmdmde>][:<pst>[,<sst>]];
```

Is changed to:

```
ED-EC1[:<TID>]:<aid>:<CTAG>[:::PJMON=<pjmon>],[LBO=<lbo>],[SOAK=<soak>],[SF
BER=<sfber>],[SDBER=<sdber>],[NAME=<name>],[AISONLPBK=<aisonlpbk>],[CMDM
DE=<cmdmde>],[EXPTRC=<exptrc>],[TRC=<trc>],[TRCMODE=<trcmode>],[TRCFORM
AT=<trcformat>][:<pst>[,<sst>]];
```

**ED-FFP-MOD2** syntax:

```
ED-FFP-MOD2:<aid>:<CTAG>[:::PROTID=<protid>],[RVRTV=<rvrtv>],[RVTM=<rvtm>],[
PSDIRN=<psdirn>][:]
```

Is changed to:

```
ED-FFP-MOD2:<aid>:<CTAG>[:::PROTID=<protid>],[RVRTV=<rvrtv>],
```

**ED-G1000** syntax:

```
ED-G1000[:<TID>]:<aid>:<CTAG>[:::MFS=<mfs>],[FLOW=<flow>],[LOWMRK=<int>],[
HIWMRK=<int>],[NAME=<name>],[CMDMDE=<cmdmde>],[SOAK=<soak>][:<pst>[,<sst
>]];
```

Is changed to:

```
ED-G1000[:<TID>]:<aid>:<CTAG>[:::MFS=<mfs>],[FLOW=<flow>],[LOWMRK=<int>],[
HIWMRK=<int>],[AUTONEG=<autoneg>],[NAME=<name>],[CMDMDE=<cmdmde>],[SO
AK=<soak>][:<pst>[,<sst>]];
```

**ED-GIGE** syntax:

```
ED-GIGE[:<TID>]:<aid>:<CTAG>[:::ADMINSTATE=<adminstate>],[LINKSTATE=<linksta
te>],[MTU=<mtu>],[FLOWCTRL=<flowctrl>],[OPTICS=<optics>],[DUPLEX=<duplex>],[S
PEED=<speed>],[NAME=<name>],[CMDMDE=<cmdmde>][:<pst>[,<sst>]];
```

Is changed to:

```
ED-GIGE[:<TID>]:<aid>:<CTAG>[:::ADMINSTATE=<adminstate>],[LINKSTATE=<linksta
te>],[FLOWCTRL=<flowctrl>],[OPTICS=<optics>],[DUPLEX=<duplex>],[SPEED=<speed>
],[NAME=<name>],[CMDMDE=<cmdmde>],[FREQ=<freq>],[LOSSB=<lossb>][:<pst>[,<ss
t>]];
```

**ED-NE-GEN** syntax:

```
ED-NE-GEN[:<TID>]:<CTAG>[:::NAME=<name>],[IPADDR=<ipaddr>],[IPMASK=<ipma
sk>],[DEFRTR=<defrtr>],[IIOPORT=<iioport>],[NTP=<ntp>];
```

Is changed to:

```
ED-NE-GEN[:<TID>]:<CTAG>[:::NAME=<name>],[IPADDR=<ipaddr>],[IPMASK=<ipma
sk>],[DEFRTR=<defrtr>],[IIOPORT=<iioport>],[NTP=<ntp>],[SUPPRESSIP=<mode>];
```

**ED-POS** syntax:

```
ED-POS[:<TID>]:<src>:<CTAG>[:::ENCAP=<encap>],[NAME=<name>],[CMDMDE=<cm
dmde>],[SOAK=<soak>][:<pst>[,<sst>]];
```

Is changed to:

```
ED-POS[:<TID>]:<aid>:<CTAG>;
```

**ED-T1** syntax:

```
ED-T1[:<TID>]:<aid>:<CTAG>[:::LINECDE=<linecde>],[FMT=<fmt>],[LBO=<lbo>],[TAC
C=<tacc>],[TAPTYPE=<taptype>],[SOAK=<soak>],[SFBER=<sfber>],[SDBER=<sdber>],[
NAME=<name>],[CMDMDE=<cmdmde>][:<pst>[,<sst>]];
```

Is changed to:

```
ED-T1[:<TID>]:<aid>:<CTAG>[::LINECDE=<linecde>],[FMT=<fmt>],[LBO=<lbo>],[TACC=<tacc>],[TAPTYPE=<tatype>],[SOAK=<soak>],[SFBER=<sfber>],[SDBER=<sdber>],[SYNCMSG=<syncmsg>],[SENDDUS=<senddus>],[NAME=<name>],[CMDMDE=<cmdmde>],[AISONLPBK=<aisonlpbk>],[MODE=<mode>],[SYNCMAP=<syncmap>],[ADMSSM=<admssm>],[VTMAP=<vtmap>],[AISVONAIIS=<aisvonais>],[AISONLOF=<aisonlof>],[INHFE  
LPBK=<inhfelpbk>][:<pst>[,<sst>]];
```

**ED-T3** syntax:

```
ED-T3[:<TID>]:<aid>:<CTAG>[::FMT=<fmt>],[LINECDE=<linecde>],[LBO=<lbo>],[INH  
FELPBK=<inhfelpbk>],[TACC=<tacc>],[TAPTYPE=<tatype>],[SOAK=<soak>],[SFBER=<  
sfber>],[SDBER=<sdber>],[NAME=<name>],[CMDMDE=<cmdmde>][:<pst>[,<sst>]];
```

Is changed to:

```
ED-T3[:<TID>]:<aid>:<CTAG>[::FMT=<fmt>],[LINECDE=<linecde>],[LBO=<lbo>],[INH  
FELPBK=<inhfelpbk>],[TACC=<tacc>],[TAPTYPE=<tatype>],[SOAK=<soak>],[SFBER=<  
sfber>],[SDBER=<sdber>],[NAME=<name>],[AISONLPBK=<aisonlpbk>],[CMDMDE=<cm  
dmde>][:<pst>[,<sst>]];
```

**ED-VC3** syntax:

```
ED-VC3[:<TID>]:<src>:<CTAG>[::RVRTV=<rvrtv>],[RVTM=<rvtm>],[HOLDOFFTIMER  
=<holdofftimer>],[TACC=<tacc>],[TAPTYPE=<tatype>],[CMDMDE=<cmdmde>],[EXPTR  
C=<exptrc>],[TRC=<trc>],[TRCMODE=<trcmode>][:<pst>[,<sst>]];
```

Is changed to:

```
ED-VC3[:<TID>]:<src>:<CTAG>[::RVRTV=<rvrtv>],[RVTM=<rvtm>],[HOLDOFFTIMER  
=<holdofftimer>],[TACC=<tacc>],[TAPTYPE=<tatype>],[CMDMDE=<cmdmde>],[EXPTR  
C=<exptrc>],[TRC=<trc>],[TRCMODE=<trcmode>],[TRCFORMAT=<trcformat>][:<pst>[,<  
sst>]];
```

**ED-VT1** syntax:

```
ED-VT1[:<TID>]:<aid>:<CTAG>[::RVRTV=<rvrtv>],[RVTM=<rvtm>],[HOLDOFFTIMER  
=<holdofftimer>],[TACC=<tacc>],[TAPTYPE=<tatype>],[CMDMDE=<cmdmde>],[EXPTR  
C=<exptrc>],[TRC=<trc>],[TRCMODE=<trcmode>][:<pst>[,<sst>]];
```

Is changed to:

```
ED-VT1[:<TID>]:<aid>:<CTAG>[::SFBER=<sfber>],[SDBER=<sdber>],[RVRTV=<rvrtv>,  
][RVTM=<rvtm>],[HOLDOFFTIMER=<holdofftimer>],[TACC=<tacc>],[TAPTYPE=<tatype  
e>],[CMDMDE=<cmdmde>],[EXPTRC=<exptrc>],[TRC=<trc>],[TRCMODE=<trcmode>],[  
TRCFORMAT=<trcformat>][:<pst>[,<sst>]];
```

**ED-VT2** syntax:

```
ED-VT2[:<TID>]:<src>:<CTAG>[::RVRTV=<rvrtv>],[RVTM=<rvtm>],[HOLDOFFTIMER  
=<holdofftimer>],[TACC=<tacc>],[TAPTYPE=<tatype>],[CMDMDE=<cmdmde>],[EXPTR  
C=<exptrc>],[TRC=<trc>],[TRCMODE=<trcmode>][:<pst>[,<sst>]];
```

Is changed to:

```
ED-VT2[:<TID>]:<src>:<CTAG>[::SFBER=<sfber>],[SDBER=<sdber>],[RVRTV=<rvrtv>,  
][RVTM=<rvtm>],[HOLDOFFTIMER=<holdofftimer>],[TACC=<tacc>],[TAPTYPE=<tatype  
e>],[CMDMDE=<cmdmde>],[EXPTRC=<exptrc>],[TRC=<trc>],[TRCMODE=<trcmode>],[  
TRCFORMAT=<trcformat>][:<pst>[,<sst>]];
```

**ENT-EQPT** syntax:

```
ENT-EQPT[:<TID>]:<aid>:<CTAG>::<aidtype>[:PROTID=<protid>],[PRTYPE=<prtype>],[
RVRTV=<rvrtv>],[RVTM=<rvtm>],[CARDMODE=<cardmode>],[PEERID=<protid>],[REG
ENNAME=<regename>],[PWL=<pw1>],[CMDMDE=<cmdmde>][:];
```

Is changed to:

```
ENT-EQPT[:<TID>]:<aid>:<CTAG>::<aidtype>[:PROTID=<protid>],[PRTYPE=<prtype>],[
RVRTV=<rvrtv>],[RVTM=<rvtm>],[CARDMODE=<cardmode>],[PEERID=<protid>],[REG
ENNAME=<regename>],[PWL=<pw1>],[CMDMDE=<cmdmde>],[RETIME=<retime>][:];
```

**ENT-ROLL** syntax:

```
ENT-ROLL-<MOD_PATH>[:<TID>]:<src>,<dst>:<CTAG>::RFROM=<rfrom>,RTO=<rto>,
RMODE=<rmode>,[FORCE=<force>];
```

Is changed to:

```
ENT-ROLL-<MOD_PATH>[:<TID>]:<from>,<to>:<CTAG>::RFROM=<rfrom>,RTO=<rto>
,RMODE=<rmode>,[CMDMDE=<cmdmde>];
```

**SET-ATTR-SECUDFLT** syntax:

```
SET-ATTR-SECUDFLT[:<TID>]::<CTAG>[:PAGE=<page>],[PCND=<pcnd>],[MXINV=<
mxinv>],[DURAL=<dural>],[TMOUT=<tmout>],[UOUT=<uout>],[PFRCD=<pfrcd>],[POL
D=<pold>],[PINT=<pint>],[LOGIN=<login>],[PRIVLVL=<uap>];
```

Is changed to:

```
SET-ATTR-SECUDFLT[:<TID>]::<CTAG>[:PAGE=<page>],[PCND=<pcnd>],[MXINV=<
mxinv>],[DURAL=<dural>],[TMOUT=<tmout>],[UOUT=<uout>],[PFRCD=<pfrcd>],[POL
D=<pold>],[PINT=<pint>],[LOGIN=<login>],[PRIVLVL=<uap>],[PDIF=<pdif>];
```

Miscellaneous syntax changes:

Syntax:

```
[:<TID>]:<aid>:<CTAG>;
```

Is changed to:

```
[:<TID>]::<CTAG>;
```

Response:

```
<aid>:<sc>,[<switchtype>]
```

Is changed to:

```
[<vendor>],[<netype>]
```

## Command Response Changes

The following TL1 responses have changed in Release 6.0.x.



**Note**

These changes apply to all ONS platforms.

**RTRV-10GIGE** response:

```
<aid>:.,[<role>],[<status>]:[<portname>],[<macaddr>],[<lbcl>],[<opt>],[<opr>],[<mfs>]:<ps
t>,[<sst>]
```

Is changed to:

```
<aid>:.,[<role>],[<status>]:[<portname>],[<macaddr>],[<lbcl>],[<opt>],[<opr>],[<mfs>],[<fr
eq>],[<lossb>]:<pst>,[<sst>]
```

**RTRV-DS3I** response:

```
<aid>::<fmt>,<linecde>,<lbo>,<tacc>,<tatype>,<sfber>,<sdber>,<soak>,<name>:
<pst>,<sst>
```

Is changed to:

```
<aid>::<fmt>,<linecde>,<lbo>,<tacc>,<tatype>,<sfber>,<sdber>,<soak>,<soakleft
>,<name>,<inhfelpbk>:<pst>,<sst>
```

**RTRV-E1** response:

```
<aid>::<linecde>,<fmt>,<tacc>,<tatype>,<sfber>,<sdber>,<soak>,<name>:<pst>
,<sst>
```

Is changed to:

```
<aid>::<linecde>,<fmt>,<tacc>,<tatype>,<sfber>,<sdber>,<soak>,<soakleft>,<na
me>,<syncmsg>,<senddus>,<retime>,<admssm>,<providesync>,<aisionlpbk>,<sa
Bit>:<pst>,<sst>
```

**RTRV-E3** response:

```
<aid>::<tacc>,<tatype>,<sfber>,<sdber>,<soak>,<name>:<pst>,<sst>
```

Is changed to:

```
<aid>::<tacc>,<tatype>,<sfber>,<sdber>,<soak>,<soakleft>,<name>:<pst>,<sst
>
```

**RTRV-E4** response:

```
<aid>::<payload>,<sfber>,<sdber>,<soak>,<name>:<pst>,<sst>
```

Is changed to:

```
<aid>::<payload>,<sfber>,<sdber>,<soak>,<soakleft>,<name>:<pst>,<sst>
```

**RTRV-EC1** response:

```
<aid>::<pjmon>,<lbo>,<rxequal>,<soak>,<soakleft>,<sfber>,<sdber>,<name>,<
aisionlpbk>:<pst>,<sst>
```

Is changed to:

```
<aid>::<pjmon>,<lbo>,<rxequal>,<soak>,<soakleft>,<sfber>,<sdber>,<name>,<
aisionlpbk>,<exptrc>,<trc>,<inctrc>,<trcmode>,<trcformat>:<pst>,<sst>
```

**RTRV-EQPT** response:

```
<aid>:<aidtype>,<equip>,<role>,<status>:<protid>,<prtype>,<rvrtv>,<rvtm>,<car
dname>,<ioscfg>,<cardmode>,<peerid>,<regenname>,<pw1>:<pst>,<sst>
```

Is changed to:

```
<aid>:<aidtype>,<equip>,<role>,<status>:<protid>,<prtype>,<rvrtv>,<rvtm>,<car
dname>,<ioscfg>,<cardmode>,<peerid>,<regenname>,<pw1>,<transmode>,<reti
me>:<pst>,<sst>
```

**RTRV-FSTE** response:

```
<aid>::<adminstate>,<linkstate>,<mtu>,<flowctrl>,<duplex>,<speed>,<flow>,<e
xpduplex>,<expspeed>,<vlancostthreshold>,<iptosthreshold>,<name>,<soak>,<soa
kleft>:<pst>,<sst>
```

Is changed to:

```
<aid>::[<adminstate>],[<linkstate>],[<mtu>],[<flowctrl>],[<optics>],[<duplex>],[<speed>],[<flow>],[<expduplex>],[<expspeed>],[<vlancosthreshold>],[<iptosthreshold>],[<name>],[<soak>],[<soakleft>]:<pst>,<sst>
```

**RTRV-GIGE** response:

```
<aid>::[<adminstate>],[<linkstate>],[<mtu>],[<flowctrl>],[<optics>],[<duplex>],[<speed>],[<name>]:<pst>,<sst>
```

Is changed to:

```
<aid>::,[<role>],[<status>]:[<adminstate>],[<linkstate>],[<mtu>],[<flowctrl>],[<optics>],[<duplex>],[<speed>],[<name>],[<freq>],[<lossb>]:<pst>,<sst>
```

**RTRV-INV** response:

```
<aid>,<aidtype>::[<plugtype>],[<pn>],[<hwrev>],[<fwrev>],[<sn>],[<clei>],[<twl1=nw1 in code>],[<twl2=w1 in code>],[<twl3=w2 in code>],[<twl4=w3 in code>],[<pluginvendorid>],[<pluginpn>],[<pluginhwrev>],[<pluginfwrev>],[<pluginsn>],[<ilossref>],[<productId>],[<versionId>],[<fpgaVersion>
```

Is changed to:

```
<aid>,<aidtype>::[<pn>],[<hwrev>],[<fwrev>],[<sn>],[<clei>],[<twl1=nw1 in code>],[<pluginvendorid>],[<pluginpn>],[<pluginhwrev>],[<pluginfwrev>],[<pluginsn>],[<ilossref>],[<productId>],[<versionId>],[<fpgaVersion>
```

**RTRV-STM1E** response:

```
<aid>::[<payload>],[<syncmsg>],[<senddus>],[<sfber>],[<sdber>],[<soak>],[<name>]:<pst>,<sst>
```

Is changed to:

```
<aid>::[<payload>],[<syncmsg>],[<senddus>],[<sfber>],[<sdber>],[<soak>],[<soakleft>],[<name>]:<pst>,<sst>
```

**RTRV-T1** response:

```
<aid>::[<linecde>],[<fmt>],[<lbo>],[<tacc>],[<tatype>],[<soak>],[<soakleft>],[<sfber>],[<sdber>],[<name>],[<syncmsg>],[<senddus>],[<retime>],[<aisonlypbk>]:<pst>,<sst>
```

Is changed to:

```
<aid>::[<linecde>],[<fmt>],[<lbo>],[<tacc>],[<tatype>],[<soak>],[<soakleft>],[<sfber>],[<sdber>],[<name>],[<syncmsg>],[<senddus>],[<retime>],[<aisonlypbk>],[<aisvonais>],[<aisonlyof>],[<mode>],[<syncmap>],[<admssm>],[<providesync>],[<vtmap>],[<inhfelpbk>]:<pst>,<sst>
```

**RTRV-VT2** response:

```
<aid>::[<sfber>],[<sdber>],[<rvrtv>],[<rvtm>],[<holdofftimer>],[<exptrc>],[<trc>],[<inctrc>],[<trcmode>],[<tacc>],[<tatype>],[<upsrpthstate>]:<pst>,<sst>
```

Is changed to:

```
<aid>::[<sfber>],[<sdber>],[<rvrtv>],[<rvtm>],[<holdofftimer>],[<exptrc>],[<trc>],[<inctrc>],[<trcmode>],[<trcformat>],[<tacc>],[<tatype>],[<upsrpthstate>]:<pst>,<sst>
```

**SET-TOD** response:

```
<year>,<month>,<day>,<hour>,<minute>,<second>,<tmtime>
```

Is changed to:

```
<year>,<month>,<day>,<hour>,<minute>,<second>,<difference>:<tmtime>
```

## TL1 ENUM Changes



**Note**

These changes apply to all ONS platforms.

### TL1 ENUM Types Changed

The following enum types have been merged into the EQUIPMENT\_TYPE enum type.

- EQUIPMENT\_TYPE\_15310
- EQUIPMENT\_TYPE\_15327
- EQUIPMENT\_TYPE\_15454

### TL1 ENUM Items Added or Removed

The following section, including [Table 1](#) through [Table 29](#), highlights ENUM items changed (added or removed) for Release 6.0.x, by ENUM type.

**Table 1** ADDRTYPE enum items added to Release 6.0.x

ENUM Name	ENUM Value
ADDRTYPE_ENUM_IP	“IP”
ADDRTYPE_ENUM_IPANDNSAP	“IP-AND-NSAP”
ADDRTYPE_ENUM_NSAP	“NSAP”

ADDRTYPE is used in the following commands:

- DLT-TADRMAP

**Table 2** CARDMODE enum items added to Release 6.0.x

ENUM Name	ENUM Value
CARDMODE_DS1E1_DS1ONLY	“DS1E1-DS1ONLY”
CARDMODE_DS1E1_E1ONLY	“DS1E1-E1ONLY”

CARDMODE is used in the following commands:

- ED-EQPT
- ENT-EQPT
- RTRV-EQPT

**Table 3** DL\_TYPE enum items added to Release 6.0.x

ENUM Name	ENUM Value
DL_TYPE_ACCEPT	“ACPT”
DL_TYPE_CANC	“CANC”

DL\_TYPE is used in the following commands:

- APPLY

**Table 4** *ENCODING enum items added to Release 6.0.x*

ENUM Name	ENUM Value
ENCODING_ENUM_LV	“LV”
ENCODING_ENUM_RAWCISCO	“RAW-CISCO”
ENCODING_ENUM_RAWSTD	“RAW-STD”

ENCODING is used in the following commands:

- ENT-TADRMAP

**Table 5** *ENV\_ALM enum items added to Release 6.0.x*

ENUM Name	ENUM Value
ENV_ALM_ENV_ALM_ENGTRANS	“ENGTRANS”
ENV_ALM_ENV_ALM_FUELLEAK	“FUELLEAK”
ENV_ALM_ENV_ALM_GASALARM	“GASALARM”
ENV_ALM_ENV_ALM_HATCH	“HATCH”
ENV_ALM_ENV_ALM_LEVELCON	“LEVELCON”
ENV_ALM_ENV_ALM_LVDADSL	“LVDADSL”
ENV_ALM_ENV_ALM_LVDBYPAS	“LVDBYPAS”
ENV_ALM_ENV_ALM_PWRMJ	“PWRMJ”
ENV_ALM_ENV_ALM_PWRMN	“PWRMN”
ENV_ALM_ENV_ALM_PWR_139	“PWR-139”
ENV_ALM_ENV_ALM_PWR_190	“PWR-190”
ENV_ALM_ENV_ALM_RINGENMN	“RINGENMN”
ENV_ALM_ENV_ALM_RINGGENMJ	“RINGGENMJ”
ENV_ALM_ENV_ALM_RTACADSL	“RTACADSL”
ENV_ALM_ENV_ALM_RTACCRIT	“RTACCRIT”
ENV_ALM_ENV_ALM_RTACPWR	“RTACPWR”
ENV_ALM_ENV_ALM_RTACPWRENG	“RTACPWRENG”
ENV_ALM_ENV_ALM_RTBAYPWR	“RTBAYPWR”
ENV_ALM_ENV_ALM_RTRVENG	“RTRVENG”
ENV_ALM_ENV_ALM_TEMP	“TEMP”
ENV_ALM_ENV_ALM_TREPEATER	“TREPEATER”

ENV\_ALM is used in the following commands:

- RTRV-ALM-ENV
- RTRV-ATTR-ENV
- RTRV-COND-ENV

- SET-ATTR-ENV

**Table 6** *EQUIPMENT\_TYPE enum items added to Release 6.0.x*

ENUM Name	ENUM Value
EQUIPMENT_TYPE_ET_DS1_E1_56	"DS1-E1-56"
EQUIPMENT_TYPE_ET_FILLER	"FILLER"
EQUIPMENT_TYPE_ET_ML100FX	"ML100X-8"
EQUIPMENT_TYPE_ET_MRC_12	"MRC-12"
EQUIPMENT_TYPE_ET_OC192_XFP	"OC192-XFP"
EQUIPMENT_TYPE_ET_STM64_XFP	"STM64-XFP" (SDH Nomenclature of OC192-XFP)
EQUIPMENT_TYPE_ET_XCVXC10G	"XCVXC-10G"
EQUIPMENT_TYPE_ET_OPT_BST_E	"OPT-BST-E"

EQUIPMENT\_TYPE is used in the following commands:

- CHG-EQPT
- ENT-EQPT

**Table 7** *EQPT\_TYPE enum items added to Release 6.0.x*

ENUM Name	ENUM Value
EQPT_TYPE_EQPT_ID_DS1_E1_56	"DS1-E1-56"
EQPT_TYPE_EQPT_ID_FILLER_CARD	"FILLER"
EQPT_TYPE_EQPT_ID_ML100FX	"ML100X-8"
EQPT_TYPE_EQPT_ID_MRC_12	"MRC-12"
EQPT_TYPE_EQPT_ID_OC192_XFP	"OC192-XFP"
EQPT_TYPE_EQPT_ID_STM64_XFP	"STM64-XFP" (SDH Nomenclature of OC192-XFP)
EQPT_TYPE_EQPT_ID_XCVXC10G	"XCVXC-10G"
EQPT_TYPE_EQPT_ID_OPT_BST_E	"OPT-BST-E"

EQPT\_TYPE is used in the following command response:

- REPT\_EVT

**Table 8** *FC\_LINKRATE enum items dropped from Release 5.0.x*

ENUM Name	ENUM Value
FC_LINKRATE_1GFC	"1GFC"
FC_LINKRATE_2GFC	"2GFC"

FC\_LINKRATE is used in the following commands:

- RTRV-FC

**Table 9** *FC\_LINKRATE enum items added to Release 6.0.x*

ENUM Name	ENUM Value
FC_LINKRATE_1GBPS	“1GBPS”
FC_LINKRATE_2GBPS	“2GBPS”

FC\_LINKRATE is used in the following commands:

- RTRV-FC

**Table 10** *FRAME\_FORMAT enum items added to Release 6.0.x*

ENUM Name	ENUM Value
FRAME_FORMAT_LT_JESF	“JESF”

FRAME\_FORMAT is used in the following commands:

- ED-BITS
- ED-DS1
- ED-E1
- ED-T1
- RTRV-BITS
- RTRV-DS1
- RTRV-E1
- RTRV-T1

**Table 11** *LO\_XC\_MODE enum items added to Release 6.0.x*

ENUM Name	ENUM Value
LO_XC_MODE_MIXED	“MIXED”
LO_XC_MODE_VC11	“VC11”
LO_XC_MODE_VC12	“VC12”
LO_XC_MODE_VT1	“VT1”
LO_XC_MODE_VT2	“VT2”

LO\_XC\_MODE is used in the following commands:

- ED-NE-PATH
- RTRV-NE-PATH

**Table 12** *LPBK\_TYPE enum items dropped from Release 5.0.x*

ENUM Name	ENUM Value
LPBK_TYPE_FE_CMD_ESF_PAYLD_LPBK	“PAYLOAD”

FC\_LINKRATE is used in the following commands:

- RTRV-FC

**Table 13** LPBK\_TYPE enum items added to Release 6.0.x

ENUM Name	ENUM Value
LPBK_TYPE_FE_CMD_ESF_PAYLD_LPBK	“FE-CMD-ESF-PAYLOAD”
LPBK_TYPE_PAYLOAD_LPBK	“PAYLOAD”

LPBK\_TYPE is used in the following commands:

- OPR-LPBK-MOD2
- RLS-LPBK-MOD2

**Table 14** MOD2 enum items added to Release 6.0.x

ENUM Name	ENUM Value
MOD2_M2_VC11	“VC11”

MOD2 is used in the following commands:

- RTRV-FFP-MOD2
- RTRV-LNK-MOD2LNK
- RTRV-NE-APC
- RTRV-NE-WDMANS
- RTRV-TRC-OCH
- SCHED-PMREPT-MOD2

**Table 15** MOD2ALM enum items added to Release 6.0.x

ENUM Name	ENUM Value
MOD2ALM_M2_VC11	“VC11”

MOD2ALM is used in the following commands:

- RTRV-ALM-MOD2ALM
- RTRV-COND-MOD2ALM

**Table 16** MOD2B enum items added to Release 6.0.x

ENUM Name	ENUM Value
MOD2B_M2_TSC	“TSC”
MOD2B_M2_VC11	“VC11”

MOD2B is used in the following commands:

- ALS
- RTRV-ALM-ALL

- RTRV-ALM-BITS
- RTRV-ALM-EQPT
- RTRV-ALM-SYNCN
- RTRV-COND-ALL
- RTRV-COND-BITS
- RTRV-COND-EQPT
- RTRV-COND-SYNCN
- RTRV-PM-MOD2
- RTRV-TH-ALL
- RTRV-TH-MOD2

**Table 17** MOD\_PATH enum items added to Release 6.0.x

ENUM Name	ENUM Value
MOD_PATH_M2_VC11	“VC11”

MOD\_PATH is used in the following commands:

- ENT-VCG
- RTRV-CRS
- RTRV-PATH
- RTRV-TRC-OC48
- RTRV-VCG

**Table 18** OPTICAL\_WLEN enum items added to Release 6.0.x

ENUM Name	ENUM Value
OPTICAL_WLEN_WL_1310	“1310”
OPTICAL_WLEN_WL_1470	“1470”
OPTICAL_WLEN_WL_1490	“1490”
OPTICAL_WLEN_WL_1510	“1510”
OPTICAL_WLEN_WL_1530	“1530”
OPTICAL_WLEN_WL_1550	“1550”
OPTICAL_WLEN_WL_1570	“1570”
OPTICAL_WLEN_WL_1590	“1590”
OPTICAL_WLEN_WL_1610	“1610”

OPTICAL\_WLEN is used in the following commands:

- ED-10GIGE
- ED-DWDM-CLNT
- ED-EQPT
- ED-FC

- ED-GIGE
- ED-OCH
- ED-OCN-TYPE
- ENT-EQPT
- RTRV-10GIGE
- RTRV-DWDM-CLNT
- RTRV-EQPT
- RTRV-FC
- RTRV-GIGE
- RTRV-LNK-MOD2LNK
- RTRV-OCH
- RTRV-OCN-TYPE

**Table 19** OPTICS enum items added to Release 6.0.x

ENUM Name	ENUM Value
OPTICS_OP_100_BASE_FX	“100_BASE_FX”
OPTICS_OP_100_BASE_LX	“100_BASE_LX”

OPTICS is used in the following commands:

- ED-GIGE
- RTRV-FSTE
- RTRV-G1000
- RTRV-GIGE

**Table 20** PROTOCOLAID enum items added to Release 6.0.x

ENUM Name	ENUM Value
PROTOCOLAID_EMS	“EMS”
PROTOCOLAID_SHELL	“SHELL”
PROTOCOLAID_SNMP	“SNMP”
PROTOCOLAID_TL1	“TL1”

PROTOCOLAID is used in the following commands:

- ED-CMD-SECU

**Table 21** PROTOCOLSTAT enum items added to Release 6.0.x

ENUM Name	ENUM Value
PROTOCOLSTAT_DISABLED	“DISABLED”
PROTOCOLSTAT_SECURE	“SECURE”
PROTOCOLSTAT_UNSECURE	“UNSECURE”

PROTOCOLSTAT is used in the following commands:

- ED-PROTOCOL

**Table 22** REACH enum items added to Release 6.0.x

<b>ENUM Name</b>	<b>ENUM Value</b>
REACH_AUTOPROV	“AUTOPROV”
REACH_CX	“CX”
REACH_DX	“DX”
REACH_ER	“ER”
REACH_EW	“EW”
REACH_HX	“HX”
REACH_I1	“I1”
REACH_I2	“I2”
REACH_I3	“I3”
REACH_I5	“I5”
REACH_IR_1	“IR-1”
REACH_IR_2	“IR-2”
REACH_IR_3	“IR-3”
REACH_IR_5	“IR-5”
REACH_L1	“L1”
REACH_L2	“L2”
REACH_L3	“L3”
REACH_L5	“L5”
REACH_LR	“LR”
REACH_LRM	“LRM”
REACH_LR_1	“LR-1”
REACH_LR_2	“LR-2”
REACH_LR_3	“LR-3”
REACH_LR_5	“LR-5”
REACH_LW	“LW”
REACH_LX	“LX”
REACH_MM	“MM”
REACH_MX	“MX”
REACH_P1L1	“P1L1”
REACH_S1	“S1”
REACH_S2	“S2”
REACH_S3	“S3”
REACH_S5	“S5”
REACH_SM	“SM”

**Table 22** REACH enum items added to Release 6.0.x (Continued)

ENUM Name	ENUM Value
REACH_SR	“SR”
REACH_SR_1	“SR-1”
REACH_SR_2	“SR-2”
REACH_SR_3	“SR-3”
REACH_SR_5	“SR-5”
REACH_SW	“SW”
REACH_SX	“SX”
REACH_T	“T”
REACH_V2	“V2”
REACH_V3	“V3”
REACH_VX	“VX”
REACH_ZX	“ZX”

REACH is used in the following commands:

- ED-10GIGE
- ED-DWDM-CLNT
- ED-FC
- ED-GIGE
- ED-OCN-TYPE
- RTRV-10GIGE
- RTRV-DWDM-CLNT
- RTRV-FC
- RTRV-GIGE
- RTRV-OCN-TYPE

**Table 23** REQTYPE enum items added to Release 6.0.x

ENUM Name	ENUM Value
REQTYPE_ENH_24HR_BES	“ENH-24HR-BES”
REQTYPE_ENH_24HR_CSS_AND_LOFC	“ENH-24HR-CSS-AND-LOFC”
REQTYPE_ENH_24HR_ES	“ENH-24HR-ES”
REQTYPE_ENH_24HR_SES	“ENH-24HR-SES”
REQTYPE_ENH_24HR_UAS	“ENH-24HR-UAS”

REQTYPE is used in the following commands:

- RTRV-BFDLPM-MOD2

**Table 24** *RFILE enum items added to Release 6.0.x*

ENUM Name	ENUM Value
RFILE_LOG	“RFILE-LOG”

RFILE is used in the following commands:

- COPY-IOSCFG
- COPY-RFILE

**Table 25** *SYNCPMAP enum items added to Release 6.0.x*

ENUM Name	ENUM Value
SYNCPMAP_ASYNC	“ASYNC”
SYNCPMAP_BYTE	“BYTE”

SYNCPMAP is used in the following commands:

- ED-T1
- RTRV-T1

**Table 26** *SYNC\_CLOCK\_REF\_QUALITY\_LEVEL enum items dropped from Release 5.0.x*

ENUM Name	ENUM Value
SYNC_CLOCK_REF_QUALITY_LEVEL_QREF_RES_SDH	“RES-SDH”

SYNC\_CLOCK\_REF\_QUALITY\_LEVEL is used in the following commands:

- ED-BITS
- ED-E1
- ED-OCN-TYPE
- ED-T1
- RTRV-BITS
- RTRV-E1
- RTRV-OCN-TYPE
- RTRV-SYNCN
- RTRV-T1

**Table 27** *TIDADRMODE enum items added to Release 6.0.x*

ENUM Name	ENUM Value
TIDADRMODE_ENUM_ALL	“ALL”
TIDADRMODE_ENUM_DISC	“DISC”
TIDADRMODE_ENUM_IP	“IP”

**Table 27** *TIDADRMODE enum items added to Release 6.0.x (Continued)*

ENUM Name	ENUM Value
TIDADRMODE_ENUM_NSAP	“NSAP”
TIDADRMODE_ENUM_PROV	“PROV”

TIDADRMODE is used in the following commands:

- RTRV-TADRMAP

**Table 28** *TRANSMODE enum items added to Release 6.0.x*

ENUM Name	ENUM Value
TRANSMODE_AU3	“AU3”
TRANSMODE_AU4	“AU4”
TRANSMODE_SONET	“SONET”

TRANSMODE is used in the following commands:

- ED-EQPT
- ENT-EQPT
- RTRV-EQPT

**Table 29** *VTMAP enum items added to Release 6.0.x*

ENUM Name	ENUM Value
VTMAP_GR253	“GR253”
VTMAP_INDUSTRY	“INDUSTRY”

VTMAP is used in the following commands:

- ED-T1
- RTRV-T1

## Related Documentation

### Release-Specific Documents

- *Release Notes for the Cisco ONS 15600, Release 6.0*
- *Release Notes for the Cisco ONS 15454 SDH, Release 6.0.1*
- *Release Notes for the Cisco ONS 15327, Release 6.0.1*
- *Release Notes for the Cisco ONS 15454, Release 6.0.1*
- *Release Notes for the Cisco ONS 15310-CL, Release 6.0.1*

- *Cisco ONS 15600 Software Upgrade Guide, Release 6.0*

## Platform-Specific Documents

- *Cisco ONS 15600 Procedure Guide*  
Provides installation, turn up, test, and maintenance procedures
- *Cisco ONS 15600 Reference Manual*  
Provides technical reference information for SONET/SDH cards, nodes, and networks
- *Cisco ONS 15600 Troubleshooting Guide*  
Provides a list of SONET alarms and troubleshooting procedures, general troubleshooting information, and hardware replacement procedures
- *Cisco ONS SONET TL1 Command Guide*  
Provides a comprehensive list of TL1 commands

## Obtaining Optical Networking Information

This section contains information that is specific to optical networking products. For information that pertains to all of Cisco, refer to the [Obtaining Documentation and Submitting a Service Request](#) section.

## Where to Find Safety and Warning Information

For safety and warning information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document that accompanied the product. This publication describes the international agency compliance and safety information for the Cisco ONS 15454 system. It also includes translations of the safety warnings that appear in the ONS 15454 system documentation.

## Cisco Optical Networking Product Documentation CD-ROM

Optical networking-related documentation, including Cisco ONS 15xxx product documentation, is available in a CD-ROM package that ships with your product. The Optical Networking Product Documentation CD-ROM is updated periodically and may be more current than printed documentation.

## Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS version 2.0.

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