



System Overview



Note

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.

This chapter provides an overview of the Cisco ONS 15454 and a list of new features for System Release 5.0.

The following topics are covered in this chapter:

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Introduction to the ONS 15454

The Cisco ONS 15454 provides efficient bandwidth delivery and management in optical networks. It can be configured as a multi-service provisioning platform (MSPP), multi-service transport platform (MSTP), or hybrid MSPP/MSTP.

As an MSPP, the ONS 15454 is a flexible SONET add/drop multiplexer (ADM) that offers service aggregation and high-bandwidth transport of voice and data traffic in a single platform. It allows you to easily manage services and increase capacity without disrupting services. The ONS 15454 carries traditional time-division multiplexing (TDM) and high-speed data traffic over a single mode fiber optic system.

System Release 4.5 introduced ONS 15454 DWDM cards and ONS 15454 MSTP configuration that used the ONS 15454 shelf assembly to provide wavelength services and DWDM channel aggregation.

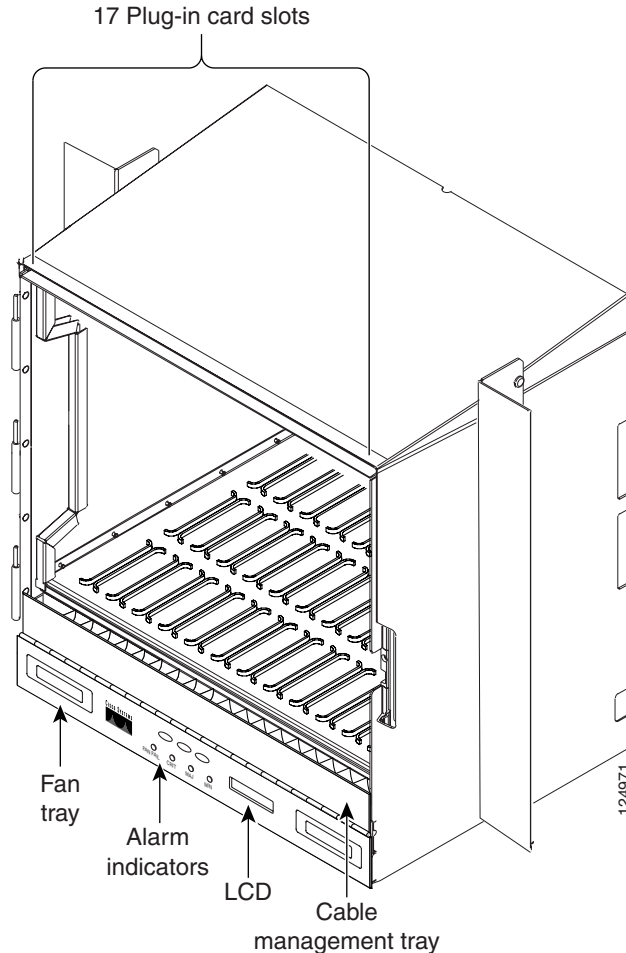
Consolidated software loads in Releases 4.6 and 5.0 allow you to deploy the ONS 15454 in a hybrid mode that supports both MSPP and MSTP configurations in a single chassis. The choice of multi-service aggregation, wavelength aggregation, and wavelength transport, combined with DWDM transmission in a single platform enables networks to be cost-optimized for any mix of services.

ONS 15454 Shelf Assemblies and Backplane Hardware

In this document, the terms “ONS 15454” and “shelf assembly” are used interchangeably. In the installation context, these terms have the same meaning. Otherwise, shelf assembly refers to the physical steel enclosure that holds cards and connects power, and ONS 15454 refers to the entire system, both hardware and software.

The ONS 15454 temperature-hardened 15454-SA-ANSI shelf assembly shown in [Figure 1-1](#) contains 17 plug-in card slots, a backplane interface, a fan tray with LCD and alarm indicators, and a cable management tray. Starting with Release 4.6, the 15454-SA-HD (high-density) shelf assembly replaces the 15454-SA-ANSI as the default chassis for new installations. You can install both 15454-SA-ANSI and 15454-SA-HD the shelf assemblies in a 19- or 23-inch rack. Both shelf assemblies weigh approximately 42 pounds without mounting ears and plug-in cards.

Figure 1-1 Cisco ONS 15454 15454-SA-ANSI Shelf Assembly



When installed in an equipment rack, the shelf assembly is typically connected to a fuse and alarm panel to provide centralized alarm connection points and distributed power for the ONS 15454. Fuse and alarm panels are third-party equipment and are not covered in this document. The front door of the ONS 15454 allows access to the shelf assembly, fan tray, and cable management area. The shelf assembly can be installed in both EIA-standard or Telcordia-standard racks.

The ANSI and HD shelf assemblies are a total of 17 inches wide with no mounting ears attached. Ring runs are not provided by Cisco and may hinder side-by-side installation of shelves where space is limited. Both shelves measure 18.5 inches high and 19 or 23 inches wide (depending on which way the mounting ears are attached). The 15454-SA-ANSI shelf with the standard door measures 12 inches deep and 14 inches deep with the optional deep door. You can install up to four of the ANSI or HD shelves in a seven-foot equipment rack. Each shelf must have 1 inch of airspace between them to allow air flow to the fan intake. When a second shelf is installed, the air ramp on top of the lower shelf assembly provides the air spacing needed and should not be modified in any way.

The backplane provides access to alarm contacts, external interface contacts, power terminals, and BNC, SMB, AMP Champ, and SCSI connectors. The lower section of the ONS 15454 backplane is covered either by a clear plastic or metal protector.

Electrical Interface Assemblies

Optional electrical interface assemblies (EIAs) are attached to the shelf assembly backplane to provide electrical interface cable connections. EIA backplane covers are typically preinstalled when ordered with the ONS 15454. EIAs must be ordered when using DS-1, DS-3, DS3XM, or EC-1 cards.

Seven different EIA backplane covers are available for the ONS 15454: BNC, High-Density BNC, Mini-BNC, SMB, AMP Champ, Universal Backplane Interface Connector – Vertical (UBIC-V) and UBIC - Horizontal (UBIC-H). UBIC-V and UBIC-H backplane covers are typically preinstalled when ordered with the ONS 15454 high density shelf (15454-SA-HD). Either UBIC-V or UBIC-H EIAs are required when using the high-density (48-port DS-3/EC-1 and 56-port DS-1) electrical cards. If the shelf was not shipped with the correct EIA interface, you must order and install the correct EIA.

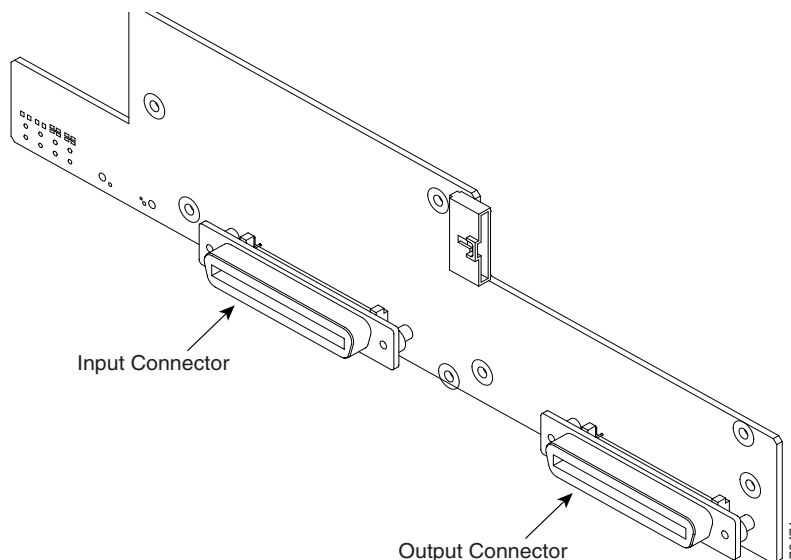
EIAs are available with SMB, BNC, Mini-BNC, UBIC-H, and UBIC-V connectors for DS-3, DS3XM (TMUX) or EC-1 cards. EIAs are available with AMP Champ, UBIC-H, and UBIC-V connectors for DS-1 cards. You must use SMB (with wire wrap Balun), UBIC-H or UBIC-V EIAs for DS-1 twisted-pair cable installation. You can install EIAs on one or both sides of the ONS 15454 backplane in any combination (in other words, AMP Champ on Side A and BNC on Side B or High-Density BNC on side A and UBIC-V on side B, and so forth).

As you face the rear of the ONS 15454 shelf assembly, the right side is the A side and the left side is the B side. The EIA connector columns are labeled transmit (Tx) and receive (Rx) to correspond to transmit and receive cables.

Alarm Expansion Panel

The ONS 15454 alarm expansion panel (AEP) is used with the Alarm Interface Card (AIC-I) card to provide 48 dry alarm contacts for the ONS 15454 system, 32 of which are inputs and 16 outputs. The AEP is a printed circuit board assembly that is installed on the backplane. [Figure 1-2](#) shows the AEP board.

Figure 1-2 Alarm Expansion Panel



Cable Routing and Management

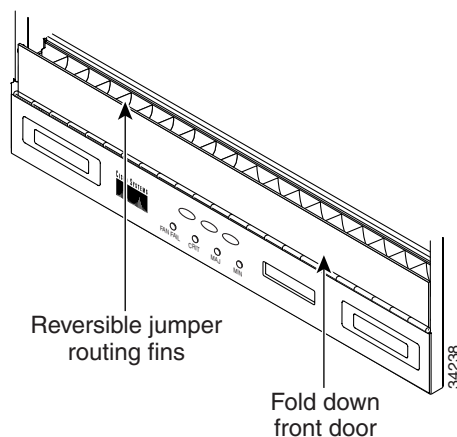
ONS 15454 optical cards have SC or small form LC connectors on the card faceplate. Ethernet cards have RJ45 connectors on the faceplate. Fiber optic and CAT 5 cables are routed into the front of the optical and Ethernet cards. Electrical cards (DS-1, DS-3, DS3XM, and EC-1) require EIAs to provide the cable connection points for the shelf assembly.

The ONS 15454 cable management facilities include the following:

- A cable-routing channel that runs the width of the shelf assembly.
- Plastic horseshoe-shaped fiber guides at each side opening of the cable-routing channel that ensure the proper bend radius is maintained in the fibers. You can remove the fiber guide if necessary to create a larger opening (if you need to route CAT-5 Ethernet cables out the side, for example).
- A fold-down door that provides access to the cable-management tray.
- Cable tie-wrap facilities on EIAs that secure cables to the cover panel.
- Reversible jumper routing fins that enable you to route cables out either side by positioning the fins as desired.
- Optional universal cable-router inserts (recommended to route jumper cables in any direction desired), as in [Figure 1-4](#).
- Jumper slack storage reels (2) on each side panel that reduce the amount of slack in cables that are connected to other devices.
- Optional fiber management tray (recommended for DWDM nodes)
- Optional tie-down bar (recommended for use with the UBIC-V and UBIC-H)

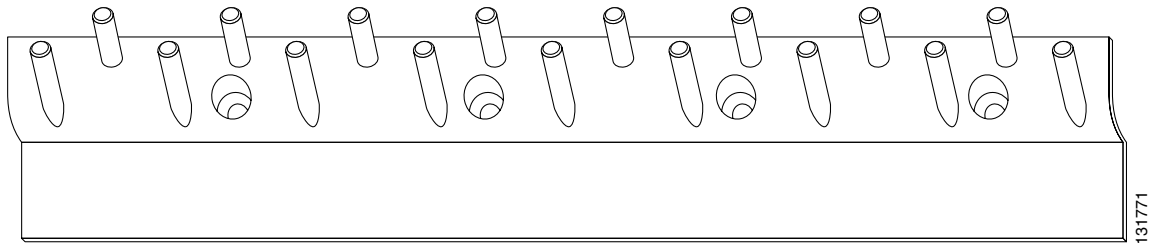
[Figure 1-3](#) shows the cable management facilities that you can access through the fold-down front door, including the cable-routing channel and the reversible jumper routing fins.

Figure 1-3 *Managing Cables on the Front Panel*



[Figure 1-4](#) shows the optional universal cable-router inserts, which has round posts that allow you to route cables out either side of the cable-routing channel.

Figure 1-4 Universal Cable-Router Inserts



ONS 15454 Plug-in Cards and Slot Requirements

ONS 15454 cards have electrical plugs at the back that plug into electrical connectors on the shelf assembly backplane. When the ejectors are fully closed, the card plugs into the assembly backplane.

The ONS 15454 15454-SA-ANSI shelf assembly has 17 card slots numbered sequentially from left to right. Slots 1 through 4 and 14 through 17 are multispeed slots. They can host any ONS 15454 card, except the OC48IR/STM16 SH 1310, OC48LR/STM 16 LH 1550, OC48ELR 1550, and OC192LR/STM64LH 1550 cards. Slots 5, 6, 12 and 13 are high-speed slots, which can host all ONS 15454 cards except the OC3/STM-6 and OC12/STM4-4 card. You can install the OC48 IR/STM16 SH AS 1310 and the OC48 LR/STM16 LH AS 1550 cards in any multispeed or high-speed card slot. The 15454-SA-HD shelf assembly is the same as the 15454-SA-ANSI, except slots 1 to 3 and 15 to 17 can supports greater electrical termination capacities required for the high-density (HD) DS-1, DS-3, and EC-1 interface cards. The HD cards are planned for a future release. Slots 7 and 11 are dedicated to Timing, Communication and Control (TCC) cards. Slots 8 and 10 are dedicated to cross-connect (XCVT, XC10G) cards. Slot 9 is reserved for the optional Alarm Interface Controller (AIC) card. Slots 3 and 15 can also host DS1N-14 and DS3N-12 cards that are used in 1:N protection.

Shelf assembly slots have symbols indicating the type of cards that you can install in them. Each ONS 15454 card has a corresponding symbol. You can only install cards in slots where the symbol on the card's faceplate matches the symbol on the slot. [Table 1-1](#) shows the slot and card symbol definitions.

Table 1-1 Plug-in Card Symbols and Slot Definitions

Card & Slot Symbol Color/Shape	Slot Definition
Orange/Circle	Multispeed slots 1 to 6 and 12 to 17. Only install traffic cards with an orange circle on the faceplate.
Blue/Triangle	High-speed slots 5, 6, 12, and 13. Only install traffic cards with a blue triangle on the faceplate.
Purple/Square	TCC slots 7 and 11 (TCC+, TCC2, TCC2Pcards only)
Green/Cross	Cross-connect slots 8 and 10 (XC, XCVT, XC10G cards only)
Red/P	Protection slots 3 and 15 used in 1:N protection schemes.
Red/Diamond	AIC/AIC-I slot 9.
Gold/Star	Multispeed slots 1 to 4 and 14 to 17. Only install traffic cards with a gold star on the faceplate.
Blue/Hexagon	High-density slots 1 to 3 and 15 to 17 only on the 15454-SA-HD shelf. Only install HD traffic cards with a blue hexagon on the faceplate.

ONS 15454 Common Control Cards

Table 1-2 lists the six common control cards available for the Cisco ONS 15454 and summarizes their functions.

Table 1-2 List of ONS 15454 Common Control Cards

Card	Function
TCC2	The enhanced TCC2 card performs all the same functions as the TCC+, but also has additional features including supply voltage monitoring, support for up to 84 data communication channel/generic communication channel (DCC/GCC) terminations, and an on-card lamp test. The TCC2 is the standard processor card shipped with System Releases 4.0 to 4.6.
TCC2P	The TCC2P card is an advanced version of the TCC2 card. The advanced functions included with the TCC2P are new Ethernet data communications security features and 64Kbps composite clock BITS timing.
XCVT	The XCVT establishes STS-1 and VT 1.5 connections and performs SONET TDM switching at the STS-1 level.
XC10G	The XC10G provides the same features as the XC-VT, but has four times the bandwidth. The XC-10G is required with the OC-192, OC-48 any-slot, OC3-8, and OC12-4.
AIC	The Alarm Interface Controller (AIC) card provides environmental alarm inputs and output controls, orderwire, and user data channel capabilities and is not required for system operation for System Releases 3.3 and lower.
AIC-I	The optional Alarm Interface Controller card (AIC-I) replaces the AIC card for System Releases 3.4 and higher. It provides four main capabilities including 1) environmental alarm interconnection, 2) orderwire, 3) A- and B-side input voltage monitoring, 4) access to user data channels.

ONS 15454 Interface Cards

The ONS 15454 is architected for maximum flexibility. A single ONS 15454 shelf assembly supports a variety of card configurations and interfaces ranging from 1.5Mb/s to 10Gb/s as listed below in Table 1-3.

Table 1-3 List of Cisco ONS 15454 Interface Cards

Card	Description
SONET/SDH	
OC3 IR 4 SH 1310 and OC3 IR 4/STM1 SH 1310	The OC3 IR 4 SH 1310 and OC3 IR 4/STM1 SH 1310 cards are functionally the same. Both cards provides four intermediate- or short-range SONET/SDH OC-3 ports compliant with ITU-T G.707, G.957, and Telcordia GR-253.
OC-3 IR 8/STM1 1310	The new The OC-3 IR 8/STM1 1310 card provides eight (8) intermediate reach SONET compliant 155.520 Mbps interfaces operating at a nominal wavelength of 1310nm.
OC12 IR 1310 and OC12 IR/STM4 SH 1310	The OC12 IR 1310 and OC12 IR/STM4 SH 1310 cards are functionally the same. Both cards provide one intermediate or short range SONET/SDH OC-12 port compliant with the ITU-T G.707, G.957, and Telcordia GR-253.

Table 1-3 List of Cisco ONS 15454 Interface Cards (continued)

Card	Description
OC12 IR/STM4 SH 1310-4	The OC12 IR/STM4 SH 1310-4 card provides four intermediate or short range SONET/SDH OC-12/STM-4 ports compliant with the ITU-T G.707, G.957, and Telcordia GR-253.
OC12 LR 1310 and OC12 LR/STM4 LH 1310	The OC12 LR 1310 and OC12 LR/STM4 LH 1310 cards are functionally the same. Both cards provide one long-range, ITU-T G.707, ITU-T G.957, and Telcordia-compliant, GR-253 SONET OC-12 port per card.
OC12 LR 1550 and OC12 LR/STM4 LH 1550	The OC12 LR 1550 and OC12 LR/STM4 LH 1550 cards are functionally the same. Both cards provide one long-range SONET/SDH OC-12 port compliant with ITU-T G.707, G.957, and Telcordia GR-253.
OC48 IR 1310	The OC48 IR 1310 card provides one intermediate-range, Telcordia-compliant, GR-253 SONET OC-48 port per card.
OC48 IR/STM16 SH AS 1310	The OC48 IR/STM16 SH AS 1310 card provides one intermediate or short-range SONET/SDH OC-48 port compliant with the ITU-T G.707, G.957, and Telcordia GR-253.
OC48 LR 1550	The OC48 LR 1550 card provides one long-range, Telcordia-compliant, GR-253 SONET OC-48 port per card.
OC48 LR/STM16 LH AS 1550	The OC48 LR/STM16 LH AS 1550 card provides one long-range SONET/SDH OC-48 port compliant with ITU-T G.707, G.957, and Telcordia GR-253.
OC192 LR/STM64 LH 1550	The OC192 LR/STM64 LH 1550 card provides one long-range SONET/SDH OC-192 port compliant with ITU-T G.707, G.957, and Telcordia GR-1377 and GR-253.
OC-192/STM64 IR 1550	The OC-192/STM64 IR 1550 card provides an intermediate reach SONET compliant 9.95328 Gbps high-speed interface operating at a nominal wavelength of 1550nm.
OC-192/STM64 SR 1310	The OC-192/STM64 SR 1310 card provides a short-reach SONET compliant 9.95328 Gbps high-speed interface operating at a nominal wavelength of 1310nm.
DWDM	
OC48 ELR/STM16 EH 100 GHz	Thirty-seven distinct OC-48 ELR/STM16 EH ITU 100GHz dense wavelength division multiplexing (DWDM) cards operating within the 1530nm to 1562nm frequency band.
OC192 LR/STM64 LH ITU 15xx.xx	The new OC192 LR/STM64 LH ITU 15xx.xx cards provide eight distinct dense wavelength division multiplexing (DWDM) channels operating within the 1530nm to 1562nm frequency band.
2.5 Gb/s Multirate Transponder-100 GHz	The TXP_MR_2.5G card (2.5-Gb/s Multirate Transponder-100-GHz-Tunable xx.xx-xx.xx) processes one 8-Mbps to 2.488-Gbps signal (client side) into one 8-Mbps to 2.5-Gbps, 100-GHz DWDM signal (trunk side).
10 Gb/s Multirate Transponder-100 GHz	The TXP_MR_10G card (10-Gbps Transponder-100-GHz-Tunable xx.xx-xx.xx) processes one 10-Gbps signal (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side).
2.5 Gb/s - 10 Gb/s Muxponder-100 GHz	The MXP_2.5G_10G card (2.5-Gbps-10-Gbps Muxponder-100 GHz-Tunable xx.xx-xx.xx) multiplexes/demultiplexes four 2.5-Gbps signals (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side).

Table 1-3 List of Cisco ONS 15454 Interface Cards (continued)

Card	Description
Optical Service Channel (OSC) Modules	There are two versions of the OSC modules: the OSCM and the OSC-CSM, which contain a combiner and separator module in addition to the OSC module. The 1510-nm wavelength and does not affect client traffic. The primary purpose of the OSC is to carry clock synchronization and orderwire channel communications for the DWDM network. It also provides transparent links between each node in the network. The OSC is an OC-3 formatted signal.
Optical Amplifiers	Optical amplifiers are used in amplified nodes, such as hub nodes, amplified OADM nodes, and line amplifier nodes. There are two forms of amplifiers, the Optical Pre-amplifier (OPT-PRE) and the Optical Booster (OPT-BST) amplifier.
Multiplexer and Demultiplexer Cards	There are three cards that multiplex and demultiplex DWDM optical channels. They include the 32-Channel Multiplexer (32MUX-O), the 32-Channel Demultiplexer (32DMX-O), and the 4-Channel Multiplexer/Demultiplexer (4MD-xx.x).
Optical Add/Drop Multiplexer (OADM) Cards	There are two groups of OADM cards: Band OADM cards add and drop one or four bands of adjacent channels; Channel OADM cards add and drop one, two, or four adjacent channels.
Electrical	
DS1-14	The ONS 15454 DS1-14 card provides 14 Telcordia-compliant, GR-499 DS-1 ports.
DS1N-14	The DS1N-14 card can function as a working or protect card in 1:1 or 1:N protection schemes and as a working or protect card in 1:N protection scheme.
DS3-12	The ONS 15454 DS3-12 card provides 12 Telcordia-compliant, GR-499 DS-3 ports per card.
DS3N-12	The DS3N-12 card operates as a working or protect card in 1:1 or 1:N protection scheme.
DS3-12E	The DS3-12E card provides 12 Telcordia-compliant ports per card and enhanced performance monitoring functions.
DS3N-12E	The DS3N-12E card also provides enhanced performance monitoring functions and can operate as a working or protect card in 1:1 or 1:N protection scheme.
DS3/EC1-48	The DS3/EC1-48 provides 48 Telcordia-compliant ports per card. Each port operates at 44.736 Mbps over a single 75-ohm, 728A or equivalent coaxial span. The EC-1 function is not supported in Software Release 5.0.
EC1-12	The EC1-12 card provides 12 Telcordia-compliant, GR-253 STS-1 electrical ports per card.
DS3XM-6 (Transmux)	The DS3XM-6 card, commonly referred to as a transmux card, provides six Telcordia-compliant, GR-499-CORE M13 multiplexing functions.
DS3XM-12	The DS3XM-12 card provides 12 Telcordia-compliant GR-499-CORE M13 multiplexing functions.
Ethernet	

Table 1-3 List of Cisco ONS 15454 Interface Cards (continued)

Card	Description
E100T-12 ¹	The E100T-12 card is used for Ethernet (10 Mb/s) and Fast Ethernet (100 Mb/s) when the XC or XC-VT cross-connect cards are in use. It provides 12 switched, IEEE 802.3-compliant, 10/100 Base-T Ethernet ports that can independently detect the speed of an attached device (auto-sense) and automatically connect at the appropriate speed.
E100T-G	E100T-G card is used for Ethernet (10 Mb/s) and Fast Ethernet (100 Mb/s) when the XC, XC-VT, or XC-10G cross-connect card is used. It provides 12 switched, IEEE 802.3-compliant, 10/100 Base-T Ethernet ports that can independently detect the speed of an attached device (auto-sense) and automatically connect at the appropriate speed.
ML100T-12	The new Cisco IOS-based ML-100T-12 card is used for Ethernet (10 Mb/s) and Fast Ethernet (100 Mb/s) when the XC-10G cross-connect card is in use. It supports Layer 2 and Layer 3 services and provides up to 2.4 Gbps of transport bandwidth, software provisionable in transport bandwidths from 50Mbps to the ports full line rate, in STS1, STS3c, STS6c, STS9c, STS12c and STS24c. Additionally, each service interface will support bandwidth guarantees down to 1Mbps, allowing SLAs above and beyond that provided by the provisionable transport bandwidth.
E1000-2 ¹	The E1000-2 cards are used for Gigabit Ethernet (1000 Mb/s) when the XC or XC-VT cross-connect cards are in use. It provides two IEEE-compliant, 1000 Mb/s ports for high-capacity customer LAN interconnections.
E1000-2-G	The E1000-2-G cards are used for Gigabit Ethernet (1000 Mb/s), when the XC, XC-VT, and XC-10G cross-connect card are used. It provides two IEEE-compliant, 1000 Mb/s ports for high-capacity customer LAN interconnections.
G1000-4 ¹	The G1000-4 cards are used for Gigabit Ethernet (1000 Mb/s) transport, when the XC-10G cross-connect card is in use. It provides four ports of IEEE-compliant, 1000 Mb/s interfaces.
G1K-4	The G-1K-4 card operates identically to the G1000-4 card, except the new card will interoperate with the XC or XC-VT cards, when installed in the high-speed multiservice card slots (5, 6, 12 & 13). The G-1K-4 card will be backward compatible to R3.2 software.
ML1000-2	The Cisco IOS-based ML-1000-2 card is used for Gigabit Ethernet (1000 Mb/s) when the XC-10G cross-connect card is in use. It supports Layer 2 and Layer 3 services and provides up to 2.4 Gbps of transport bandwidth, software provisionable in transport bandwidths from 50Mbps to the ports full line rate, in STS1, STS3c, STS6c, STS9c, STS12c and STS24c. Additionally, each service interface will support bandwidth guarantees down to 1Mbps, allowing SLAs above and beyond that provided by the provisionable transport bandwidth.
Storage Access Networking (SAN)	
FC_MR-4	The Fibre Channel (FC)/FICON (FC_MR-4) card uses pluggable Gigabit Interface Converters (GBICs) to transport non-SONET/SDH-framed, block-coded protocols over SONET/SDH in virtually or contiguously concatenated payloads.

1. See http://cisco.com/en/US/products/hw/optical/ps2006/prod_eol_notices_list.html for an update on End-Of-Life and End-Of-Sale notices.

ONS 15454 GBIC and SFP Connectors

Table 1-4 lists the GBICs and SFPs supported by the ONS 15454.

Table 1-4 List of Cisco ONS 15454 GBICs and SFPs

GBIC/SFP	Description
SX	Is an IEEE 1000Base-SX compliant, 850 nm multi-mode GBIC optical module.
LX	Is an IEEE 1000Base-LX-compliant, 1300 nm single-mode GBIC optical module.
ZX	Is an IEEE 1000Base-ZX-complaint, 1550 nm single-mode GBIC optical module.
CWDM	Is a 1000Base CWDM GBIC optical module.
DWDM	Is a 1000Base DWDM GBIC optical module.
GX FC	GX-2FC-SML is a 2Gb FC 1310nm Single-mode with SC connectors; GX-2FC-MMI is a 2Gb FC 850nm Multi-mode with SC connectors
SX SFP	Is an IEEE 1000Base-SX-compliant 850 nm multi-mode SFP optical module.
LX SFP	Is an IEEE 1000Base-LX-compliant 1300 nm single-mode SFP optical module

ONS 15454 Network Management

The Cisco ONS 15454 supports CORBA, SNMPv1/v2, and TL1 as protocols for Operations Support System (OSS) interfaces. The OSS interface is TCP/IP based. Your OSS can access the ONS 15454 through either an external LAN (10BaseT) or a TL1 terminal interface. A LAN modem can also be used to connect remotely via a dial-in connection and a standard modem can be used to connect remotely to the TL1 terminal interface. The ONS 15454 accepts TL1 scripts via a telnet session through the RS232 or LAN interfaces.

The ONS 15454 is compatible with several network management protocols, such as Simple Network Management Protocol (SNMP), Proxy Address Resolution Protocol (ARP), and Open Shortest Path First (OSPF) protocol. If OSPF is not available, static routes can also connect to ONS 15454s through routers. DCC tunneling is provided for interoperability with other vendors' equipment.

SNMP Traps

The ONS 15454 can receive SNMP requests from a number of SNMP managers and send traps to 10 trap receivers. The ONS 15454 generates all alarms and events as SNMP traps. The ONS 15454 generates traps containing an object ID that uniquely identifies the alarm. An entity identifier uniquely identifies the entity that generated the alarm (slot, port, synchronous transport signal [STS], Virtual Tributary [VT], bidirectional line switched ring [BLSR], Spanning Tree Protocol [STP], and so on). The traps give the severity of the alarm (critical, major, minor, event, and so on) and indicate whether the alarm is service affecting or non-service affecting. The traps also contain a date/time stamp that shows the date and time the alarm occurred. The ONS 15454 also generates a trap for each alarm when the alarm condition clears. For additional information about SNMP and list of traps supported by the ONS 15454, see the Cisco ONS 15454 Reference Manual, Release 5.0.

ONS 15454 Connection Methods

The Cisco ONS 15454 provides you multiple ways to connect to the node. You can connect your PC directly to the ONS 15454 (local craft connection) using the RJ-45 port on the TCC card or the LAN pins on the backplane, connect your PC to a hub or switch that is connected to the ONS 15454, connect to the ONS 15454 through a LAN, a LAN modem, or establish TL1 connections from a PC or TL1 terminal. [Table 1-5](#) lists the ONS 15454 connection methods and requirements.

Table 1-5 ONS 15454 Connection Methods

Method	Description	Requirements
Local Craft	Refers to onsite network connections between the Cisco Transport Controller (CTC) computer and the ONS 15454 using one of the following: <ul style="list-style-type: none"> • The RJ-45 (LAN) port on the TCC2/TCC2P card • The LAN pins on the ONS 15454 backplane • A hub or switch to which the ONS 15454 is connected 	If you do not use Dynamic Host Configuration Protocol (DHCP), you must change the computer IP address, subnet mask, and default router, or use automatic host detection.
Corporate LAN	Refers to a connection to the ONS 15454 through a corporate or network operations center (NOC) LAN.	<ul style="list-style-type: none"> • The ONS 15454 must be provisioned for LAN connectivity, including IP address, subnet mask, default gateway. • The ONS 15454 must be physically connected to the corporate LAN. • The CTC computer must be connected to the corporate LAN that has connectivity to the ONS 15454.
TL1	Refers to a connection to the ONS 15454 using TL1 rather than CTC. TL1 sessions can be started from CTC, or you can use a TL1 terminal. The physical connection can be a craft connection, corporate LAN, or a TL1 terminal.	Refer to the Cisco ONS 15454 and Cisco ONS 15327 TL1 Command Guide.
Remote	Refers to a connection made to the ONS 15454 using a LAN modem.	The LAN modem must be connected to the RJ-45 port on a TCC card or to the LAN pins on the ONS 15454 backplane. The LAN modem must be properly configured for use with the ONS 15454. When the modem is installed, dial-up access to the ONS 15454 is available using a personal computer modem. To run CTC, the modem must be provisioned for Ethernet access.

Cisco Transport Controller

ONS 15454 provisioning and administration is performed using the Cisco Transport Controller (CTC), the software interface.

CTC Software Delivery Method

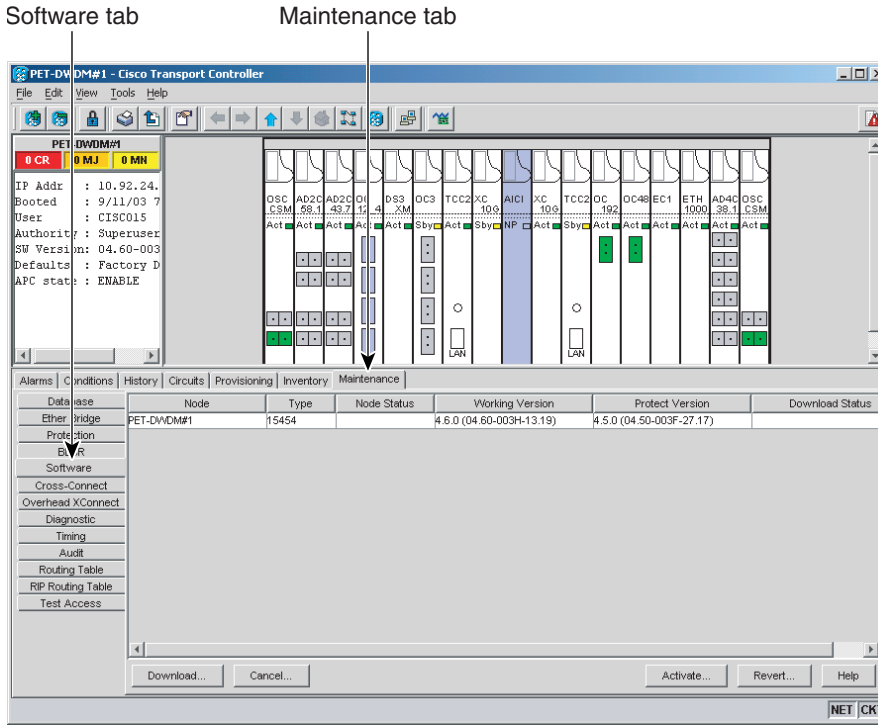
CTC is a Java application that is preloaded on the ONS 15454 TCC cards from the factory and is automatically downloaded to your computer or workstation the first time you log into the ONS 15454 with a new software release. Downloading the CTC software files automatically ensures that your computer is running the same CTC software version as the TCC cards you are accessing. The CTC files are stored in the temporary directory designated by your computer operating system. You can use the Delete CTC Cache button to remove files stored in the temporary directory. If the files are deleted, they download the next time you connect to an ONS 15454. Downloading the Java archive files, called “JAR” files, for CTC takes several minutes depending on the bandwidth of the connection between your computer and the ONS 15454. For example, JAR files downloaded from a modem or a data communication channel (DCC) network link require more time than JAR files downloaded over a LAN connection.

CTC Software Upgrade

When you upgrade CTC software, the TCC cards store the new CTC version as the protect software version. When you activate the new CTC software, the TCC cards store the older CTC version as the protect software version, and the newer CTC release becomes the working version. Before allowing a software activation or reversion to proceed, ONS 15454 nodes running Software Release 5.0 verify that their current state meets required activation criteria. Activation criteria must be met in order to avoid traffic hits. All BLSR spans on the nodes must be locked-out, and no 1:1, 1:N, 1+1 or Y-Cable protection switches can be in progress.

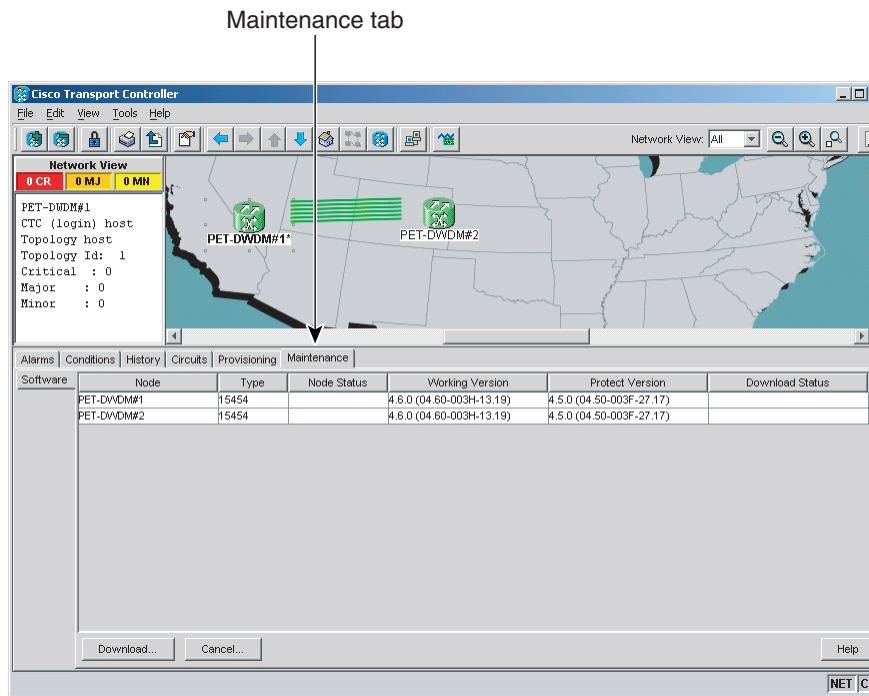
You can view the working and protect software versions that are installed on an ONS 15454 by selecting the Maintenance > Software tabs in node view ([Figure 1-5](#)).

Figure 1-5 CTC Software Versions Found In Node View



When a new CTC software version is released, use the Cisco ONS 15454 Software Upgrade Guide to upgrade the ONS 15454 software on the TCC cards. Select the Maintenance > Software tabs in network view to display the software versions installed on all the network nodes (Figure 1-6).

Figure 1-6 CTC Software Versions Found In Network View



CTC Software Revert

When you click the Activate button after a software upgrade, the TCC copies the current working database and saves it in a reserved location in the TCC flash memory. If you later need to revert to the original working software load from the protect software load, the saved database installs automatically. You do not need to restore the database manually or recreate circuits.



Note

The TCC card does not carry any software earlier than Software R4.0. You will not be able to revert to a software release earlier than Software R4.0 with TCC cards installed.

The revert feature is useful if a maintenance window closes while you are upgrading CTC software. You can revert to the protect software load without losing traffic. When the next maintenance window opens, complete the upgrade and activate the new software load.

Circuits created or provisioning done after a software load is activated (upgraded to a higher release) do not reinstate with a revert (for example, 4.0 to 3.4). The database configuration at the time of activation is reinstated after a revert. This does not apply to maintenance reverts (for example, 2.2.2 to 2.2.1), because maintenance releases use the same database.

CTC Operations

To use CTC in the ONS 15454, your computer must have a web browser with the correct Java Runtime Environment (JRE) installed. The correct JRE for each CTC software release is included on the Cisco ONS 15454 software CD and the ONS 15454 documentation CD. If you are running multiple CTC software releases on a network, the JRE installed on the computer must be compatible with the different software releases.

You can change the JRE version on the Preferences dialog box JRE tab. When you change the JRE version on the JRE tab, you must exit and restart CTC for the new JRE version to take effect. [Table 1-6](#) shows JRE compatibility with ONS software releases.

Table 1-6 JRE Compatibility with ONS Software Releases

ONS Software Release	JRE 1.2.2 Compatible	JRE 1.3 Compatible	JRE 1.4 Compatible
Release 2.2.1 and lower	Yes	No	No
Release 2.2.2	Yes	Yes	No
Release 3.0	Yes	Yes	No
Release 3.1	Yes	Yes	No
Release 3.2	Yes	Yes	No
Release 3.3	Yes	Yes	No
Release 3.4	No	Yes	No
Release 4.0 ¹	No	Yes	No
Release 4.1	No	Yes	No
Release 4.5	No	Yes	No
Release 4.6	No	Yes	Yes
Release 5.0	No	Yes	Yes

1. Software Releases 4.0 and higher notify you if an older version of the JRE is running on your PC or UNIX workstation.

In addition to the JRE, the Java plug-in and modified java.policy file are also included on the ONS 15454 software CD and the ONS 15454 documentation CD.

Computer Requirements

Table 1-7 lists the computer requirements for PCs and UNIX workstations to run CTC.

Table 1-7 Computer Requirements

Area	Requirements	Notes
Processor	Pentium III (or higher) 700 MHz, UltraSPARC, or equivalent	700 MHz is the recommended processor speed. You can use computers with a lower processor speed; however, you may experience longer response times and slower performance.
RAM	384 MB RAM recommended, 512 MB RAM optimum	Cisco recommends using 512 MB RAM for networks with 25 nodes or more to avoid longer response times and slower performance.
Hard Drive	20 GB recommended with 50 MB vacant space available	—
Ethernet Network Interface Converter (NIC)	10/100 BaseT	—
Operating System	<ul style="list-style-type: none"> • PC: Windows 98, Windows NT 4.0 with Service Pack 6, Windows 2000, or Windows XP • Workstation: Solaris versions 8 or 9 	—
JRE	JRE 1.4.2 or 1.3.1_02	JRE 1.4.2 is installed by the CTC Installation Wizard included on the Cisco ONS 15454 software and documentation CDs. JRE 1.4.2 provides enhancements to CTC performance, especially for large networks with numerous circuits. Cisco recommends that you use JRE 1.4.2 for networks with Software R4.6 nodes. If CTC must be launched directly from nodes running software earlier than R4.6, Cisco recommends JRE 1.3.1_02.

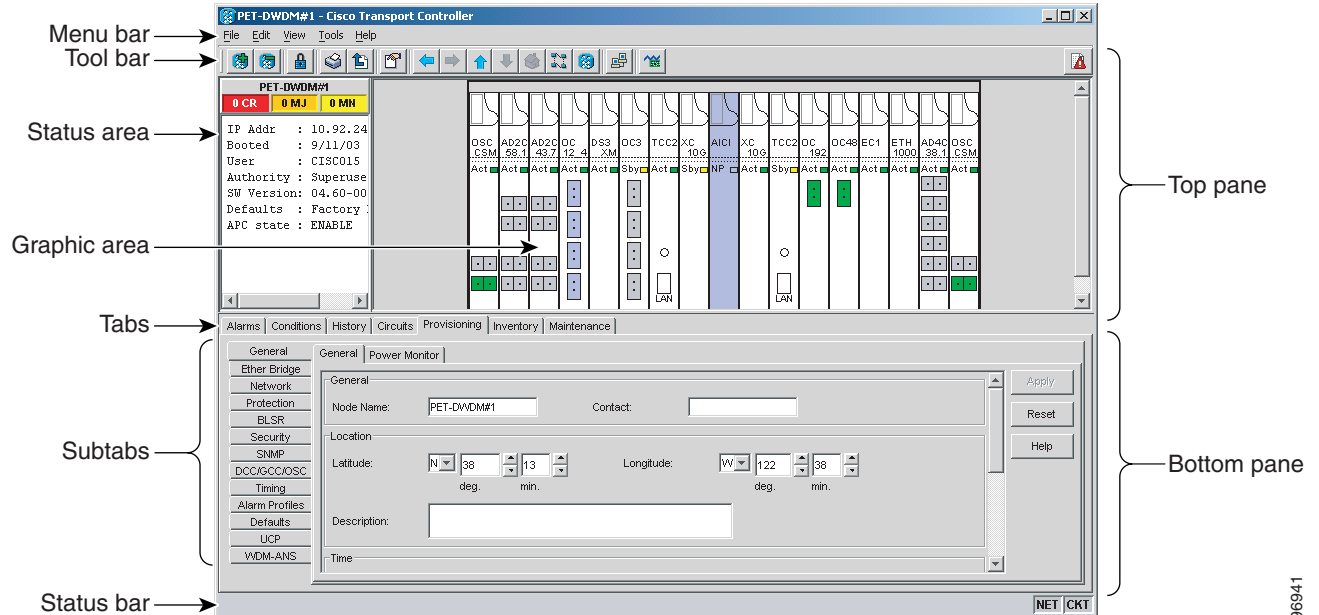
Table 1-7 Computer Requirements

Area	Requirements	Notes
Web Browser	PC: Netscape 4.76, Netscape 7.x, Internet Explorer 6.x UNIX Workstation: Netscape 4.76, Netscape 7.x	For the PC, use JRE 1.4.2 or 1.3.1_02 with any supported web browser. For UNIX, use JRE 1.4.2 with Netscape 7.x or JRE 1.3.1_02 with Netscape 4.76. Netscape 4.76 or 7.x is available at the following site: http://browser.netscape.com Internet Explorer 6.x is available at the following site: http://www.microsoft.com
java.policy File	A java.policy file modified for CTC	The java.policy file is modified by the CTC Installation Wizard included on the Cisco ONS 15454 software and documentation CDs.
Cable	User-supplied CAT-5 straight-through cable with RJ-45 connectors on each end to connect the computer to the ONS 15454 directly or through a LAN port on the TCC faceplate.	—
Modem	A compatible modem must meet the following minimum requirements: <ul style="list-style-type: none"> • 300, 1200, 2400, 4800, or 9600 baud • Full duplex • 8 data bits • No parity bits • 1 start bit • 1 stop bit • No flow control 	—

CTC Windows

The CTC window appears after you log into an ONS 15454 (Figure 1-7). The window includes a menu bar, toolbar, and a top and bottom pane. The top pane provides status information about the selected objects and a graphic of the current view. The bottom pane provides tabs and subtab to view ONS 15454 information and perform ONS 15454 provisioning and maintenance. From this window you can display three ONS 15454 views: network, node, and card.

Figure 1-7 Node View (Default Login View)



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Node View

Node view, shown in [Figure 1-7](#), is the first view that appears after you log into an ONS 15454. The login node is the first node shown, and it is the “home view” for the session. Node view allows you to manage one ONS 15454 node. The status area shows the node name; IP address; session boot date and time; number of Critical (CR), Major (MJ), and Minor (MN) alarms; the name of the current logged-in user; and the security level of the user; software version; and the network element default setup.

CTC Card Colors

The graphic area of the CTC window depicts the ONS 15454 shelf assembly. The colors of the cards in the graphic reflect the real-time status of the physical card and slot ([Table 1-8](#)).

Table 1-8 Node View Card Colors

Card Color	Card Status
Gray	Slot is not provisioned; no card is installed.
Violet	Slot is provisioned; no card is installed.
White	Slot is provisioned; a functioning card is installed.
Yellow	Slot is provisioned; a functioning card is installed; a Minor alarm condition exists.
Orange	Slot is provisioned; a functioning card is installed; a Major alarm condition exists.
Red	Slot is provisioned; a functioning card is installed; a Critical alarm exists.

The wording on a card in node view shows the state of a card (Active, Standby, Loading, or Not Provisioned). [Table 1-9](#) lists the card states.

Table 1-9 Node View Card States

Card State	Description
Sty	Card is in standby
Act	Card is active
NP	Card is not present
Ldg	Card is resetting

Ports can be assigned one of four states, OOS, IS, OOS-AINS, or OOS-MT. The color of the port in both card and node view indicates the port state. [Table 1-10](#) lists the port colors and their states.

Table 1-10 Node View Card Port Colors

Port Color	State	Description
Cyan (blue)	OOS-MA, LPBK	(Out-of-Service and Management, Loopback) Port is in a loopback state. On the card in node view, a line between ports indicates that the port is in terminal or facility loopback. Traffic is carried and alarm reporting is suppressed. Raised fault conditions, whether or not their alarms are reported, can be retrieved on the CTC Conditions tab or by using the TL1 RTRV-COND command.
	OOS-MA, MT	(Out-of-Service and Management, Maintenance) Port is out-of-service for maintenance. Traffic is carried and loopbacks are allowed. Alarm reporting is suppressed. Raised fault conditions, whether or not their alarms are reported, can be retrieved on the CTC Conditions tab or by using the TL1 RTRV-COND command. Use OOS-MA,MT for testing or to suppress alarms temporarily. Change the state to IS-NR, OOS-MA,DSBLD, or OOS-AU,AINS when testing is complete.
Gray	OOS-MA, DSBLD	(Out-of-Service and Management, Disabled) The port is out-of-service and unable to carry traffic. Loopbacks are not allowed in this service state.
Green	IS-NR	(In-Service and Normal) The port is fully operational and performing as provisioned. The port transmits a signal and displays alarms; loopbacks are not allowed.
Violet	OOS-AU, AINS	(Out-of-Service and Autonomous, Automatic In-Service) The port is out-of-service, but traffic is carried. Alarm reporting is suppressed. The node monitors the ports for an error-free signal. After an error-free signal is detected, the port stays in OOS-AU,AINS state for the duration of the soak period. After the soak period ends, the port service state changes to IS-NR. Raised fault conditions, whether or not their alarms are reported, can be retrieved on the CTC Conditions tab or by using the TL1 RTRV-COND command. The AINS port will automatically transition to IS-NR when a signal is received for the length of time provisioned in the soak field.

Node View Card Shortcuts

If you move your mouse over cards in the graphic area, pop-ups display additional information about the card including the card type; the card status (active or standby); the type of alarm, such as Critical, Major, and Minor (if any); the alarm profile used by the card; and for TXP or MXP cards, the wavelength of the DWDM port. Right-click a card to reveal a shortcut menu, which you can use to open, reset, delete, or change a card. Right-click a slot to pre-provision a card (that is, provision a slot before installing the card).

Node View Tabs

Table 1-11 lists the tabs and subtabs available in the node view.

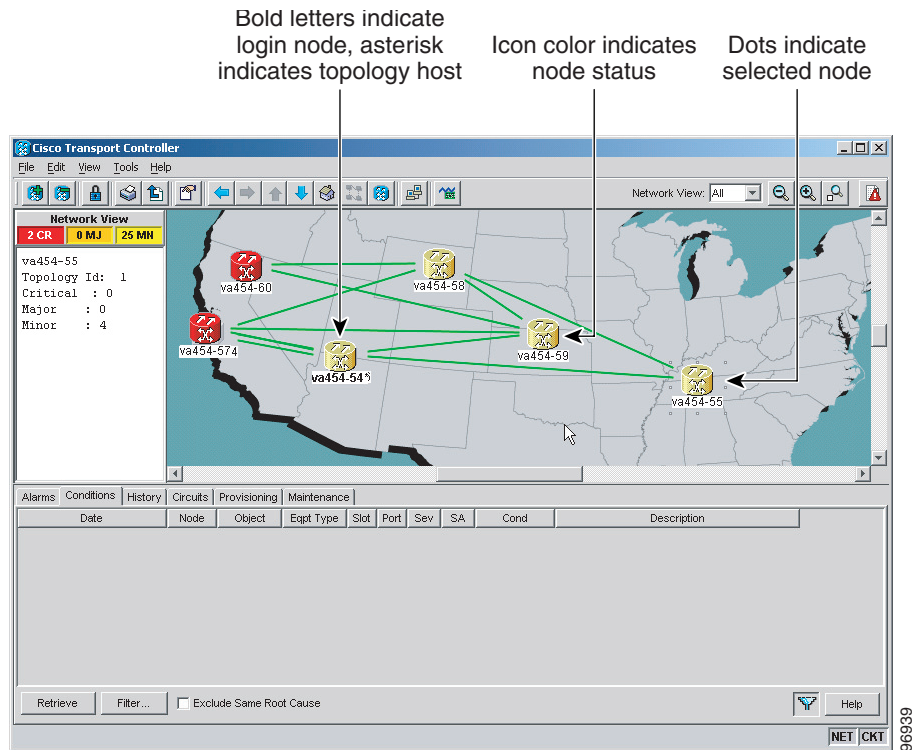
Table 1-11 Node View Tabs and Subtabs

Tab	Description	Subtab
Alarms	Lists current alarms (CR, MJ, MN) for the node and updates them in real time.	None
Conditions	Displays a list of standing conditions on the node.	None
History	Provides a history of node alarms including date, type, and severity of each alarm. The Session subtab displays alarms and events for the current session. The Node subtab displays alarms and events retrieved from a fixed-size log on the node.	Session, Node
Circuits	Creates, deletes, edits, and maps circuits.	None
Provisioning	Provisions the ONS 15454 node.	General, Ether Bridge, Network, Protection, BLSR, Security, SNMP, DCC/GCC/OSC, Timing, Alarm Profiles, Defaults, UCP, WDM-ANS
Inventory	Provides inventory information (part number, serial number, Common Language Equipment Identification [CLEI] codes) for cards installed in the node. Allows you to delete and reset cards, and change card service state.	None
Maintenance	Performs maintenance tasks for the node.	Database, Ether Bridge, Protection, BLSR, Software, Cross-connect, Overhead XConnect, Diagnostic, Timing, Audit, Routing Table, RIP Routing Table, Test Access

Network View

Network view allows you to view and manage ONS 15454s that have DCC connections to the node that you logged into and any login node groups you may have selected (Figure 1-8).

Figure 1-8 Network In CTC Network View



Note

Nodes with DCC connections to the login node do not appear if you checked the Disable Network Discovery check box in the Login dialog box.

The graphic area displays a background image with colored ONS 15454 icons. A Superuser can set up the logical network view feature, which enables each user to see the same network view. The lines show DCC connections between the nodes. DCC connections can be green (active) or gray (fail). The lines can also be solid (circuits can be routed through this link) or dashed (circuits cannot be routed through this link).

There are four possible combinations for the appearance of DCCs: green/solid, green/dashed, gray/solid, and gray/dashed. DCC appearance corresponds to the following states: active/routable, active/nonroutable, failed/routable, or failed/nonroutable. Circuit provisioning uses active/routable links. Selecting a node or span in the graphic area displays information about the node and span in the status area.

The color of a node in network view, shown in Table 1-12, indicates the node alarm status.

Table 1-12 Node Status Shown in Network View

Color	Alarm Status
Green	No alarms
Yellow	Minor alarms
Orange	Major alarms
Red	Critical Alarms
Gray with Unknown#	Node initializing for the first time (CTC displays Unknown# because CTC has not discovered the name of the node yet)

Table 1-13 lists the tabs and subtabs available in network view.

Table 1-13 Network View Tabs and Subtabs

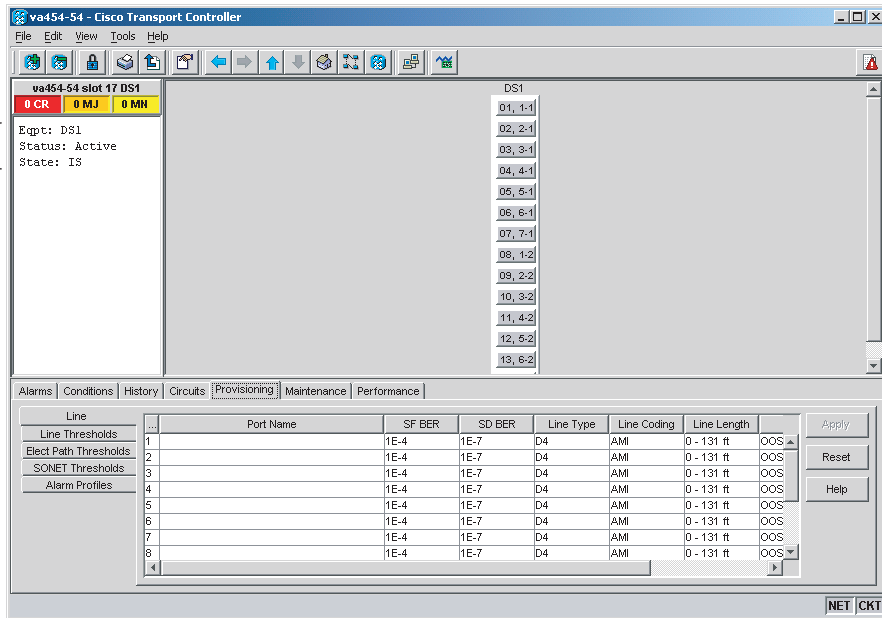
Tab	Description	Subtab
Alarms	Lists current alarms (CR, MJ, MN) for the network and updates them in real time.	None
Conditions	Displays a list of standing conditions on the network.	None
History	Provides a history of network alarms including date, type, and severity of each alarm.	None
Circuits	Creates, deletes, edits, filters, and searches for network circuits.	None
Provisioning	Provisions security, alarm profiles, BLSRs, and overhead circuits.	Security, Alarm Profiles, BLSR, Overhead Circuits
Maintenance	Displays the type of equipment and the status of each node in the network; displays working and protect software versions; and allows software to be downloaded.	None

Card View

Card view provides information about individual ONS 15454 cards. Use this window to perform card-specific maintenance and provisioning (Figure 1-9). A graphic showing the ports on the card is shown in the graphic area. The status area displays the node name, slot, number of alarms, card type, equipment type, and the card status (active or standby), card and port service states, when a card is present. The information that appears and the actions you can perform depend on the card.

Figure 1-9 CTC Card View Showing a DS1 Card

Card identification and status



Note

CTC provides a card view for all ONS 15454 cards except the TCC2, TCC2P, XC, XCVT, and XC10G cards. Provisioning for these common control cards occurs at the node view; therefore, no card view is necessary.

Use the card view tabs and subtabs, shown in Table 1-14, to provision and manage the ONS 15454. The subtabs, fields, and information shown under each tab depend on the card type selected. The Performance tab is not available for the AIC or AIC-I cards.

Table 1-14 Card View Tabs and Subtabs

Tab	Description	Subtab
Alarms	Lists current alarms (CR, MJ, MN) for the network and updates them in real time.	None
Conditions	Displays a list of standing conditions on the network.	None
History	Provides a history of network alarms including date, type, and severity of each alarm.	Session (displays alarms and events for the current session), Card (displays alarms and events retrieved from a fixed-size log on the card)
Circuits	Creates, deletes, edits, filters, and searches for network circuits.	Circuits

Table 1-14 Card View Tabs and Subtabs

Tab	Description	Subtab
Provisioning	Provisions an ONS 15454 card.	DS-N and OC-N cards: Line, Line Thresholds (different threshold options are available for DS-N and OC-N cards), Elect Path Thresholds, SONET Thresholds, or SONET STS, and Alarm Profiles TXP and MXP cards: Card, Line, Line Thresholds (different threshold options are available for electrical and optical cards), Optics Thresholds, OTN, and Alarm Profiles DWDM cards (subtabs depend on card type): Optical Line, Optical Chn, Optical Amplifier, Parameters, Optics Thresholds
Maintenance	Performs maintenance tasks for the card.	Loopback, Info, Protection, J1 Path Trace, AINS Soak (options depend on the card type), Automatic Laser Shutdown (TXP and MXP cards only)
Performance	Performs performance monitoring for the card.	DS-N and OC-N cards: no subtabs TXP and MXP cards: Optics PM, Payload PM, OTN PM DWDM cards (subtabs depend on card type): Optical Line, Optical Chn, Optical Amplifier, Parameters, Optics Thresholds
Inventory	Displays an Inventory screen of the ports (TXP and MXP cards only).	None

Card Reset

You can reset the ONS 15454 plug-in cards by using CTC (a soft reset) or by physically reseating a card (a hard reset).

You can apply a soft reset from CTC to either an active or standby TCC2/TCC2P card without affecting traffic. A soft reset reboots the TCC2/TCC2P card and reloads the operating system and the application software. If you need to perform a hard reset on an active TCC2/TCC2P card, put the TCC2/TCC2P card into standby mode first by performing a soft reset. Additionally, a hard reset temporarily removes power from the TCC2/TCC2P card and clears all buffer memory.



Note

When a CTC reset is performed on an active TCC2/TCC2P card, the AIC and AIC-I cards go through an initialization process and also resets because the AIC and AIC-I cards are controlled by the active TCC2/TCC2P.

Network Configurations

The ONS 15454 supports a variety of network configurations, including terminal mode (TM), linear ADM, path protection, two- and four-fiber bidirectional line switched ring (BLSR), subtending rings, path protected meshed networks (PPMNs), and regenerator mode. The ONS 15454 can be combined with other Cisco ONS products or interoperate with equipment from third-parties to provide end-to-end solutions for SONET and dense wavelength division multiplexing (DWDM) networks.

New Features in Release 5.0.x

Table 1-15 lists the new hardware and software features provided in Release 5.0.x that are covered in this document.

Table 1-15 **New Hardware and Software Feature**

New Features in Release 5.0.x	
Hardware	2.5G Data Muxponder (MXP_MR_2.5G and MXPP_MR_2.5G) Cards
	12-Port DS3XM-12 Transmux Card with Portless Interface Mode
	48-Port DS3/EC1-48 Card
	8-Port CE-100T-8 Ethernet Mapper Card with GFP, VCAT, LCAS ¹
	96-Port Mini-BNC EIA Panels
	DSX Wiring Verification Kit
	Detectable Filler Card (Software support i R6.0)
	Enhanced 2.5-Gb/s-10-Gb/s Muxponder-100 GHz-Tunable (MXP_2.5G_10E) Card
	Enhanced 10-Gb/s Transponder-100-GHz-Tunable (TXP_MR_10E) Card
	Reconfigurable OADM (ROADM) with 32-Channel Demultiplexer (32DMX) and 32-Channel Wavelength Selective Switch (32WSS) Cards
	Small Form-Factor Pluggables
	TCC2P Card
	Universal Backplane Interface Connector – Horizontal (UBIC-H) ²
	UBIC-H Cable Assemblies ²

Table 1-15 *New Hardware and Software Feature (continued)*

New Features in Release 5.0.x	
Software	1+1 VT Protection Support
	Admin SSM
	Consolidated R4.7 DWDM Software
	TL1-CTC Circuit Unification
	Dual-Ring Interconnect for BLSR
	GFP-F Support on ML-Series Ethernet Cards
	Hi-Capacity RMON
	In-Service Topology Upgrades
	Linear Port-Mapped Ethernet Mode
	Link Capacity Adjustment
	Manual Provisioning of STS Around a Ring ³
	Open GNE
	Optimized 1+1 Protection
	Portless Transmux Circuits
	Provisionable Patchcords
	Runtime Diagnostics
	SL-Series Fibre Channel Card Enhancements
	State Verification Scan Before Activation
TCC2P Secure Mode Operation	
VCAT Member Routing Enhancements	

1. CE-100T-8 Ethernet mapper card will be available in R5.0.2.
2. Product is release independent and was introduced between R4.6 and R5.0.
3. For provisioning a STS around a ring, refer to the Cisco ONS 15454 Procedures Guide.

End of Life

Table 1-16 outlines the products which have entered the End-of-Life (EoL) process but have not reached End-of-Sale (EoS). You should analyze your spares needs in order to place an order for last time purchases. All EoL product bulletins for the ONS 15454 can be accessed at the following URL:

http://cisco.com/en/US/products/hw/optical/ps2006/prod_eol_notices_list.html

Table 1-16 *Products in End-of-Life Process*

EOL Product Name	EoL Product Bulletin #	Replacement Product Name
15454-EIA-AMP-A84	2481	15454-EIA-1AMPA84
15454-EIA-AMP-B84	2481	15454-EIA-1AMPB84
15454-EIA-BNC-A24	2481	15454-EIA-1BNCA48
15454-EIA-BNC-B24	2481	15454-EIA-1BNCB48

Table 1-16 Products in End-of-Life Process (continued)

EoL Product Name	EoL Product Bulletin #	Replacement Product Name
15454-EIA-BNC-A48	2481	15454-EIA-1BNCA48
15454-EIA-BNC-B48	2481	15454-EIA-1BNCB48
15454-EIA-SMB-A84	2481	15454-EIA-1SMBA84
15454-EIA-SMB-B84	2481	15454-EIA-1SMBB84
15454-SA-ANSI	2480	15454-SA-HD
15454-EIA-1BNC-A24	2632	15454-EIA-1BNCA48
15454-EIA-1BNC-B24	2632	15454-EIA-1BNCB48
15454-DS3-12	2633	15454-DS3-12E
15454-DS3N-12	2633	15454-DS3N-12E
15454-OC192LR1550	2559	15454-OC192LR2
15454-OC48IR1310	2353	15454-OC48IR1310A
15454-OC48LR1550	2353	15454-OC48LR1550A

