Numerics

1+1 protection A card protection scheme that pairs a working card with a protect card of the same type in an adjacent slot. If the working card fails, the traffic from the working card switches to the protect card. When the failure on the working card is resolved, traffic reverts back to the working card if this option is set. This protection scheme is specific to electrical cards.

1:1 protection A card protection scheme that pairs a single working card with a single dedicated protect card. A term specific to optical cards.

1:N protection A card protection scheme that allows a single card to protect several working cards. When the failure on the working card is resolved, traffic reverts back to the working card. A term specific to electrical cards.

A

access drop Points where network devices can access the network.

address mask Bit combination used to describe the portion of an IP address that refers to the network or subnet and the part that refers to the host. Sometimes referred to as mask. See also subnet mask.

ADM Add/drop multiplexer. ADM allows a signal to be added into or dropped from a SONET span.

agent
1. Generally, software that processes queries and returns replies on behalf of an application.
2. In a network management system, a process that resides in all managed devices and reports the values of specified variables to management stations.

AID Access Identifier. An access code used in TL1 messaging that identifies and addresses specific objects within the ONS 15454. These objects include individual pieces of equipment, transport spans, access tributaries, and others.

AIS Alarm indication signal is an alarm state that means that either: 1) The input to the multi-service card has gone down. 2) A regenerator on the network has failed. See also Blue Alarm.

AMI Alternate Mark Inversion. Line-code format used on T1 circuits that transmit ones by alternate positive and negative pulses. 01 represents zeroes during each bit cell and 11 or 00 represents ones, alternately, during each bit cell. AMI requires that the sending device maintain ones density. Ones density is not maintained independently of the data stream. Sometimes called binary-coded alternate mark inversion.

APS Automatic Protection Switching. SONET switching mechanism that routes traffic from working lines to protect lines in case a line card failure or fiber cut occurs.

asynchronous transmission	Allows data to be sent in irregular intervals. The transmitter and receiver are able to identify data through the use of start and stop bits.
ATAG	Autonomous Message Tag. ATAG is used for TL1 message sequencing.
ATM	Asynchronous Transfer Mode is cell-based technology that is connection oriented. ATM is a good solution for multiple-site-inter-connectivity.

B

B3ZS	Bipolar 3 Zero Substitution is a line coding method for T3 lines. Basic condition is that no more than 3 consecutive zeros can be sent across the T3 line.
B8ZS	Binary 8-zero Substitution. A line-code type, used on T1 circuits, that substitutes a special code whenever 8 consecutive zeros are sent over the link. This code is then interpreted at the remote end of the connection. This technique guarantees ones density independent of the data stream. Sometimes called bipolar 8-zero substitution.
BER	Bit Error Rate. Ratio of received bits that contain errors.
bit	Binary digit either 0 or 1.
bit interleaving	Method of placing multiple lower speed lines to a higher speed medium. This method is utilized in inverse multiplexing as well as T3 for conventional M13 framing. Bit interleaving places bits from each input into the higher medium frame structure.
bit rate	Speed at which bits are transmitted, usually expressed in bits per second.
BITS	Building Integrated Timing Supply. A single building master timing supply that minimizes the number of synchronization links entering an office. Sometimes referred to as a Synchronization Supply Unit.
BLSR	Bi-directional Line Switched Ring. SONET ring architecture that provides working and protection fibers between nodes. If the working fiber between nodes is cut, traffic is automatically routed onto the protection fiber.
blue alarm	Blue alarm is an alarm state that means that either: 1) The input to the multi-service card has gone down. 2) A regenerator on the network has failed. See also AIS.
blue band	Dense Wavelength Division Multiplexing (DWDM) wavelengths are broken into two distinct bands: red and blue. DWDM cards for the ONS 15454 operate on wavelengths between 1530.33nm and 1542.94nm in the blue band. The blue band is the lower frequency band.
BPV	Bipolar violation occurs when the next successive pulse in transmission is of the same polarity at the previous pulse.
bridge	Device that connects and passes packets between two network segments that use the same communications protocol. In general, a bridge will filter, forward, or flood an incoming frame based on the MAC address of that frame.
broadcast	Data packet that will be sent to all nodes on a network. Broadcasts are identified by a broadcast address. Compare with multicast and unicast. See also Broadcast address.

broadcast address	Special address reserved for sending a message to all stations. Generally, a broadcast address is a MAC destination address of all ones.
broadcast storm	Undesirable network event in which many broadcasts are sent simultaneously across all network segments. A broadcast storm uses substantial network bandwidth and, typically, causes network time-outs.
bus	Common physical signal path composed of wires or other media across which signals can be sent from one part of a computer to another.

C

C2 byte	The C2 byte is the signal label byte in the STS path overhead. This byte tells the equipment what the SONET payload envelope contains and how it is constructed.
card	In this document, card refers to one of the common or multi-service plug-in cards for the ONS 15454. ONS 15454 cards serve as channel service units and provide network termination, keep alive, electrical protection, regeneration of signal, and supports loopbacks.
C bit	C bits are control bits. Their functionality varies depending on T3 framing format. Traditionally, C bits are used for stuffing bit indicators.
C bit parity framing	T3 framing structure that uses the traditional management overhead bits (X, P, M, F), but differs in that the control bits (C bits) are used for additional functions (FID, FEAC, FEBE, TDL, CP).
channel	Channel is used in this document to refer to a DWDM wavelength or data communications path.
collision	In Ethernet, the result of two nodes transmitting simultaneously. The frames from each device impact and are damaged when they meet on the physical media.
concatenation	A mechanism for allocating contiguous bandwidth for payload transport. Through the use of Concatenation Pointers, multiple OC-1s can be linked together to provide contiguous bandwidth through the network, from end to end.
CRC	Cyclic Redundancy Check is a process used to check the integrity of a block of data. CRC is a common method of establishing that data was correctly received in data communications.
crosspoint	A set of physical or logical contacts that operate together to extend the speech and signal channels in a switching network.
CTAG	Correlation Tag. A unique identifier given to each input command by the TL1 operator. When the ONS 15454 system responds to a specific command, it includes the command's CTAG in the reply. This eliminates discrepancies about which response corresponds to which command.
CTC	Cisco Transport Controller. A Java-based graphical user interface (GUI) that allows operations, administration, maintenance, and provisioning (OAM&P) of the ONS 15454 using an Internet browser.
CTM	Cisco Transport Manager. A Java-based network management tool used to support large networks of Cisco 15000-class equipment.
CV	Code violation

D

D4/SF   The D4/Superframe (SF) format groups 12 T1 frames together and utilizes the 12 T1 framing bits to provide a repetitive pattern that allows other equipment on the T1 line to lock onto the framing pattern.

DACS   Digital Access Cross-Connect System is a device that will take a full T1 service in, and be able to route data from particular channels to differing output ports.

DCC   Data Communications Channel. Used to transport information about operation, administration, maintenance, and provisioning (OAM&P) over a SONET interface. DCC can be located in section DCC (SDCC) or line overhead (LDCC.)

demultiplex   To separate multiple multiplexed input streams from a common physical signal back into multiple output streams. See also Multiplexing.

destination   The endpoint where traffic exits an ONS 15454 network. Endpoints can be a path (STS or STS/VT for optical card endpoints), port (for electrical circuits, such as DS1, VT, DS3, STS), or card (for circuits on DS1 and Ethernet cards).

DS1   Digital Signal Level 1 represents an electrical signal having a line rate of 1.544 Mb/s in North America.

DS2   Digital Signal Level 2 is the second layer in digital hierarchy. It represents an electrical signal having a line rate of 6.312 Mb/s in North America.

DS3   Digital Signal Level 3 is the third layer in digital hierarchy. It represents an electrical signal having a line rate of 6.312 Mb/s in North America.

DSX   Digital Signal Cross-connect frame. A manual bay or panel where different electrical signals are wired. A DSX permits cross-connections by patch cords and plugs.

DWDM   Dense Wave Division Multiplexing. A technology that increases the information carrying capacity of existing fiber optic infrastructure by transmitting and receiving data on different light wavelengths. Many of these wavelengths can be combined on a single strand of fiber.

E

EDFA   Erbium Doped Fiber Amplifier. A type of fiber optical amplifier that transmits a light signal through a section of erbium-doped fiber and amplifies the signal with a laser pump diode. EDFA is used in transmitter booster amplifiers, in-line repeating amplifiers, and in receiver preamplifiers.

EIA   Electrical Interface Assemblies. Provides connection points for the ONS 15454 and DS-1, DS-3, or EC-1 units.

EMI   Electromagnetic Interference. Interference by electromagnetic signals that can cause reduced data integrity and increased error rates on transmission channels.

envelope   The part of messaging that varies in composition from one transmittal step to another. It identifies the message originator and potential recipients, documents its past, directs its subsequent movement by the Message Transfer System (MTS), and characterizes its content.

EoMPLS	EoMPLS is an Internet Engineering Task Force (IETF) standard-track protocol based on the Martini draft, specifically the draft-martini-l2circuit-encap-mpls-01 and draft-martini-l2circuit-transport-mpls-05 sections. EoMPLS provides a tunneling mechanism for Ethernet traffic through an MPLS-enabled Layer 3 core. It encapsulates Ethernet protocol data units (PDUs) inside MPLS packets and using label stacking forwards them across the MPLS network.
EOW	Express Orderwire. A permanently connected voice circuit between selected stations for technical control purposes.
ES	Errored Second is a 1-second period with one or more errored blocks.
Ethernet Switch	An Ethernet data switch. Ethernet switches provide the capability to increase the aggregate LAN bandwidth by allowing simultaneous switching of packets between switch ports. Ethernet switches subdivide previously-shared LAN segments into multiple networks with fewer stations per network.
external timing reference	A timing reference obtained from a source external to the communications system, such as one of the navigation systems. Many external timing references are referenced to Coordinated Universal Time (UTC).

F

falling threshold	A falling threshold is the counterpart to a rising threshold. When the number of occurrences drops below a falling threshold, this triggers an event to reset the rising threshold. See also rising threshold.
FDDI	Fiber Distributed Data Interface. LAN standard, defined by ANSI X3T9.5, specifying a 100-Mbps token-passing network using fiber optic cable, with transmission distances of up to 2 km. FDDI uses a dual-ring architecture to provide redundancy.
Fibre Channel	A serial data transfer architecture designed for new mass storage devices and other peripheral devices that require very high bandwidth. Using optical fiber to connect devices, Fibre Channel (FC) supports full-duplex data transfer rates of 100MB/s.
frame	Logical grouping of information sent as a data link layer unit over a transmission medium. Often refers to the header and trailer, used for synchronization and error control that surrounds the user data contained in the unit.
free-running synchronization mode	Occurs when the external timing sources have been disabled and the ONS 15454 is receiving timing from its Stratum 3 level internal timing source.

G

GBIC	Gigabit Interface Converter. A hot-swappable input/output device that plugs into a Gigabit Ethernet port to link the port with the fiber optic network.

H

hard reset	The physical removal and insertion of a card. A card pull.

HDLC	High-Level Data Link Control. Bit-oriented, synchronous, data-link layer protocol developed by ISO. HDLC specifies a data encapsulation method on synchronous serial links using frame characters and checksums.
host number	Part of IP address used to address an individual host within the network or sub network.
hot swap	The process of replacing a failed component while the rest of the system continues to function normally.

I

input alarms	Used for external sensors such as open doors, temperature sensors, flood sensors, and other environmental conditions.
IP	Internet Protocol. Network layer protocol in the TCP/IP stack offering a connectionless internetwork service. IP provides features for addressing, type-of-service specification, fragmentation and reassembly, and security.
IP address	32-bit address assigned to host using TCP/IP. An IP address belongs to one of five classes (A, B, C, D, or E) and is written as 4 octets separated by periods (dotted decimal format). Each address consists of a network number, an optional sub network number, and a host number.

J

jitter	Jitter is caused when devices that process information in a network insert delay when relaying the information through the network. If the delay or variance in signal is greater than 10 UI (Unit Intervals/Bit Positions) it is called Wander.

K

K bytes	Automatic protection switching bytes. K1 and K2 bytes are located in the SONET line overhead and monitored by equipment for an indication to switch to protection.

L

LAN	Local Area Network. High-speed, low error data network covering a relatively small geographic area. LANs connect workstations, peripherals, terminals, and other devices in a single building or other geographically limited area. Ethernet, FDDI, and Token Ring are widely used LAN technologies.
LCD	Liquid Crystal Display. An alphanumeric display using liquid crystal sealed between two pieces of glass. LCDs conserve electricity.
line coding	Methods for ensuring that 1's density requirements are met on a T1 line. The two choices of line coding are AMI and B8ZS.

Line Layer	Refers to the segment between two SONET devices in the circuit. The line layer deals with SONET payload transport, and its functions include multiplexing and synchronization. Sometimes called a maintenance span.
line timing mode	A node that derives its clock from the SONET lines.
link budget	The difference between the output power and receiver power of an optical signal expressed in dB. Link refers to an optical span and all of its component parts (optical transmitters, repeaters, receivers, and cables). See also Span Budget.
link integrity	The network communications channel is intact.
LOF	Loss of Frame is a condition detected in the SONET signal overhead at the receiver, indicating that a valid framing pattern could not be obtained.
loopback test	Test that sends signals then directs them back toward their source from some point along the communications path. Loopback tests are often used to test network interface usability.
LOS	Loss of Signal is a condition directly detected at the physical level (photonic or electric) at the receiver indicating the signal has been lost.
LOW	Local Orderwire. A communications circuit between a technical control center and selected terminal or repeater locations.

M

M12	M12 is a designation for a multiplex, which interfaces between four DS1s and one DS2 circuit.
M13	The multiplexer equivalent of T1 in North America. A M13 multiplexer takes 28 DS1 inputs and combines them into a single 44.736 Mb/s (DS3) stream. The data is bit interleaved.
MAC address	Standardized data link layer address that is required for every port or device that connects to a LAN. Other devices in the network use these addresses to locate specific ports in the network and to create and update routing tables and data structures. MAC addresses are six bytes long and are controlled by the IEEE. Also known as the hardware address, MAC-layer address, and physical address.
Maintenance user	A security level that limits user access to maintenance options only. See also Superuser, Provisioning User, and Retrieve User.
managed device	A network node that contains an SNMP agent and resides on a managed network. Managed devices include routers, access servers, switches, bridges, hubs, computer hosts, and printers.
managed object	In network management, a network device that can be managed by a network management protocol. Sometimes called an MIB object.
mapping	A logical association between one set of values, such as addresses on one network, with quantities or values of another set, such as devices on another network.

MIB	Management Information Base. Database of network management information that is used and maintained by a network management protocol such as SNMP or CMIP. The value of a MIB object can be changed or retrieved using SNMP or CMIP commands, usually through a GUI network management system. MIB objects are organized in a tree structure that includes public (standard) and private (proprietary) branches.
multicast	Single packets copied by the network and sent to a specific subset of network addresses.
multiplex payload	Generates section and line overhead, and converts electrical/optical signals when the electrical/optical card is transmitting.
multiplexer/MUX	A multiplexer is a device that allows multiple inputs to be placed across a single output.
multiplexing	Scheme that allows multiple logical signals to be transmitted simultaneously across a single physical channel. Compare with Demultiplex.

N

NE	Network Element. In an Operations Support System, a single piece of telecommunications equipment used to perform a function or service integral to the underlying network.
network number	Part of an IP address that specifies the network where the host belongs.
NMS	Network Management System. System that executes applications that monitor and control managed devices. NMSs provide the bulk of the processing and memory resources required for network management.
Node	Endpoint of a network connection or a junction common to two or more lines in a network. Nodes can be processors, controllers, or workstations. Nodes, which vary in routing and other functional capabilities, can be interconnected by links, and serve as control points in the network. Node is sometimes used generically to refer to any entity that can access a network. In this manual the term "node" usually refers to an ONS 15454.
NPJC	Negative pointer justification count.

O

OAM&P	Operations, Administration, Maintenance, and Provisioning. Provides the facilities and personnel required to manage a network.
optical amplifier	A device that amplifies an optical signal without converting the signal from optical to electrical and back again to optical energy.
optical receiver	An opto-electric circuit that detects incoming lightwave signals and converts them to the appropriate signal for processing by the receiving device.
orderwire	Equipment that establishes voice contact between a central office and carrier repeater locations.
output contacts (alarms)	Triggers that drive visual or audible devices such as bells and lights. Output contacts can control other devices such as generators, heaters, and fans.

P

P bits   These bits are used a parity check for the previous M-Frame. Possible values are 11 and 00.

passive devices Components that do not require external power to manipulate or react to electronic output. Passive devices include capacitors, resisters, and coils.

Path Layer   The segment between the originating equipment and the terminating equipment. This path segment may encompass several consecutive line segments or segments between two SONET devices.

Path Protection Path-switched SONET rings that employ redundant, fiber- optic transmission facilities in a pair configuration. One fiber transmits in one direction and the backup fiber transmits in the other. If the primary ring fails, the backup takes over.

payload   Portion of a cell, frame, or packet that contains upper-layer information (data).

ping   Packet internet grouper. ICMP echo message and its reply. Often used in IP networks to test the reachability of a network device.

PPJC   Positive pointer justification count

PPMN   Path Protected Mesh Network. PPMN extends the protection scheme of a path protectionbeyond the basic ring configuration to the meshed architecture of several interconnecting rings.

priority queuing Routing feature that divides data packets into two queues: one low-priority and one high-priority.

Provisioning user A security level that allows the user to access only provisioning and maintenance options in CTC. See also Superuser, Maintenance user, and Retrieve user.

Q

queue   In routing, a backlog of packets waiting to be forwarded over a router interface.

R

red band   DWDM wavelengths are broken into two distinct bands: red and blue. The red band is the higher frequency band. The red band DWDM cards for the ONS 15454 operate on wavelengths between 1547.72nm and 1560.61nm.

Retrieve user   A security level that allows the user to retrieve and view CTC information but not set or modify parameters. See also Superuser, Maintenance user, and Provisioning user.

revertive switching A process that sends electrical interfaces back to the original working card after the card comes back online.

rising threshold The number of occurrences (collisions) that must be exceeded to trigger an event.

RMON   Remote Network Monitoring. Allows a network operator to monitor the health of the network with a Network Management System (NMS). RMON watches several variables, such as Ethernet collisions, and triggers an event when a variable crosses a threshold in the specified time interval.

S

SNMP   Simple Network Management Protocol. Network management protocol used almost exclusively in TCP/IP networks. SNMP monitors and controls network devices and manages configurations, statistics collection, performance, and security.

SNTP   Simple Network Time Protocol. Using an SNTP server ensures that all ONS 15454 network nodes use the same date and time reference. The server synchronizes alarm timing during power outages or software upgrades.

soft rest   A soft reset reloads the operating system, application software, etc., and reboots the card. It does not initialize the ONS 15454 ASIC hardware.

SONET   Synchronous Optical Network. High-speed synchronous network specification developed by Telcordia Technologies, Inc. and designed to run on optical fiber. STS-1 is the basic building block of SONET. Approved as an international standard in 1988.

source   Synchronous Optical Network. High-speed synchronous network specification developed by Telcordia Technologies, Inc. and designed to run on optical fiber. STS-1 is the basic building block of SONET. Approved as an international standard in 1988.

spanning tree   Loop-free subset of a network topology. See also STA and STP.

SPE   Synchronous Payload Envelope. A SONET term describing the envelope that carries the user data or payload.

SSM   Sync Status Messaging. A SONET protocol that communicates information about the quality of the timing source using the S1 byte of the line overhead.

STA   Spanning-Tree Algorithm. An algorithm used by the spanning tree protocol to create a spanning tree. See also Spanning tree and STP.

static route   A route that is manually entered into a routing table. Static routes take precedence over routes chosen by all dynamic routing protocols.

STP   Spanning Tree Protocol. Bridge protocol that uses the spanning-tree algorithm to enable a learning bridge to dynamically work around loops in a network topology by creating a spanning tree. See also Spanning tree, STA, and Learning bridge.

STS-1   Synchronous Transport Signal 1. Basic building block signal of SONET, operating at 51.84 Mbps for transmission over OC-1 fiber. Faster SONET rates are defined as STS-n, where n is a multiple of 51.84 Mb/s. See also SONET.

subnet mask   32-bit address mask used in IP to indicate the bits of an IP address that are used for the subnet address. Sometimes referred to simply as mask. See also IP address mask and IP address.

subnetwork   In IP networks, a network confined to a particular subnet address. Sub networks are networks segmented by a network administrator in order to provide a multilevel, hierarchical routing structure while shielding the sub network from the addressing complexity of attached networks. Sometimes called a subnet.

subtending networks	SONET rings that incorporate nodes that are also part of an adjacent SONET ring.
Superuser	A security level that can perform all of the functions of the other security levels as well as set names, passwords, and security levels for other users. A Superuser is usually the network element administrator. See also Retrieve user, Maintenance user, and Provisioning user.

T

T1	T1 transmits DS-1-formatted data at 1.544 Mbps through the telephone-switching network using AMI or B8ZS coding. See also AMI, B8ZS, and DS-1.
T3	T3 is an unbalanced coaxial pair connection, 1 connection for transmit and 1 for receive. T3 is Full Duplex in nature. The line rate on a T3 is 44.736 Mb/s, which is the same as a DS3. The unbalanced connectors are BNC type RG59 75 Ohm. The T3 is equivalent to 28 T1s.
Tag	Identification information, including a number plus other information.
TDM	Time Division Multiplexing. Allocates bandwidth on a single wire for information from multiple channels based on preassigned time slots. Bandwidth is allocated to each channel regardless of whether the station has data to transmit.
Telcordia	Telcordia Technologies, Inc., formerly named Bellcore. Eighty percent of the U.S. telecommunications network depends on software invented, developed, implemented, or maintained by Telcordia.
TID	Target Identifier. Identifies the particular network element (in this case, the ONS 15454) where each TL1 command is directed. The TID is a unique name given to each system at installation.
TLS	Transparent LAN Service. Provides private network service across a SONET backbone.
transponder	Optional devices of a DWDM system providing the conversion of one optical wavelength to a precision narrow band wavelength.
trap	Message sent by an SNMP agent to an NMS (CTM), console, or terminal to indicate the occurrence of a significant event, such as an exceeded threshold.
tributory	The lower-rate signal directed into a multiplexer for combination (multiplexing) with other low rate signals to form an aggregate higher rate level.
trunk	Network traffic travels across this physical and logical connection between two switches. A backbone is composed of a number of trunks. See also Backbone.
tunneling	Architecture that is designed to provide the services necessary to implement any standard point-to-point encapsulation scheme. See also encapsulation.

U

Unicast	The communication of a single source to a single destination.
upstream	Set of frequencies used to send data from a subscriber to the headend.

V

VDC   Volts Direct Current

VLAN   Virtual Local Area Network

VPN   Virtual Private Network

VT1.5   Virtual Tributary equals 1.544 megabits per second

W

WAN   Wide Area Network

W   Watts

X

XC   Cross Connect

XCVT   Cross-connect Virtual Tributary

X.25   Protocol providing devices with direct connection to a packet switched network