Alcatel·Lucent

Alcatel-Lucent 7670 Routing Switch Platform

Release 8.1.2

3HE 04535 0006 TQZZA Edition 01

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ISSUE HISTORY OF THIS RELEASE NOTICE

Edition number	Date of issue	Reason for issue
1	August 13, 2009	This is the first issue of this document.

APPROVALS

This release notice has been read and approved by the following:

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This document was signed off electronically. The sign-off form is filed by Document and Data Management.

The original signed-off document is held in the APN Library. When printed, this document is uncontrolled.

Contents

1 Introduction

This release notice provides general information for Release 8.1.2 for the following product:

- 7670 RSP

7670 RSP Release 8.1.2 is based on 7670 RSP Release 8.1.1

2 Overview

2.1   Purpose of the release

This release has been created to introduce new features, to implement DCRs, and to fix problems. This software load is targeted for mobile backhaul applications that utilize IMA capabilities in an ATM backhaul network, or IP/MPLS pseudo wire technology over a metro Ethernet backhaul network.

2.2   New features and DCRs

For information about the new features of this release, see the Release Description document 31RD0049. The Release Description document can be obtained from:

http://www.alcatel-lucent.com/wps/portal/SignIn

The following table lists additional features or DCR functionality added by this release.

Feature name or DCR number	Description
DCR.537113	This DCR allows a user the ability to remote power cycle ESC cards.
DCR.550969	Allow configuration of MPLS Hello and Keep Alive timers.
DCR.555577	Added support of 16 T1s per IMA bundle on the ESC cards.

2.3   Features no longer supported

There are no features that are no longer supported.

2.4   Restrictions, limitations, and notable information

Restrictions

The following table lists restrictions to the product and feature functionality.

Restriction number	Restriction

R1	ESC line cards must not be placed in boot mode when they are part of a line card redundancy pair. Refer to P. 535884 and P.539503 for more information.
R3	UDT ports configured on ESC line cards may cause traffic loss on adjacent ports. Refer to P.526650 and TA 3692 for more information.
R5	SPVPs are not supported on ESC cards. Refer to P.544136 for more information.
R8	Scaled OSPF interfaces numbering more than 250 require the "hello interval" to be configured to a minimum of 30 seconds, and the "dead interval" configured to 120 seconds.
R10	The number of IP based services configured per Gigabit Ethernet line card should not exceed 120 OSPF adjacencies and 240 MPLS signaling links.
R12	The 7670 RSP supports 2000 IMA groups per multishelf system. There is no restriction on the number of IMA groups on a single-shelf system.
R13	The 7670 RSP supports 4000 TDM pseudowires per system.

Limitations

None.

Notable Information

The following table lists notable information to the product and feature functionality.

Notable number	Notable
N1	Executing a 'clear ospf lsdb' command requires the inactive control card to be subsequently reset.
N2	The MPLS Hello Hold timer and Keep Alive Hold timer on the near and far end devices must be configured to the following settings, depending on the number of configured OSPF and MPLS links. • For devices with 750 to 1000 MPLS links and 375 to 500 OSPF links: 120s for Hello Hold Timer, 40s for Hello Interval, and 120s for Keep Alive Hold Timer • For devices with 300 to 750 MPLS links and 250 to 375 OSPF links: 90s for Hello Hold Timer, 30s for Hello Interval and 90s for Keep Alive Hold Timer When upgrading to this release, reconfigure these MPLS timers for signaling links that have already been configured.

2.5   Restrictions and limitations lifted from this release

Restrictions lifted from this release

Restriction number	Restriction
R6	The 7670 RSP supports 500 IMA groups per multi-shelf system. There is no restriction on the number of IMA groups on a single-shelf system. Refer to P.547011 for more information.
R7	Up to 2000 TDM pseudo wires are supported on a single or multi-shelf system. See P.547011 for more information.
R9	Scaled MPLS signaling in the presence of OSPF scaling requires the "hello interval" to be configured to a minimum of 30 seconds.
R14	Congestion stats on IMA endpoints are not supported in this release.

2.6   Compatibility

Hardware compatibility

All significant components of the 7670 RSP have software-readable hardware-revision indicators. To ensure correct operation of the 7670 RSP, the minimum hardware revision levels listed in the following table for Release 8.1.2 software loads must be present in the system.

Please note the following when reading the table:

The minimum field revision is the recommended minimum revision of hardware for Release 8.1.2. If the hardware revision is less than the minimum field revision, Release 8.1.2 software can still run on this hardware; Alcatel-Lucent recommends contacting your account representative to determine if a hardware upgrade is required.

The current hardware repair revision is the latest hardware revision shipped from the repair center if the card is returned for repair.

The information in the following table is superseded by any PCN issued.

Component	Part number	Minimum field revision	Hardware repair revision as of RN publication date
CC2G CONTROL CARD	90-9505-01 Note: a minimum 1-Gbyte flash disk is required.	A	B
PERIPHERAL SHELF CONTROLLER (PSC)	90-7732-01	B	F
SW.SHELF CTLR CARD (SSC)	90-7582-01	F	L
CTRL INTERCONNECT CARD (CIC)	90-6703-01	C	F

Component	Part number	Minimum field revision	Hardware repair revision as of RN publication date
PERIPHERAL INTERCONNECTION CARD (PIC)	90-7731-01	B	C
INTER-SHELF CONNECT (ICON) CARD	90-7324-01	F	H
ICON I/O EXPANSION CARD (UPPER)	90-7733-01	A	F
ICON I/O CARD (LOWER)	90-7734-01	A	E
SWITCH MATRIX CARD (SMX)	90-7339-01	C	G
SWITCHING SCHEDULER CARD (SCH)	90-7340-01	B	G
SWITCH ACCESS CARD (SAC)	90-7583-01	A	K
SWITCH CARD	90-4590- 01 02	 A A	 E A
QUAD FABRIC INTERFACE CARD (QFIC)	90-7730-01	B	J
DUAL FABRIC INTERFACE CARD DFIC)	90-7729-01	A	K
FACILITIES CARD (FAC)	90-7039-01 (North America) 90-7039-02 (International)	B B	E B
SINGLE SHELF (Switching, Control, Peripheral)	90-6699-01	D	T
GIGE LINE PROCESSING CARD	90-9089-01	B	C
2P GIGE I/O CARD SX LX LH	90-9090- 01 02 03	 C C C	 E E E
OC48C/STM16C NNI LINE CARD	90-7041-01	A	G
OC48C/STM16C I/O CARD SR IR LR (for OC48 ATM and Multi-Rate 16 POS)	90-7042- 01 02 03	 B B A	 G G D
MULTI-RATE 16 ATM LINE CARD	90-7572-01	A	G
8P OC-3C/STM-1 SR I/O CARD SR IR LR XLR STM1 ELECT	90-7569- 01 02 03 04 05	 A A A A A	 C C C C D
DS3 8P I/O CARD	90-8395-01	A	D

Component	Part number	Minimum field revision	Hardware repair revision as of RN publication date
2P OC12C/STM4 SR I/O CARD SR IR LR XLR	90-7570- 01 02 03 04	 A A A A	 C C C C
MR48 LINE CARD	90-9132-01	A	B
EDGE SERVICES CARD	90-9787-01	A	A
1P OC48/STM16 SR MR48 Ch I/O CARD SR IR LR	90-9166- 01 02 03	 A A A	 A A A
4P OC12/STM4 SR MR48 Ch I/O CARD SR IR LR	90-9227- 01 02 03	 A A A	 A A A
8P OC3/STM1 MR48/ESC I/O CARD SR IR LR	90-9228- 01 02 03	 A A A	 A A A
STM ELECTRICAL I/O CARD	90-9228-05	A	A

Compatible 5620 NM software releases

The following table lists the Alcatel-Lucent 5620 NM software releases with which 7670 RSP Release 8.1.2 is compatible.

Product	Release	Area(s) of test
5620 NM	Release 9.1 H3	Network Management

Database compatibility

The following table lists the database conversions supported by Release 8.1.2 of the 7670 RSP.

Convert from…	To…
Release 6.3	Release 8.1.2

3   Closed problems

This section lists problems that have been closed in this release. For information about all closed problems, contact your Alcatel-Lucent technical support representative.

The following table defines the priority levels used in the problem summaries.

Priority level	Definition
Critical	This priority refers to problems that affect service, with no acceptable workaround available.
Major	This priority refers to problems that affect service, with an acceptable workaround available.
Minor	This priority refers to problems that do not affect service but cause features or functionality to be inoperative.

3.1   Technical Alerts addressed by this release

The following Technical Alerts were addressed in Release 8.1.2. A complete list of all Technical Alerts is accessible at: **http://www.alcatel-lucent.com/wps/portal/SignIn**

TA #	PTS#	Title
3793	551144 533989 534093 534099 536623 536827 537348 537985 538152 538471 538607 538858 539246 554360	Control card(s) may reset or signaling links may go down after 497 days of continuous operation.
3864	551916	Removing a T1/E1 link designated as TRL from an IMA group may cause egress traffic corruption
3900	558091	Changing the Priority of Specific Alarms Can Cause Loss of Management Connection to the 7670 RSP.
3903	558060	Deleting An IMA Group May Cause An Existing Connection To Stop Passing Traffic

3.2   Fixed problems

Critical fixed problems

PTS #	Regional Support Tracking #	Description

PTS #	Regional Support Tracking #	Description
558502	None	If an IMA Group contains links from two different STS1's and the user deletes one of those STS1's, that IMA Group will be deleted even though it should have remained since there are links from the other STS1 still present.

Major fixed problems

PTS #	Regional Support Tracking #	Description
546951	1-2032485	The 'traceroute mpls slsp' command does not function properly when the LSP name contains 16 characters or more. This problem was also closed fixed in Release 8.1.1.1.
547011 *542582* *549830* *552240*	None	If more than 100 pseudowires or more than 500 IMA groups are configured in a multishelf system with line card redundancy and there is a system event such as a dual ICON reset, one or both of the control cards may reset with restart cause Sys38. If more than 2000 pseudowires are configured, the same event may cause the control cards to continually reset. This problem was also closed fixed in Release 8.1.1.1.
548560	None	When an IMA group is congested in the egress direction, it is possible that other IMA groups will be affected. This problem was also closed fixed in Release 8.1.1.2.
548758	None	If a Gigabit Ethernet link goes out of service and subsequently comes back in service for a period of approximately 10 to 40 seconds, there may be a loss of LSPs. This problem was also closed fixed in Release 8.1.1.1.
550364	None	If Ethernet pseudowire connections are created from the 5620 NM and a subsequent reconcile of the 5620 NM occurs, the pseudowire connections will go IVN. This problem was also closed fixed in Release 8.1.1.2.
551144 *533989* *534093* *534099* *536623* *536827* *537348* *537985* *538152* *538471* *538607* *538858* *539246* *554360*	None *200803018567* *200803020626* *200803020628* *None* *1-1866558* *200805017741* *200806002277* *1-1884909* *200806008285* *None* *200806014636* *None* *1-2153796*	Control card(s) may reset or signaling links may go down after 497 days of continuous operation. Refer to TA 3793 for more information.

PTS #	Regional Support Tracking #	Description
551916 *550803*	1-2115705 *1-2100193*	If the IMA group has never been in-service, and the timing reference link is deleted (typically the first link in the group), then some or all egress traffic could be corrupted. Refer to TA 3864 for more information. The symptoms are: - Near-end IMA group could be out-of-service with "IMA: Insufficient Links" and "IMA: Remote Failure Ind." alarms. - Far-end equipment could detect Loss of Cell Delineation. This problem was also closed fixed in Release 8.1.1.2.
556499	None	When a database is restored, it can take a long time after CLI reports the control card is going to reset for the reset to actually occur. The delay is proportional to the number of alarms in the alarm queue with the location field indicating a slot containing a channelized line card (MR48, ESC), times in excess of 20mins have been observed.
558060	None	Removing an IMA group can cause traffic to stop on an unrelated connection on the same slot. Refer to TA 3903 for more information. This problem was also closed fixed in Release 8.1.1.3.
558091	1-2213428	If the entire alarm log is not cleared prior to changing the priority of specific alarms or suppressing an alarm, the alarm queue may be corrupted and may cause the loss of the management connection to the node. Refer to TA 3900 for more information.

Minor fixed problems

PTS #	Regional Support Tracking #	Description
538210	1-1884708	The LSP Name contains invalid characters when it is longer than 15 characters. This problem was also closed fixed in Release 8.1.1.1.
539763	200807002603	The IMA resources of 7670 RSP Edge Services Card (ESC) may not be displayed correctly on the 5620 NM when a link within the IMA group fails because of a physical fault.
548712	1-2022599	Under certain circumstances, a 7670 RSP SONET port configured for Bidirectional APS on the MR16, MR8, or OC48 line cards will transmit a Unidirectional switching code in the K2 byte. This can be seen, when port #2 is configured for Bidirectional switching, while port #1 on the same IO card is configured for Unidirectional switching.
550750	None	The 'show mpls siglink detail' command always shows 15s for the hello timer.
552060 *544203* *555587*	None *1-1974636* *None*	GigE IOC intermittently raises a false positive PCHK diagnostic for egress traffic. This is for traffic coming from the LC towards the IOC.

4   Outstanding problems

This section lists outstanding problems in this release of which customers must be aware before deploying it in a live network or lab environment. For information about all outstanding problems, contact your Alcatel-Lucent technical support representative. The following table defines the priority levels used in the problem summaries.

Priority level	Definition
Critical	This priority refers to problems that affect service, with no acceptable workaround available.
Major	This priority refers to problems that affect service, with an acceptable workaround available.
Minor	This priority refers to problems that do not affect service but cause features or functionality to be inoperative.

4.1   Technical Alerts outstanding in this release

The following Technical Alerts are outstanding in Release 8.1.2. A complete list of all Technical Alerts is accessible from: **http://www.alcatel-lucent.com/wps/portal/SignIn**

TA #	PTS#	Title
3692	526650	Traffic loss may occur on an ESC OC3 STS3-STM1 cell relay port when the adjacent port has UDT TDM connections.

4.2   Outstanding problems

Critical outstanding problems

There are no outstanding critical problems in Release 8.1.2.

Major outstanding problems

PTS #	Regional Support Tracking #	Description
526650 *546413*	None	Traffic loss may occur on an ESC OC3 STS3-STM1 cell relay port when the adjacent port has UDT TDM connections. Refer to TA 3692 for more information. There is no workaround.
541991 *539503* *535884* *535885*	None	ESC line cards must not be placed in boot mode when they are part of a line card redundant pair. The workaround is to de-configure line card redundancy and reset the ESC line card in the odd slot.

PTS #	Regional Support Tracking #	Description
544136	None	SPVPs are not supported on ESC line cards There is no workaround.
548978	None	If a TDM pseudowire is disconnected and reconnected during a reconcile of the inactive control card, the inactive control card may reset with restart cause Sys34. The inactive control card will then recover normally.
557928 552893 553925 555554 558049 558855 561345 562364 563451 563689 563774 564044 564467	1-2212948 1-2130522 1-2146641 1-2173124 1-2215809 1-2231506 1-2284696 1-2302009 1-2323767 1-2320941 1-2331487 1-2337491 1-2347810	An RSP node can experience a CTL complex reset on the Active CTL card with a cause code reset of Sys12. During this event, CPSS node management will be down. While both Control cards are undergoing a reset there is no service impact to data flow however following initialization of the Active CTL card, a high priority download of all connections is issued to all line cards which may cause a traffic hit up to 5 sec on a few connections. There is no workaround.
559076	1-2236146	Following a double release control in a multi-shelf node, the MAINT SHELF FAB-BP-STATUS for a shelf may display 'disabled'. Occurrences to date do not appear to have a service impact to data flow. To recover from the event, reseat the FIC card with the 'disabled' status. There is no workaround.
560038	1-2259409	A reroute of moderate to heavy PW traffic from the primary route to an alternate route may result in data loss for several minutes. There is no workaround.

Minor outstanding problems

PTS #	Regional Support Tracking #	Description
541931	None	VCCV ping fails when the MPLS interface is on an MR48 POS channel. There is no workaround.

5   Installation and upgrade notes

5.1   Installation notes

All cards must be running Release 8.1.2 software loads of the same release.

5.2   Upgrade notes

31NUP0059 addresses the following direct upgrades:

Release 6.3.0.4 to Release 8.1.2;
Release 6.3.0.7 to Release 8.1.2;

The following upgrade information is specific to upgrading from Release 6.3.0.4 (or 6.3.0.7) to Release 8.1.2 only.

No software support for MR48 line cards with 90-level 90-9132-01-00-A in R8.1.2

As of Release 8.1.2, software support for MR48 line cards with 90-level part number 90-9132-01-00-A is discontinued. Downloading a Release 8.1.2 or greater application bundle to an MR48 with this 90-level part number will result in a failure of the card to boot following a card hard reset. Therefore, when upgrading MR48 line cards to this release, it is mandatory that Release 8.1.2 be applied only to MR48 cards with 90-level part number 90-9132-01-00-B or greater.

Upgrading MR48 line cards with 90-level 90-9132-01-00-B (or greater)

When upgrading MR48 line cards with 90-level part number 90-9132-01-00-B or greater, a one-time special upgrade procedure must be followed.

The MR48 active bank **must** be Bank 2 and it must contain the application bundle from Release 6.3.0.4 (or 6.3.0.7).

The Release 8.1.2 application bundle **must** be downloaded into Bank 1.

The standard upgrade procedure then applies.

If this procedure is not followed, the MR48 line card under upgrade will fail to initialize properly after reset. Once initialized, the boot ROM will be updated to be "A83B06-H3-12", and the status of Bank 2 will be "prob". The "prob" status can be corrected by downloading the same application bundle once again into Bank 2.

This upgrade procedure is only required the first time that a Release 8.1.2 application bundle is downloaded. For example, the special upgrade procedure is required if going from Release 6.3.0.4 (or 6.3.0.7) to Release 8.1.2, but is not required on a subsequent upgrade from Release 8.1.2 to a later release.

Downgrading MR48 line cards from R8.1.2 to R6.3.0.4 (or R6.3.0.7)

If, for whatever reason, an MR48 line card downgrade must be performed back to Release 6.3.0.4 (or 6.3.0.7) from Release 8.1.2, a similar downgrade procedure must be followed.

The MR48 active bank **must** be Bank 2, and it must contain the application bundle from Release 8.1.2.

The new application bundle from Release 6.3.0.4 (or 6.3.0.7) **must** be downloaded into Bank 1.

The standard downgrade procedure then applies.

Software support for MR48 line cards with 90-level 90-9132-01-00-A

MR48 line cards with 90-level part number 90-9132-01-00-A are supported in Release 8.1.2 by running the R6.3.0.4 (or 6.3.0.7) MR48 line card application with the software generic A83B16-H3-04 (or A83B16-H3-07).

I/O card firmware

The following table lists the I/O card firmware for the current load. The I/O card firmware is upgraded automatically on the I/O card whenever the current load revisions differ from the previous load upgraded, unless the line cards are part of a line card redundant pair. Note that I/O cards for the MR48 line card and the ESC line card do not have firmware to update during an upgrade.

I/O card[1][1]	Line card	Firmware
8-port OC3c/STM1	Multi-Rate 16 ATM	80-6221-01-04
8-port DS3 I/O card	Multi-Rate 16 ATM	80-6492-01-00
2-port OC12/STM4	Multi-Rate 16 ATM	80-6221-01-04
1-port OC48c/STM16	OC48c/STM16 SONET/SDH ATM	80-5782-01-05
Gigabit Ethernet LX	Gigabit Ethernet	80-6711-01-00
Gigabit Ethernet SX	Gigabit Ethernet	80-6711-02-00
8-port OC3c/STM1	MR48, Edge Services Card	n/a
4-port OC12c/STM4	MR48	n/a
1-port OC48c/STM16	MR48	n/a
8-port OC3c/STM1 Electrical	MR48	n/a

Boot ROM upgrades

The boot ROM loads must be upgraded to the loads listed in the following table. All cards automatically upgrade their boot ROM loads.

Line card	Boot ROM load
OC48c/STM16 SONET/SDH ATM	A83206-H3-10

Line card	Boot ROM load
Multi-Rate 16 ATM	A83406-H3-10
Gigabit Ethernet	A83606-H3-10
MR48	A83B06-H3-12
Edge Services Card	A83E06-H3-10
Inter-Shelf Connect (ICON) Card	A82406-H3-10
Switching Shelf Controller Card	A82306-H3-10
PSC	A82705-H0-01
CC2G	A82105-H0-03

6   Software Generics

The 7670 RSP Release 8.1.2 consists of the following software generics.

Card type	Minimum boot generic	Current boot generic	Bundle generic	Software generic	89-level generic	Checksum [1]
Control Cards						
CC2G CONTROL CARD	A82103-H0-03	A82105-H0-03	L82118-H1-20	A82118-H1-20	89-9505-1-81-20-07	715326541
Line cards						
GIGABIT ETHERNET LINE PROCESSING CARD	A83602-H2-01	A83606-H3-10	L83618-H1-20	A83618-H1-20	89-9089-1-81-20-03	114551834
MULTI-RATE 16 ATM LINE CARD	A83402-H2-01	A83406-H3-10	L83418-H1-20	A83418-H1-20	89-7572-1-81-20-02	3533435591
MR48 LINE CARD	A83B02-H2-01	A83B06-H3-12	L83B18-H1-20	A83B18-H1-20	89-9132-1-81-20-10	3460267001
EDGE SERVICES CARD	A83E06-H2-00	A83E06-H3-10	L83E18-H1-20	A83E18-H1-20	89-9787-1-81-20-12	2599314497
OC48C/STM16C NNI LINE CARD	A83202-H2-01	A83206-H3-10	L83218-H1-20	A83218-H1-20	89-7041-1-81-20-01	2531703888
Switch cards						
SWITCH CARD (variant 01)	N/A	N/A	N/A	AQIDRV11xxx [2]	N/A	N/A
SWITCH CARD (variant 02)	ASC101-H0-01	ASC101-H0-03	LSC111-H0-02	ASC111-H0-02	89-4590-1-10-01-00	N/A
Multi-shelf infrastructure cards						
QUAD/DUAL FABRIC INTERFACE CARD(QFIC/DFIC)	A82802-B0-05	A82802-B2-05	L82818-H1-20	A82818-H1-20	N/A	N/A
INTER-SHELF CONNECT (ICON) CARD	A82402-H2-01	A82406-H3-10	L82418-H1-20	A82418-H1-20	89-7324-1-81-20-01	282020630
PERIPHERAL SHELF CONTROLLER (PSC)	A82702-B0-0T	A82705-H0-01	L82718-H1-20	A82718-H1-20	89-7732-1-81-20-00	1202996201
SW.SHELF CTLR CARD (SSC)	A82302-B0-15	A82306-H3-10	L82318-H1-20	A82318-H1-20	89-7582-1-81-20-01	146392971

[1] The CRC (checksum *) was calculated using the UNIX cksum command.

[2] The last three digits of the Switch card software generic are irrelevant. Changes to these digits do not represent software changes.

7   Release history

7.1   Hardened product loads

Release	Date
8.1	2008.09.23
8.1.1	2008.12.19
8.1.2	2009.08.13

8   Obtaining technical support

Technical support engineers are available to assist you 24 hours a day, 7 days a week. For the list of regional contact telephone and fax numbers, visit:

http://www.alcatel-lucent.com/wps/portal/Support and click on the Global Support link.

9   Product documentation

9.1   Customer user documentation

The Support Documentation Service gives customers online access to the latest Alcatel-Lucent customer user documentation. For a wide range of documentation, including product manuals and documentation updates, visit:

https://www1.alcatel-lucent.com/profile/forms/login.jhtml and log in.

9.2   Customer feedback

We value your feedback. Please direct questions or comments about Alcatel-Lucent documentation to: **documentation.feedback@alcatel-lucent.com**

Glossary

Term	Expansion
2P	2-port
4P	4-port
8P	8-port
ACL	access control list
APN	Alcatel-Lucent part number
ASAM	advanced services access manager
ATM	asynchronous transfer mode
BFD	bidirectional forwarding detection
CESoPSN	circuit emulation over packet switched network
CIC	control interconnect card
CLI	command line interface
CPSS	control packet switching system
CRC	cyclic redundancy check
CTL	control
DCR	design change request
D-DR	destination designated router
DFIC	dual fabric interface card
DR	designated router
DS3	digital signal level 3
ELECT	electrical card
ESC	edge services card
FAC	facilities card
FD	feature description
FIC	fabric interface card
GR	graceful restart
I/O	input/output
ICON	intershelf connect card
IGMP	Internet group management protocol
IMA	inverse multiplexing for ATM
IO	input output
IOC	input output card
IP	Internet protocol
IPD	IP division
IR	intermediate range
IVN	interrupted via NMTI (CLI)
LAN	local area network
LANE	LAN emulation

Term	Expansion
LC	line card
LCR	line card redundant
LR	long range
LH	long haul
LSA	link state advertisement
LSDB	link state database
LSP	label switched path
LX	long range
MIB	management information base
MPLS	multiprotocol label switching
MSP	7470 Multiservice Platform
MTU	maximum transmission unit
NM	network manager
NNI	network node interface
NUP	network upgrade procedure
OAM	operations, administration, maintenance
OC	optical carrier
OIF	outgoing interface
OSPF	open shortest path first
P2MP	point to multipoint
P2P	point-to-point
PCN	product change notice
PE	provider edge
PEP	persistent endpoint
PHP	penultimate hop popping
PIC	peripheral interconnection card
PIM	protocol independent multicast
PIM-SM	PIM sparse mode
PNNI	private network node interface
POS	packet over SONET
PSC	peripheral shelf controller
PTS	problem tracking system
PW	pseudo wire
QFIC	quad fabric interface card
R&D	research and design
RD	release description
RIP	routing information protocol
RN	release notice
ROM	read-only memory
RP	rendez-vous point

Term	Expansion
RSP	7670 Routing Switch Platform
SAC	switch access card
SCH	switching scheduler card
SDH	synchronous digital hierarchy
SDR	source designated router
SEEP	serial electrically erasable programmable read-only memory
S-LSP	signaled label-switched path
SMX	switch matrix
SNMP	simple network management protocol
SONET	synchronous optical network
SPVC	soft permanent virtual circuit
SPVP	soft permanent virtual path
SR	short range
SR	7750 Service Router
SRRP	single router redundancy protocol
SSC	switching shelf controller
STM	synchronous transfer mode
STS	synchronous transport signal
SX	short range
TA	technical alert
TCA	threshold crossing alarm
TDM	time division multiplexing
TDM-PW	TDM pseudo wires
TRL	time reference link
TTL	time to live
UDT	unstructured data transfer
VCCV	virtual circuit connection verification
VLAN	virtual local area network
VPN	virtual private network
XLR	extra-long range