



Alcatel 7670 RSP

Routing Switch Platform | Release 6.2

A multiservice IP routing and switching platform supporting new and established services



The Alcatel 7670 Routing Switch Platform (RSP) is a feature-rich, highly scalable, multiservice platform optimized to deliver IP/MPLS and ATM-based services reliably and concurrently. The platform is ideal for service providers seeking to preserve and expand current services while transitioning towards an IP/MPLS infrastructure.

With separate control planes for IP/MPLS and ATM, the Alcatel 7670 RSP has been uniquely designed to support a wide range of services including IP-VPNs, Layer 2 VPNs, Ethernet, ATM, and frame relay. The Alcatel 7670 RSP also offers comprehensive network and service interworking capabilities leveraging standards-based approaches over both MPLS and ATM. Furthermore, the Alcatel 7670 RSP supports high-density, channelized, multi-service cards that offer outstanding flexibility with the ability to support multiple concurrent services at different speeds on a single card.

Designed to accommodate traffic growth, the Alcatel 7670 RSP scales rapidly and without service interruption from 50 Gb/s to 450 Gb/s (full duplex, redundant). The breadth of supported configurations ensures optimal node deployments at multiple sites of varying size.

As a highly reliable, carrier-grade platform, the Alcatel 7670 RSP provides full common equipment redundancy. Facility protection capabilities include automatic protection switching (APS) for SONET/SDH interfaces and link aggregation group (LAG) for Ethernet interfaces. With the addition of MPLS fast reroute (FRR), non-stop routing, non-stop signaling and non-stop forwarding, the result is a high-availability architecture at all levels providing the foundation for true end-to-end, non-stop Layer 2 and Layer 3 services.

The industry-leading Alcatel 5620 Network Manager (NM) provides a single management platform to seamlessly manage both legacy and IP/MPLS services. Only Alcatel can provide a single tool for automated end-to-end provisioning of both label switched paths (LSPs) and VCs across multiple platforms, monitoring and enforcement of service level agreements (SLAs), and open interfaces that enable simple integration into any OSS environment.

The Alcatel 7670 RSP is deployed in over 110 of the world's largest fixed and mobile service provider networks worldwide. Its unique platform enables the deployment of flexible, scalable, highly reliable and manageable networks capable of supporting both today's requirements and tomorrow's evolution.

This document, which refers to Alcatel, was issued prior to our merger. It has not been modified to refer to Alcatel-Lucent since it is part of our archives.

Product Summary

Services

Layer 3 VPNs

- > IP-VPN (RFC 4364)
- > Virtual routing and forwarding (VRF): 2,000 VRFs
- > Inter-AS option-A and option-B
- > Bandwidth guarantee per VRF via MPLS-TE
- > Numbered and unnumbered VPN interfaces with virtualized DHCP relay agent
- > Customer equipment (CE) – provider edge (PE) routing: static, BGP-4, OSPF, RIP v1/v2
- > Integrated public Internet service
- > Extranet
- > Non-stop VRF routing/MPLS

Layer 2 VPNs

- > Ethernet virtual LAN service
- > Ethernet virtual leased line
- > Circuit emulation (TDM) virtual leased line
- > Cell relay virtual leased line
- > Cell relay and IMA v1.1 and v1.0 switched services
- > Frame relay and multilink frame relay

Network and service interworking

- > Service interworking enables access to Layer 2 VPN service via Ethernet, cell relay and frame relay
- > Network interworking enables IP/MPLS-based services over ATM networks and ATM-based services over IP/MPLS networks
- > Ethernet, ATM and IP pseudowires (a.k.a. draft Martini)

Residential broadband services

- > IP aggregation: Ethernet, frame relay
- > PPP, cell relay, POS, G.SHDSL
- > Broadcast TV: IGMP v2/v3, PIM-SSM, PIM-SM, static multicast
- > Video on demand (VoD)
- > Voice over IP (VoIP)

Voice over packet service

- > Reliable VoIP transport (switching and routing) based on quality of service (QoS)
- > AAL2:
 - G.711 encoding
 - G.726 and G.729A/B compression, silence suppression, comfort noise generation, 128-ms echo cancellation
- > Circuit emulation: AAL1, 128-ms echo cancellation

Leased line service

- > Leased line: AAL1 circuit emulation, point-to-point and broadcast
- > TDM over packet: AAL1 circuit emulation, 3/1/0 circuit grooming and packet-based digital cross-connect switching

IP-Enabled Multiservice Networks

- Self-paced migration to multiservice, multiprotocol Layer 2 and 3 networks
- > Configurable service and protocol isolation and interworking
 - ensures continuity of existing services
 - enables controlled introduction of new services and protocols
 - leverages collective strengths of each protocol to enable multiple SLA-based services with statistical gain

- > Comprehensive tools enable hierarchical service definitions
 - multiple service queues enable differentiated Layer 2 and 3 services with multiple QoS levels
 - hierarchical, multilayer service definitions enable delivery of IP traffic without loss by prioritizing an IP flow according to Layer 3 CoS and by shaping resulting stream to its Layer 2 circuit’s QoS parameters
- > Service isolation and fairness enable per-customer SLA enforcement
 - shapes, polices and marks traffic based on Layer 2 and 3 service definitions
 - hierarchical QoS
 - bandwidth reservations per IP CoS, LSP, VC (hierarchical connection admission)
 - per-IP flow, LSP and VC queuing and shaping at ingress and egress
 - per-IP flow, LSP and VC fairness and flow control
 - work-conserving hierarchical WFQ coupled to admission policy

- > Unicast IP routing protocols: BGP-4 (route reflector, confederation) IS-IS, IS-IS-TE, OSPF, OSPF-TE
- > Multicast IP routing protocols: IGMP v2/v3, PIM-SSM, PIM-SM, static multicast
- > MD5 authentication between routing peers
- > Layers 3 and 4 access control lists
- > AS path lists, community lists and route maps
- > Flow-based rate limiting
- > Reverse path filtering
- > DiffServ and DSCP remarking
- > Eight CoS classes (user-defined)
- > Multiple field classification (MFC)
- > ICMP
- > Flexible ECMP implementation: applicable to routing protocols and static routing
- > DHCP relay agent

IPv6 Features and Performance

- > IPv6 interfaces: 16,000
- > FIB size: 100,000 unique routes
- > RIB size: >500,000 BGP routes (RIB-in)
- > Wirespeed forwarding for 60-byte packets at all ports
- > Non-stop routing
- > MBGP with IPv6 AFI support
- > 6PE tunneling
- > ICMPv6
- > Neighbor discovery
- > EUI-64 support
- > Stateless address autoconfiguration
- > Eight CoS classes
- > DiffServ and DSCP remarking

Technical Summary

IPv4 Features and Performance

- > IPv4 interfaces: 100,000
- > FIB size: 1 million unique routes
- > RIB size: >2 million BGP routes (RIB-in)
- > Wirespeed forwarding for 40-byte packets at all ports
- > Non-stop routing: BGP, OSPF, IS-IS and RIP
- > Graceful restart helper for BGP and OSPF
- > PE and provider router

Physical Interfaces, Channels and Protocols

	GigE, 10/100	OC-48/STM-16	OC-12/STM-4	OC-3/STM-1	DS-3*	E3	n*DS-1/n*E1	DS-1/E1	n*DS-0	DS-0
Ethernet	Eth									
OC-48/STM-16		POS, ATM	POS, ATM	POS, ATM	POS, ATM					
OC-12/STM-4			POS, ATM	POS, ATM	POS, ATM					
OC-3/STM-1				POS, ATM	ATM, CE	ATM, CE	ATM IMA	ATM, CE	ATM, CE	CE, AAL2
DS-3					ATM, FR, CE			FR, CE	FR, CE	FR, CE
E3						ATM, FR, CE		CE	CE	CE
T1/E1							ATM IMA, MLFR	ATM, FR, CE	FR, CE	CE, AAL2
g.SHDSL								ATM	ATM	

* STS-1/DS-3 in channelized OC-48/STM-16 and OC-12/STM-4 interfaces

MPLS Features

- > LER and LSR
- > Generic label (“shim header”) and label control ATM (VPI/VCI)
- > LSP signaling, RSVP-TE, LDP DoD, LDP-DU and CR-LDP
 - explicit route reservation (and alternate explicit route)
 - resource reservation
- > Non-stop MPLS signaling, LDP graceful restart
- > Dynamic LSP and provisioned/static LSP
- > CSPF for RSVP-TE
- > LSP tunnels (BGP and IGP shortcuts)
- > End-to-end LSP protection (FRR)
- > Multiple parallel LSPs
- > Hitless “make before break” LSP modification
- > Directed ping and traceroute over MPLS
- > LSP ping and traceroute
- > ATM/MPLS mediation
- > IPv6 tunneling over MPLS (6PE)
- > Source-based forwarding to MPLS LSPs
- > Network layer OA&M: MPLS ping and traceroute
- > Service layer OA&M: PW VCCV

ATM Features and Performance

- > CBR, 2 x rt-VBR, 3 x nrt-VBR, ABR and UBR with MDCR (UBR+)
- > As per Telcordia GR-11110-CORE, GR-1248-CORE, ATM Forum TM4.0 and ITU-T I.371; VS/VD and full ABR as per ATM Forum TM4.0, including ER marking
- > PNNI, AINI, B-ICI v.2.0, ILMI 4.0, UNI 3.1, UNI 4.0, Q.2931 and Q.2961 signaling
- > UNI services from DS-1 through OC-48/STM-16
- > 3,000 SVC calls per second (sustained) – equivalent to 10 million BHCAs
- > 768,000 connections
- > Signaling congestion control
- > ATM Forum policy-based routing
- > PNNI QoS routing
- > PNNI-H (hierarchy)
- > NCCI
- > SVCs and SVPs
- > S-PVCs and S-PVPs
- > S-PVC operator-directed routing
- > Point-to-point and point-to-multipoint PVCs, SVCs and S-PVCs

- > Logical multicast
- > S-PVC hitless connection moves
- > Test access connections
- > ILMI address registration
- > ATM Forum PNNI path and connection trace
- > Closed user groups
- > Address screening and address translation
- > Efficient support of real-time traffic (CBR and rt-VBR)
- > Explicit rate and virtual source/virtual destination support for ABR
- > Virtual path aggregation
- > OA&M performance monitoring
- > OA&M round trip delay

System Reliability and Redundancy

- > Hitless software upgrades
- > Hardware redundancy: common control, data plane fabric, control plane fabric (separate from data), line and I/O cards, power, cooling, synchronization and management
- > Control redundancy: 1+1 redundant call processing, billing, routing, network data collection and node control
- > Non-stop routing for BGP, OSPF and IS-IS
- > Non-stop RSVP-TE signaling
- > Hot standby for PNNI routing and signaling
- > Non-stop IMA
- > APS
- > IEEE 802.3ad link aggregation on GigE line card with LACP
- > F1- to F5-level OA&M functions
- > Circuit, equipment and line loopbacks
- > Background and directed diagnostics for fault isolation
- > Performance monitoring with threshold crossing alerts
- > EAC
- > Alarm logs and remote alarm signaling
- > Operational and diagnostic LED displays
- > Network inventory support from Alcatel 5620 NM

Network Management

- > Management of VPs, VCs, LSPs and IP service interfaces through Alcatel 5620 NM, or local management interface (i.e., CLI)

- > Point-and-click provisioning
- > Centralized alarm management with audible and visual alarm notification
- > Centralized software management administration
- > Router configuration templates
- > Dynamic routing protocol configuration
- > IP diagnostics (ping and traceroute)
- > Automatic discovery of equipment additions, deletions and changes
- > Sophisticated link and path management
- > Extensive performance data for SLAs and billing capabilities based on AMA records
- > Multiple graphical displays of performance data
- > Open interfaces at network and service levels for maximum business automation
- > SNMP support
 - MIB II as per RFC 1213
 - interface table MIB as per RFC 1573
 - SONET MIB as per RFC 1595
 - DS-3/E3 MIB as per RFC 1407
 - ATM interface MIB as per RFC 1695
 - ILMI MIB as per ATM Forum UNI v3.1
 - enterprise MIB for PVC and S-PVC setup
 - frame relay services MIB
 - call routing statistics MIB
 - IPv6 MIB

Scalable Architecture

In-service system expansion

- > Switching fabric scales from 50 Gb/s to 450 Gb/s (full duplex, redundant, APS enabled)
- > Single nodal entity (i.e., one logical management interface)
- > Parallel, redundant optics used to interconnect shelves, integrated on common control

Peripheral shelf (PS)

- > Single PS can be deployed as a stand-alone 50 Gb/s Alcatel 7670 RSP system
- > 14 universal, multiprotocol IP/MPLS/ATM slots, each supporting 2.4 Gb/s user I/O, per PS
- > Mid-plane design enables combinations of different optical I/O per line card
- > Optimized per-PS configuration enables APS in all slots with zero fabric consumption for redundant cards

Switching shelf (SS)

- > Fabric scales to 450 Gb/s (full duplex) providing 320 Gb/s user I/O (full duplex)
- > Enables 14 additional PSs to be added (15 in total)

Edge services extender shelf (ESE)

- > Extends Alcatel 7670 RSP multiprotocol capabilities to low-speed, multiservice interfaces
- > Subtended from PS via standard ATM NNI STM-4/OC-12c or STM-1/OC-3c interface
- > Also deployable as a standalone 3.2 Gb/s multiservice switch
- > 12 universal, multiservice slots, each supporting channelized and unchannelized interfaces up to STM-1/OC-3
- > two high-speed slots for STM-4/OC-12c or multiprotocol STM-1/OC-3c

Interfaces

Any service, any port

- > Concurrent POS and ATM channels within OC-48/STM-16 and OC-12/STM-4 interfaces (channelized to STS-1/DS-3)
- > IP forwarding, MPLS and ATM switching supported in ATM channels
- > IP forwarding, MPLS and ATM mediation supported in POS channels
- > Bridged and Routed Encapsulation (RFC 2684)
- > Short-, intermediate- and long-reach optics

Gigabit Ethernet

- > Per VLAN configuration for access to Layer 3 service or as an endpoint to Layer 2 service
- > Layer 2 network interworking with Ethernet over ATM, Ethernet over MPLS
- > Layer 2 service interworking: Ethernet VLAN to frame relay/ATM VC
- > Short-, intermediate- and long-reach optics

Low speed, multiservice

- > ATM IMA v1.1 and v1.0
- > Frame relay and MLFR
- > Circuit emulation: private line, TDM over packet
- > Voice over packet (AAL2)
- > 10/100 Ethernet

Physical Dimensions

Peripheral shelf

- > Height: 93.3 cm (36.7 in.)
- > Width: 54.5 cm (21.4 in.)
- > Depth: 54.5 cm (21.4 in.) without cables; 60 cm (23.6 in.) with cables

Switching shelf

- > Height: 97.7 cm (38.4 in.)
- > Width: 54.5 cm (21.4 in.)
- > Depth: 54.5 cm (21.4 in.) without cables; 60 cm (23.6 in.) with cables

Edge services extender shelf

- > Height: 92.0 cm (36.7 in.)
- > Width: 44.0 cm (17.3 in.)
- > Depth: 31.0 cm (12.2 in.) without cables; 39.0 cm (15.5 in.) with cables

Normal Operating Environment

- > -5 C to +40 C (23 F to 104 F)
- > 5% to 85% relative humidity, non-condensing

Power

- > DC power: -48 V to -60 V DC
- > -60 m to 1,800 m (-197 ft. to 5,905 ft.) above sea level

Industry-Specific Requirements

Telcordia (Bellcore)

- > TR-NWT-000332
- > GR-78-CORE
- > GR-63-CORE
- > GR-1089-CORE

ETSI

- > ETS 300 019
- > ETS 300 132-2

Telecom

- > Telcordia (Bellcore) TR-NWT-1112 (Multimode)
- > ITU G.957 (Optical STM-N)
- > Telcordia (Bellcore) TR-NWT-000499 (DS-N)
- > AT&T Pub 62411 (DS-1)
- > ITU G.703 (T1/E1/155 Mb/s)
- > ITU G.707 (Synchronization Status) Network Node Interface for Synchronous Digital Hierarchy
- > ITU G.825 Jitter/Wander, Digital Networks for Synchronous Digital Hierarchy
- > Telcordia GR-253-CORE Issue 3 (Section 4: Physical Layer)
- > Telcordia GR-253-CORE Issue 3 (Section 5.4 and 5.6: Network ITU-T G.703 Physical Electrical Interfaces Requirements)
- > ITU-T G.707 (SDH Mapping and Overhead Requirements)
- > ITU-T G.813 (Network Synchronization Option 1 (E rate))

- > ITU-T G.823 (E-rate Jitter/Wander)
- > ITU-T G.824 (T-rate Jitter/Wander)
- > ITU-T G.825 (SDH Jitter/Wander)
- > ITU-T G.957 (IR/LR/XLR)
- > ANSI T1.403 (DS-1 Physical Layer)
- > ANSI T1.404 (DS-3 Physical Layer)
- > ANSI T1.102 (STM-1e)
- > ANSI T1.105.06

The Alcatel 7670 RSP also supports customer-specific qualification requirements.

Qualification Summary

North and South America	Europe, Middle East, Africa	Asia, Pacific
Product Safety Approvals		
CSA 60950-1	European Community	IEC 60950-1
UL 60950-1	EN 60950-1	IEC 60825-1, -2
FDA/CDRH 21 CFR Part 1040	EN 60825-1, -2	AS/NZS 3260 and TS001
EMC Approvals		
ICES-003 Class A	European Community	CISPR 22 Class A
	EN 55022 Class A	AS/NZS 3548 Class A
FCC Part 15 Class A	ETS 300 386 Class B	MIC Notice no. 2001-115
		MIC Notice no. 2001-116
Network Attachment Approvals		
IC CS-03		JATE Digital Services (Green Book)
ACTA TIA/EIA/IS-968 (formerly FCC Part 68)		AS/ACIF S016
		MIC Proclamation No: 1998-62
		MIC Proclamation No: 1998-18
		MIC Notice no. 2001-03

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