Alcatel-Lucent 7750 SR

SERVICE ROUTER

Alcatel-Lucent 7750 SR multiservice edge routers have been designed from inception to deliver differentiated, high-performance, high availability services. With platform capacities ranging from 40 Gb/s to 2 Tb/s, specialized service-aware application processing, advanced quality of service (QoS), and a comprehensive range of Ethernet and multiservice interfaces and protocols, the 7750 SR provides industry-leading scale and intelligence to deliver residential, business, and wireless broadband IP services on a converged edge routing platform.

The Alcatel-Lucent 7750 Service Router (SR) portfolio is a suite of multiservice edge routers designed from inception to deliver high-performance, high availability routing with service-aware operations, administration, management, and provisioning. The 7750 SR integrates the scalability, resiliency, and predictability of MPLS along with the bandwidth and economics of Ethernet and a broad selection of legacy interfaces, to enable a converged network infrastructure for the delivery of next-generation services. The 7750 SR's advanced and comprehensive feature set enables it to be deployed as a Broadband Network Gateway (BNG) for residential services, as a Multiservice Edge (MSE) for Carrier Ethernet and IP VPN business services, as the aggregation router in mobile backhaul applications, or as a mobile packet core for 2G, 3G and LTE wireless networks. With support for service-enabled, high-density 10GigE and 100GigE interfaces, the 7750 SR is also well suited for core routing applications. Available in five chassis variants, the 7750 SR scales gracefully from 40 Gb/s to 2 Tb/s of capacity, providing cost-effective solutions to address the smallest to the largest network locations.

Features

Industry-leading FP2 silicon

At the heart of the Alcatel-Lucent 7750 SR is the Alcatel-Lucent award-winning FP2 network processing silicon. Clocking in at 100 Gb/s, the FP2 chipset enables line interfaces to scale to 100 Gb/s, while concurrently supporting processing-intensive edge routing and mobile gateway services without performance impact. Network processing silicon is an essential element in the quest for no compromise, high-speed, intelligent services that can adapt to customer requirements. Alcatel-Lucent has a proven track record as an innovator and industry leader in network processor silicon technology.

Proven end-to-end operating system

Alcatel-Lucent Service Router Operating System (SR OS) is a carrier-grade, highly fault-tolerant, and feature-rich operating system that operates across the entire Alcatel-Lucent Service Router portfolio. With a single operating system across all platforms, operators can be assured of consistent and reliable operations and management when deploying Ethernet (VLL, VPLS), IP/MPLS (IP VPN), legacy (ATM, TDM, POS), and/or mobile services and applications on an Alcatel-Lucent service router network.

Best-in-class high availability

High availability is more than just redundant hardware. In addition to redundant common equipment and line card redundancy, SR OS supports numerous features that minimize service disruption, such as, non-stop routing, stateful failover capabilities, in-service software upgrades (ISSU), and innovative multi-chassis features for service resiliency. Further, the 7750 SR supports service assurance and monitoring tools across IP, MPLS, and Ethernet domains. In short, with a comprehensive suite of high availability features, the 7750 SR is the industry's most reliable platform for offering non-stop applications and services.

Advanced Hierarchical QoS

With today's IP traffic streams including a range of services consisting of video applications, voice, best-effort Internet access, and mission-critical business services, QoS becomes a critical element for delivering both best-effort and SLA-based services on a common platform. The Alcatel-Lucent 7750 SR sets the standard with its advanced and highly flexible Hierarchical QoS implementation with hardware support for multi-tiered shaping and policing hierarchies. As it is designed as a service delivery platform, the 7750 SR provides the tools to define and deliver the most stringent SLAs for high-value, differentiated services.

Service routing specialization

Alcatel-Lucent recognizes that service providers need to be nimble and yet cost sensitive when introducing application-enabled services into the network. With service routing specialization, operators can add new services with higher-level processing requirements to the network wherever an Alcatel-Lucent 7750 SR is located, by simply adding an Integrated Services Adapter (ISA) or Integrated Services Module (ISM) to the node. Compared to using dedicated network elements to provide services, 7750 SR service adapters have tighter management integration, higher performance, higher scale, and consume less energy. They allow service providers to leverage the network design in deploying services where most cost effective, where most easily managed, and with appropriate scale. Applications supported include Application Assurance, which leverages deep packet inspection (DPI) technology to provide application-level traffic reporting and traffic management capabilities, advanced video services (Fast Channel Change/Retransmission or Ad Insertion), IPsec services, large scale Network Address Translation (NAT), and L2TP Network Server (LNS) services.

Service-aware management

The 7750 SR family is managed by the Alcatel-Lucent 5620 Service Aware Manager (SAM) for assured, simplified and integrated operations across both network and service management domains. 5620 SAM is designed to manage services and provides service-level visibility into the network for small- and large-scale service deployments. The Alcatel-Lucent management offering includes additional tools like the 5650 Control Plane Assurance Manager (CPAM) and 5670 Reporting and Analysis Manager (RAM) that work in conjunction with 5620 SAM and streamline network operations and aid in the provisioning and management of all connectivity and advanced networking services.

Benefits

Increased revenues with innovative, differentiated services

Support for advanced networking services allows service providers to capitalize on information embedded in the network to provide subscriber-centric Internet and connectivity services. Subscriber, service, and application awareness can be used to provide differential QoS treatment of higher-value traffic streams and manage the online experience. Guaranteeing a superior Quality of Experience (QoE) for certain applications and metering them separately for billing permits tiered pricing for different levels of service.

Reduced operational expense

By combining wireline and wireless services on a 7750 SR-based converged provider edge, network operations are simplified because all services run over a platform with consistent feature set, operational model, and management, while supporting the service scalability required to combine services. As legacy services are migrated to converged service networks, the legacy networks that carried the service can be decommissioned, further simplifying overall network operations and expenditure. In addition, the 7750 SR has numerous features for automated provisioning of subscribers and services based on service templates and interacting with other operational systems for authentication, authorization, and billing that all but eliminates the need for individual, manual service provisioning.

Investment protection

From its introduction, the 7750 SR family has evolved with customer feature and scaling requirements. The 7750 SR's sophisticated and flexible hardware has a track record of allowing new features and enhancements to be introduced "in-place" in software, rather than through a series of ever-changing hardware iterations. The award-winning FP2 network processing silicon ensures 7750 SR platform capacity and service scale can

continually evolve in step with customer requirements providing an unprecedented level of investment protection.

Environmentally friendly

Pioneering advances in power efficiency are incorporated into each member of the Alcatel-Lucent 7750 SR family reducing the expense of both powering and cooling when comparing products with less advanced silicon technology. Combined with environmentally sensitive manufacturing processes, careful materials selection, and a view to sustainable product life cycle management, the 7750 SR family assists service providers in reducing their environmental impact.

Hardware overview

The Alcatel-Lucent 7750 SR is available in five chassis types — the 7750 SR-12, SR-7, SR-c12, SR-c4, and SR-1. The 7750 SR-12 and SR-7 are offered in a mobile gateway configuration. Table 1 provides a summary of the technical specifications for each platform within the family.

The Alcatel-Lucent 7750 SR family supports a wide range of media and service adapters that are optimized to address different network and application requirements:

- *Input/Output Modules (IOMs)* – IOMs are supported on the 7750 SR-12 and 7750 SR-7 and are optimized for flexibility in deploying a variety of mobile, multiservice, and Ethernet-based applications. Each IOM supports up to two Media Dependent Adapters (MDAs) and can also be used to house Integrated Service Adapters (ISAs). IOM3-XPs are the latest generation of IOMs featuring the Alcatel-Lucent FP2 network processing silicon.
- *Media Dependent Adapters (MDAs)* – MDAs are supported on all platforms and provide physical interface connectivity. MDAs are available in a variety of interface and density configurations. MDA-XPs are the latest generation of Ethernet MDAs and are notable for supporting the Synchronous Ethernet (SyncE) standard for the distribution of timing across Ethernet networks.
- *Compact Media Adapters (CMAs)* – CMAs are interface adapters supporting lower speed services and port densities. CMAs are supported on the 7750 SR-c12 and SR-c4 platforms.
- *Integrated Media Modules (IMMs)* – IMMs are line cards providing integrated processing and physical interfaces on a single board. IMMs provide high-capacity, high-density Ethernet interfaces and are supported on the 7750 SR-12 and SR-7 platforms. IMMs feature the Alcatel-Lucent FP2 network processing silicon.
- *Integrated Service Adapters (ISAs)* – ISAs are resource blades that provide specialized processing and buffering for applications. ISAs are supported on the 7750 SR-12 and SR-7 platforms.
- *Integrated Service Modules (ISMs)* – ISMs are resource line cards that provide specialized processing and buffering for applications. ISMs are supported on the 7750 SR-12 and SR-7 platforms.

Refer to Tables 2 to 6 for further information regarding the different types of MDA, CMA, IMM, ISA, and ISM available for the 7750 SR family.

Table 1. Technical specifications for the Alcatel-Lucent 7750 SR family

	7750 SR-1	7750 SR-c4	7750 SR-c12	7750 SR-7	7750 SR-12
System throughput	Switch fabric: Up to 40 Gb/s (half duplex)	Switch fabric: Up to 90 Gb/s (half duplex)	Switch fabric: Up to 90 Gb/s (half duplex)	Switch fabric: Up to 1 Tb/s (half duplex) Slot capacity: Up to 100 Gb/s (full duplex)	Switch fabric: Up to 2 Tb/s (half duplex) Slot capacity: Up to 100 Gb/s (full duplex)
Built-in network interfaces	• 10/100BASE Management Ethernet RJ-45	• 2 x 10GBASE (LAN/ WAN PHY) XFP • 10/100BASE Management Ethernet RJ-45	• 10/100BASE Management Ethernet RJ-45	-	-
Number of MDAs per chassis	2	2	6	10	20
Number of CMAs per chassis	-	4	8 (plus 2 MDAs)	-	-
Number of IOM/IMM/ ISM per chassis	-	-	-	5	10
Common equipment redundancy	Power, fans	Power (PEMs), fans	CFM-XP, power (PEMs), fans	SF/CPM, power (PEMs), fans	SF/CPM, power (PEMs), fans
Hot-swappable modules	MDAs	MDAs, CMAs, PEMs, fans	CFM-XP, MDAs, CMAs, PEMs, fans	SF/CPM, IOMs, IMMs, ISMs, MDAs, ISAs, PEMs, fans	SF/CPM, IOMs, IMMs, ISMs, MDAs, ISAs, PEMs, fans
Dimensions	• Height: 6.6 cm (2.6 in.) • Width: 44.4 cm (17.5 in.) • Depth: 56.4 cm (22.2 in.)	• Height: 13.8 cm (5.4 in.) • Width: 44.5 cm (17.5 in.) • Depth: 47.0 cm (18.5 in.)	• Height: 22.2 cm (8.7 in.) • Width: 44.4 cm (17.5 in.) • Depth: with cable management: 60.0 cm (23.6 in.)	• Height: 35.5 cm (14 in.) • Width: 44.4 cm (17.5 in.) • Depth: 59.7 cm (25.5 in.)	• Height: 62.2 cm (24.5 in.) • Width: 44.4 cm (17.5 in.) • Depth: without cable: 64.5 cm (25.4 in.); with cable: 76.5 cm (30.1 in.)
Weight	• Empty: 12.3 kg (27 lb) • Loaded: 13.2 kg (29 lb) approx.	• Empty: 13.6 kg (30.0 lb) • Loaded: 22.5 kg (50 lb) approx.	• Empty: 16.4 kg (36.2 lb) • Loaded: 45.4 kg (100 lb) approx.	• Empty: 27.2 kg (60 lb) • Loaded: 70.5 kg (155 lb) approx.	• Empty: 33.1 kg (73 lb) • Loaded: 152 kg (335 lb) approx.
Power	• -40 V DC to -72 V DC • 110 V AC or 220 V AC • 6 A to 10 A • AC options available	• -40 V DC to -72 V DC • 100 V AC to 240 V AC	• -40 V DC to -72 V DC • 220 V AC to 240 V AC	• -40 V DC to -72 V DC • 52 A to 93 A • AC options available	• -40 V DC to -72 V DC • 90 A to 162 A • AC options available
Cooling	• Side-to-side air flow	• Side-to-side air flow	• Side-to-side air flow	• Side-to-back air flow	• Front-to-back air flow

Table 2. Alcatel-Lucent 7750 SR MDA, MDA-XP support-by-chassis type

MDA TYPE	PORTS PER MDA	CONNECTOR TYPE	SR-1	SR-c4	SR-c12	SR-7	SR-12	SR-7/SR-12 MOBILE GATEWAY
ETHERNET MDA-XPs								
1000BASE	10/20	SFP	√	√	√	√	√	√
10/100/1000BASE-TX	20	RJ-45	√	√	√	√	√	√
10/100/1000BASE-TX	48	6 x mini RJ-21	-	-	-	√	√	-
10GBASE (LAN/WAN PHY)	1/2/4	XFP	√	√ / √ / -	√ / √ / -	√	√	√
ETHERNET MDAs								
100BASE-FX	20	SFP	√	√	√	√	√	-
10/100BASE-TX	60	5 x mini RJ-21	√	√	√	√	√	-
10GBASE/1000BASE (LAN PHY)	1+10	XFP/SFP	√	-	-	√	√	-
10GBASE (tunable optics)	1	LC	√	-	-	√	√	-
HIGH SCALE MDAs								
1000BASE	10	SFP	-	-	-	√	√	-
10GBASE	1	XFP	-	-	-	√	√	-
POS MDAs								
OC-3c/STM-1c	8/16	SFP	√	√ / -	√ / -	√	√	-
OC-3c/STM-1c/OC-12c/ STM-4c (Multirate)	8/16	SFP	√	-	-	√	√	-
OC-48c/STM-16c	2/4	SFP	√	√ / -	√ / -	√	√	-
OC-192c/STM-64c	1	Simplex SC	√	-	-	√	√	-
ANY SERVICE ANY PORT (ASAP) MDAs*								
Chan. DS3/E3 ASAP	4/12	1.0/2.3 Connectors	-	√	√	√	√	-
Chan. OC-3/STM-1 ASAP	4	SFP	-	√	√	√	√	-
Chan. OC-12/STM-4 ASAP	1	SFP	-	√	√	√	√	-
CIRCUIT EMULATION SERVICE (CES) MDAs*								
Chan. OC-3/STM-1 CES	1/4	SFP	-	- / √	- / √	√	√	-
Chan. OC-12/STM-4 CES	1	SFP	-	√	√	√	√	-
ATM MDAs*								
ATM OC-3c/STM-1c/ OC-12c/STM-4c (Multirate)	4	SFP	√	√	√	√	√	-
ATM OC-3c/STM-1c	16	SFP	√	-	-	√	√	-
OTHER								
Versatile Service Module	N/A	N/A	√	-	-	√	√	-

Table 3. Alcatel-Lucent 7750 SR CMA support-by-chassis type

CMA TYPE	PORTS PER CMA	CONNECTOR TYPE	SR-c4	SR-c12
1000BASE	1/5	SFP	√	√
Chan. DS1/E1	8	RJ-48c	√	√
DS3/E3	4	1.0/2.3 Connectors	√	√
10/100BASE-TX	8	RJ-45	√	√
1000BASE	1	SFP	√	√
Chan. OC-3/STM-1 CES	1	SFP	√	√
OC-3c/STM-1c/OC-12c/STM-4c (Multirate)	2	SFP	√	√
ATM T1/E1 IMA	8	RJ-48c	√	√

Table 4. Alcatel-Lucent 7750 SR IMM support-by-chassis type

IMM TYPE	PORTS PER IMM	CONNECTOR TYPE	SR-7	SR-12	SR-7/SR-12 MOBILE GATEWAY
100GBASE	1	CFP	√	√	-
10GBASE	12	SFP+	√	√	-
10GBASE	4/5/8	XFP	√	√	- / √ / -
10/100/1000BASE	48	SFP	√	√	-
10/100/1000BASE	48	RJ-45	√	√	-

Table 5. ISA support-by-chassis type

ISA TYPE*	SR-1	SR-c4	SR-c12	SR-7	SR-12	SR-7/SR-12 MOBILE GATEWAY
Multiservice Integrated Services Adapter (MS-ISA)	-	-	-	√	√	-

* Consult the MS-ISA Data Sheet for details for application support on a given platform.

Table 6. ISM support-by-chassis type

ISA TYPE*	SR-1	SR-c4	SR-c12	SR-7	SR-12	SR-7/SR-12 MOBILE GATEWAY
Mobile Gateway Integrated Services Module (MG-ISM)	-	-	-	-	-	√

Technical specifications

Safety standards and compliance agency certifications

Safety

- EN 60590-1
- IEC 60950-1CB Scheme
- CSA/UL 60950-1 NRTL
- FDA CDRH 21-CFR 1040
- EN 60825-1
- EN 60825-1/2
- IEC 60825-1
- IEC 60825-2

EMC

- ICES-003 Class A
- FCC Part 15 Class A
- EN 300 386
- EN 55022
- EN 55024
- EN 61000-4-2
- EN 61000-4-3
- EN 61000-4-4
- EN 61000-4-5
- EN 61000-4-6
- EN 61000-4-11
- IEC CISPR22
- AS/NZS CISPR 22

Immunity

- EN 61000-3-2 Power Line Harmonics
- EN 61000-3-3 Voltage Fluctuations and Flicker
- EN 61000-4-2 Electric Static Discharge
- EN 61000-4-3 Radiated Immunity
- EN 61000-4-4 EFT
- EN 61000-4-5 Surge
- EN 61000-4-6 Low Frequency Common Immunity
- EN 61000-4-11 Voltage Dips and Sags

Telecom

- Telcordia GR-253-CORE, Issue 3
- IEEE 802.3 (Gigabit Ethernet, Ethernet)
- ANSI T1.105.03
- ANSI T1.105.06
- ANSI T1.105.09
- ANSI T1.403 (DS1)
- ANSI T1.404 (DS3)
- ITU-T G.957
- ITU-T G.825
- ITU-T G.824
- ITU-T G.823
- ITU-T G.813
- ITU-T G.707
- ITU-T G.703

Environmental

- ETS 300 019-1-1, Storage Tests, Class 1.2
- ETS 300 019-1-2, Transportation Tests, Class 2.3
- ETS 300 019-1-3, Operational Tests, Class 3.2
- ETS 300 019-2-4, pr A1 Seismic

Environmental specifications

- Operating temperature: 5°C to 40°C (32°F to 104°F)
- Operating relative humidity: 5% to 85%
- Maximum operating altitude: 4000 m (13,000 ft) at 30°C

Electronic equipment devices

- WEEE
- RoHS
- R&TTE
- China CRoHS

Certifications

- Network Equipment Building System (NEBS) Level 3
  - ¬ Telcordia GR-63-CORE, Issue 4, June 2006
  - ¬ Telcordia GR-1089-CORE, Issue 3, March 2006
  - ¬ ATT-TP-76200
- CE

Alcatel·Lucent