ALCATEL-LUCENT 7950 EXTENSIBLE ROUTING SYSTEM CORE ROUTER FAMILY

The Alcatel-Lucent 7950 XRS is the world's most powerful core router platform. Delivering unprecedented density and efficiency without compromising the versatility to support evolving traffic demands, the 7950 XRS handles the full range of service provider routing needs for years to come.

Service providers must expand their infrastructure to stay ahead of demand as the Internet experience becomes more immersive and the appetite for bandwidth expands. The scale, efficiency and versatility of core networks are critical to service provider profitability.

Fundamental innovation lies at the heart of the 7950 XRS family. It delivers 5x the typical core routing density while consuming 66% less power. The 7950 XRS offers headroom to expand IP core networks well into the 100G era and beyond, while preserving the full range of capabilities that will cost-effectively address IP routing, MPLS switching and infrastructure services needs.

FEATURES

Single platform for all services

The 7950 XRS provides a single platform to efficiently address the full range of core networking requirements: Internet routing, MPLS switching, IP peering, datacenter interconnection and infrastructure services.

Industry-leading FP3 silicon

The 7950 XRS is optimized for scaling networks at 100GE and beyond. Based on the innovative FP3 chipset, the industry's first and only 400G network processor silicon, the 7950 XRS delivers unparalleled density of 100GE interfaces and is ready for 400GE and terabit interfaces.

Proven Service Router Operating System

The 7950 XRS is based on the proven, resilient, and feature-rich Service Router Operating System (SR OS).

IP/Optical integration

The 7950 XRS incorporates tunable IPoDWDM interfaces, options for optical extension shelf capabilities, as well as cross-layer network visibility and wavelength tracking to facilitate optical integration

Operational efficiency

The 7950 XRS is fully managed by the 5620 Service Aware Manager (SAM), resulting in integrated network management across the IP core, service edge and optical transport domains of the network.

BENEFITS

Reduced power & space

Service providers save more than 50% of their power and space costs over a five year period of network growth.

Efficient scaling

Graceful scaling within a single system minimizes the cost and complexity of premature clustering, while options for multi-chassis expansion ensure even further system growth.

Alcatel·Lucent

Flexibility for superior economics

The flexibility of supporting core routing, MPLS switching and infrastructure services on a single platform with superior economics eliminates the cost and complexity of deploying single-purpose platforms.

Perfect geometry for scaling

The 7950 XRS system design captures the ideal geometry for scaling Ethernet interfaces without stranding bandwidth, ensuring that service providers get the most from their assets.

Performance and high availability

Service providers benefit from operational confidence, based on the SR OS track record of performance and high availability in more than a decade of deployments.

7950 XRS CORE ROUTER FAMILY OVERVIEW

Until now, it was assumed that cost-effective core router scaling could only be achieved by sacrificing the scope of functionality and range of capabilities.

Alcatel-Lucent leverages fundamental silicon innovation and a proven operating system to eliminate that compromise. The 7950 XRS family cost-effectively addresses service provider core routing, Internet peering, MPLS switching, datacenter interconnection and infrastructure service needs in a single platform. This achieves greater scale and higher efficiency while preserving the versatility to address current and future functionality required in Internet backbone and metro core networks.

7950 XRS-40

The Alcatel-Lucent 7950 XRS-40 provides 32 Tb/s of routing capacity in a single system. The system comprises 40 slots, each initially supporting 400 Gb/s of aggregate interface capacity.

Designed to meet the needs of today's largest Internet backbones, a single 7950 XRS-40 core router handles up to 160 100GE interfaces. This capacity exceeds the highest amount of bandwidth deployed to date in a multi-chassis service provider implementation.

The 7950 XRS-40 has been designed to accommodate Terabit Ethernet (1 Tb/s), and Alcatel-Lucent's existing technology ensures a clear path to 400GE interface modules.

The 7950 XRS-40 can be further expanded to a multi-chassis configuration that will ensure service provider scaling needs are exceeded.

7950 XRS-20

The Alcatel-Lucent 7950 XRS-20 provides 16 Tb/s of routing capacity in a single 19" rack, making it the highest capacity single-chassis core routing platform available.

With 20 slots each initially capable of 400 Gb/s of aggregate interface capacity, the system supports 10GE, 40GE, 100GE, and future 400GE interfaces without stranding system bandwidth.

The 7950 XRS-20 can support up to eighty 100GE ports in a single rack, requiring 80% less space than existing core router alternatives.

7950 XRS-20 systems can be upgraded to the 7950 XRS-40 to double the routing and interface capacity, and to multi-chassis 7950 XRS configurations for further system scaling.

7950 XRS-16c

The Alcatel-Lucent 7950 XRS-16c is optimized for meeting the core routing needs of smaller networks and regional service providers. With a routing capacity of 6.4 Tb/s, the 7950 XRS-16c initially supports up to sixteen 200 Gb/s interface modules or up to eight 400 Gb/s interface modules.

With its ability to deliver 32 100GE interfaces or 320 10GE interfaces in a single system, the 7950 XRS-16c is a compelling alternative for operators whose traffic mix and service footprint dictate a lower capacity system with all the flexibility of the other members of the 7950 XRS family.

Common elements

The 7950 XRS core router family shares fundamental attributes that ensure consistency, operational ease of use, and investment protection for service providers.

Interface modules

A broad array of 7950 XRS Media Adapters (XMA) provide interface options for the 7950 XRS, including high-density 10GE, 40GE and 100GE interface modules.

Over time, the range of interface modules and slot densities will expand, along with overall system capacity, in order to accommodate the needs of service providers while protecting their investment in 7950 XRS systems.

Silicon innovation

The 7950 XRS leverages internally-developed 400G NPU silicon to ensure optimal performance and scaling. A generational leap from commercial NPU silicon, the groundbreaking FP3 chipset enables greater interface density while drawing only a fraction of the power. Silicon innovation also drives the high level of flexibility that can be delivered by the 7950 XRS, unleashing performance for the Internet backbone and metro core without inhibiting the functionality required to operate in a full range of scenarios, including IP routing, MPLS LSR switching, infrastructure services and datacenter interconnection.

Operating system

The 7950 XRS family is based on the proven SR OS, carrying forward nearly a decade of experience and run-time in the IP networks of more than 450 service providers worldwide. With a single common OS across the Alcatel-Lucent routing portfolio, service providers benefit from an extensive track record of reliability in the field, and a full suite of features to enable resiliency, high availability and in-service software upgrades (ISSU). The 7950 XRS represents a state-of-the-art platform that benefits directly from the cumulative effort and experience of 10 prior releases of SR OS software.

Optical integration

The 7950 XRS supports tunable DWDM interfaces that integrate transponder functionality on the router, including Forward Error Correction (FEC). Tunable DWDM interfaces for 10GE and 40GE will be available as they are today on the Service Router portfolio, and 100GE DWDM interfaces are planned. Advanced Wavelength Tracker functionality enables direct power monitoring and adjustment for integrated tunable DWDM interfaces. As well, the 5620 SAM provides cross-layer visibility and common management tools to simplify operations of a converged IP and optical core network.

The 7950 XRS design also includes an Optical Extension Shelf (OES) port that will facilitate further integration with the 1830 Photonic Service Switch (PSS) DWDM/OTN platform, as part of continued efforts to optimize the overall efficiency of the core through closer integration of the IP and optical domains.

Power efficiency

In addition to superior power efficiency that results from FP3 silicon building blocks, the 7950 XRS system design incorporates key enhancements such as clock gating techniques that dynamically reduce power to system components not in use, as well as modular fans that adjust to provide appropriate cooling as needed while minimizing waste. In aggregate, key enhancements such as these enable the 7950 XRS to provide maximum power efficiency while handling increasing traffic loads and operating in a variety of core network scenarios.

Network management

The 7950 XRS core router family is fully managed under the Alcatel-Lucent 5620 SAM portfolio of network management tools, providing a powerful and common platform for managing IP/MPLS and Ethernet services from end to end. Operational tools including the 5650 Control Plane Assurance Manager (CPAM) provide additional visibility and flexibility in monitoring and scenario planning for the control plane of the IP core network. The 5620 SAM also manages key elements of the Alcatel-Lucent optical portfolio, enabling consistent operational views across the IP and DWDM elements of an optimized core.

Feature and protocol support

Protocol support within the 7950 XRS family includes (but is not limited to):

- IPv4 and IPv6 unicast and multicast routing and forwarding
- BGP, IS-IS, OSPF, and PIM routing protocols
- MPLS Label Edge Router (LER) and Label Switching Router (LSR) functions
- LDP and RSVP for MPLS Signaling and Traffic Engineering, including Point-to-Point and Multipoint LSPs
- Point-to-Point Ethernet VLLs, Multipoint Ethernet VPLS and IP VPNs for use in delivering core infrastructure services
- uRPF, RADIUS/TACACS+, and comprehensive control plane protection features for security
- Management via CLI, and SNMP MIBs in addition to comprehensive support through the Alcatel-Lucent 5620 SAM
- Extensive OA&M features including Ethernet CFM (802.1ag, Y.1731), EFM (802.3ag), TWAMP and a full suite of MPLS OAM tools
- Bi-directional Fault Detection (BFD)
- Intelligent packet classification, queue servicing, policing and buffer management
- Industry-leading high availability (including non-stop routing, non-stop services, ISSU)

7950 XRS system specifications

7950 XRS MODEL	SYSTEM CAPACITY	SYSTEM INTERFACE SLOTS	100GigE CAPACITY	SYSTEM EXPANSION	STANDARD 19" RACKS
7950 XRS-40	32 Tb/s	40	160	Multi-Chassis	2
7950 XRS-20	16 Tb/s	20	80	7950 XRS-40 and Multi-Chassis	1
7950 XRS-16c	6.4 Tb/s	16	32	Standalone	1

7950 XRS TECHNICAL SPECIFICATIONS

Common equipment

Engineered for reliability and efficiency in delivering unmatched capacity, common components of the Alcatel-Lucent 7950 XRS consist of:

Chassis Control Module (CCM) for 7950 XRS-40 and 7950 XRS-20

Redundant CCMs support operator access to the Alcatel-Lucent 7950 XRS-40 and 7950 XRS-20 control and management interfaces. Each CCM has an LCD touch-screen display and supports interfaces for timing, management, alarms, memory and Optical Extension Shelf (OES) support.

Power Equalization Module (PEQ)

PEQs provide the DC power for the 7950 XRS. PEQs support cost-effective modular expansion so that additional, redundant power and PEQs can be added to the chassis as required.

Fan Trays

Fan trays provide system cooling for the 7950 XRS. Redundant fans have dedicated controllers, and fan speed is linearly modulated to allow for the optimal balancing of cooling, power, and noise.

Switch Fabric Module (SFM)

SFMs enable the line-rate connectivity between all slots of the 7950 XRS chassis. The fabric cards are N+1 redundant and fully active at all times. SFMs are designed to support upgrades of the 7950 XRS-20 to the 7950 XRS-40, as well as upgrades of the 7950 XRS-20 and 7950 XRS-40 into multi-chassis 7950 XRS systems.

Control Processor Module (CPM)

CPMs provide the management, security, and control plane processing for the Alcatel-Lucent 7950 XRS. Redundant CPMs operate in a hitless, stateful, failover mode. Central processing and memory are intentionally separated from the forwarding function on the interface modules to ensure utmost system resiliency.

7950 XRS interface cards

INTERFACE SPEED	XMA CARD & DENSITY
100GigE	4-port XMA 2-port XMA
40GigE	10-port XMA 5-port XMA
10GigE	40-port XMA 20-port XMA

Interface modules

The Alcatel-Lucent 7950 XRS uses a pair of complementary modules to support current and future interfaces: the XMA Control Module (XCM) and the 7950 XRS Media Adapter (XMA). Designed to evolve to 2 Tb/s per module, the XCM provides connectivity to the system fabric via the mid-plane, initially supporting 800 Gb/s for the 7950 XRS-40 and 7950 XRS-20 systems; and 400 Gb/s for the 7950 XRS-16c. The 800 Gb/s XCM can support a pair of 400G XMAs or 200G XMAs in the 7950 XRS-40 and 7950 XRS-20; and the 400 Gb/s XCM can support a single 400G XMA or a pair of 200G XMAs in the 7950 XRS-16c. Each provides Ethernet physical interfaces ranging from 10GE to 100GE and beyond.

XMA module design integrates Alcatel-Lucent's distributed packet processing and traffic management engines for the industry's most advanced, flexible, and power-efficient forwarding plane. Together, the XCM and XMAs deliver the full complement of

Alcatel-Lucent SR OS capabilities for core routing, IP peering (both interconnect and multicast functions), route reflectors, MPLS LSR switching, datacenter interconnection, and infrastructure services.

The flexibility and modularity of XCMs and XMAs allow service providers to granularly configure each Alcatel-Lucent

7950 XRS with its desired range of Ethernet interfaces to meet the demands of growing core networks supporting video, data, wireless and cloud-based services. The Alcatel-Lucent 7950 XRS is a future-proof investment, with maximum flexibility and lower overall total cost of ownership for service providers.

7950 XRS system dimensions

7950 XRS MODEL	DIMENSIONS*	WEIGHT*
7950 XRS-40	Height: 173.4 cm (68.25 in.) Width**: 89.2 cm (35.1 in.) Depth: 91.4 cm (36 in.)	929.2 kg (2000 lb)
7950 XRS-20	Height: 173.4 cm (68.25 in.) Width: 44.6 cm (17.55 in.) Depth: 91.4 cm (36 in.)	454.6 kg (1000 lb)
7950 XRS-16c	Height: 126.7 cm (49.9 in.) Width: 44.6 cm (17.5 in.) Depth: 74.9 cm (29.5 in.)	329.6 kg (725 lb)

* Weights and dimensions are approximate and subject to change. Refer to the appropriate Installation Guide for the current weights and dimensions.
** Denotes two standard 19" racks.

Alcatel·Lucent