Nokia 7750 SR-s Service Router

Release 26

The Nokia 7750 SR-s series of ultra-high-performance IP edge and core routers delivers superior speed, capacity, scalability, and energy efficiency. Designed for modern, dynamic IP networks, it combines flexible capabilities, robust security, and advanced automation tools to meet the demands of evolving telecommunication providers, AI and cloud providers, and mission-critical enterprise environments.

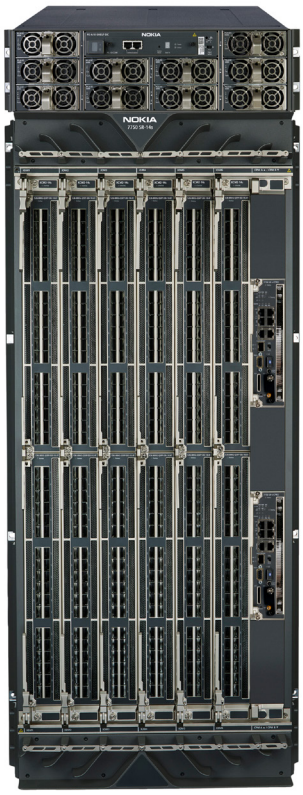
Overview

Powered by Nokia's FP5 and FP4 routing silicon, the Nokia 7750 SR-s is purpose-built to meet the demands of next-generation IP networks, delivering exceptional performance, scalability, energy efficiency, security, and automation, along with a proven track record of investment protection.

At the heart of the Nokia 7750 SR-s is fully programmable Nokia FP routing silicon, which provides deterministic performance and enables support for diverse deployment needs. This enables the platform to meet the requirements of demanding applications while delivering predictable performance under all operating conditions.

With platforms scaling from 2.4 Tb/s full duplex (FD) to 216 Tb/s FD, and up to 230 Tb/s with intelligent aggregation (IA), the Nokia 7750 SR-s supports a wide range of connector speeds and optics. This includes 800G QSFP-DD, 800G QSFP112, 400G QSFP-DD, 400G QSFP112, 200G SFP-DD, and 100G QSFP28, as well as flexible 100G, 400G, and 800G breakout options.

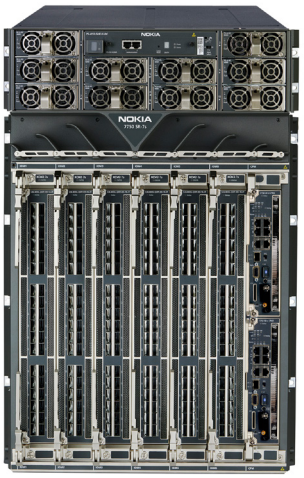
To protect against escalating security threats, the Nokia 7750 SR-s embeds robust security measures across all aspects of the data path without compromising router performance. This includes enhanced IEEE 802.1AE quantum-safe MACsec/ ANYsec line-rate network cryptography, as well as precise IP payload filtering to effectively mitigate Distributed Denial of Service (DDoS) attacks.



7750 SR-14s



7750 SR-2se



7750 SR-7s



7750 SR-2s



7750 SR-1se



7750 SR-1s

Leveraging the backward compatibility of Nokia FP5, the Nokia MDA2-s adapter family enhances FP4-based systems with seamless integration of 800GE interfaces and enhanced IEEE 802.1AE quantum-safe MACsec (ANYsec) cryptography, enabling operators to scale capacity, enhance security, and accelerate service delivery without requiring forklift upgrades.

Leveraging the feature-rich capabilities of the Nokia Service Router Operating System (SR OS), the versatile Nokia 7750 SR-s supports a full range of demanding IP routing applications, including edge, core, peering, data center gateway, broadband gateway, and multi-access aggregation.

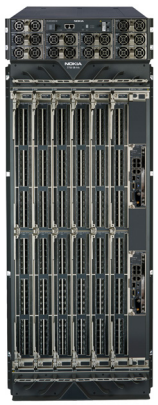
Speed and capacity

There are six system variants in the Nokia 7750 SR-s product family: the FP4-enabled 7750 SR-1s and 7750 SR-2s; the FP5-enabled 7750 SR-1se and 7750 SR-2se; and the 7750 SR-7s and 7750 SR-14s, which support a full concurrent mix of FP4 and FP5 silicon. Table 1 outlines the platform form factors, speeds and capacities.

Table 1. 7750 SR-s platform overview





	7750 SR-1s	7750 SR-1se	7750 SR-2s	7750 SR-2se	7750 SR-7s	7750 SR-14s
Height and depth	3RU; 67.79 cm (26.69 in)	3RU; 67.79 cm (26.69 in)	5RU; 81.38 cm (32.04 in)	5RU; 80.26 cm (31.6 in)	16 or 17RU; 85.8 cm (33.8 in)	27 or 28RU; 87.9 cm (34.6 in)
System configuration: Full duplex (FD)	Fixed: 2.4 Tb/s, 4.8 Tb/s; Modular: 3 Tb/s	Fixed	2 slots, modular	2 slots, modular	6 slots, modular	12 slots, modular
Fabric, control	Integrated, simplex	Integrated, simplex	Integrated, control redundant	Fabric & control redundant	Fabric & control redundant	Fabric & control redundant
System capacity (FD)	Up to 4.8 Tb/s	19.2 Tb/s	9.6 Tb/s	36 Tb/s	108 Tb/s	216 Tb/s
Line rate slot forwarding (FD)	Up to 4.8 Tb/s	19.2 Tb/s	4.8 Tb/s	18 Tb/s	18 Tb/s	18 Tb/s
Line rate port density: 800G/400G 100G/10G	2 / 12 48 / 360	24 / 48 192 / 360	4 / 24 96 / 720	36 / 84 360 / 720	108 / 252 1080 / 2160	216 / 504 2160 / 4320
Intelligent aggregation (IA) capacity (FD)	12 Tb/s	All ports to 19.2 Tb/s line rate	24 Tb/s	38.4 Tb/s	115.2 Tb/s	230.4 Tb/s
IA slot forwarding (FD)	12 Tb/s	All ports to 19.2 Tb/s line rate	12 Tb/s	19.2 Tb/s	19.2 Tb/s	19.2 Tb/s
IA port density: 800G/400G/ 100G/10G	2 / 24 120 / 360	All ports to 19.2 Tb/s line rate	4 / 48 240 / 720	48 / 96 384 / 720	144 / 288 1152 / 2160	288 / 576 2304 / 4320
Common parts			FP4 line cards	FP5 line cards	FP4 and FP5 line cards	
					Switch Fabric Modules (SFMs) and fans	
	Power supply units (PSUs)					

All platforms support 10GE to 800GE interfaces with full breakout options and a wide variety of compatible optics. Please refer to the Nokia 7750 SR-s XMA2-s, 7750 SR-s XMA-s, 7750 SR-s IOM2-se, 7750 SR-s MDA-se, 7750 SR-s IOM-s, 7750 SR-s MDA2-s and 7750 SR-s MDA-s data sheets for more details on line card variants. Optical breakout options include 4 x 10G, 8 x 10G, 10 x 10G, 4 x 25G, 2 x 100G, 4 x 100G, 2 x 400G and 8 x 100G. This is all provided within the same product family, in licensable platforms ranging from 0.8 Tb/s FD to 216 Tb/s FD.

Energy efficiency

Reduce energy use without compromising performance

The energy-efficient design of the Nokia 7750 SR-s makes IP networks more sustainable through reduced emissions. With power density optimization, a best-in-class mechanical design for optimal cooling, 112G SERDES, integrated memories and smaller silicon geometries, an FP5-based system consumes 75% less energy than an FP4-based system and delivers typical energy efficiency in the order of 0.1W/Gig in chassis-based systems. Even more, with FP silicon, performance is always deterministic.

This energy efficiency is realized with full features enabled while concurrently being fully buffered on both ingress and egress, with line rate memories on buffers and tables. With FP5 silicon, there is no compromising router performance or minimizing features to achieve this level of energy efficiency. The line card design of the Nokia 7750 SR-s dynamically scales energy consumption based on licensing levels and connectors in use. This significantly reduces energy use when only a fraction of a line card is in use. With multiple license configurations and line card/system options, operators have the flexibility to ideally dimension network locations for energy use, performance, capacity and speed to achieve sustainability and networking requirements.

System efficiency

The mechanical and thermal design of the Nokia 7750 SR-s is focused on enabling operators to maximize the density and usability of coherent optics. Today's coherent optics, such as 400G and 800G ZR/ZR+, can consume power above 20W and are a challenge to cool in data center-focused router designs. The design of the 7750 SR-s line cards and systems allows for a full set of coherent 400G and 800G ZR/ZR+ optics in all cages without restrictions or fan algorithm changes.

The Nokia 7750 SR-s supports 400G ZR, 400G ZR+, 800G ZR, and 800G ZR+ coherent pluggable transceivers in both QSFP112-DD and QSFP56-DD form factors, delivering optimal density and performance for data center interconnect, metro and regional access, edge, and core network applications.

Leveraging 112G SERDES technology, the Nokia 7750 SR-s unlocks the energy efficiency advantages of next-generation optics. 800G QSFP-DD optics save in the order of 25 to 43 percent of the optical energy budget compared to using two 400G QSFP-DD optics. It supports 800G QSFP-DD, 800G QSFP112, 400G QSFP-DD, 400G QSFP112 and 200G SFP-DD optics. As systems densify, optics become a larger part of overall system energy use and the energy savings behind next-generation optics quickly becomes compelling.

For greater energy efficiency, 7750 SR-s systems support intelligent power-management capabilities. For example, pre-installed optics on line cards can remain in a low-power state, reducing energy use while enabling staged service activation per port in the future. During periods of low traffic, the switch-fabric capacity on chassis-based systems can be scaled down to further reduce energy consumption. Operators can also lower power consumption by disabling inactive or provisioned components that are not in use.

FlexE 2.0 is supported for super-rating and bonding. This support enables the bonding of 4 x 400GE interfaces to create a single interface with the full 1.6 Tb/s bandwidth available to the 7750 SR-s. It can also help further drive system-level efficiencies by mitigating the inefficiencies associated with link aggregation group (LAG) hashing.

In combination, these capabilities provide a future-ready set of functions to deliver investment protection over the long term.

Flexible capability

Network processor-based architecture

Every generation of Nokia FP silicon has been based on an NP design. A Nokia NP offers the highest degree of flexibility and programmability in the industry. With a fully programmable data path and zero hard-coded logic, FP silicon is fully upgradable to new hardware-based performance standards with a simple software update. The value of a fully upgradable data path has been shown over several generations of FP deployments, where segment routing (SR), Ethernet virtual private network (EVPN) and IEEE 1588 Precision Time Protocol (PTP) edge timestamping have been activated in hardware without the need for hardware swaps on silicon delivered before these standards were conceived. With uncertainty around future evolving network standards, an NP-based architecture delivers the lowest TCO compared to any other chipset architecture on the market.

Deterministic performance: Tables, buffers and QoS

The NP architecture of FP silicon has been designed to be fully deterministic across tables and buffering under all network loading conditions. Nokia-designed smart memories for tables and line rate buffer memories make this design possible, allowing high-scale routing with full access control lists (ACLs) and services with no performance trade-off. This enables certainty at full scale and under real-world network conditions from Day 1 through Year 10 and beyond. A line rate memory system will always outperform a non-line rate memory system under all network loading conditions—without exception.

Full buffering for ingress as well as egress data combined with packet pre-classification and pre-buffering ensures superior performance for all critical flows. This guarantees the traffic that matters most regardless of port configuration, microbursting or network congestion. Our FP NPs support all necessary QoS features, from basic to advanced, in a highly granular way. They support a full set of QoS with up to 16 queues per service, five-layer hierarchical QoS (H-QoS), and an industry-leading total number of queues and policers. QoS capabilities provide tremendous capability for broadband network gateway (BNG) and quad-play services but can equally be scaled to deliver optimized, lean performance.

Pay-as-you-grow licensing

The flexible pay-as-you-grow licensing model for hardware capacity and functions provides a choice of entry points for immediate requirements and the ability to scale in-place for evolving needs without hardware changes. Throughput rates are also available where capacity can be scaled down, lowering power consumption proportionally, and to provide the right power, performance and port mix in the most economical way.

In-service SR OS right to use (RTU) licenses can be activated with many pay-as-you grow license options, ensuring that performance and port capacity are not constrained by maintenance windows.

Platform versatility

Demanding network roles demand in-house silicon. The Nokia 7750 SR-s provides a common platform to support the full array of IP applications without performance compromises. Leading SR OS capabilities combined with licensing and line card modularity provides complete configuration versatility to support multiple, demanding network roles with deterministic performance on a single platform. Extensible hardware and SR OS feature licensing allows each 7750 SR-s system to be tailored to meet exact networking requirements in the most economical way.

For telecommunication providers, the Nokia 7750 SR-s is deployed in WAN, data center and aggregation networks to support IP edge, core, peering, data center gateway/interconnect, broadband edge gateways (Multi-Access Gateway (MAG), Broadband Network Gateway (BNG) and Fixed-Wireless Gateway FWG)), IPsec gateway and multi-access IP aggregation applications.

For AI and cloud providers looking to maximize application performance, the Nokia 7750 SR-s supports IP edge, data center gateway/interconnect, core and peering applications. For mission-critical enterprises, the 7750 SR-s provides high-performance IP routing, including connectivity to the data center, internet and WAN applications.

Service richness

Nokia's feature-rich, 64-bit SR OS addresses the full spectrum of IP routing requirements. With comprehensive QoS, IP/MPLS, SR and model-driven management features, the Nokia 7750 SR-s has the service capabilities and tools to meet the most stringent SLAs and deliver the highest end-user quality of experience (QoE). The 7750 SR-s supports hundreds of thousands of IP flows and access control lists (ACLs) with high performance at scale, even when multiple processing-intensive features are enabled concurrently. It supports advanced push-based telemetry models to stream flow-level data and insights in near-real time for network assurance and DDoS security.

Leveraging SR OS, the Nokia 7750 SR-s supports value-added services and network functions through the 7750 SR Extended Services Appliance (ESA), including application assurance (AA), Layer 7 stateful firewall, Carrier Grade - Network Address Translation (CG-NAT) and IPsec gateways.

The Nokia 7750 SR-s supports multi-dimensional table scaling where IP, MPLS, ACL and MAC addresses can all scale concurrently. Tables can all grow simultaneously and concurrently, allowing the true potential of network designs to be unleashed without constraint. Trading off scale in one dimension for another is a recipe for compromise and will constrain network growth over the long term.

Intelligent aggregation

Intelligent aggregation allows the Nokia 7750 SR-s to cost-effectively aggregate port capacity beyond the forwarding capacity of a line card in a deterministic way while guaranteeing QoS and packet priority. The 7750 SR-s supports up to 19.2 Tb/s (FD) per slot of intelligent aggregation, enabling it to collapse the pre-aggregation layer or expand port availability without adding line cards. This capability significantly reduces the number of network elements for power savings and can deliver savings in the order of one-third the cost of a traditional leaf/spine topology, resulting in significantly lower TCO from both CAPEX and OPEX savings. This is all possible without increased power or feature trade-offs.

IP network security

DDoS mitigation

Nokia Deepfield Defender in combination with the Nokia 7750 SR-s can mitigate 100 percent of all DDoS attacks in-band at the edge of the network without the need to redirect any traffic to a scrubbing center. The solution is uniquely enabled by the massive filtering scale and performance in FP silicon that allow the 7750 SR-s to act as highly precise attack sensor and mitigation element without compromising the performance of any function or service running on it.

Security policies are continuously monitored and tuned using Nokia SR OS telemetry from the Nokia 7750 SR-s. With automated workflows in Deepfield Defender, tens of thousands of ACL filters are updated in seconds to respond to changing security conditions without delay. The filters associated with DDoS mitigation are signature ACLs. These are ACLs beyond typical 5-tuple ACLs that only serve to complete DDoS attacks by impacting all traffic. Signature-based ACLs provide surgical payload-level inspection capabilities at line rate to truly filter out DDoS traffic in a cost-effective way.

IP network cryptography

Network security can no longer be an afterthought in IP network design and deployment. Network operators must move toward a holistic approach of end-to-end quantum-safe network security.

As part of our multi-layer defense-in-depth IP cryptography, we deliver on networking requirements to provide end-to-end secure and trusted quantum-safe network connectivity. The Nokia 7750 SR-s supports IEEE 802.1AE MACsec and the MAC Security Key Agreement 802.1X protocol (combined with quantum-safe pre-shared key cryptography), to deliver quantum-safe network connectivity.

To extend our defence-in-depth IP cryptography capabilities, we have enhanced IEEE 802.1AE MACsec, which we call ANYsec. It delivers universal line rate MACsec and ANYsec encryption across L2, L2.5, and L3 on all connectors and all speeds from 10 Gb/s to 1.6 Tb/s. Additionally, it extends hardware low-latency secure and trusted quantum-safe network connectivity to MPLS- and IP-based flows.

ANYsec runs hop-by-hop or end-to-end, and can be extended to any network topology at scale. ANYsec interworks with legacy network equipment and can be added as a network overlay.

In addition to securing internal network links and connections, ANYsec offers a valuable, revenue-generating option for new services. It can significantly increase the competitiveness and operational efficiency of network solutions, speeding the velocity of deployment and delivering quantum-safe network connectivity today.

Network automation

Model-driven management

To simplify and automate network operations, the Nokia 7750 SR-s enables model-driven management of network elements through the Nokia SR OS. YANG-based data modeling delivers the foundation for programmability, and model-driven interface support includes NETCONF, gRPC (gNMI and gNOI) and model-driven CLI (MD-CLI). The Nokia Network Services Platform (NSP) also supports these interfaces using YANG models to customize automation for operational use cases.

SDN integration and automation

The Nokia 7750 SR-s and the programmability of the Nokia SR OS enable multivendor software-defined networking (SDN). Control integration is enabled through OpenFlow, the Path Computation Element Protocol (PCEP), and model-driven network element management.

In combination with the Nokia NSP, the Nokia 7750 SR-s can be deployed to introduce scalable and integrated SDN control across IP, MPLS, Ethernet and optical transport layers. The NSP delivers best-in-class SDN capabilities for multi-layer, cross-domain, multi-technology and coordinated management of IP and optical assets. The NSP supports unified service automation and network optimization with comprehensive path computation capabilities to enable source-based routing and traffic steering with SR support, online traffic engineering and resource optimization, and elastic bandwidth services for dynamic cloud applications.

Hardware overview

The Nokia 7750 SR-s is available in six variants and, along with the 7750 SR Extended Services Appliance (ESA) and 7210 Service Access Switch (SAS) satellites, supports a wide range of hardware assemblies. The modular architecture of the chassis-based systems enables exceptional design versatility and investment protection. The function and capabilities of the 7750 SR-s adapters, modules and systems are described as follows and shown in figure 1. Table 2 provides the hardware specifications for each 7750 SR-s system. All equipment adapters and modules are hot swappable and field replaceable to maximize system uptime.

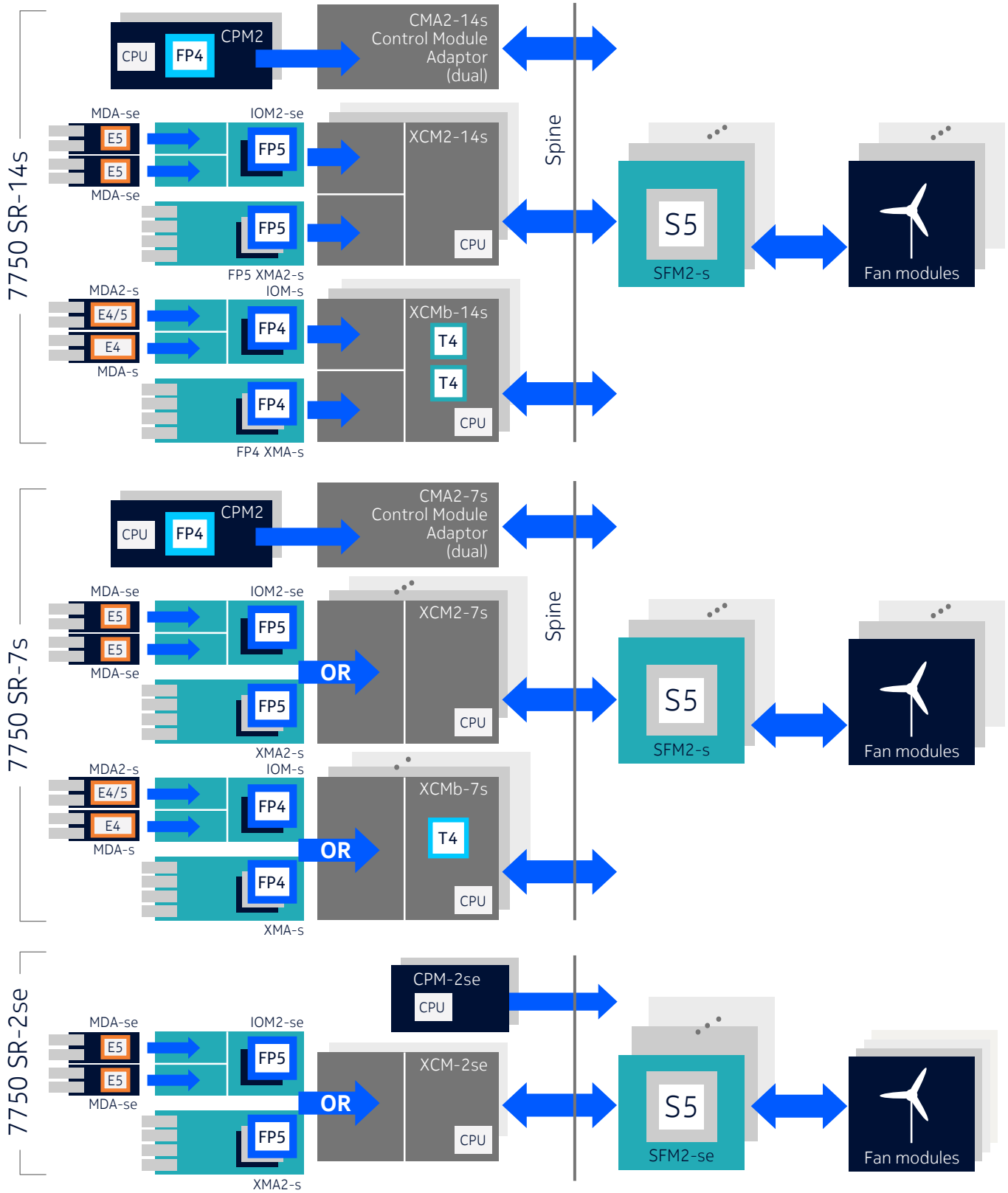
eXpandable Media Adapter-s (XMA-s/XMA2-s)

The Nokia XMA-s contains the forwarding complex that performs typical functions such as IP/MPLS routing, packet lookups, traffic classification, processing and forwarding, service enablement and QoS. It also provides specific interface ports, physical media and optical functions. The XMA-s is available in 1.2 Tb/s FD, 2.4 Tb/s FD, 3.6 Tb/s FD and 4.8 Tb/s FD capacity variants and is licensable from 0.6 Tb/s FD to 4.8 Tb/s FD with 100G QSFP28 and 400G QSFP-DD connector options. The Nokia XMA2-s is available in 3 Tb/s FD, 6 Tb/s FD, 12 Tb/s FD and 18 Tb/s FD capacity variants and is licensable from 2.4 Tb/s FD to 18 Tb/s FD and supports port options of 400G QSFP112, and 800G QSFP-DD. Both the XMA-s and the XMA-2s support several pay-as-you-grow licensable configurations.

Input/Output Module-s (IOM-s/IOM2-se)

The Nokia IOM-s contains the forwarding complex that performs typical functions such as IP/MPLS routing, packet lookups, traffic classification, processing and forwarding, service enablement and QoS. Available in 1.5 Tb/s FD and 3.0 Tb/s FD capacity variants, the IOM-s is licensable in capacities ranging from 0.8 Tb/s FD to 3.0 Tb/s FD. The Nokia IOM2-se is available in 3.0 Tb/s FD and 6.0 Tb/s FD capacity variants and is licensable in capacities ranging from 1.6 Tb/s FD to 6.0 Tb/s FD. The IOM-s and IOM2-se equips up to two pluggable Media Dependent Adapter-s (MDA-s/MDA2-s/MDA-se) types and supports several pay-as-you-grow licensable configurations.

Figure 1. 7750 SR-s modular hardware architecture



Media Dependent Adapter-s (MDA-s/MDA2-s/MDA-se)

The Nokia MDA series delivers unparalleled modular interface connectivity, designed to meet diverse network demands with maximum flexibility and performance. The Nokia MDA-s supports a broad range of cutting-edge optics and physical media, including 400G QSFP-DD, 100G QSFP28, 100G SFP-DD, and CFP2-DCO variants, empowering operators to tailor deployments across metro, edge, and core environments. Building on these capabilities, the Nokia MDA2-s offers three versatile variants with 800G QSFP-DD, 100G SFP112, and 100G QSFP28 connectors, delivering high-capacity, energy-efficient optical functions optimized for scaling IP networks. In addition, the Nokia MDA-se extends this flexibility with support for 800G QSFP-DD, 400G QSFP112, 200G SFP-DD, and CFP2-DCO variants, providing advanced media and optics options that enable next-generation network architectures with seamless modularity and unmatched adaptability.

XMA Control Module-s (XCM-s/XCM2-s/XCM-2se/XCM-b)

Each Nokia XMA and IOM is equipped in an appropriate Nokia XCM. Each XCM-s variant contains a slot-level control plane subsystem and is the system fabric interface card for the XMA-s, XMA2-s, IOM-s and IOM2-se. The XCM-b, which accepts FP4-based XMA-s and/or IOM-s cards, is used when a system is required to co-exist with FP5-based XCM2-s adapters.

Switch Fabric Module-s (SFM-s/SFM2-s)

The Nokia SFM-s enables line rate connectivity among all slots of a 7750 SR-2se, SR-7s and SR-14s system. SFM and XCM cards mate together via orthogonal direct cross-connect to eliminate the need for a backplane/midplane, providing upgradability beyond classic system designs. Fabrics are cell based, avoiding the head of line (HoL) blocking that comes with packet-based fabrics, and support graceful degradation. The SFM-s interconnects with the XCM-s. The SFM2-s interconnects with the XCM2-s or XCM-b.

Control Processor Module-s (CPM-s/CPM2-s)

A Nokia CPM provides configuration, management, security and control plane processing. It can be deployed in a simplex or redundant configuration in systems that allow for redundancy. Redundant CPM configurations allow for a hitless, stateful failover with full nonstop routing and nonstop services.

CPM management adapter (CMA-s/CMA2-s)

A Nokia CMA provides a pluggable interface for one or more CPMs to be equipped in a 7750 SR-7s or SR-14s.

Nokia 7750 SR-2se

The Nokia FP5-based 7750 SR-2se is two-slot, redundant system that scales from 2.4 Tb/s FD to 36 Tb/s FD. It is designed to accept the same FP5-based XMA2-s and IOM2-se/MDA-se line cards as the SR-7s and SR-14s. In the compact configuration, using two switch fabric modules, it supports up to 6.0 Tb/s FD per slot for a system capacity of 12 Tb/s FD, 38.4 Tb/s FD with IA. It is upgradeable to the full configuration. In the full configuration, with four switch fabric modules, it supports up to 18 Tb/s FD per slot for a system capacity up to 36 Tb/s FD, 38.4 Tb/s FD with IA.

Nokia 7750 SR-2s

The Nokia FP4-based 7750 SR-2s is a two-slot redundant systems that scales from 0.6 Tb/s FD to 9.6Tb/s FD, 24 Tb/s FD with IA. It is designed to accept the same FP4-based XMA-s and IOM-s/MDA-s line cards that are supported on the 7750 SR-7s and SR-14s.

Nokia 7750 SR-1se

The Nokia FP5-based 7750 SR-1se is a fixed form factor system that scales from 9.6 Tb/s FD to 19.2 Tb/s FD with simplex control.

Nokia 7750 SR-1s: Fixed and modular variants

The Nokia FP4-based 7750 SR-1s is available in two fixed form factors ranging in capacity from 1.6 Tb/s FD to 4.8 Tb/s FD and also in a modular variant. The modular platform is available in capacities ranging from 1.6 Tb/s FD to 3.0 Tb/s FD and accepts two MDA-s pluggable adapters. All three systems support a simplex control plane.

Power

The Nokia 7750 SR-7s and SR-14s implement a building-block approach to power with a decoupled power subsystem design. LVDC, AC or HVDC power types are available via a clip-on power shelf that can be flexibly changed and spared independent of the main chassis. The SR-1s, SR-1se, SR-2 and SR-2se have an integrated power shelf. All 7750 SR-s systems share common LVDC and AC/HVDC power supply units (PSUs).

Nokia 7750 SR Extended Services Appliance (ESA)

The Nokia 7750 SR-s is supported by the Nokia 7750 SR ESA to offer value-added services and network applications external to the 7750 SR-s.

Nokia 7210 SAS and 7250 IXR satellites

The Nokia 7750 SR-s is supported by the Nokia 7210 SAS and 7250 IXR satellite systems to offer GE to 100GE port extension external to the 7750 SR-s.

Technical specifications

Table 2. Hardware specifications for 7750 SR-s systems

	7750 SR-1se 7750 SR-1s	7750 SR-2se 7750 SR-2s	7750 SR-7s	7750 SR-14s
System architecture	SR-1se: Centralized; fixed connectors SR-1s: Centralized; fixed and modular variants	SR-2se: Orthogonal direct cross-connect; redundant control and fabric SR-2s: Centralized; control redundant	Orthogonal direct cross-connect; redundant control and redundant fabric	Orthogonal direct cross-connect; redundant control and redundant fabric
System capacity (FD; max)	SR-1se: 19.2 Tb/s SR-1s: 4.8 Tb/s	SR-2se: 36 Tb/s SR-2s: 9.6 Tb/s	108 Tb/s	216 Tb/s
Per-slot line rate capacity (FD; max)	SR-1se: 19.2 Tb/s SR-1s: 4.8 Tb/s	SR-2se: 18 Tb/s SR-2s: 4.8 Tb/s	18 Tb/s with XCM2-s/SFM2-s 4.8 Tb/s with XCM-s/SFM-s	18 Tb/s with XCM2-s/SFM2-s 4.8 Tb/s with XCM-s/SFM-s
Per-slot IA capacity (FD; max)	SR-1se: N/A. All ports to line rate. SR-1s: 12 Tb/s	SR-2se: 19.2 Tb/s SR-2: 12 Tb/s	19.2 Tb/s with XMA2 12 Tb/s with XMA	19.2 Tb/s with XMA2 12 Tb/s with XMA
Line card slots	1	2	6	12
Line card adapters and modules (hot swappable)	SR-1se: Integrated with fixed connectors SR-1s: Fixed: integrated with fixed connectors; Modular: IOM-s/MDA-s and MDA2-s	SR-2se: XMA2-s, IOM2-se/MDA-se SR-2s: XMA-s, IOM-s/MDA-s and MDA2-s	XMA-s, XMA2-s IOM-s/MDA-s and MDA2-s, IOM2-se/MDA-se	XMA-s, XMA2-s IOM-s/MDA-s and MDA2-s, IOM2-se/MDA-se
System modules (hot swappable)	SR-1se: PSU, fan SR-1s: Fixed: PSU, fan; Modular: MDA, PSU, fan	SR-2se: XMA, XCM, SFM, CPM, PSU, fan SR-2s: XMA, XCM, CPM, PSU, fan	XMA, IOM, MDA, XCM, SFM, CPM, PSU, fan	XMA, IOM, MDA, XCM, SFM, CPM, PSU, fan
Cooling	Front to back. Optional filter kit available.	Front to back. Optional filter kit available.	Front to back. Optional filter kit available.	Front to back. Optional filter kit available.
Dimensions	SR-1se: 3RU, includes integrated power shelf • Height: 13.33 cm (5.25 in) • Width: 44.45 cm (17.5 in) • Depth: 67.79 cm (26.69 in) SR-1s: 3RU, includes integrated power shelf • Height: 13.33 cm (5.25 in) • Width: 44.45 cm (17.5 in) • Depth: 67.79 cm (26.69 in)	SR-2se: 5RU, includes integrated power shelf • Height: 22.02 cm (8.67 in) • Width: 48.26 cm (19 in) • Depth: 80.26 cm (31.6 in) SR-2s: 5RU, includes integrated power shelf • Height: 22.23 cm (8.75 in) • Width: 44.45 cm (17.5 in) • Depth: 81.38 cm (32.04)	• 13RU + 3RU (LVDC) or 4RU (AC/HVDC) power shelf • Height: – 16RU – 71.1 cm (28 in) – 17RU – 75.6 cm (29.75 in) • Width: 44.45 cm (17.5 in) • Depth: 85.8 cm (33.8 in)	• 24RU + 3RU (LVDC) or 4RU (AC/HVDC) power shelf • Height: – 27RU – 119.9 cm (47.2 in) – 28RU – 124.5 cm (49 in) • Width: 44.45 cm (17.5 in) • Depth: 87.9 cm (34.6 in)
Weight	SR-1se: • Loaded: 51.7 kg (114.1 lb); excludes optics SR-1s: Fixed system (max) • Loaded: 50.3 kg (111 lb); excludes optics Modular system (max) • Loaded: 49.5 kg (109.2 lb); excludes optics	SR-2se: • Loaded: 102.06 kg (225 lb); excludes optics SR-2s: • Loaded: 102.06 kg (225 lb); excludes optics	Loaded: 214.8 kg (473.6 lb); excludes power shelf and optics	Loaded: 369.0 kg (815.7 lb); excludes power shelf and optics
Power	• LVDC: -48 V/-60 V, 80 A max per feed • HVDC: 260-400 V DC, 12 A max per source • AC: 200 V–240 V AC, 50 Hz/60 Hz, 16 A per feed • N+N redundancy • Integrated 1RU power shelf	• LVDC: -48 V/-60 V, 80 A max per feed • HVDC: 260-400 V DC, 12 A max per source • AC: 200 V–240 V AC, 50 Hz/60 Hz, 16 A per feed • N+N redundancy • Integrated 1RU power shelf	• LVDC: -48 V/-60 V, 80 A max per feed • HVDC: 260-400 V DC, 12 A max per source • AC: 200 V–240 V AC, 50 Hz/60 Hz, 16 A per feed • N+N redundancy • Common power shelf with the SR-14s	• LVDC: -48 V/-60 V, 80 A max per feed • HVDC: 260-400 V DC, 12 A max per source • AC: 200 V–240 V AC, 50 Hz/60 Hz, 16 A per feed • N+N redundancy • Common power shelf common with the SR-7s

Table 3. Nokia 7750 SR-s maximum density

Ethernet speed | Connector	7750 SR-1se 7750 SR-1s	7750 SR-2se 7750 SR-2s	7750 SR-7s	7750 SR-14s
800G | QSFP-DD	SR-1se: 24 SR-1s: 2	SR-2se: 36/48* SR-2s: 4	108/144*	216/288*
400G | QSFP-DD	SR-1se: 48 SR-1s: 12/24*	SR-2se: 84/96* SR-2s: 24/48*	252/288*	504/576*
100G | QSFP28	SR-1se: 192 SR-1s: 48/120*	SR-2se: 360/384* SR-2s: 96/240*	1080/1152*	2160/2304*
25G | 100G QSFP28 (via 4 x 25G breakout with FP5)	SR-1se: 144 SR-1s: —	SR-2se: 288 SR-2s: —	864	1728
10G | 100G QSFP28 (via 10 x 10G breakout)	360	720	2160	4320
10G/25G/50G/100G | SFP-DD**	SR-1se: — SR-1s: 32	SR-2se: 96 SR-2s: 64	288	576
100G/200G/300G/400G | CFP2-DCO	SR-1se: — SR-1s: 8	SR-2se: — SR-2s: 16	48	96

* With intelligent aggregation

** MACsec capable with FP4. All FP5-based connectors are ANYsec/MACsec capable.

Feature and protocol support highlights[1]

Feature and protocol support within the 7750 SR-s series includes, but is not limited to, the following.

IP and MPLS routing features

- IP unicast routing:
  - Intermediate System-to-Intermediate System (IS-IS)
  - Open Shortest Path First (OSPF)
  - Routing Information Protocol (RIP)
  - Multiprotocol Border Gateway Protocol (MBGP)
  - Unicast Reverse Path Forwarding (uRPF)
  - Comprehensive control plane protection features for security
  - IPv4 and IPv6 feature parity
- IP multicast routing:
  - Internet Group Management Protocol (IGMP)
  - Multicast Listener Discovery (MLD)
  - Protocol Independent Multicast (PIM)
  - Multicast Source Discovery Protocol (MSDP)
  - Bit Indexed Explicit Replication (BIER)
  - IPv4 and IPv6 feature parity
- MPLS:
  - Full Label edge router (LER) and Label switch router (LSR) functionality with comprehensive SR-MPLS and MPLS-SRv6 interworking for seamless MPLS designs
  - MPLS-Transport Profile (MPLS-TP)
  - Label Distribution Protocol (LDP) and Resource Reservation Protocol (RSVP) for MPLS signaling and traffic engineering
  - Includes Point-to-Point (P2P) and Point-to-Multipoint (P2MP) Label Switched Paths (LSPs) with Multicast LDP (MLDP), P2MP RSVP and weighted Equal Cost Multi Path (ECMP)

Segment Routing and SDN features

- Segment Routing (SR) flexible algorithms for SR-MPLS and SRv6 (128-bit and micro-segment) data plane
  - Nokia SR OS platforms support intra-area and/or inter-area shortest path using IGP metric, TE-metric or delay, as well as traffic engineered tunnels. In addition, SR OS supports selecting a subset of links to be included or excluded for each flexible algorithm.
- Multiple-instance IS-IS and OSPF SR support with shortest path tunnel, Segment Routing - Traffic

1 Some systems and/or hardware assemblies may have feature exclusions or exceptions

Engineering (SR-TE) LSP, flexible algorithms, and static and BGP SR policy.
  - Implementation provides Loop Free Alternate (LFA), remote LFA and Topology Independent - LFA (TI-LFA) protection for all types of tunnels as well as end-to-end protection with primary/secondary paths for SR-TE tunnels and SR policies.
  - PCEP allows delegation of the SR-TE LSP to the Nokia NSP or a third-party PCE function
- Programmable forwarding tables via gRPC-based routing information base (RIB) API feature and MPLS forwarding policy
- Extensive set of capabilities using ACL logic to steer routes/flows towards various target types, such as IP next-hop, SR-TE/RSVP-TE/MPLS-TP LSP and Virtual Routing and Forwarding (VRF)
  - Applicable to a wide range of routing and service contexts, such as global routing table, Virtual Private Routed Network (VPRN), virtual private LAN service (VPLS) and E-Pipe service
  - Supports control interfaces such as OpenFlow, FlowSpec, CLI and NETCONF
- Multivendor SDN control integration through OpenFlow, PCEP, BGP-Link State (BGP-LS) and BGP SR Policy support
- Collection of traffic statistics on an extensive set of constructs:
  - LDP
  - RSVP-TE, and SR-TE LSPs
  - MPLS forwarding policies
  - SR-MPLS and SRv6 policies
  - RIB API tunnel entries
  - Interior Gateway Protocol (IGP) SIDs

Layer 2 features

- Ethernet LAN (E-LAN): BGP-VPLS, PBB-VPLS, EVPN and PBB-EVPN
- E-Line: BGP Virtual Private Wire Service (BGP-VPWS), EVPN-VPWS, EVPN Flexible Cross Connect (FXC), PBB-EVPN E-line, and EVPN-VPWS service gateway functionality
- E-Tree: EVPN and PBB-EVPN per AC E-Tree and EVPN per PE E-Tree
- DCI: EVPN Virtual eXtensible LAN (VXLAN) to VPLS/EVPN-MPLS/EVPN-VXLAN/EVPN-SRv6 gateway functions

Layer 3 features

- IP-VPN, enhanced internet services
- EVPN for Layer 3 unicast and Optimized Inter-Subnet Multicast (OISM) services with Integrated Routing and Bridging (EVPN-IRB)
- Multicast VPN (MVPN), which includes inter-AS MVPN and Next Generation MVPN (NG-MVPN)
- EVPN and IP-VPN gateway interworking, including D-PATH attribute for loop protection in redundant gateways
- Seamless MPLS/SRv6 integration with IP-VRF for interworking or migration between MPLS and SRv6 transport technologies
- ARP/ND control plane synchronization on Layer 3 interfaces

Security

- Management plane
  - SSHv2
  - TLS 1.2 and 1.3
  - AAA (local, RADIUS, TACACS+, LDAP)
    Note: LDAP is only for user authentication
  - User policy and access control
  - Anomaly logging/monitoring; log locally or via syslog
- Control plane
  - CPM filtering based on IP/MAC criteria
  - IP filtering and rate limiting
  - Distributed CPU protection
- Platform trust
  - System integrity verification
  - TPM 2.0 Initial Device Identity (IDevID) and Initial Attestation Key (IAK)
  - Secure boot
- Data plane
  - ACL filtering for DDoS mitigation
  - Quantum-safe entropy and ESV certified

- Quantum-safe IEEE 802.1AE MACsec in LAN and WAN mode
- IEEE 802.1X MACsec Key Agreement (MKA)
  - Keychain
  - Auto-generate auto-distribute of PSK
- Quantum-safe TLS 26.10
- IEEE 802.1X authenticator

System features

- Ethernet satellites: Port expansion through local and remote Nokia 7210 SAS and 7250 IXR satellite systems to fit a wide variety of deployment needs. Fiber, copper, and PoE/PoE+ (IEEE 802.3af/at) capable copper models are available with Ethernet interfaces ranging from GE to 100GE
- Extensive fault and performance monitoring. Operations, Administration and Maintenance (OAM) includes:
  - Ethernet Connectivity Fault Management (CFM) (IEEE 802.1ag, ITU-T Y.1731)
  - Ethernet in the First Mile (EFM) (IEEE 802.3ah)
  - Link Layer Discovery Protocols (LLDP) (IEEE 802.3AB-2005)
  - Service Activation Test (SAT) (ITU-T Y.1564)
  - Bidirectional Forwarding Detection (BFD), including Seamless BFD
  - BIER
  - Cflowd
  - Two-Way Active Measurement Protocol (TWAMP and TWAMP Light/STAMP)
  - A full suite of MPLS and SR fault and performance tools
  - Service mirroring
  - Lawful intercept
- Timing:
  - ITU-T Synchronous Ethernet (SyncE)
  - IEEE 1588v2 Precision Time Protocol (PTP)
  - Network Time Protocol (NTP)
  - BITS ports (T1, E1, 2M)
  - GNSS receiver
  - 1PPS
- QoS:
  - Flexible intelligent packet classification
  - Ingress and egress hierarchical QoS (H-QoS) with multitiered shaping and two-tiered, class-fair hierarchical policing
  - Advanced, scalable network and service QoS
  - End-to-end consistent QoS regardless of oversubscription or congestion
- High availability:
  - Nonstop routing[2]
  - Nonstop services[2]
  - In-Service Software Upgrade (ISSU)[1]
  - IP: ECMP with up to 64 x 64 paths (2-level hierarchical ECMP: BGP ECMP and link/tunnel ECMP), IP FRR with LFA, BGP Edge and Core PIC
  - MPLS: LDP with ECMP and LFA/RLFA; RSVP-TE LSP with primary/standby secondary paths; BGP-LU tunnel with ECMP and Edge PIC
  - SR-MPLS: LFA/RLFA/TI-LFA, SR-TE LSP with ECMP and primary/standby secondary paths; SR policy with linear and ECMP protection modes
  - SRv6: LFA/RLFA/TI-LFA, SRv6 policy with linear and ECMP protection modes
  - PW redundancy
  - EVPN single-active and all-active multi-homing with revertive and non-revertive mode
  - Multi-chassis LAG
  - Multi-chassis PW endpoint redundancy
  - BGP Multi-Homing for VPLS/VPWS services
- Power management:
  - Disable inactive or provisioned components that are not in use, such as line cards, ports, and optics to lower power consumption
  - Reduce system forwarding capacity by disabling active components, such as SFMs, during periods of lower network traffic to lower power consumption

2 Requires redundant CPM modules

Management features

- Model-driven management of configuration and state through the MD-CLI, NETCONF and gRPC/gNMI using YANG models; streaming telemetry through gRPC/gNMI subscriptions; operations through NETCONF and gRPC/gNOI
- Enhanced automation framework provides personalization and automation with Python 3
- Event triggered and time-based Python 3 applications
- Full SNMP management support, including configuration, monitoring and traps
- Comprehensive network and node management through the Nokia NSP
- Zero touch provisioning (ZTP) automatically downloads the image and configuration from a server via out-of-band management port or in-band interfaces

Standards support[3]

Environmental specifications

- Operating temperature: 5°C to 40°C (41°F to 104°F)
- Operating relative humidity: 5% to 95% non-condensing
- Operating altitude: Up to 3,960 m (13,000 ft); operating temperature range de-rated above 1,829 m (6,000 ft)

Safety

- AS/NZS 62368.1
- IEC/EN 60825-1
- IEC/EN 60825-2
- IEC/EN/UL/CSA 62368-1

EMC emission

- AS/NZS CISPR 32 Class A
- BSMI CNS15936 Class A
- EN 55032 Class A
- FCC Part 15 Class A
- ICES-003 Class A
- IEC CISPR 32 Class A
- IEC/EN 61000-3-2 Power Line Harmonics
- IEC/EN 61000-3-3 Voltage Fluctuations and Flicker
- IEC/EN 61000-6-4
- KS C 9832 Class A
- VCCI Class A

EMC immunity

- BT GS7
- EN 55035
- ETSI EN 300 132-1 AC Power Supply Interface
- ETSI EN 300 132-2 DC Power Supply Interface
- ETSI EN 300 132-3 HVDC Power Supply Interface (SR-1se & SR-2se)
- ETSI EN 300 132-3-1 HVDC Power Supply Interface
- ETSI EN 300 386
- ETSI ES 201 468
- IEC CISPR 35 (SR-1s and SR-2s)
- IEC/EN 61000-4-2 Electrostatic Discharge
- IEC/EN 61000-4-3 Radiated, RF, EM Field Immunity
- IEC/EN 61000-4-4 Electrical Fast Transients
- IEC/EN 61000-4-5 Surge Immunity
- IEC/EN 61000-4-6 Immunity to Conducted Disturbances
- IEC/EN 61000-4-11 Voltage Interruptions
- IEC/EN 61000-6-2 Immunity for Industrial Environments
- ITU-T K.20
- ITU-T L.1200
- KS C 9835

Environmental/NEBS

- ATIS 0600010
- ATIS-0600015
- ATIS-0600015.03
- ATIS-0600315.01 HVDC Power Supply Interface

3 System design intent is according to the listed standards. Refer to the product documentation for detailed compliance status.

- ATT-TP-76200
- ETSI EN 300 019-2-1 Storage Tests, Class 1.2
- ETSI EN 300 019-2-2 Transportation Tests, Class 2.3
- ETSI EN 300 019-2-3 Operational Tests, Class 3.2
- ETSI EN 300 019-2-3 Earthquake
- ETSI 300 753 Acoustic Noise, Class 3.2 (excluding SR-7s & SR-14s)
- GR-63-CORE, Level 3
- GR-1089-CORE, Level 3
- TR No. 176002 1.1
- VZ.TPR.9205
- VZ.TPR.9305

Wireless

- ETSI EN 301 489-1
- ETSI EN 301 489-19 (GNSS) (SR-1se and SR-2se)

Directives, regional approvals and certifications

- Directive 2011/65/EU Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (Recast) Directive (including Commission Delegated Directive (EU) 2015/863)
- Directive 2012/19/EU Waste Electrical and Electronic Equipment (WEEE)
- Directive 2014/30/EU Electromagnetic Compatibility (EMC)
- Directive 2014/35/EU Low Voltage Directive (LVD)
- Directive 2014/53/EU Radio Equipment Directive (RED) (for 7750 SR-1se and SR-2se)
- NEBS Level 3
- CRoHS - China RoHS
- BSMI Mark - Taiwan
- CE Mark - Common Europe
- KC Mark - South Korea
- RCM Mark – Australia
- TEC Mark - India (Excludes SR-1se and SR-2se)
- UKCA Mark - United Kingdom
- VCCI Mark – Japan

Mplify Carrier Ethernet For Business Certified

Refer to the 7750 SR-s product and release documentation for system details on dimensions, weights, hardware, safety standards, compliance agency certifications and protocol support.

About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

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