

Nokia 7750 SR-s Service Router

Release 23

The Nokia 7750 SR-s series of IP routers takes edge and core routing to new heights. It delivers the speed, capacity, power efficiency, flexible capability, network security and automation tools essential for IP networking in the 5G and cloud era. With continuous design innovation and proven investment protection, the 7750 SR-s helps build a sustainable IP network that can evolve with changing needs for years to come.

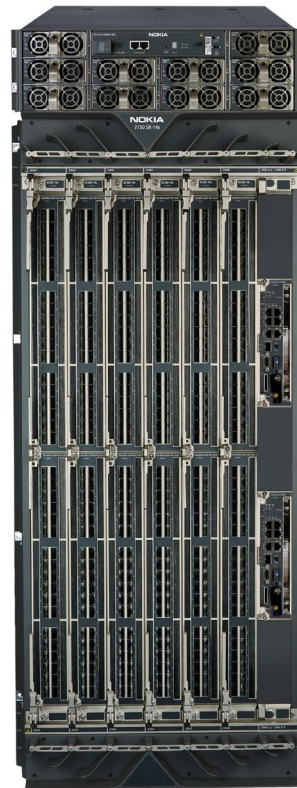
Overview

As networks experience unprecedented traffic growth and unpredictable demands, operators are challenged to increase network capacity efficiently and meet ever-increasing performance requirements while rolling out new services.

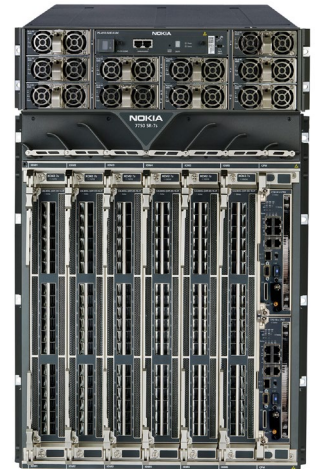
Leveraging Nokia 6.0 Tb/s FP5 and 3.0 Tb/s FP4 silicon, the 7750 SR-s addresses today's network imperatives, enabling operators to build a scalable, secure, automated and efficient network.

With platforms scaling from 1.6 Tb/s full duplex (FD) to 216 Tb/s FD, the 7750 SR-s delivers power-efficient performance certainty for demanding network roles. The 7750 SR-s supports a mix of port speeds and optic types: 800G QSFP-DD, 400G QSFP-DD, 400G QSFP112, 100G SFP-DD, 100G QSFP, 400G QSFP, 100G QSFP28 and CFP2-DCO. This variety enables high-density 800GE, 400GE, 200GE, 100GE, 50GE, 25GE and 10GE interfaces as well as hardware support for 1.6 Tb/s flows.

At the heart of the 7750 SR-s is Nokia FP silicon—an essential element for high-performance routing. Leveraging a fully programmable network processor (NP) architecture, the systems are designed to be deterministic, enabling diverse deployment needs for demanding IP edge, core and smart aggregation applications under all network operating conditions.



7750 SR-14s



7750 SR-7s



7750 SR-2s



7750 SR-1se



7750 SR-2se



7750 SR-1s

Running the Nokia Service Routing Operating System (SR OS), the 7750 SR-s delivers deployment versatility and consistency. It provides a common platform to optimize IP edge and core functions and services without performance compromises. Extensible hardware and SR OS feature licensing allows each system to be tailored to meet exact networking requirements in the most economical way. These industry-leading capabilities enable network designs without trade-offs among performance, capacity, scalability and power consumption.


To protect against increasing security threats, the 7750 SR-s embeds security across all aspects of the data path without impacting router performance.

This includes support for line rate-based, low-latency encryption as well as surgical IP payload filters to mitigate against distributed denial of service (DDoS) attacks.

Speed and capacity

There are six system variants in the 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; 68.78 cm (27.08 in)	3RU; 68.78 cm (27.08 in)	5RU; 81.35 cm (32.03 in)	5RU; 80.3 cm (31.6 in)	16 or 17RU; 85.8 cm (33.8 in)	27 or 28RU; 85.8 cm (33.8 in)
System configuration: Full duplex (FD)	Fixed: 2.4 Tb/s, 4.8 Tb/s; Modular: 3 Tb/s	Fixed	2 slots, modular XMA-s / IOM-s	2 slots, modular XMA2-s, IOM2-se	6 slots, modular XMA-s, IOM-s, XMA2-s, IOM2-se	12 slots, modular XMA-s, IOM-s, XMA2-s, IOM2-se
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	- / 12 48 / 360	24 / 48 192 / 360	- / 24 96 / 720	36 / 84 360 / 720	132 / 252 1080 / 2160	264 / 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	- / 24 120 / 360	All ports to 19.2 Tb/s line rate	- / 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 universal line cards, with support for any speed on any service on any port, ranging from 10GE to 800GE, with full breakout options on all ports. Please refer to the 7750 SR-s XMA2-s, 7750 SR-s XMA-s and 7750 SR IOM-s data sheets for more details on line card variants. Optical breakout options include 4 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 platforms ranging from 1.6 Tb/s FD to 216 Tb/s FD.

Power

Sustainability

The power-efficient design of the 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 delivers typical power consumption in the order of 0.1W/Gig in chassis-based systems¹. Even more, with FP silicon, performance is always deterministic.

This power consumption 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 power efficiency. The line card design of the 7750 SR-s dynamically scales power consumption based on licensing levels and connectors in use. This significantly reduces consumption when only a fraction of a line card is in use. With multiple license configurations and line card/system options, operators have flexibility to design network locations with the right power consumption, performance, capacity and scalability to achieve sustainability goals.

System efficiency

The mechanical and thermal design of the 7750 SR-s is focused on enabling operators to maximize the density and usability of coherent

optics. Today's coherent optics, such as 400G 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 ZR/ZR+ optics in all cages without restrictions or fan algorithm changes.

In addition, cards and systems are equally ready to support 800G coherent optics without density trade-off. The intent of coherent optics is to leverage full router density without losing ports and without sacrifice, and that is exactly what the 7750 SR-s design delivers.

Leveraging 112G SERDES technology, the 7750 SR-s unlocks the power efficiency advantages of next-generation optics. 800G QSFP-DD optics save in the order of 25 to 43 percent of the optical power budget compared to using two 400G QSFP-DD optics. It is hardware-ready to support power-efficient 100G/200G SFP112 and 400G QSFP optics. As systems densify, optics become a larger part of overall system power consumption, and the power savings behind next-generation optics quickly becomes compelling.

FlexE 2.0² is supported across all of channelization, sub-rating and bonding. Bonding support enables 1.6 Tb/s clear-channel flows in advance of 1.6 Tb/s optics availability and can increase link 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

¹ FP5-based 7750 SR-s typical power consumption is expected to be below this figure. Power measurements are pending.

² Enabled via software in a future release.

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.

Intelligent aggregation

Intelligent aggregation allows the 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.

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.

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 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.

The 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.

Platform versatility

Demanding network roles demand in-house silicon. The 7750 SR-s supports a full array of network functions and services. Leading SR OS capabilities combined with licensing and line card modularity provide complete configuration versatility to support multiple, demanding network roles with deterministic performance on a single platform.

For service providers, the 7750 SR-s is deployed in WAN, data center and aggregation networks to support IP edge, BNG, security gateway, peering and core functions for advanced residential, mobile and enterprise services.

For webscale operators looking to maximize application performance, the 7750 SR-s supports data center edge functions, including aggregation, gateway, interconnect and internet/peering. In point of presence (PoP) locations, it supports internet/peering edge and core router functions. For enterprises, the 7750 SR-s provides high-performance IP routing, including connectivity to the data center, internet and WAN applications.

IP network security

DDoS mitigation

Nokia Deepfield Defender in combination with the 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.

³ Enabled via software targeted for Release 23.

Security policies are continuously monitored and tuned using Nokia SR OS telemetry from the 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.

ANYsec line rate encryption

Network security can no longer be an afterthought in IP network design and deployment. Operators must move toward a holistic approach of end-to-end network security, avoiding trade-offs with piecemeal MACsec or IPsec solutions.

Network security is embedded into the FP5 silicon, enabling the 7750 SR-s to deliver a unique, network-embedded approach to IP network security called ANYsec³.

ANYsec delivers universal, line rate encryption across L2, L2.5 and L3 at the full system bandwidth. It delivers line rate MACsec on all connectors and all speeds from 10 Gb/s to 1.6 Tb/s and also extends hardware low-latency encryption to MPLS- and IP-based flows.

ANYsec is service oriented, operating across SR, EVPN, MPLS, IPv4 and IPv6 traffic with support for all routing protocols. It interworks with all legacy equipment in a network that does not support encryption by allowing encryption to be added as a network overlay.

ANYsec runs hop-by-hop or end-to-end and can be extended to any network topology at scale. In addition to securing internal network links, it is a valuable, revenue-generating option for new service enablement and can significantly increase the competitiveness of a provider's network solutions when securing new, encryption-based transport customers.

Network automation

Model-driven management

To simplify and automate network operations, the 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 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 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 7750 SR-s is available in six chassis 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 function and capabilities of the 7750 SR-s adapters, modules and systems are described as follows. All equipment adapters and modules are hot swappable and field replaceable to maximize system uptime.

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

The universal 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 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 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 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-se) types and supports several pay-as-you-grow licensable configurations.

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

The MDA-s provides modular interface connectivity with 400G QSFP-DD, 100G QSFP28, 100G SFP-DD and CFP2-DCO variants, physical media and optical functions. Each supports up to 1.5 Tb/s FD in capacity, and up to two are installed in the IOM-s. The MDA2-se provides modular interface connectivity with 800G QSFP-DD, 400G QSFP112, 200G SFP-DD and CFP2-DCO* variants, physical media and optical functions. Each supports up to 3.0 Tb/s FD in capacity, and up to two are installed in the IOM2-se.

* Targeted for a future release

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

Each XMA and IOM is equipped in an appropriate XCM. The XCM-s contains a slot-level control plane subsystem and is the system fabric interface card for the XMA. 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 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 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 CMA provides a pluggable interface for one or more CPMs to be equipped in a 7750 SR-7s or SR-14s.

7750 SR-2se

The 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/MDA2-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.

7750 SR-2s

The 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.

7750 SR-1se

The 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.

7750 SR-1s: Fixed and modular variants

The 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 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).

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-2s: 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	SR-2se: XMA2-s, IOM2-se/MDA2-se SR-2s: XMA-s, IOM-s/MDA-s	XMA-s, XMA2-s IOM-s/MDA-s, IOM2-se/MDA2-se	XMA-s, XMA2-s IOM-s/MDA-s, IOM2-se/MDA2-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 <ul style="list-style-type: none"> Height: 13.3 cm (5.25 in) Width: 44.5 cm (17.5 in) Depth: 68.78 cm (27.08 in) SR-1s: 3RU, includes integrated power shelf <ul style="list-style-type: none"> Height: 13.3 cm (5.25 in) Width: 44.5 cm (17.5 in) Depth: 68.78 cm (27.08 in) 	SR-2se: 5RU, includes integrated power shelf <ul style="list-style-type: none"> Height: 22.2 cm (8.75 in) Width: 44.5 cm (17.5 in) Depth: 80.3 cm (31.6 in) SR-2s: 5RU, includes integrated power shelf <ul style="list-style-type: none"> Height: 22.2 cm (8.75 in) Width: 44.5 cm (17.5 in) Depth: 81.35 cm (43.03 in) 	<ul style="list-style-type: none"> 13RU + 3RU (LVDC) or 4RU (AC/HVDC) power shelf Height: <ul style="list-style-type: none"> 16RU – 71.1 cm (28 in) 17RU – 75.6 cm (29.75 in) Width: 44.5 cm (17.5 in) Depth: 85.8 cm (33.8 in) 	<ul style="list-style-type: none"> 24RU + 3RU (LVDC) or 4RU (AC/HVDC) power shelf Height: <ul style="list-style-type: none"> 27RU – 120.0 cm (47.2 in) 28RU – 124.5 cm (49 in) Width: 44.5 cm (17.5 in) Depth: 85.8 cm (33.8 in)
Weight	SR-1se: <ul style="list-style-type: none"> Loaded: 51.7 kg (114.1 lb); excludes optics SR-1s: <ul style="list-style-type: none"> Fixed system (max) <ul style="list-style-type: none"> Loaded: 50.3 kg (111 lb); excludes optics Modular system (max) <ul style="list-style-type: none"> Loaded: 49.5 kg (109.2 lb); excludes optics 	SR-2se: <ul style="list-style-type: none"> Loaded: 102.06 kg (225 lb); excludes optics SR-2s: <ul style="list-style-type: none"> Loaded: 102.06 kg (225 lb); excludes optics 	Loaded: 215.3 kg (473.6 lb); excludes power shelf and optics	Loaded: 370.1 kg (815.7 lb); excludes power shelf and optics
Power	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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: —	SR-2se: 36/48* SR-2s: —	132/144*	264/288*
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: 288/384* SR-2s: 96/240*	864/1152*	1728/2304*
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: — SR-2s: 64	192	384
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

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:

- Label Edge Router (LER) and Label Switch Router (LSR) functions with support 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 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

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, Provider Backbone Bridging for VPLS (PBB-VPLS), EVPN and PBB-EVPN
- E-Line: BGP Virtual Private Wire Service (BGP-VPWS), EVPN-VPWS and PBB-EVPN
- E-Tree: EVPN and PBB-EVPN

- DCI: EVPN Virtual eXtensible LAN (VXLAN) to VPLS/EVPN-MPLS/EVPN-VXLAN 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

System features

- Ethernet satellites: Port expansion through local or remote Nokia 7210 SAS-S series GE, 10GE, 100GE and SONET/SDH satellite variants, offering 24/48 x GE ports, 64 x GE/10GE ports or legacy SONET/SDH ports over GE, 10GE and 100GE uplinks
- 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)
 - Bidirectional Forwarding Detection (BFD), including Seamless BFD
 - Cflowd
 - Two-Way Active Measurement Protocol (TWAMP and TWAMP Light/STAMP)
 - A full suite of MPLS and Segment Routing OAM tools
- Timing:
 - ITU-T Synchronous Ethernet (SyncE)
 - IEEE 1588v2 Precision Time Protocol (PTP)
 - Network Time Protocol (NTP)
 - BITS ports (T1, E1, 2M)
 - 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 routing⁴
 - Nonstop services⁴
 - In-Service Software Upgrade (ISSU)⁴
 - Fast reroute for IP, RSVP, LDP and SR
 - Pseudowire redundancy
 - ITU-T G.8031 and G.8032
 - Weighted ECMP
 - Weighted, mixed-speed link aggregation

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 support⁵

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 Ed2

EMC emission

- AS/NZS CISPR 32 Class A
- BSMI CNS13438 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)

⁴ Requires redundant CPM modules

⁵ System design intent is according to the listed standards. Refer to the product documentation for detailed compliance status.

- 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-0600315.01.2015 HVDC Power Supply Interface
- 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 (SR-7s and SR-14s)
- VZ.TPR.9205
- VZ.TPR.9305

Wireless

- ETSI EN 301 489-1
- ETSI EN 301 489-17 (Bluetooth)
- ETSI EN 301 489-19 (GNSS) (SR-1se and SR-2se)
- KS X 3124:2020
- KS X 3126:2020 (Bluetooth)

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)
- BSMI Mark - Taiwan
- CE Mark - Common Europe
- CRoHS - China RoHS
- KC Mark - South Korea
- NEBS Level 3
- RCM Mark - Australia
- UKCA Mark - United Kingdom
- VCCI Mark - Japan

MEF certifications

For a list of Nokia CE 1.0-, CE 2.0- and CE 3.0-certified products, refer to the [MEF certification registry](#).

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 the future where networks meet cloud to realize the full potential of digital in every industry.

Through networks that sense, think and act, we work with our customers and partners to create the digital services and applications of the future.

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