Nokia 7750 Service Router

Release 26

The Nokia 7750 Service Router (SR) series of IP routers delivers high performance, offering speed, capacity, energy efficiency, flexible capability, network security, and automation tools essential for modern, dynamic IP networks of telecommunications providers, AI and cloud providers, and mission-critical enterprise environments.

Overview

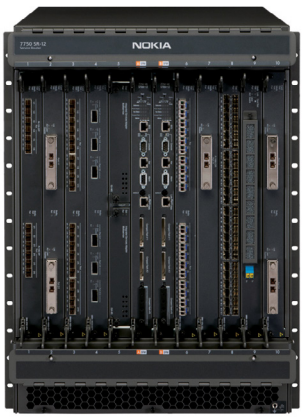
Powered by Nokia FP4 routing silicon, the Nokia 7750 SR is designed to meet modern networking imperatives, enabling operators to build a high-performance, scalable, energy-efficient, secure and automated network that continues to deliver proven investment protection.

Building on the backwards compatibility of Nokia FP technology, the Nokia 7750 SR introduces a new family of adapters. The Nokia 7750 SR MDA2-e-XP, powered by Nokia FP5-based E5 MAC silicon, enhances FP4-based 7750 SR systems with support for native 800GE interfaces, energy-efficient 800G QSFP-DD, QSFP112, and SPF112 optics, and enhanced IEEE 802.1AE quantum-safe MACsec (ANYsec) cryptography capabilities.

The Nokia 7750 SR supports a wide range of connector speeds and optic types, including 800G QSFP-DD, 400G QSFP-DD, 400G QSFP112, 100G QSFP28 and 100G SFP112, 10/25G SFP28, and CFP2-DCO. With platforms scaling from 1.5 Tb/s full duplex (FD) to 13.5 Tb/s FD, and up to 36 Tb/s FD with intelligent aggregation (IA), it enables high-density interface options, including 10GE, 25GE, 40GE, 50GE, 100GE, 400GE, and 800GE natively and through flexible breakout options.

At the heart of the Nokia 7750 SR is the fully programmable Nokia FP4 routing silicon, which provides deterministic performance. This

7750 SR-12e



7750 SR-12


7750 SR-1

7750 SR-7

enables it to support diverse deployment needs for demanding applications, delivering predictable performance under all operating conditions.

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

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

Speed and capacity

Highly scalable platform

Available in four system variants, the Nokia 7750 SR is highly scalable to fit various network locations and deployment models, supporting 10GE, 100GE, 400GE, and 800GE networking environments.

The compact Nokia 7750 SR-1 is a modular, single-slot system supporting up to 1.5 Tb/s FD and up to 4.0 Tb/s FD with intelligent aggregation. It supports 800G QSFP-DD, 800G QSFP112-DD, 400G QSFP112, 400G QSFP56-DD, 200G QSFP28-DD, 100G QSFP28, 100G SFP112, and 10/25G SFP28 connectors along with flexible breakout options, including 4 x 10G, 8 x 10G, 10 x 10G, 4 x 25G, 2 x 100G, 4 x 100G, 8 x 100G and 2 x 400G.

The chassis-based Nokia 7750 SR-7 and SR-12 are equipped with five and ten slots respectively, offering 800 Gb/s FD per slot and up to 1.2 Tb/s FD with intelligent aggregation. It supports 400G QSFP56-DD, 200G QSFP28-DD, 100G QSFP28, and 10/25G SFP28 connectors.

The chassis-based Nokia 7750 SR-12e is equipped with nine slots and supports up to 1.5 Tb/s FD per slot and up to 4.0 Tb/s FD with intelligent aggregation. It supports 800G QSFP-DD, 800G QSFP112-DD, 400G QSFP112, 400G QSFP56-DD, 200G QSFP28-DD, 100G QSFP28, 100G SFP112, and 10/25G SFP28 connectors. These systems also support flexible breakout options, including 4 x 10G, 8 x 10G, 10 x 10G, 4 x 25G, 2 x 100G, 4 x 100G, 8 x 100G and 2 x 400G.

The modular system architecture and universal line card connectors give the Nokia 7750 SR flexible interface expansion options and economic scaling of switching capacity, density and connector type.

For port extension options, the Nokia 7210 Service Access System (SAS) and 7250 Interconnect Router (IXR) satellite systems offer fiber and copper variants with interfaces ranging from GE up to 100GE.

IP-optical integration

The Nokia 7750 SR 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.

Designed with energy efficiency and enhanced thermal management in mind, the Nokia 7750 SR line cards are engineered to support high-performance coherent optics without compromising density or reliability. The platform's innovative mechanical design allows operators to seamlessly deploy 400G ZR and ZR+ optics—such as within an installed 7750 SR-12e—without requiring hardware changes, preserving investment while enabling rapid service evolution.

Energy efficiency

Energy-efficient design innovations on the Nokia 7750 SR increase the sustainability of IP networks through reduced emissions.

The Nokia FP4 silicon architecture enables line card designs with fewer FP4 complexes and fewer components on each board to lower energy consumption. The FP4 memory architecture is exceptionally energy efficient. Energy consumption scales with licensing level to drastically reduce energy when only a fraction of a line card is in use. With FP4 silicon, these and other mechanisms

are dynamic, enabling each Nokia 7750 SR system to automatically adapt to lower energy consumption.

Nokia FP4 silicon reduces energy consumption by 50 percent over the previous generation Nokia FP3 silicon while offering up to six times more capacity. With the Nokia 7750 SR, this energy reduction is realized with full capacity and features enabled and deterministic performance under all network operating conditions. Multiple license configurations, including intelligent aggregation and a choice of line card assembly options, give operators the flexibility to design network locations for energy use consumption along with performance, capacity and scale to achieve sustainability goals.

Flexible capability

Network processor-based architecture

Every generation of Nokia FP silicon has been based on a network processor (NP) design. An NP offers the highest degree of flexibility and programmability in the industry. With a fully programmable data path, the data path is fully upgradable to new hardware-based performance standards with a simple software update. Fixed-function silicon with pre-defined upgradability pales in comparison.

Modern networks today rely on segment routing, EVPN, 1588 edge timestamping and countless other standards that were not conceived 10 years ago. Nokia FP's NP-based architecture has been able to turn on these capabilities with hardware-based performance, eliminating the need for hardware-based upgrades. This is a true measure of programmability and investment protection. 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

Nokia FP4 silicon is fully deterministic across tables and buffers under all network loading conditions. This enables performance certainty at full scale and under real-world network conditions. This capability is powered with line-rate packet processor intelligent memories coupled with fast buffer memories. Where other industry packet processors rely on non-line rate memories for buffering, for tables, or potentially for both, FP4 avoids their performance sacrifice to deliver 10 years of predictable performance. A line rate memory system will always outperform a non-line rate memory system under all network loading conditions without exception.

Nokia FP4 silicon is fully buffered with both deep line rate ingress and deep line rate egress buffers. It supports full packet pre-classification and pre-buffering in front of the packet processor equally, ensuring a superior level of performance for all critical flows and guarantees the traffic that matters most, regardless of port configuration. It supports a full set of QoS with up to eight queues per service, hardware-assisted H-QoS, and an industry leading total number of queues and policers to support all necessary QoS features from simple to complex in a highly granular way. QoS capabilities support tremendous capability for BNG and enhanced broadband services but can equally be scaled to deliver optimized lean performance.

Pay-as-you-grow licensing

A flexible pay-as-you-grow licensing model for the Nokia FP4-based line card provides a choice of entry points for immediate requirements and the ability to scale in place for evolving needs with software-only upgrades. This provides cost savings, ensuring operators pay for only the required functionality.

Capacity licenses provide bandwidth, connector density and intelligent aggregation mode options. Functional licenses scale services through control options on egress hardware queues and egress policers. Each FP4-based line card supports multiple combinations of these licenses to cost-effectively scale capacity and functionality attributes while protecting hardware investments.

Platform versatility

Demanding network roles demand in-house silicon. The Nokia 7750 SR 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 system to be tailored to meet exact networking requirements in the most economical way.

For telecommunication providers, the Nokia 7750 SR is deployed in mission-critical WAN, data center and aggregation networks to support IP edge, core, 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 supports IP edge, data center gateway/ interconnect and peering applications.

For mission-critical enterprises, the Nokia 7750 SR provides high-performance IP routing, including connectivity to the data center, internet and WAN applications.

Proven investment protection

Proven across four generations of Nokia FP silicon, each new generation of FP silicon supports seamless backwards compatibility to extend the product life of deployed systems. Line card designs anticipate future requirements for higher powered optics and speeds along with flexible licensing to cost-effectively scale capacity.

Nokia FP3-based 7750 SR-7, SR-12 and SR-12e systems can seamlessly be upgraded to Nokia FP4 to enable higher capacity, connector speed and other capabilities without service impact and without requiring additional control, power or fan upgrades. With an FP4-based switch fabric and the latest control processor module, these systems support both FP3- and FP4-based line cards with full backwards compatibility. This means both variants interwork in the same chassis at the same time with full capacity, scale and features and no interworking caveats for best in-class investment protection.

Nokia FP4 silicon has a fully programmable data path and is upgradable to new hardware-based performance standards with a simple software update. The programmability of FP silicon and Nokia SR OS integration ensures quick adaptation of new standards and features without the need for hardware-based upgrades. This means that adding new silicon enhancements, capacity and capabilities is field extensible, without a forklift.

Combined, these attributes provide the best investment protection in the industry and allow operators to build an IP network that can evolve with changing needs for years to come.

Service richness

Nokia's feature-rich 64-bit SR OS addresses the full spectrum of IP routing requirements. With comprehensive QoS, IP/MPLS, segment routing and model-driven management features, the Nokia 7750 SR has the packet intelligence capabilities and tools to define and deliver the most stringent SLAs and end-user quality of experience (QoE) requirements.

The Nokia 7750 SR supports tens of thousands of IP flows and access control lists (ACLs) with high performance at scale even when multiple advanced features are enabled concurrently. It supports advanced push-based telemetry models to stream flow-level data and insights in near-real time for network automation and DDoS security.

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

Intelligent aggregation

Intelligent aggregation is a capability that allows the Nokia 7750 SR to cost-effectively aggregate port capacity beyond the forwarding capacity of a delivered line card. The 7750 SR enables up to 4 Tb/s FD of intelligent aggregation per system and line card, and it does this in a deterministic way with full respect for QoS and packet priority.

Intelligent aggregation guarantees QoS with full pre-buffering and pre-classification in front of our packet processor when used in an aggregation configuration. This enables the Nokia 7750 SR to collapse full layers of pre-aggregation in front of systems or, if ports are constrained on an edge or core node, to expand the number of available ports without adding more line cards and to continue to perform in a fully deterministic way under all network loading conditions. As a result, intelligent aggregation can be a significant driver of sustainability and both CAPEX and OPEX savings.

IP network security

DDoS mitigation

Nokia Deepfield Defender in combination with the Nokia 7750 SR 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 headroom in FP4 silicon that allows the 7750 SR to act as highly precise attack sensor and mitigation element without compromising the performance of any application and service running on it.

Security policies are continuously monitored and tuned using Nokia SR OS telemetry from the Nokia 7750 SR. With automated workflows in Deepfield Defender, tens of thousands of silicon 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.

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 defence-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, equipped with MDA2-e-XP adapters, 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 speeds from 10 Gb/s to 400 Gb/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 infrastructure 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 enables model-driven network element management 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 the 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 and the programmability of the Nokia SR OS enable multivendor software-defined

networking (SDN). Control integration is enabled through OpenFlow, Path Computation Element Protocol (PCEP) and model-driven network element management.

In combination with the Nokia NSP, the Nokia 7750 SR 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 Nokia NSP supports unified service automation and network optimization with comprehensive path computation capabilities to enable source-based routing and traffic steering with segment routing support, online traffic engineering and resource optimization and elastic bandwidth services for dynamic cloud applications.

Hardware overview

The Nokia 7750 SR is available in four variants and supports a wide range of hardware assemblies. For value-added services and Ethernet interface extension options, the Nokia 7750 SR ESA and, 7210 SAS and 7250 IXR satellite systems are hardware options external to the 7750 SR. With reference to Table 2, this overview captures the function and capabilities of 7750 SR adapters, modules and systems. All equipment adapters and modules are hot swappable and field replaceable to maximize system uptime.

Input/Output Module (IOM)

The full slot IOM contains the forwarding complex that performs typical functions such as IP/MPLS routing, packet lookups, traffic classification, processing and forwarding, service enablement, and QoS for the Nokia 7750 SR-7, SR-12 and SR-12e. Available in two variants, it equips up to two pluggable media dependent adapter-e (MDA-e) types and supports a number of pay-as-you-grow licensable configurations.

The Nokia FP4-based IOM5-e delivers up to 1.5 Tb/s FD (non-redundant) and 1.2 Tb/s FD (redundant per-slot capacity for the 7750 SR-12e. It delivers up to 800 Gb/s FD (non-redundant) and up to 400 Gb/s FD (redundant) per-slot capacity in the SR-7 and SR-12. The FP3-based IOM4-e delivers up to 200 Gb/s FD per-slot performance and is supported on the SR-7, SR-12 and SR-12e.

Media Dependent Adapter (MDA)

The Nokia MDA series provides modular interface connectivity along with a variety of interface types and density configurations and support ITU-T Sync-E and IEEE 1588v2 for synchronization requirements.

The Nokia MDA2-e-XP is a high-performance, half-slot modular adapter supported on the Nokia 7750 SR-1 and by the Nokia 1.5 Tb/s IOM5-e on the 7750 SR-12e platforms. It delivers a wide range of interface types, including 800G QSFP-DD, 400G QSFP-DD, 400G QSFP112, 100G QSFP28, 100G SFP112, and 10/25G SFP28. The MDA2-e-XP offers flexible breakout 4 x 10G, 8 x 10G, 10 x 10G, 4 x 25G, 2 x 100G, 4 x 100G, 8 x 100G, and 2 x 400G, allowing for optimal port utilization across a variety of deployment scenarios. It also features robust, line-rate encryption capabilities across all connectors, including support for quantum-safe MACsec and enhanced IEEE 802.1AE quantum-safe MACsec (ANYsec) cryptography capabilities, which enables secure, high-performance networking that is future-ready.

The Nokia MDA-e-XP is a high-density, half-slot modular adapter supported on the Nokia IOM5-e within the Nokia 7750 SR-1, SR-7, SR-12, and SR-12e platforms. Available in six variant configurations, it supports a range of high-speed interfaces including 400G QSFP56-DD, 200G QSFP28-DD, 100G QSFP28, 40G QSFP+, and 10/25G SFP28. Flexible breakout options are available, including 4 x 10G, 8 x 10G, 10 x 10G, 2 x 100G, and 4 x 100G. The MDA-e-XP enables up to 2.0 Tb/s FD intelligent aggregation on the SR-1 and SR-12e, and up to 600 Gb/s FD on the SR-7 and SR-12. Enhanced security is provided through quantum-safe MACsec, supported on the variant with 16 x 10/25G SFP28 (MACsec-capable) connectors and 2 x 100G QSFP28, ensuring line-rate cryptography across secure transport environments.

The Nokia MDA-e is a half-slot adapter and is supported in the Nokia IOM4-e and IOM4-e-HS in the Nokia 7750 SR-7, SR-12 and SR-12e and by the Nokia IOM-e in the Nokia 7750 SR-e series. It supports QSFP28, SFP28, CSFP, SFP+ and CFP2 connectors with flexible breakout options, including 10 x 10G and 4 x 25G, MACsec along with ITU-T G.709 and FEC optical transport network (OTN) support.

Switch Fabric Module (SFM)

The Nokia SFM is available in two primary types. The SFM6-12e enables 1.5 Tb/s FD (non-redundant) and 1.2 Tb/s FD (redundant) connectivity between all slots of the Nokia 7750 SR-12e chassis. The hot-swappable fabric cards are 3+1 redundant with active-active load-sharing design or are 4+0 non-redundant in a back-to-back configuration. Two full-height SFM6-12e modules provide the switching functions for the system as well as housing the pluggable control processor module 5 (CPM5). There are also two half-height mini SFM6-12e modules that provide exclusive switching functions for the system.

The Nokia SFM6-7/12 enables 800 Gb/s FD (non-redundant) or 400 Gb/s FD (redundant) line rate connectivity between all slots of the Nokia 7750 SR-7 and SR-12 chassis. The hot-swappable fabric cards are 1+1 active-active load-sharing design or 2+0 non- redundant in a back-to-back configuration. The full-height SFM6-7/12 modules control the switching functions for the system and house the pluggable CPM5 for investment protection.

Control Processor Module (CPM5)

The Nokia CPM5 is housed in a SFM5 and is supported in the Nokia 7750 SR-7, SR-12 and SR-12e. It provides the management, security and control plane processing. Central processing and memory are intentionally separated from the forwarding function on the interface modules to ensure system resiliency. Redundant CPM variants operate in a hitless, stateful failover mode with full nonstop routing and nonstop services.

Power

Power supply units (PSUs) provide modular, redundant AC power for the Nokia 7750 SR-1. Power entry modules (PEMs) provide low-voltage DC power for the Nokia 7750 SR-7 and SR-12. Advanced power equalization modules (APEQs) provide power for the Nokia 7750 SR-12e. The low-voltage DC APEQs deliver up to 2,800 W each. The high-voltage DC APEQs take 260 V-400 V and provide 3,000 W each. AC APEQs take 200 V-240 V single phase and deliver 3,000 W each.

Nokia 7750 SR-1 compact system

The Nokia 7750 SR-1 is a compact, one-slot system with an integrated 1.5 Tb/s FD IOM5-e and a simplex control plane. It houses up to two Nokia MDA2-e-XP and MDA-e-XPs and supports 800G QSFP-DD, 400G QSFP-DD, 400G QSFP112, 100G QSFP28, 100G SFP112 and 10/25G SFP28 connectors and flexible breakout options including 4 x 10G, 8 x 10G, 10 x 10G, 2 x 100G and 4 x 100G. It supports up to 4.0 Tb/s FD of intelligent aggregation and is available in a number of pay-as-you-grow licensable configurations. The AC variant has two rear-mounted modular power supplies. The DC variant comes with integrated dual feeds at the rear of the system. Both systems have modular rear-mounted fans.

Nokia 7750 SR Extended Services Appliance (ESA)

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

Nokia 7210 SAS and 7250 IXR satellites

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

Technical specifications

Table 1. Hardware specifications for the 7750 SR series

	7750 SR-1	7750 SR-7	7750 SR-12	7750 SR-12e
System capacity FD	1.5 Tb/s	• 4 Tb/s (non-redundant) • 2 Tb/s (redundant)	• 8 Tb/s (non-redundant) • 4 Tb/s (redundant)	• 13.5 Tb/s (non-redundant) • 10.8 Tb/s (redundant)
Slot capacity (FD)	1.5 Tb/s	• 800 Gb/s (non-redundant) • 400 Gb/s (redundant)	• 800 Gb/s (non-redundant) • 400 Gb/s (redundant)	• 1.5 Tb/s (non-redundant) • 1.2 Tb/s (redundant)
Per-slot intelligent aggregation (FD)	4.0 Tb/s	1.2 Tb/s	1.2 Tb/s	4.0 Tb/s
Number of IOM and MS-ISM slots	1 (integrated IOM)	5	10	9
Number of MDAs	2	10	20	18
Cooling	Front to back	Side to back	Front to back	Front to back
System modules	MDA2-e-XP, MDA-e-XP, fan module, PSU	SFM6-7/12, SFM5-12, CPM5, IOM, MDA-e-XP, MDA-e, MS-ISM, EFT, PEM	SFM6-7/12, SFM5-12, CPM5, IOM, MDA-e-XP, MDA-e, MS-ISM, EFT, PEM	SFM6-12e, Mini-SFM6-12e, SFM5-12e, Mini-SFM5-12e, CPM5, IOM, MDA2-e-XP, MDA-e-XP, MDA-e, MS-ISM, APEQ, Enhanced fan tray (EFT)
Dimensions	• Height: 8.9 cm (3.5 in), 2RU • Width: 48.3 cm (19.0 in) • Depth: 62.5 cm (24.6 in)	• Height: 35.56 cm (14.0 in), 8RU • Width: 44.45 cm (17.5 in) • Depth: 64.77 cm (25.5 in)	• Height: 62.23 cm (24.5 in), 14RU • Width: 44.45 cm (17.5 in) • Depth: 64.51 cm (25.4 in)	• Height: 97.79 cm (38.5 in), 22RU • Width: 44.45 cm (17.5 in) • Depth: 76.2 cm (30.0 in)
Weight	**DC system** • Empty: 15 kg (33.0 lb) **AC system** • Empty: 14.38 kg (31.7 lb)	• Empty: 34 kg (75 lb) • Loaded: 70 kg (155 lb)	• Empty: 56.4 kg (124.3 lb) • Loaded: 155.7 kg (343.3 lb)	• Empty: 86.63 kg (191 lb) • Loaded: 211.83 kg (467 lb)
Power	**DC power** • DC input: -40 V to -72 V, 40 A max • Power feed redundancy **AC power** • AC input: 90 V to 127 V/200 V to 264 V AC, 50 Hz/60 Hz, 12 A/10 A • 1+1 redundancy	**DC power** • DC-40 V to -72 V, 100 A, 4,000 W max or • DC-46 V to -72 V, 100 A, 4,600 W max • 1+1 redundancy **External AC power (option)** • Input voltage: 200 V AC to 240 V AC • Output voltage: 42 V DC to 56 V DC • Current: 50 A	**DC power** • DC-40 V to -72 V, 162 A max, 6,480 W or • DC-46 V to -72 V, 175 A max, 8,050 W or • DC-49 V to -55 V, 175 A max, 8,575 W or • DC-50.5 V to -72 V, 175 A max, 8,837.5 W • 1+1 redundancy **External AC power (option)** • Input voltage: 200 V AC to 240 V AC • Output voltage: 42 V DC to 56 V DC • Current: 50 A	**DC power** • DC-40 V to -72 V, 60 A or 80 A per feed or • DC 260 V to 400 V, 13 A per feed • 4+1 redundancy

Table 2. Nokia 7750 SR MDA2-e-XP maximum density*

MDA2-e-XP variants	Speed options	7750 SR-1	7750 SR-12e
2-connector 100G QSFP28 + 2-connector 800G QSFP-DD MDA2-e-XP	800G/400G/100G	2/4/20	18/36/180
8-connector 100G SFP112 + 2connector 800G QSFP-DD MDA2-e-XP	800/400/100G/50G/25G/10G	2/4/20/16/24/56	18/36/180/144/216/504
16-connector 100G SFP112 MDA2-e-XP	100G/50G/25G/10G	20/20/32/32	180/180/288/288
10-connector 100G QSFP28 MDA2-e-XP	100G/40/25G/10G	20/20/32/72	180/180/288/648

* With intelligent aggregation

Table 3. Nokia 7750 SR MDA-e-XP maximum density*

MDA-e-XP variants	Speed options	7750 SR-1	7750 SR-7	7750 SR-12	7750 SR-12e
6-connector 400G QSFP-DD MDA-e-XP	400G/100G/10G	8/40/120	-	-	72/360/1,080
3-connector 400G QSFP-DD MDA-e-XP	400G/100G/10G	4/20/60	5/50/300	10/100/600	36/180/540
12-connector 100G QSFP28 MDA-e-XP	100G/10G	24/240	-	-	216/2,160
6-connector 100G QSFP28 MDA-e-XP	100G/10G	12/120	60/600	120/1,200	108/1,080
16-connector 10/25T SFP28 (MACsec) + 2-connector 100G QSFP28 MDA-e-XP	10/25G +100G/10G	32 + 4/40	160 + 20/200	320 + 40/400	288 + 36/360
3-connector CFP2-DCO MDA-e-XP	100G	12	30	60	108

* With intelligent aggregation

Table 4. Nokia 7750 SR and 7750 SR-e MDA-e maximum density

MDA-e variants	Speed options	7750 SR-1	7750 SR-7	7750 SR-12	7750 SR-12e
2-port 100G QSFP28 MDA-e (MACsec)	100G/25G/10G	-	20/80/80	40/160/160	36/144/144
8-port 10/25G SFP28 MDA-e (MACsec)	10G/25G	-	80	160	144
1-port 100G CFP2 MDA-e	100G	-	10	20	18
12-port 10/1G SFP+ MDA-e (MACsec)	10G/1G	-	120	240	216
10-port 10G SFP+ MDA-e	10G	-	100	200	180
6-port 10G SFP+ MDA-e	10G	-	60	120	108
40-port 1G CSFP/SFP MDA-e	1G	-	400	800	720

Feature and protocol support highlights[1]

Feature and protocol support within the Nokia 7750 SR 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 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

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

- 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 (Radius, Tacplus, 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
  - 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 fromGE 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)
  - 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 service

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 85% non-condensing (SR-12e, SR-12, SR-7)
  - 5% to 95% non-condensing (SR-1)
- Operating altitude: Up to 3,960 m (13,000 ft) at 30°C (86°F)

Safety

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

2 Requires redundant CPM modules

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

EMC emission

- AS/NZS CISPR 32 Class A
- BSMI CNS15936 Class A
- CISPR 32 Class A
- EN 55032 Class A
- EN 61000-3-2
- EN 61000-3-3
- FCC Part 15 Class A
- ICES-003 Class A
- IEC 61000-6-4
- KS C 9832
- VCCI Class A

EMC immunity

- BT GS-7
- EN 55035
- ES 201 468
- ETSI EN 300 386
- ETSI EN 300 132-2 DC Power Supply Interface
- ETSI EN 300 132-3-1 HVDC Power Supply Interface (SR-1, SR-12e)
- ETSI EN 300 132-3 AC Systems (SR-1, SR-12e)
- IEC 61000-6-2
- KS C 9835

Environmental

- 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 (SR-1 only)

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)
- CRoHS - China RoHS (SR-7, SR-12, SR-12e)
- NEBS Level 3
- CE Mark - Common Europe
- KC Mark - South Korea
- RCM Mark – Australia
- TEC Mark - India (except SR-7)
- UKCA Mark - United Kingdom
- VCCI Mark – Japan (SR-1 only)

Network Equipment Building System (NEBS)

- ATIS-0600010.03
- ATIS-0600015
- ATIS-0600015.03
- ATIS-0600315 (SR-1, SR-7, SR-12, SR-12e)
- ATT-TP-76200
- GR-63-CORE
- GR-295-CORE (SR7, SR-12, SR-12e)
- GR-1089-CORE
- VZ.TPR.9205 TEEER
- VZ.TPR.9305

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 Nokia 7750 SR 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, which is celebrating 100 years of innovation.

With truly open architectures that seamlessly integrate into any ecosystem, our high-performance networks create new opportunities for monetization and scale. Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.

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