Nokia 7750 Service Router

Release 20

The Nokia 7750 Service Router (SR) series of IP routers delivers high-performance routing. It delivers the scale, comprehensive features and platform versatility needed to stay ahead of the evolving service demands driven by 5G, cloud and the Internet of Things (IoT). The Nokia 7750 SR product family consists of the Nokia 7750 SR series, the Nokia 7750 SR-s series, the Nokia 7750 SR-a series and the Nokia 7750 SR-e series.

As the demand for network bandwidth continues to grow unabated, operators are on a quest to meet ever-increasing performance requirements while at the same time looking to drive down network costs. The scale, feature breadth and versatility of the 7750 SR address these imperatives, enabling operators to build a bigger, smarter, automated and secure network, with superior return on investment.

At the heart of the 7750 SR is the highly programmable Nokia FP4 network processing silicon. It is an essential element for high performance, driving industry-leading capacity and density with deterministic performance at scale, without compromise. It provides enhanced packet intelligence and control capabilities to optimize traffic flows and protect network infrastructure against distributed denial of service (DDoS) attacks. Powered by the comprehensive features of the Nokia Service Router Operating System (SR OS), the 7750 SR supports a full array of network functions and services, achieving scale and efficiency without compromising versatility.

Flexible FP4-based licensing allows the 7750 SR to be tuned to meet evolving needs through software upgrades without hardware swap-outs. This provides cost savings, ensuring operators pay for only the functionality they require.

7750 SR-12e
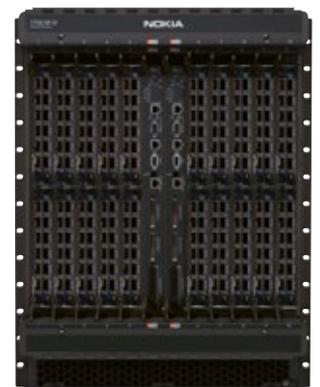
7750 SR-12

7750 SR-1

7750 SR-7

For service providers, the 7750 SR is deployed in data center, WAN and aggregation networks to support the full spectrum of provider edge and gateway functions to enable advanced residential, mobile and enterprise services. For webscale operators, the 7750 SR delivers high scale and comprehensive features for deployment in data centers and point-of-presence (PoP) locations to maximize application performance for exceptional customer experience. For enterprises, the 7750 SR provides high-performance IP routing, including connectivity to the data center, internet and WAN applications.

Features and benefits

FP4 - Deterministic performance

The 7750 SR leverages the latest generation of Nokia IP routing silicon, FP4, which combines a disaggregated, fully buffered chipset architecture and intelligent memory design to provide deterministic packet forwarding performance at scale, without compromise, even when complex processing-intensive operations are required. With the FP4 traffic manager, buffering is always deterministic, ensuring consistent system performance even when IP, MPLS, QoS and ACL capabilities are scaled concurrently. The 7750 SR delivers line-rate performance that does not degrade as advanced capabilities and applications are enabled.

Conversely, products with partially buffered chipset architectures typically result in non-deterministic performance and unpredictable system behavior as the scale on the chipset increases.

Highly scalable

The 7750 SR is available in four variants: 7750 SR-1, 7750 SR-7, 7750 SR-12, and 7750 SR-12e.

The 7750 SR has a modular system and line card architecture for a highly scalable platform. It scales in system capacity from 3.0 Tb/s half duplex (HD) to 27 Tb/s HD. It is equipped with high-density Gigabit Ethernet (GE), 10GE, 25GE, 40GE, 100GE and 400GE interfaces with flexible 10GE and 100GE optical breakout options.

Pay-as-you-grow licensing

A flexible FP4 pay-as-you-grow licensing model for the 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. 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 line card supports multiple combinations of these licenses to scale capacity and functional attributes, to cost-effectively scale the system while protecting hardware investments.

Comprehensive features

Nokia's feature-rich 64-bit SR OS addresses the full spectrum of IP routing requirements. With extensive QoS, IP/MPLS, segment routing and model-driven management capabilities, the 7750 SR has the intelligent capabilities and tools to define and deliver the most stringent SLAs and end-user quality of experience (QoE) requirements. With specialized application processing, the 7750 SR leverages embedded subscriber, service and application intelligence to enable deeper levels of integrated service capabilities. It 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. It supports a leading number of statistics counts per packet, enabling comprehensive statistics for existing and future applications.

Versatile platform

The comprehensive routing features of the SR OS enable the 7750 SR to support a full array of network functions and services. The SR OS combined with FP4-based licensing and line card modularity provides complete configuration versatility to support multiple network roles—all with deterministic performance on a single platform.

For service providers, the 7750 SR is deployed in WAN and aggregation networks to support IP edge and gateway functions, including: access

aggregation for broadband services and Broadband Network Gateway (BNG) for residential subscriber management; provider edge (PE) for enterprise VPN, internet access, and cloud and data center interconnect (DCI) services; and PE for backhaul, IPsec and security gateway, WLAN gateway and hybrid access gateway in IP mobile anyhaul. Value-added services include application assurance (AA) and carrier-grade Network Address Translation (NAT). In data centers, support includes gateway, interconnect and internet/peering functions.

The 7750 SR also functions as a mobile gateway supporting the user plane function (UPF) in 5G networks, SGW/PGW in 4G networks, GGSN in 2G/3G networks, PCEF for 2G/3G/4G access and ePDG/TWAG for Wi-Fi access—plus TDF and SSG for enhanced subscriber services.

For webscale companies, the 7750 SR delivers high scalability along with leading features for data center edge functions, including aggregation, gateway, interconnect and internet/peering. In the PoP it supports internet/peering edge and backbone router functions.

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

Intelligent fan-in/fan-out

To cost-effectively meet the most stringent high-density aggregation scenarios, the 7750 SR delivers unprecedented intelligent fan-in/fan-out (iFIFO) capabilities. This allows the 7750 SR to handle much more aggregation than capacity in an exceptionally smart way. The pre-classification and pre-buffering capabilities of FP4 allow for the 7750 SR to support up to three times intelligent aggregation per FP4-based line card. Packet priority is always respected and delivers leading ingress buffering and shaping in a fully deterministic way.

This differentiated approach to aggregation allows multiple network layers to be collapsed into a single layer, enables superior peering capabilities, and provides industry-leading support for a high degree of fractional flows. Where competing solutions do not support native aggregation or will drop traffic indiscriminately when oversubscribed, all

generations of FP are always deterministic and fully scheduled based on strict QoS priorities.

SDN integration and automation

The 7750 SR and 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 through CLI, NETCONF and gRPC/gNMI using YANG models.

In combination with the Nokia Network Services Platform (NSP), the 7750 SR can be deployed to introduce scalable and integrated SDN control across IP, MPLS, Ethernet and optical transport layers.

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. The NSP is further assisted by Deepfield analytics to support insight-driven automation of network and flow optimization as well as DDoS attack mitigation.

High availability

For always-on service delivery, the 7750 SR sets the benchmark for high availability. Moving beyond full system redundancy, the robust SR OS supports numerous features to maximize network stability, ensuring IP/MPLS protocols and services run without interruption. These features include innovative nonstop routing, nonstop services, in-service software upgrade (ISSU) and multi-chassis resiliency mechanisms.

Network management

The 7750 SR is managed by the Nokia NSP, supporting integrated element and network management with end-to-end orchestration of network resource provisioning and assurance operations.

Hardware overview

The 7750 SR is available in four chassis variants— the 7750 SR-1, 7750 SR-7, 7750 SR-12 and 7750 SR-12e. It supports a wide range of interface adapters and modules, integrated service adapters (ISAs) and common system modules optimized to address various network and function requirements. For details on the 7750 SR-s series, 7750 SR-e series and 7750 SR-a series, refer to the respective data sheets.

Switch Fabric Module (SFM6-12e)

The SFM6-12e enables 1.5 Tb/s FD (non-redundant) and 1.2 Tb/s FD (redundant) connectivity between all slots of the 7750 SR-12e chassis. The hot-swappable fabric cards are 3+1 redundant with active-active load-sharing design or 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 providing exclusive switching functions for the system.

Switch Fabric Module (SFM6-7/12)

The SFM6-7/12 enable 800 Gb/s FD (non-redundant) or 400 Gb/s FD (redundant) line rate connectivity between all slots of the 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 CPM5 is a pluggable, hot-swappable module housed in the SFM6-12e, SFM6-7/12, SFM5-7 and SFM5-12. The CPM5 provides the management, security and control plane processing for the 7750 SR-7, SR-12 and SR-12e. Redundant CPMs operate in a hitless, stateful failover mode. Central processing and memory are intentionally separated from the forwarding function on the interface modules to ensure system resiliency. Face plate interfaces include an RJ-45 BITS port, a 1PPS port and a 10/100/1000BASE (RJ-45) management interface port.

Input/Output Module (IOM)

IOMs are available in two hot-swappable types and provide the forwarding complex that performs functions such as packet lookups, traffic classification, processing and forwarding, service enablement and QoS.

The FP4-based IOM5-e supports up to two MDA-e-XPs. In the 7750 SR-12e it delivers up to 1.5 Tb/s FD (non-redundant) and 1.2 Tb/s FD (redundant) per-slot capacity. In the SR-7 and SR-12, it delivers up to 800 Gb/s FD (non-redundant) and up to 400 Gb/s FD (redundant) per-slot capacity. With iFIFO, the SR-12e supports up to 4.0 Tb/s FD per-slot capacity, and the SR-7 and SR-12 support up to 1.2 Tb/s FD per-slot capacity.

The FP3-based IOM4-e delivers up to 200 Gb/s FD per-slot performance and are supported on the SR-7, SR-12 and SR-12e.

7750 SR-1 compact system

Providing full SR OS capabilities in a compact 2RU form factor, the 3.0 Tb/s HD 7750 SR-1 has an integrated IOM5-e based on the FP4 silicon and a simplex control plane. It supports up to two MDA-e-XPs and supports up to 8.0 Tb/s HD capacity with iFIFO. It offers a flexible pay-as-you-grow licensing model with capacity and functional-level licensing options. It provides flexible entry points with growth options to tune requirements according to evolving needs, including iFIFO options—all enabled through software without hardware replacement. It provides full synchronization and Nokia 7210 Service Access Switch-S series (SAS-S) satellite system support for Ethernet port expansion. 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.

Media Dependent Adapter (MDA)

MDAs are available in two hot-swappable types. They provide modular interface connectivity along with a variety of interface types and density configurations. Ethernet types support ITU-T Sync-E and IEEE 1588v2 for synchronization requirements.

The MDA-e-XP provides up to 750 Gb/s FD performance in a half-slot adapter and supports QSFP-DD, QSFP28, SFP28, SFP+, QSFP+ and CFP2-DCO optics with optical breakout options, that include 10 x 10GE and 2 x 100GE. Universal face plate connectors give the MDA-e-XP the flexibility to configure any connector for any Ethernet speed. It is supported by the IOM5-e on the SR-1, SR-7, SR-12 and SR-12e.

The MDA-e provides up to 100 Gb/s FD performance and has variants that support MACsec and optical breakout options, including 10 x 10GE and 4 x 25GE. It is supported by the IOM4-e, IOM4e-B and IOM4-e-HS in the 7750 SR-7, SR-12 and SR-12e, and by the IOM-e in the 7750 SR-e series. The MDA-e supports a full range of QSFP28, SFP28, SFP, SFP+, CSFP, QSFP+ and CFP2 optics. Optical transport network (OTN) support includes ITU-T G.709 and FEC.

Integrated Media Module (IMM)

IMMs are line cards providing integrated processing and physical interfaces on a single module. IMMs are hot-swappable and provide high-capacity Ethernet interfaces that deliver up to 400 Gb/s FD per-slot performance. For synchronization requirements, they also support ITU-T Synchronous Ethernet (Sync-E) and IEEE 1588v2.

Multiservice Integrated Service Module (MS-ISM)

The MS-ISMs are hot-swappable, full-height resource modules. They provide specialized processing and buffering for deeper levels of integrated services and advanced applications. They leverage two embedded Integrated Service Adapter 2 (ISA2) general-purpose multicore processors and support up to 80 Gb/s of processing. Combination IMMs support Ethernet ports and an embedded ISA2, which supports up to 40 Gb/s of processing.

Multiservice Integrated Service Adapter 2 (MS-ISA2)

The MS-ISA2, common with the SR-7, SR-12 and SR-12e and the 7750 SR-e series, is a hot-swappable, half-height resource adapter. They provide specialized processing and buffering for deeper levels of integrated services and advanced applications. They deliver up to 40 Gb/s of processing and are supported by the IOM4-e.

Integrated Service Module - Mobile Gateway (ISM-MG)

ISM-MGs are hot-swappable, full-height modules that fit into any 7750 SR I/O slot and provide the bearer functions for 2G/3G/4G and Wi-Fi access networks.

Advanced Power Equalization Modules (APEQs)

APEQs provide power for the 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. APEQs support cost-effective modular expansion as required.

Power Entry Modules (PEMs)

PEMs provide low-voltage DC power for the SR-7 and 7750 SR-12 and support cost-effective modular expansion as required.

Power Supply Units (PSUs)

PSUs provide modular, redundant AC power for the 7750 SR-1.

Technical specifications

Table 1. Hardware specifications for the 7750 SR series

	7750 SR-12e	7750 SR-12	7750 SR-7	7750 SR-1
System capacity with FP4 3.0 Tb/s (HD)	• 27 Tb/s (non-redundant) • 21.6 Tb/s (redundant)	• 16 Tb/s (non-redundant) • 8 Tb/s (redundant)	• 8 Tb/s (non-redundant) • 4 Tb/s (redundant)	3.0 Tb/s
Slot capacity with FP4 3.0 Tb/s (FD)	• 1.5 Tb/s (non-redundant) • 1.2 Tb/s (redundant)	• 800 Gb/s (non-redundant) • 400 Gb/s (redundant)	• 800 Gb/s (non-redundant) • 400 Gb/s (redundant)	1.5 Tb/s
Slot capacity with iFIFO and FP4 3.0 Tb/s (FD)	4.0 Tb/s	1.2 Tb/s	1.2 Tb/s	4.0 Tb/s
Number of MDA-e/ MDA-e-XP/MDA/ ISA2 adapters	18	20	10	2; MDA-e-XPs only
Number of IOMs/ IMMs/ISMs	9	10	5	1; integrated IOM
Common equipment redundancy	SFM6-12e, Mini-SFM6-12e, SFM5-12e, Mini-SFM5-12e, CPM5, SF/CPM, APEQs, enhanced fan tray (EFT)	SFM6-7/12, SFM5-12, CPM5, SF/CPM, PEM, EFT	SFM6-7/12, SFM5-7, CPM5, SF/CPM, PEM, EFT	Fan module, PSU
Hot-swappable modules	SFM6-12e, Mini-SFM6-12e, SFM5-12e, Mini-SFM5-12e, IOM, IMM, ISM, MDA-e-XP, MDA-e, MDA-XP, MDA, ISA2, VSM, APEQ, EFT	SFM6-7/12, SFM5-12, CPM5, IOM, IMM, ISM, MDA-e-XP, MDA-e, MDA-XP, MDA, ISA2, VSM, EFT, PEM	SFM6-7/12, SFM5-7, CPM5, IOM, IMM, ISM, MDA-e-XP, MDA-e, MDA-XP, MDA, ISA2, VSM, EFT, PEM	MDA-e-XP, fan module, PSU
Dimensions	• Height: 97.8 cm (38.5 in), 22RU • Width: 44.5 cm (17.5 in) • Depth: 76.2 cm (30.0 in)	• Height: 62.2 cm (24.5 in), 14RU • Width: 44.5 cm (17.5 in) • Depth: 64.5 cm (25.4 in) Note: Dimensions without cable management	• Height: 35.6 cm (14.0 in), 8RU • Width: 44.5 cm (17.5 in) • Depth: 64.8 cm (25.5 in)	• Height: 9.53 cm (3.5 in), 2RU • Width: 48.3 cm (19.0 in) • Depth: 62.5 cm (24.6 in)
Weight	• Empty: 86.63 kg (191 lb) • Loaded: 211.83 kg (467 lb)	• Empty: 56.4 kg (124.3 lb) • Loaded: 155.7 kg (343.3 lb)	• Empty: 34 kg (75 lb) • Loaded: 70 kg (155 lb)	**DC system** • Empty: 15 kg (33.0 lb) **AC system** • Empty: 14.38 kg (31.7 lb)

Table 1. Hardware specifications for the 7750 SR series (continued)

	7750 SR-12e	7750 SR-12	7750 SR-7	7750 SR-1
Power	**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	**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, 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 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
Cooling	Front to back	Front to back	Side to back	Front to back

Table 2. Nokia 7750 SR MDA-e-XP and MDA-e overview

MDA type	Connectors / ports	Connector / port type	Maximum density			
			7750 SR-12e	7750 SR-12*	7750 SR-7*	7750 SR-1
MDA-e-XP						
400G/100G/40G/10GBASE **	6	QSFP-DD	72/360/108/1080	—	—	8/40/12/120
400G/100G/40G/10GBASE **	3	QSFP-DD	36/216/54/540	40/100/60/600	20/50/30/300	4/24/6/60
100G/40G/10GBASE **	12	QSFP28/QSFP+	216/216/2,160	—	—	24/24/240
100G/40G/10GBASE **	6	QSFP28/QSFP+	108/108/1,080	120/120/1,200	60/60/600	12/12/120
10G/25GBASE (MACsec) + 100G/40G/10GBASE **	16 + 2	SFP28/SFP+ + QSFP28/QSFP+	288 + 36/36/360	320 + 40/40/400	160 + 20/20/200	32 + 4/4/40
100GBASE **	3	CFP2-DCO/CFP2	108	60	30	12
MDA-e						
100G/40G/25G/10GBASE (MACsec)	2	QSFP28/QSFP+	36/36/144/144	40/40/160/160	20/20/80/80	—
100G/40GBASE	2	QSFP28/QSFP+	36	40	20	—
25G/10GBASE (MACsec)	8	SFP28/SFP+	144	160	80	—
100GBASE	1	CFP2	18	20	10	—
10GBASE	10, 6	SFP+	180, 108	200, 120	100, 60	—
10G/1000BASE (MACsec)	12	SFP+/SFP	216	240	100	—
1000BASE	40	CSFP/SFP	720	800	400	—

* The new ess-system-type BOF option allows a 7750 SR-7-B or SR-12-B chassis to operate as a 7450 ESS-7 or ESS-12 chassis.
** Leverages iFIFO based on 3.0 Tb/s FP4 silicon. The QSFP-DD MDA-e-XP requires a future 4 x 100GE QSFP56-DD breakout to get to the maximum 100GE connector density.

Data sheet
Nokia 7750 Service Router

Table 3. Nokia 7750 SR-1 and IOM5-e licensing overview

Type	System	Capabilities	
		Capacity licenses per slot (FD)	Functional licenses
	SR-1	System forwarding fixed at 1.5Tb/s (FD) with 3.0 Tb/s FP4 silicon. With iFIFO to 4Tb/s (FD). Available bandwidth is a function of inserted MDA-e-XP types.	• Core routing • Edge routing • High-scale edge routing
IOM5-e 400G	SR-7/SR-12 SR-12e	400 Gb/s with iFIFO of 1.2 Tb/s (redundant) 400 Gb/s with iFIFO of 4.0 Tb/s (redundant)	• Core routing • Edge routing • High-scale edge routing
IOM5-e 800G	SR-7/SR-12 SR-12e	800 Gb/s with iFIFO of 1.2 Tb/s (non-redundant) 800 Gb/s with iFIFO of 4.0 Tb/s (redundant)	• Core routing • Edge routing • High-scale edge routing
IOM5-e	SR-7/SR-12 SR-12e	800 Gb/s with iFIFO of 1.2 Tb/s (non-redundant) 1.2 Gb/s with iFIFO of 4.0 Tb/s (redundant) 1.5 Gb/s with iFIFO of 4.0 Tb/s (non-redundant)	• Core routing • Edge routing • High-scale edge routing

Table 4. Nokia 7750 SR IOM5-e functional licenses

Type	Number of egress hardware queues	Number of egress policers
Core routing	1,024	1,024
Edge routing	16,384	16,384
High-scale edge routing	128,000	Up to 384,000

Table 5. Nokia 7750 SR IMM overview

IMM type	Ports	Connector type	Maximum density		
			7750 SR-12e	7750 SR-12	7750 SR-7
100GBASE	4	CXP	36	—	—
100GBASE	2	CFP	18	20	10
10GBASE	40	SFP+	360	—	—
10GBASE	12, 20	SFP+	108, 180	120, 200	60, 100
10GBASE + 100/1000BASE	10/20	SFP+/SFP	90/180	100/200	50/100

Table 6. Nokia 7750 SR ISA support overview

ISA type	7750 SR-12e	7750 SR-12	7750 SR-7
Multiservice Integrated Service Adapter 2 (MS-ISA2)	√	√	√
Multiservice Integrated Service Module (MS-ISM)	√	√	√
Integrated Service Module - Mobile Gateway (ISM-MG)*	—	√	√

* See the ISM-MG data sheet for details. Support requires the SR OS-MG.

Feature and protocol support highlights

Feature and protocol support within the 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, and 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), and 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 GMPLS UNI, 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

- Multiple instance IS-IS and OSPF Segment Routing support with shortest path tunnel, Segment Routing - Traffic Engineering (SR-TE) LSP, and static and BGP SR policy. The 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. PCEP allows the 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), and in 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 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), Ethernet VPN (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), and Multicast VPN (MVPN), which includes Inter-AS MVPN and Next Generation MVPN (NG-MVPN)

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

- OAM: 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), cflowd, Two-Way Active Measurement Protocol (TWAMP/TWAMP-Light), and 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) and 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, and end-to-end consistent QoS regardless of oversubscription or congestion

- High availability: Nonstop routing[1], nonstop services[1], in-service software upgrade (ISSU)[1], fast reroute for IP, RSVP, LDP and segment routing, pseudowire redundancy, ITU-T G.8031 and G.8032, weighted ECMP, and weighted, mixed-speed link aggregation

Management features

- Model-driven management through the CLI, NETCONF and gRPC/gNMI using YANG models; streaming telemetry through gRPC/gNMI subscriptions

- Full SNMP management support, including configuration

- 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[2]

Environmental specifications

- Operating temperature: 5°C to 40°C (41°F to 104°F)

- Operating relative humidity:
  - 5% to 85% (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 60950.1

- AS/NZS 62368.1 (SR-7, SR-12, and SR-12e)

- IEC/EN 60825-1

- IEC/EN 60825-2

- IEC/EN/UL/CSA60950-1 Ed2 Am2

- IEC/EN/UL/CSA 62368-1 Ed2 (SR-7, SR-12, and SR-12e)

EMC emission

- AS/NZS CISPR 32 (Class A)

- CISPR 32 (Class A)

- EN 55032 (Class A)

- EN 61000-3-2 (SR-1, SR-12e)

- EN 61000-3-3 (SR-1, SR-12e)

- FCC Part 15 (Class A)

- ICES-003 (Class A)

- IEC 61000-6-4

- KN 32 (Class A)

- VCCI (Class A)

EMC immunity

- BT GS-7

- EN 55024

- ES 201 468 (7750 SR-1 only)

- ETSI EN 300 386

- IEC 61000-6-2

- KN 35

EMC radio

- EN 301 489-1 (7750 SR-1 only)

- EN 301 489-17 (Bluetooth; 7750 SR-1 only)

---

1 Requires redundant CPM modules
2 System design intent is according to the listed standards. Refer to product documentation for detailed compliance status.

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 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)
- ETSI 300 753 Acoustic Noise, Class 3.2 (7750 SR-1 only)

Directives, regional approvals and certifications

- CE Mark - Common Europe
- CRoHS - China RoHS (SR-7, SR-12, SR-12e)
- EU Directive 2011/65/EU Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (Recast) Directive (RoHS2)
- EU Directive 2012/19/EU Waste Electrical and Electronic Equipment (WEEE)
- EU Directive 2014/30/EU Electromagnetic Compatibility (EMC)
- EU Directive 2014/35/EU Low Voltage Directive (LVD)
- EU Directive 2014/53/EU Radio Equipment Directive (RED) (SR-1)
- KC Mark - South Korea
- NEBS Level 3
- RCM Mark - Australia
- VCCI Mark - Japan

Network Equipment Building System (NEBS)

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

MEF certifications

- CE 1.0 (MEF 9 and MEF 14)
- CE 2.0
  - Certified (on E-LAN, E-Line, E-Tree and E-Access MEF service types)
- 100G certified (on E-Line and E-Access MEF service types)

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