

Nokia 7750 SR-a Service Router

Release 20

The Nokia 7750 SR-a series of IP routers delivers the comprehensive features and platform versatility in a compact platform that is needed to stay ahead of evolving demands driven by 5G, cloud and the Internet of Things (IoT). The 7750 SR product family consists of the 7750 SR-s series, the 7750 SR series, the 7750 SR-a series and the 7750 SR-e series.

Compact platform

For service providers, the Nokia 7750 SR-a enables delivery of advanced residential, enterprise and mobile services. For webscale companies and enterprises, the 7750 SR-a provides high-performance networking for cloud, data center and WAN applications.

The 7750 SR-a is based on the Nokia FP3 network processing silicon and is available in 200 Gb/s half duplex (HD) and 400 Gb/s HD system capacities. Having a depth of just 24 cm, the 7750 SR-a4 measures 22 cm (5 RU) in height and the 7750 SR-a8 is 31 cm (7 RU) in height. For IP/optical integration applications requiring collocation with transport equipment, the 7750 SR-a easily fits into a 300-mm, ETSI-compliant cabinet. To ensure maximum system up time, the 7750 SR-a offers control plane and power redundancy, and all system components are modular and hot-swappable.

The 7750 SR-a delivers high-density Gigabit Ethernet (GE) and 10GE density and is ideally suited for GE and 10GE fan-out in subscribed and over-subscribed access and aggregation networks. With high-performance 40GE and 100GE interfaces, the 7750 SR-a can scale access and aggregation networks in step with evolving traffic demands for years to come.



7750 SR-a8



7750 SR-a4

Deterministic performance

The Nokia 7750 SR-a leverages the Nokia FP3, which combines a disaggregated chipset architecture and a flexible memory design to provide deterministic packet forwarding performance even when complex processing-intensive operations are required. With the FP3 traffic manager, buffering is always deterministic and does not degrade or cause control plane discards if the buffer rate increases—common occurrence for partially buffered chipsets.

Comprehensive features

Nokia's feature-rich 64-bit Service Router Operating System (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-a has the comprehensive features and tools to define and deliver the most stringent SLAs and end-user quality of experience (QoE) requirements. It supports thousands of IP flows and access control lists with high performance and scale even when multiple advanced features are enabled concurrently. The 7750 SR-a supports a leading number of statistics counts per packet, enabling comprehensive statistics for existing and future services.

Versatile platform

The 7750 SR-a supports a wide range of IP network functions and applications.

Service providers can use the 7750 SR-a in deployments for network functions, including: Broadband Network Gateway (BNG) for residential subscriber management; provider edge (PE) router for MPLS-enabled enterprise VPN, internet access, cloud services and data center interconnect; and as a mobile aggregation router for 3G, LTE and LTE-A backhaul.

For webscale companies and enterprises, the 7750 SR-a provides high-performance IP routing for cloud, data center and WAN applications.

Carrier SDN integration

The 7750 SR-a 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 cloud-ready 7750 SR-a can be deployed as part of a Carrier SDN solution, supporting unified service automation and network optimization 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.

Industrial environments

The 7750 SR-a series is designed to withstand stringent electromagnetic immunity levels for power utility substation and railway environments. The 7750 SR-a meets the IEEE 1613, IEC 61850-3 and EN50121-4 standards.

Network management

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

Hardware overview

The Nokia 7750 SR-a series is available in two chassis variants—the 7750 SR-a8 and the 7750 SR-a4—and supports a wide range of Ethernet interfaces and common system modules that are optimized to address various network and application requirements.

Control Processing Module (CPM-a)

The CPM-a, available in 8GB and 4GB DRAM variants, provides intelligent control and processing functionality. It offers optional 1+1 redundancy in an active-active load-sharing design and is hot-swappable. Redundant CPM-a's operate in a hitless, stateful failover mode. Central processing and memory are intentionally separated from the forwarding function on the interface modules to ensure utmost system resiliency. Timing, alarm and management ports are accessible from the face plate.

Input/Output Module (IOM-a)

Each IOM-a provides up to 100 Gb/s full duplex (FD) connectivity to MDA-a's and MDA-a XPs and is optimized for versatility in deploying a variety of Ethernet and IP-based services and applications. Each hot-swappable IOM-a uses a multi-core processor and supports up to four MDA-a and MDA-a XP modules. These FP3-based IOM-a modules provide forwarding and service functions along with high-end traffic management capabilities. The programmability of the FP3 ensures that services, applications and protocols can easily adapt to changing standards and requirements.

Media Dependent Adapter (MDA-a)

MDA-a's and MDA-a XPs provide physical Ethernet interface connectivity, are available in a variety of interface and density configurations and are hot-swappable. MDA-a XPs provide up to 100 Gb/s performance over 10GE, 40GE and 100GE interfaces. MDA-a's provide up to 25 Gb/s performance over GE and 10GE interfaces. They support a wide range of pluggable optical modules, including support for copper SFPs and digital diagnostic monitoring (DDM).

Power supply unit (PSU)

Modular, hot-swappable PSUs provide universal AC and/or -48 V DC power, with redundancy in a load-sharing design for each system. A power status LED is mounted on the face plate and is also available from the CLI or the Nokia NSP.

Fan tray

The fan tray provides side-to-side system cooling. For vertical mounting configurations, the fan tray supports front-to-back airflow. The fan tray has six redundant fans configured in a load-sharing design and is hot-swappable. Fans are variable speed for power efficiency. A power status LED is mounted on the face plate and is also available from the CLI or the Nokia NSP.

Technical specifications

Table 1. Technical specifications for the Nokia 7750 SR-a series

	7750 SR-a8	7750 SR-a4
System throughput (half duplex, maximum)	Up to 400 Gb/s	Up to 200 Gb/s
Number of MDA-a's and MDA-a XPs per chassis	8	4
Number of IOM-a's per chassis	2	1
Common equipment redundancy	CPM-a, PSU, fan	CPM-a, PSU, fan
Hot-swappable equipment	IOM-a, MDA-a, MDA-a XP, CPM-a, PSU, fan, fan filter	IOM-a, MDA-a, MDA-a XP, CPM-a, PSU, fan tray, fan filter
Dimensions	<ul style="list-style-type: none"> Height (7 RU): 31.11 cm (12.25 in) Width: 48.26 cm (19.0 in) Depth (300 mm ETSI-compliant): 24.8 cm (9.56 in) 	<ul style="list-style-type: none"> Height (5 RU): 22.23 cm (8.75 in) Width: 48.26 cm (19.0 in) Depth (300 mm ETSI-compliant): 24.28 cm (9.56 in)
Weight	Empty: 13.61 kg (30.0 lb) Full: 38.10 kg (84.0 lb)	Empty: 10.30 kg (22.71 lb) Full: 26.31 kg (58 lb)
Power	<ul style="list-style-type: none"> AC and DC power options 3 PSUs per chassis 2+1 redundancy 	<ul style="list-style-type: none"> AC and DC power options 2 PSUs per chassis 1+1 redundancy
Cooling	<ul style="list-style-type: none"> N+1 internal redundant fans Right-to-left airflow Variable speed for power efficiency 	<ul style="list-style-type: none"> N+1 internal redundant fans Right-to-left airflow Variable speed for power efficiency

Table 2. Nokia 7750 SR-a MDA-a XP and MDA-a summary

MDA-a type	Ports	Connector type	Maximum density	
			7750 SR-a8	7750 SR-a4
MDA-a XP				
10/1GBASE (MACsec)	10	SFP+/SFP	80	40
10GBASE	10	SFP+	80	40
40GBASE/10GBASE (combination)	1/6	QSFP+/SFP+	8/48	4/24
100GBASE	1	CFP2	8	4
MDA-a				
1000BASE	44 or 22	CSFP or SFP	352 or 176	176 or 88
10/100/1000BASE-TX	20	RJ-45	160	80
10GBASE/1000BASE (combination)	2/12	SFP+/SFP	16/96	8/48
10GBASE	4	SFP+	32	16

Feature and protocol support highlights

Feature and protocol support within the Nokia 7750 SR-a 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 VRF, and in a wide range of routing and service contexts such as Global Routing table, VPRN, VPLS and E-PIPE service; supports control interfaces such as OpenFlow, FlowSpec, CLI and NETCONF

- Multivendor SDN control integration through OpenFlow, PCEP, 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 (ELAN): BGP-VPLS (Virtual Private LAN Service), Provider Backbone Bridging for VPLS (PBB-VPLS), Ethernet VPN (EVPN) and PBB-EVPN
- E-Line: BGP-VPWS (Virtual Private Wire Service), 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 Service Access Switch (SAS)-S series GE, 10GE, 100GE and SONET/SDH satellite variants, offering 24/48xGE ports, 64xGE/10GE ports or legacy SONET/SDH ports over GE, 10GE and 100GE uplinks
- OAM: Extensive fault and performance 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 (PTP), Network Time Protocol (NTP), BITS ports (T1, E1, 2M) and 1PPS
- QoS: Flexible intelligent packet classification; ingress and egress hierarchical QoS with multi-tiered shaping; advanced, scalable network and service QoS, and end-to-end consistent QoS regardless of oversubscription or congestion
- High availability: Nonstop routing¹, nonstop services¹, 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 support²

Environmental specifications

- Normal operating temperature: -5°C to +55°C (23°F to 131°F)
- Normal operating relative humidity: 5% to 95% (non-condensing)
- Operating altitude: Up to 4000 m (13,123 ft)

Safety

- AS/NZS 60950.1
- CSA/UL 60950-1 2nd Ed NRTL
- EN 60950-1 2nd Ed CE Mark
- IEC 60950-1 2nd Ed CB Scheme
- IEC/EN 60825-1
- IEC/EN 60825-2

EMC

- AS/NZS CISPR 32 Class A
- BT GS-7
- EN 300 386
- EN 55024
- EN 55032 Class A
- ETSI EN 300 132-2
- ETSI EN 300 132-3
- ES 201 468
- FCC Part 15 Class A
- GR-1089-CORE
- ICES-003 Class A
- IEC 61000-6-2
- IEC 61000-6-4
- IEC CISPR 24
- IEC CISPR 32 Class A
- IEC/EN 61000-3-2 Power Line Harmonics
- IEC/EN 61000-3-3 Voltage Fluctuations and Flicker
- IEC/EN 61000-4-2 ESD
- IEC/EN 61000-4-3 Radiated Immunity
- IEC/EN 61000-4-4 EFT

Telecom standards

- ITU-T G.813

Environmental

- ATIS-0600010.03
- ATIS-0600015
- ATIS-0600015.03
- ATT-TP-76200

¹ Requires redundant CPM-a's

² System design intent is according to the listed standards. Refer to product documentation for detailed compliance status.

- 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 300 753 Acoustic Noise, Class 3.2
- GR-63-CORE
- GR-295-CORE
- VZ-TPR-9205
- VZ-TPR-9305
- EU Directive 2014/35/EU Low Voltage Directive (LVD)
- KC Mark - South Korea
- NEBS Level 3
- RCM Mark - Australia
- VCCI Mark - Japan

Directives, regional approvals and certifications

- CE Mark - Common Europe
- EU Directive 2011/65/EU Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS2)
- EU Directive 2012/19/EU Waste Electrical and Electronic Equipment (WEEE)
- EU Directive 2014/30/EU Electromagnetic Compatibility (EMC)

Power utility substations

- IEEE 1613 (exception, forced air system)
- IEEE 1613.1 Zone A
- IEC 61000-6-5
- IEC 61850-3 (normal environmental conditions)
- IEC/AS 60870.2.1

Railway

- EN 50121-4
- IEC 62236-4

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

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