Nokia 7750 SR-e Service Router
Release 19

The Nokia 7750 SR-e series of IP routers deliver high performance, comprehensive features and resiliency. Designed to stay ahead of evolving service demands driven by the cloud, 5G and the Internet of Things, 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.

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

As an extension to the Nokia 7750 SR product family, the Nokia FP3-based 7750 SR-e scales system capacity from 400 Gb/s half duplex (HD) to 1.2 Tb/s HD. To extend the network edge closer to end users, the 7750 SR-e has the service scale to support multiple applications and functions onto a common platform. The 7750 SR-e’s innovative NEBS-compliant front-to-back thermal design provides the foundation for future growth and delivers investment protection.

The 7750 SR-e delivers high-density Gigabit Ethernet (GE), 10GE and 25GE 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-e can scale access and aggregation networks in step with evolving traffic demands for years to come.
Deterministic performance
The Nokia 7750 SR-e leverages the Nokia 400 Gb/s FP3, which combines a multichip 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.

Comprehensive features
With Nokia’s feature-rich 64-bit Service Router Operating System (SR OS) and extensive QoS, IP/MPLS and segment routing capabilities, the 7750 SR-e 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-e supports a leading number of statistics counts per packet, enabling comprehensive statistics for existing and future applications.

Full array of IP routing functions
The 7750 SR-e supports a full array of IP network functions and applications.

Service providers can use the 7750 SR-e in deployments supporting multiple network functions, including: Broadband Network Gateway (BNG) for residential subscriber management; provider edge (PE) router for MPLS-enabled enterprise VPN, internet access and cloud services and data center interconnect; mobile applications, including as an aggregation router for 3G, LTE and LTE-A backhaul, a WLAN gateway for Wi-Fi® network aggregation, and a security gateway for securing backhaul networks; and value-added services, including application assurance (AA) and carrier-grade Network Address Translation (NAT).

For webscale companies, the 7750 SR-e delivers leading features for data center aggregation, gateway and interconnect, along with PoP edge and internet peering functions.

For enterprises, the 7750 SR-e provides high-performance IP routing for cloud, data center and wide area networking applications.

High availability
For always-on service delivery, the Nokia 7750 SR-e 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.

Carrier SDN integration
Multivendor software defined networking (SDN) control integration is enabled through OpenFlow, Path Computation Element Protocol (PCEP), BGP-LS and NETCONF/YANG interfaces. In combination with the Nokia Network Services Platform (NSP), the cloud-ready 7750 SR-e 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.

IP/optical integration
A standards-based GMPLS user-network interface (UNI) enables the 7750 SR-e to efficiently coordinate IP routing and transport requirements across administrative boundaries and dynamically provision and protect optical segments and end-to-end transport connections.

Network management
The 7750 SR-e is fully managed by the Nokia NSP, resulting in integrated network management across the network infrastructure of service providers, webscale companies and enterprises.
Hardware overview

The Nokia 7750 SR-e series uses a mid-plane system architecture and is available in three chassis variants—the 7750 SR-3e, 7750 SR-2e, and 7750 SR 1e. It supports a wide range of Ethernet interfaces, integrated service adapters (ISAs) and common system modules that are optimized to address various network and application requirements.

Control Processing Module (CPM-e)

The CPM-e provides intelligent control and processing functionality. It is mounted in the rear of the chassis, offers optional 1+1 redundancy and is hot-swappable. Redundant CPM-e’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.

Chassis Control Module (CCM-e)

The CCM-e provides an interface to the CPM-e. It is mounted on the front of the chassis and is hot-swappable. It provides a one-to-one relationship with its associated CPM-e. For timing and synchronization, each CCM-e has an RJ-45 BITS port and a 1PPS port. For management, each CCM-e supports a 10/100/1000BASE (RJ-45) management interface: an RJ-45 serial console port (DCE/DTE switch). Alarms include the CPM-e status LED along with critical, major and minor alarm LEDs with a reset button. The module is also equipped with dry contacts to support alarm inputs and outputs (using a +24 V DC internal power source).

Input/Output Module (IOM-e)

Each IOM-e provides up to 200 Gb/s (full duplex) connectivity to MDA-e and MS-ISA2 modules and is hot-swappable. It is optimized for versatility in deploying a variety of Ethernet and IP-based services and applications. Each IOM-e uses a multicore processor and supports up to four MDA-e and MS-ISA2 modules. IOMs are FP3-based modules and provide the 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 as standards and requirements evolve.

Media Dependent Adapter (MDA-e)

The MDA-e provides up to 100 Gb/s FD throughput and provides physical Ethernet interface connectivity. It is available in a variety of interface and density configurations and is hot-swappable. It is supported by the IOM-e in the 7750 SR-e series and also by IOM4-e variants in 7750 SR-12e, SR-12 and SR-7 systems. For synchronization requirements, they support ITU-T Synchronous Ethernet (Sync-E) and IEEE 1588v2. Optical transport network (OTN) support includes ITU-T G.709 and FEC.

Multiservice Integrated Service Adapter 2 (MS-ISA2)

MS-ISA2s, common with the 7750 SR series (SR-12e, SR-12 and SR-7) and the SR-e series, are resource adapters that provide specialized processing and buffering for deeper levels of integrated services and advanced applications. They leverage Nokia FP3 network processing silicon to deliver up to 40 Gb/s of integrated service and application processing in a hot-swappable, half-slot form factor that inserts into an IOM-e.

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. Each system also supports a mix of AC and DC PSUs. A power status LED is mounted on the face plate. The power status is also available from the CLI or the Nokia NSP.

Fan tray

A single, hot-swappable fan tray provides front-to-back system cooling. The fan tray has redundant fans configured in a load-sharing design. Fans are variable-speed for power efficiency. A fan status LED is mounted on the face plate. The fan status is also available from the CLI or the Nokia NSP. Each system is also equipped with a fan filter.
## Technical specifications

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

<table>
<thead>
<tr>
<th></th>
<th>7750 SR-3e</th>
<th>7750 SR-2e</th>
<th>7750 SR-1e</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System throughput</strong>&lt;br&gt;(half duplex, max)</td>
<td>Up to 1.2 Tb/s</td>
<td>Up to 800 Gb/s</td>
<td>Up to 400 Gb/s</td>
</tr>
<tr>
<td><strong>Number of MDA-e’s and MS-ISA2s per chassis (max)</strong></td>
<td>12</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td><strong>Number of IOM-e’s per chassis (max)</strong></td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Common equipment redundancy</strong></td>
<td>CPM-e, CCM-e, PSU, fan</td>
<td>CPM-e, CCM-e, PSU, fan</td>
<td>CPM-e, CCM-e, PSU, fan</td>
</tr>
<tr>
<td><strong>Hot-swappable equipment</strong></td>
<td>IOM-e, MDA-e, MS-ISA2, CPM-e, CCM-e, PSU, fan tray, fan filter</td>
<td>IOM-e, MDA-e, MS-ISA2, CPM-e, CCM-e, PSU, fan tray, fan filter</td>
<td>IOM-e, MDA-e, MS-ISA2, CPM-e, CCM-e, PSU, fan tray, fan filter</td>
</tr>
</tbody>
</table>
| **Dimensions**<sup>*</sup> | • Height (13 RU): 57.8 cm (22.75 in)  
• Width: 44.45 cm (17.5 in)  
• Depth (600 mm ETSI-compliant): 53.8 cm (21.2 in) | • Height (10 RU): 44.5 cm (17.5 in)  
• Width: 44.45 cm (17.5 in)  
• Depth (600 mm ETSI-compliant): 53.8 cm (21.2 in) | • Height (6 RU): 26.7 cm (10.5 in)  
• Width: 44.45 cm (17.5 in)  
• Depth (600 mm ETSI-compliant): 53.8 cm (21.2 in) |
| **Weight**<sup>*</sup> | 83.9 kg (184.6 lb) [Note: Fully configured] | 68.4 kg (150.5 lb) [Note: Fully configured] | 44.9 kg (98.8 lb) [Note: Fully configured] |
| **Power** | • AC and DC power options  
• Up to 8 PSUs per chassis  
• N+1 redundancy | • AC and DC power options  
• Up to 8 PSUs per chassis  
• N+1 redundancy | • AC and DC power options  
• Up to 4 PSUs per chassis  
• N+1 redundancy |
| **Cooling** | • N+1 internal redundant fans  
• Front-to-back airflow  
• Variable speed for power efficiency | • N+1 internal redundant fans  
• Front-to-back airflow  
• Variable speed for power efficiency | • N+1 internal redundant fans  
• Front-to-back airflow  
• Variable speed for power efficiency |

* Dimensions and weights are approximate and subject to change. Refer to the appropriate installation guide for the current dimensions and weights.

**Table 2. Nokia 7750 SR-e MDA-e summary**

<table>
<thead>
<tr>
<th>MDA-e type</th>
<th>Ports</th>
<th>Connector type</th>
<th>Maximum density</th>
</tr>
</thead>
<tbody>
<tr>
<td>100GBASE/40GBASE/25GBASE/10GBASE (MACsec)</td>
<td>2</td>
<td>QSFP28/QSFP+</td>
<td>24/24/96/96</td>
</tr>
<tr>
<td>100GBASE/40GBASE/25GBASE/10GBASE</td>
<td>2</td>
<td>QSFP28/QSFP+</td>
<td>24/24/96/96</td>
</tr>
<tr>
<td>100GBASE</td>
<td>1, 2</td>
<td>CFP2, CFP4</td>
<td>12, 24</td>
</tr>
<tr>
<td>10GBASE</td>
<td>10, 6</td>
<td>SFP+</td>
<td>120, 72</td>
</tr>
<tr>
<td>10GBASE/1000BASE (MACsec)</td>
<td>12</td>
<td>SFP+/SFP</td>
<td>144</td>
</tr>
<tr>
<td>1000BASE</td>
<td>40 or 20</td>
<td>CSFP/SFP</td>
<td>480 or 240</td>
</tr>
</tbody>
</table>

**Table 3. Nokia 7750 SR MS-ISA2 summary**

<table>
<thead>
<tr>
<th>ISA type</th>
<th>Chassis variant</th>
</tr>
</thead>
</table>
| MS-ISA2  | 7750 SR-3e  
7750 SR-2e  
7750 SR-1e |
Feature and protocol support highlights

Feature and protocol support in the Nokia 7750 SR-e series includes but is not limited to the following.

IP and MPLS routing features
- IP unicast routing: Routing Information Protocol (RIP), Intermediate System-to-Intermediate System (IS-IS), Open Shortest Path First (OSPF), 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), 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 and 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. 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 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

Layer 2 features
- Ethernet LAN (E-LAN): 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
- EVPN: EVPN-VXLAN (Virtual eXtensible LAN) to VPLS/EVPN-MPLS gateway functions

Layer 3 features
- IP-VPN, enhanced internet services, EVPN for Layer 3 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 24/48 x GE ports, 64 x GE/10GE ports or legacy SONET/SDH ports over GE, 10GE and 100GE uplinks
- OAM: Extensive fault and performance 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), and a full suite of MPLS 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 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, nonstop services, ISSU, 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 network element management through CLI, NETCONF and gRPC/gNMI using YANG models
- Full SNMP management support including configuration
- Comprehensive network and node management through the Nokia NSP

**Standards support**

**Environmental specifications**

- Operating temperature: 5°C to 40°C (41°F to 104°F)
- Normal operating relative humidity: 5% to 95% (non-condensing)
- Operating altitude: Up to 4000 m (13,123 ft) at 30°C (86°F)

**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 55032 Class A
- EN 55024
- ES 201 468
- ETSI EN 300 132-2
- ETSI EN 300 132-3
- 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
- IEC/EN 61000-4-5 Surge
- IEC/EN 61000-4-6 Conducted Immunity
- IEC/EN 61000-4-11 Voltage Interruptions
- KCC Korea-Emissions & Immunity (in accordance KN32/35)
- VCCI Class A

**Telecom standards**

- ATIS 0900101
- ITU-T G.813

**Environmental**

- ATIS-0600010.03
- ATIS-0600015
- ATIS-0600015.03
- 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

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1 System design intent is according to standards listing. Refer to product documentation for detailed compliance status.
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Directives, regional approvals and certifications

- 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

- CE Mark - Common Europe
- Designed to comply with MEF CE 2.0
- 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)
- KC Mark - South Korea
- NEBS Level 3
- RCM Mark - Australia
- VCCI Mark - Japan