

Nokia 7750 SR-s Service Router

Input/Output Modules

Leveraging breakthrough Nokia FP5 routing silicon, the Nokia 7750 SR-s series of Input/Output Modules^{2-se} (IOM2-se) enables up to 6.0 Tb/s full duplex (FD) per slot of energy-efficient capacity and delivers highly scalable IP/MPLS routing and packet processing capabilities to support the full array of IP edge, core, peering, gateway and aggregation applications.

Overview

Nokia's industry-leading FP5 routing silicon powers a new generation of IOM2-se modules. Available in 3.0 Tb/s FD and 6.0 Tb/s FD variants, the IOM2-se doubles the throughput capacity over FP4-based IOM-s modules. With intelligent aggregation (IA), capacity increases to 12.8 Tb/s per slot. It delivers line-rate performance that does not degrade as advanced capabilities and applications are enabled.

The IOM2-se enables interface modularity by housing up to two, half-slot Media Dependent Adapter-se (MDA-se) variants. This combination enables exceptional configuration versatility, allowing operators to mix and match IOM2-se and MDA-se variants to support 800G QSFP-DD, 400G QSFP112, 200G SFP-DD and CFP2-DCO interfaces in a single slot while supporting the full array of IP networking applications and services and protecting hardware investments over time.

Leveraging FP5 silicon, the IOM2-se/MDA-se combination unlocks the benefits of energy-efficient 800GE routing. FP5 consumes 75 percent less energy than previous-generation FP4 silicon—all while delivering unmatched real-world deterministic performance. FP5 silicon supports 112G SERDES, enabling a new generation of energy-efficient 800G QSFP-DD, 400G QSFP-DD, 400G QSFP112 and 200G SFP-DD optics and delivers higher densities with 2 x 400GE and 8 x 100GE optical breakout options.



6.0 Tb/s IOM2-se



3.0 Tb/s IOM2-se

The IOM2-se performs packet lookups, traffic classification, packet processing, service enablement and QoS, and it enables forwarding through the MDA-se adapter.

Software pay-as-you-grow hardware licensing enables options through the IOM2-se to expand capacity and QoS scaling capabilities, allowing operators to scale capabilities as needs evolve. Software licensing of Nokia Service Router Operating System (SR OS) features gives the IOM2-se the versatility to support the full breadth of demanding IP edge and core applications, including broadband network gateway (BNG), security gateway, provider edge, interconnect peering and backbone infrastructure—all on a common platform with performance certainty.

Capacity, licensing and interface modularity

Designed to address the challenge of scaling network capacity with interface modularity in more efficient and profitable ways, the IOM2-se is supported on Nokia 7750 SR-2se, SR-7s and SR-14s systems. The IOM2-se provides flexible capacity and functionality through licensing and enables per-slot interface modularity.

The flexible pay-as-you-grow licensing model provides a choice of entry points for immediate requirements and the ability to scale in place for evolving needs with software-only upgrades. With capacity licenses, customers can start the 3.0 Tb/s FD IOM2-se at 1.6 Tb/s FD and expand to 3.0 Tb/s FD later. With the 6.0 Tb/s FD IOM2-se, customers can start at 3.2 Tb/s FD and expand to 6.0 Tb/s FD as required. Functional licenses scale egress hardware queues and egress policers for the desired edge and core routing application. The IOM2-se supports multiple combinations of these licenses.

The IOM2-se enables interface modularity and density through the half-slot MDA-se. It provides a variety of connector types, density configurations and optical breakouts to maximize system configuration versatility and investment protection. The IOM2-se is supported on Nokia 7750 SR-2se, SR-7s and SR-14s systems.

- 3 Tb/s FD IOM2-se
 - Capacity licenses: 1.6 Tb/s FD and 3.0 Tb/s FD; up to 12.8 Tb/s FD with IA
 - Functional licenses: core routing, edge routing and high-scale edge routing
 - Interface modularity: Supports up to two MDA-se variants, in any combination:
 - 14-connector 800G QSFP-DD and 4-connector 400G QSFP112 MDA-se
 - 6-connector 800G QSFP-DD MDA-se
 - 24-connector 200G SFP-DD MDA-se
 - 6-connector CFP2 DCO MDA-se

- 6 Tb/s FD IOM2-se
 - Capacity licenses: 3.2 Tb/s FD and 6.0 Tb/s FD; up to 12.8 Tb/s FD with IA
 - Functional licenses: core routing, edge routing and high-scale edge routing
 - Interface modularity: Supports up to two MDA-se variants, in any combination:
 - 14-connector 800G QSFP-DD and 4-connector 400G QSFP112 MDA-se
 - 6-connector 800G QSFP-DD MDA-se
 - 24-connector 200G SFP-DD MDA-se
 - 6-connector CFP2 DCO MDA-se

Design innovations

The mechanical and thermal design innovations of the IOM2-se and MDA-se are focused on optimizing air flow and cooling, allowing for a full set of coherent 400G ZR/ZR+ and 800G optics in all cages without restrictions.

The IOM2-se and MDA-se combination is designed with a dual-sided PCB with belly-to-belly optical cages that use dedicated heat sinks per cage. Hexagonal mesh air intakes and exhausts provide a 90 percent open faceplate compared to a 50-60 percent open faceplate with classic datacenter cooling that uses holes punched in bent metal. This design allows more air to enter, enabling more efficient cooling and lower energy consumption. These innovations enable a full set of coherent optics to be used in every single cage without restriction.

Modular architecture

The architecture of 7750 SR-s chassis-based systems (see Figure 1 and Table 1) enables exceptional modularity and investment protection.

Figure 1. 7750 SR-s modular hardware architecture

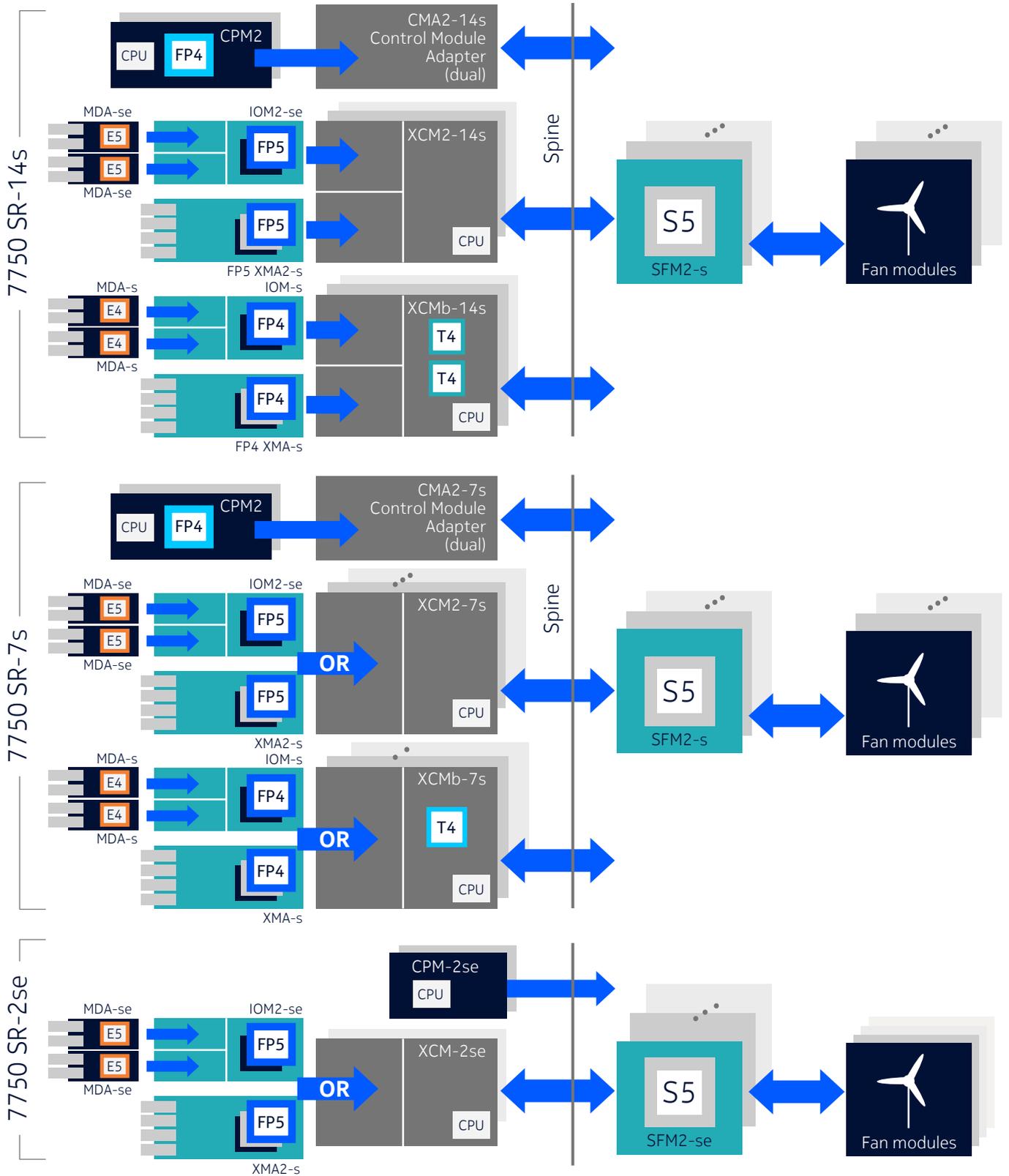


Table 1. 7750 SR-s hardware combinations and system configurations

	Expandable media adapters and input/output modules	XMA control modules	Switch fabric modules
7750 SR-14s	12 x XMA2-s, XMA-s, IOM2-se/MDA-se, IOM-s/MDA-s	6 x XCM2-14s: Two XMA2-s per XCM2-14s or 6 x XCMb-14s: Two XMA-s per XCMb-14s	8 SFM-s: Installed at rear
7750 SR-7s	6 x XMA2-s, XMA-s, IOM2-se/MDA-se, IOM-s/MDA-s	6 x XCM2-7s: One XMA2-s per XCM2-7s or 6 x XCMb-7s: One XMA-s per XCMb-7s	4 SFM-s: Installed at rear
7750 SR-2se	2 x XMA2-s, IOM2-se/MDA-se	2 x XCM2-2se: One XMA2-s per XCM2-2se	4 SFM-s: Installed at rear

Each eXtensible Media Adapter2-s (XMA2-s) contains the interfaces, FP5 MAC (E5) and FP5 packet processing elements that perform forwarding functions, including IP/MPLS. The IOM2-se contains the FP5 packet processing elements and each inserted MDA-se provides the interfaces and FP5 MAC (E5). The S5 ASIC on each Switch Fabric Module2-s (SFM2-s) and SFM2-se implements fabric forwarding functions using our single-stage crossbar cell-based fabric.

When configured as shown in Figure 1, the XMA2-s and IOM2-se inserts into an XMA2-s Control Module (XCM2). Each XCM2 supports a local dedicated multicore CPU, which increases control plane processing speed and convergence by an order of magnitude compared to distributed systems that lack local CPUs.

The system design leverages an orthogonal direct cross-connect design. With this design, there is no backplane, no midplane and no series of midplane connectors. Each Control Processing Module2-s (CPM2-s) provides the management, security and control plane processing for the 7750 SR-s.

This industry-leading design provides unrivalled versatility, allowing operators to mix and match XMA2-s, XMA-s, IOM2-se/MDA-se and IOM/MDA-s line cards in a single modular system to meet slot capacity, density, interface and power requirements. The design also provides pay-as-you-grow software licensing flexibility to meet future requirements without needing to replace hardware.



Technical specifications

Table 2. Nokia 7750 SR-s IOM2-se hardware specifications

	3 Tb/s IOM2-se	6 Tb/s IOM2-se
Capacity (FD)	3.0 Tb/s	6.0 Tb/s
Adapter (half slot) slot capacity (FD)	1.5 Tb/s	3.0 Tb/s
Capacity with intelligent aggregation (FD)	12.8 Tb/s	12.8 Tb/s
7750 SR-s system support	7750 SR-2se, SR-7s, SR-14s	7750 SR-2se, SR-7s, SR-14s
Adapters per IOM2-se	2	2
Adapter variants supported	MDA-se	MDA-se
Hot swappable	Yes	Yes
Dimensions	<ul style="list-style-type: none">• Height: 6.01 cm (2.37 in)• Width: 40.6 cm (16.0 in)• Depth: 39.14 cm (15.41 in)	<ul style="list-style-type: none">• Height: 6.01 cm (2.37 in)• Width: 40.6 cm (16.0 in)• Depth: 39.14 cm (15.41 in)

Table 3. Nokia 7750 SR-s IOM2-se hardware licensing overview

IOM2-se variant	Capacity licenses	Functional licenses
3 Tb/s IOM2-se	1.6 Tb/s FD 3 Tb/s FD with an IA of 12.8 Tb/s	<ul style="list-style-type: none">• Core routing• Edge routing• High-scale edge routing
6 Tb/s IOM2-se	3.2 Tb/s FD 6 Tb/s FD with an IA of 12.8 Tb/s	<ul style="list-style-type: none">• Core routing• Edge routing• High-scale edge routing

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

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