

Nokia 7750 SR-s Service Router

eXpandable Media Adapters

Leveraging breakthrough Nokia FP5 routing silicon, the Nokia 7750 SR-s series of eXpandable Media Adapters 2 (XMA2-s) provides high-density, power-efficient 800GE, 400GE and 100GE interfaces, up to 19.2 Tb/s full duplex (FD) per slot forwarding capacity and highly scalable IP/MPLS routing and packet processing capabilities to support the full array of edge, core and smart aggregation applications.

Overview

Nokia's industry-leading FP5 routing silicon powers a new generation of line cards with variant options of 3 Tb/s FD 400G QSFP112, 6 Tb/s FD 800G QSFP-DD, 12 Tb/s FD 800G QSFP-DD and 18 Tb/s FD 800G QSFP-DD. With intelligent aggregation (IA) enabled, slot capacity increases up to 19.2 Tb/s FD.

Leveraging FP5 silicon, the XMA2-s unlocks the benefits of power-efficient 800GE routing. FP5 delivers a capacity increase of more than three times and consumes 75 percent less power than previous-generation FP4 silicon—all while delivering unmatched real-world, deterministic network performance. FP5 supports 112G SERDES, enabling a new generation of power-efficient optics and higher densities with 2 x 400GE and 8 x 100GE optical breakout options.

Software pay-as-you-grow hardware licencing enables per-line-card options to expand capacity, density, optics and QoS scaling capabilities, allowing operators to scale capabilities as needs evolve. Software licencing of Nokia Service Router Operating System (SR OS) features gives the XMA2-s the versatility to support the full breadth of demanding IP edge and core needs, including broadband network gateway (BNG), security gateway, interconnect peering and backbone infrastructure—all on a common platform with performance certainty.



36-connector 18 Tb/s 800G QSFP-DD XMA2-s



36-connector 12 Tb/s 800G QSFP-DD XMA2-s



36-connector 6 Tb/s 800G QSFP-DD XMA2-s



36-connector 3 Tb/s 400G QSFP112 XMA2-s

Speed and capacity

Designed to address the challenge of increasing network capacity in more efficient and profitable ways, the XMA2-s is supported on Nokia 7750 SR-2se, SR-7s and SR-14s systems and is available in four base licensed variants:

- 3 Tb/s FD 400G QSFP112 XMA2-s
 - 36-connector 100G QSFP, 2.4 Tb/s FD
 - 36-connector 400G QSFP112, 3 Tb/s FD; up to 9.6 Tb/s FD with IA
- 6 Tb/s FD 800G QSFP-DD XMA2-s
 - 36-connector 400G QSFP-DD, 4.8 Tb/s FD
 - 36-connector 800G QSFP-DD, 6 Tb/s FD; up to 19.2 Tb/s FD with IA
- 12 Tb/s FD 800G QSFP-DD XMA2-s
 - 36-connector 400G QSFP-DD, 9.6 Tb/s FD
 - 36-connector 800G QSFP-DD, 12 Tb/s FD; up to 19.2 Tb/s FD with IA
- 18 Tb/s FD 800G QSFP-DD XMA2-s
 - 36-connector 400G QSFP-DD, 14.4 Tb/s FD
 - 36-connector 800G QSFP-DD, 18 Tb/s FD; up to 19.2 Tb/s FD with IA

Universal connectors and optical breakouts

With universal connectors, the XMA2-s can support any speed on any connector, including 10GE, 25GE, 100GE, 400GE and 800GE, including clear-channel 1 x 800G support with full breakout options on all connectors.

Each connector supports a wide variety of 800G, 400G and 100G pluggable optics. Optical breakout options include 2 x 400G, 8 x 100G, 4 x 100G, 2 x 100G, 4 x 25G, 10 x 10G and 4 x 10G.

Pay-as-you-grow licensing

The flexible pay-as-you-grow licensing model for hardware capacity and functions provides a choice of entry points for immediate requirements and the ability to scale in-place for evolving needs with software-only upgrades.

For example, with the XMA2-s, customers have the option to start with 400G and a capacity of 9.6 Tb/s FD or 14.4 Tb/s FD and enable 800G later with capacity options of 12 Tb/s FD or 18 Tb/s FD.

Functional licenses additionally scale egress hardware queues and egress policers. The XMA2-s supports multiple combinations of these licenses.

Design innovations

The mechanical and thermal design innovations of the XMA2-s 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 XMA2-s 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 data center cooling that uses holes punched in bent metal. The XMA2-s design allows more air to enter, enabling more efficient cooling and lower power consumption. These innovations enable a full set of coherent optics to be used in every single cage without restriction.

Backwards compatibility

Proven across five generations of FP silicon, each new generation of FP silicon supports seamless backwards compatibility to extend the product life. Operators can upgrade deployed 7750 SR-s systems to FP5 performance capabilities one slot at a time while preserving FP4 investments.

In the 7750 SR-7s and 7750 SR-14s, FP4-based XMA-s and FP5-based XMA2-s run concurrently at line rate in the same system. When moving to FP5 in these systems, there are no power upgrades, no fan upgrades and no control upgrades required. FP4 and FP5 each run at full line rate and full scale with no feature trade-offs in a mixed operational environment.

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

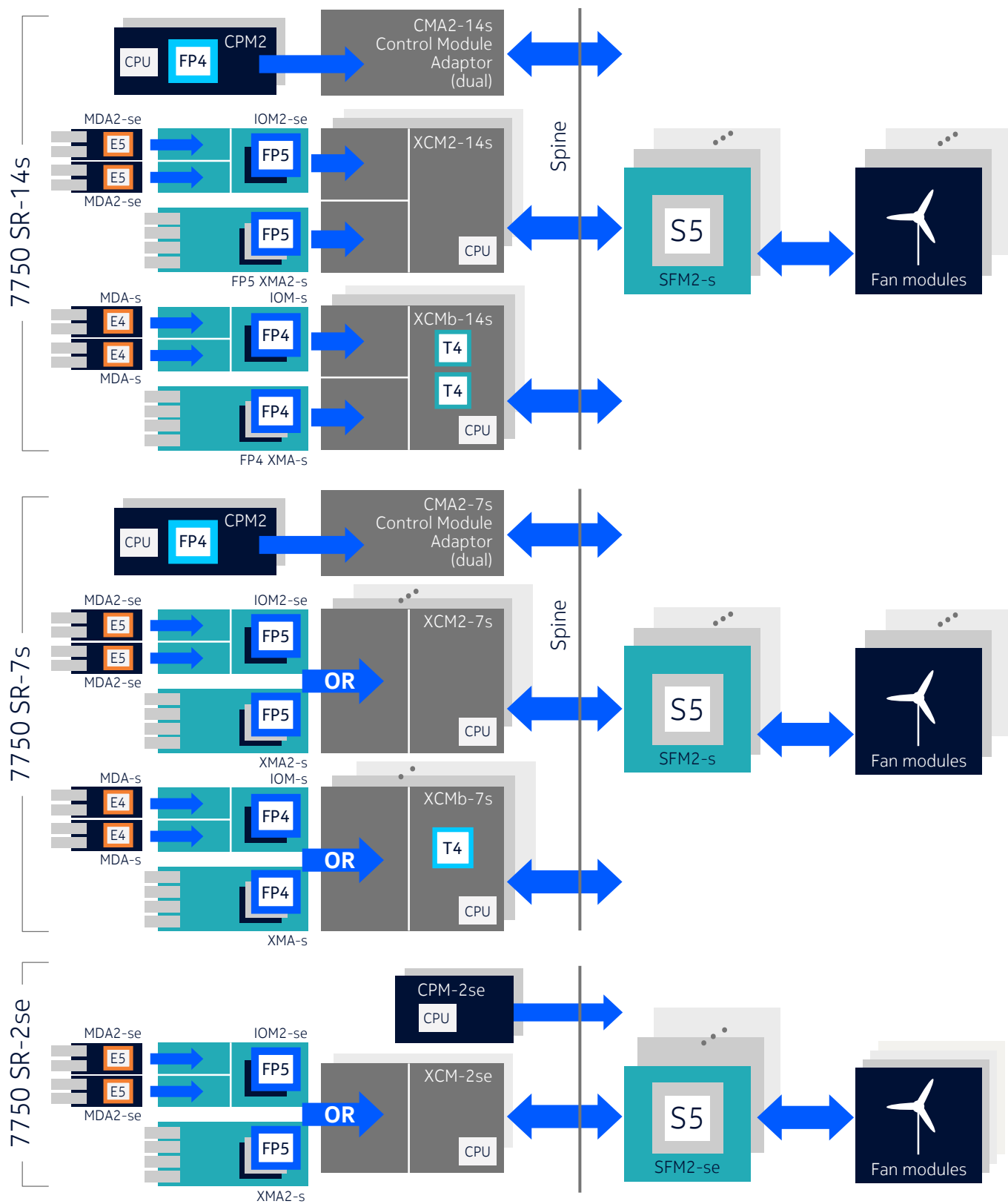


Table 1. 7750 SR-s hardware combinations and system configurations

	Expandable Media Adapters and Input/Output modules	XMA Control Modules 2	Switch Fabric Modules
7750 SR-14s	12 x XMA2-s, XMA-s, IOM2-se/MDA2-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/MDA2-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/MDA2-se	2 x XCM2-2se: One XMA2-s per XCM2-2se	4 SFM-s: Installed at rear

Each XMA2-s contains the FP5 MAC (E5) and packet processing elements (FP5 in Figure 1) that perform forwarding functions, including IP/MPLS routing, segment routing, packet lookups, traffic classification, service enablement and QoS. Each Input/Output Module (IOM2-se) contains the FP5 packet processing elements and the Media Dependent Adapter (MDA2-se) has the interfaces and FP5 MAC (E5). The S5 ASIC on each Switch Fabric Module2-s (SFM2-s) implements fabric forwarding functions using our single-stage crossbar cell-based fabric.

When configured as shown in Figure 1, the XMA2-s 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 Module (CPM2-s) provides the management, security and control plane processing for the 7750 SR-s.

This industry-leading design provides unrivaled versatility, allowing operators to mix and match XMA2-s, XMA-s, IOM2-se/MDA2-se and IOM-s/MDA-s variants in a single system to meet slot capacity, density, interface and power requirements. The design also provides extensible software licensing flexibility to meet future requirements without needing to replace hardware.

Technical specifications

Table 2. Nokia 7750 SR-s XMA2-s hardware specifications

	3 Tb/s XMA2-s	6 Tb/s XMA2-s	12 Tb/s XMA2-s	18 Tb/s XMA2-s
7750 SR-s system support	7750 SR-2se, SR-7s, SR-14s	7750 SR-2se, SR-7s, SR-14s	7750 SR-2se, SR-7s, SR-14s	7750 SR-2se, SR-7s, SR-14s
Adapter capacity (FD)	3 Tb/s	6 Tb/s	12 Tb/s	18 Tb/s
Intelligent aggregation (FD)	9.6 Tb/s	19.2 Tb/s	19.2 Tb/s	19.2 Tb/s
Connectors	36 x 400G QSFP112	36 x 800G QSFP-DD	36 x 800G QSFP-DD	36 x 800G QSFP-DD
Optical transceivers	400G QSFP112, 100G QSFP28, 40G QSFP+	800G QSFP-DD, 400G QSFP112, 400G QSFP-DD, 200G QSFP28-DD, 100G QSFP28, 40G QSFP+	800G QSFP-DD, 400G QSFP112, 400G QSFP-DD, 200G QSFP28-DD, 100G QSFP28, 40G QSFP+	800G QSFP-DD, 400G QSFP112, 400G QSFP-DD, 200G QSFP28-DD, 100G QSFP28, 40G QSFP+
Optical breakouts	400G QSFP112-DD: 4 x 100G, 4 x 50G 100G QSFP28: 4 x 25G and 10 x 10G QSFP+: 4 x 10G	800G QSFP-DD: 2 x 400G, 8 x 100G 400G QSFP112: 4 x 100G, 4 x 50G 400G QSFP-DD: 4 x 100G QSFP28-DD: 2 x 100G QSFP28: 4 x 25G and 10 x 10G QSFP+: 4 x 10G	800G QSFP-DD: 2 x 400G, 8 x 100G 400G QSFP112: 4 x 100G, 4 x 50G 400G QSFP-DD: 4 x 100G QSFP28-DD: 2 x 100G QSFP28: 4 x 25G and 10 x 10G QSFP+: 4 x 10G	800G QSFP-DD: 2 x 400G, 8 x 100G 400G QSFP112: 4 x 100G, 4 x 50G 400G QSFP-DD: 4 x 100G QSFP28-DD: 2 x 100G QSFP28: 4 x 25G and 10 x 10G QSFP+: 4 x 10G
Pre-classification and pre-buffering	10.8 million 64B packet micro-buffer	21.6 million 64B packet micro-buffer	21.6 million 64B packet micro-buffer	21.6 million 64B packet micro-buffer
Buffering*	32 GB: 16 GB ingress, 16 GB egress	64 GB: 32 GB ingress, 32 GB egress	128 GB: 64 GB ingress, 64 GB egress	192 GB: 96 GB ingress, 96 GB egress
Dimensions	- Height: 41.28 cm (16.25 in) - Width: 6.27 cm (2.47 in) - Depth: 42.16 cm (16.60 in)	- Height: 41.28 cm (16.25 in) - Width: 6.27 cm (2.47 in) - Depth: 42.16 cm (16.60 in)	- Height: 41.28 cm (16.25 in) - Width: 6.27 cm (2.47 in) - Depth: 42.16 cm (16.60 in)	- Height: 41.28 cm (16.25 in) - Width: 6.27 cm (2.47 in) - Depth: 42.16 cm (16.60 in)
Weight	TBD	TBD	12.1 kg (26.6 lbs); excludes optics	13.64 kg (30.07 lbs); excludes optics

* ingress and egress amounts of buffer memory can be reallocated.

Table 3. Nokia 7750 SR-s XMA2-s density

XMA2-s base hardware variant	Capacity licensing options		Maximum density per slot				
	Connectors	Capacity	10GBASE	25GBASE	100GBASE	400GBASE	800GBASE
3 Tb/s FD 400G QSFP112 XMA2-s	36	2.4 Tb/s FD	240	96	24	—	—
	36	3 Tb/s FD with IA of 9.6 Tb/s FD	360*	144	30/36*	6/24*	—
6 Tb/s FD 800G QSFP-DD XMA2-s	36	4.8 Tb/s FD	360	144	48	12	—
	36	6 Tb/s FD with IA of 19.2 Tb/s FD	360	144	60/144*	36	6/24*
12 Tb/s FD 800G QSFP-DD XMA2-s	36	9.6 Tb/s FD	360	144	96	24	—
	36	12 Tb/s FD with IA of 19.2 Tb/s FD	360	144	120/192*	30/48*	15/24*
18 Tb/s FD 800G QSFP-DD XMA2-s	36	14.4 Tb/s FD	360	144	144	36	—
	36	18 Tb/s FD with IA of 19.2 Tb/s FD	360	144	180/192*	36/48*	18/24*

* With intelligent aggregation

Table 4. Nokia 7750 SR-s XMA2-s hardware licensing overview

XMA2-s variant	Capacity licenses	Functional licenses
3 Tb/s FD 400G QSFP112 XMA2-s	36-connector 100G QSFP, 2.4 Tb/s FD 36-connector 400G QSFP112, 3 Tb/s FD; up to 9.6 Tb/s FD with IA	- Core routing - Edge routing - High-scale edge routing
6 Tb/s FD 800G QSFP-DD XMA2-s	36-connector 400G QSFP-DD, 4.8 Tb/s FD 36-connector 800G QSFP-DD, 6 Tb/s FD; up to 19.2 Tb/s FD with IA	- Core routing - Edge routing - High-scale edge routing
12 Tb/s FD 800G QSFP-DD XMA2-s	36-connector 400G QSFP-DD, 9.6 Tb/s FD 36-connector 800G QSFP-DD, 12 Tb/s FD; up to 19.2 Tb/s FD with IA	- Core routing - Edge routing - High-scale edge routing
18 Tb/s FD 800G QSFP-DD XMA2-s	36-connector 400G QSFP-DD, 14.4 Tb/s FD 36-connector 800G QSFP-DD, 18 Tb/s FD; up to 19.2 Tb/s FD with IA	- 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.



About Nokia

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