Nokia 7250 IXR-e Interconnect Routers

Release 20

Routers in the Nokia 7250 Interconnect Router (IXR)-e series[1] are used for access and aggregation and as 5G multi-access edge computing (MEC) leaf nodes. They are ideal for IP anyhaul and fixed-mobile convergence.

Ready for growth

The 7250 IXR-e series features high system throughput and a variety of interfaces. 100GE ports used for high-speed uplinks enable cost-effective 100GE ring architectures.

5G mobile and telco cloud infrastructures are moving toward 25GE interfaces. On the 7250 IXR-e series, the native 25GE ports are capable of supporting 1GE,[2] 10GE or 25GE transceivers. Combined with support for GE SFPs in all SFP+ cages, the 7250 IXR-e allows for seamless migrations from 1GE to 10GE to 25GE rates without the need to replace the router.

7250 IXR-e 2QSFP28 8SFP28 24SFP+

7250 IXR-e 14SFP+ 4RJ45

Compact and power saving

The 7250 IXR-e's compact (1RU) size and extended temperature range make it ideal for outside cabinet applications. It is ETSI 300-mm compliant, with all-up-front access and side-to- side air flow. A fan filter and redundant fans increase system lifetime and reduce maintenance costs.

7250 IXR-e systems consume approximately 15 percent less power than equivalent competing systems. Mass deployments for 5G will benefit significantly from this green design.

Differentiated service support

The 7250 IXR-e series supports low-latency applications while providing a large buffer memory for delay-tolerant applications. Very granular per-service and per-forwarding class policing and queuing features support differentiated quality of service (QoS), making the 7250 IXR-e series ideal for any-G aggregation and fixed-mobile network convergence.

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1   The 7250 IXR-e series is part of the 7250 IXR product family. Additional data sheets are available for other models in the product family.
2   Future software deliverable

Automation

The 7250 IXR-e series uses the Nokia Service Router Operating System (SR OS) and is managed by the Nokia Network Services Platform (NSP), which offers a rich set of service management features that automate end-to-end service provisioning and operations, administration and maintenance (OAM) to enhance end-user experience and reduce operating costs.

Standards-based software-defined networking (SDN) interfaces enable best-path computation to be offloaded to path computation elements (PCEs) such as the Nokia NSP. 7250 IXR-e-series routers operating as path computation clients (PCCs) collect and report per-link and per-service delay, jitter and loss metrics together with port utilization levels, for efficient path computation.

Software features

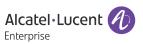The 7250 IXR-e series supports, but is not limited to, the following features.

Services

- Point-to-point Ethernet pseudowires/virtual leased line (VLL)
- Ethernet Virtual Private Network (EVPN)
  - Virtual Private Wire Service (EVPN-VPWS)
  - Virtual Private LAN Services (EVPN-VPLS): IPv4 and IPv6 support, including Virtual Router Redundancy Protocol (VRRP)
  - Multihoming with single active or active/active
- Multipoint Ethernet VPN services with VPLS based on Targeted Label Distribution Protocol (T-LDP) and Border Gateway Protocol (BGP)
- Routed VPLS with Internet Enhances Services (IES)/IP-VPN IPv4 and IPv6
- Ingress and egress VLAN manipulation for L2 services
- IP VPN (VPRN), Inter-Autonomous System (Inter-AS) Option A, B, and C
- IPv6 VPN Provider Edge (6VPE)

Network protocols

- Segment routing
  - Intermediate System-to-Intermediate System (SR-ISIS) and Open Shortest Path First (SR-OSPF)
  - Traffic engineering (SR-TE) IPv4, IPv6
- MPLS label edge router (LER) and label switching router (LSR) functions
  - LDP
  - Resource Reservation Protocol with traffic engineering (RSVP-TE)
- BGP Labeled Unicast (LU) (RFC 3107) route tunnels
- IP routing
  - Dual-stack Interior Gateway Protocols (IGP)
  - Multi-topology, multi-instance IS-IS
  - Multi-instance OSPF
  - Multiprotocol BGP (MP-BGP)
  - BGP-LU support in edge, area border router (ABR) and autonomous system boundary router (ASBR) roles
  - Usage-triggered download of BGP label routes to Label - Forwarding Information Base (L-FIB)
  - Accumulated IGP (AIGP) metric for BGP
  - BGP monitoring protocol (BMP)
  - BGP route-reflector for EVPN and IP-VPN with VPNv4 and VPNv6 address families (AFs)
  - BGP confederations
- Layer 3 Multicast - base routing
  - Internet Group Management Protocol (IGMP)
  - Protocol Independent Multicast – Sparse Mode (PIM-SM), Source Specific Multicast (SSM)
  - Multicast Listener Discovery (MLD)
- Layer 3 Multicast - VPRN
  - Next-generation multicast VPNs (NG-MVPN)
  - SSM with multicast LDPv4 (mLDPv4)
  - IGMP/MLD
  - IGMP/MLD on Routed VPLS Interface
- Layer 2 Multicast
  - IGMP/MLD snooping

SDN

- SR-TE LSPs, RSVP-TE LSPs
  - PCC initialized, PCC controlled
  - PCC initialized, PCE computed
  - PCC initialized, PCE controlled
- SR-TE LSPs: PCE initialized, PCE controlled
- Topology discovery: BGP-Link State (BGP-LS) IPv4 and IPv6
- Telemetry: streaming interface statistics, service delay and jitter metrics

Load balancing and resiliency

- Segment routing topology independent and remote loop-free alternate (TI-LFA and rLFA)
- LDP LFA, rLFA
- IEEE 802.3.ad Link Aggregation Group (LAG) and multi-chassis (MC) LAG
- Pseudowire and LSP redundancy
- IP and MPLS load balancing by equal-cost multipath (ECMP)
- VRRP
- Configurable polynomial and hash seed shift
- Entropy label (RFC 6790)
- RSVP-TE Fast Reroute (FRR)
- BGP Edge and Core Prefix Independent Convergence (BGP PIC)

Platform

- Ethernet IEEE 802.1Q (VLAN) and 802.1ad (QinQ) with 9K jumbo frames
- Detailed forwarded and discarded counters for service access points (SAPs) and network interfaces in addition to port-based statistics: per Virtual Output Queue (VoQ) packet and byte counters
- High-scale, per-policer, detailed counters on a per-state basis
- Dynamic Host Configuration Protocol (DHCP) server for IPv4 IES, VPNv4

- DHCP relay, IPv4 and IPV6, IES, IP-VPN, EVPN-VPLS
- Accounting records

QoS and traffic management

- Hierarchical QoS (H-QoS)
  - Hierarchical egress schedulers and shapers per forwarding class, SAP, network interface or port
  - Port sub-rate
- Intelligent packet classification, including media access control (MAC), IPv4, IPv6 match-criteria-based classification
- Granular rate enforcement with up to 32 policers per SAP/VLAN, including broadcast, unicast, multicast and unknown policers
- Hierarchical policing for aggregate rate enforcement
- Strict priority, weighted fair queuing schedulers
- Congestion management via weighted random early discard (WRED)
- Egress marking or re-marking

System management

- Simple Network Management Protocol (SNMP)
- Model-driven (MD) management interfaces
  - Netconf
  - MD CLI
  - Remote Procedure Call (gRPC)
- Comprehensive management with Nokia NSP

Operations, administration and maintenance

- IEEE 802.1ag, ITU-T Y.1731: Ethernet Connectivity Fault Management (CFM) for both fault detection and performance monitoring, including delay, jitter and loss tests

- Ethernet bandwidth notification (ETH-BN) with egress rate adjustment

- IEEE 802.3ah: Ethernet in the First Mile (EFM)

- Bidirectional Forwarding Detection (BFD) IPv4, IPv6

- Two-Way Active Measurement Protocol (TWAMP), TWAMP Light

- A full suite of MPLS OAM tools, including LSP and virtual circuit connectivity verification (VCCV) ping

- Service assurance agent

- Mirroring with slicing support
  - Port
  - VLAN
  - Filter output: MAC, IPv4/IPv6 filters
  - Local/remote

- Port loopback with MAC-swap

- Configuration rollback

- Zero Touch Provisioning (ZTP) capable

Security

- Remote Authentication Dial-In User Service (RADIUS), Terminal Access Controller Access Control System Plus (TACACS+), and comprehensive control-plane protection capabilities

- MAC-, IPv4- and IPv6-based access control lists and criteria-based classifiers

- Secure Shell (SSH)

Technical specifications

Optical breakout solution available on QSFP28/QSFP+ ports: 4 x 10GE

Table 1. 7250 IXR-e series specifications

Feature	7250 IXR-e 2QSFP28 8SFP28 24SFP+	7250 IXR-e 14SFP+ 4RJ45
System throughput: Half duplex (HD) IMIX traffic	600 Gb/s	240 Gb/s
Service interfaces	• 2 x QSFP28/QSFP+ 100/40GE • 8 x SFP28/SFP+/SFP 25/10/1GE • 24 x SFP+/SFP 10/1GE	• 14 x SFP+/SFP 10/1GE • 4 x RJ-45 100/1000 Mb/s
Control interfaces	Console, management, USB*, 1PPS out, SD slot, reset button	Console, management, USB*, 1PPS out, SD slot, reset button

Timing and synchronization	• Includes Stratum 3E oscillator
	• ITU-T Synchronous Ethernet (SyncE)
	• IEEE 1588v2
	  – Boundary clock (BC)
	  – Profile: ITU-T G8275.1
	• ITU-T G.8273.2 Class B**
	• RFC 5905 Network Time Protocol (NTP)
	• Pulse-per-second (1PPS) timing
	• Support for GNSS SFP
		• Includes Stratum 3E oscillator
		• ITU-T SyncE
		• IEEE 1588v2
		  – BC
		  – Profile: ITU-T G8275.1
		• ITU-T G.8273.2 Class B***
		• RFC 5905 NTP
		• 1PPS timing
		• Support for GNSS SFP

Indicators	• Management, power status (1 & 2) LEDs • Per port link and activity status LEDs • System (Stat), fan, remote management (LOC) status LEDs	• Management, power status (1 & 2) LEDs • Per port link and activity status LEDs • System (Stat), fan, remote management (LOC) status LEDs
Memory buffer size	3 GB	1 GB
Hardware redundancy	Power supplies, cooling fans N+1	Power supplies, cooling fans N+1
Dimensions	• Height: 1RU, 4.5 cm (1.75 in) • Depth: 25.4 cm (10.0 in) • Width: 43.8 cm (17.25 in) • Rack-mountable in a 48.2-cm rack, 30-cm depth (standard 19-in equipment rack, 12-in depth) • ETSI 300-mm compliant	• Height: 1RU, 4.5 cm (1.75 in) • Depth: 25.4 cm (10.0 in) • Width: 43.8 cm (17.25 in) • Rack-mountable in a 48.2-cm rack, 30-cm depth (standard 19-in equipment rack, 12-in depth) • ETSI 300-mm compliant
Power supply options	• Two feeds: Modular AC and DC power supplies • Supports concurrent use of AC and DC power supplies	• Two feeds: Modular AC and DC power supplies • Supports concurrent use of AC and DC power supplies
Power requirements	• AC input: 100 V to 240 V, 50 Hz to 60 Hz • DC input: 20 V to 60 V • Low-voltage DC with single feed: -40 V to -72 V	• AC input: 100 V to 240 V, 50 Hz to 60 Hz • DC input: 20 V to 60 V • Low-voltage DC with single feed: -40 V to -72 V
Cooling	• Internal non-replaceable fans • Replaceable filter • Right-to-left airflow	• Internal non-replaceable fans • Replaceable filter • Right-to-left airflow
Normal operating temperature range	-40°C to +65°C (-40°F to +149°F) sustained	-40°C to +65°C (-40°F to +149°F) sustained
Shipping and storage temperature	-40°C to +70°C (-40°F to +158°F)	-40°C to +70°C (-40°F to +158°F)
Normal humidity	5% to 95%, non-condensing	5% to 95%, non-condensing

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*   Future software deliverable
**   For noise generation only
*** For noise generation only. Some exceptions apply.

Standards compliance[3]

Environmental specifications

- 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
- ETSI EN 300 019-2-3; Operational Tests, Class 3.2, 3.3
- ETSI EN 300 753 Acoustic Noise Class 3.2
- GR-63-CORE
- GR-3108-CORE
- VZ.TPR.9203 (CO)
- VZ-TPR-9205

Safety

- AS/NZS 60950.1/62368.1
- IEC/EN 60825-1
- IEC/EN 60825-2
- IEC/EN/UL/CSA 60950-1 Ed2
- IEC/EN/UL/CSA 62368-1 Ed2

Electromagnetic compatibility

- AS/NZS CISPR 32 Class A
- BSMI CNS13438 Class A
- BT GS-7
- EN 55024
- EN55032 Class A
- EN 55035
- ETSI EN 300 132-2
- ETSI EN 300 132-3
- ETSI EN 300 386
- ETSI ES 201 468
- FCC Part 15 Class A
- FTZ 1 TR9 (Deutsche Telekom)

- GR-1089-CORE
- ICES-003 Class A
- IEC CISPR 24
- IEC CISPR 32 Class A
- IEC/EN 61000-3-2, 3-3
- IEC/EN 61000-6-2, 6-4
- 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
- ITU-T K.20
- KCC Korea-Emissions & Immunity (in accordance KN32/KN35)
- VCCI Class A

Directives, regional approvals and certifications

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

Other certifications

- MEF CE 3.0 certified

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

About Nokia

We create the technology to connect the world. Only Nokia offers a comprehensive portfolio of network equipment, software, services and licensing opportunities across the globe. With our commitment to innovation, driven by the award-winning Nokia Bell Labs, we are a leader in the development and deployment of 5G networks.

Our communications service provider customers support more than 6.4 billion subscriptions with our radio networks, and our enterprise customers have deployed over 1,300 industrial networks worldwide. Adhering to the highest ethical standards, we transform how people live, work and communicate. For our latest updates, please visit us online www.nokia.com and follow us on Twitter @nokia.