Nokia 7250 IXR-X Interconnect Routers

Release 25

Nokia 7250 Interconnect Router-X series (IXR-X series) routers[1] are high-speed, high-density 1RU platforms. They are ideal as leaf nodes in data centers and multi-access edge computing nodes and are valuable for access and aggregation as well as 5G interconnectivity.

There are three platforms in the IXR-X series: the 7250 IXR-Xs, 7250 IXR-X1 and 7250 IXR-X3. Using these routers, network operators can efficiently scale up bandwidth to prepare for future growth requirements.

7250 IXR-Xs

7250 IXR-X1

7250 IXR-X3

High-density aggregation

Routers in the Nokia 7250 IXR-X series provide up to 14.4 Tb/s of system capacity and are equipped with high-performance 400GE, 100GE, 50GE, 40GE, 25GE and 10GE interfaces, allowing networks to scale to meet evolving traffic demands. At only 1RU high, these compact routers provide high port density while minimizing rack space. They consume low watts per gigabit, and therefore provide ongoing cost savings.

Pluggable Digital Coherent Optics (DCO) 100ZR/400ZR(+) and pluggable Line System (QSFP-LS) are supported on the 7250 IXR-X series.

Diverse applications

The 7250 IXR-X series uses a common fixed-form design with options for port interfaces, power supplies and airflow that provide the versatility needed to fit a wide variety of network requirements. Redundant fans improve resiliency.

These routers are ideal for carrier data center applications where their flexible port interfaces support layers of aggregation, for example, a first leaf layer of 25GE to 100GE aggregation and a second layer of 100GE to 400GE aggregation. Optical breakout options provide high-density 25GE and 10GE port counts and flexibility to mix connector types and port speeds.

1 The 7250 IXR-X series is part of the 7250 IXR product family. Additional data sheets are available for other models in this product family.

Low latency and accurate synchronization

The 7250 IXR-X series combines low nodal latency with advanced synchronization features to serve latency-sensitive applications and meet 4G and 5G fronthaul requirements. Advanced QoS features allow high-priority packets to traverse the network without queuing delay. This makes them ideal for centralized and virtualized RAN applications, BBU aggregation and edge computing applications.

Automation

To simplify and automate network operations, the 7250 IXR-X platforms enable model-driven network management features through the Nokia SR OS and are managed by the Nokia Network Services Platform (NSP). The Nokia NSP offers a rich set of service management features that automate new service delivery 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. The 7250 IXR operates as a path computation client (PCC), collecting and reporting per-link and per-service delay, jitter and loss metrics, as well as port utilization levels, for efficient path computation.

Technical specifications

Optical breakout solutions available:

- QSFP-DD ports: 4 x 100GE, 2 x 100GE, 8 x50GE, 4 x 25GE and 4 x 10GE
- QSFP28/QSFP+ ports: 4 x 25GE and 4 x 10GE

Table 1. 7250 IXR-X series specifications

Feature	7250 IXR-Xs	7250 IXR-X1	7250 IXR-X3
System throughput Full duplex (FD) IMIX traffic	4.8 Tb/s	4.8 Tb/s	14.4 Tb/s
Ports	• 6 x QSFP-DD 400GE • 48 x SFP56/SFP28/SFP+ 50/25/10GE	• 4 x QSFP-DD 400GE • 32 x QSFP28/QSFP+ 100/40GE	36 x QSFP-DD 400GE
Control interfaces	Console, management, USB, SD slot	Console, management, Bluetooth[2], USB, SD slot	Console, management, Bluetooth[2], USB, SD slot
Satellite Mode option	Supported	Supported	NA
Timing and synchronization	• Includes Stratum 3E oscillator • ITU-T Synchronous Ethernet (SyncE) – ITU-T G.8262.1 (eEEC) • IEEE 1588v2 PTP Clock Types – Boundary – Slave – Grandmaster • IEEE 1588v2 PTP Profiles – ITU-T G.8275.1 – ITU-T G.8275.2 with PTS – ITU-T G.8265.1 – IEEE 1588v2 Default • IEEE 1588v2 PTP Encapsulations – Ethernet – UDP/IPv4 – UDP/IPv6 • PTP Profile Interworking • ITU-T G.8273.2 Class C performance[2] • RFC 5905 Network Time Protocol (NTP)		
Memory buffer size	8 GB	8 GB	24 GB
Internal storage	N/A	N/A	SSD drive
Dimensions	• Height: 1RU, 4.5 cm (1.75 in) • Depth: 54.6 cm (21.5 in) • Width: 44.45 cm (17.5 in)	• Height: 1RU, 4.5 cm (1.75 in) • Depth: 54.6 cm (21.5 in) • Width: 44.45 cm (17.5 in)	• Height: 1RU, 4.5 cm (1.75 in) • Depth: 64.7 cm (25.5 in) • Width: 44.45 cm (17.5 in)
Common equipment redundancy	Power supplies (1+1), cooling fans	Power supplies (1+1), cooling fans	Power supplies (1+1), cooling fans
Power supply options	Power supplies (1+1), cooling fans		

2 Future software deliverable

Power requirements	• HV AC input (rated): 200 V AC to 240 V AC, 50 Hz to 60 Hz • DC input (rated): -48 V DC/-60 V DC		
Cooling	• Modular replaceable fans (3 total) • Front-to-back airflow • Back-to-front airflow	• Modular replaceable fans (3 total) • Front-to-back airflow • Back-to-front airflow	• Modular replaceable fans (3 total) • Front-to-back airflow
Normal operating temperature range	0°C to +40°C (32°F to +104°F) sustained		
Shipping and storage temperature	-40°C to +70°C (-40°F to +158°F)		
Normal humidity	5% to 95%, non-condensing		

Software features

The 7250 IXR 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 modes
- Multipoint Ethernet VPN services with VPLS based on Targeted Label Distribution Protocol (T-LDP) and Border Gateway Protocol (BGP)
- Routed VPLS with Internet Enhanced Service (IES) or IP-VPN, IPv4 and IPv6
- Ingress and egress VLAN manipulation for Layer 2 services
- IP VPN Virtual Private Routed Network (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-IS-IS) and Open Shortest Path First (SR-OSPF)
  - Traffic engineering (SR-TE) IPv4, IPv6
- Segment Routing IPv6 (SRv6)
  - SRv6 IS-IS shortest path tunnel support in MT=0 and MT=2
- MPLS label edge router (LER) and label switching router (LSR) functions
  - Label Distribution Protocol (LDP)
  - Resource Reservation Protocol with traffic engineering (RSVP-TE)
- IP routing
  - Dual-stack Interior Gateway Protocol (IGP)
  - Multi-topology, multi-instance Intermediate System-to-Intermediate System (IS-IS)
  - Multi-instance OSPF
  - Multiprotocol BGP (MP-BGP)
  - 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
- IGP and BGP shortcuts

- Layer 3 Multicast – base routing
  - Internet Group Management Protocol (IGMP)
  - Multicast Listener Discovery (MLD)
  - Protocol Independent Multicast – Sparse Mode (PIM-SM), Source Specific Multicast (SSM) for IPv4
  - PIM-SSM for IPv6
  - Multicast Source Discovery Protocol (MSDP)
- Layer 3 Multicast - VPRN
  - Next-generation multicast VPNs (NG-MVPN)
  - SSM with multicast LDPv4 (mLDPv4)
  - IGMP/MLD
  - IGMP/MLD on routed VPLS interface
  - PIMv4/PIMv6
- Layer 2 Multicast
  - IGMP/MLD snooping
- IP-GRE tunnel support

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
- LSP stats
- Topology discovery: BGP-Link State (BGP LS) IPv4 and IPv6
- Telemetry: streaming interface statistics, service delay and jitter metrics
- Netflow/cflowd

Load balancing and resiliency

- IEEE 802.3.ad Link Aggregation Group (LAG) and multi-chassis (MC) LAG
- Pseudowire and LSP redundancy
- BGP Edge and Core Prefix Independent Convergence (BGP PIC)
- Fast reroute:
  - LDP with loop-free alternate (LFA) and remote loop-free alternate (rLFA) policies
  - RSVP-TE
  - Segment routing with rLFA and topology independent LFA (TI-LFA) in both SR-MPLS and SRv6
- IP, SRv6 and MPLS load balancing by equal-cost multipath (ECMP)
- Weighted LAG hash
- LAG adaptive load balancing
- VRRP
- Configurable polynomial and hash seed shift
- Entropy label (IETF RFC 6790)

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
- 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
  - Hierarchical egress schedulers and shapers per forwarding class, SAP, network interface, port or LAG
  - Port sub-rate
- 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 for both fault detection and performance monitoring, including delay, jitter and loss tests
- Ethernet bandwidth notification with egress rate adjustment
- ITU-T Y.1564 Service Activation Test
- IEEE 802.3ah: Ethernet in the First Mile
- Bidirectional Forwarding Detection IPv4 and IPv6
- Hardware based sBFD
- Two-Way Active Measurement Protocol (TWAMP), TWAMP Light
- A full suite of MPLS OAM tools, including LSP and virtual circuit connectivity verification ping
- Service assurance agent
- Mirroring with slicing support:
  - Port
  - VLAN
  - Filter output: Media Access Control (MAC), IPv4/IPv6 filters
  - Local/remote
- Configuration rollback

Security

- MAC-, IPv4- and IPv6-based access control lists
  - Forward and drop statistics, local/remote logging
- Distributed CPU Protection (DCP)
- Secure Shell (SSH) with configurable server/client lists and strong KEX, HMAC and CIPHERs
- AAA functionality with 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
- SR OS Secure Boot
- CPM filters
- IP unicast RPF (uRPF)

Standards compliance[3]

Environmental

- ATIS-0600015.03
- 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
- GR-3160-CORE
- VZ.TPR.9205
- VZ.TPR.9203 (Data Centers)

Safety

- AS/NZS 62368.1
- IEC/EN 60825-1
- IEC/EN 60825-2
- IEC/EN/UL/CSA 62368-1
- IEC 60529 IP20

Electromagnetic compatibility

- AS/NZS CISPR 32 (Class A)
- ATIS-600315.01.2015
- BT GS-7
- BSMI CNS 13438 (Taiwan)
- EN 300 386
- EN 55035
- EN 55032 (Class A)
- ES 201 468
- EN 301 489-1
- EN 301 489-17 (Bluetooth)
- ETSI EN 300 132-2 (LVDC)
- ETSI EN 300 132-3 V1.2.1 (AC)
- FCC Part 15 (Class A)
- GR-1089-CORE
- ICES-003 (Class A)
- IEC 61000-3-2
- IEC 61000-3-3
- IEC CISPR 35
- IEC CISPR 32 (Class A)
- IEC 61000-6-2
- IEC 61000-6-4
- 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
- EC/EN 61000-4-11 Voltage Interruptions
- KS C 9832 Class A (Emissions; South Korea)
- KS C 9835 (Immunity; South Korea)
- KS C 3124 (South Korea)
- KS C 3126 (Bluetooth; South Korea)
- VCCI CISPR 32 Class A (Japan)

Directives, regional approvals and certifications

- DIRECTIVE 2011/65/EU RoHS
- DIRECTIVE 2012/19/EU WEEE
- DIRECTIVE 2014/30/EU EMC
- DIRECTIVE 2014/35/EU LVD
- DIRECTIVE 2014/53/EU RED
- MEF CE 3.0 compliant
- Australia: RCM Mark
- China RoHS: CRoHS
- Europe: CE Mark
- United Kingdom: UKCA Mark
- Japan: VCCI Mark
- South Korea: KC Mark
- Taiwan: BSMI Mark
- TL9000
- ISO 14001
- ISO 9001

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

About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.

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