Nokia 7250 IXR-e Interconnect Routers

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, 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.

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.

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.
**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)
- 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 route-reflector for EVPN and IP-VPN with VPNv4 and VPNv6 address families (AFs)
- 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
- 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

<table>
<thead>
<tr>
<th>Feature</th>
<th>7250 IXR-e 2QSFP28 8SFPP28 24SF+</th>
<th>7250 IXR-e 14SF+/ 4RJ45</th>
</tr>
</thead>
<tbody>
<tr>
<td>System throughput: Half duplex (HD) IMIX traffic</td>
<td>600 Gb/s</td>
<td>240 Gb/s</td>
</tr>
<tr>
<td>Service interfaces</td>
<td>• 2 x QSFP28/QSFP+ 100/40GE</td>
<td>• 14 x SFP+/SFP 10/1GE</td>
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<tr>
<td></td>
<td>• 8 x SFP28/SFP+/SFP 25/10/1GE</td>
<td>• 4 x RJ-45 100/1000 Mb/s</td>
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<td></td>
<td>• 24 x SFP+/SFP 10/1GE</td>
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<tr>
<td>Control interfaces</td>
<td>Console, management, USB*, 1PPS out, SD slot, reset button</td>
<td>Console, management, USB*, 1PPS out, SD slot, reset button</td>
</tr>
<tr>
<td>Timing and synchronization</td>
<td>• Includes Stratum 3E oscillator</td>
<td>• Includes Stratum 3E oscillator</td>
</tr>
<tr>
<td></td>
<td>• ITU-T Synchronous Ethernet (SyncE)</td>
<td>• ITU-T SyncE</td>
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<tr>
<td></td>
<td>• IEEE 1588v2</td>
<td>• IEEE 1588v2</td>
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<tr>
<td></td>
<td>– Boundary clock (BC)</td>
<td>– Boundary clock (BC)</td>
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<td></td>
<td>– Profile: ITU-T G8275.1</td>
<td>– Profile: ITU-T G8275.1</td>
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<tr>
<td></td>
<td>• ITU-T G.8273.2 Class B**</td>
<td>• ITU-T G.8273.2 Class B**</td>
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<td></td>
<td>• RFC 5905 Network Time Protocol (NTP)</td>
<td>• RFC 5905 NTP</td>
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<tr>
<td></td>
<td>• Pulse-per-second (1PPS) timing</td>
<td>• 1PPS timing</td>
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<tr>
<td></td>
<td>• Integrated GNSS receiver***</td>
<td>• Integrated GNSS receiver***</td>
</tr>
<tr>
<td></td>
<td>• Support for GNSS SFP</td>
<td>• Support for GNSS SFP</td>
</tr>
<tr>
<td>Indicators</td>
<td>• Management, power status (1 &amp; 2) LEDs</td>
<td>• Management, power status (1 &amp; 2) LEDs</td>
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<tr>
<td></td>
<td>• Per port link and activity status LEDs</td>
<td>• Per port link and activity status LEDs</td>
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<td></td>
<td>• System (Stat), fan, remote management (LOC) status LEDs</td>
<td>• System (Stat), fan, remote management (LOC) status LEDs</td>
</tr>
<tr>
<td>Memory buffer size</td>
<td>3 GB</td>
<td>1 GB</td>
</tr>
<tr>
<td>Hardware redundancy</td>
<td>Power supplies, cooling fans N+1</td>
<td>Power supplies, cooling fans N+1</td>
</tr>
<tr>
<td>Dimensions</td>
<td>• Height: 1RU, 4.5 cm (1.75 in)</td>
<td>• Height: 1RU, 4.5 cm (1.75 in)</td>
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<tr>
<td></td>
<td>• Depth: 25.4 cm (10.0 in)</td>
<td>• Depth: 25.4 cm (10.0 in)</td>
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<tr>
<td></td>
<td>• Width: 43.8 cm (17.25 in)</td>
<td>• Width: 43.8 cm (17.25 in)</td>
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<tr>
<td></td>
<td>• Rack-mountable in a 48.2-cm rack, 30-cm depth (standard 19-in equipment rack, 12-in depth)</td>
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</tr>
<tr>
<td></td>
<td>• ETSI 300-mm compliant</td>
<td>• ETSI 300-mm compliant</td>
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<tr>
<td>Power supply options</td>
<td>• Two feeds: Modular AC and DC power supplies</td>
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<td></td>
<td>• Supports concurrent use of AC and DC power supplies</td>
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</tr>
<tr>
<td>Power requirements</td>
<td>• AC input: 100 V to 240 V, 50 Hz to 60 Hz</td>
<td>• AC input: 100 V to 240 V, 50 Hz to 60 Hz</td>
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<tr>
<td></td>
<td>• DC input: 20 V to 60 V</td>
<td>• DC input: 20 V to 60 V</td>
</tr>
<tr>
<td></td>
<td>• Low-voltage DC with single feed: -40 V to -72 V</td>
<td>• Low-voltage DC with single feed: -40 V to -72 V</td>
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<tr>
<td>Cooling</td>
<td>• Internal non-replaceable fans</td>
<td>• Internal non-replaceable fans</td>
</tr>
<tr>
<td></td>
<td>• Replaceable filter</td>
<td>• Replaceable filter</td>
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<tr>
<td></td>
<td>• Right-to-left airflow</td>
<td>• Right-to-left airflow</td>
</tr>
<tr>
<td>Normal operating temperature range</td>
<td>-40°C to +65°C (-40°F to +149°F) sustained</td>
<td>-40°C to +65°C (-40°F to +149°F) sustained</td>
</tr>
<tr>
<td>Shipping and storage temperature</td>
<td>-40°C to +70°C (-40°F to +158°F)</td>
<td>-40°C to +70°C (-40°F to +158°F)</td>
</tr>
<tr>
<td>Normal humidity</td>
<td>5% to 95%, non-condensing</td>
<td>5% to 95%, non-condensing</td>
</tr>
</tbody>
</table>

* Future software deliverable
** For noise generation only
*** Future orderable variant
Standards compliance

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