Nokia 7250 IXR-e series Interconnect Routers

Release 25

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 IP/MPLS routing with a variety of interfaces. 400GE and 100GE ports used for highspeed uplinks enable cost-effective networking architecture for access and aggregation.

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. The 7250 IXR-e2 provides support for multi-400/100GE connectivity.

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

7250 IXR-e2

7250 IXR-e 2QSFP28 8SFP28 24SFP+

7250 IXR-e 14SFP+ 4RJ45

7250 IXR-e2c

7250 IXR-ec

Compact and power saving

All 7250 IXR-e variants exhibit a compact (1RU) size and support extended temperature range (ETR) operation making them ideal for outside cabinet applications. All interfaces and power supplies are front accessible, with a front-to-back airflow configuration for the 7250 IXR-e2 and side-to-side

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.

airflow for the ETSI 300 mm compliant 7250 IXR-e, IXR-e2c and IXR-ec. A fan filter (7250 IXR-e and IXR-ec) and redundant fans (all variants) increases system lifetime and reduces maintenance costs.

7250 IXR-e systems are architected to consume significantly less power than equivalent competing systems.

Mass deployments for 5G will benefit significantly from this green design. The 7250 IXR-e2 provides over 1 Tb/s of interface aggregation and 800 Gb/s throughput.

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.

To meet the timing and synchronization requirements of 5G networks, the 7250 IXR-e series routers meet the G.8273.2 specification for Class C clock noise generation. Additionally, the 7250 IXR-e2 and 7250 IXR-e2c models offer enhanced capabilities with a Class D clock.

Automation

To simplify and automate network operations, the 7250 IXR-e series enables model-driven network management features through 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.

Technical specifications

Optical breakout solution 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-e series specifications

Feature	7250 IXR-e2	7250 IXR-e 2QSFP28 8SFP28 24SFP+ (4 variants)	7250 IXR-e 14SFP+ 4RJ45 (4 variants)	7250 IXR-e2c (4 variants)	7250 IXR-ec (4 variants)
System throughput: Full duplex IMIX traffic	800 Gb/s	300 Gb/s	120 Gb/s	100 Gb/s	64 Gb/s
Ports	• 2 x 400G QSFP-DD • 2 x 100G QSFP28 • 24 x SFP28/SFP+/ SFP 25/10/1GE	• 2 x 100G QSFP28 • 8 x SFP28/SFP+/ SFP 25/10/1GE[2] • 24 x SFP+/SFP 10/1GE	• 14 x SFP+/SFP 10/1GE • 4 x RJ-45 100/1000 Mb/s	• 2x 100G QSFP28 • 12 x SFP28/SFP+/ SFP 25/10/1GE	• 6 x SFP+/SFP 10/1GE • 20 x SFP 1GE • 4 x RJ-45 100/1000 Mb/s

2 GE on SFP28 ports is a future software deliverable

Feature	7250 IXR-e2	7250 IXR-e 2QSFP28 8SFP28 24SFP+ (4 variants)	7250 IXR-e 14SFP+ 4RJ45 (4 variants)	7250 IXR-e2c (4 variants)	7250 IXR-ec (4 variants)
Control interfaces	Console, management, USB(except IXR-ec), 1 PPS out, SD slot, alarm input/output (except IXR-e)				
Satellite Mode option	NA	Supported	NA	NA	NA
Timing and synchronization	• Includes Stratum 3E oscillator • ITU-T Synchronous Ethernet (SyncE) – ITU-T G.8262.1 (eEEC) • IEEE 1588v2 – Boundary clock – Slave clock – Grandmaster clock – Profile: ITU-T G.8275.1 – Profile: ITU-T G.8275.2 with PTS and APTS – Profile ITU-T G.8265.1 – Profile IEEE 1588-2008 – Ethernet encapsulation – UDP/IPv4 encapsulation – ITU-T G.8273.2 Class D[3] • Integrated dual-band GNSS receiver – PRTC-B capable (GPS/Galileo) • RFC 5905 Network Time Protocol (NTP) • Pulse-per-second (1PPS) output timing	• Includes Stratum 3E oscillator • ITU-T Synchronous Ethernet (SyncE) – ITU-T G.8262.1 (eEEC) • IEEE 1588v2 – Boundary clock – Slave clock (GNSS variant) – Grandmaster clock (GNSS variant) – Profile: ITU-T G.8275.1 – Profile: ITU-T G.8275.2 with PTS and APTS (GNSS variant) – Profile ITU-T G.8265.1 – Profile IEEE 1588-2008 (GNSS variant) – Ethernet encapsulation – UDP/IPv4 encapsulation – UDP/IPv6 encapsulation (GNSS variant) – ITU-T G.8273.2 Class C[3] • RFC 5905 Network Time Protocol (NTP) • Pulse-per-second (1PPS) output timing • Support for GNSS SFP • PTP Profile interworking (GNSS variant) • Integrated GNSS receiver, GPS supported (GNSS variant)		• Includes Stratum 3E oscillator • ITU-T Synchronous Ethernet (SyncE) – ITU-T G.8262.1 (eEEC) • IEEE 1588v2 – Boundary clock – Profile: ITU-T G.8275.1 – Profile: ITU-T G.8265.1 – Ethernet encapsulation – UDP/IPv4 encapsulation • ITU-T G.8273.2 Class C[3] • RFC 5905 Network Time Protocol (NTP) • Pulse-per-second (1PPS) output timing • Support for GNSS SFP
Indicators	• Management, power status LEDs • Per port link and activity status LEDs • System (Stat), fan status LEDs	• Management, power status (1 & 2) LEDs • Per port link and activity status LEDs • System (Stat), fan, remote management (LOC) status LEDs		• Management, power status LEDs • Per port link and activity status LEDs • System (Stat), fan status LEDs	• Power status (Batt A and Batt B) LEDs • Per port link and activity status LEDs • System (Stat), fan status LEDs

3 For noise generation. Please contact Nokia for implementation details.

Feature	7250 IXR-e2	7250 IXR-e 2QSFP28 8SFP28 24SFP+ (4 variants)	7250 IXR-e 14SFP+ 4RJ45 (4 variants)	7250 IXR-e2c (4 variants)	7250 IXR-ec (4 variants)
Memory buffer size	2 GB	3 GB	1 GB	1 GB	1 GB
Hardware redundancy		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)	• 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: 21.1cm (8.3 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: DC variant 23.5cm (9.3 in) AC variant 25.4cm (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 or DC power supplies	• Two feeds: Modular AC or DC power supplies • Supports concurrent use of AC and DC power supplies		Two feeds: AC or DC inputs	Two feeds: AC or DC inputs
Power requirements	• AC input (rated): 100 V to 240 V, 50 Hz to 60 Hz • DC input (rated): -48 V DC/-60 V DC	• AC input (rated): 100 V to 240 V, 50 Hz to 60 Hz • DC input (rated): 24 V DC/-48 V DC		• AC input (rated): 100 V to 240 V • DC input (rated): -48 V to -60 V	• AC input (rated): 100 V to 240 V • DC input (rated): -48 V to -60 V
Conformal coating	—	Supported on 2 variants	Supported on 2 variants	—	Supported on 2 variants
PCB enhanced plating (PEP)	—	—	—	Supported	—
Cooling	• Internal non-replaceable fans • Front-to-back airflow	• Internal non-replaceable fans • Replaceable filter • Right-to-left airflow	• Internal non-replaceable fans • Replaceable filter • Right-to-left airflow	• 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			
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-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 modes
- 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 Virtual Private Routed Network (VPRN), Inter-Autonomous System (Inter-AS) Option A, B, and C
- IPv6 VPN Provider Edge (6VPE)
- EVPN Interface-less IPv4 and IPv6 prefix routes (EVPN-IFL)
- MPLS (including SR-MPLS) to SRv6 interworking GW[4]

Network protocols

- Segment Routing MPLS (SR-MPLS)
  - Intermediate System-to-Intermediate System (SR-ISIS) and Open Shortest Path First (SR-OSPF)
  - Traffic engineering (SR-TE) IPv4, IPv6
- Segment Routing IPv6 (SRv6)[4]
  - SRv6 IS-IS shortest path tunnel support in MT=0 and MT=2
- Flexible Algorithms
  - Admin-group include/exclude, IGP/TE/Latency metric
- 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 Protocol (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
  - IGP and BGP shortcuts
- 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)
  - 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
- Layer 2 Multicast
  - IGMP/MLD snooping
- IP-GRE tunnel support[4]

4 Supported on 7250 IXR-e2 and IXR-e2c models

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
- SR policy: BGP and static
- 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

- Segment routing topology independent loop-free alternate (TI-LFA) and remote loop-free alternate (rLFA) in both SR-MPLS and SRv6[4]
- LDP LFA and rLFA
- IEEE 802.3.ad Link Aggregation Group (LAG) and multi-chassis (MC) LAG
- Pseudowire and LSP redundancy
- IP, SRv6[4], and MPLS load balancing by equal-cost multipath (ECMP)
- Weighted LAG hash
- LAG adaptive load balancing[4]
- VRRP
- Ethernet Ring Protection Switching ITU-T G.8032v2
- 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
- VLAN range-based SAPs
- 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, port or LAG
  - 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)
- ITU-T Y.1564 Service Activation Test
- Bidirectional Forwarding Detection (BFD) IPv4, IPv6
- Micro-BFD - per member link
- Hardware based sBFD[4]
- Two-Way Active Measurement Protocol (TWAMP), TWAMP Light for base and flex-algo topologies
- 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 and VLAN 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
- Distributed CPU Protection (DCP)[4]
- MAC-, IPv4- and IPv6-based access control lists and criteria-based classifiers
- Secure Shell (SSH)
- MACsec (7250 IXR-e small)
- SR OS Secure Boot
- IP unicast RPF (uRPF)[4]

Standards compliance[5]

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
- ETSI EN 300 753 Acoustic Noise Class 3.2
- GR-3108
- GR-63-CORE
- VZ.TPR.9305
- VZ-TPR-9205

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
- BSMI CNS13438 Class A
- BT GS-7
- EN 55032 Class A
- EN 301 489-1
- EN 301 489-19
- EN 55035
- ETSI EN 300 132-1
- ETSI EN 300 132-2
- ETSI EN 300 386
- ETSI ES 201 468
- FCC Part 15 Class A

5 System design intent is according to the listed standards. Certifications vary on different models. Refer to product documentation for detailed compliance status.

- FTZ 1 TR9 (Deutsche Telekom)
- GR-1089-CORE
- ICES-003 Class A
- IEC CISPR 35
- IEC CISPR 32 Class A
- IEC/EN 61000-3-2 AC Current Harmonics
- IEC/EN 61000-3-3 AC Voltage Fluctuations
- 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 KS C 9832 and KS C 9835)
- VCCI Class A

Railway

- AREMA[6]
- EN 50121-4[7]
- IEC 62236-4[7]

Power utility substations[8]

- IEC 61850-3
- IEEE 1613 / 1613.1

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)
- MEF CE 3.0 certified
- NEBS Level 3
  - Australia: RCM Mark
  - China RoHS: CRoHS
  - Europe: CE Mark
  - Japan: VCCI Mark
  - South Korea: KC Mark
  - Taiwan: BSMI Mark
  - United Kingdom: UKCA Mark

Other certifications

- MEF CE 3.0 certified

6 Applicable to 7250 IXR-ec model
7 Applicable to 7250 IXR-e2, 7250 IXR-e2c, 7250 IXR-ec models
8 Applicable to 7250 IXR-e2, 7250 IXR-ec models. 7250 IXR-e2c coming soon

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.

Nokia Oyj
Karaportti 3
FI-02610 Espoo, Finland
Tel. +358 (0) 10 44 88 000

Document code: (March) CID206825

EQUIPMENT FOR SALE

NOKIA 7250 IXR-e SERIES INTERCONNECT ROUTERS

NOKIA

7250 IXR-e2

7250 IXR-e 14SFP+ 4RJ45

7250 IXR-e 2QSFP28 8SFP28 24SFP+

7250 IXR-e2c

7250 IXR-ec

Routers in the Nokia 7250 Interconnect Router (IXR)-e series1 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.

Contact Today
For Current Inventory

Visit **TELECOMCAULIFFE.com**

✓ REDUCING **LEADTIMES** ✓ COST **SAVINGS** ✓ LIFETIME **WARRANTY** ✓ SUSTAINABLE **SOLUTIONS**

PICS | TELECOMCAULIFFE
A PICS TELECOM TEAM

BILL MCAULIFFE
Director of Sales – National Accounts
TEAMMCAULIFFE@PICSTELECOM.COM | 585.746.6383 | TELECOMCAULIFFE.COM