Nokia 7250 IXR-R Interconnect Routers

Release 23

The Nokia 7250 Interconnect Router R-series (IXR-R-series)[1] offers high port density in compact, modular, extended-temperature form factors. Routers in this series are ideal for IP anyhaul, aggregation, fixed-mobile convergence and mission-critical applications.

There are four platforms in the R-series: the 7250 IXR-R6dl, IXR-R6d, IXR-R6 and the IXR-R4. Using these routers, service providers can rapidly create and deploy new services while extending the lifetime of their existing infrastructure investment. Public and private enterprises can efficiently expand their aggregation networks

New service opportunities

The 7250 IXR-R series supports new 5G transport requirements. It delivers low latency for fronthaul, Internet of Things (IoT) and mission-critical applications while providing a large buffer memory for less delay-sensitive applications.

Per-service queuing features support differentiated quality of service (QoS), which is ideal for any-G aggregation and fixed-mobile network convergence. These features also help industrial enterprises attain IT/OT convergence by simultaneously carrying both their business and operational traffic.

Network operators who upgrade to the 7250 IXR-R series today will be ready to meet new service demands for many years to come.

7250 IXR-R6dl

7250 IXR-R6d

7250 IXR-R6

7250 IXR-R4

---

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

Automation

To simplify and automate network operations, the 7250 IXR enables model-driven network management features through the Nokia SR OS and is managed by the Nokia Network Services Platform (NSP). The NSP offers a rich set of service management features that automates new service delivery and reduces operating cost.

Standards-based software-defined networking (SDN) interfaces enable best-path computation to be offloaded to SDN controllers such as the Nokia NSP. 7250 IXR-R-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 by a path computation element (PCE) function in the SDN controller.

Network longevity

The modular architecture used by routers in the 7250 IXR-R series supports a variety of deployment options. High-density 1GE/10GE/25GE/40GE/100GE media-dependent adapter (MDA) cards accommodate future growth. CFP2 DCO optics provide high bandwidth over extended distances, lowering the total cost of operations. Legacy interface cards support transport over existing TDM interfaces and allow for seamless migration to a next-generation IP/MPLS infrastructure.

Side-to-side airflow with a fan filter and redundant fans increases system lifetime and reduce maintenance costs. Side-to-side airflow also guarantees compatibility with 300 mm ETSI-compliant cabinets. This capability is typically not available with front-to-back cooled systems.

High performance

The 7250 IXR-R series offers industry-leading control-plane performance using a multi-tasking, multi-priority operating system to take full advantage of multi-core processors combined with symmetrical multiprocessing (SMP). Network operators benefit from faster convergence times and powerful operations, administration and maintenance (OAM) and security features.

Accurate timing

The 7250 IXR-R series provides precise timing and accurate synchronization to meet the stringent requirements of 4G/5G mobile base stations and other networks. It improves timing accuracy over packet networks by combining built-in architectural features with Global Navigation Satellite System (GNSS) capabilities, ITU-T Synchronous Ethernet (SyncE) and the Nokia Bell Labs IEEE 1588v2 algorithm. Powerful QoS mechanisms deliver best-in-class performance by minimizing the delay and delay variation experienced by packet synchronization technologies. Port-based timestamping delivers consistently accurate IEEE 1588v2 performance.

Reliable service delivery

Granular, in-depth and scalable per-service monitoring offers visibility into packet flows. The 7250 IXR-R series provides comprehensive reporting on key performance indicators such as packet discard and forward counters. These capabilities improve reliability and help service providers fulfill service-level guarantees. Industry, enterprise and public sector operators can ensure that their critical operations traffic is receiving the required treatment.

The 7250 IXR-R series provides excellent protection against link or equipment failures through control and datapath redundancy options. It quickly reroutes traffic and re-converges networks using a robust set of dynamic routing and recovery capabilities. Superior network resiliency reduces network downtime and improves the overall productivity of network operations. With a highly resilient network, network operators can reduce operating costs, improve end-user satisfaction and offer higher-value SLAs.

For harsh environments

The 7250 IXR-R series, with its extended temperature range, mechanical hardening and robust EMC design, meets the IEEE 1613, IEC 61850-3 and EN 50121-4 standards for power substation and railway environments.

For uncertain environmental conditions, PCB enhanced plating (PEP) is included on the 7250 IXR-R6, IXR-R6d and IXR-R6dl to provide robustness without the need for conformal coating.

Software features

The 7250 IXR-R 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 Enhanced 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[2]

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)[2]
  - 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)
- 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

NOKIA

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

- IEEE 802.3.ad Link Aggregation Group (LAG) and multi-chassis (MC) LAG
- Pseudowire and LSP redundancy
- Control plane high availability (HA)
- BGP Edge and Core Prefix Independent Convergence (BGP PIC)
- HA routing and forwarding (excluding 7250 IXR-R4)
- 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[2]
- IP, SRv6[2] and MPLS load balancing by equal-cost multipath (ECMP)
- Weighted LAG hash
- VRRP
- Ethernet Ring Protection Switching ITU-T G.8032v2 (7250 IXR-R4/R6)
- Configurable polynomial and hash seed shift
- Entropy label (RFC-6790)
- In-service software upgrade (ISSU) (7250 IXR-R6)

---

2   SRv6 is supported on 7250 IXR-R6d and 7250 IXR-R6dl models

Platform

- Ethernet IEEE 802.1Q (VLAN) and 802.1ad (QinQ) with 9k jumbo frames (7250 IXR-R4/R6) and 9.8K jumbo frames (7250 IXR-R6d/R6dl)
- Detailed forwarded and discarded counters for service access points (SAPs) and network interfaces in addition to port-based statistics
- High-scale, per-Virtual Output Queue (VoQ) packet and byte counters (7250 IXR-R6)
- 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
- Y.1564 SAT
- ETH-CFM LBM Responder
- IEEE 802.3ah: Ethernet in the First Mile (EFM)
- Bidirectional Forwarding Detection (BFD) IPv4, IPv6
- Micro-BFD - per member link (7250 IXR-R4/R6)
- 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
- MAC, IPv4/IPv6 filters and criteria-based classifiers
- Per-port MAC security (MACsec)
- Secure Shell (SSH)

Technical specifications

Table 1. 7250 IXR-R series specifications

Feature	7250 IXR-R4	7250 IXR-R6	7250 IXR-R6d	7250 IXR-R6dl
System throughput Full duplex IMIX traffic	300 Gb/s with single or redundant active/standby control processor modules (CPM	800 Gb/s with single or redundant active/standby control-processor input/ output modules (CPIOMs)	2.4 Tb/s with single or redundant active/standby control-processor input/ output modules (CPIOMs)	2.4 Tb/s with single or redundant active/standby control-processor input/ output modules (CPIOMs)
Card slot throughput	160 Gb/s FD per slot	160 Gb/s full duplex (FD per slot	500 Gb/s or 300 Gb/s full duplex (FD) per slot	500 Gb/s or 300 Gb/s full duplex (FD) per slot
Card slots	Four	Six	Six (half slots)	Six (full slots)
Service interfaces	1 x QSFP28/QSFP+ 100/40GE + 6 x SFP+/SFP 10/1GE, 1 x CFP2 DCO 100GE + 4 x SFP+/SFP 10/1GE, 4 x SFP28/SFP+ 25/10GE + 6 x SFP+/SFP 10/1GE, 10 x SFP+/SFP 10/1GE, 20 x cSFP 1GE	1 x QSFP28/QSFP+ 100/40GE + 6 x SFP+/SFP 10/1GE, 1 x CFP2 DCO 100GE + 4 x SFP+/SFP 10/1GE, 4 x SFP28/SFP+ 25/10GE + 6 x SFP+/SFP 10/1GE, 10 x SFP+/SFP 10/1GE, 20 x cSFP 1GE, 32 x SDH, E1	5 x QSPF28 100GE, 1 x QSFP-DD 400GE + 1 x QSFP28 100GE, 2 x CFP2-DCO 400GE +100GE 15 x SFP28/SFP+ 25GE/10GE + 3 x SFP+ 10GE, 10 x SFP56/SFP28/ SFP+ 50GE/25GE/ 10GE, 20 x SFP+/SFP 10GE/GE	5 x QSPF28 100GE, 1 x QSFP-DD 400GE + 1 x QSFP28 100GE, 2 x CFP2-DCO 400GE +100GE 15 x SFP28/SFP+ 25GE/10GE + 3 x SFP+ 10GE, 10 x SFP56/SFP28/ SFP+ 50GE/25GE/ 10GE, 20 x SFP+/SFP 10GE/GE, 46 x SFP+/SFP 10GE/1GE
Control interfaces[3]	• Console, management, SyncE/1588, BITS, USB, 1PPS out, SD slot	• Console, management, SyncE/1588, BITS, Bluetooth, USB, GNSS in, 1PPS out, SD slot	• Console, management, SyncE/1588, Bluetooth, USB, GNSS in, 1PPS out, SD slot	• Console, management, SyncE/1588, Bluetooth, USB, GNSS in, 1PPS out, SD slot

Timing and synchronization	• Stratum 3E oscillator
	• ITU-T SyncE
	• IEEE 1588v2
	  – MC, BC, SC
	  – Profiles: IEEE 1588v2 default, G.8265.1, G8275.1, G8275.2
	  – UDP/IPv4 and Ethernet encapsulations
	• Nokia Bell Labs IEEE 1588v2 algorithm
	• RFC 5905 Network Time Protocol (NTP)
	• BITS port (T1, E1, 2M) and 1PPS timing
	• Support for GNSS SFP
		• Stratum 3E oscillator
		• ITU-T SyncE
		• IEEE 1588v2
		  – Grandmaster clock (GMC), master clock (MC), boundary clock (BC), slave clock (SC)
		  – Profiles: IEEE 1588v2 default, ITU-T G.8265.1, G.8275.1, G.8275.2 with PTS and APTS[4]
		  – UDP/IPv4 and Ethernet encapsulations
		• Nokia Bell Labs IEEE 1588v2 algorithm
		• ITU-T G.8273.2 Class C[5]
		• RFC 5905 Network Time Protocol (NTP)
		• Building Integrated Timing Supply (BITS) port (T1, E1, 2M) and pulse-per-second (1PPS) timing
		• Integrated, redundant GNSS receivers
			• Stratum 3E oscillator
			• ITU-T SyncE
			• IEEE 1588v2
			  – Grandmaster clock (GMC), master clock (MC), boundary clock (BC), slave clock (SC)
			  – Profiles: IEEE 1588v2 default, ITU-T G.8265.1, G.8275.1, G.8275.2 with PTS and APTS[4]
			  – UDP/IPv4 and Ethernet encapsulations
			• Nokia Bell Labs IEEE 1588v2 algorithm
			• ITU-T G.8273.2 Class C[5]
			• RFC 5905 Network Time Protocol (NTP)
			• Pulse-per-second (1PPS) timing
			• Integrated, redundant dual-band GNSS receivers
			• ITU-T G.8272 PRTC-B capable[5]
				• Stratum 3E oscillator
				• ITU-T SyncE
				• IEEE 1588v2
				  – Grandmaster clock (GMC), master clock (MC), boundary clock (BC), slave clock (SC)
				  – Profiles: IEEE 1588v2 default, ITU-T G.8265.1, G.8275.1, G.8275.2 with PTS and APTS[4]
				  – UDP/IPv4 and Ethernet encapsulations
				• Nokia Bell Labs IEEE 1588v2 algorithm
				• ITU-T G.8273.2 Class C[5]
				• RFC 5905 Network Time Protocol (NTP)
				• Pulse-per-second (1PPS) timing
				• Integrated, redundant dual-band GNSS receivers
				• ITU-T G.8272 PRTC-B capable[5]

3   Some control processor port features are future software deliverables.
4   APTS and dual band GNSS receivers are future software deliverable
5   For noise generation

Feature	7250 IXR-R4	7250 IXR-R6	7250 IXR-R6d	7250 IXR-R6dl
Common connectors/ indicators (on the fan tray)	• Alarm input/output • Alarm cutoff/lamp test (ACO/LT) button • Power status (A & B), fan and alarm LEDs	• Alarm input/output • Alarm cutoff/lamp test (ACO/LT) button • Power status (A & B), fan and alarm LEDs	• Alarm input/output • Alarm cutoff/lamp test (ACO/LT) button • Power status (A & B), fan and alarm LEDs	• Alarm input/output • Alarm cutoff/lamp test (ACO/LT) button • Power status (A & B), fan and alarm LEDs
Memory buffer size	3 GB	8 GB	4 GB	4 GB
Enhanced statistics collection	Standard	Full-scale	Full-scale	Full-scale
Common equipment redundancy	Control, power feeds, cooling fans	Control, switch, power feeds, cooling fans	Control, switch, power feeds, cooling fans	Control, switch, power feeds, cooling fans
Dimensions	• Height: 2RU, 8.9 cm (3.5 in) • Width: 44.5 cm (17.5 in) • Depth: 26.5 cm (10.4 in) • Rack-mountable in a 48.2-cm rack, 30-cm depth (standard 19-in equipment rack, 12-in depth)	• Height: 3RU, 13.3 cm (5.25 in) • Width: 44.5 cm (17.5 in) • Depth: 26.5 cm (10.4 in) • Rack-mountable in a 48.2-cm rack, 30-cm depth (standard 19-in equipment rack, 12-in depth)	• Height: 4RU, 17.8 cm (7.0 in) • Width: 44.5 cm (17.5 in) • Depth: 26.4 cm (10.4 in) • Rack-mountable in a 48.2-cm rack, 30-cm depth (standard 19-in equipment rack, 12-in depth)	• Height: 7RU, 31.1 cm (12.25 in) • Width: 44.5 cm (17.5 in) • Depth: 26.4 cm (10.4 in) • Rack-mountable in a 48.2-cm rack, 30-cm depth (standard 19-in equipment rack, 12-in depth)
Power	• DC input (two feeds, rated): -48 V DC/-60 V DC • AC power solutions available: 100 V AC to 240 V AC, 50 Hz/60 Hz	• DC input (two feeds, rated): -48 V DC/-60 V DC • AC power solutions available: 100 V AC to 240 V AC, 50 Hz/60 Hz	• DC input (two feeds, rated): -48 V DC / -60V DC • AC power solutions available: 100 V AC to 240 V AC, 50 Hz/60 Hz	• DC input (two feeds, rated): -48 V DC / -60 V DC • AC power solutions available: 100 V AC to 240 V AC, 50 Hz/60 Hz
Cooling	• One tray of fans with redundancy • Safety electronic breaks on removal • Right-to-left airflow • Front-to-back airflow (optional with add-on ancillaries) • Fan filter	• One tray of fans with redundancy • Safety electronic breaks on removal • Right-to-left airflow • Front-to-back airflow (optional with add-on ancillaries) • Fan filter	• One tray of fans with redundancy • Safety electronic breaks on removal • Right-to-left airflow • Front-to-back airflow (optional with add-on ancillaries) • Fan filter	• One tray of fans with redundancy • Safety electronic breaks on removal • Right-to-left airflow • Front-to-back airflow (optional with add-on ancillaries) • Fan filter
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 -40°C to +70°C[6]	-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)	-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	5% to 95%, non-condensing	5% to 95%, non-condensing
PCB Enhanced Plating (PEP)	MDAs	Yes	Yes	Yes

Optical breakout options include 4 x 100GE, 2 x 100GE on QSFP-DD ports and 4 x 25GE and 4 x 10GE on QSFP28/QSFP+ ports.

High-density MDA cards provide flexibility with breakout options and multiprotocol ports. Legacy TDM interfaces are also supported on the 7250 IXR-R6.

The 7250 IXR-R4 input/output module (IOM) has two SFP+/SFP 10GE ports and ten SFP GE ports providing an initial service configuration before any MDA cards are installed.

two SFP+/SFP 10GE ports and ten SFP GE ports providing an initial service configuration before any MDA cards are installed.

6   See product documentation for details

Table 2. 7250 IXR-R4/R6 MDA cards
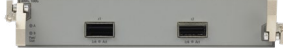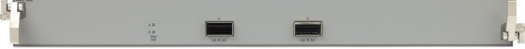
Card name	Details	
1-port 100GE + 6-port 10GE	• 1 x QSFP28/QSFP+ 100/40GE • 6 x SFP+/SFP 10/1GE	
1-port 100GE + 4-port 10GE	• 1 x CFP2 DCO 100GE • 4 x SFP+/SFP 10/1GE	
4-port 25GE + 6-port 10GE	• 4 x SFP28/SFP+ 25/10GE • 6 x SFP+/SFP 10/1GE	
10-port 10GE	• 10 x SFP+/SFP 10/1GE	
20-port GE	• 20 x cSFP 1GE (also accepts SFPs)	
32-port ASAP E1[7]	• TDM services	

Table 3. 7250 IXR-R6d/R6dl MDA cards

Card name	Details	
2-port 400GE	• 1 x CFP2-DCO 400GE + 1 x CFP2-DCO 100GE • 2 x CFP2-DCO 200GE/100GE	
5-port 100GE	• 5 x QSFP28 100GE	
1-port 400GE + 1-port 100GE	• 1 x QSFP-DD + 1 x QSFP28 100GE	
10-port 50GE	• 10 x SFP56/SFP28/SFP+ 50GE/25GE/10GE	
15-port 25GE + 3-port 10GE	• 15 x SFP28/SFP+ 25GE/10GE + 3 x SFP+ 10GE	
20-port 10GE/1GE	• 20 x SFP+/SFP 10GE/1GE	
46-port 10GE (7250 IXR-R6dl)	• 45 x SFP+ 10GE + 1 SFP 1GE	

---

7   Supported on the 7250 IXR-R6. Compatible with 7705 SAR-8/SAR-18. See the 7705 SAR data sheets for more details

Table 4. Maximum platform density per port speed

Port speed	7250 IXR-R4	7250 IXR-R6	7250 IXR-R6d	7250 IXR-R6dl
400GE	NA	NA	4 x 400GE	4 x 400GE
100/40GE	4 x 100/40GE	6 x 100/40GE	26 x 100GE	26 x 100GE
50GE	NA	NA	52 x 50GE	52 x 50GE
25GE	16 x 25GE	24 x 25GE	80 x 25GE	80 x 25GE
10GE	42 x 10GE	60 x 10GE	120 x 10GE	210 x 10GE
GE	80 x GE Above configurations include Ethernet ports on the IOM card	80 x GE	192 x SFP GE	480 x SFP GE

Standards compliance[8]

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-63-CORE
- GR-3108-CORE
- VZ-TPR-9205
- VZ.TPR.9203 (CO)

Safety

- AS/NZS 62368.1
- IEC/EN 60825-1
- IEC/EN 60825-2
- IEC/EN/UL/CSA 62368-1 Ed2
- IEC 60529 IP20

Electromagnetic compatibility

- AS/NZS CISPR 32 Class A
- ATIS-0600315

- BSMI CNS13438 Class A
- BT GS-7
- EN 300 386
- EN 301 489-1 (excluding 7250 IXR-R4)
- EN 301 489-17 (Bluetooth) (excluding 7250 IXR-R4)
- EN 301 489-19 (GNSS) (excluding 7250 IXR-R4)
- EN 55032 Class A
- EN 55024
- EN 55035
- ES 201 468
- ETSI EN 300 132-2
- FCC Part 15 Class A
- GR-1089-CORE
- ICES-003 Class A
- IEC 61000-6-2
- IEC 61000-6-4
- IEC CISPR 24
- IEC CISPR 35
- IEC CISPR 32 Class A
- IEC/EN 61000-4-2 ESD
- IEC/EN 61000-4-3 Radiated Immunity
- IEC/EN 61000-4-4 EFT

---

8   System design intent is according to standards listing. Refer to product documentation for detailed compliance status.

- IEC/EN 61000-4-5 Surge
- IEC/EN 61000-4-6 Conducted Immunity
- IEC/EN 61000-4-11 Voltage Interruptions
- IEC/EN 61000-6-2 Immunity for industrial environments
- IEC/EN 61000-6-4
- KCC Korea-Emissions & Immunity (in accordance KN32/35)
- KN 301 489-1 (excluding 7250 IXR-R4)
- KN 301 489-17 (Bluetooth) (excluding 7250 IXR-R4)
- VCCI Class A

Radio (excluding 7250 IXR-R4)

- EN 303 413 (GNSS)
- EN 300 328 (Bluetooth)
- FCC Part 15 Subpart C (Bluetooth)
- RSS-GEN
- RSS-247 (Bluetooth)

Power utility substations

- IEEE 1613 (exception, forced air system)
- IEEE 1613.1
- IEC 61000-6-5
- IEC 61850-3 (normal environmental conditions)
- IEC/AS 60870.2.1

Railway

- EN 50121-4
- IEC 62236-4

Directives, regional approvals and certifications

- Directive 2011/65/EU Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (Recast) Directive (including Commission Delegated Directive (EU) 2015/863)
- 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)
- DIRECTIVE 2014/53/EU Radio Equipment Directive (RED)
- MEF certification:
  - For a list of Nokia CE 1.0-, CE 2.0- and CE3.0-certified products, refer to the MEF certification registry.
- NEBS Level 3:
  - BSMI Mark - Taiwan
  - CE Mark - Common Europe
  - CRoHS - China RoHS
  - KC Mark - South Korea
  - RCM Mark - Australia
  - VCCI Mark – Japan
  - UKCA Mark – United Kingdom