Nokia 7250 IXR-6e/IXR-10e/IXR-18e Interconnect Routers

Release 25

The Nokia 7250 IXR-6e/IXR-10e/IXR-18e Interconnect Routers are differentiated, modular platforms designed for data center spine, super-spine, aggregation and WAN deployments. These platforms deliver massive scalability, flexibility and operations simplicity for enterprise, service provider and webscale data center and cloud environments.

Overview

Network operators require highly scalable, modular, reliable platforms that are designed to support high-speed interfaces for current and future network buildouts, including support for AI and high-performance computing (HPC) workloads. These platforms must also support a comprehensive set of features that enable flexible interconnectivity within and across networks.

Collectively, the Nokia 7250 IXR-6e/10e/18e/ is a set of high-capacity, high-density, modular platforms designed for data center spine, super-spine, aggregation and WAN deployments. It offers hardware support for 800GE, 400GE, 100GE, 50GE, 40GE, 25GE and 10GE interfaces including breakout support for intra-fabric, WAN and server connectivity.

The 7250 IXR-6e/10e/18e delivers a robust and comprehensive set of capabilities, including IP routing, Layer 2 Ethernet, QoS, MPLS, segment routing, router security, scalable telemetry and model-driven programmability. Flexible traffic management includes big buffering, per-port queuing and shaping.

7250 IXR-6e 7250 IXR-10e 7250 IXR-18e

The 7250 IXR-6e/10e/18e supports up to 28.8 Tb/s (FD) per slot, enabling very high-capacity and scalable interconnects without compromising on power efficiency.

The 7250 IXR-6e is a 4-slot platform supporting a system capacity up to 115.2 Tb/s full duplex (FD). The 7250 IXR-10e is an 8-slot platform supporting a system capacity up to 230.4 Tb/s FD. The 7250 IXR-18e is a 16-slot platform supporting a system capacity up to 460.8 Tb/s FD

Line cards are based on the latest generation of application-specific integrated circuits (ASICs).

Features and benefits

The Nokia 7250 IXR-6e/10e/18e delivers massive scalability, very high throughput and flexibility, enabling rapid deployment and easy adaptation for evolving data center, cloud and WAN environments and for supporting the demanding needs of AI and HPC workloads.

In addition to supporting high availability control, fabric, fan and power configurations, these platforms support industry-leading and unique hardware design innovations and capabilities, including:

- High-quality, midplane-less, orthogonal direct cross-connect—a critical design element to successfully move to future faster SERDES speeds and beyond
- An architecture without retimers across multiple generations of ASICs driving low power and ultra-high reliability due to a component minimizing design
- Power- and cooling-optimized design
- Support for 800GE and 400GE coherent optics with support for 400GE ZR+ optics in all pluggable optics positions
- High-capacity 800GE density and efficiency in a 16-slot configuration
- The IXR-6e and 10e platforms share the same control processor module (CPM). All chassis share the same integrated media modules (IMMs). The 10e and 18e platforms share the same switch fabric modules (SFMs) and the same fan tray.
- A generational chassis design that can start with J2C+ IMMs and upgrade to J3 while preserving CPMs, power supply units (PSUs) and fans with full backward compatibility for J2C+ IMMs.

These leading hardware design attributes combined with a full suite of SR Linux software features and the Nokia Event Driven Automation (EDA) operations and automation toolkit help data center and cloud teams to achieve their high availability design and operations efficiency goals.

Nokia Service Router Linux

Nokia SR Linux is a Linux®-based open, extensible and resilient NOS that enables scalability, flexibility and efficiency in data center and cloud environments. The Nokia 7250 IXR-6e/10e/18e implements Nokia SR Linux.

SR Linux is a key component of the Nokia Data Center Fabric solution, which also includes the Nokia Event Driven Automation (EDA) and the Nokia Data Center hardware platforms.

Ground-up, model-driven architecture delivers extensibility

In cloud-scale networks, the primary challenges are scalability and ease of operations. SR Linux is designed from the ground up with a management architecture that meets the demands of a model-driven world where visibility—and the scalability and granularity of that visibility—are paramount.

SR Linux features a completely model-driven architecture for flexible and simplified management and operations. An extensible and open infrastructure allows applications to define and declare their own schemas, enabling the retrieval of fine-grained system state and setting of configuration.

Modular, state-sharing architecture

SR Linux uses an unmodified Linux kernel as the foundation on which applications share state via a publish/subscribe (pub/sub) architecture. The Nokia pub/sub architecture is implemented using generalized Remote Procedure Call (gRPC), protocol buffers (protobufs) and the Nokia Impart Database (IDB).

The Nokia IDB is a lightweight database that is optimized to handle high volumes of messages while protecting against any one application slowing down the whole system.

Field-proven protocol stacks

SR Linux leverages field-proven protocol stacks from the Nokia Service Router Operating System (SR OS), which has a strong pedigree in IP routing.

Enterprise, service provider and webscale data centers are increasingly adopting leaf-spine fabric designs using enhanced IP routing with Multiprotocol-Border Gateway Protocol (MP-BGP), Ethernet VPN (EVPN) and Virtual Extensible LAN (VXLAN) protocols. By using field-proven protocol stacks, data center planning and operations teams can immediately benefit from the stability, scalability and interoperability of a resilient NOS.

Superior CLI programmability and integration of third-party applications

Operators can leverage command line interface (CLI) plugins to completely customize the way the CLI operates, plugging in Linux commands or pulling the state/configuration from various locations, combining them with system state/configuration to allow advanced logic.

SR Linux allows third-party applications to be fully integrated into the system and given all the same benefits as Nokia applications. This includes consistent configuration via YANG, telemetry support, life cycle management and visibility of system resources.

SR Linux offers a state-of-the-art NetOps Development Kit (NDK) for data center teams to develop new applications and operational tools in the language of their choice with deep programmatic access to, and control of, the entire system.

Nokia Event-Driven Automation

The Nokia Event Driven Automation framework (EDA) is an extensible, declarative, intent-based automation and operations NetOps platform that delivers agile and scalable network operations for data center and cloud environments of any size.

The declarative, intent-based framework and the automation capabilities of the EDA framework are only made possible by leveraging a modern NOS that offers an open, model-driven, stream-anything foundation.

By using Nokia SR Linux modern streaming telemetry approach for the NOS, the EDA framework has timely and efficient access to more granular data across the entire fabric. This data can then be used to understand the state of the network, which is essential for event-driven applications to determine if the network is behaving according to their intent. This approach is also highly scalable, which is essential in today's networks.

7250 IXR software features

The 7250 IXR-6e/10e/18e supports, but is not limited to, the following SR Linux software features.

Open Linux support

- Support for unmodified Linux kernel
- Access to Linux tools, patching and packaging
- SR Linux container
- Linux control groups (cgroupsv2)

Platform features

- Dynamic Ternary Content Addressable Memory (TCAM) table allocation

Layer 2 features

- Dot1q and untagged sub-interfaces
- Ethernet IEEE 802.1Q (VLAN) with support for jumbo frames
- Link aggregation: Link Aggregation Group (LAG) and Link Aggregation Control Protocol (LACP)
- Link Layer Discovery Protocol (LLDP) on all interfaces

Layer 3 features

- IPv4/v6 routing
- BGP with iBGP/eBGP: Support for IPv4/v6, including:
  - Core Prefix Independent Convergence (PIC)
  - 4-byte autonomous system number
  - Route reflector
  - Dynamic BGP
  - BGP unnumbered
  - eBGP multi-hop
  - Add-paths for IPv4 and IPv6 routes
  - IS-IS v4/v6
- Graceful restart client for IS-IS
- Open Shortest Path First (OSPFv2 and OSPFv3)
- Static routes for IPv4/v6
- Equal cost multi-path (ECMP) with consistent and resilient hashing and configurable hash fields
- IPv6 flow label hashing
- VRF: Multiple VRF support
- Maintenance modes
- Bi-directional forwarding detection (BFD), micro BFD (mBFD)
- Interfaces: Loopback interfaces
- Routing policy:
  - Structured rules for accepting, rejecting and modifying routes that are learned and advertised to routing peers
  - Routes can be matched based on prefix lists, autonomous system (AS) path regular expressions, BGP communities, Address Family Indicator/Subsequent Address Family Indicator (AFI/SAFI) protocol, etc.
  - Policy-based forwarding based on DiffServ Code Point (DSCP) and/or IP
  - Route leaking between network instances
- Layer 3/Layer 4 access control lists (ACLs) with validation; accept, reject and log actions

MPLS and segment routing (SR)

- Interface Label Distribution Protocol (LDP) over IPv4
- SR-ISIS over IPv4/v6
- Colored SR-MPLS TE-Policy
- BGP shortcuts over LDP
- BGP shortcuts over SR-ISIS
- MPLS QoS via EXP to forwarding class mapping
- MPLS ACL filters
- ICMP tunneling
- ICMP extensions for MPLS
- LSP ping and trace for LDP and SR-ISIS tunnels

QoS

- Intelligent packet classification, including IPv4 and IPv6 match-criteria-based classification
- Queuing/scheduling:
  - Strict priority
  - Weighted round robin (WRR)
  - Weighted Random Early Detection (WRED)
  - Explicit Congestion Notification (ECN)
- QoS classification and marking based on DSCP
- Explicit Congestion Notification (ECN) and Priority Flow Control (PFC)

System management and automation

- Native model-driven architecture, configuration candidates, exclusive mode, checkpoints and rollbacks
  - Support for SR Linux and OpenConfig data models
- Management interfaces: gNMI, gRPC Routing Information Base Interface (gRIBI), JSON-RPC and CLI (transactional, Python CLI and CLI plugins)
- gRPC network operations interface (gNOI)
- gRPC Network Security Interface (gNSI)
- P4 runtime packet extraction and injection
- Per-user configurable options for CLI
- Local Authentication, Authorization and Accounting (AAA) with Role Based Access Control (RBAC)
- Remote Authentication Dial-In User Service (RADIUS) support for AAA
- Terminal Access Controller Access Control System (TACACS+) AAA
- Password complexity policies and lockout management
- Access to common Linux utilities: Bash, cron and Python
- Syslog RFC 5424
- Telemetry
  - Subscription-based telemetry for modeled data structures, either on change or sampled
  - sFlow
  - Logging infrastructure
- Telemetry-driven event management
- Python-based Zero Touch Provisioning (ZTP)
- Address management: Dynamic Host Configuration Protocol (DHCP) v4/v6 relay
- DHCP v4/v6 server with static allocations
- Interactive mirroring

NetOps Development Kit (NDK)

- gRPC and protobuf-based interface for tight integration
- Leverages SR Linux model-driven architecture
- Direct access to other application functionality, e.g., forwarding information base (FIB), LLDP and BFD
- Native support for streaming telemetry

Load balancing and resiliency

- Support for redundant fan and power configurations
- Support for hot-swappable, redundant control and fabric modules
- BGP fast reroute using label/unlabeled unicast routes

Security

- Distributed and aggregated ACLs and policers for control and management plane
- Layer 3, Layer 4 Control Plane Policing (CoPP)
- Mirroring to Switch Port Analyzer (SPAN) and Encapsulated Remote SPAN (ERSPAN)
- IPv6 router advertisements guard
- MAC security (MACsec)
- IPSec[1]

Hardware overview

The Nokia 7250 IXR-6e/10e/18e delivers massive scalability, openness, aggregation and inter-connectivity for cloud environments as well as interconnects for AI and HPC workloads.

1 Future software release

Modular and high-availability platforms

The 7250 IXR-6e and IXR-10e share common CPMs, IMM cards and PSUs.The 7250 IXR-18e has a unique CPM.

The 7250 IXR-6e/10e/18e supports dual CPMs, redundant PSUs and fabric configurations that support redundancy as well as graceful degradation.

The 7250 IXR-6e/10e/18e uses an orthogonal direct cross connect architecture that allows for the full front and full back of the chassis to be used for air intake and exhaust.

The system configuration allows for IMMs connecting in front and switch fabrics and fans connecting at the rear. Fans and switch fabrics are decoupled to ensure that fan failures never result in packet loss if a fan fails and needs replacement.

Next-generation ASICs require advanced EMI containment without compromising critical airflow and increasing fan power. Nokia's unique mesh air intake and exhaust design solve these problems by delivering a Faraday cage design. It provides exceptional cooling, advanced power efficiency and superior EMI containment.

The IXR-6e and IXR-10e provide generational upgrades starting with J2C+ and where they can be upgraded to J3. Generational fans in the system ensure that fans are reusable across the upgrade, in addition to CPMs, PSUs and IMMs that are all backward compatible.

Nokia offers an eight-switch fabric design for both the 400G and 100G IMMs, reducing overall power consumption using fewer fabric ASICS. It reduces overall trace length all while improving resiliency when compared to systems offering a six-SFM design.

WIth the introduction of the 36 x 800GE IMM, the IXR-6e and IXR-10e move to a seven-SFM configuration—and the IXR-18e is introduced with a 14-SFM configuration.

The 7250 IXR-6e supports two SFM configurations; the 7250 IXR-10e supports three SFM configurations across two generations of ASICs (J2C+ and J3). The 7250 IXR-18e supports a single SFM configuration with J3 only.

Switch Fabric Module 1 (SFM1)

The SFM1 is supported only on the 7250 IXR-10e and is optimized for high-density 100GE data center leaf-spine designs. Using an 8+0 switch fabric design with graceful degradation for the IXR-10e only, the system supports line rate 100GE line cards in all slots and line rate 400GE line cards in the top two slots of the 7250 IXR-10e chassis. This configuration delivers ultimate power efficiency for 100G aggregation in ways that competing systems cannot.

Switch Fabric Module 2 (SFM2)

The SFM2 is optimized for high-density 400GE data center leaf-spine designs. For both the IXR-6e and IXR-10e, the SFM2 supports a 7+1 switch fabric configuration for full fabric redundancy with graceful degradation. The SFM2 supports line rate 400GE and 100GE line cards in all slots.

Switch Fabric Module 3 (SFM3)

The SFM3 is required for the 36 x 800GE IMM deployments. The 7250 IXR-6e/10e/18e support a distinct SFM3 variant.

When deployed in the IXR-6e and IXR-10e, the systems use a seven-SFM configuration. When used in the IXR-18e, the system uses a 14-SFM configuration.

Control Processor Module (CPM)

The 7250 IXR-6e/10e/18e supports multiple CPM variants. Individual CPM4/CPM5 variants support Root of Trust (RoT) features. In addition, a CPM4 variant with RoT and synchronization features is supported only with J2C+ line cards.

The CPM4/CPM5 with RoT features a multi-core x86e CPU that delivers control plane scalability and performance—a key requirement for data center leaf-spine designs.

The 7250 IXR-6e/10e/18e supports dual CPMs and a fully distributed control infrastructure with dedicated CPUs per line card. Compared to single monolithic control plane systems, this distributed architecture provides optimized control plane processing without any detrimental impacts to the central CPM during system maintenance, IMM commissioning and heavy traffic loads. The distributed architecture also improves system security and greatly improves IGP/EGP convergence times.

The CPM4/CPM5 with RoT supports an integrated 120G SSD, a discrete trusted platform module and is designed to meet all demanding performance benchmarks.

The CPM4/CPM5 with RoT enables Secure Boot to ensure that the software executed by the system is trusted. The Trusted Platform module (TPM 2.0) is provisioned with Nokia Initial Device Identity (IDevID) and Initial Attestation Key (IAK).

Integrated Media Module (IMM)

IMMs are line cards providing integrated processing and physical interfaces on a single module. IMMs are hot-swappable and provide high-capacity Ethernet interfaces with full duplex (FD) per-slot capacity up to 28.8 Tb/s.

All IMMs natively support line rate MACsec and IPsec in hardware without the need to purchase specific part numbers, which complicates deployments and sparing.

With support for a 36-port 800GE QSFP-DD IMM, a 36-port 400GE QSFP-DD IMM and a 60-port 100GE QSFP28 IMM, a full range of densities are available. Hardware breakout on the 60-port 100GE IMM is also industry leading without the same trade-offs that come with lower density 100GE competitor line cards.

Power Supply Unit (PSU)

The 7250 IXR-6e, IXR-10e and IXR-18e platforms support up to 9, 12 and 24 PSUs respectively, allowing for full N+N power supply redundancy along with full power feed redundancy. The 7250 IXR-6e/10e/18e provides added room for power growth to support system enhancements with next-generation ASICs.

Two PSU variants are available: a 3,000 watt DC PSU and a 3,000 watt AC PSU. The PSUs are fully interchangeable between the chassis variants. Each individual PSU supports dual-feed inputs. The PSUs are rated at a Platinum efficiency level, with the DC PSU delivering up to 93% efficiency while the AC PSU delivers up to 94% efficiency.

System scale and performance

Platform-specific scale and performance information is available and can be provided on request.

Technical specifications

Table 1. 7250 IXR-6e/IXR-10e/IXR-18e specifications

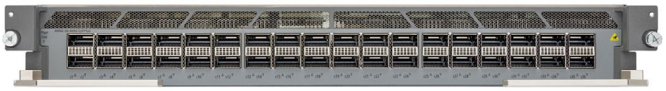
Feature	7250 IXR-6e	7250 IXR-10e	7250 IXR-18e
System throughput: Full duplex (FD)	Up to 115.2 Tb/s with latest-generation cards	Up to 230.4 Tb/s with latest-generation cards	Up to 460.8 Tb/s with latest-generation cards
SFM capabilities	• Single-stage fabric with graceful degradation • Separate fan module from switch fabric • Orthogonal direct cross-connect • Design that minimizes trace length • Ultra-efficient configuration focused on upgradability		
Maximum IMM throughput per slot (FD)	28.8 Tb/s with latest-generation IMMs	28.8 Tb/s with latest-generation IMMs	28.8 Tb/s with latest-generation IMMs
IMM slots	4	8	16
SFM slots	8	8	16
SFM cards required for J2C+ IMMs	8	8	n/a
SFM cards required for J3 IMMs	7	7	14
PSU slots	9	12	24
Control interfaces	Console, management, Bluetooth, USB, SD slot	Console, management, Bluetooth, USB, SD slot	Console, management, Bluetooth, USB, SD slot
Memory buffer size	Per card (see Table 2)	Per card (see Table 2)	Per card (see Table 2)
Redundant hardware	• Dual redundant CPMs • Switch fabric redundancy (7+1, 7+0) • Power redundancy (N+N) • Fan redundancy (N+1)	• Dual redundant CPMs • Switch fabric redundancy (8+0, 7+1, 7+0)) • Power redundancy (N+N) • Fan redundancy (N+1)	• Dual redundant CPMs • Switch fabric redundancy (14+0) • Power redundancy (N+N) • Fan redundancy (N+1)
Dimensions	• Height: 44.50 cm (17.5 in); 10 RU • Width: 48.30 cm (19.0 in) • Depth: 92.20 cm (36.3 in) • Fits in standard 19-in rack	• Height: 71.00 cm (28.0 in); 16 RU • Width: 48.50 cm (19.0 in) • Depth: 92.20 cm (36.3 in) • Fits in standard 19-in rack	• Height: 155.57 cm (62.3 in); 35 RU • Width: 48.50 cm (19.0 in) • Depth: 103.12 cm (40.6 in) • Fits in standard 19-in rack
Power	• 9 PSUs with N+N redundancy • DC (dual feed): -40V DC to -72V DC • AC (dual feed): 200V AC to 240V AC, 50 Hz to 60 Hz • Front-bottom PSUs and power cabling	• 12 PSUs with N+N redundancy • DC (dual feed): -40V DC to -72V DC • AC (dual feed): 200V AC to 240V AC, 50 Hz to 60 Hz • Front-bottom PSUs and power cabling	• 24 PSUs with N+N redundancy • DC (dual feed): -40V DC to -72V DC • AC (dual feed): 200V AC to 240V AC, 50 Hz to 60 Hz • Front-bottom PSUs and power cabling
Cooling	• 4 trays of 3 ultra-quiet fans • Fan trays separate from switch fabric • Mesh air intakes and exhaust for superior air entry and exit • Safety electronic breaks on removal • Front-to-back airflow • Fan filter door kit (optional)	• 4 trays of 6 ultra-quiet fans • Fan trays separate from switch fabric • Mesh air intakes and exhaust for superior air entry and exit • Safety electronic breaks on removal • Front-to-back airflow • Fan filter door kit (optional)	• 8 trays of 6 ultra-quiet fans • Fan trays separate from switch fabric • Mesh air intakes and exhaust for superior air entry and exit • Safety electronic breaks on removal • Front-to-back airflow

Feature	7250 IXR-6e	7250 IXR-10e	7250 IXR-18e
Normal operating temperature range	0°C to +40°C (32°F to +104°F) sustained	0°C to +40°C (32°F to +104°F) sustained	0°C to +40°C (32°F to +104°F) sustained
Shipping and storage temperature range	-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

Table 2. 7250 IXR-6e/IXR-10e/IXR-18e IMM cards

CPM/IMM	Details	
CPM4 (Supported on 7250 IXR-6e/10e with J3 line cards)	• 8-core x86 at 2.5 GHz CPU • 2 threads per core • 32 GB DRAM • 120 GB SSD • Bluetooth • TPM 2.0 • Root of Trust (RoT)	
CPM4 with Synchronization (Supported on IXR-6e/10e with J2C+ line cards)	• 8-core x86 at 2.5 GHz CPU • 2 threads per core • 32 GB DRAM • 120 GB SSD • Bluetooth • TPM 2.0 • Root of Trust (RoT) • SyncE/1588	
CPM5 (Supported on 7250 IXR-18e)	• 8-core x86 at 2.5 GHz CPU • 2 threads per core • 32 GB DRAM • 120 GB SSD • Bluetooth • TPM 2.0 • Root of Trust (RoT)	
36-port 800GE (Supported on 7250 IXR 6e/10e/18e)	• 36 x 800GE QSFP-DD • Requires SFM3 • Native hardware support for 800GE, 400GE, and 100GE • Hardware breakout* options for 2 x 400GE, 8 x 100GE, 2 x 100GE and 8 x 50GE • 32 GB packet buffer • 40 GB SSD • 4-core x86 at 2.7 GHz, 16 GB DRAM • Dedicated separate thumb screws and ejectors • Mesh air intakes for superior cooling	

* Some breakout options require future software support and specific DAC cables

CPM/IMM	Details	
36-port 400GE (Supported on 7250 IXR-6e/10e)	• 36 x 400GE QSFP-DD • Supported with SFM1, SFM2 and SFM3 • Native hardware support for 400GE, 100GE and 40GE • Hardware breakout* options for 4 x 100GE, 2 x 100GE, 8 x 50GE, 2 x 50GE, 4 x 25GE and 4 x 10GE • 16 GB packet buffer • 60 GB SSD • 4-core x86 at 2.5 GHz, 16 GB DRAM • Dedicated separate thumb screws and ejectors • Mesh air intakes for superior cooling • Can be mixed with 36 x 800G IMM when used with SFM3 on IXR-6e/10e	
60-port 100GE (Supported on 7250 IXR-6e/10e)	• 60 x 100GE QSFP28 • Supported with SFM1, SFM2 and SFM3 • Native hardware support for 100GE and 40GE • Hardware breakout options* for 2 x 50GE, 4 x 25GE and 4 x 10GE • 8 GB packet buffer • 60 GB SSD • 4-core x86 at 2.5 GHz, 16 GB DRAM • Dedicated separate thumb screws and ejectors • Mesh air intakes for superior cooling • Can be mixed with 36 x 800G IMM when used with SFM3 on IXR-6e/10e	

* Some breakout options require future software support and specific DAC cables.

Table 3. 7250 IXR-6e/IXR-10e/IXR-18e maximum chassis density

Ethernet speed	7250 IXR-6e	7250 IXR-10e	7250 IXR-18e
10GE*	576	1,152	NA
25GE*	576	1,152	NA
40GE*	240	480	NA
50GE*	1,152	2,304	4,608
100GE	1,152	2,304	4,608
400GE	288	576	1,152
800GE	144	288	576

* Future software support

Table 4. 7250 IXR-6e/10e/18e IMM scale*

IMM scale	60-port QSFP28 IMM	36-port 400G QSFP-DD	36-port 800G QSFP-DD
10GE	144	144	NA
25GE	144	144	NA
40GE	60	36	NA
50GE	120	288	288
100GE	60	144	288
400GE	NA	36	72
800GE	NA	NA	36
IPsec	All ports	All ports	All ports
MACsec	All ports	All ports	All ports
Packet buffer	8 GB	16 GB	16 GB

* The port type and densities listed are dependent on software support.

Standards compliance[2]

Environmental

- 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[3]
- GR-3160-CORE

Safety

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

Electromagnetic compatibility

- AS/NZS CISPR 32 (Class A)
- BSMI CNS 13438 (Class A)
- BT GS-7
- EN 300 386
- EN 301 489-1
- EN 301 489-17 (Bluetooth)
- EN 55032 (Class A)
- EN 55035
- ETSI EN 300 132-1 (AC)
- ETSI EN 300 132-2 (LVDC)
- ETSI ES 201 468
- FCC Part 15 (Class A)
- ICES-003 (Class A)
- IEC 61000-3-2
- IEC 61000-3-3
- IEC 61000-6-2
- IEC 61000-6-4
- IEC CISPR 32 (Class A)
- IEC CISPR 35
- IEC/EN 61000-4-2 ESD
- IEC/EN 61000-4-3 Radiated Immunity

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

3 Supported on 7250 IXR-6e only

- 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
- KN 301 489-1
- KN 301 489-17 (Bluetooth)
- KS C 9832 (2019)
- KS C 9835 (2019)
- VCCI (Class A)

Radio

- EN 300 328 (Bluetooth)
- FCC Part 15.247 (Bluetooth)
- RSS-GEN
- RSS-247 (Bluetooth)

Directives and regional approvals

- Directive 2011/65/EU RoHS (including Commission Delegated Directive EU 215/863)
- Directive 2012/19/EU WEEE
- Directive 2014/30/EU EMC
- Directive 2014/35/EU LVD
- Directive 2014/53/EU RED
- BSMI Mark: Taiwan
- CE Mark: Europe
- CRoHS: China RoHS
- KC Mark: South Korea
- NEBS Level 3
- RCM Mark: Australia
- VCCI Mark: Japan
- UKCA: United Kingdom

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
Karakaari 7
02610 Espoo
Finland
Tel. +358 (0) 10 44 88 000

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