Nokia 7250 IXR-R6
Interconnect Router
Release 13.1

The Nokia 7250 Interconnect Router R6 (IXR-R6)\(^1\) offers high-density 10GE and 100GE port counts in a compact form factor. It is an ideal router for IP anyhaul (fronthaul and backhaul), fixed-mobile convergence and mission-critical applications.

With the 7250 IXR-R6, service providers can rapidly create and deploy new services while extending the lifetime of their existing infrastructure investment. Industry and government network operators can efficiently expand their aggregation networks.

New service opportunities

The 7250 IXR-R6 is ready to support new transport requirements on the path to 5G. The 7250 IXR-R6 delivers low latency for fronthaul, Internet of Things (IoT) and mission-critical applications while providing 8 GB of buffer memory for less delay-sensitive applications.

The router’s 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 industry and government network operators merge their operational and business services traffic.

The 7250 IXR-R6 uses the Nokia Service Router Operating System (SR OS) and is managed by the Nokia Network Services Platform (NSP). It offers a rich set of service management features that can automate new service delivery and reduce operating cost.

Operators who upgrade to the 7250 IXR-R6 today will be ready to meet new service demands for many years to come.

Network longevity

The 7250 IXR-R6’s modular architecture supports a variety of deployment options. High-density 1GE/10GE/25GE\(^2\) /40GE/100GE interface cards accommodate future growth. Legacy interface cards support transport over existing TDM interfaces, including SONET/SDH, and allow for a seamless migration to a next-generation IP/MPLS infrastructure. Side-to-side airflow with a fan filter and redundant fans increases system lifetime and reduces maintenance costs.

High performance

The 7250 IXR-R6 offers industry-leading control-plane performance using a 16-core-processor architecture combined with symmetrical multiprocessing. Service providers benefit from faster convergence times and powerful operations, administration and maintenance (OAM) and security features.

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\(^1\) The 7250 IXR-R6 is part of the 7250 IXR product family. Please refer to the 7250 IXR-10/IXR-6/IXR-s data sheet for details on those models.

\(^2\) Hardware ready; future software deliverable
Precise timing


Reliable service delivery

Granular, in-depth and highly scalable per-service monitoring offers visibility into packet flows. The 7250 IXR-R6 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.

By supporting line-rate MAC Security (MACsec³) on all ports, the 7250 IXR-R6 offers flexible and scalable security options for future network requirements.

The 7250 IXR-R6 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, service providers can reduce operating costs, improve end-user satisfaction and offer higher-value SLAs.

For harsh environments

The 7250 IXR-R6, 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.

Software features

The 7250 IXR-R6 supports, but is not limited to, the following features.

Services

- Point-to-point Ethernet VPN services
- Ethernet pseudowires/virtual leased line (VLL)
- Ethernet Virtual Private Wire Service (EVPN-VPWS) and Flexible Cross Connect (FXC) with virtual LAN (VLAN) normalization
  - Multihoming with single active or active/active
- Multipoint Ethernet VPN services with Virtual Private LAN Service (VPLS) based on Targeted Label Distribution Protocol (T-LDP) and Border Gateway Protocol (BGP)
- IP VPN (VPRN), Inter-Autonomous System (Inter-AS) Option A, B, and C
- IPv6 VPN Provider Edge (6VPE)
- Internet Enhanced Services (IES)
- TDM pseudowires/VLL with Circuit Emulation Service over Packet-Switched Network (CESoPSN) and Structure-Agnostic TDM over Packet (SATOP)

Interfaces

- Ethernet – 9K jumbo frames
- TDM
  - OC3/STM1, OC12/STM4
  - DS1/E1

Network protocols

- Segment routing
  - Intermediate System-to-Intermediate System (IS-IS) and Open Shortest Path First (OSPF)
  - BGP Labeled Unicast (LU) (RFC 3107) route tunnels
- MPLS label edge router (LER) and label switching router (LSR) functions
  - Label Distribution Protocol (LDP)
  - Resource Reservation Protocol (Rsvp)
- IP routing
  - Dual-stack Interior Gateway Protocol (IGP)
  - Multi-topology, multi-instance Intermediate System to Intermediate System (IS-IS)

³ Future software deliverable
- Multi-instance Open Shortest Path First (OSPF)
- Multiprotocol BGP (MBGP)
- 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)

**Multicast**
- Internet Group Management Protocol (IGMP)
- IGMP snooping
- Protocol Independent Multicast – Sparse Mode (PIM-SM), Source Specific Multicast (SSM)

**Platform**
- Counters per service access point (SAP) and network interface in addition to port-based statistics
- High-scale, per Virtual Output Queue (VoQ) packet and byte counters
- High-scale, per-policer, detailed counters on a per-state basis
- Configuration rollback
- Accounting records
- Dynamic Host Configuration Protocol (DHCP) server for IPv4 IES, VPNv4
- DHCP relay for IPv4 IES, VPNv4, VPNv6
- Cflowd

**Timing and synchronization**
- Built-in Stratum 3E clock
- ITU-T Synchronous Ethernet (SyncE)
- IEEE 1588v2
- Boundary clock (BC), slave clock (SC)
- RFC 5905 Network Time Protocol (NTP)
- Differential clock recovery (DCR) timing for TDM pseudowires
- Building Integrated Timing Supply (BITS) ports (T1, E1, 2M) and pulse-per-second (1PPS) timing

**QoS and traffic management**
- Hierarchical QoS (HQoS)
  - Hierarchical egress schedulers and shapers per forwarding class, SAP, network interface or port
  - Port sub-rate
  - 16 GB of buffer memory
- Intelligent packet classification, including complex multifield classification
- Hierarchical policing, including broadcast, multicast and unknown policers
- Aggregate policers for hierarchical rate enforcement
- Strict priority, weighted fair queuing schedulers
- Congestion management via weighted random early discard (WRED)
- Marking or re-marking at egress

**System management**
- Management by CLI, Simple Network Management Protocol (SNMP) MIBs, and service assurance agent (SAA) with comprehensive support through the 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
- IEEE 802.3ah: Ethernet in the First Mile (EFM)
- Bidirectional Forwarding Detection (BFD)
- Two-Way Active Measurement Protocol (TWAMP), TWAMP Light
- A full suite of MPLS OAM tools
- Mirroring
  - Port
  - VLAN
  - Filter output (Media Access Control (MAC)/IPv4/IPv6 filters)
  - Local/remote
- SAP and port loopback

**Load Balancing & Resiliency**
- Nonstop routing
- BGP Edge and Core Prefix Independent Convergence (PIC)
- RSVP-TE Fast Reroute (FRR)
- Segment routing remote loop-free alternate (LFA)
- LDP LFA
• Virtual Router Redundancy Protocol (VRRP)  
• 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)  
• Entropy label (RFC-6790)  

Security  
• Remote Authentication Dial-In User Service (RADIUS), Terminal Access Controller Access Control System Plus (TACACS+), and comprehensive control-plane protection capabilities

4 Future software deliverable

Technical specifications

Table 1. 7250 IXR-R6 specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>System throughput</td>
<td>3.2 Tb/s switch engine</td>
</tr>
<tr>
<td>Half duplex IMIX traffic</td>
<td>1.6 Tb/s with single or redundant active/standby CPIOMs</td>
</tr>
<tr>
<td>Card slot throughput</td>
<td>160 Gb/s full duplex (FD) per slot</td>
</tr>
<tr>
<td>Card slots</td>
<td>Six (two of which also support Nokia 7705 SAR-8/SAR-18 adapter cards)</td>
</tr>
<tr>
<td>Built-in CPIOM interfaces*</td>
<td>Console, management, SyncE/1588, Bluetooth, USB, GNSS in, 1PPS out, Optical Management Connection (OMC), SD slot</td>
</tr>
<tr>
<td>Common connectors/indicators</td>
<td>Alarm input/output</td>
</tr>
<tr>
<td>(on the fan tray)</td>
<td>Alarm cutoff/lamp test (ACO/LT) button</td>
</tr>
<tr>
<td></td>
<td>Power status (A &amp; B), fan and alarm LEDs</td>
</tr>
<tr>
<td>Common equipment redundancy</td>
<td>Control, switch, power feeds, cooling fans</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Height: 3 RU, 13.3 cm (5.25 in)</td>
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<tr>
<td></td>
<td>Width: 44.5 cm (17.5 in)</td>
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<tr>
<td></td>
<td>Depth: 26.5 cm (10.4 in)</td>
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<tr>
<td></td>
<td>Rack-mountable in a 48.2-cm rack, 30-cm depth</td>
</tr>
<tr>
<td></td>
<td>(standard 19-in equipment rack, 12-in depth)</td>
</tr>
<tr>
<td>Power</td>
<td>Two feeds: -48 V DC/-60 V DC</td>
</tr>
<tr>
<td></td>
<td>AC power solutions available: 100 V AC to 240 V AC, 50 Hz/60 Hz</td>
</tr>
<tr>
<td>Cooling</td>
<td>One tray of six ultra-quiet fans with redundancy</td>
</tr>
<tr>
<td></td>
<td>Safety electronic breaks on removal</td>
</tr>
<tr>
<td></td>
<td>Right-to-left airflow</td>
</tr>
<tr>
<td></td>
<td>Front-to-back airflow (optional with add-on ancillaries)</td>
</tr>
<tr>
<td></td>
<td>Fan and filter</td>
</tr>
<tr>
<td>Normal operating temperature</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>
</tr>
<tr>
<td>Normal humidity</td>
<td>5% to 95%, non-condensing</td>
</tr>
</tbody>
</table>

* Some CPIOM port features are future software deliverables.
Table 2. 7250 IXR-R6 adapter cards

<table>
<thead>
<tr>
<th>Card name*</th>
<th>Details</th>
</tr>
</thead>
</table>
| 1-port 100GE + 6-port 10GE | • 1 x QSFP28/QSFP+ 100/40 Gb/s (future support for breakout to 4 x 10 Gb/s or 4 x 25 Gb/s)  
• 6 x SFP+/SFP 10/1 Gb/s |
| 10-port 10GE | • 10 x SFP+/SFP 10/1 Gb/s |
| 10-port 10GE | |
| 20-port GE | • 20 x cSFP 1 Gb/s |
| 4-port OC-3/STM-1 or 1-port OC-12/STM-4 | • 4 x SFP configurable for SONET or SDH (configurable as 4 x OC-3/STM-1 or 1 x OC-12/STM-4)  
• TDM services |
| 32-port ASAP T1/E1** | TDM services |

* The Ethernet cards are MACsec hardware-ready on every port.
** Compatible with 7705 SAR-8/SAR-18. See the 7705 SAR Legacy Interface Adapter Cards data sheet for more details.

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
• ETSI EN 300 753 Acoustic Noise Class 3.2
• GR-63-CORE
• GR-295-CORE
• GR-3108-CORE
• VZ-TPR-9205
• VZ.TPR.9203 (CO)

Electromagnetic compatibility

• AS/NZS CISPR 32 Class A
• ATIS-0600315.2013
• BSMI CNS13438 Class A
• BT G5-7
• EN 300 386
• EN 301 489-1
• EN 301 489-17 (Bluetooth)
• EN 301 489-19 (GPS)
• EN55032 Class A
• EN 55024
• ES 201 468
• ETSI EN 300 132-2
• FCC Part 15 Class A
• GR-1089-CORE

Safety

• AS/NZS 60950.1
• CSA/UL 62368-1 NRTL
• EN 62368-1 CE Mark
• IEC 60529 IP20
• IEC 60950-1/62368-1 CB Scheme
• IEC/EN 60825-1
• IEC/EN 60825-2

System design intent is according to standards listing. Refer to product documentation for detailed compliance status.
• ICES-003 Class A
• IEC 61000-6-2
• IEC 61000-6-4
• IEC CISPR 24
• IEC CISPR 32 Class A
• 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 Intermittions
• KCC Korea-Emissions & Immunity (in accordance KN32/35)
• 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)
• DIRECTIVE 2014/53/EU Radio Equipment Directive (RED)
• NEBS Level 3
• Australia: RCM Mark
• China RoHS: CRoHS
• Europe: CE Mark
• Japan: VCCI Mark
• South Korea: KC Mark
• Taiwan: BSMI Mark

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