As part of the Nokia Data Center Fabric solution, the Nokia 7220 IXR-D series routers are designed for the leaf and spine layers of data center fabrics, delivering high-scale interconnectivity for webscale, service provider, enterprise data center and cloud environments.

**Overview**

The Nokia Data Center platforms include the 7250 IXR-10/IXR-6, the Nokia 7220 IXR-H series and the 7220 IXR-D series of interconnect routers—all of which implement the Nokia Service Router Linux (SR Linux) network operating system (NOS). This data sheet discusses the 7220 IXR-D series, which consists of the 7220 IXR-D3, the 7220 IXR-D2 and the 7220 IXR-D1.

High-bandwidth servers are driving the need for higher port speeds and density in data center architectures. Similarly, the need for more power-efficient and state-of-the-art NOS design is driving the modernization of network aggregation and interconnect within data centers.

The 7220 IXR-D series routers are high-performance, fixed-configuration routers designed for data center leaf-spine deployments. They offer 100GE, 50GE, 40GE, 25GE, 10GE and 1GE interfaces for intra-fabric and server connectivity.

The 7220 IXR-D series deliver a robust and comprehensive set of capabilities, including IP routing, Layer 2 Ethernet, QoS, router security, scalable telemetry and model-driven management.
The 7220 IXR-D series is available in three chassis variants.

**7220 IXR-D3 32QSFP28 2SFP+**
The 7220 IXR-D3 is 1 RU high with a system capacity of 6.4 Tb/s HD. It is equipped with 32 100GE QSFP28 ports and 2 1/10GE SFP+ ports.

All QSFP28 ports include hardware support for native 100GE, 50GE, 40GE, 25GE, 10GE and 1GE speeds. The QSFP28 ports also include hardware support for breakout options for 50GE, 25GE, 10GE and 1GE.

The SFP+ ports include hardware support for native 10GE and 1GE speeds.

These port options provide exceptional flexibility in a variety of leaf or spine deployment configurations.

The 7220 IXR-D3 supports two power supplies with 1+1 redundancy using either AC or DC power options.

The system supports both front-to-back and back-to-front airflow configuration with 5 N+1 hot-swappable fans.

**7220 IXR-D2 48SFP28 8QSFP28**
The 7220 IXR-D2 is 1 RU high with a system capacity of 4.0 Tb/s HD. It is equipped with 48 25GE SFP28 ports and 8 100GE QSFP28 ports.

All QSFP28 ports include hardware support for native 100GE, 50GE, 40GE, 25GE and 10GE speeds. The QSFP28 ports also include hardware support for breakout options for 50GE, 25GE, 10GE and 1GE.

The SFP28 ports include hardware support for native 25GE, 10GE and 1GE speeds.

These port options provide high-performance intra-fabric uplinks, storage and server connectivity.

The 7220 IXR-D2 supports two power supplies with 1+1 redundancy using either AC or DC power options.

The system supports both front-to-back and back-to-front airflow configuration with 4 N+1 hot-swappable fans.

**7220 IXR-D1 48T 4SFP+**
The 7220 IXR-D1 is 1 RU high with a system capacity of 176 Gb/s HD. It is equipped with 48 10/100/1000 Mb/s RJ45 ports and 4 1/10GE SFP+ ports.

The SFP+ ports include hardware support for native 10GE and 1G speeds. The 7220 IXR-D1 is optimized for leaf-spine designs, which require server connectivity at 1GE speeds.

The 7220 IXR-D1 supports two power supplies with 1+1 redundancy using either AC or DC power options.

The system supports both front-to-back and back-to-front airflow configuration with 3 N+1 hot-swappable fans.

**Nokia Service Router Linux**

Nokia Service Router Linux (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 7220 IXR-D series implements Nokia SR Linux.

SR Linux is a key component of the Nokia Data Center Fabric solution, which also includes the Nokia Fabric Services Platform and the Nokia Data Center platforms.

**Ground-up, model-driven architecture delivers extensibility**

In cloud-scale data center networks, the primary challenges are scalability and/or 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. SR Linux delivers an extensible and open infrastructure that 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.

Webscale, service provider and enterprise 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 operators 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 Fabric Services System

The Nokia Fabric Services System is a declarative, intent-based automation and operations toolkit that delivers agile and scalable network operations for data center and cloud environments.

Scalable automation for all phases of data center fabric operations

Technically, automation at scale can only be delivered through intent. The Fabric Services System is designed from the ground up for intent-based automations for all phases of data center fabric operations, including Day 0 design, Day 1 deployment and Day 2+ configuration, operation, measurement and analysis of a data center fabric.

The system uses the Kubernetes framework and benefits from an established open platform instead of reinventing key platform components. All fabric services use a distributed microservices approach, allowing Nokia to deliver a true cloud-native platform for automation and operations.

Fabric Services System digital sandbox

The Fabric Services System delivers a cloud-native digital sandbox that is a true emulation of a single data center router as a containerized SR Linux (cSR Linux) instance and a fabric of multiple cSR Linux instances. The digital sandbox as an operational tool is capable of emulating a data center fabric, application workloads and external BGP speakers.

Fabric intent (as code)

The Fabric Services System is designed from the ground up to represent fabric as code. All the intent and configuration state of the data center fabric is represented in a declarative way in YAML format. This lays a strong foundation for continuous integration/continuous deployment of network infrastructure, thereby fitting into the move towards infrastructure as code.

Both fabric design intent and workload intent can be validated on the Fabric Services System digital sandbox, allowing operations teams to
confidently and quickly manage the risk of a change. The digital sandbox allows the operator to first try out the changes, perform detailed validations and then apply the changes to the production network.

**Fabric observability**

Fabric observability is a combination of telemetry data and log data collected from the fabric to monitor and provide visibility into the east-west and north-south traffic. The Fabric Services System enables a cloud-native, scale-out collector architecture so that the collection capabilities are highly distributed.

**Fabric operations**

The Fabric Services System combines design intent with all the telemetry data collected from the fabric and presents the data in a context relevant to the operational task. These contextual views combined with the digital sandbox enable the operations team to deliver agility with confidence and removes the barriers between cross-functional teams.

**Fabric integrations**

The Fabric Services System enables a flexible, cloud-native approach for external integrations, resulting in faster, customized integration in customer environments. The system can be integrated with compute virtualization, storage solutions, in-house operational tools and cloud environments.

The cloud-native integration model enables data center teams to develop their integrations in a loosely coupled manner that fits into a standard Kubernetes framework.

**Software features**

For details about software feature support, see the Nokia Service Router Linux data sheet.

### Technical specifications

**Table 1. 7220 IXR-D series specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>7220 IXR-D3</th>
<th>7220 IXR-D2</th>
<th>7220 IXR-D1</th>
</tr>
</thead>
<tbody>
<tr>
<td>System throughput</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Half duplex (HD)</td>
<td>6.4 Tb/s</td>
<td>4.0 Tb/s</td>
<td>176 Gb/s</td>
</tr>
<tr>
<td>Ports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 32 x QSFP28/QSFP+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 2 x SFP+</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Ports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 8 x QSFP28/QSFP+</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• 48 x SFP28</td>
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<td></td>
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<tr>
<td>Ports</td>
<td></td>
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<td></td>
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<tr>
<td>Hardware support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(maximum ports per chassis)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 100GE</td>
<td>32</td>
<td>8</td>
<td>Not applicable</td>
</tr>
<tr>
<td>• 50GE</td>
<td>64</td>
<td>16</td>
<td>Not applicable</td>
</tr>
<tr>
<td>• 40GE</td>
<td>32</td>
<td>8</td>
<td>Not applicable</td>
</tr>
<tr>
<td>• 25GE</td>
<td>128</td>
<td>80</td>
<td>Not applicable</td>
</tr>
<tr>
<td>• 10GE</td>
<td>130</td>
<td>80</td>
<td>4</td>
</tr>
<tr>
<td>• 1GE</td>
<td>130</td>
<td>80</td>
<td>52</td>
</tr>
<tr>
<td>Management ports</td>
<td>1x 1000BASE-T</td>
<td>1x 1000BASE-T</td>
<td>1x 1000BASE-T</td>
</tr>
<tr>
<td>USB ports</td>
<td>1x USB2.0</td>
<td>2x USB2.0</td>
<td>1x USB2.0</td>
</tr>
<tr>
<td>Console port</td>
<td>1x RJ45</td>
<td>1x RJ45</td>
<td>1x RJ45</td>
</tr>
<tr>
<td>Processor</td>
<td>4-core x 86</td>
<td>4-core x 86</td>
<td>4-core x 86</td>
</tr>
</tbody>
</table>
### Feature | 7220 IXR-D3 | 7220 IXR-D2 | 7220 IXR-D1
---|---|---|---
**Power supplies** | • 1+1 redundant AC or -48V DC | • 1+1 redundant AC or -48V DC | • 1+1 redundant AC or -48V DC
 | • 650W AC | • 650W AC | • 240W AC
 | • 800W DC | • 800W DC | • 550W DC
**Hot-swappable power supplies** | Yes | Yes | Yes
**Fan modules** | • 5 fans, N+1 redundant | • 4 fans, N+1 redundant | • 3 fans, N+1 redundant
 | • Front-to-back or back-to-front airflow | • Front-to-back or back-to-front airflow | • Front-to-back or back-to-front airflow
**Hot-swappable fan modules** | Yes | Yes | Yes
**Dimensions** | • Height: 4.35 cm (1.75 in); 1 RU | • Height: 4.35 cm (1.75 in); 1 RU | • Height: 4.35 cm (1.75 in); 1 RU
 | • Width: 43.85 cm (17.26 in) | • Width: 43.85 cm (17.26 in) | • Width: 43.85 cm (17.26 in)
 | • Depth: 46 cm (18.11 in) | • Depth: 46 cm (18.11 in) | • Depth: 46 cm (18.11 in)
 | • Fits in standard 19-in mounting rack | • Fits in standard 19-in mounting rack | • Fits in standard 19-in mounting rack
**4-post mounting** | Yes; rail kit option | Yes; rail kit option | Yes; rail kit option
**Discrete Trusted Platform Module (TPM)** | Yes | Yes | Yes
**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** | -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

### Standards compliance

#### Environmental
- ETSI EN 300 019-2-1; Storage Tests
- ETSI EN 300 019-2-2; Transportation Tests
- ETSI EN 300 019-2-3; Operational Tests
- ETSI EN 300 753 Acoustic Noise (Class 3.2)
- GR-63 Core NEBS L2
- GR-1089 Core NEBS L2
- GR-3160

#### Safety
- AS/NZS 60950.1
- AS/NZS 62368.1
- IEC/EN 60825-1
- IEC/EN 60825-2
- IEC/UL/CSA/EN 60950-1 Ed2
- IEC/UL/CSA/EN 62368-1 Ed2

#### Electromagnetic compatibility
- AS/NZS CISPR32 Class A
- CISPR 24
- CISPR 35
- CISPR 32 Class A
- CNS 13438 Class A
- EN 55024
- EN 55032 Class A
- EN 55035
- EN 55032 Class A
- IEC/EN 60825-1
- IEC/EN 60825-2
- IEC/UL/CSA/EN 60950-1 Ed2
- IEC/UL/CSA/EN 62368-1 Ed2
- IEC/EN 61000-3-2

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1 System design intent is according to the listed standards. Refer to product documentation for detailed compliance status.
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With our commitment to innovation and technology leadership, driven by the award-winning Nokia Bell Labs, we deliver networks at the limits of science across mobile, infrastructure, cloud, and enabling technologies.

Adhering to the highest standards of integrity and security, we help build the capabilities we need for a more productive, sustainable and inclusive world.

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