Nokia 7750 Service Router and Nokia 7450 Ethernet Service Switch

Integrated Media Modules

Delivering up to 400 Gb/s (full duplex) per-slot performance, Nokia 7750 Service Router (SR) and Nokia 7450 Ethernet Service Switch (ESS) Integrated Media Modules (IMMs) combine high-density Ethernet interfaces with highly scalable IP/MPLS routing and packet processing capabilities to support the full array of IP network functions and services.

Nokia IMMs are designed to enable network operators to stay ahead of evolving service demands driven by 5G, cloud and the Internet of Things.

Using highly programmable Nokia FP3 network processing (NP) silicon, the IMM forwarding complex performs packet lookups, traffic classification, packet processing and forwarding, service enablement and QoS. Nokia FP3 NP silicon ensures deterministic packet forwarding performance at full bandwidth, even when complex and processing-intensive applications are required.

IMMs are full-slot, hot-swappable modules that also provide the physical termination, specific interface ports, physical media and optical functions over Gigabit Ethernet (GE), 10GE, 40GE and 100GE interfaces. For added flexibility, combination IMM variants provide two interface speeds on the same module. A combination IMM is also available with 10GE or 100GE interfaces plus an embedded Integrated Service Adapter 2 (ISA2) to extend networking functionality and processing capabilities for deeper levels of differentiated services and applications.
Nokia IMMs provide the full complement of Nokia Service Router Operating System (SR OS) capabilities to support the full array of functions and services required for IP networking.

For service providers, for their data center, WAN and aggregation networks, they support the full spectrum of provider edge and gateway functions to enable advanced residential, mobile and enterprise services.

For webscale companies, they support data center edge functions including aggregation, gateway, interconnect and internet/peering. In the PoP it supports internet/peering edge and backbone router functions. For enterprises, they provide high-performance IP routing, including connectivity to data center, internet and WAN applications.

Features and benefits

• Powered by the Nokia FP3 technology, IMMs deliver line rate performance that does not degrade as advanced services and applications are enabled

• Highly programmable FP3 technology enables rapid service adaptation to support emerging technologies, protocols, services and applications

• By distributing routing and processing on a per-slot basis, overall system performance scales linearly with the addition of each IMM to the system

• Flexible, tiered feature licensing allows customers to pay for only the functionality they require, and allows for in-place feature upgrades without changing the IMM hardware

• Advanced H-QoS and enhanced subscriber management for assured service delivery on a per-subscriber and per-service basis

• Line rate access control list (ACL) filtering with configurable ingress/egress ACLs for highly enhanced subscriber management, security and control

• ITU-T Synchronous Ethernet (Sync-E) and IEEE 1588v2 to distribute precision network timing and synchronization

• The combination IMM with embedded ISA2 use subscriber, service and application intelligence to provide up to 40 Gb/s data path connectivity to any chassis port to support value-added services and applications

• 100GE IMM with integrated tunable DWDM optics and configurable wavelengths reach up to 80 km without requiring optical signal amplification and supports up to 1000 km with optical line system, allowing the 7750 SR and 7450 ESS to be interconnected directly to existing DWDM systems

• Support the same client optics density on 10G ports with tunable SFP+ for DWDM applications

• Pluggable optics (including CSFP, SFP, SFP+, XFP, QSFP+, CFP and CFP4) with Digital Diagnostic Monitoring (DDM) for extended OAM support

• Management provided by the Nokia Network Services Platform (NSP)
Technical specifications

Table 1 provides a technical overview and summarizes IMM support on the 7750 SR and the 7450 ESS.

### Table 1. Nokia 7750 SR and 7450 ESS IMMs summary

<table>
<thead>
<tr>
<th>IMM type</th>
<th>Ports</th>
<th>Connector type</th>
<th>Slot throughput (full duplex)</th>
<th>Maximum density</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7750 SR/7450 ESS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SR-12e</td>
</tr>
<tr>
<td>10/100/1000BASE</td>
<td>160 or 80</td>
<td>CSFP or SFP</td>
<td>200 Gb/s</td>
<td>1440 or 720</td>
</tr>
<tr>
<td>10/100/1000BASE</td>
<td>48</td>
<td>SFP</td>
<td>50 Gb/s</td>
<td>432</td>
</tr>
<tr>
<td>10GBASE</td>
<td>40</td>
<td>SFP+</td>
<td>400 Gb/s</td>
<td>360</td>
</tr>
<tr>
<td>10GBASE/100/100BASE (combination)</td>
<td>10/20</td>
<td>SFP+/SFP</td>
<td>200 Gb/s</td>
<td>90/180</td>
</tr>
<tr>
<td>10GBASE + 7 x 50 ISA2 (combination)</td>
<td>10</td>
<td>SFP+</td>
<td>200 Gb/s</td>
<td>90</td>
</tr>
<tr>
<td>10GBASE</td>
<td>12, 20</td>
<td>SFP+</td>
<td>120 Gb/s, 200 Gb/s</td>
<td>108, 180</td>
</tr>
<tr>
<td>40BASE</td>
<td>6</td>
<td>QSFP+</td>
<td>200 Gb/s</td>
<td>54</td>
</tr>
<tr>
<td>40BASE/100/100BASE (combination)</td>
<td>3/20</td>
<td>QSFP+/SFP</td>
<td>200 Gb/s</td>
<td>27/180</td>
</tr>
<tr>
<td>100BASE</td>
<td>4</td>
<td>CFP4</td>
<td>400 Gb/s</td>
<td>36</td>
</tr>
<tr>
<td>100BASE</td>
<td>4</td>
<td>CXP</td>
<td>400 Gb/s</td>
<td>36</td>
</tr>
<tr>
<td>100BASE</td>
<td>1, 2</td>
<td>CFP</td>
<td>200 Gb/s</td>
<td>9, 18</td>
</tr>
<tr>
<td>100BASE/100BASE (combination)</td>
<td>1/10</td>
<td>CFP/SFP+</td>
<td>200 Gb/s</td>
<td>9/90</td>
</tr>
<tr>
<td>100BASE + 7 x 50 ISA2 (combination)</td>
<td>1</td>
<td>CFP</td>
<td>200 Gb/s</td>
<td>9</td>
</tr>
<tr>
<td>100BASE IMM (Integrated DWDM tunable optics)</td>
<td>1</td>
<td>LC</td>
<td>100 Gb/s</td>
<td>9</td>
</tr>
</tbody>
</table>

* Layer 3 routing and services capabilities supported in mixed mode on the 7450 ESS

Tables 2 and 3 summarize the IMM feature licenses offered on 7750 SR and 7450 ESS systems. The features supported on an IMM are determined by the feature license purchased with the IMM. Feature licenses for IMMs are offered with tiered levels of functionality for Layer 2 and Layer 3. IMMs with Layer 3 feature licenses can add optional Virtual Private Routed Network (VPRN) licenses that determine IP VPN scaling supported on the IMM. IMM licensing gives customers the flexibility to purchase the license that meets current requirements, with an option for a simple, in-place upgrade to additional features without changing the IMM hardware.

### Table 2. Nokia 7750 SR and 7450 ESS IMM feature licenses

<table>
<thead>
<tr>
<th>Feature license</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
</table>
| L3BQ            | Layer 3 Basic Queuing | • Full IPv4/IPv6 routing with 8 ingress/8 egress queues per port  
|                 |             | • No support for hierarchical policing |
| L2HQ            | Layer 2 High Queuing | • 7450 ESS feature set equivalence with IOM3-XP  
|                 |             | • Full queuing, policing support for Layer 2 features |
| L3HQ            | Layer 3 High Queuing | • Full queuing and hierarchical policing  
|                 |             | • Full IPv4/IPv6 routing |

* Layer 3 routing and services capabilities supported in mixed mode on the 7450 ESS
Table 3. Nokia 7750 SR and 7450 ESS IMM VPRN feature licenses*

<table>
<thead>
<tr>
<th>Feature license</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure VPRN</td>
<td>Support for up to 8 VPRN instances per IMM licensed with L3BQ or L3HQ</td>
</tr>
<tr>
<td>Service VPRN</td>
<td>Support for fully scaled VPRN instances per IMM licensed with L3BQ or L3HQ</td>
</tr>
<tr>
<td>MS-ISA2</td>
<td>Requires the purchase of Right to Use (RTU) licenses. Please contact your Nokia sales representative for pricing information on service licenses.</td>
</tr>
</tbody>
</table>

* Layer 3 routing and services capabilities supported in mixed mode on the 7450 ESS

**Dimensions and weights**

- Standard full-slot form factors are common to all variants
  - Height: 3.6 cm (1.4 in)
  - Width: 42.5 cm (16.7 in)
  - Depth: 43.2 cm (17 in)
- 160/80-port GE IMM - CSFP/SFP
  - 7.3 kg (16.1 lb)
- 48-port GE IMM - SFP
  - 6 kg (13.2 lb)
- 40-port 10GE IMM - SFP+
  - 7.2 kg (15.9 lb)
- 10-port 10GE - SFP+ plus 20-port GE - SFP
  - 6.1 kg (13.4 lb)
- 10-port 10GE - SFP+ plus ISA2
  - 7.3 kg (16 lb)
- 20-port 10GE IMM - SFP+
  - 5.8 kg (12.8 lb)
- 12-port 10GE IMM - SFP+
  - 5.8 kg (12.8 lb)
- 6-port 40GE IMM - QSFP+
  - 7.1 kg (15.7 lb)
- 3-port 40GE - QSFP+ plus 20-port GE - SFP
  - 6.2 kg (13.7 lb)
- 4-port 100GE IMM - CFP4
  - 7.2 kg (15.9 lb)
- 4-port 100GE IMM - CXP
  - 7.2 kg (15.9 lb)
- 2-port 100GE IMM - CFP
  - 6.1 kg (13.4 lb)
- 1-port 100GE - CFP plus 10-port 10GE - SFP+
  - 6.3 kg (13.9 lb)
- 1-port 100GE - CFP plus ISA2
  - 7.3 kg (16 lb)
- 1-port 100GE IMM — CFP
  - 6.1 kg (13.4 lb)
- 1-port 100GE IMM — tunable DWDM
  - 6.8 kg (15 lb)

Refer to the 7750 SR and 7450 ESS product and release documentation for system details on dimensions, weights, hardware, safety standards, compliance agency certifications and protocol support.
About Nokia

We create the technology to connect the world. Powered by the research and innovation of Nokia Bell Labs, we serve communications service providers, governments, large enterprises and consumers, with the industry’s most complete, end-to-end portfolio of products, services and licensing.

From the enabling infrastructure for 5G and the Internet of Things, to emerging applications in digital health, we are shaping the future of technology to transform the human experience. networks.nokia.com

Nokia operates a policy of ongoing development and has made all reasonable efforts to ensure that the content of this document is adequate and free of material errors and omissions. Nokia assumes no responsibility for any inaccuracies in this document and reserves the right to change, modify, transfer, or otherwise revise this publication without notice.

Nokia is a registered trademark of Nokia Corporation. Other product and company names mentioned herein may be trademarks or trade names of their respective owners.

© 2019 Nokia

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

Document code: SR1909038604EN CID157829