NRU 0301
Network Rack Unit

Ericsson Software Defined Infrastructure

Ericsson Network Rack Unit is a fully integrated part of Ericsson Software Defined Infrastructure, providing software-defined infrastructure capabilities. The key features of NRU 0301 are 32x 100GbE QSFP ports totaling 3.2Tb I/O capacity, single fabric wide management interface and advanced analytics powered by intel x86 Broadwell DE, providing real time networking telemetry.
High density Switching fabric
The Broadcom Trident 3 switch chipset provides market leading I/O bandwidth of 3.2 Tbps per switch.

NRU 0301 is built to provide a cost optimized building block for the L2/L3 CLOS topology that encompasses a typical fabric with both spine and leaf layers.

NRU 0301 supports 32 QSFP28 ports with flexible configuration, i.e. the port attachment can either be used as a single 100/40 GbE port or as 4 x 25/10 GbE ports.

NRU 0301 is an integrated 1U chassis fitting as full width element in a 19” rack.

Fabrics build by CLOS connected NRU 0301 provides the ability to connect to a high number of compute and storage resources supporting various types of QSFPs (optical modules, direct attached copper cables (DAC) or active-optical cables (AOC). Ericsson SDI Networking provides the required capability to support the CLOS spine-leaf architecture in a datacenter.

Hot swappable modules
To ensure ease of maintenance, the optical modules, DAC, PSU, and fans are all hot swappable.

Single fabric wide management interface
The conventional way to configure a switch is by using the CLI interface towards individual switches or automate using scripted CLI. This created the need to upgrade automation techniques (scripts) for every new network configuration or feature addition.

With the Ericsson SDI Networking option, this activity is conducted via Ericsson SDI Manager, using traditional CLI. In this case the entire fabric is one logical switch using the single north bound REST/API fabric interface.

The traditional CLI is paired with fabric-wide programmability (RESTful API) for agility and automation via a single point of management. This same interface can be used for granular performance visibility and control through a fabric wide directory that contains endpoint information (Ports connecting to VM’s) as well as granular flow filtering and control.

NRU 0301 provides a standard OVSDB interface to control the single HW-VTEP (VXLAN Termination End-Point). The Ericsson Cloud SDN Controller can program the hardware accelerated VTEP, using the OVSDB interface.

Advanced analytics providing real time networking telemetry
The Intel x86, Broadwell DE with 12 cores and 32 GB of RAM provides server class processing capability providing visibility into virtual overlays with state beyond far beyond 1 million virtual MACs and give the foundation for doing extensive analytics

The switch has 2 x 256 GB (512 GB) of internal SSD for storing large amount of analytic data reducing the need for external storage and simplifying regular datacenter operations. The internal storage is also used to record metrics for a “Time Machine” (a.k.a. Network DVR). The Time Machine capability enables analysis of networking transactions for deep forensics (up to 3 years of networking metadata can be stored).

This capability provides Ericsson SDI Manager with the ability to collect this data and query it for advanced proactive analytics facilitating necessary business decisions.

Redundancy
The NRU 0301 support redundant control ports for both control network and board management network. Dual power supplies provide redundant power feed for both AC and DC installations.

Cost effective interconnect
The NRU 0301 supports a variety of QSFP28 and QSFP+ pluggable modules: DAC cables are typically used within the rack whereas AOCs, SR4 multi-mode, PSM4 single-mode optical modules are a good fit for inter-rack interconnect at medium distance. Single-mode LR4 optical modules allows for long haul inter-data center connectivity.
### Specifications

**Form factor**
- 1 U rack unit, rail mounting

**Dimensions**
- WxHxD 17” (433.8mm) x 1U/1.75" (44.4mm) x 20.5” (520mm)
- Weight: System weight 15.5 kg (AC) and 15.4 kg (DC)

**Environmental**
- Operating temperature: 5˚C to 40˚C (41˚F to 104˚F)
- Non-operating temperature: -40˚C to 70˚C (-40˚F to 158˚F)
- Operating relative humidity: 20% to 85% RH
- Non-operating relative humidity: 10% to 95% RH

**Processor board, COMe**
- Broadwell D-1557 12 core @ 1.5GHz
- 32 GB DDR4
- 2 x 10GbE Trident 3 management

**Switch ASIC**
- Broadcom Trident 3 BCM 56870

**Storage**
- Type
  - Internal M.2 SSD 2 x 256GB

**Power supply**
- Redundant power supply, 2x 550 W
- 108-240 VAC
- -48 VDC 2x 558 W PSU
- Typical power consumption 400W

**Cooling**
- Back-to-front airflow
- 5 dual rotor fans (4 + 1 redundant)

**Auxiliary interface**
- 1 USB 2.0 port

**Firmware**
- UEFI BIOS with fallback function
- ONIE bootloader

**Security**
- Trusted Platform Module (TPM) 2.0 supporting for Trusted Execution Technology (TXT)

**Supported operating systems and virtualization software**
- Netvisor OS

**Board Management**
- Integrated AST2520
- IPMI 2.0 with HPM extension,
- Out-of-band firmware upgrade, dual image,
- Sensor monitor for temperature, voltage, fans
- Event management (SEL, SNMP)
- Chassis power control
- FRU management
- DCMI 1.5
- Network bonding
- NTP client

**Ethernet interface**
- 32 x 100G QSFP28 ports with support for legacy 40G
- Speed per port: 32 x 40/100GbE or 128 x 10/25 GbE, using fan-out cable

**LED indicators**
- PSU status
- Power
- Locator
- Status
Network level supported software features planned for release 2.2:

<table>
<thead>
<tr>
<th>Feature Area</th>
<th>Feature</th>
<th>Explanation</th>
<th>License</th>
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<tr>
<td>L2 fabric</td>
<td>MAC learning by control plane</td>
<td>Switch provisioning is performed statically and by manually configuration.</td>
<td>Fabric, vPOD</td>
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<td>Virtual port (vPort recognition in fabric)</td>
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<td>ARP suppression</td>
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<td>Loop detection - Loop Free Fabric</td>
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<td>Connectivity/Cable database</td>
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<td>Switch and Port status</td>
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<td>Port alarms</td>
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<tr>
<td>L3 fabric*</td>
<td>IP routing for fabric topology maintenance</td>
<td>L3 routing protocols (E-BGP assumed) for maintaining leaf-spine topology.</td>
<td>Fabric</td>
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<td></td>
<td>ECMP for load distribution</td>
<td>ECMP for load distribution across spine switches. Allows for scaling spines beyond 2.</td>
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<td>Fabric QoS</td>
<td>L2 service must use VxLAN overlay. QoS support in fabric</td>
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<td>IPv6</td>
<td>Basic IPv6 support</td>
<td>Servers on the same L2Network can exchange IPv6 packages. Neighbour discovery in the L2 fabric.</td>
<td>Fabric, vPOD</td>
</tr>
<tr>
<td>L3 service</td>
<td>IP subnets and interfaces (IPv4)</td>
<td>The network fabric provides DHCP service on a per vPOD and L3 subnet basis.</td>
<td>Fabric, vPOD</td>
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<td></td>
<td>DHCP (IPv4)</td>
<td>MTU specified on L3 interface</td>
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<td>Configurable MTU size</td>
<td>Network address translation. Minimum SNAT.</td>
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<td>NAT</td>
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<td>L3 Routing</td>
<td>vRouter</td>
<td>The network provides L3 forwarding with static routing.</td>
<td>Fabric, vPOD</td>
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<td>HA vRouter</td>
<td>HA vRouter realized through two vRouters in clustered switch pair using active-active VRRP.</td>
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<td>Static routes</td>
<td>SW and HW vRouters are supported.</td>
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<tr>
<td>L3 Gateway</td>
<td>Providing L3 connectivity to external networks / gateways</td>
<td>The network provides L3 connectivity to external network/ gateway.</td>
<td>Fabric, vPOD</td>
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<td></td>
<td>Static firewall support</td>
<td>L3 ACL for protecting DATACENTER/fabric for external access.</td>
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<td>vPOD</td>
<td>Slicing the physical network into per vPOD logical networks</td>
<td>This feature enables all Fabric Services to be provided on a per vPOD basis, i.e. making those Fabric Services separated and controlled for each instantiated vPOD.</td>
<td>vPOD</td>
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<tr>
<td>Analytics</td>
<td>TCP connections</td>
<td>vPorts location showing VM location and attachment to data network fabric.</td>
<td>Analytics</td>
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<td>vPorts</td>
<td>TCP Connections end-to-end latency</td>
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<td>Additional metrics</td>
<td>Inspection on historic network statistics exposing Pluribus time machine.</td>
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<td>Flight recorder /</td>
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<td>Port mirroring/ tapping</td>
<td>Mirroring of traffic</td>
<td>Traffic mirroring with source port filtering</td>
<td>Analytics</td>
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<td>SPAN</td>
<td>Mirroring to destination port or local collector.</td>
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<td>Security</td>
<td>Denial of service protection for the control plane</td>
<td>Policing traffic on the network prohibiting anyone to completely saturate/monopolize the control network.</td>
<td>Basic, Fabric, vPOD</td>
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<tr>
<td>Network platform</td>
<td>NSU sled support</td>
<td>Network solution based on NRU (Pluribus E28)</td>
<td>Basic, Fabric, vPOD</td>
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<td></td>
<td>NRU combination</td>
<td>Network solution based on NSU, i.e. a switch sled in a chassis</td>
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<td>SW management phase 1</td>
<td>Process for manual check and potential update of installed SW during initial switch configuration.</td>
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<td>NRU inventory</td>
<td>Retrieval of inventory information of NRU</td>
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<td>Backup and restore</td>
<td>Data network configuration can be saved (backup) for later restoration.</td>
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<td>Fabric switch authentication</td>
<td>SDI Manager authentication of switch with self signed certificate that will enable encryption of management traffic between SDI Manager and fabric.</td>
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<td>Network automation</td>
<td>Automated connectivity discovery (Cable DB)</td>
<td>Server connectivity discovered through LLDP</td>
<td>Basic, Fabric, vPOD</td>
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<td>Automated L2 fabric configuration</td>
<td>Fabric reference topologies can be configured without need to configure individual switches.</td>
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<td>Automated IP configuration of L2 fabric</td>
<td>IP forwarding configuration is automated.</td>
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<td>Conveniently used together with VxLAN overlay.</td>
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<td>System integration</td>
<td>VMWare</td>
<td>The network fabric can support L2 service infrastructure enabling VMware supported connectivity.</td>
<td>Fabric, vPOD</td>
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<td>OpenStack plugins</td>
<td>Ability to integrate with customer OpenStack through installing plugins.</td>
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**Standards and regulations**

**EMC**

EMC Directive, ETSI EN 300 386, Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunications network equipment Electromagnetic Compatibility (EMC) requirements

**Emission**

CISPR 32 /EN 55 032, 'Limits and Methods of Measurement of Radio Interference Characteristics on Information Technology Equipment'

**Immunity**

CISPR 24/EN 55 024 :2015

**Safety**


**Environment**

RoHS Directive, 2011/65/EU EN 50 821, Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

EN 300 019-2 Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment for storage and transport

EN 300 019-2-3 class 3.1 & 3.1E for extended temperature and humidity characteristics
Ericsson is one of the leading providers of Information and Communication Technology (ICT) to service providers, with about 40% of the world's mobile traffic carried through our networks. We enable the full value of connectivity by creating game-changing technology and services that are easy to use, adopt and scale, making our customers successful in a fully connected world. For more than 140 years, our ideas, technology and people have changed the world: real turning points that have transformed lives, industries and society as a whole.