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Nokia 7705 SAR-Hc

Service Aggregation Router

Nokia 7705 Service Aggregation Router - Hc (SAR-Hc) provides industry-leading IP/MPLS communications capabilities in a DIN rail-mountable compact form factor with temperature, electromagnetic, shock and vibration hardening. It is ideally suited for deployments in harsh and cramped environments, particularly smart grid distribution and field area automation or rolling rail vehicles' on-board applications. It is ideal for secure and reliable delivery of mission-critical applications for network operators in utilities, transportation, government and public safety.

The Nokia 7705 SAR-Hc is an IP/MPLS-based, temperature- and electromagnetic-hardened router designed for communications in environments where size, power and flexibility are critical, while providing powerful service-oriented networking capabilities. As part of the Nokia IP/MPLS service routing solutions, it is well suited for utility, railway and other industries. Power utilities, for example, require highly reliable communications infrastructures for their smart grid projects such as grid modernization, substation automation, distribution automation and advanced metering infrastructure (AMI). The 7705 SAR-Hc together with other variants of the 7705 SAR portfolio are perfectly suited to these applications.

The Nokia 7705 SAR-Hc is a feature-rich IP/MPLS router in a cost-effective compact platform that can be deployed in distribution automation networks or field area networks (FANs), for example, to aggregate traffic from different smart grid applications such as supervisory control and data acquisition (SCADA) systems and distribution automation field sensors, control devices, AMI collectors and field security appliances such as cameras. Its compact form makes it suitable for deployment in small enclosure settings. The 7705 SAR-Hc is managed by the Nokia 5620 Service Aware Manager (SAM) portfolio for end-to-end service consistency and management across a resilient IP/MPLS network from core to access.

Features

IP/MPLS convergence and networking

The Nokia 7705 SAR-Hc helps enable the convergence of mission-critical network applications and services onto a single IP/MPLS-based networking solution. As part of the award-winning Nokia 7705 SAR portfolio of routers, and running on the award-winning Nokia Service Router Operating System (SR OS), the 7705 SAR-Hc extends the reach of IP/MPLS out into the remote edges of these networks using the form factor and mounting capabilities needed in remote locations.

To provide a converged IP/MPLS networking solution, the 7705 SAR-Hc supports Layer 1, Layer 2 and Layer 3 virtual private networks (VPNs) to allow the separation of traffic between different applications, services or organizations. Example VPNs include the following:

- Pseudowire transport for SCADA over RS-232 serial interfaces

- Virtual Private LAN Service (VPLS) for IEC 61850 Generic Object Oriented Substation Events (GOOSE) Messaging over multipoint Ethernet connections

- IP-VPN for SCADA over IP, IP-based video surveillance, Voice over IP (VoIP) or AMI collector data

The 7705 SAR-Hc supports a variety of tunneling options including MPLS, IP and Generic Routing Encapsulation (GRE) for aggregating and transporting traffic between sites and locations.

Label switched routing

The Nokia 7705 SAR-Hc is a feature-rich IP/MPLS-capable router that can be configured as either a Label Edge Router (LER) or a Label Switched Router (LSR), allowing deployment in access as well as aggregation applications. Label Switched Paths (LSPs) can be signaled using either the Label Distribution Protocol (LDP) or the Resource Reservation Protocol with Traffic Engineering (RSVP-TE) or seamless MPLS.

The 7705 SAR-Hc brings a strong suite of traffic engineering and resiliency capabilities using functions such as Constraint-based Shortest Path First (CSPF) routing, Fast Reroute (FRR), primary and secondary LSP switchover and redundant pseudowires.

Quality of service and traffic management

It is critical to maintain the end-to-end quality of service (QoS) for different traffic. Not all types of traffic have the same set of requirements. Protection and control traffic in particular require low latency, whereas other data traffic often has less stringent delay requirements but may be very sensitive to loss. To ensure the required treatment throughout the network, traffic flows with different requirements are identified at the access, marked in-line with the appropriate QoS metrics, and maintained end-to-end.

The Nokia 7705 SAR-Hc utilizes extensive traffic management policies to ensure fairness with detailed classification and hierarchical scheduling including minimum/maximum, queue-based weighted round robin, and strict priority and profiled scheduling, as well as multi-tier policing to differentiate and prioritize individual services and flows.

Operations, administration and maintenance

In order to ensure continuity of services, the Nokia 7705 SAR-Hc has a full set of operations, administration and maintenance (OAM) features. These features ensure rapid fault detection as well as efficient troubleshooting. Rapid commissioning of remote devices is supported through an integrated auto-discovery protocol.

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Cyber security

The Nokia 7705 SAR-Hc has extensive integrated security features that help network operators defend against cyber security threats, ensure data privacy, and help meet North American Electric Reliability Corporation (NERC) Version 5 Critical Infrastructure Protection (CIP) compliance and other government cyber security regulations. Key security features include
the following:

- Wide variety of access control lists (ACLs)

- Extensive authentication features for control plane protection and user account management and profiling

- Network group encryption (NGE) and IPSec

-Encryption supported includes AES 256/128, 3DES, and DES encryption. Authentication supported includes HMAC-SHA-512, HMAC-SHA-256, HMAC-MD5, and SHA-1-96.

- Network address translation (NAT)

- Zone-based stateful firewall

Synchronization

Accurate synchronization is important in communications networks in maintaining network operational integrity. The Nokia 7705 SAR-Hc supports a range of timing options:

- IEEE 1588v2 Precision Timing Protocol (PTP)

- Synchronous Ethernet

Features and benefits

Feature	Benefit
Purpose-built temperature/electromagnetic-hardened, fanless, DIN rail- or wall-mountable platform	Enables deployment in distribution automation networks, FANs and other harsh environments requiring a hardened DIN rail-mountable IP/MPLS router
Full featured IP/MPLS router	Allows extension of powerful IP/MPLS capabilities from core to the access in flexible topologies
Network Group Encryption and IPSec	Strong encryption and authentication capabilities that include AES-256, AES-128, HMAC-SHA-512 and HMAC-SHA-256 for providing VPN-based services over encrypted tunnels. NGE protects multiprotocol traffic with MPLS encryption. Can also provide local termination of IPSec tunnels of remote equipment as needed
NAT/port address translation (PAT)	Network and port address translations between public and private domains or as an added security layer to hide internal addressing from potential snooping attackers or other cyber security threats
Local Dynamic Host Configuration Protocol (DHCP) server	Decentralize IP address management tasks deeper into the network. Supports public and private addressing, including overlapped private addressing in the form of virtual private routed networks in the same router
Stateful zone-based firewall	Allows efficient service aware security policy provisioning and updates
Power over Ethernet (PoE), PoE+ capability	Enables the direct connection of PoE/PoE+ power devices

Technical specifications

Hardware

The 7705 SAR-Hc is available in one chassis type.

Nokia 7705 SAR-Hc interface types

- Main chassis

    - Two 10/100/1000BASE-T Ethernet ports (RJ-45 PoE/PoE+ capable)

    - Two 10/100/1000BASE-T Ethernet ports (RJ-45)

    - Two 100/1000BASE-TX ports (SFP)

    - Two RS-232 (async) ports

Nokia 7705 SAR-Hc technical specifications

- Operating temperature:
  -40°C to +70°C (-40°F to +158°F) sustained with a minimum airflow rate of 0.5 m/s, -40°C to +65°C (-40°F to +149°F) in a still air environment

- Power (redundant DC feeds): ±20 V DC to 75 V DC

- Physical dimensions:

    - Height: 177.8 mm (7 in)

    - Width: 91.4 mm (3.6 in)

    - Depth: 152.4 mm (6 in)

    - Weight: 2. kg (4.5 lb)

- Mounting

    - DIN rail

    - Wall/panel

    - IP40 Packaging

- Cooling

    - Fanless, passively cooled

- Power utility substation

    - IEEE 1613 Class 2

    - IEC 61850-3

- Railway

    - EN 50121-4

    - EN 50155

Table 1. Nokia 7705 SAR-Hc part numbers

Part Number	Part Name	Discription
3HE07353AA	SAR-Hc	SAR-Hc with redundant (20 V to 75 V) DC power feeds. DIN rail or panel mountable. Node has 6 10/100/1000 Mb/s Ethernet ports (2 SFP, 2 RJ-45, 2 POE RJ-45), and 2 RS-232 ports. OS, firewall, and encryption software licenses are sold separately. DIN rail or panel mounting hardware sold separately
3HE07353BA	SAR-Hc with Conformal Coating	SAR-Hc with conformal coating on internal PCBs. Has redundant (20 V to 75 V) DC power feeds. DIN rail- or panel-mountable. Node has 6 10/100/1000 Mb/s Ethernet ports (2 SFP, 2 RJ-45, 2 POE RJ-45), and 2 RS-232 ports. OS, firewall, and encryption software licenses are sold separately. DIN rail or panel mounting hardware sold separately
3HE08607BA	Right-to-use (RTU) - 7705 SAR-Hc Basic IPSec License	RTU - SAR-Hc Basic IPSec license. Including encryption throughput of 150 Mb/s and maximum of 25 IPSec tunnels. One (1) OS license is required for each SAR-Hc in the network.

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Table 1. Nokia 7705 SAR-Hc part numbers

Part Number	Part Name	Discription
3HE08607BB	RTU - 7705 SAR-Hc UP-Basic to Full IPSec License	RTU - SAR-Hc Upgrade IPSec license. Upgrade Basic IPSec license to Full IPSec license. One (1) OS license is required for each SAR-Hc in the network
3HE08607BC	RTU - 7705 SAR-Hc Full IPSec License	RTU - SAR-Hc Full IPSec license. Including maximum supported encryption throughput and maximum supported IPSec tunnels. One (1) OS license is required for each SAR-Hc in the network.
3HE09259BA	RTU - 7705 SAR-Hc NGE License	RTU - SAR-Hc Network Group Encryption license. Includes maximum supported NGE throughput available on one SAR-Hc node. One (1) OS license is required for each SAR-Hc in the network.
3HE06972AA	100W HV Power Supply	An external high voltage power supply with a single 85 V to 264 V AC or 88 V to 300 V DC input using a standard IEC320-C14 connector, and a single 54 V DC output (6-ft cable length) to provide power to one terminal of a 7705 SAR main chassis. This 100 W power supply is DIN rail- or wall/panel-mountable with mounting hardware included. Includes one NA AC, and one Euro AC power cord. Operating temperature range is -40°C (-40°F) to +65°C (+149°F).
3HE07945AA	SAR-Hc Panel Mounting Hardware Kit – Rear Mount	Kit contains bracket hardware for mounting the SAR-Hc to a panel from the rear of the chassis
3HE07945AB	SAR-Hc Panel Mounting Hardware Kit – Side Mount	Kit contains bracket hardware for mounting the SAR-Hc to a panel from the side of the chassis
3HE07357AA	SAR-Hc DIN Mounting Hardware Kit – Rear Mount	Kit contains DIN rail bracket and hardware to mount the SAR-Hc to a DIN rail from the rear of the chassis
3HE07357AB	SAR-Hc DIN Mounting Hardware Kit – Side Mount	Kit contains DIN rail bracket and hardware to mount the SAR-Hc to a DIN rail from the side of the chassis