Nokia Virtualized Network Address Translation
VSR Release 16

- Versatile IPv4-to-IPv6 migration support with large-scale NAT44, Dual-Stack Lite (DS-Lite), L2-aware NATP, NAT64 and MAP-T (RFC 7599)
- Leverage standard, open-source IT compute virtualization for elastic scaling
- Deploy on general-purpose server hardware for superior investment protection

**Overview**
Virtualized Network Address Translation (vNAT) is a virtualized network function (VNF) delivered by the Nokia Virtualized Service Router (VSR).

The VSR can be configured to deliver a stand-alone vNAT function (when the VSR is configured as a Provider Edge).

Alternatively, vNAT functionality can be fully integrated when the VSR is configured as a virtualized Broadband Network Gateway (vBNG) or as a virtualized Wireless LAN (WLAN) gateway. In both cases, vNAT is Layer 2-aware, and tight coupling and full synchronization of subscriber context (BNG/NAT or WLAN/NAT) is achieved.

Network operators benefit from superior deployment flexibility, a rich feature set, carrier-grade performance and comprehensive support tools for a quick operational deployment in cloud and hybrid environments.

The vNAT functionality is based on the field-proven Nokia Service Router Operating System (SR OS). The Nokia Network Services Platform (NSP) delivers VNF and element management and allows network operators to seamlessly manage integrated NAT capabilities (delivered on a service router platform) and virtualized NAT functionality using existing operations, administration and maintenance protocols and management practices.

**Virtualized Network Address Translation**
IPv6 is gradually gaining wide-scale deployment and acceptance in private clouds and on the internet, but IPv4 services still need to be supported for many years until the migration to IPv6 is complete. Network Address Translation (NAT) helps network operators achieve an orderly and phased transition to IPv6 and also maintain IPv4 service continuity during the migration process.

- NAT44 allows many IPv4 clients to reuse the same public IPv4 address to scale IPv4 services within the confines of the available address space.
- DS-Lite (RFC 6333) allows interworking IPv4 clients with IPv4 hosts over an IPv6 access network by using tunneling techniques in combination with NAT44.
• Subscriber-aware NATP applies the soft-wire concept of DS-lite to Layer 2 subscriber sessions and is deployed as an integrated function of the Broadband Network Gateway

• MAP-T enables IPv4 interworking over IPv6 by using a stateless Border Relay at the provider edge and a stateful NAT44 function at the customer edge. This model gives better scale and performance, simplifies multi-node redundancy and reduces log data.

• NAT64 enables IPv6 clients to interwork with legacy IPv4 hosts on the internet.

Introducing cloud-optimized Network Address Translation

Virtualized Network Address Translation (vNAT) benefits from the tremendous scalability offered by cloud-based server infrastructures. This allows scaling to millions of simultaneous sessions while tracking customer connections, enforcing per-subscriber session limits and meeting Lawful Interception (LI) requirements.

A virtualized NAT solution offers optimal hardware investment protection because allocated compute and storage resources can be repurposed for other tasks after the transition from IPv4 to IPv6 is completed.

Technical specifications

The Nokia vNAT feature set for VSR OS Release 16 includes (but is not limited to):

• Large-scale NAT44 (LSN44) (IPv4-to-IPv4 address translation)
  – Subscriber-aware NAT
  – Deterministic or non-deterministic variant
  – Protocol-agnostic 1:1
  – Destination-based NAT

• NAT64 (IPv6-to-IPv4 address translation)
• IPv6 DS-Lite NAT (IPv4 over IPv6)
• LSN44, NAT64 and DS-Lite supported features:
  – Static-port forwards
  – Port Control Protocol (PCP) support
  – Flow logging (IPFIX), RADIUS logging and syslog
  – Application Layer Gateway (FTP, SIP, RTSP, PPTP) support
  – 1:1 NAT with multiple NAT policies
  – TCP Maximum Segment Size Adjust
  – Layer 2-aware NAT

• MAP-T Border Relay features
  – Hub-and-Spoke Model
  – Full routing support (IS-IS, BGP, OSPF, RIP)
  – Upstream MAP-T anti-spoof
  – Multiple MAP-T domains in the same routing context
  – MSS adjust and MTU support per domain
  – Upstream/downstream fragmentation and statistics collection
  – Packets forwarded/dropped statistics collection per domain
  – Logging function

Please refer to the Nokia Virtualized Service Router (VSR) datasheet for platform specifications and supported edge routing features.

Leading performance

The vNAT has been designed optimized for Linux 64-bit operating systems (CentOS, Red Hat® Enterprise Linux® and Ubuntu) in combination with KVM/QEMU and VMware ESXi hypervisors. The vNAT can optionally be deployed using OpenStack (Red Hat® OpenStack® Platform or RDO project distributions) and Nokia CloudBand.
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