NORTEL

Product Brief

Nortel HLR

The GSM-UMTS Home Location Register at Release NSS19

Introduction

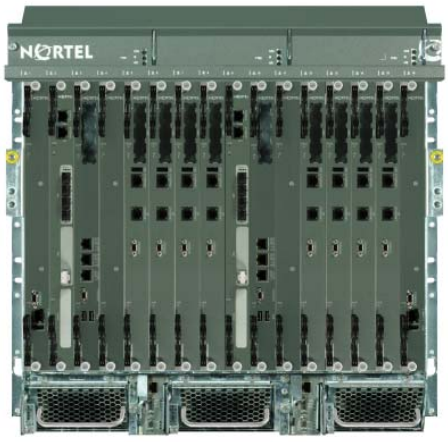
Nortel's NSS19 solution introduces a complete 'Next Generation' Voice Core for GSM and UMTS. This solution is implemented using All-IP for both the bearer and control plane. Clearly the HLR is a fundamental component of any voice core solution and consequently, a Next Generation 'All-IP' HLR is being introduced in NSS19. HLR network connectivity is implemented using IP-based signaling with full support for Sigtran. Nortel's HLR also provides for a very high speed and single point of provisioning through the application of a dedicated data server.

The NSS19 HLR utilizes new high-density and highly-scalable third-party commercial off-the-shelf (COTS) computing equipment compliant to Advanced Telecommunications Computing Architecture (ATCA) standards. This enables the HLR to support up to 17 million GSM subscribers or up to 10 million UMTS subscribers in a single rack of equipment. High density COTS technology provides cost-effective scalability for the additional performance load needed by UMTS compared with conventional GSM HLR technology.

Nortel HLRs have been widely deployed globally in GSM, GSM-R, GPRS and UMTS applications with more 300 HLRs in service with 68 operators supporting over 100 million subscribers. The NSS19 HLR is deployed using this same feature-rich application suite and therefore provides a mature HLR application. Nortel achieves the 'best of both worlds' by combining this feature-rich and stable HLR application with a truly carrier-grade softswitch platform at release NSS19. This means that the HLR application can be delivered in a very high density package with very high capacity and scalability without compromising the stability of the application with new software.

This product is provided as both an upgrade path from an existing HLR or as a completely new HLR for new network builds. Naturally, the HLR supports not only both conventional wireless voice and packet applications including GPRS and HSDPA but also evolves to support IP Multimedia Applications as a fully-featured HSS.

Figure 1. Nortel's HLR at NSS19 based on ATCA equipment



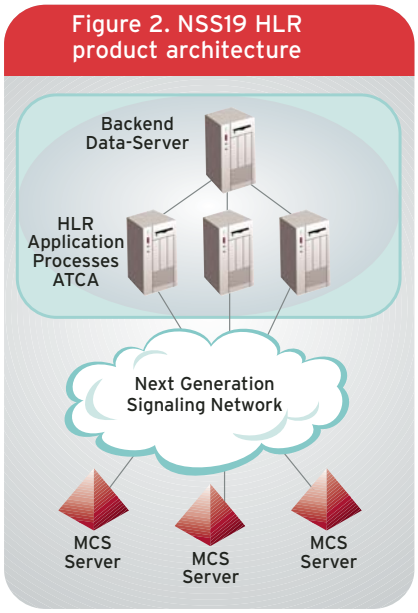
HLR product architecture

The NSS19 HLR product architecture has three component parts, where each component is both scalable and redundant. The three components are:

- Redundant Data-Server
- HLR Application Processing
- All-IP Next Generation Network Signaling

This provides a logical and physical separation of database, HLR processing and network signaling functions, enabling the application of best-in-class functionality to each component with the ability to scale, upgrade or evolve each component independently of the other.

Figure 2. NSS19 HLR product architecture



Data-Server

The HLR Data-Server function is implemented in NSS19 using a fully redundant, open and extensible Oracle database residing on commercial Sun Netra hardware, supporting:

- A high-capacity and centralized 'single-point of provisioning' capability at up to 186,000 orders per hour
- Admin-Center consolidation
- Oracle database for data-mining of subscriber data
- Flexible provisioning methods (i.e. HLR mass provisioning)

In NSS19, the Data-Server enables very high speed centralized provisioning at a rate of up to 186,000 orders per hour per Data-Server. This means that the operator can run high volume marketing and customer promotions and still be able to support the back office provisioning load on the HLR. This centralized single point of provisioning also means that the operator only needs to provision subscriber data once rather than provisioning multiple HLRs in turn. Bulk provisioning enables mass changes to be made across large numbers of subscribers simultaneously and Data Mastering provides a means by which the operator can mine subscriber data in order to analyze it for promotional or operational purposes.

The HLR Data-Server is also implemented with Nortel's NSS18 HLR enabling the co-existence of both NSS18 and NSS19 HLRs under the same Data-Server and the simple and hitless upgrade of existing NSS18 HLRs to NSS19 ATCA-based HLRs.

HLR Application Processor

The HLR application utilizes the same highly-featured, stable and mature software that is already deployed globally on a proprietary Nortel platform. However, in NSS19, Nortel is introducing a new processing platform that provides:

- 2nd Generation ATCA equipment compliant to PICMG specifications
- Fully third-party supplied equipment: for open-market supply chain benefits
- True 'carrier-grade' resiliency: self stabilizing with fault containment
- Design for telecom market: serviceability and operating environments

This 2nd Generation ATCA equipment platform is being introduced for all mission-critical and real-time control-plane applications including the NSS19 MSC Server, HLR and HSS for GSM and UMTS. The equipment utilizes standard blades for network interface connectivity, storage and storage management, system controller and switching and for generic computing blades. The HLR application itself resides on a generic processing blade, effectively as an HLR-on-a-blade. This enables the existing software application to run natively on ATCA such that the evolution to ATCA can be regarded as a processor upgrade. The application of very high density and highly scalable COTS technology enables a single frame of HLR equipment to support up to:

- 9 million active plus 8 million pre-provisioned subscribers for GSM
- 5 million active plus 5 million pre-provisioned subscribers for UMTS

HLR application functionality

The Nortel HLR offers a mature, feature-rich and stable HLR application suite incorporating a range of highly advanced capabilities, including:

Intelligent Networks (IN)

Nortel's HLR includes compliancy to an extensive suite of IN capabilities including:

- CAMEL Phase 3 Compliancy
- Proprietary IN features enabling inter-working with LME VLR and GMSC products
- Offboard and Onboard Proprietary Nortel IN features

Supercharger

Both 3GPP Standardized Supercharger and Nortel's Proprietary Supercharger are supported.

Basic Service and Supplementary Service Compliance

Over 60 basic GSM and Supplementary Services are supported. Support for Location Based Services (LCS) and Operator Determined Barring is also included. Nortel is also able to offer a highly flexible roaming and screening architecture that enables an operator to tailor services when needed.

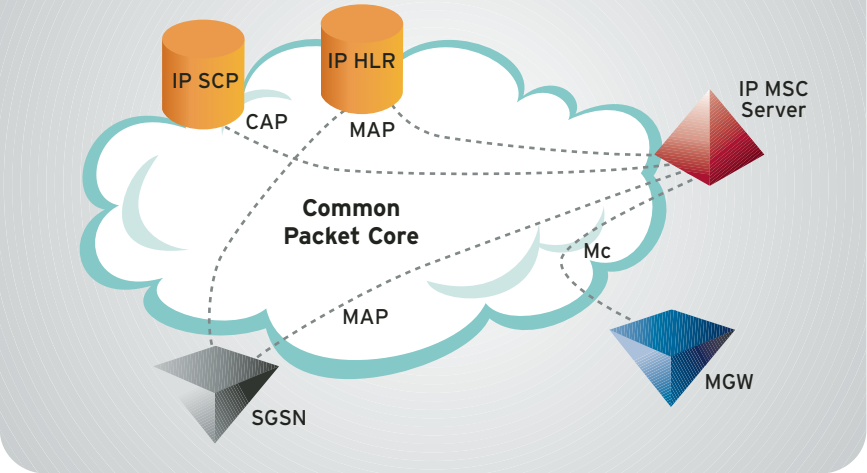
H.324-M

Nortel's HLR application includes support for 64-kbps circuit video used in UMTS networks.

MAP Version 3 (Phase 2+)

Nortel's HLR application is compliant to the most recent application contexts for MAP operations.

Figure 3. All-IP Next Generation Signaling Solution



Network signaling

With the introduction of a true softswitch processing platform in NSS19, the HLR can now be regarded as an All-IP application residing on a COTS industrial computing platform. All signaling for the softswitch is therefore IP-based. In a pure IP signaling network, the softswitch platform can communicate using a physically integrated Sigtran function without any external signaling gateway function. However, in a mixed signaling environment including TDM SS7 or ATM, an external signaling node can be applied. This can be a Nortel supplied signaling node or it can be a suitable third-party node. If no external signaling node is used, then each HLR softswitch appears to the network as a discrete Sigtran-enabled Application Server. The HLR's Sigtran solution offers:

- M3UA RFC compliant Sigtran: M3UA/SCTP
- A fully scalable Sigtran-pooling capability such that signaling can be dimensioned on a per-node basis rather than on a per-link basis

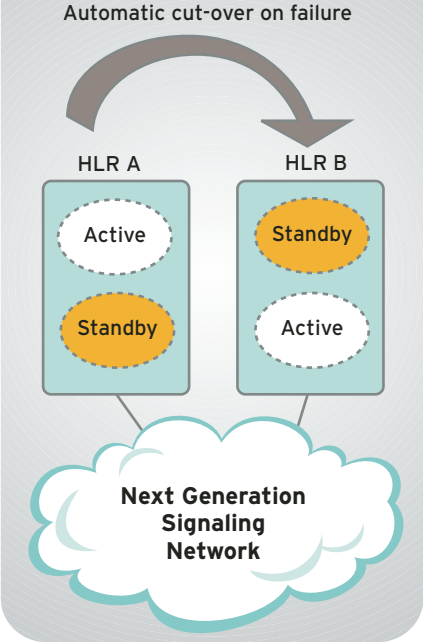
Network resiliency

Nortel's HLR products have a demonstrated record of carrier-grade reliability and stability. The maturity, feature-richness and stability of this HLR application software is leveraged in the NSS19 HLR by re-using it on the softswitch platform. The use of a true softswitch platform also enables a very high density, small footprint and highly-scalable implementation. However, Nortel recognizes that higher-density equipment requires a parallel increase in system reliability and availability due to the larger potential impact of any failure. Consequently, Nortel has also addressed network-level resiliency through the implementation of an Automatic Nodal Cut-Over (ACO) feature to create a mated pair of HLRs. This feature is already extensively deployed on existing HLR systems and is now also being applied to Nortel's ATCA-based HLR in NSS19.

Nortel's HLR mated pair configuration

Nortel's introduction of a very high-capacity and high-density COTS HLR means that a mated pair solution can be implemented using a relatively small number of mated systems compared to conventional HLRs. This makes the implementation of a mated-pair HLR much more cost-effective than with multiple low capacity systems. Both HLRs in the mated pair hold a complete copy of the subscriber database where some subscriber records are active and some are standby. In the event of a failure impacting one node, all records on the surviving node are made active. However, with the introduction of a blade-based COTS HLR, the HLR application resides on a processor blade. Therefore, Nortel has extended Nodal ACO to operate between HLR blades, enabling single-blade take-over by another HLR blade in the event of a blade failure. The take-over blade can be located in a different HLR node. Consequently, Nortel's overall HLR system reliability is further improved through the introduction of COTS technology.

Figure 4. Nortel's HLR mated pair configuration



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NN117101-061906

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