



IBM BladeCenter — Home Location Register (HLR) Solution featuring:

- Apertio
- SUSE
- Intel

*Alex Cabanes
IBM Systems & Technology Group
Industry Marketing Manager, Next Generation Networks*

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Overview

The Home Location Register (HLR) and Home Subscriber Server (HSS) are the main databases of subscriber information for GSM wireless networks and IMS networks. They contain information such as identities, subscriber address, location, status, and profile. The HLR and HSS are accessed with different protocols, the HLR via SS7 TCAP and MAP and the HSS via diameter Cx, Sh, and HTTP digest protocols.

Apertio built this core network element and accelerated its time-to-market by leveraging the strengths of the IBM BladeCenter, including:

- *IBM BladeCenter H platform provides the carrier-grade SUSE Linux platform*
- *With a single, Dual-Core Intel® Xeon® processor, the Apertio HLR can handle approximately 17,000 TCAP transactions per second and more than 13 million subscribers.*

Apertio Home Location Register (HLR) solution

As part of the Apertio One suite of applications, Apertio One-HLR specifically addresses the architectural inefficiencies and fragmented databases of legacy HLR solutions. Apertio One-HLR is a uniquely scalable, high performance HLR solution that provides a single logical directory of subscriber records. By taking advantage of the underlying in-memory database, Apertio One-NDS (Network Directory Server), One-HLR can also be further extended to form an integral part of a pan-network customer data repository. The Apertio One-HLR is a software solution, implemented on commercially available hardware. It delivers significant performance advantages when compared with legacy hardware systems, without sacrificing the robust mobility features required by advanced networks. Apertio's One-HLR key performance improvements are:

- *Upto 100 times greater scalability – can serve from 1,000 to over 250 million subscribers*
- *Upto 5 to 10 times greater performance – in memory database with deterministic, single digit millisecond response times and high transaction throughput*

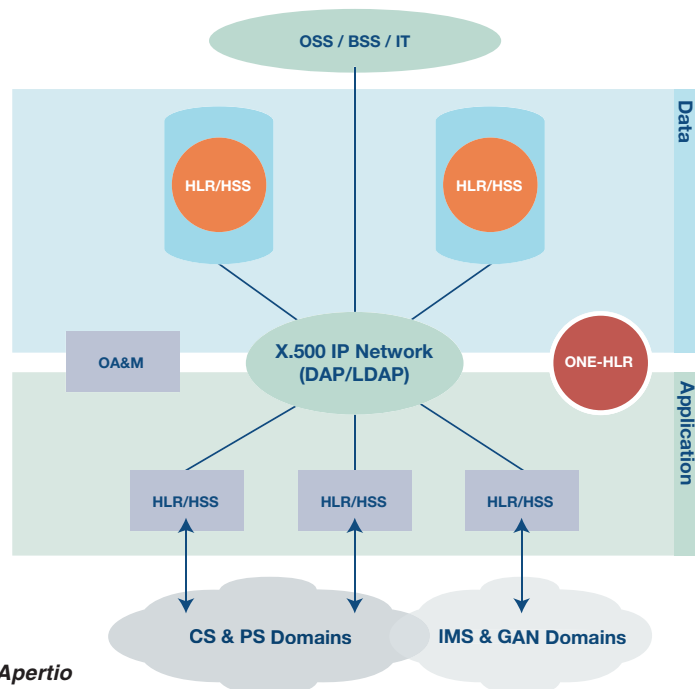
Highlights

IBM BladeCenter family provides a scalable open standards based platform for next generation networks applications

Implemented using a multi-tier distributed architecture, separating transaction and data processing; One-HLR allows new signalling and transaction processing capacity to be added without the need to increase subscriber storage capacity, and vice versa. The One-HLR multi-tier distributed architecture allows signaling and transaction processing capacity to be scaled independently. The ability to independently scale the solution in this manner results in more effective use of infrastructure and working capital. The scalability also provides the ability to enable aggressive marketing campaigns without the need for significant infrastructure investment.

As service providers look to combine new services and embrace IP switching as a replacement for traditional circuit switched environments, legacy HLRs need to be enhanced or replaced to cope with the many different ways a subscriber could consume fixed and mobile services. One-HLR offers a software update path to a 3GPP Release 6 compliant Home Subscriber Server (HSS) with coexistent HLR functionality. This offers mobile, fixed and converged Service providers the capability to support mobility for IMS (IP Multimedia Subsystem), UMA (Unlicensed Mobile Access) and other IP services.

Apertio One-HLR architecture



Source: Apertio

Highlights

As services converge, the underlying infrastructure is also converging onto a common COTS based platform

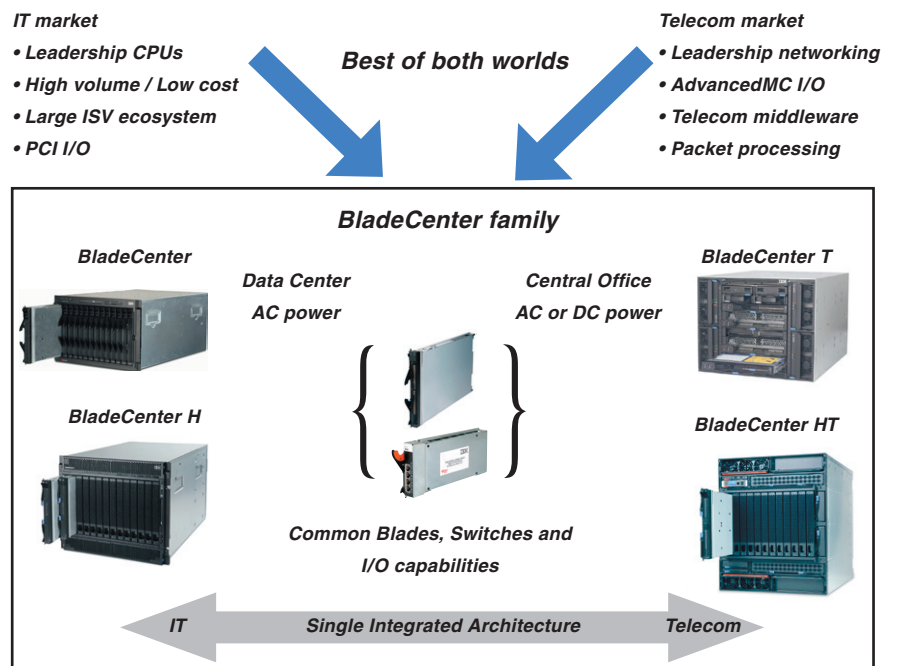
The IBM BladeCenter family

The IBM BladeCenter T chassis supports full hardware redundancy (power supply, I/O modules, management modules, L2 switching, mid-plane, etc.) thereby minimizing potential points of failure in the solution.

The IBM BladeCenter is an advanced blade system which integrates servers, storage and networking into a single chassis – yielding significant simplification, improved density and potential TCO savings . A single family of common server blades, storage, I/O, switches and networking modules are fully supported and interchangeable across the entire family of BladeCenter chassis. The IBM BladeCenter chassis is designed as the ideal solution for data center deployments. The IBM BladeCenter H is for high performance computing platform, while the IBM BladeCenter T chassis is specifically designed for telecom central office deployments.

The new, IBM BladeCenter HT – a new, telecom optimized version of the BladeCenter H – opens new market opportunities with a new and powerful NGN platform ideally suited for telecom equipment and service providers.

Advantages of the IBM BladeCenter



Source: IBM

Highlights

IBM systems, software, services and partners delivers a comprehensive portfolio that helps accelerate the NGN transformation

The IBM BladeCenter T and BladeCenter HT deliver rich telecommunications features and functionality, including fault-tolerant capabilities, hot-swappable redundant DC or AC power supplies and cooling, and built-in systems management resources in a 20” deep chassis. The IBM BladeCenter T and BladeCenter HT have been designed and developed to meet the rigorous Network Equipment Building System (NEBS) Level 3 and European Telecommunications Standard Institute (ETSI) standards for electromagnetic compatibility, thermal robustness, fire resistance, earthquake and office vibration resistance, transportation and handling durability, acoustics and illumination, and airborne contaminant resistance. The IBM BladeCenter T and BladeCenter HT have been specifically developed to meet the robust reliability, power, form factor and extreme environmental needs for telecom central office deployments.

Harnessing the power of the Intel Xeon processors

The Quad-Core Intel® Xeon® processor series surpasses most other processors by providing excellent computational density and value.

The BladeCenter family offers choice of processors, connectivity, power and form factors to simplify the deployment of solutions in the telecom central office or data center

The new Intel® Core™ Microarchitecture further improves performance by increasing the size of the L2 smart cache, increasing the instructions per cycle by 33% and doubling the width of the SSE3 engine for media-intensive calculations. Lastly, the associated Intel® 5000P Chipset supports 21 GB/s of memory bandwidth to Fully-Buffered DIMMs (FB-DIMMs) and 21 GB/s of peak system bus bandwidth through its Dual-Independent Buses (DIBs). The combination of 4-cores per socket, the new Intel® Core™ Microarchitecture, and the high-throughput chipset supporting FB-DIMMs allows the BladeCenter HS21 to bring unrivaled performance to the blade market segment.

Highlights

The use of interchangeable blades across the entire BladeCenter family, allowing service providers to deploy both network and IT functions on this common platform

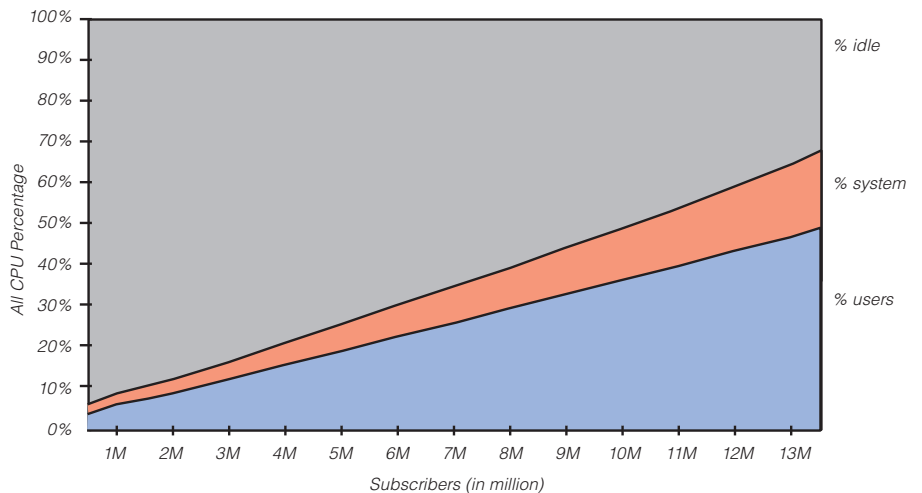
Scalability

Recent scalability testing at the IBM Network Transformation Center in Montpellier, France demonstrated Apertio’s impressive Home Location Register (HLR) capabilities. Benchmarking of the Apertio application was performed on IBM BladeCenter H using HS21 Intel Xeon blade servers running SUSE Linux. The HS21 Intel Xeon blades were ideal for Front End transaction processing. This test demonstrated the ability of a single HS21 dual core Front End (FE) blade to achieve massive performance, reaching over 13 million subscribers for the HLR application with a CPU usage of less than 70%. TCAP message pairs reached an impressive throughput of 17,000 TPS with a single FE server. Average complete MAP dialogue response times were as low as 27ms at the peak subscriber load using a representative mix of MAP operations. This unparalleled performance is achievable due to the highly scalable and efficient architecture of the One-HLR application built on Apertio One-NDS.

“This benchmark testing clearly showed the benefits of deploying Apertio’s new generation HLR infrastructure for mobile operators on economical Intel Xeon on high density IBM HS21 Blade servers together with the IBM BladeCenter chassis. The ability to support tens of millions of subscribers in one rack with linear scalability provides operators with un-paralleled CAPEX and OPEX benefits.”

— Wallace Ascham, Vice President
Partners and co-founder of Apertio

Benchmarked Home Location Register (HLR)



Source: Apertio

Highlights

Integrated platforms reduces complexity while improving reliability

The IBM BladeCenter family offers telecom service providers with increased flexibility in how they choose to deploy applications in the central office or the data center

Unprecedented performance, flexibility and reliability

Today's telecom infrastructure and data center environments require greater processing capacity, lower power consumption and ease of use to deploy new services being deployed every year. The integrated COTS solution of IBM, Intel and Apertio addresses these issues with interoperability, flexibility, ease of use and cost effectiveness. The reliability of the IBM BladeCenter and the ability to use the Dual-Core Intel® Xeon® processor is greatly enhanced with SUSE Linux carrier-grade capabilities. The solution provides:

- *Greater throughput and energy efficiency using the Intel Xeon processors with low power consumption*
- *Carrier-grade, Home Location Register (HLR) from Apertio*
- *Reliable and highly available IBM BladeCenter platform*
- *Highly scalable, open standards, Linux based solution*
- *Ease of Use for fast deployment, maintenance and the adding subscribers*
- *Greater cost effectiveness*

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IBM BladeCenter QS20 requires a separate chassis from other blade servers, and is supported only in the original BladeCenter chassis. Some machines are designed with a power management capability to provide customers with the maximum uptime possible for their systems. In extended thermal conditions, rather than shutdown completely, or fail, these machines automatically reduces the frequency of the processor to maintain acceptable thermal levels.

MB, GB, and TB = 1,000,000, 1,000,000,000 and 1,000,000,000,000 bytes, respectively, when referring to storage capacity. Accessible capacity is less; up to 3GB is used in service partition. Actual storage capacity will vary based upon many factors and may be less than stated. Some numbers given for storage capacities give capacity in native mode followed by capacity using data compression technology. Maximum internal hard disk and memory capacities may require the replacement of any standard hard drives and/or memory and the population of all hard disk bays and memory slots with the largest currently supported drives available.

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Department XVXA
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U.S.A., 27709

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