



IBM BladeCenter — Fixed Mobile Convergence Solution featuring:

- **BridgePort Networks**
- **GoAhead Software**
- **Solid Information Technology**
- **AMD Opteron processors**

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Overview

Fixed-Mobile Convergence (FMC) services open the door to a number of new and exciting services for mobile service providers. However, network engineers need to ensure that any new end-to-end solution is carrier grade. These include the need for high availability, scalability and easy administration.

BridgePort Networks' MobileSTICK™ solution offers a market-ready FMC software solution that uses open standards hardware and software to achieve carrier-grade performance. The keystone to the MobileSTICK solution is the NomadicONE™ Network Convergence Gateway (NCG) software from BridgePort Networks. It provides internetworking between mobile networks and the internet for voice, text and multimedia communications.

BridgePort Networks built this core network element and accelerated its time-to-market by leveraging the strengths of key IBM Business Partners, including:

- *GoAhead's SelfReliant middleware provides high availability of system resources and uninterrupted services.*
- *Solid Information Technology provides solidDB, an embedded database within the BridgePort NomadicONE NCG that tracks subscriber registration activity.*
- *IBM BladeCenter T platform provides the carrier-grade Linux platform*
- *With AMD's high-throughput Opteron processors, the NomadicONE NCG can handle over a million subscribers on eight LS21 servers within a single IBM BladeCenter chassis.*

BridgePort Networks MobileSTICK Solution

The MobileSTICK solution enables mobile subscribers to start using their Personal Computers (PCs) and laptops for their existing mobile voice and messaging services, plus a host of compelling new integrated applications, without adding a new phone number or changing phones. Mobile service providers can offer secure fixed-mobile convergence services to consumers today with this solution. The solution bridges the mobile and broadband networks within the mobile operator's core network using BridgePort Networks' NomadicONE™ Network Convergence Gateway. Subscribers use a USB key with an embedded SIM card and a softphone client, with a PC using a broadband connection to use the services.

Highlights

BridgePort Networks MobileSTICK:

- Extends use of existing mobile subscriber's voice, text, and multimedia services to a PC
- Helps increase messaging revenue – both text and multimedia
- Helps build additional VoIP revenue
- Leverages existing infrastructure and GSM SIM security for rapid deployment
- Scales to over 1 million subscribers in a single BladeCenter T chassis with 8 server blades

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

GoAhead SelfReliant provides an open, standards-based, high availability and system management middleware that helps deliver carrier-grade Linux platform with greater availability

AMD's Direct Connect architecture helps deliver greater throughput capabilities at greater speeds with minimal packet loss

Solid Information Technology's solidDB provides a full-featured, in-memory database which provides scalable, high performance data access for subscriber information

This solution draws on three key capabilities to enable converged, PC-based communications.

1. A USB key's softphone and SIM card that is authenticated by the mobile network and uses SIP signaling to communicate with the mobile network
2. A capability to converge the Internet with the mobile network, bridging between SIP and SS7 signaling
3. The ability to associate two user devices (PC and mobile phone) with a single phone number and set of services

The MobileSTICK solution combines the following items to provide PC-based integration with existing mobile services:

- USB key with an embedded SIM card
- Softphone client software on the USB key
- BridgePort Networks' NomadicONE Network Convergence Gateway (NCG) acting as a SIP Registrar and Serving MSC
- Standard media gateway, media gateway controller, signaling gateway, session border controller and media server
- Mobile Carrier's Home Location Register (HLR) and Multimedia Messaging Services Controller (MMS-C)

BridgePort Networks - MobileSTICK solution



Source: BridgePort Networks

Highlights

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

"The IBM BladeCenter platform allows BridgePort Networks' customers to start small and grow quickly on a platform that is optimized for reliability and scalability. On a single blade, we can handle over 100,000 Busy Hour Call Attempts, with room to expand within the chassis. Our goal is to drive performance so carriers can deliver voice, messaging, and content-driven Fixed Mobile Convergence more cost effectively."

— Steve Blumenthal, Chief Technology Officer, BridgePort Networks

The keystone to this solution is the NomadicONE NCG which mediates between the SS7-based mobile network and the SIP-based VoIP network. The NCG functions as a MSC/VLR in the GSM network and a SIP Registrar/Proxy in the VoIP network.

By associating the two IMSIs – one from the cell phone and one from the MobileSTICK – to a single phone number, mobile services can be converged and extended to the internet.

NomadicONE NCG Software Architecture

The BridgePort Networks' NomadicONE NCG consists of three modules:

- 1** *Convergence Services Gateway (CSG)*
- 2** *Network Signaling Handler (NSH)*
- 3** *Convergence Database (CDB)*

The Convergence Services Gateway (CSG) is the application performing all the per-subscriber and per-session call processing between mobile and VoIP networks. The main functions include:

- *SIP Proxy and Registrar*
- *Serving MSC / VLR*
- *Gateway-MSC*
- *Back-to-Back User Agent (B2BUA) allowing a SIP device to look like a mobile phone off the cellular network, and allowing a mobile phone to look like a SIP device off the broadband network*

The Network Signaling Handler (NSH) is the application handling the SS7/ SIGTRAN interface and SIP traffic load balancing. The NSH allows for an entire NomadicONE cluster of processing blades to appear as a single Mobile Switching Center (MSC) to the mobile network using a single SS7 point code. Working with the CDB, the NSH also provides a portion of the SIP Aware Load Balancing capability. This allows telecom service providers to easily scale their subscriber counts without requiring additional mobile network point codes. The common NSH is shared by all the nodes in the NomadicONE cluster (i.e. CDB and CSGs).

Highlights

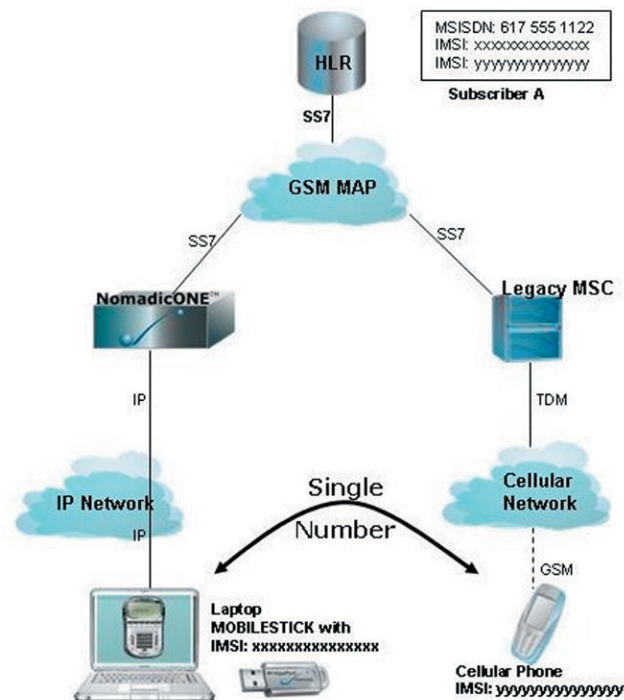
“Solid Information Technology continues to work with IBM to ensure our data management solution enhances and supports the requirements for a standards-based ecosystem for the IBM BladeCenter, making it easier and more cost effective for our joint customers to create and deliver embedded solutions that are fast, always-on, and flexible.”

— Ari Valtanen, Co-founder and Chief Technology Officer, Solid

The Convergence Database (CDB) tracks essential subscriber call state and registration activity for NomadicONE NCG. To enable higher quality of service, the CDB utilizes solidDB™, an advanced database from Solid Information Technology. The solidDB is ideally suited to the IBM BladeCenter architecture. Proven in over 3 million deployments worldwide, solidDB’s compact, full-featured database technology enables rapid data access as well as the scalability to accommodate growth.

The solidDB’s in-memory database engine provides exceptional performance, supporting high transaction rates with rapid response times. It supports carrier-grade high availability using a two-node, hot standby configuration with instant failover. For scalability, solidDB takes maximum advantage of multi-core processors and supports database replication across multiple nodes. Database management is handled within NomadicONE NCG, thereby simplifying administration, reducing costs and further improving availability.

NomadicONE NCG software architecture



Source: BridgePort Networks

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

Achieving High Availability

The NomadicONE NCG is designed to provide high availability and carrier grade performance. The NCG is able to achieve its high reliability by exploiting both hardware and software platform architecture.

The IBM BladeCenter family

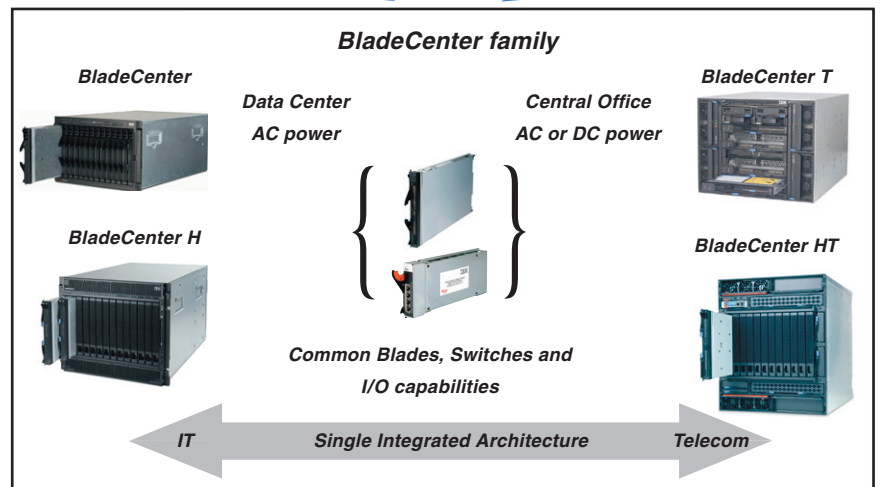
The IBM BladeCenter T chassis supports full hardware redundancy (power supply, I/O modules, management modules, L2 switching, mid-plane, etc.) thereby minimizing potential points of failure in the NomadicONE solution.

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

Advantages of the IBM BladeCenter

- | | | |
|---|-----------------------------------|--|
| <p>IT market</p> <ul style="list-style-type: none"> • Leadership CPUs • High volume / Low cost • Large ISV ecosystem • PCI I/O | <p>Best of both worlds</p> | <p>Telecom market</p> <ul style="list-style-type: none"> • Leadership networking • Advanced MC I/O • Telecom middleware • Packet processing |
|---|-----------------------------------|--|

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



Source: IBM

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

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.

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 AMD Opteron processors

AMD’s Direct Connect architecture provides greater throughput capabilities with minimal packet loss enabling better QoS for today’s demanding telecom environment. It also enhances GoAhead’s ability to further improve system uptime for a robust, carrier-grade Linux platform. The AMD64 processors with Direct Connect Architecture feature an integrated, on-die memory controller, optimizing memory performance and bandwidth per CPU. AMD’s PowerNow!™ technology with Optimized Power Management (OPM) further strengthens the exceptional performance-per-watt capabilities of the AMD Opteron processor. Not only does AMD PowerNow! technology with OPM provide enhanced power management capabilities, it can also aid in platform investment protection for today’s demanding server environments by providing less strain on data center cooling and ventilation systems.

Highlights

“We believe that by building solutions using industry-leading, standards-based platforms such as the IBM BladeCenter and GoAhead SelfReliant high-availability management software, customers are able to put together application ready platforms in a cost-effective and timely way.”

— Dr. Asif Naseem, CTO and COO,
GoAhead

High Availability middleware

Application reliability is achieved through a variety of techniques. The CDB node is deployed in a 1:1 (Active/Standby) manner – with the solidDB database handling fault detection, recovery, and database replication across the multiple nodes. A single fault on any of the CSG nodes should not result in any system degradation. The Broadband Location Register (BLR) portion of the CDB is a highly available, in-memory, database server used to store dynamic registration and call information so that it can be shared between the multiple CSG blades (for SIP Aware Load Balancing purposes) – allowing another CSG blade to take over call processing if one CSG blades goes down.

The NSH node is deployed in a 1:1 manner – with the NSH handling fault detection, recovery and replication across the multiple nodes. A single fault on any of the nodes should not result in any system degradation. The NSH receives subscriber call processing requests and interacts with the CDB-based BLR to determine which CSG blade to utilize to process the subscriber request.

The CSG blades are deployed in an N active manner. The NomadicONE internal load balancer on the NSH blades supports monitoring of the blades, CSG nodes are removed and restored on a per-blade basis. Failures in a single CSG do not directly impact other solution nodes. NomadicONE session persistence capabilities help prevent stable calls from being lost on a CSG failure.

To further enhance carrier-grade availability of the NomadicONE Network Convergence Gateway, BridgePort Networks leverages GoAhead Software, open standards-based, high availability middleware which is already deployed on more than 15,000 nodes worldwide. By utilizing commercial-off-the shelf solution, BridgePort was able to deliver comprehensive availability and platform management capability, while focusing resources on the value-added application layer and speeding time-to-revenue.

Highlights

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

“The IBM BladeCenter platform is key to BridgePort Networks’ strategy of providing a highly scalable telecom carrier-grade solution. Its improved performance will allow our customers to deliver voice, messaging, and content-driven Fixed Mobile Convergence more cost effectively.”

— Steve Blumenthal, Chief Technology Officer, BridgePort Networks

IBM BladeCenter with GoAhead SelfReliant middleware offers and end-to-end, High Availability and systems management on a carrier-grade Linux platform. The use of GoAhead middleware reduces the burden of integration and validation, helping telecom service providers accelerate new application deployment and time-to-market. GoAhead supports the Service Availability Forum (SA Forum) specification, including:

- *Hardware Platform Interface (HPI) specification for complete chassis and blade server management of hardware-specific sensors and controls*
- *Application Interface Specification (AIS) for platform portability and application re-use.*

GoAhead also provides a System Model to manage system resources for comprehensive availability, high performance with millisecond, stateful failover, fast messaging and low CPU usage.

Scalability

The NomadicONE solution is designed for easy scalability. Because each CSG is independent of one another, adding per-subscriber capacity can be achieved simply by adding additional CSG blade servers.

The internal load balancers on the NSH’s monitor the state of each CSG (both at the physical and application layers) and remove/restore them for subscriber service processing accordingly. Once a CSG has been physically added to the cluster, all that’s required to put it into service is to provision the new CSG address into the load balancer and it will become an active member of the NomadicONE solution.

As described above, the BridgePort Networks solution allows for multiple chassis and BladeCenter server blades to be part of a common cluster. Inter-chassis communications allows the CDB and NSH redundant pairs to communicate at extremely high speeds across the chassis when utilizing the multi-chassis redundant configuration – significantly reducing the OA&M operations required when scaling the NomadicONE solution.

Highlights

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, AMD, BridgePort Networks, GoAhead Software and Solid addresses these issues with interoperability, flexibility, ease of use and cost effectiveness. The reliability of the IBM BladeCenter and the ability to use the AMD Opteron processors is greatly enhanced with GoAhead's High Availability middleware, which delivers carrier-grade availability. The solution provides:

- *Greater throughput and energy efficiency using the AMD Opteron processors with low power consumption*
- *Greater system resource availability from GoAhead middleware*
- *Carrier-grade Fixed Mobile Convergence solution from BridgePort Networks*
- *Reliable and highly available IBM BladeCenter platform*
- *Scalable, high performance subscriber database from Solid*
- *Ease of Use for fast deployment, maintenance and the adding subscribers*
- *Greater cost effectiveness*

Highlights

For more information

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Cell processor based blades require a chassis separate from other blades. 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.

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