The convergence of IT and telecommunications network technology
With the rapid rise of Next Generation Networks (NGNs), the telecommunications industry is experiencing a convergence of IT and telecom network technology. Older, proprietary hardware is not always able to cost-effectively deliver the high performance or throughput required to support new services such as Voice over IP (VoIP), streaming video, gaming or blended services.

Telecommunications and network equipment providers are finding a pressing need to update their network infrastructures in order to compete in this new marketplace, where network performance and reliability are essential. Market pressures also place a premium on the rapid deployment of new applications, easy scalability and lower total cost of ownership.

Accelerating NGN convergence
The three planes of an NGN telecommunications network architecture—service, control and transport—have different needs, driving many hardware manufacturers to develop highly customized, telecom-specific solutions to meet these requirements.
Few available solutions can span all three planes, requiring telecommunications service providers to frequently deploy mixed infrastructures to handle their various telecommunications applications—relying on the integration and flexibility compromises that these infrastructures entail.

Moreover, these specialized telecommunications solutions are typically not well suited to data center needs; requiring the deployment of separate architectures to deal with different telecom and business computing requirements. Implementing multiple platforms drives up costs and hampers overall flexibility, both key considerations for telecom providers.

IBM offers a single, integrated platform with the high performance and throughput needed to support telecommunications network, central office and data center needs. The IBM BladeCenter® family leverages open standards and commercial-off-the-shelf (COTS) components to deliver an easily integrated, affordable, flexible, highly scalable family of servers, one that shares a common architecture. It is a true convergence platform that helps maximize flexibility while minimizing cost.

Telecom functions in the control and transport planes require high performance, bandwidth and throughput. With the introduction of the high-performance, high-speed IBM BladeCenter HT—specifically designed for telecommunications networks—telecommunications service providers can now deploy a common, standardized, integrated platform across all three layers of the telecommunications infrastructure: one family, one architecture, one set of capabilities that addresses the diverse needs of NGN telecommunications applications.

By harnessing the best of IT and telecommunications in a standardized platform, the common BladeCenter family architecture allows telecoms to take advantage of a wide variety of solutions created by IBM Business Partners, which span telecommunications applications for end-to-end support in both hardware and software solutions.

The BladeCenter platform, by being based on open standards and COTS components, enables more rapid adoption of new technologies as they become available.

This means telecoms are not locked into a proprietary solution and can gain investment protection while leveraging flexibility and choice—resulting in an enhanced ability to innovate.

**IBM BladeCenter HT: Telecommunications flagship**

The IBM BladeCenter HT is the cornerstone of the family’s telecom capability. A telecommunications-optimized version of the IBM BladeCenter H, it delivers the performance, speed and bandwidth needed to deploy service plane applications, while supporting deeper network functions in the control and transport planes.

The BladeCenter HT provides increased network infrastructure performance with high-performance dual- and quad-core CPUs from Intel® AMD and IBM, and an integrated and unified architecture designed to facilitate high-speed 4x10Gbps switching and expansive I/O bandwidth. IBM BladeCenter HT’s multi-terabit networking and throughput capability, which is essential for I/O-intensive NGN applications such as IP Television (IPTV) and video-on-demand (VoD), yields greater overall performance—ultimately helping to improve the overall user experience.

The BladeCenter HT also offers robust interconnectivity through support of a wide variety of high-speed networking protocols—OC1, OC3, OC12, ATM, GIGE, SS7, T1/E1 and J1—by leveraging offerings from the IBM Business Partner ecosystem.

“BroadSoft has worked closely with IBM to optimize our solutions on the IBM BladeCenter family of products with great success. We’re excited about the release of BladeCenter HT and expect it will further accelerate the shift we’re seeing toward blade servers as our customers transition to IMS and Next Generation Networks.”

– Bob Weidenfeller, vice president of engineering, BroadSoft
An example of a telecommunications industry leader leveraging open standards is the Nortel 10Gb Ethernet Switch by BNT. Using a fully non-blocking architecture, coupled with blade server technology such as Intel Core Micro Architecture and AMD integrated memory controller, enables the IBM BladeCenter HT to deliver high throughput and low latency—virtually eliminating packet loss, while increasing speed and network reliability for applications like media streaming.

Throughput is further enhanced by HyperTransport I/O, a point-to-point high-speed communication within the core processor architecture delivering higher bandwidth for I/O-intensive applications such as media streaming.

The BladeCenter family makes efficient use of power resources to help reduce operating and environmental costs. The IBM Low Voltage Intel HS21 and the new power-efficient AMD LS21/41 processor-based blades, specifically designed for the needs of power-sensitive telecom environments, can be used in the BladeCenter HT.

The BladeCenter HT is ideal for NGN telecommunications applications requiring NEBS Level 3/ETSI characteristics (see the sample configurations table). With the BladeCenter common family architecture, telecoms and network equipment providers are able to easily configure their infrastructures according to the specific requirements of each application. This helps optimize IT and NGN network investments, including system management resources.

The IBM BladeCenter HT is an outstanding high-performance platform for high-speed Next Generation Networks. It offers the performance and throughput required to support applications across all three telecommunications infrastructure planes—transport, control and services—while leveraging the IBM BladeCenter family’s shared architecture, enabling businesses to deploy a standardized, easy-to-manage, affordable platform across the enterprise.

### Transport plane performance
The transport plane is the network’s pathway to the outside world, moving data in the network. The responsiveness, speed and reliability of the network are critical, and for this reason transport plane applications require very high throughput and I/O performance.

Transport plane applications typically include, but are not limited to:
- **Signaling Gateways (SS7)**
- **Wireless Access Gateways** (narrow- and wideband, WiMAX)
- **Broadband Network Services**
- **Legacy Network/PSTN interconnection**
- **LAN/WAN interconnection**
- **Media Gateways**

The BladeCenter HT is specifically designed to meet the stringent I/O throughput demands of transport plane applications, offering:

**High-performance packet processing**
A multi-terabit backplane and a special-purpose 4x1 AdvancedMC Carrier blade supporting two 1GbE switches and a PCIe switch facilitate high-speed switching and I/O, providing the performance required to support a multi-service infrastructure.

**Very high I/O bandwidth**
The BladeCenter HT architecture greatly increases network performance by supporting a multi-terabit backplane and 40Gbps throughput per blade. Packaged in a dense chassis accommodating up to 12 blades, this yields outstanding I/O capacity and scalability.

**Accommodating a variety of high-speed I/O interfaces**
Adherence to open standards provides support for multiple telecom protocols (e.g., OC1, OC3, ATM, GIGE, SS7, T1/E1, J1), and a high-density 12U chassis offers multiple physical connections. This gives telecoms greater flexibility and choice for support of network protocols and interfaces.

**Low latency**
The BladeCenter HT can utilize the new Nortel 10Gb Ethernet switch by BNT using a fully non-blocking architecture that helps reduce interruptions, thus significantly reducing the number of dropped packets.
In addition, the BladeCenter HT supports HS21 Intel processor-based blade servers featuring advanced memory technology, as well as the new LS21/41 AMD Opteron processor-based blade servers with a low-latency memory subsystem. Low latency helps enable faster data transmission by reducing the time between the request for and delivery of the information stored in memory. Combined with the low packet loss, this provides enhanced reliability and high-speed throughput with higher levels of bandwidth for applications such as video streaming.

**Control plane performance**

The “brain” of the telecommunications infrastructure, the control plane serves as a centralized arbitrator between the service and transport planes, controlling basic processing, switching and signaling across the network. Working hand-in-hand with transport plane applications, control plane applications require high-performance processing along with I/O bandwidth similar to those of the transport plane.

Control plane applications typically include, but are not limited to:
- Softswitch
- Media Gateway Controller Function (MGCF)
- Wireless Base Station Controllers (BSC)
- Home Location Register/Subscriber Server (HLR/HSS)
- Session Border Control (SBC)
- Session Initiation Protocol (SIP) Server

The high performance and throughput of the BladeCenter HT are well suited to these applications with the following features:

**High-performance CPU**

High-performance dual- and quad-core processors from Intel, AMD and IBM meet the needs of the compute-intensive applications that reside in the control plane.

**Very high I/O bandwidth**

Multi-terabit networking and blade server throughput of 40Gbps deliver high network performance.

**High density for scalability and headroom**

A 12U chassis, efficient cooling and use of power, combined with dual- and quad-core processors, enables a large amount of computing power to be deployed in a compact area, reducing costs associated with floor space. In addition, multiple chassis can be interconnected using high-speed switches to create a powerful clustered system providing additional scalability.

**Large memory capacity and low-latency memory subsystem**

With a 32GB (Intel) or 64GB (AMD) memory capacity, efficient memory subsystems and Memory I/O option (MIO), the BladeCenter HT offers increased speed and responsiveness for control plane applications.

**Efficient use of power resources**

Highly efficient power supplies and single plane, straight-through cooling enable very high density along with power-consumption savings. In addition, the BladeCenter HT supports power-efficient CPUs, including the new Intel Low Voltage HS21 and AMD LS21/LS41 Opteron processor-based blade servers.

**Cost-effective, high-performance, large-capacity storage**

The NEBS3/ETSI compliant IBM System Storage™ DS3000 portfolio (DS3200, DS3400, EXP3000) with optional DC power is well suited to support telecom applications in the control and service planes, with SAS interface technology (DS3200), 4Gbps Fibre Channel controller (DS3400) and up to 14TB of external storage. For larger needs, the IBM System Storage DS4700 delivers extremely high performance (up to 1550Mbps throughput) and scalability, with up to 56TB of external storage.

**Services plane performance**

The services plane is where the new generation of value-added telecommunications services reside...these are what subscribers pay to access. Here, too, high performance is important, to give subscribers a smooth, responsive service experience.

Services plane applications typically include, but are not limited to:
- Application servers for IP Multimedia Subsystem (IMS), VoIP, IPTV, VoD and Advanced Security
- Feature Servers
- Directory Services
- Multimedia Messaging/Short Message Service (MMS/SMS)
- Gaming
- Web hosting and caching
- Parlay Gateway
- Intelligent Network/Advanced Intelligent Network
The same high-performance features that make the BladeCenter HT an ideal choice for transport and control plane applications, also suit it for the requirements of the services plane:

High-performance CPU
A selection of high-performance, dual- and quad-core, low-power-consumption processors is available, allowing telecoms to configure the BladeCenter HT to satisfy unique telecom industry requirements.

Very high I/O bandwidth
As with the transport and control planes, I/O is critical to maintaining peak performance. The BladeCenter HT supports multi-terabit networking and delivers this performance thanks to its high-speed backplane architecture.

Large memory capacity and low-latency memory subsystem
A variety of memory technologies such as fully buffered memory modules, dedicated memory bandwidth for each CPU and HyperTransport I/O – point-to-point high-speed communication within the core processor – deliver higher bandwidth and lower latency, which can improve the overall user experience for applications such as streaming video, music and video downloads.

Efficient use of power resources
IBM BladeCenter Low Voltage HS21 Intel-based blade servers and new LS21/41 AMD Opteron processor-based, power-efficient blade servers, specifically designed for power-sensitive telecom environments, deliver better performance per watt than ever before, and reduce environmental costs.

"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

High-performance, large-capacity storage
As with control plane applications, high-speed, highly scalable storage is a critical part of services plane applications. Less delay in accessing data means that subscribers get the quality of service and speed that they have come to expect. IBM System Storage delivers fast, reliable access to large volumes of online data with NEBS Level 3/ETSI compliant storage platforms delivering cost-effective performance, high throughput and ease of growth.

The IBM advantage
The IBM BladeCenter HT gives telecommunications providers and network equipment providers the ability to accelerate NGN convergence by harnessing the best of IT and telecommunications technology, while supporting the entire end-to-end transport, control and services plane infrastructure. This makes it an ideal choice as the centerpiece of a telecommunication provider’s IT strategy.

But more importantly, the IBM BladeCenter family as a whole delivers the benefits of IBM’s commitment to open standards. By basing its systems on open standards and COTS components, capital and operating costs are reduced, while investments are protected and the ease of integration with existing infrastructures is enhanced. The BladeCenter family’s openness also means that IBM Business Partners have developed a wide variety of application and compatible hardware solutions that are readily integrated into a BladeCenter based telecommunications infrastructure.

IBM has a leadership position in offering standardized, end-to-end NGN solutions for telecommunications service providers and network equipment providers. These powerful solutions, based on IBM’s vision, advanced industry knowledge and collaboration with a rich ecosystem of IBM Business Partners, give telecommunications service providers the tools and flexibility they need to innovate – to develop and deliver new, compelling products and services that give them a competitive edge.
### Control plane applications

**Base Station Controller (BSC)**

Centralized server in cellular systems for controlling multiple Base Transceiver Stations (BTSs). Performs radio channel allocations, controls the flow of calls, controls handovers between BTSs, controls fault management of BTSs and provides operational usage data. Interfaces to the Mobile Switching Center (MSC) for routing calls. Also includes transcoding functions, which are sometimes performed by a standalone unit.
- BladeCenter T or BladeCenter HT
- Blade (HS21: two for high availability, two 73GB drives, RAID 1 configuration)
- AMC carrier blade with:
  - T1/E1 AMC card running SS7 (Adax)
  - T1/E1 (optionally OC1 or OC3) running ATM

**Softswitch**

Controls connections in IP backbone networks and between IP and circuit networks. Switching is controlled with software, as opposed to hardware in the older PSTN circuit switches. Provides subscriber services. Provides control to signaling gateway and may include media gateway control functions.
- BladeCenter T or BladeCenter HT
- Blade (HS21: two for redundancy, 4GB memory, two 73GB drives)
- System Storage EXP3000 (optional)
- High-speed expansion daughter card (requires 10G switch in chassis)

**Media Gateway Controller Function**

Provides the control function for the media gateways; receives signaling information and controls routing.
- BladeCenter T or BladeCenter HT
- Blade (HS21: two for redundancy, 4GB memory, two 73GB drives)
- AMC carrier blade with SS7 card (optional)

**Session Border Control**

Provides security, monitoring for billing and regulatory purposes, maintains privacy of user and carries into, resolution of VoIP protocol problems due to NAT/PAT and firewalls.
- BladeCenter H or BladeCenter HT
- Blade (HS21: two for redundancy, 4GB memory)

**HLR/HSS**

Main database of subscriber information for a wireless network (HLR) or an IMS network (HSS). Contains information such as subscriber address, status and profile. Functionally, HLR and HSS are similar; however, the protocols used in accessing them and the type of networks in which they exist are different.
- BladeCenter T or BladeCenter HT
- Blade (HS21: two for redundancy)
- PEU side card with SAS HBA
- System Storage EXP3000
- AMC carrier blade if also performing HLR function
  - T1/E1/J SS7 AMC card (Adax)

**SIP Server (or S-CSCF)**

Allows networks to implement routing and security policies, authenticate users, and manage user locations. In the case of CSCF in an IMS network, it performs registration of users, routing and translation, interrogation of the HSS for authorization and user profiles, and maintains session timers.
- BladeCenter (HS21: two for redundancy)

### Transport plane applications

**Broadband Network Services**

Services provided through a medium capable of supporting two or more signals/channels of data being transmitted simultaneously. Generally, this includes DSL, fibre channel and ATM networks.
- AMC carrier blade with:
  - T1/E1 AMC card
  - OC1 AMC card
  - OC3 AMC card
  - AMC processor card
**Wireless Access**

Services that allow devices which transmit and receive information without the use of electrical conductors to connect into a telecommunications network:
- BladeCenter HT
- HS-21
- AMC carrier blade
- OC3-STM1 AMC card

**Signaling Gateway**

A network entity that translates signaling information from one medium to another, usually SS7 to IP.
- AMC carrier blade with:
  - HDCII-AMC card SS7 E1/T1/J1 (Adax: two cards running Sigtran protocols)

**Media Gateway**

Network unit that translates the data between unlike networks, e.g., instance conversion of TDM to VoIP (RTP) format:
- AMC carrier blade with:
  - T1/E1 AMC card (optionally OC1, OC3 or OC12)
  - AMC processor card

**Legacy PSTN Interconnection**

Services providing TDM and SS7 connectivity to the PSTN for the purpose of enabling legacy phones and faxes with voice-enabled broadband networks.
- BladeCenter HT
- AMC carrier blade
- HDCII T1/E1/J1 AMC card
- iSpan 3639 T1/E1/J1 AMC card

**Services plane applications**

**IPTV VoD Server (or media server)**

Server that stores and transmits videos that can be individually selected by a user for display on a video monitor.
- BladeCenter H
- LS21: 32GB memory
- High-speed expansion daughter card
- PEU side card with two SAS HBAs
- 10G switch in chassis
- System Storage EXP3000

**SMS**

Server that stores text messages sent by a user and delivers them to the recipient when they are available.
- BladeCenter HT
- Blade (HS21: two for redundancy, two 73GB drives)
- AMC carrier blade
- T1/E1/J1 SS7 AMC card (Adax) for legacy support

**IPTV Application Server EPG**

Server providing an on-screen television program guide to television programs to multiple users, which allows them to view, select and discover content through multiple options such as time, channel, or title via their remote control or keyboard.
- BladeCenter H
- Blade (HS21: 4GB memory, 73GB drive)

**Security (Firewall)**

Server that allows or blocks traffic to provide secure access using various techniques such as Network Address Translation (NAT), packet filtering and stateful inspection.
- BladeCenter H or BladeCenter HT
- Blade (HS21: quad core, 4GB memory, two 73GB drives, RAID 1 configuration)
- High-speed expansion daughter card (would require 10G switch in chassis)

**IMS (VOIP Server)**

Application server in an IMS network, typically serving as either an SIP Proxy or VoIP PBX.
- BladeCenter H or BladeCenter HT
- Blade (HS21: two for redundancy, 8GB memory, two 73GB drives)
For more information
Learn how IBM can help your company capitalize on revenue opportunities and reduce costs, while helping you retain profitable customers.

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