

Systems and Technology Group

# BladeCenter presentation & Hands on – corso XTRB1IT

- 18 marzo 2009 -

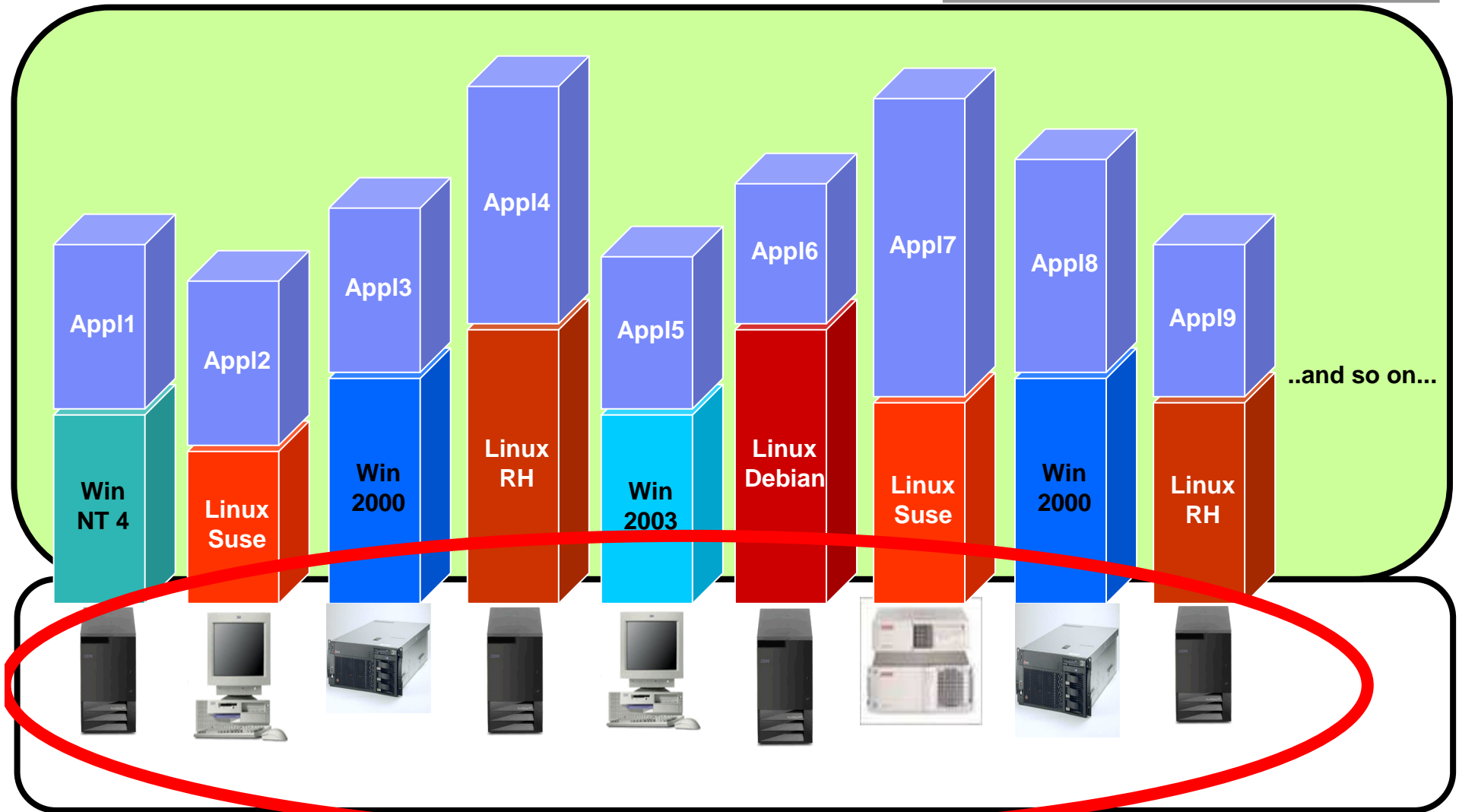
*Alessandro Malosio & Gian Paolo Guarneri*  
System x Technical Sales Support Team  
STG Training BladeCenter & System x



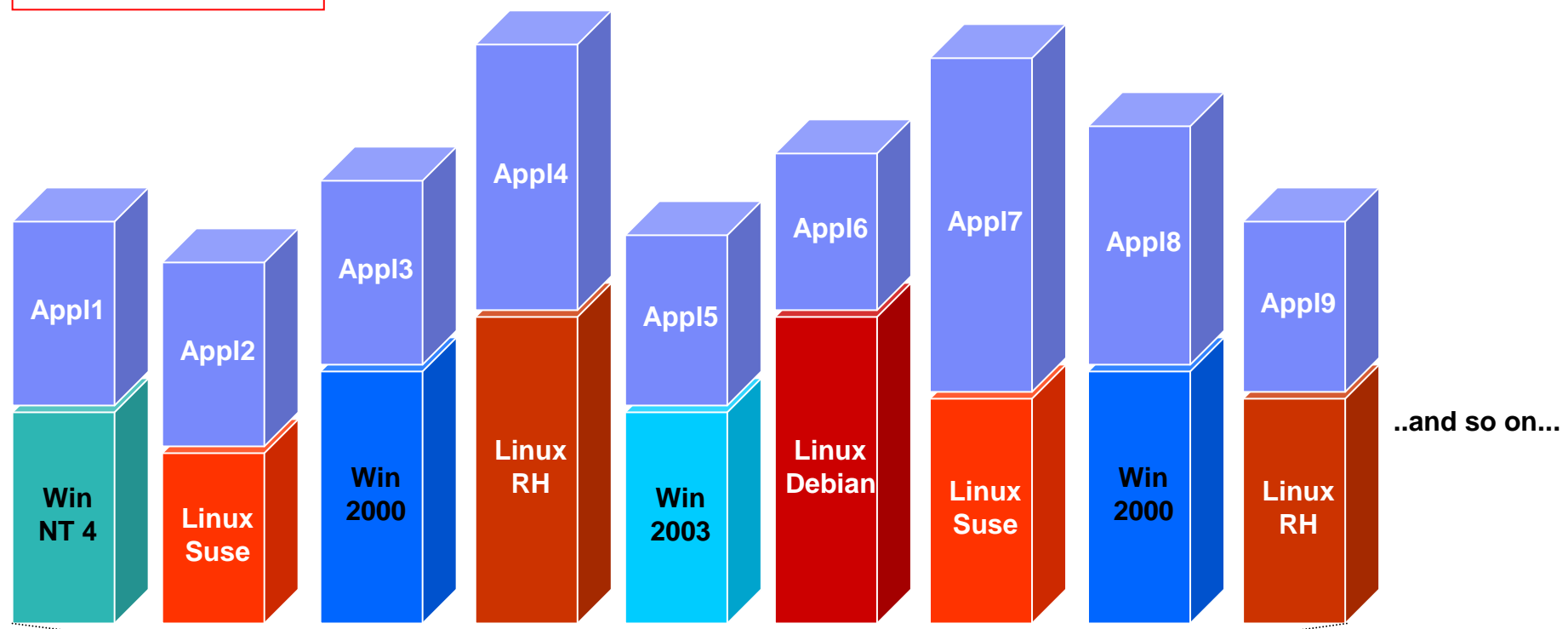
## Agenda (Inizio lavori h 9:30)

- **BladeCenter concepts, new announces**  
Coffee break h.11:00
- **Virtualization concepts & features with VMware**
- **Storage integration with DS3000 family**  
Buffet lunch h.12:45
  
- **Laboratorio BladeCenter & System x**
  - ▶ Ritrovo in aula per registrazione c/o reception IBM h.13:45
  - ▶ “hands on”: BladeCenter + VMware, BladeCenter + DS3400, BladeCenter S + SCMCoffee break h.15:45  
Chiusura lavori h.17:00

## Common x86 landscape

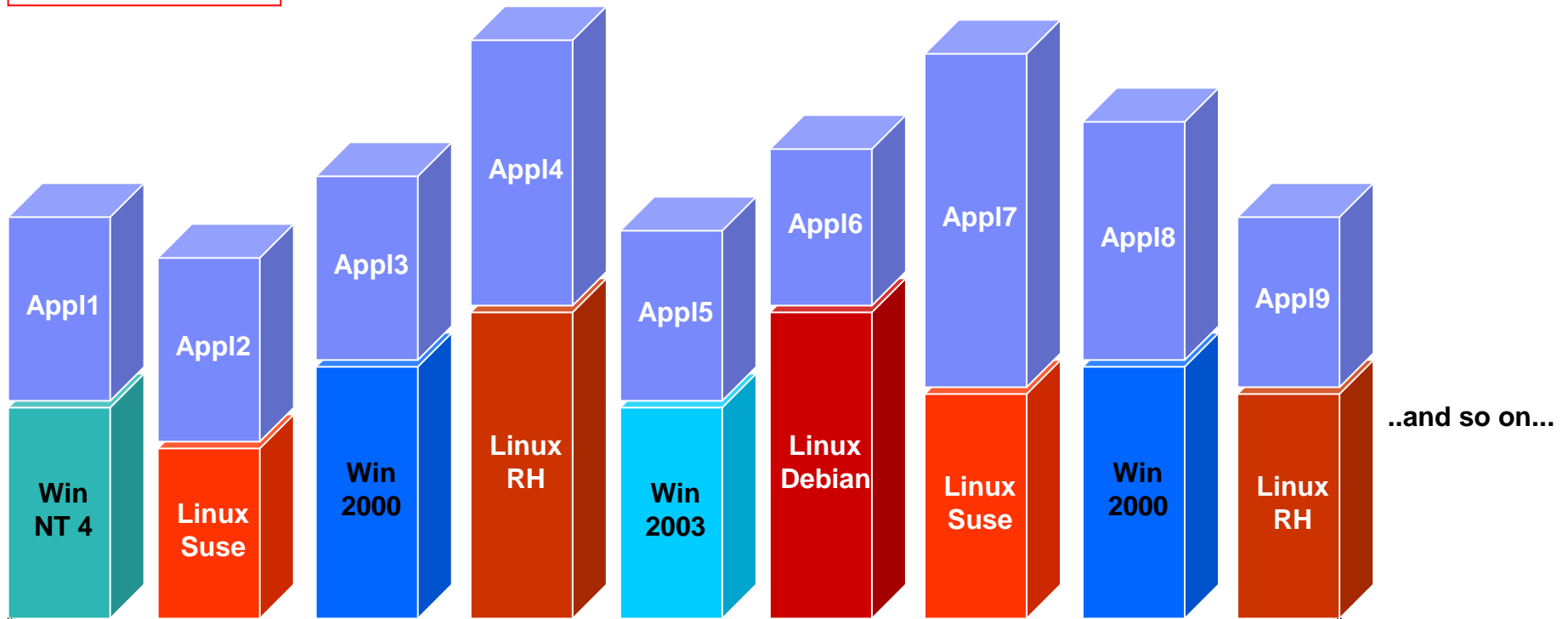


**TRADITIONAL**





**EVOLUTION**



**BladeCenter**

**SAN**



**LAN Eth**

## What's a "BladeCenter" ? and what's a "Blade"?

A "server on a card" - each "Blade" has its own:

- processor
- ethernet
- memory
- optional storage
- etc.



IBM Blade ready for insertion into the BladeCenter

The chassis provides shared:

- management console (KVM)
- power supply
- cooling
- network switches
- CD-ROM drive
- diskette drive
- etc.



IBM BladeCenter chassis - 7U rackable

# YOU CAN ALWAYS COUNT ON FAMILY. ESPECIALLY THIS ONE.

## THE IBM BladeCenter FAMILY



### IBM BladeCenter S

- 6 blades, 7U
- Extra internal storage room
- Ideal for SMB server consolidation

### IBM BladeCenter E

- 14 blades, 7U
- Mainstream applications
- Ideal for data centers and remote sites

### IBM BladeCenter H

- 14 blades, 9U
- Ideal for extreme I/O, data-intensive environments
- Excellent platform for virtualization or high perf requirements

### IBM BladeCenter T

- 8 blades, 8U
- NEBS characteristics
- Ruggedized chassis
- Ideal for telco, military, medical-imaging applications

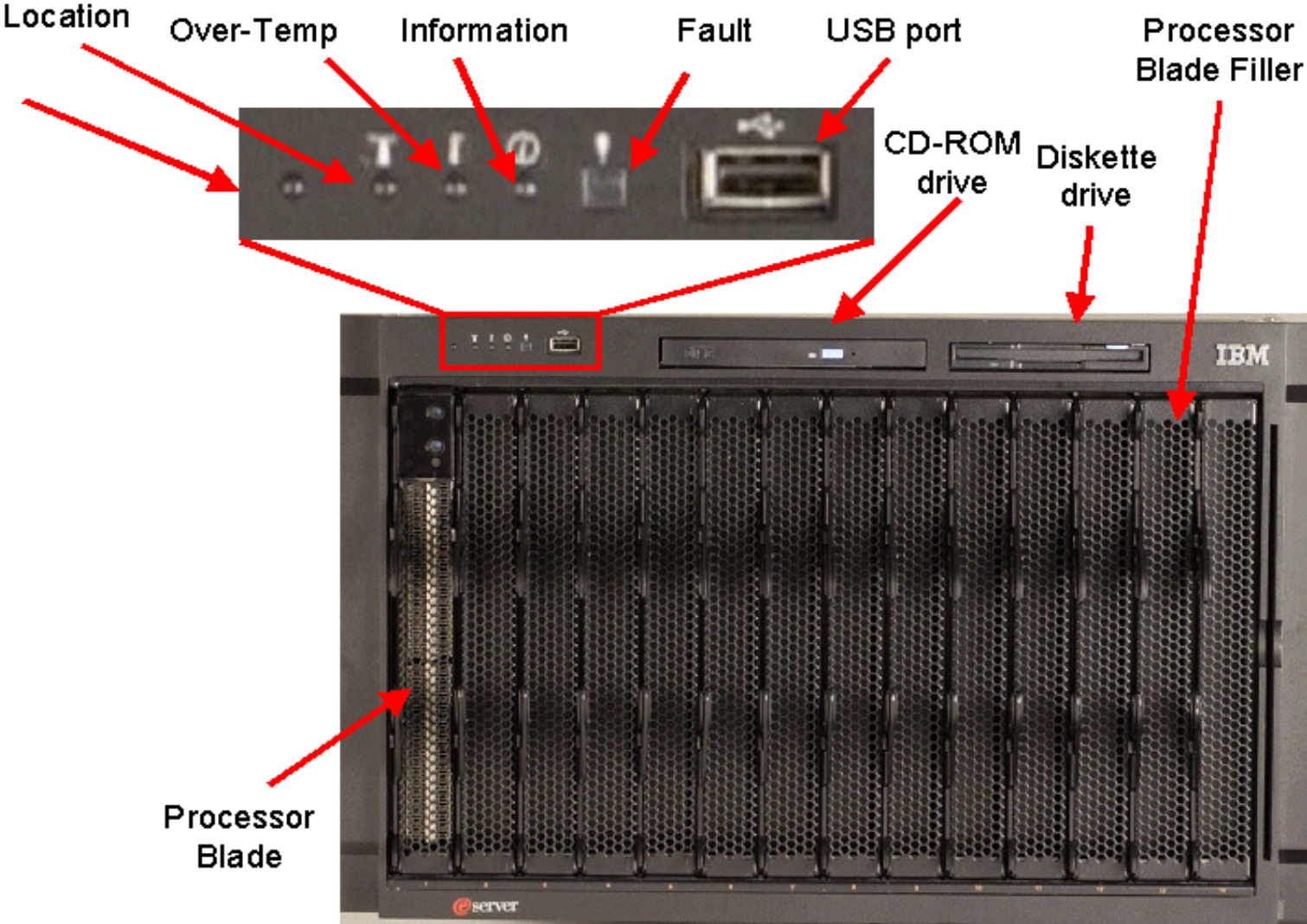
### IBM BladeCenter HT

- 12 blades, 12U
- NEBS characteristics
- Ideal for services, control and transport planes
- Ruggedized chassis

## Common Blades, Common Switches

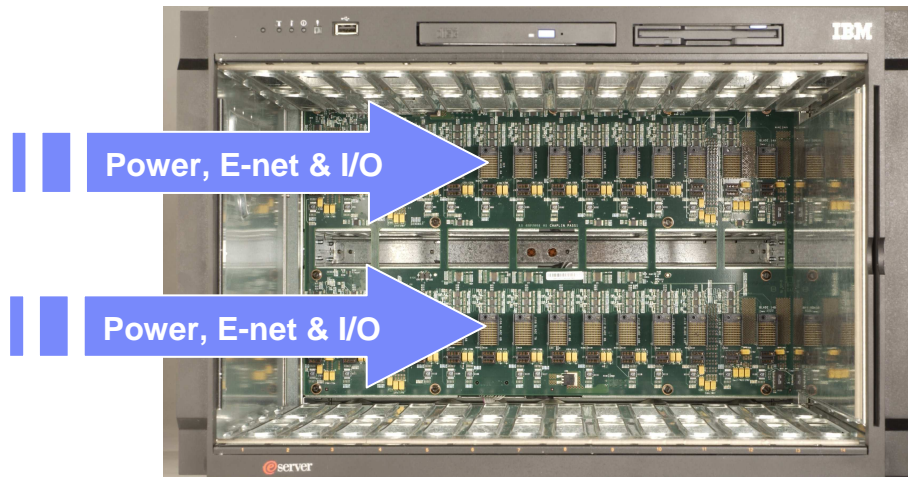


# Blade Center Chassis - front view





## BladeCenter technology advantage: dual midplane



- At least **two** connections from each blade server to the midplane
- **Dual** communication paths to the *passive* midplane for Ethernet, Fibre Channel, KVM, Power, and Management signals
- Chassis can be configured with **dual** Ethernet, Fibre Channel Modules providing **two** active paths to your external network
- **Multiple** paths from blade to chassis components helps to protect you from potential failed connectors or traces

## BladeCenter chassis – rear view

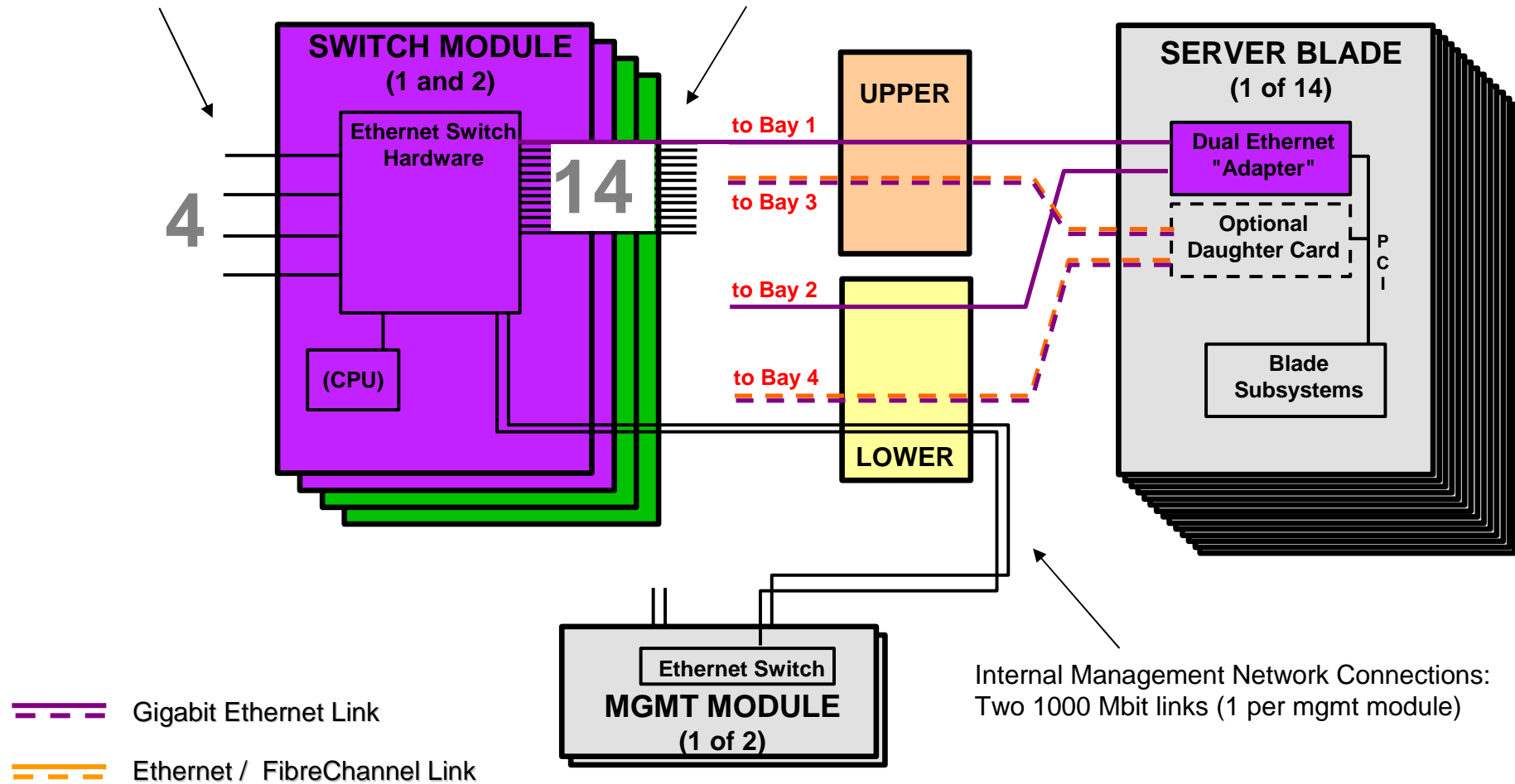
- **Gigabit Ethernet Switches**
  - ▶ Portfolio of switches (Cisco, Nortel)
  - ▶ Lower cost via Integration
  - ▶ Functions range from Layer 2 thru Layer 7
- **Fibre Channel Switches (FC Fabric)**
  - ▶ Portfolio of Switches (Qlogic, Brocade, MCdata)
  - ▶ Potentially lower cost via integration
  - ▶ Full support of FC-SW-2 standards
- **Power Subsystem**
  - ▶ Upgradeable as required
    - 2000 or 2300 W/each; ( 2300W avail from 31mar2009)
  - ▶ Redundant and load balancing for high availability
- **Calibrated, Vectored Cooling™**
  - ▶ Highly fault tolerant
  - ▶ Allow maximum processor speeds
- **BladeCenter Management Modules**
  - ▶ Full remote video redirection
  - ▶ Out-of-band / lights out systems management
  - ▶ Concurrent Serial connectivity



# Internal Switch Connectivity - Ethernet

**External** Network Connections:  
4 10/100/1000 Gigabit ports

**Internal** Ethernet Connections:  
14 Gigabit ports (1 per blade)





# BladeCenter Ethernet Components



Cisco Systems®  
Intelligent Gigabit  
Ethernet Switch Module



Cisco Systems® (Fiber)  
Intelligent Gigabit  
Ethernet Switch Module



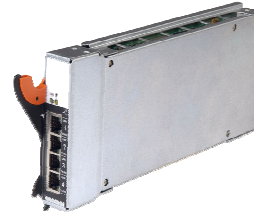
BNT® Layer 2/3 (Fiber)  
Gigabit Ethernet Switch  
Module



BNT® Layer 2-3 Gigabit  
Ethernet Switch Module



BNT® Layer 2-7 Gigabit  
Ethernet Switch Module



Server Connectivity Module  
for IBM BladeCenter



BNT® Layer 2/3 10GbE  
Uplink Switch Module

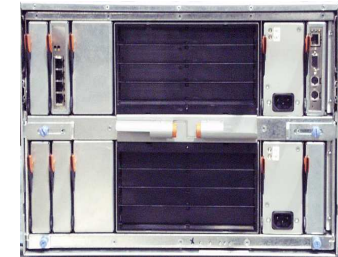
- (1) 10 Gb MM Fiber Ports
- (2) 10 Gb Copper Ports



Intelligent  
Copper Pass-thru



BladeCenter Telco



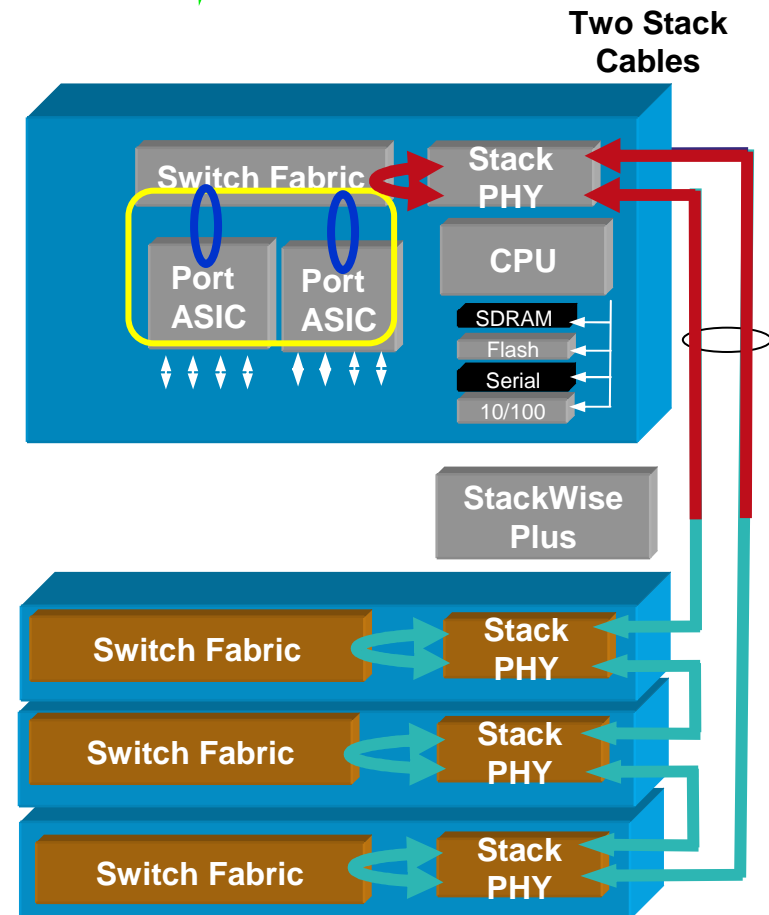
BladeCenter



BladeCenter H

# Cisco Catalyst 3012/3110

- Integrates Cisco Catalyst networking technology into BladeCenter – under ‘Catalyst’ umbrella
- Three (3) new Cisco Switch Modules
  - ▶ 1Gb Switch without Stacking (**3012**)
  - ▶ 1 Gb Switch with Stacking (**3110g**)
  - ▶ 10Gb Uplink Switch with Stacking (**3110x**)
- Software Keys
  - ▶ Base Services - layer 2, static routing, RIP – included with all 3 switches
  - ▶ IP Services - Layer 2/3, OSPF, BGP (optional for 3110)
  - ▶ Advanced IP Services - IPv6 (optional for 3110)
- First to market with next generation switch technology
- First blade solution in industry with embedded Cisco switch stacking: **Virtual Blade Switch** technology (VBS)



# BNT® 1/10 GB ETHERNET SWITCH

- Designed for IBM BladeCenter form factor
- Full Layer 2 Switching and Layer 3 Routing - Stackable
- Ports
  - ▶ 22x 1G copper RJ-45
    - 6x 1G RJ45 External uplinks
    - 14x 1G Internal server links
    - 2x Internal MM ports
  - ▶ 3x 10G ports
    - 3 SFP+ uplink ports (SR/LR)
- Line rate performance with no packet drop
- Power
  - ▶ Meets IBM BladeCenter requirements: less than 45W



# BladeCenter SAN Components



QLogic® 10 and 20 ports 4Gb Fibre Channel Switch Module

- NB: be aware, 10-port upgrade now only available from Qlogic support



McDATA® 10 and 20 ports 4Gb Fibre Channel Switch Module



Brocade® 10 and 20 ports 4Gb SAN Switch Modules



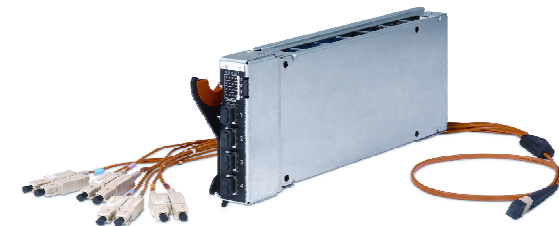
Cisco® 10 and 20 ports 4Gb Fibre Channel Switch Module

- SANOS
- Utilizes Cisco SFPs (also IBM p/n)



QLogic® Intelligent Pass-thru Module

- 6 external shared connections - 4Gb I/O
- NPIV technology (N\_Port\_ID Virtualization)
- Presents multiple N-Ports to the fabric
- Needs external switch NPIV capable



Optical Pass-thru Module

- Supplier: IBM
- Provides unswitched / unblocked optical connection
- Up to 14-optical connections to external SAN (requires breakout cable option)
- Max 2Gb bandwidth

# BladeCenter SAN Components - new



QLogic®  
20 ports 8Gb Fibre Channel  
Switch Module  
(P/N 44X1905)

- 20-port 8 Gb Fibre Channel Switch with 14 internal/midplane ports for server connectivity and six external/SFP enabled ports for target or fabric connectivity
- 14 internal copper SERDES connections to the blade servers with F-port 2 Gb and 4 Gb autodetect speed types
- Six external client-accessible F/FL/E, 2, 4, and 8 Gb autodetect SFP ports



QLogic®  
8Gb Intelligent Pass-thru Module  
(P/N 44X1907)

- 6 external shared connections - 4Gb I/O
- NPIV technology (N\_Port\_ID Virtualization)
- Presents multiple N-Ports to the fabric
- Needs external switch NPIV capable
- Eliminates E\_Port Switch to switch incompatibility

# BladeCenter H Tour

## *A Look At The Front*

### Server Blades

- Same Blades
- Same I/O Feature Cards
- Same Server Blade Features
- Same Dual Slot PCI adapter 'sidecar'
  
- BC-H and new Blades add:
  - Additional Blade Power/Thermal Capacity
  - Additional High Speed I/O Options
    - PCI-Express x8 chipset link
    - 4 4x Switch Module links

### Power Modules (2 or 4)

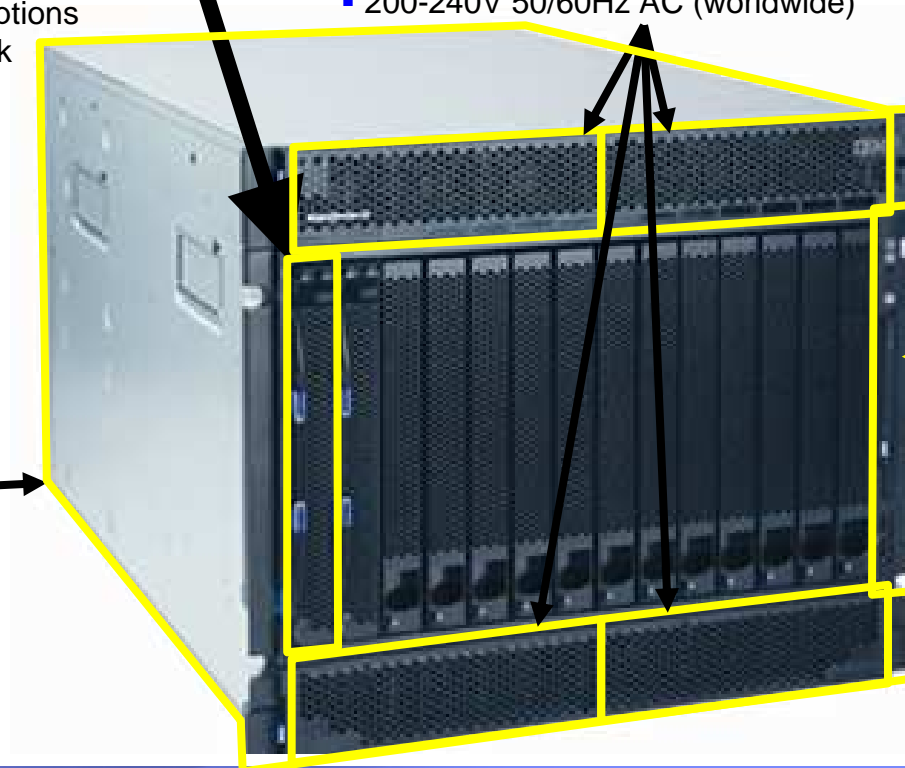
- Hot Swap, Redundant
- 200-240V 50/60Hz AC (worldwide)

### BC-H Chassis

- 18 inch rack mount
- Front to rear airflow
- Front/rear service
- Rear cabling
  - 14 Server Bays
  - 9U high, 28" deep

### Op Panel & Media

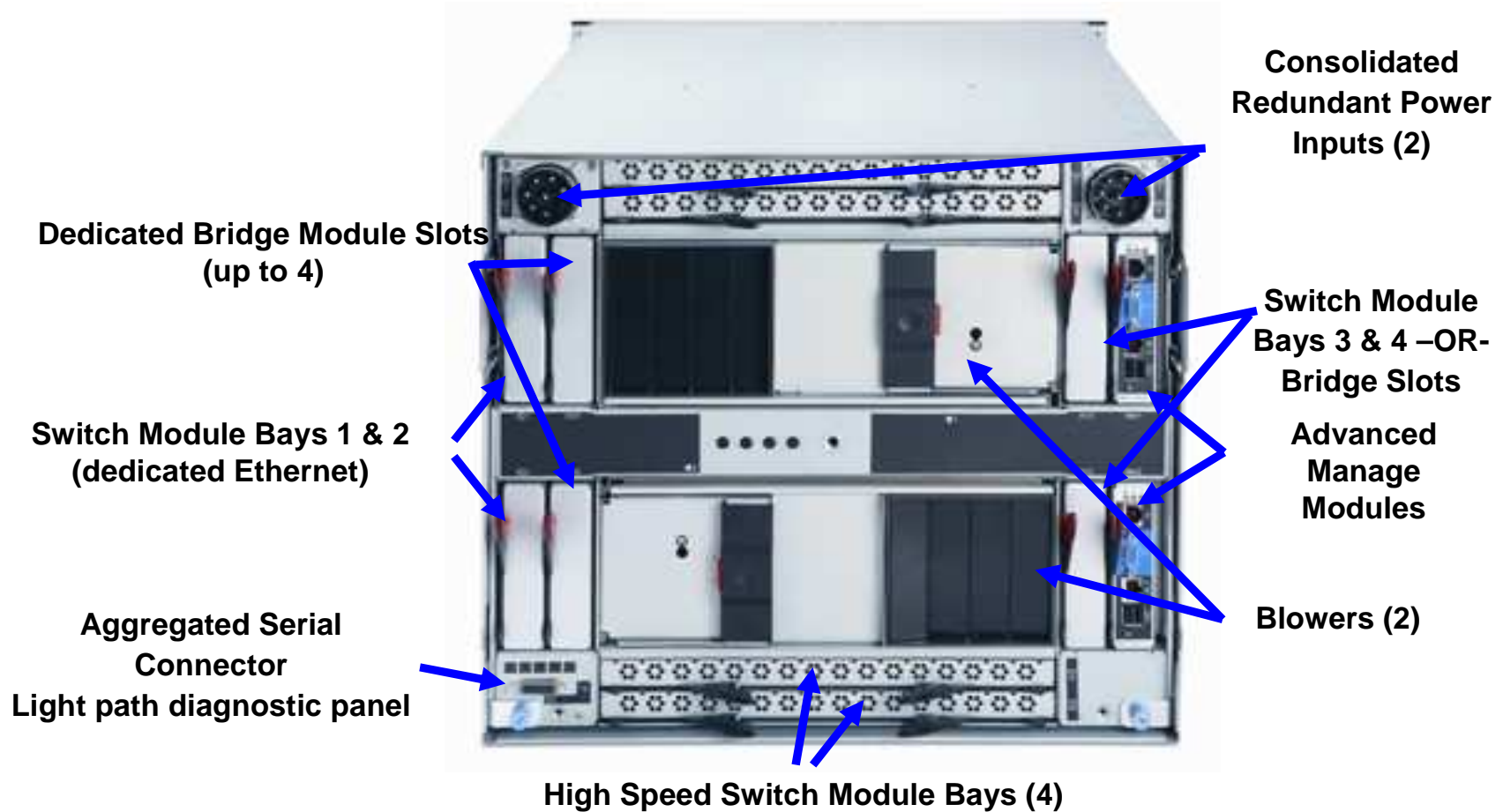
- Chassis level LEDs-
  - Power, Alert, Info
  - Chassis 'Locate'
- 2 USB Ports
- Removable storage media
  - DVD





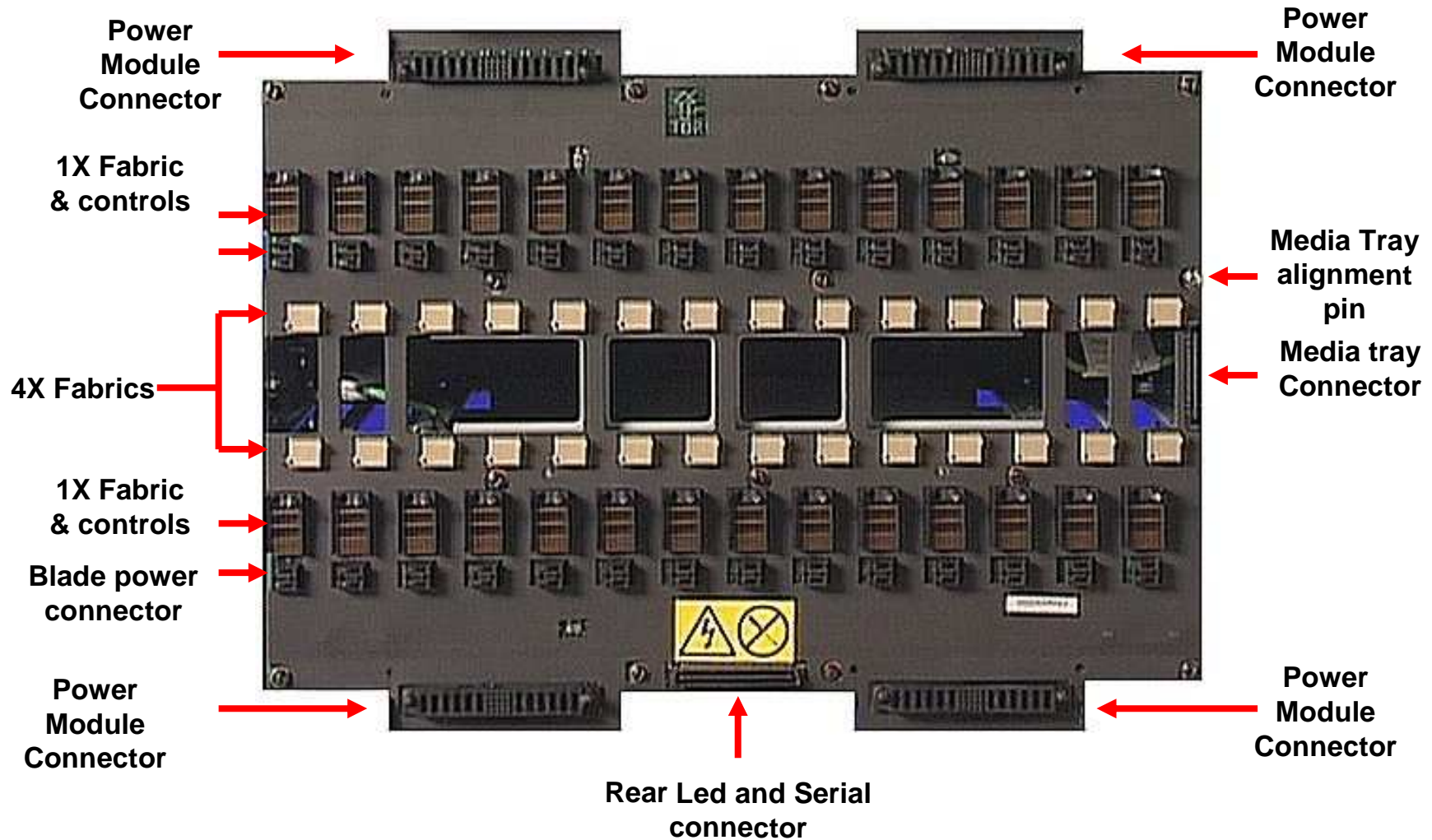
# BladeCenter H Tour

## *What is Where?*

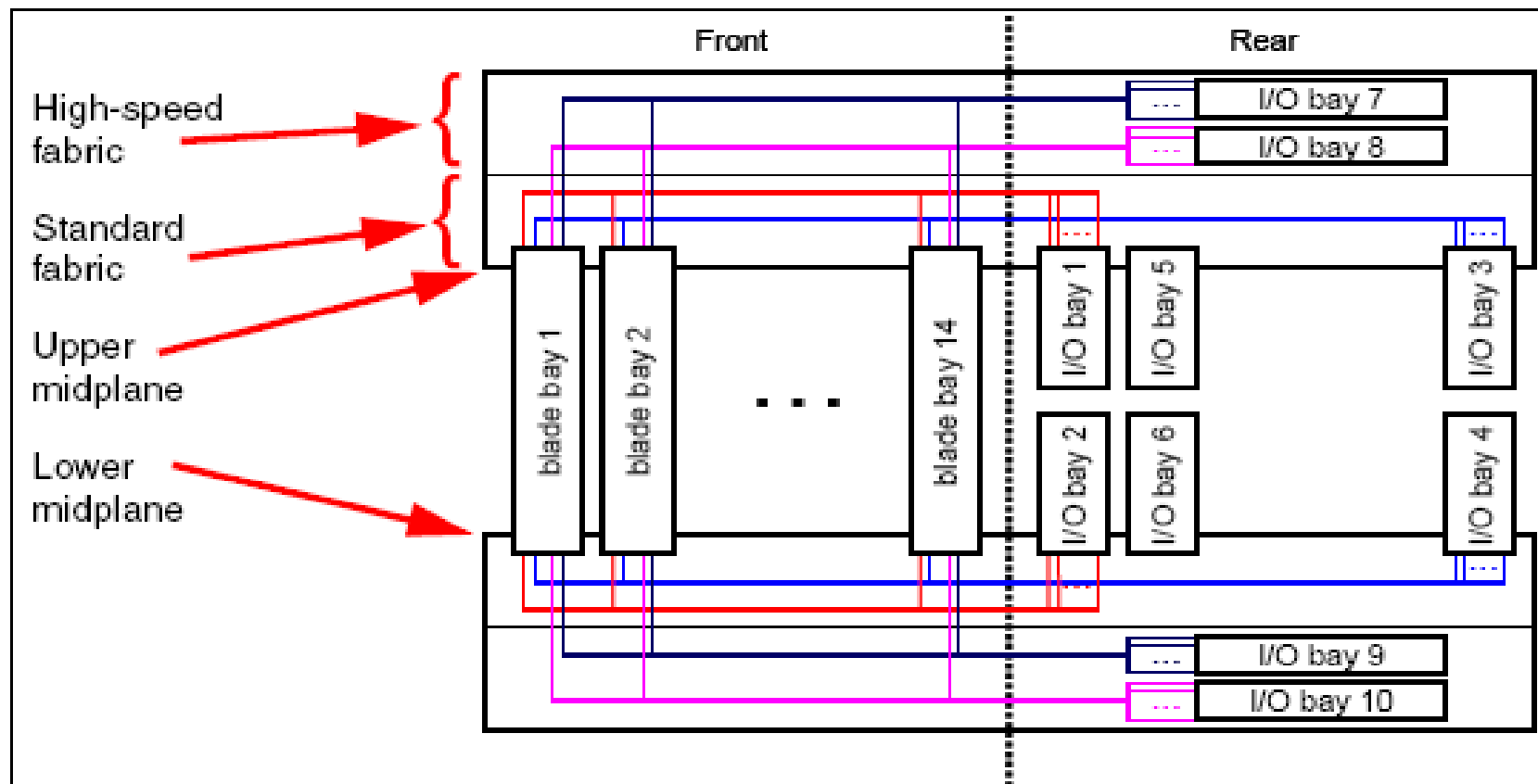




# IBM BladeCenter H Midplane Internal Detail



# IBM BladeCenter H – connection paths



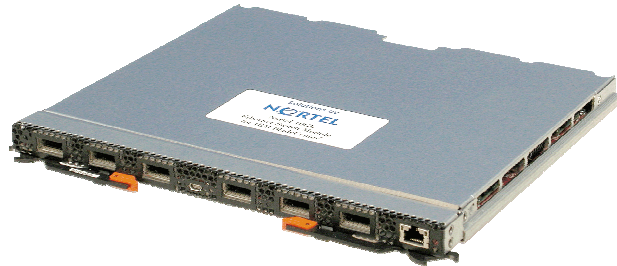
# BladeCenter H – High Speed Network

- **Support for high speed switches**
  - 4X InfiniBand,
  - 10G Ethernet
  - MSIM
- **Support for high speed DC's on blades**
  - 4 high-speed fabrics
  - Still have access to legacy fabrics



# Introducing the BladeCenter Nortel 10G Ethernet Switch

## Unsurpassed 10G Throughput

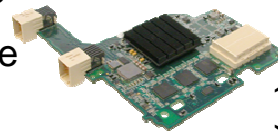


■ **IBM and Nortel have jointly developed a 10G Ethernet switch**

- n.14 internal 10GbE ports
- n.6 external 10 Gb XFP (SR or LR) interfaces

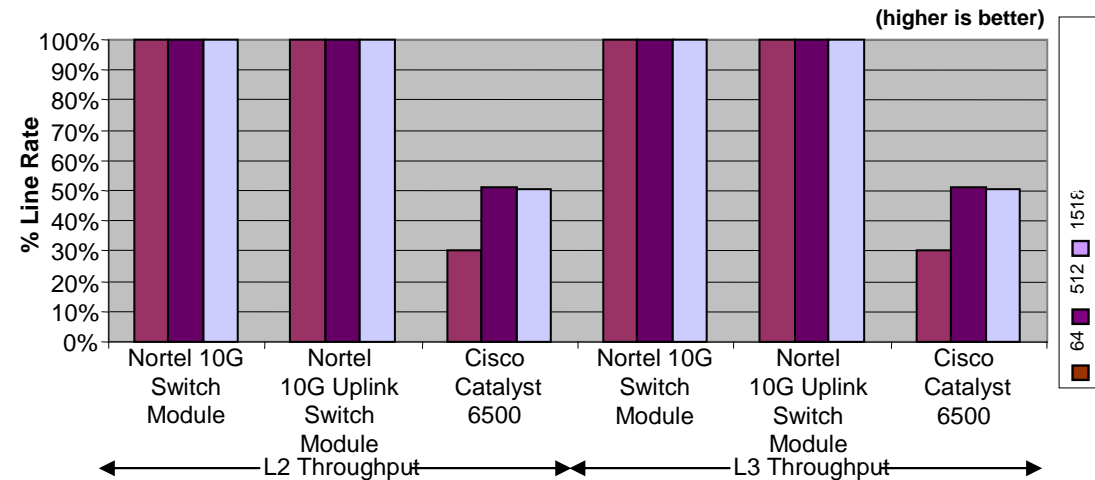
■ **IBM and NetXen are jointly developing a 10Gb Ethernet expansion card for HS21, LS21, LS41, JS21.**

- n.2 SERDES 10Gb interface
- PCIe connection to the Blade

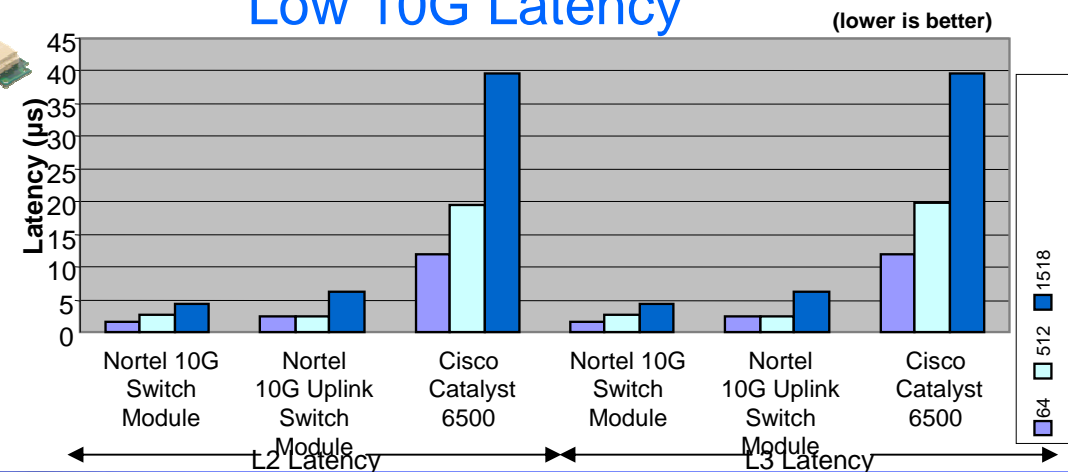


■ **Delivers Extreme Bandwidth and throughput for NGN apps such as IPTV, VoD, Security, using the fully non-blocking architecture of the Nortel 10GB Ethernet Switch Module.**

■ **Improve efficiency and resource sharing through increased 10GbE port availability and advanced virtualization capabilities**

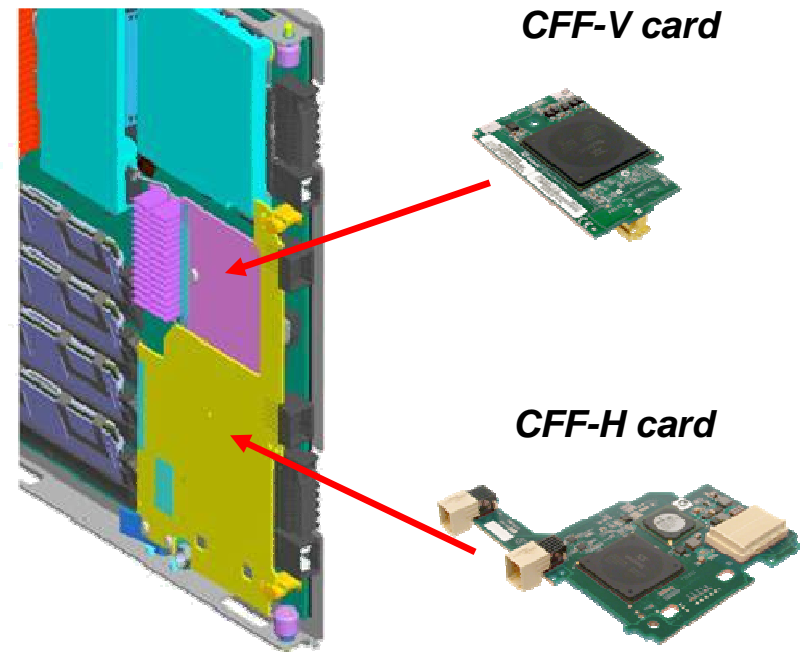


### Low 10G Latency



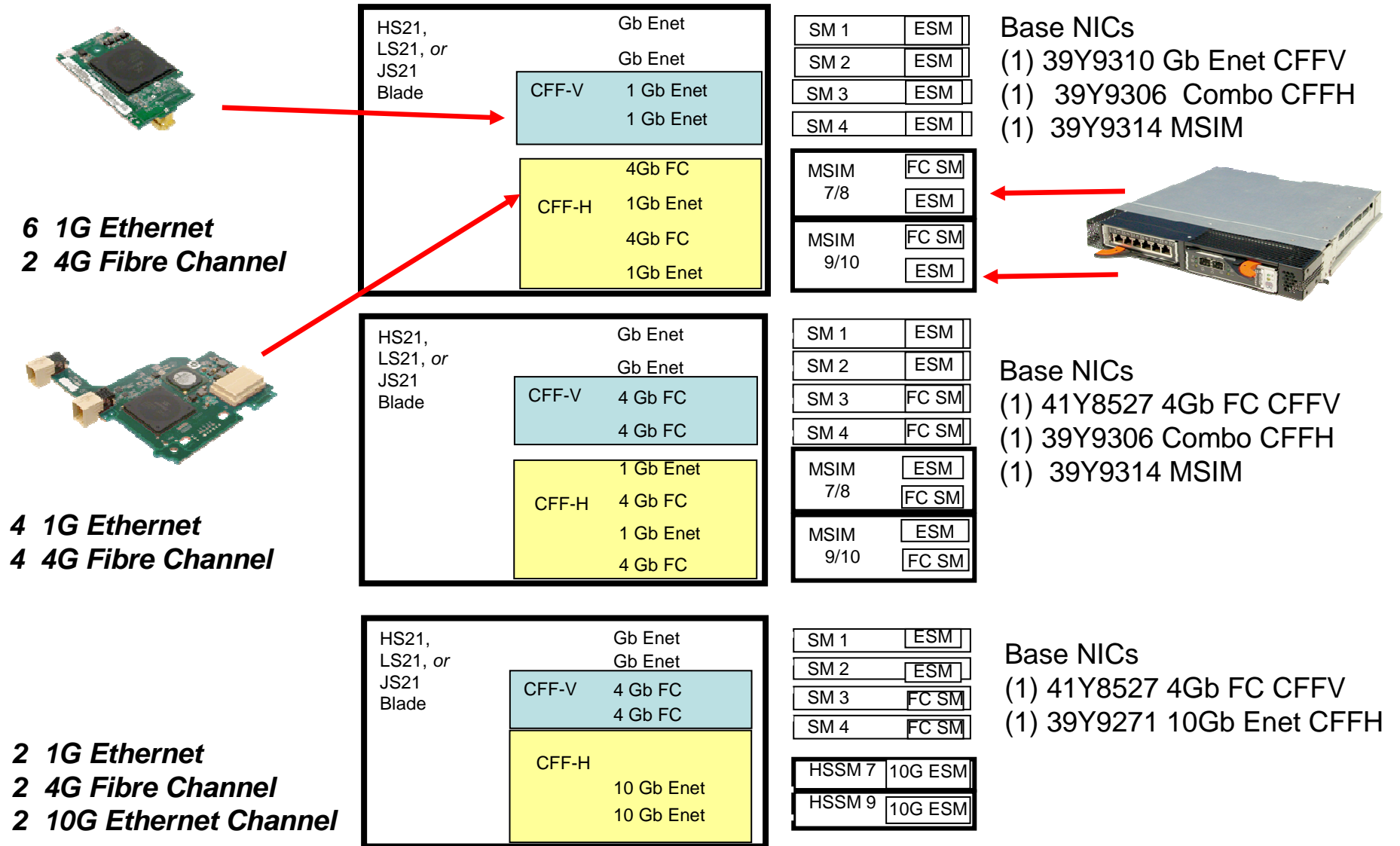
## MSIM - The Evolution of I/O Connectivity (1st)

- Virtualization, multi-core, and clustering are all driving additional port requirements per blade
- BladeCenter H has inherent hardware capability for eight I/O paths per blade
- **Multi-Switch Interconnect Module** provides a means for exploiting existing 8 paths to each blade (HS21, LS21, JS21)
- MSIM fits into the high speed switch slots in BladeCenter H
- Supports standard BladeCenter switch portfolio

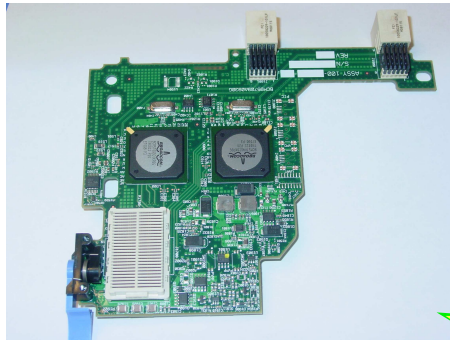




# MSIM - The Evolution of I/O Connectivity (2nd)



# 2/4 Port Ethernet Expansion Card (CFFh)



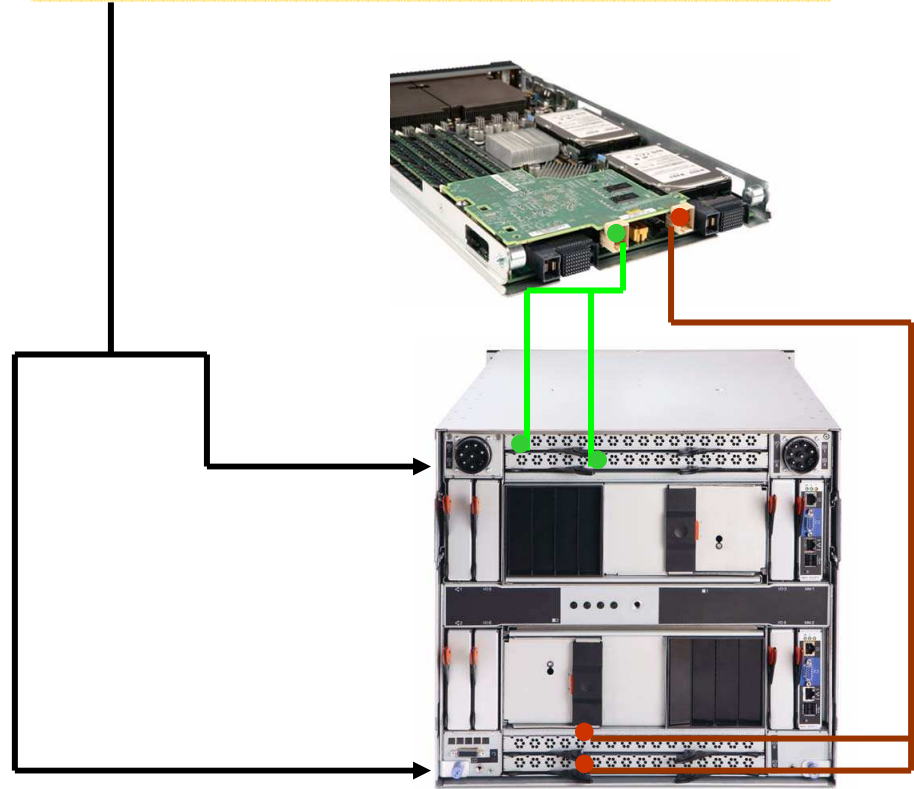
Ann: 12/08/08  
GA: 29/08/08

p/n: 44W4479

**Meets customer needs of additional IO Bays on BC-H**

**Enables IO Bays 7,8,9&10 in BladeCenter H/HT for:**

- Additional switch module slots available.
- Increased Bandwidth for Virtualization
- Up to 8 Ethernet port combinations possible

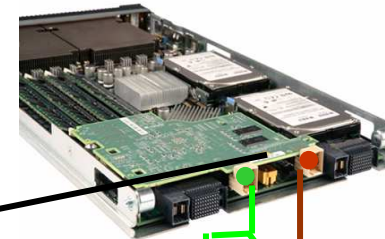




# Dual Port 8Gb Fibre Channel & Dual Port 1Gb Ethernet PCIe Expansion Card

## Enable 8Gb FC & extra Eth on BC-H + MSIM

- Features a highly desirable combination adapter that enables two 8Gb Ethernet ports, along with two 1Gb Ethernet ports
- Supported blade platforms include HS21, HS21xm, LS21, LS41, LS42, HS12
- Uses QLogic 2532 ASIC and Broadcom 5709S ASIC



Ann:6/1/2009  
GA: 30/1/2009

p/n: 44X1940



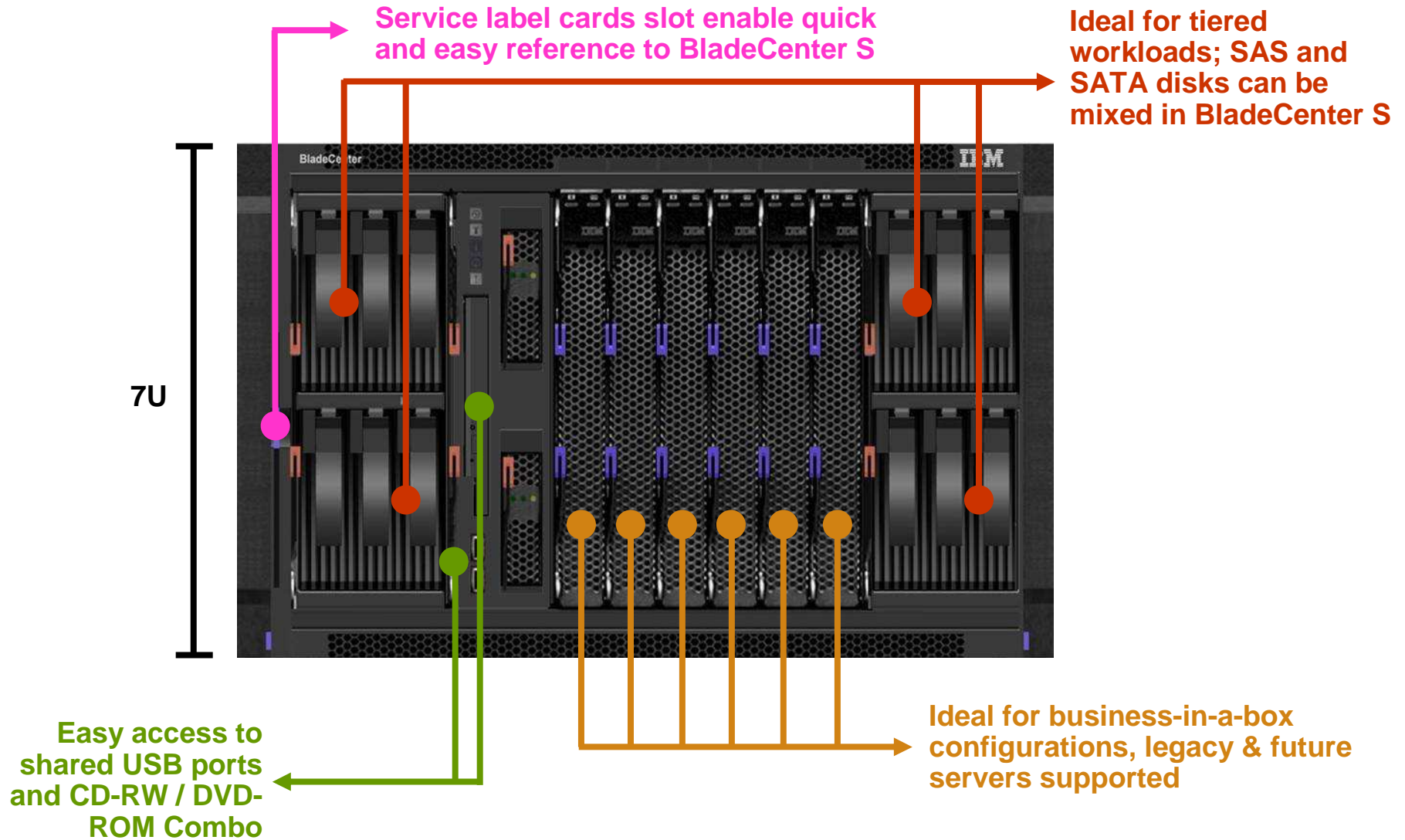
## Introducing BladeCenter S



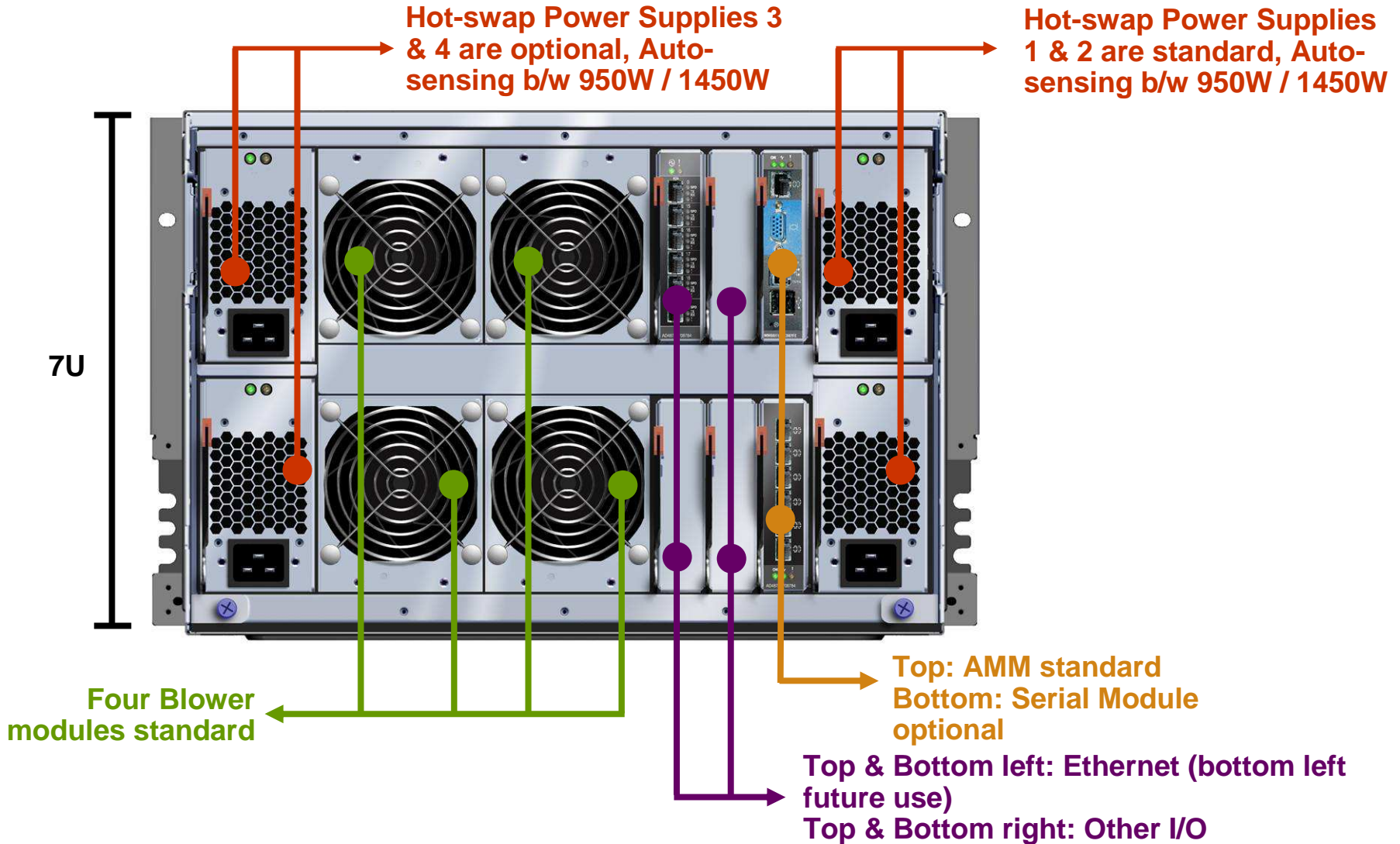
1. **First BladeCenter chassis focused on distributed LE & SME markets**
2. **First BladeCenter chassis to incorporate integrated shared storage**
3. **Significant focus on improving usability and customer experience**
4. **Attractive alternative to racks and high availability towers**
5. **Greatly improved BladeCenter platform for small office environment**

By tailoring BladeCenter S for distributed LE & SME, IBM is calling the same highly successful play that stormed BladeCenter into dominant market share in the Data Center

# BladeCenter S Product Summary



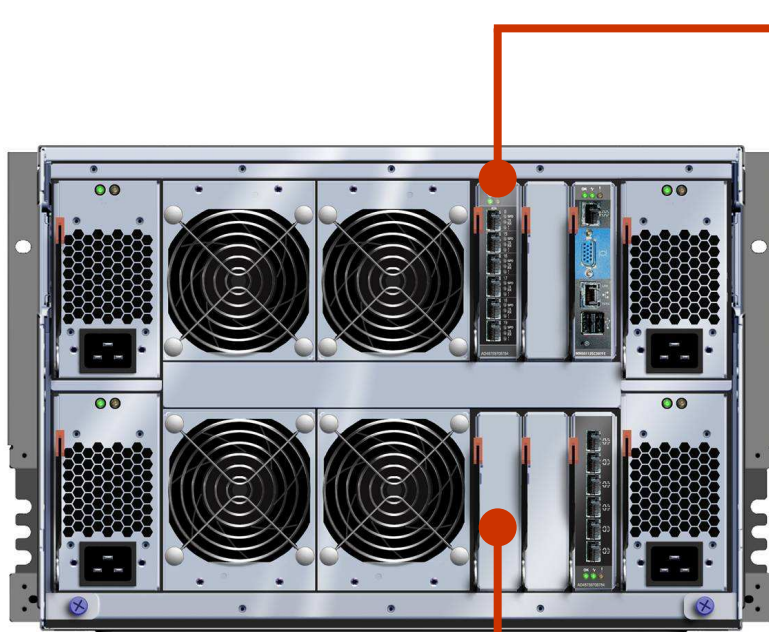
# BladeCenter S Product Summary





# Interoperability

## I/O Bays 1 and 2



**I/O Bay 1:** For Ethernet switch

This switch bay is wired to both Ethernet ports of the 6 blade slots

This bay accepts the following switches:

Part #	Description
32R1783	BNT 10Gb Uplink Ethernet Switch Module
32R1860	BNT Layer 2/3 Copper GbE Switch Module
32R1861	BNT Layer 2/3 Fibre GbE Switch Module
39Y9324	Server Connectivity Module
39Y9320	IBM BladeCenter Copper Pass-thru Module
39Y9316	IBM BladeCenter Optical Pass-thru Module (Ethernet only)
32R1859	BNT Networks Layer 2-7 Gigabit Ethernet Switch Module



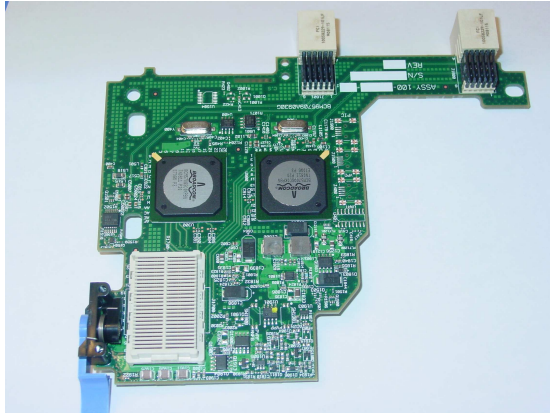
**I/O Bay 2:**

Redundant Ethernet switch

with 4 port 1Gb CFFh exp card (44W4479)

# 2/4 Port Ethernet Expansion Card (CFFh)

**Meets Customer needs for IO redundancy on BC-S**



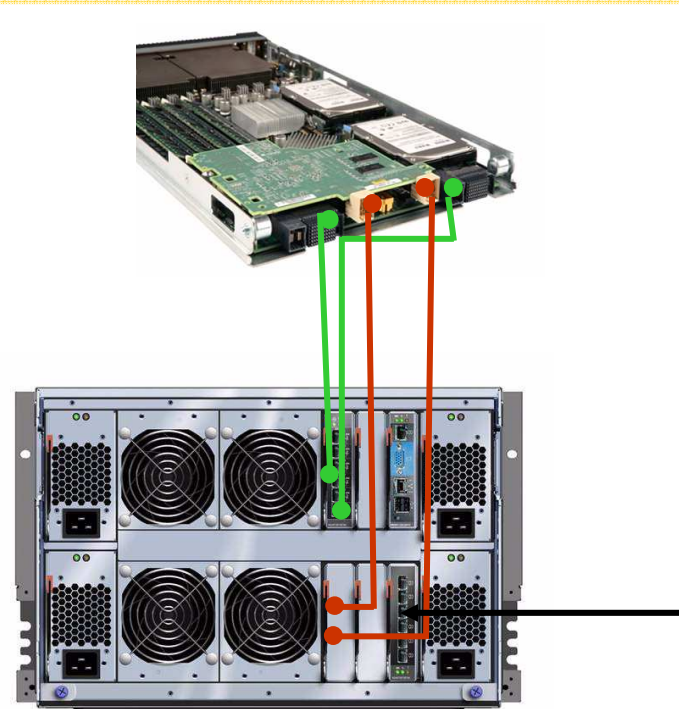
**Ann:12/08/08**

**GA: 29/08/08**

**p/n:44W4479**

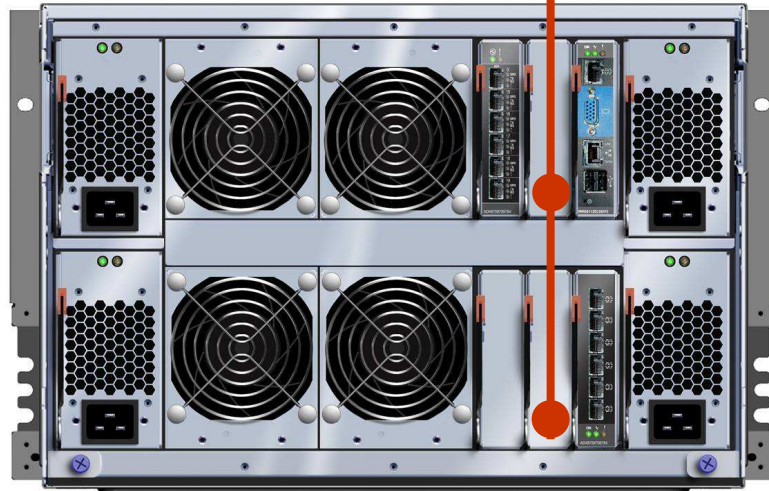
**Enables 2nd Ethernet switch in BladeCenter S for:**

- Switch Module level failure tolerance and redundancy
- Increased Ethernet bandwidth for Virtualization workloads
- Up to 6 Ethernet port combinations possible



# Interoperability

## I/O Bays 3 and 4



**SAS RAID Controller Module**  
 Ann: 09/09/08  
 GA: 24/10/08



- Redundant configuration (dual RAID Controller, dual-switch and dual-BBU)
- RAID 0, 1, 0+1 & 5
- Supports two disk storage modules (DSM) with up to 12 x 3.5in SAS drives
- Need of Eth switch for internal communication

### I/O Bay 3 & I/O Bay 4:

For Ethernet, Fibre Channel, or SAS  
 Must be of same type, mixing is not supported

If DSS is installed then SAS Connectivity Module or SAS RAID Controller is/are required.

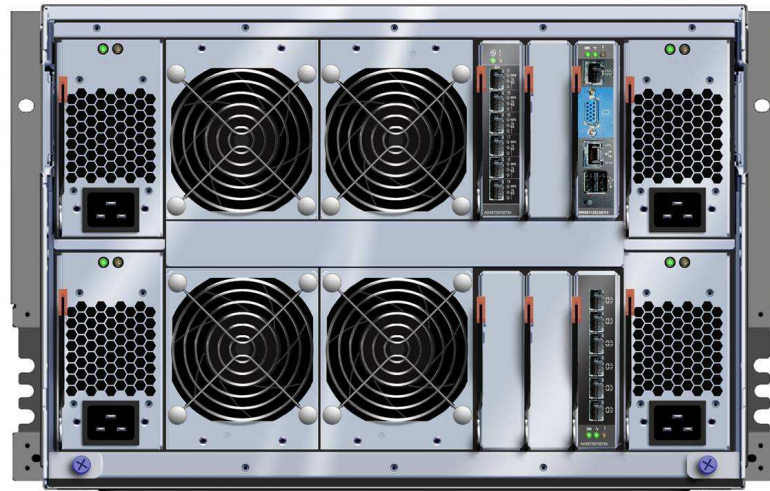
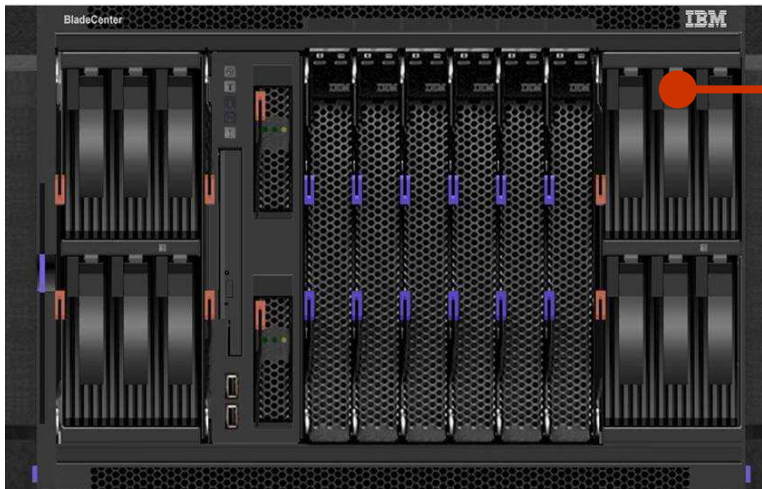
The following are accepted:

Part #	SAS RAID controller
43W3584	IBM BladeCenter S SAS RAID Controller Module
Part #	SAS switch
39Y9195	IBM BladeCenter SAS Connectivity Module
Part #	Ethernet switches
32R1783	BNT 10Gb Uplink Ethernet Switch Module
32R1860	BNT Layer 2/3 Copper GbE Switch Module
32R1861	BNT Layer 2/3 Fibre GbE Switch Module
39Y9324	Server Connectivity Module
39Y9320	IBM BladeCenter Copper Pass-thru Module
39Y9316	IBM BladeCenter Optical Pass-thru Module (Ethernet only)
32R1859	BNT Networks Layer 2-7 Gigabit Ethernet Switch Module
Part #	Fibre Channel switches
32R1813	Brocade 10-port 4Gb SAN Switch Module
39Y9284	Cisco Systems 4Gb 10-port Fibre Channel Switch Module
43W6724	QLogic 10-port 4Gb SAN Switch Module
43W6723	QLogic Intelligent Pass-Thru Module
39Y9316	IBM BladeCenter Optical Pass-thru Module



# Interoperability

## DSM



### DSM 1 & DSM 2:

Any SAS or SATA disk or combination is valid (note: no intermix with RAIDed switch, only SAS disks allowed).

SAS Switch is required if DSM are populated with disks.

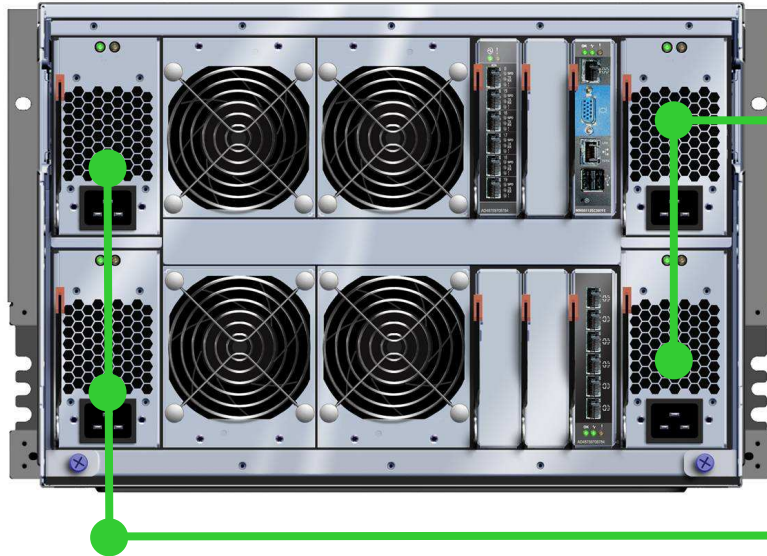
Power Supply 3 & 4 are required if DSM 2 is installed.

The following disks are supported:

Part #	HDDs
40K1043	73GB 15K SAS
40K1044	146GB 15K SAS
43X0802	300GB 15K SAS
42D0519	450GB 15K SAS
42D0546	750GB 7.2K SAS
42D0547	1 TB 7.2K NL SAS
39M4530	500GB SATA
43W7576	750GB SATA

Ann: 2 dic 2008  
Avail: 27 feb 2009

## When to use the Optional Power Supplies 3 & 4

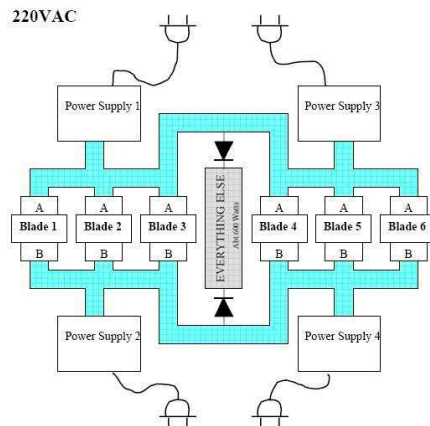


### Standard Power Supplies supply provide power for:

- All blade servers, depending from electric load
- nr.1 Disk Storage Module with disks

### Optional Power Supplies 3 & 4 needed to power all slots:

- When blades are power demanding
- nr.2 Disk Storage Modules installed (with disks)



- Need 4 separate AC circuits, wired to 4 separate "breakers"
- Each circuit receptacle must be within 6 ft of the chassis
- Each power cord is a standard 6 ft length
- each supply 1450W capable
- total pwr limited to 2900W per Power Domain

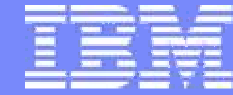
## BladeCenter S and the NEW O.E.K.

- Ideal way to deploy BladeCenter S into office environments
- Includes Acoustical Module built into the back
- Optional Air Filter on the front
- Locking door for security
- Mobile with rollers
- 33% (4U) extra room to grow

*Incredibly Quiet*  
*Dust Filter*  
*Up to 9TB*  
*Shippable WW*

*Perfect workgroup*  
*solution foundation*





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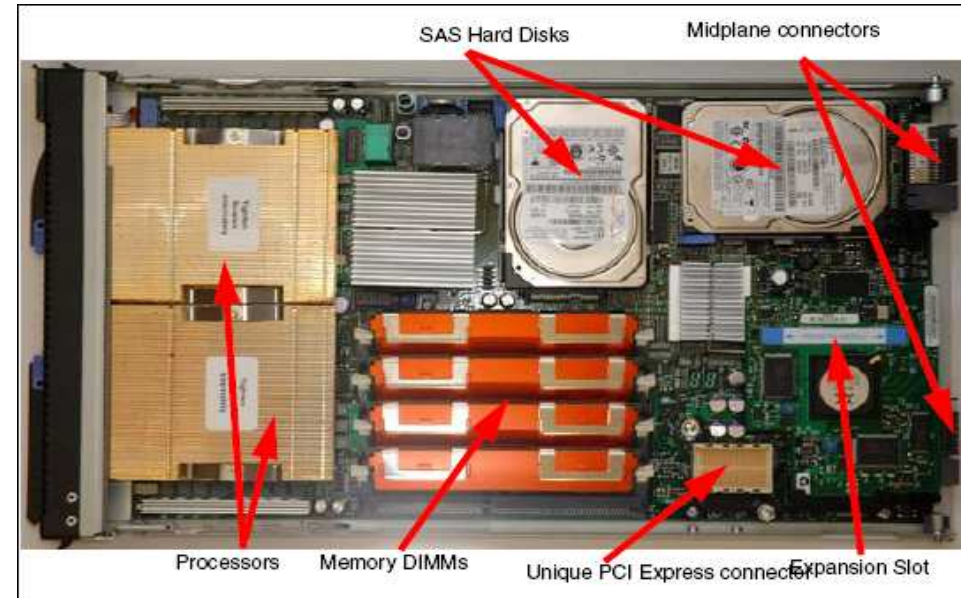
# BladeCenter Server Portfolio





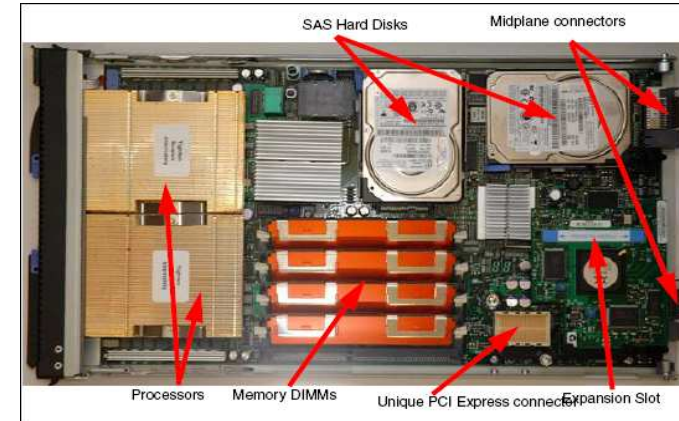
## BladeCenter HS21 - *Maximum Density*

- DP Intel **Dual Core Woodcrest / Quad core Clovertown / Harpertown**
- **1066/1333** MHz Front Side Bus
- 4 Fully Buffered DIMMs in 30mm blade (up to **8 DIMMs** -32GB RAM with MIO expansion unit)
- 2 Gb Eth ports, TOE enabled (5708)
- 2 SFF **SAS** HDDs with RAID 0, 1 on base blade (36/73/ **146 GB** - 10Krpm or **73GB-15Krpm**)
- Support for SIO expansion unit: 3 HS SAS HDD, 2 I/O Exp Cards, RAID 1E, optional RAID 5 with ServRAID and battery backed cache
- Support for legacy Exp Cards
- Support for new **High Speed Cards**
- **cKVM** and cMedia feature card support (w. option)
- Support for IBM Director, RDM, ServerGuide, UpdateXpress, and Toolkit support



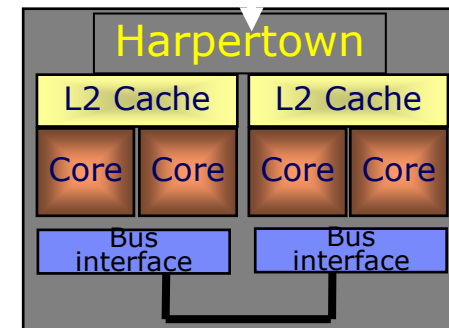
# HS21 Dual / Quad-Core blades

- **Intel Xeon Processor L5310 / L5320** (quad-core Xeon processor “Clovertown”)
  - ▶ 1.60 GHz; 1066MHz FSB; 4MB\*2 - L2 Cache; 50w
  - ▶ 1.86 GHz; 1066MHz FSB; 4MB\*2 - L2 Cache; 50w
- **Intel Xeon Processor x5355**
  - ▶ 2.66 Ghz; 1333Mhz FSB; 4MB\*2 – L2 Cache; 120w
- **Intel Xeon Processor L5335** (on HS21XM)
  - ▶ 2.00 Ghz; 1333Mhz FSB; 4MB\*2 – L2 Cache; 50w
- **Intel Xeon Processor X5365** (on HS21)
  - ▶ 3.00 Ghz; 1333Mhz FSB; 4MB\*2 – L2 Cache; 120w



## Intel Quad-Core Xeon Processor “Harpertown” (45nm- y/e 2007)

- ▶ E5405: 2.00GHz - 1333MHz - 12MB L2 Cache - 80w
- ▶ E5420: 2.50GHz - 1333MHz - 12MB L2 Cache - 80w
- ▶ E5430: 2.66GHz - 1333MHz - 12MB L2 Cache - 80w
- ▶ E5440: 2.83GHz - 1333MHz - 12MB L2 Cache - 80w
- ▶ E5450: 3.00GHz - 1333MHz - 12MB L2 Cache - 80w
- ▶ X5460: 3.16GHz - 1333MHz - 12MB L2 Cache - 120w (only on “HS21”)



## Intel Quad-Core Xeon Processor “Harpertown LV” (45nm)

- ▶ L5420: 2.50GHz - 1333MHz - 12MB L2 Cache - **50w**

## Intel Dual-Core Xeon Processor “Wolfdale LV” (45nm)

- ▶ L5240: 3.0GHz - 1333MHz - 6MB L2 Cache - **40w**

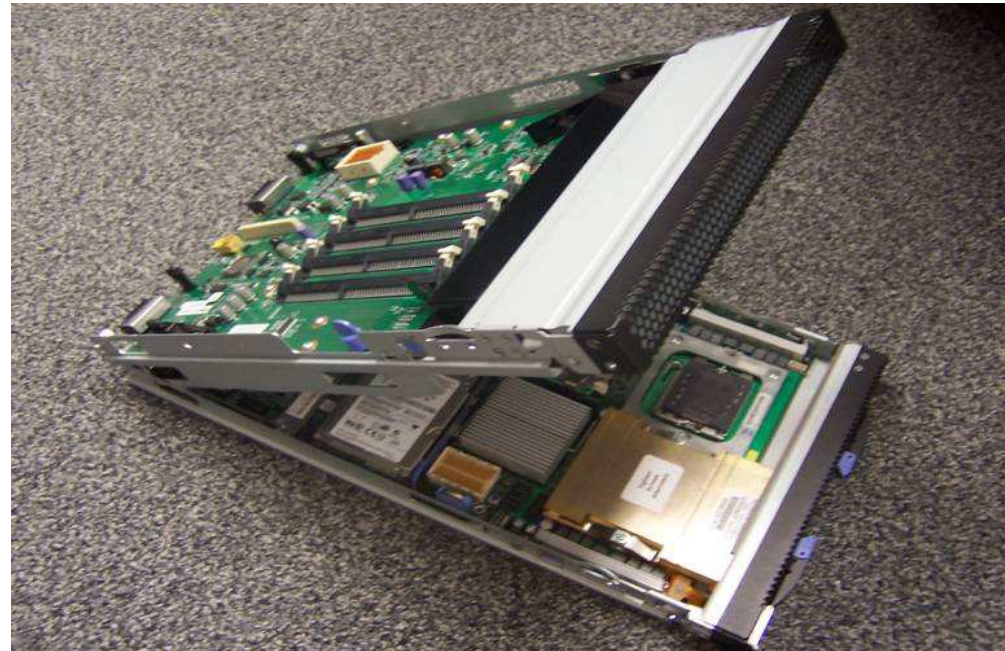
**Announced:**  
**25 Mar 2008**

**13 May 2008**

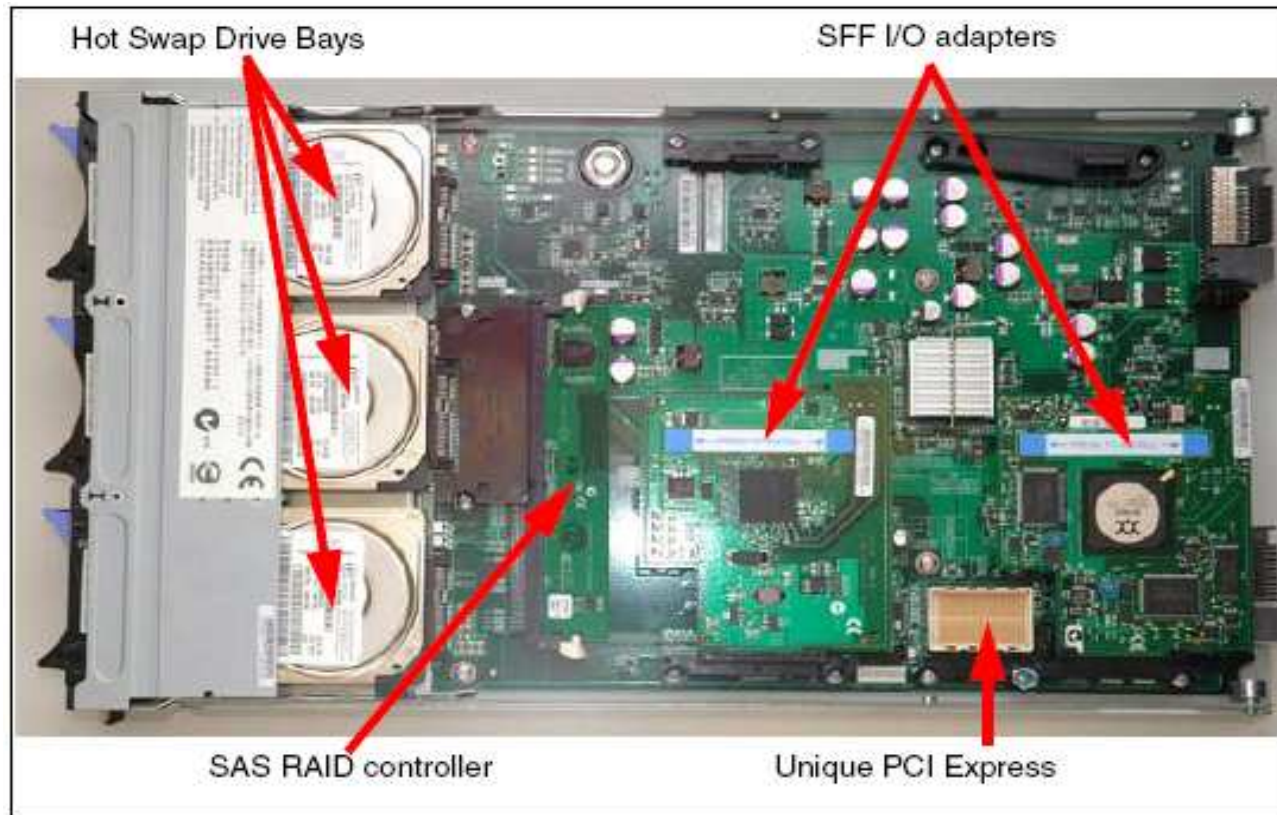


## BladeCenter HS21 + the MIO (Memory - I/O expansion unit)

- Start with the feature packed 30mm base and add a 30mm Memory and I/O Expansion Blade
  - ▶ 4 additional DIMM slots
  - ▶ 2 additional NICs
  - ▶ 1 additional PCI-E slot
  - ▶ 1 additional PCI-X slot
- **Combined** they create the 60MM higher function offering
  - ▶ 8 FB DIMMs (up to 16GB of memory per blade)
  - ▶ 2 Non Hot Swap SAS HDD
  - ▶ 4 NICs - 2 TOE enabled
  - ▶ Supported in all IBM Chassis with 65W processors (follows same rules as base 30mm blade)
- General Availability for the MIO: Sept. 06



## the SIO (Storage - I/O expansion unit)

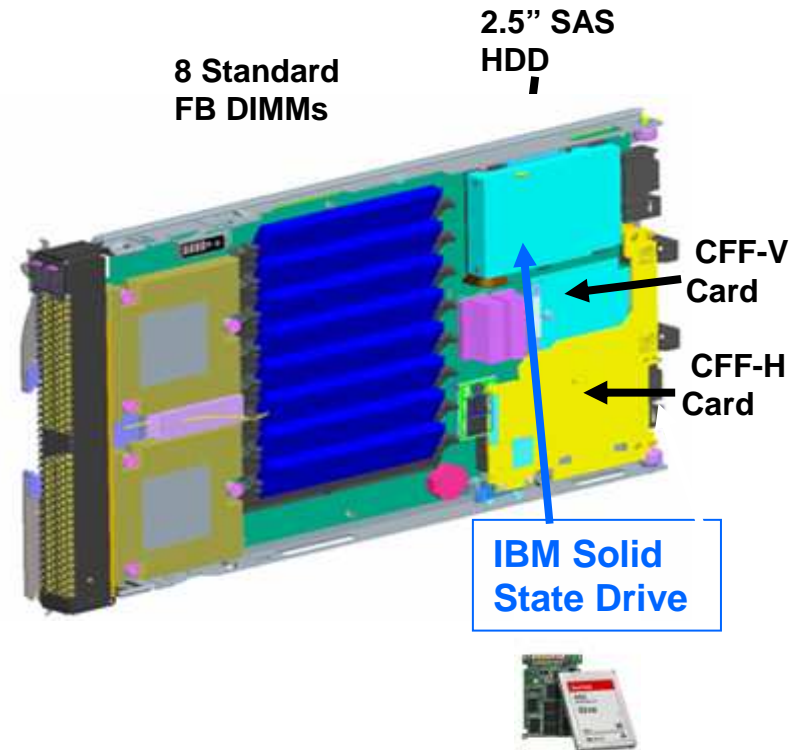


- Three hot swap SAS 2.5" drives
- ServeRAID – 8k provide RAID 5 capability and 256MB cache.
- Additional PCI-E + PCI-X slot (or 2 legacy PCI-X slots)

# IBM BladeCenter HS21 XM

## A Closer Look

- 8 FB DIMMs: up to 32GB of memory per blade
- SAS HDD (36, 73, 146GB)
- Diskless ready:
  - ▶ iSCSI and SAN boot for all OS
  - ▶ Support for SolidStateDrives or Modular Flash Device 4GB
- Dual-Core (up to 3.33Ghz 80w –x5260) and Quad-Core processors
- 2 NICs - Broadcom 5708S (TOE enabled)
- Supports Concurrent KVM Card (cKVM)
- Supports PEU2 and SIO Expansion Units
- Support for the new MSIM Combo Form Factor (CFF) card to double port count per blade



### Features

- 15.8GB SSD
- 15.8GB Dual SSD (mirrorable)
- 31.4GB SSD
- 50 GB SATA 2.5" NHS SFF High IOPS SSD (avail. from 31 mar 2009)
- SATA drive / SAS interface



## Solutions for SAS and solid state drives

Solution Area	SAS	Solid State
<b>Web serving</b>		<input checked="" type="checkbox"/>
<b>OS Booting / Paging</b>		<input checked="" type="checkbox"/>
<b>Virtualization</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Email / Collaboration</b>	<input checked="" type="checkbox"/>	
<b>File / Print</b>	<input checked="" type="checkbox"/>	
<b>Content / Document Management</b>	<input checked="" type="checkbox"/>	

Feature	Function	SAS	Solid State
<b>OS Changes and Update</b>	<b>Random</b>		<input checked="" type="checkbox"/>
<b>Application and OS changes and updates</b>	<b>Random</b>		<input checked="" type="checkbox"/>
<b>Access User data</b>	<b>Random</b>		<input checked="" type="checkbox"/>
<b>Hibernate</b>	<b>Sequential</b>	<input checked="" type="checkbox"/>	
<b>Application Load</b>	<b>Sequential</b>	<input checked="" type="checkbox"/>	

# New High IOPS SSD

- 50 GB SATA 3.5" HS High IOPS SSD (43W7698)
- 50 GB SATA 2.5" SFF NHS High IOPS SSD (43W7706)
- 50 GB SATA 2.5" SFF Slim-HS High IOPS SSD (43W7714)
- 50 GB SATA 2.5" SFF HS High IOPS SSD (43W7722)

## PERFORMANCE

50 GB performance characteristics include:

- Formatted capacity: Up to 50,000 MB
- Drive to host interface that supports 1.5 Gb/s burst rate
- Internal transfer read rate: Up to 80 MB/s
- Internal transfer write rate : Up to 50 MB/s
- Combination 67% Read/33% Write transaction processing rate: up to 2600 IOPS
- Energy saving with as little as 2.1 W of power consumption per drive

This drive is ideal for delivering high performance IOPS and thereby relieving storage bottlenecks.

## IBM Solid State Drive

Ann:10/03/09

GA: 31/03/09



Blade servers supported include:

- HS21 (8853)
- LS22 (7901)
- LS42 (7902)
- HS21 XM (7995)
- HS12 (8014)

SATA compliance enables the IBM 50 GB SATA 2.5-inch HS SSD and 3.5-inch HS SSD to attach to **System x supported systems**.

- x3850M2/x3950M2 (7233,7241)
- x3755 (8877,7163)
- x3655 (7943)
- x3650 (7979)
- x3650 (7980)
- x3550 (7978)
- x3500 (7977)
- x3455 (7940,7941)
- x3400 (7973,7974,4192,4193)
- x3250M2 (4190,4191,4194)
- x3200 (4367,4368)

# Storage Options on HS21 XM

## Storage and I/O Expansion Blade

- Support for up to (3) I/O Expansion Cards – at least one on the blade and two on the SSES
- Allows the HS21 XM blade server to support up to (4) HDDs for a total storage capacity of 584GB per blade



## Solid State Hard Disk Drives

- Improved MTBF
- Reduced power requirements
- Reduced points of failure – no moving parts
- Perfect for OS boot and small bandwidth data



## USB Modular Flash Drive

- Small form factor
- Linux OS Boot
- Reduced points of failure – no moving parts



## Diskless

- Use iSCSI Host Bus Adapter from QLogic via Ethernet to create a stable and affordable remote storage platform
- or utilize cost-effective and modular Ethernet solution via iSCSI Software Initiator (BladeBoot)





## New SAS 2.5" SFF HDD

- **New 73/146GB 15K 6Gbps SAS 2.5" SFF HDDs**
  - ▶ 6Gbps ready – requires new adapter support to provide 6Gbps capability
  - ▶ **Announce: 10 mar 09    Availability: 31 mar 09**
    - Supported on HS12 and new 3550M2/3650M2
      - (42D0672) 73GB Slim-Hot Swap HDD
    - Supported on HS12, new 3550M2/3650M2 and "Legacy" 2.5" platforms
      - (42D0677) 146GB Slim Hot Swap HDD
      - (42D0667) 146GB Non Hot Swap HDD
      - (42D0652) 146GB Hot Swap HDD
  
- **New 146/300GB 10K 6Gbps SAS 2.5" SFF HDDs**
  - ▶ 6Gbps ready – requires new adapter support to provide 6Gbps capability
  - ▶ **Announce: 10 mar 09    Availability: 31 mar 09**
    - Supported on HS12 and new 3550M2/3650M2
      - (42D0632) 146GB Slim Hot Swap HDD
    - Supported on HS12, new 3550M2/3650M2 and "Legacy" 2.5" platforms
      - (42D0637) 300GB Slim Hot Swap HDD
      - (42D0627) 300GB Non Hot Swap HDD
      - (42D0612) 300GB Hot Swap HDD



# HS21 XM – VMware 3i Preload

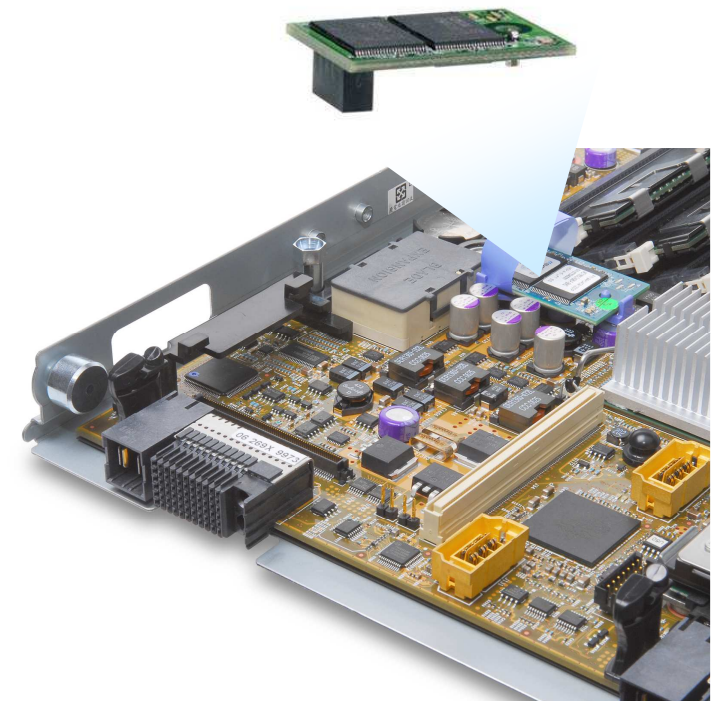


<u>MTM</u>	<u>GAV</u>	<u>CPU Speed</u>	<u>CPU Power</u>	<u>FSB</u>	<u>CPU Cache</u>	<u>CPUs Std</u>	<u>Memory Std</u>	<u>DIMM Slots</u>	<u>HDDs</u>	<u>Blade Width</u>	<u>Additional</u>
7995-HVx	7995-HVY	2 x 3.0GHz (E5450)	80W	1333MHz	12MB	2	2 x 2GB	8	4GB Modular Flash Drive	30mm	VMware3i Preload

- Dedicated model of HS21 XM (7995-HVY)
  - ▶ Contains embedded hypervisor on 4GB Modular Flash Drive



IBM Modular Flash Drive

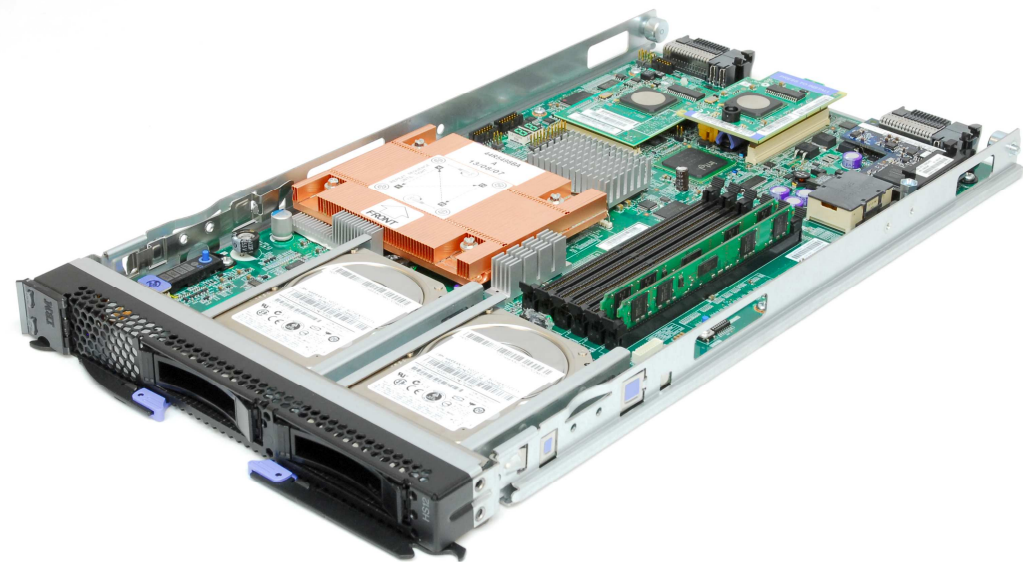


## HS12 – New Function. New Price Point. *Same Trusted BladeCenter Solution*

- 6 DIMMs DDR2 memory
  - ▶ Low cost 12GB, 24GB max
- Flexible disk options
  - ▶ 2 Not-Hot-Swap SATA (up to 80GB each)
  - ▶ 2 Hot Swap SAS, RAID 0 &1 support (up to 146GB each)
  - ▶ 2 Hot Swap SSD, RAID 0 & 1 support (up to 31.4GB each)
- Supports single, dual, and quad core Intel CPU's: from single-core 1.86Ghz, to 2.83Ghz quad-core (or NEW 3.0Ghz dual-core)
- All the same I/O as HS21
- Supports cKVM
- Supported in all chassis
- Pricing starts at \$999

**Great Feature Set**  
**Attractive pricing**  
**Perfect for the SMB &**  
**Non multi threaded apps**

- Departmental Print Server
- File server
- Application / Web server
- Light Mail



# Intel Blade Server by Workload

<u>WORKLOADS</u>	<u>LIGHT USAGE</u>	<u>HEAVY USAGE</u>
HPC	HS21XM	
Virtualization	HS12	HS21XM
Database	HS21	HS21XM
General Business	HS12	HS21XM
Collaboration	HS21	HS21XM
VoIP	HS12	
Web server	HS12	HS21XM
Video server	HS12	HS21
Application Server	HS12	HS21XM
Mail Server	HS12	HS21
Print Server	HS12	
File Server	HS12	HS21
Citrix/Terminal Services	HS12	HS21XM

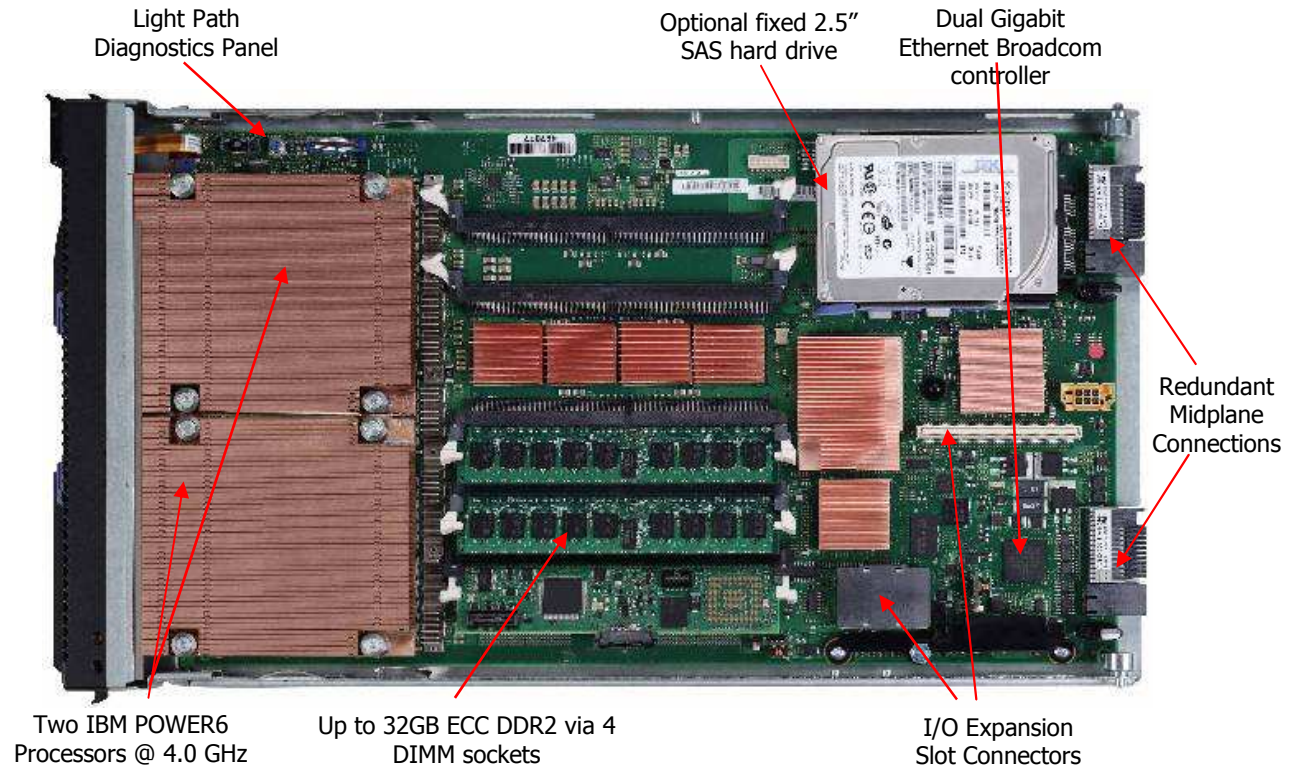
- Lead with HS12**
- Lead with HS21**
- Lead with HS21XM**

The choice of server is dependent on workload/application

- RIGHT choice often changes with usage model – light to heavy
- No single blade server is best for everything



# IBM BladeCenter JS22 Overview



In certain conditions, the JS22 automatically temporarily reduces processor frequency to maintain acceptable thermal levels.



# IBM BladeCenter JS22 vs. JS21

	JS21	JS22
Architecture	2.5 GHz PowerPC® 970 4 core (2 Socket x 2 Core) Single Wide	4.0 GHz POWER6 SCM 4 core (2 Socket x 2 Core) Single Wide
Memory	1 GB to 16 GB DDR2 (Chip kill) 533 MHZ	2 GB to 32 GB DDR2 (Chip kill) 667 MHZ
DASD / Bays	0-2 SAS disk (73 or 146 GB)	0-1 SAS disk (73 or 146 GB)
Daughter Cards	Legacy, SFF, or High speed DC	Legacy, SFF, or High speed DC
Integrated Features	Dual Port 1Gb Ethernet SAS Controller USB	Keyboard, Video and Mouse Dual Port 1Gb Ethernet SAS Controller USB
Fiber Support	Yes (via BladeCenter)	Yes (via BladeCenter)
Redundant Power	Yes (via BladeCenter)	Yes (via BladeCenter)
Redundant Cooling	Yes (via BladeCenter)	Yes (via BladeCenter)
Service Processor	BMC	FSP1 (IPMI, SOL)
Virtualization	AIX V5.3 & Linux Advanced POWER Virtualization (Built-in) Integrated Virtualization Manager	AIX V5.3, AIX 6 & Linux Advanced POWER Virtualization (Built-in) Integrated Virtualization Manager
Systems Management	IBM Director and CSM	IBM Director and CSM IBM EnergyScale™ Technology
OS Support	AIX 5.3, 6.1 and Linux	AIX 5.3, 6.1 and Linux
rPerf	8	30

- POWER6 @ 4.0 GHZ
- Huge Performance Advantages
- Over 3X the rPerf of JS21
- 2X Total Memory Capacity at 667 MHz speed
- Integrated KVM Support
- IBM EnergyScale Technology

Announce date: 29 January 2008 - Support for IBM BladeCenter servers:  
 i5/OS V6R1 is supported on the JS22 Express blade server in the BladeCenter H chassis.  
 With blade servers, clients can consolidate their IBM System i™ and Intel processor-based servers into a single chassis, leveraging the management, space and power savings provided by BladeCenter solutions.



The i5/OS V6R1 operating system and support on BC-H will be available on March 21, 2008.  
 The BladeCenter S support will be available

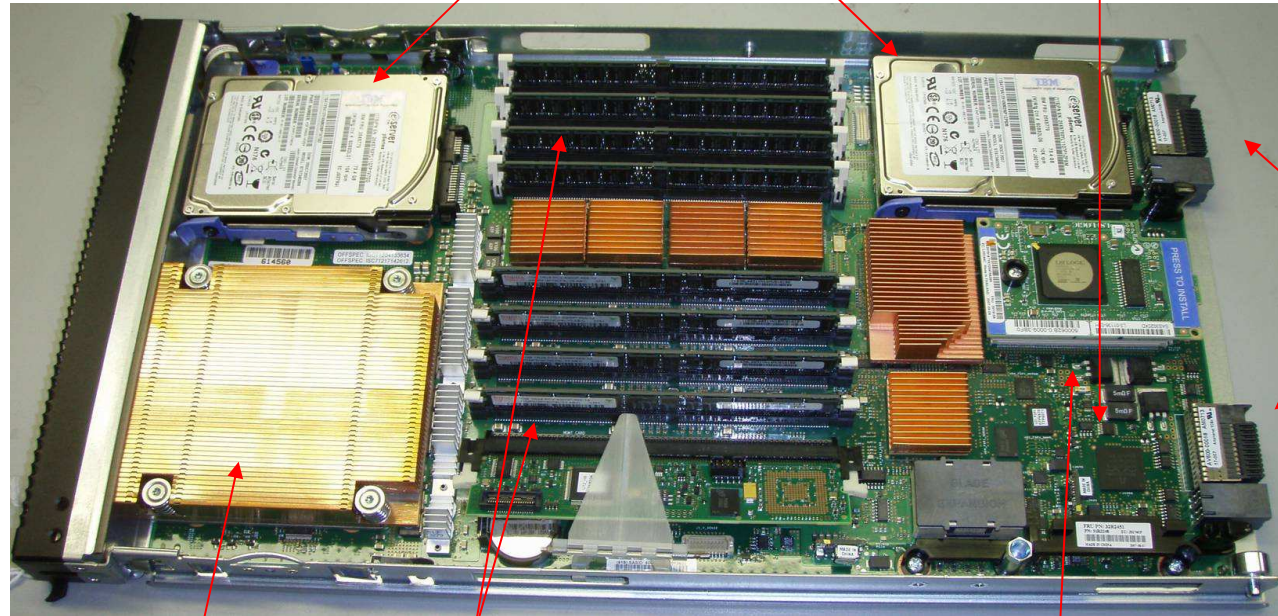
# IBM BladeCenter JS12 overview



Light Path Diagnostics Panel

Up to two optional 2.5" SAS hard drives

Dual Gigabit Ethernet Controller (P5I0C2 HEA)



Redundant Midplane Connections

I/O Expansion Slot Connectors

One IBM POWER6 Processor- Dual Core @ 3.8 GHz

Up to 64GB Memory via 8 DIMM sockets



# IBM BladeCenter JS12 Express & JS22 Express

**The broadest range of Power based blades in the world!**

	BladeCenter JS12 Express	BladeCenter JS22 Express
Architecture	<b>3.8 GHz POWER6 SCM 2-core (1 Socket x 2 Cores) Single Wide</b>	<b>4.0 GHz POWER6 SCM 4-core (2 Socket x 2 Cores) Single Wide</b>
Memory	<b>2 GB to 64 GB DDR2 (Chipkill)</b>	<b>2 GB to 32 GB DDR2 (Chipkill)</b>
DASD / Bays	<b>0-2 SAS disk (73 or 146 GB)</b>	<b>0-1 SAS disk (73 or 146 GB)</b>
Daughter Cards	<b>Legacy, SFF or High speed DC</b>	<b>Legacy, SFF, or High speed DC</b>
Integrated Features	<b>Keyboard, Video and Mouse Dual Port 1Gb Ethernet SAS Controller USB</b>	<b>Keyboard, Video and Mouse Dual Port 1Gb Ethernet SAS Controller USB</b>
Fiber Support	<b>Yes (via BladeCenter)</b>	<b>Yes (via BladeCenter)</b>
Redundant Power	<b>Yes (via BladeCenter)</b>	<b>Yes (via BladeCenter)</b>
Redundant Cooling	<b>Yes (via BladeCenter)</b>	<b>Yes (via BladeCenter)</b>
Service Processor	<b>FSP1 (IPMI, SOL)</b>	<b>FSP1 (IPMI, SOL)</b>
Virtualization	<b>PowerVM standard edition built-in</b>	<b>PowerVM standard edition built-in</b>
Systems Management	<b>IBM Director and CSM IBM EnergyScale Technology</b>	<b>IBM Director and CSM IBM EnergyScale Technology</b>
OS Support	<b>AIX, i, Linux</b>	<b>AIX, i, Linux</b>
rPerf	<b>14.37</b>	<b>30.26</b>
CPW	<b>7100</b>	<b>13800</b>
BladeCenter Chassis Support	<b>BCE, BCH, BCHT, BCT, BCS</b>	<b>BCH, BCHT, BCS</b>

# LS22 & LS42 Value Proposition

Next generation AMD blades built for quad-core

**LS42 – Significant power savings for comparable performance and price**

- ▶ Consumed less power than HP’s “Tigerton” blade (double-digit %)
- ▶ Competitive performance to HP’s “Tigerton” blade
- ▶ Leadership floating point performance
- ▶ Ideal apps include virtualization and database



**LS22 – HPC Blade for Memory-Intensive Applications**

- ▶ Leadership floating-point performance
- ▶ Optional 800MHz memory (20% faster than 667MHz)
- ▶ Memory booster increases throughput to remote memory (up to 96%)

**More than twice as fast as previous generation LS21 and LS41**

**LS22 / LS42**

*..now with “Shanghai” processor (2.7 Ghz - 75 watts)*

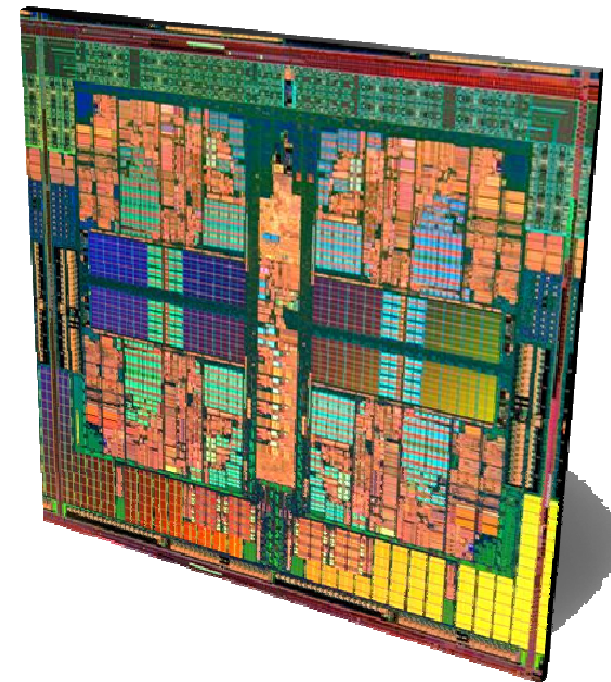
**Announce: 18 nov 2008**

**Availability: 30 nov 2008**



## Quad-Core AMD Opteron “Barcelona” in a nutshell...

- Barcelona is AMD’s first quad-core Opteron processor
- Better performance. Better performance per watt.
- Dual Dynamic Power Management: independently power cores and memory controller for added efficiency and performance
- More power efficient DDR2 Memory vs. FBDIMM
- Increased memory bandwidth





## ...from “Barcelona” to “Shanghai”

### Quad-Core AMD Opteron™ (“Barcelona”) Features

65nm Technology

AMD Balanced Smart Cache

HyperTransport 1.0 @ 8GB/s

AMD-V™ with  
Rapid Virtualization Indexing

AMD Memory Optimizer  
Technology

Drop-in Upgradeability  
Investment Protection

### New With “Shanghai”

45nm Technology  
Significantly reduced power

L3 grows to 6MB  
*(2x overall more cache than “Barcelona”)*

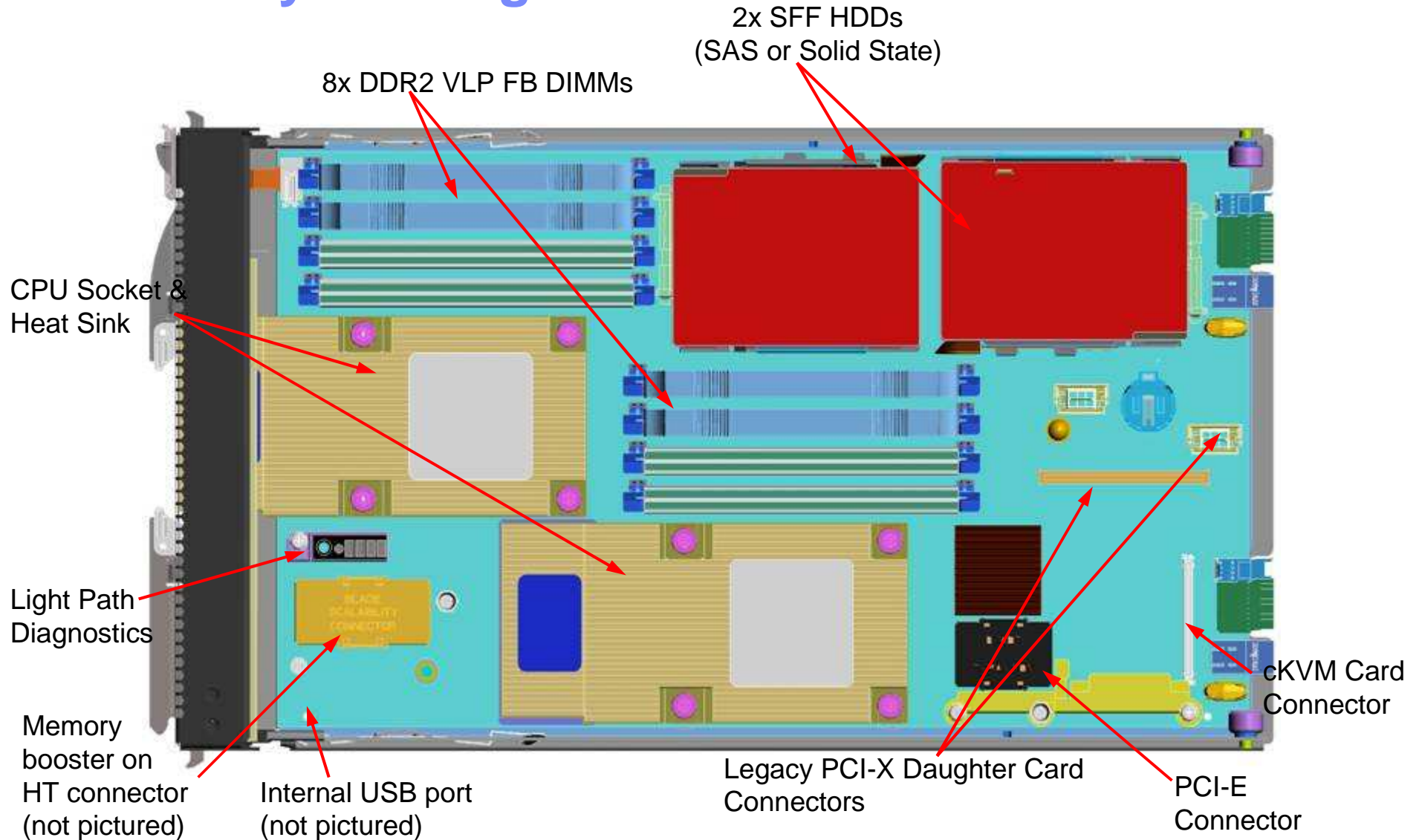
HyperTransport 3.0 @ 17.6GB/s

Designed for 25% faster  
“world Switch” time

DDR2-800 Memory Support  
*(~10% greater delivered memory  
bandwidth vs. 65nm QC)*

Continued Drop-in Upgradeability  
Investment Protection

# LS22 Layout Diagram



# Lucas Blade Feature Comparison

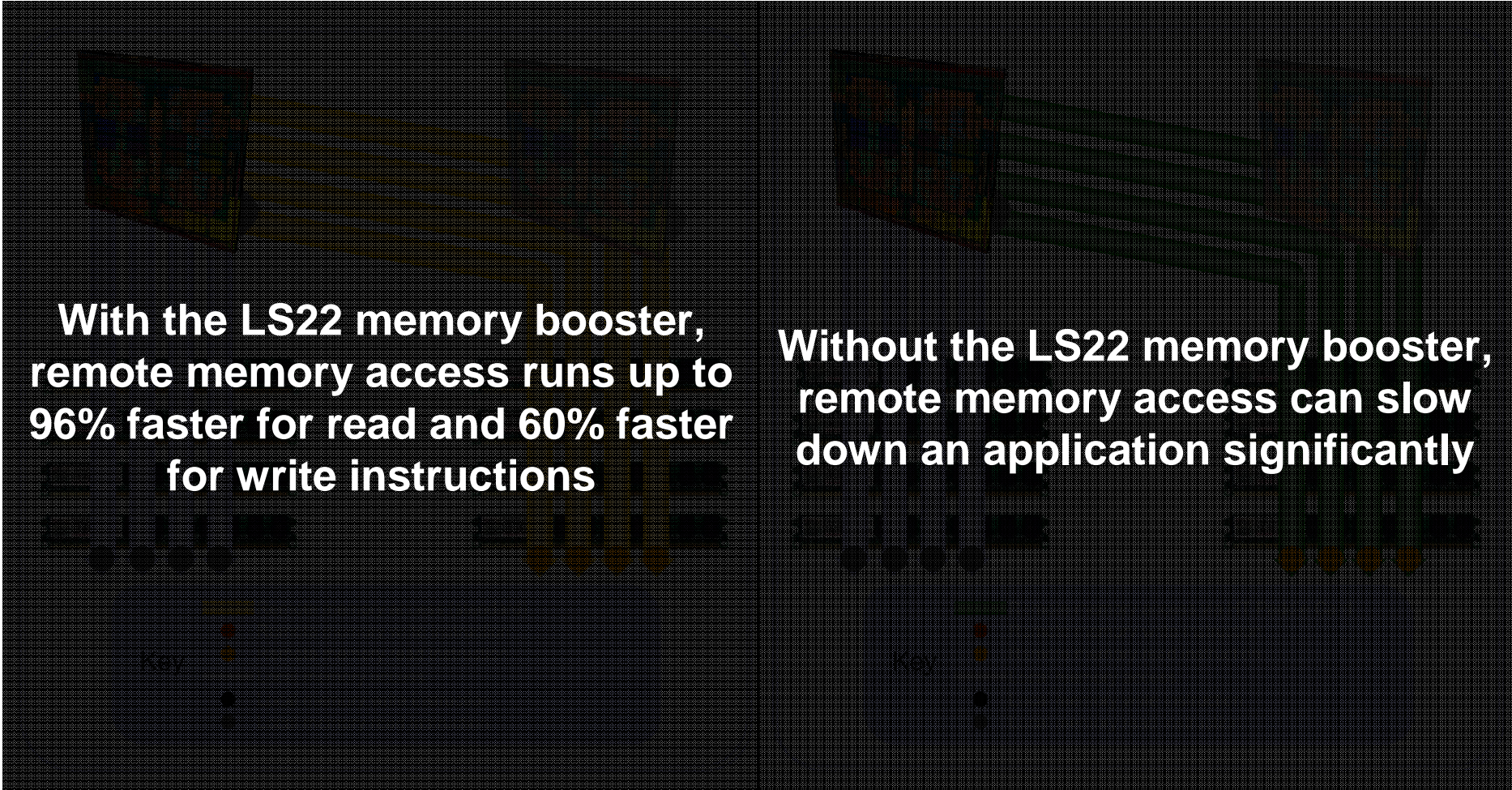
	Morrison LS20		Lucas LS22	Lucas LS42
		<b>Faster I/O with new HT2100 chipset on base 30mm blade</b>		
MTM	8850-xxx		7901-xxx	7902-xxx
Width	30mm		30mm	60mm
Chipset			HT2100/HT1000	HT2100/HT1000
Power Plane			Split	Split
Max # of Processors	2	<b>Dual Dynamic Power Management to independently power cores and memory controller (better performance and better performance per watt)</b>	2	4
Processor Models	AMD Opteron 2xx Single Core & Dual Core 68W	<b>Latest quad-core processors</b>	AMD Opteron 23xx Quad Core 79W, 115W	AMD Opteron 83xx Quad Core 79W, 115W
Max Proc SKU	2.4GHz 68W Dual Core	<b>Faster, 800MHz memory &amp; projected support for 8GB DIMMs ; Memory booster for added performance</b>	2.3GHz 115W Quad Core 1.9GHz 79W Quad Core	2.3GHz 115W Quad Core 1.9GHz 79W Quad Core
Max Memory	4 DIMMs / 8GB DDR1 up to 400MHz		8 DIMMs / 64GB VLP DDR2 up to 800MHz	16 DIMMs / 128GB VLP DDR2 up to 800MHz
Storage	2x fixed SCSI	<b>Support for up to 2 HDDs on 30mm blade &amp; support for latest generation solid state drives that are more reliable and require less power</b>	2x fixed SFF SAS or 2x SSD	2x fixed SFF SAS or 2x SSD
Imbed USB	No		YES	YES
Ethernet	2x Gigabit		2x Gigabit w/TOE IPv6	4x Gigabit w/TOE IPv6
I/O	1 PCI-X	<b>Internal USB; optional <u>VMware ESX i 3.5</u></b>	1 PCI-X and 1 PCI-E	2 PCI-X and 1 PCI-E
Management	BMC w/IPMI 1.5	<b>Support for IPv6</b>	BMC w/IPMI 2.0	BMC w/IPMI 2.0
Warranty	3 yr	3 yr	3yr	3yr

**Better Performance  
Better Performance Per Watt  
More Reliability**

Programs, features and dates are subject to change.

## LS22 memory booster improves memory performance

**Up to 96% faster memory throughput in dual-socket configuration running applications requiring fewer cores and more capacity memory**



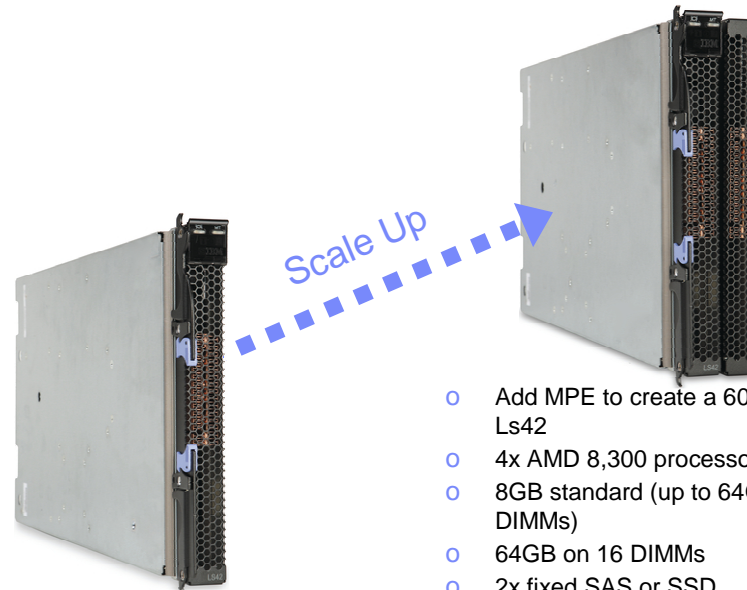
**With the LS22 memory booster, remote memory access runs up to 96% faster for read and 60% faster for write instructions**

**Without the LS22 memory booster, remote memory access can slow down an application significantly**

# LS42 2+2 = investment protection you can afford

*Introducing the industry's only snap-n-scale blade that can grow as your business grows...*

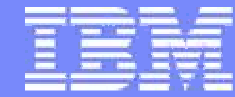
*...and won't break the bank!*



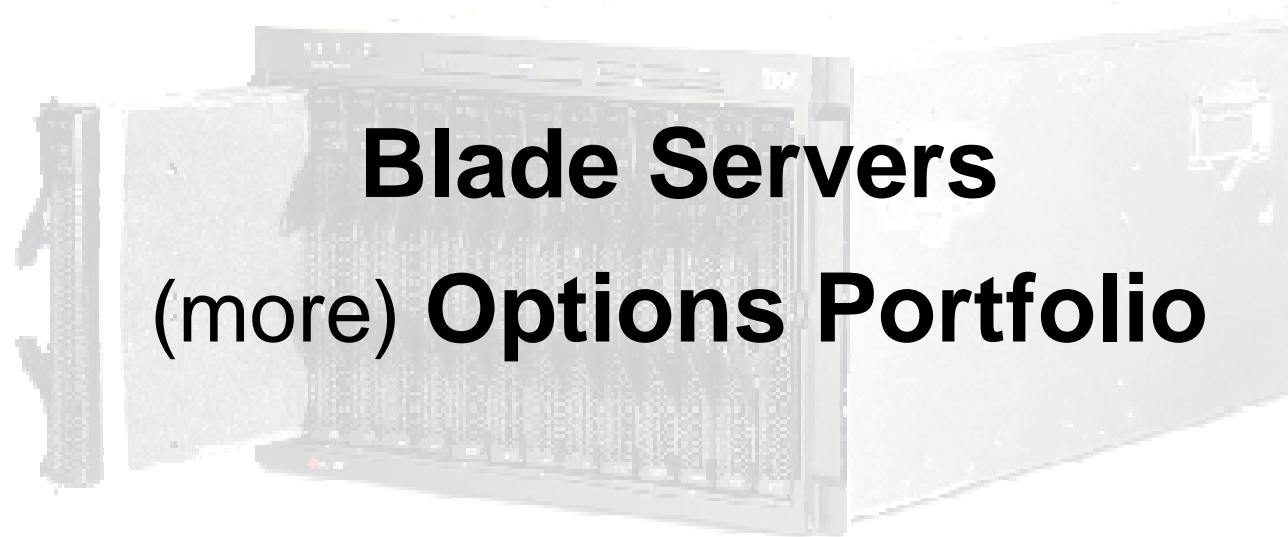
- Start with a 30mm, 2-socket scalable LS42
- 2x AMD 8,300 series quad-core processors
- 4GB memory standard (up to 32GB on 8 DIMMs)
- 2x fixed SAS or SSD
- Ready to scale to 4 sockets with additional MPE

- Add MPE to create a 60mm, 4-socket Ls42
- 4x AMD 8,300 processors
- 8GB standard (up to 64GB on 16 DIMMs)
- 64GB on 16 DIMMs
- 2x fixed SAS or SSD
- **128GB on 16 DIMMs trough 8GB dimm – (ann 10 feb 2009 / G.A. 9 mar 2009)**
- **embedded VMWare ESXi3.5 through an optional USB key – (ann 10 feb 2009 / G.A. 9 mar 2009)**



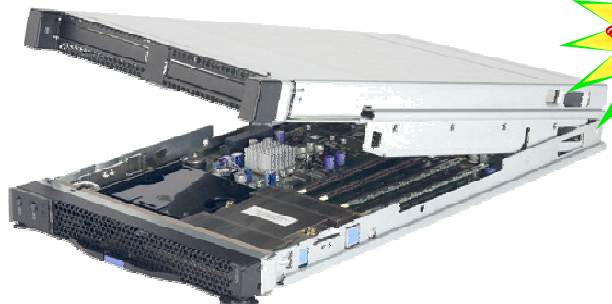
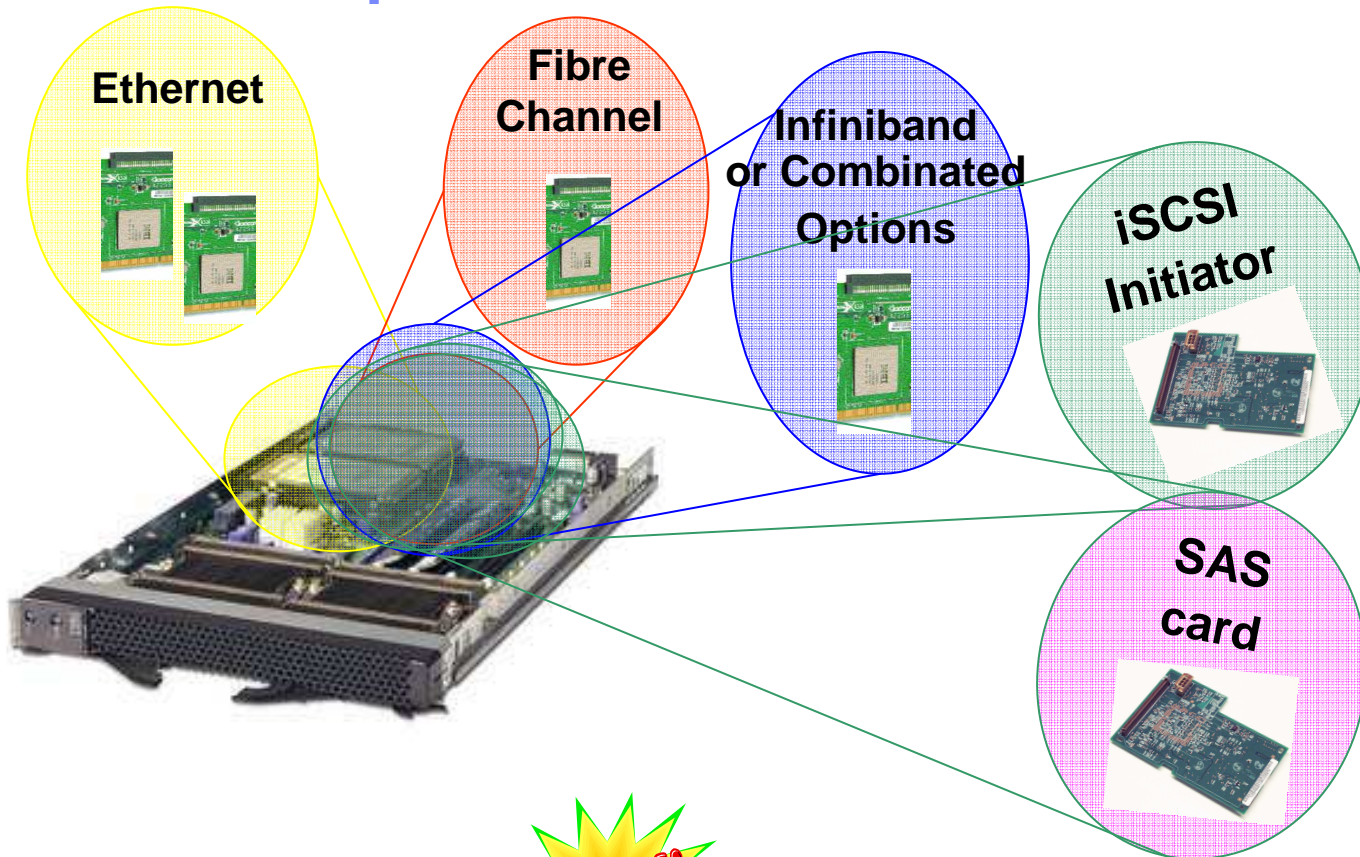


Systems and Technology Group



# Blade Servers (more) Options Portfolio

# Blade I/O Expansion Cards



## PCI I/O Expansion Unit

(Ann: 8 apr 2008 – G.A. 9 may 2008)

Provides two full-length PCI Express x16 mechanical/x8 electrical slots for that blade alone, which can be used for a variety of cards.

# Infrastructure Savings

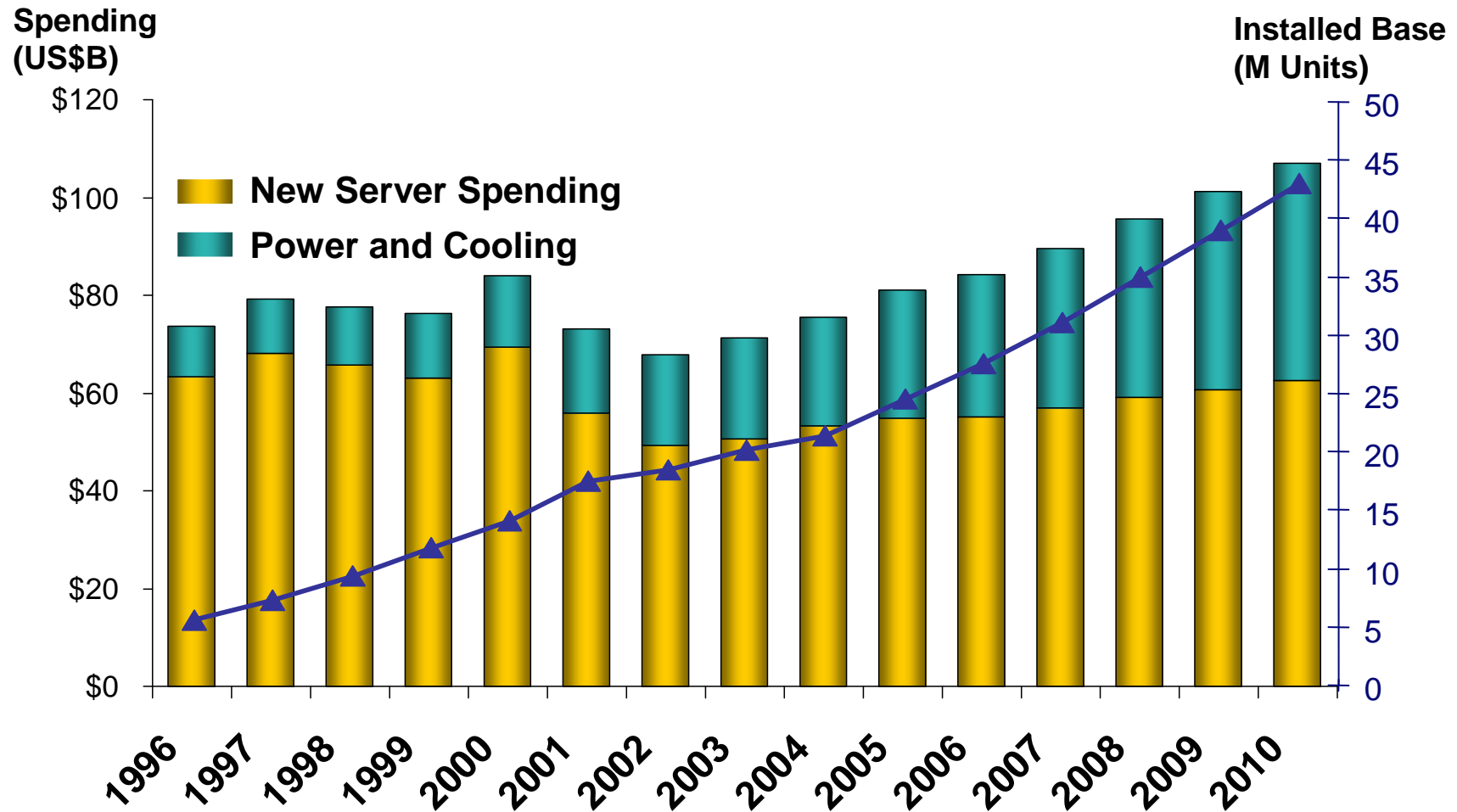
- **Significant Infrastructure Savings with BladeCenter**
  - ▶ More than twice the density of 1U servers
  - ▶ up to 83% fewer cables than typical 1U
  - ▶ up to 64% fewer cables than our competitors

Per 42 Servers (IDE, dual SAN, dual enet, KVM, redun pwr)	1U Servers	Blades	Reduction / Addition
Rack Space	42U	21U	-50%
Ethernet Cabling	84	6 / 24	-71%
Fibre Channel Cabling	84	12	-86%
KVM Cabling	42	0 / 3	-93%
Systems Mgmt Cabling	42	6	-86%
Power Cords	84	12	-86%
PDU's	8	4	-50%
KVM Switches	6	0 / 1	-83%

Additional Notes: Networking, SAN and KVM Switching takes 10+ Power Cords and 2U to 8U in Rack  
 Power cord and PDU figures assume equivalent function of redundant power in 1U server



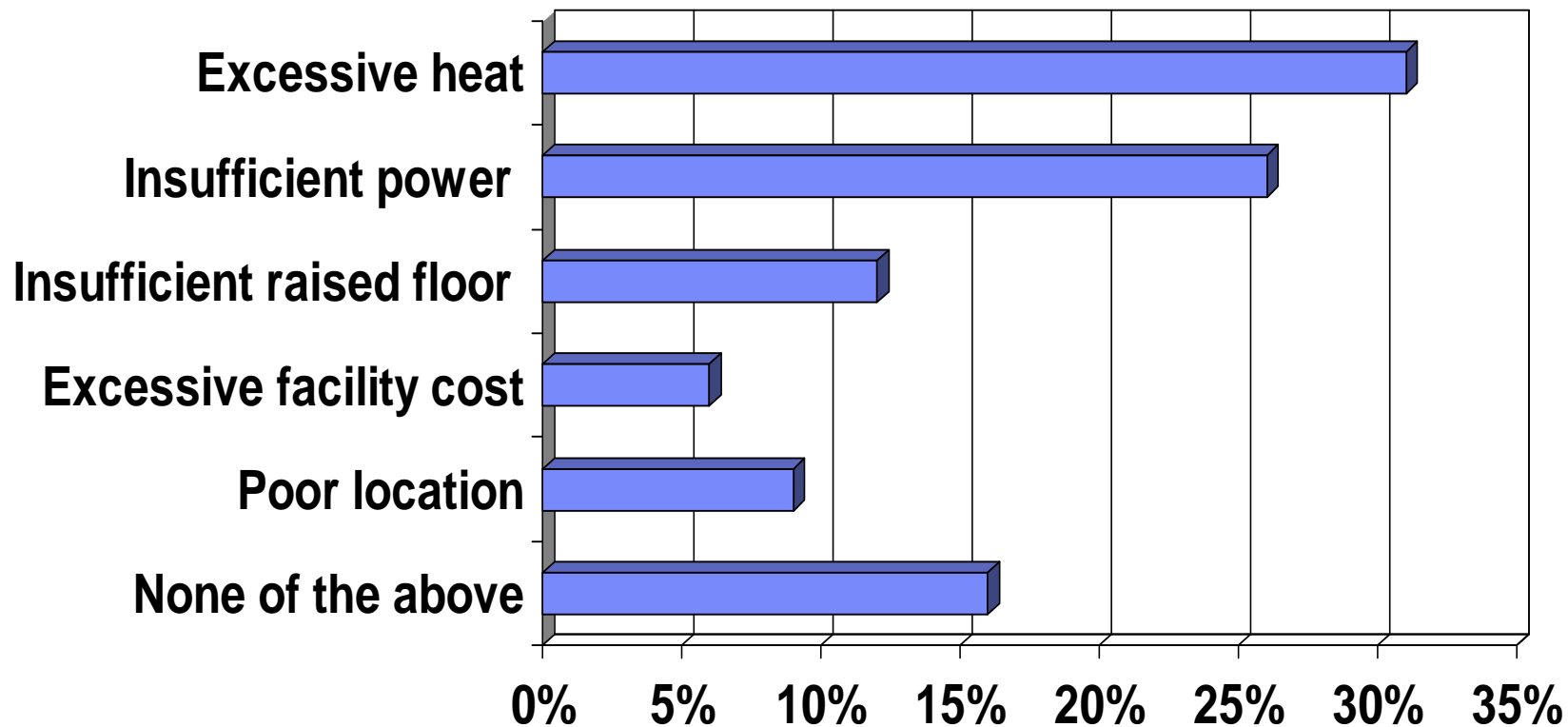
# Worldwide Server Market (IDC) : il reale costo dei server



IDC Presentation, The Impact of Power and Cooling on Data Center Infrastructure, Doc #201722, May 2006

Question:  
 What is the greatest facility problem with your primary data center?

(Gartner 2006)





# What's using the power?

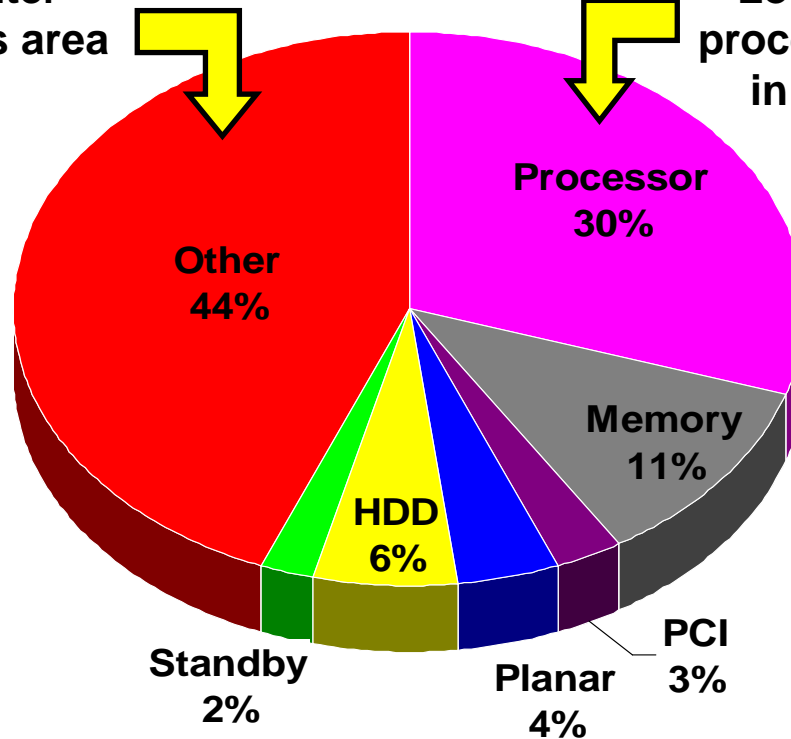
The processor power growth is the largest single contributor  
 but there are many other areas -  
 the more you pack into a server the more power it needs!

## OTHER?

- ◆ AC to DC Transitions
- ◆ DC to DC Deliveries
- ◆ Fans and air movement

BladeCenter helps in this area

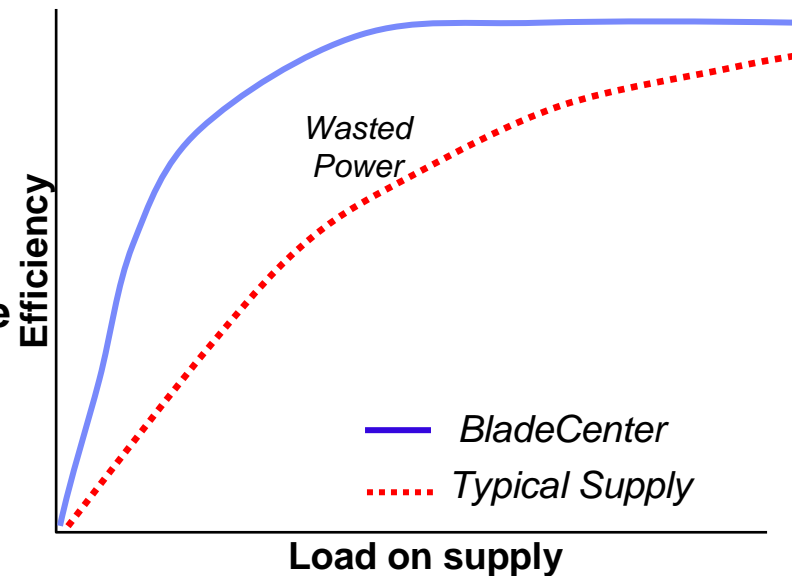
Low Voltage processors help in this area



- Processor
- Memory
- PCI
- Planar
- HDD
- Standby
- Other

## Increasing Power Efficiency

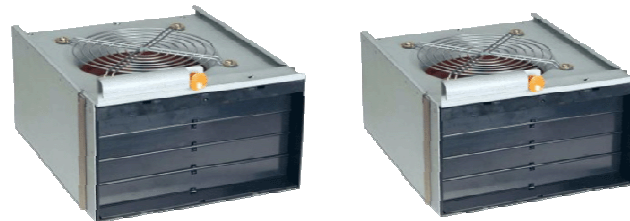
- Power supplies typically work better at high loading/utilization
  - ▶ A problem for servers with N+N power
  - ▶ It's a cost issue, expensive to design supply components that work efficiently across range of load
  - ▶ BC has four supplies can afford and chose to invest in efficiency of our supplies
    - 91% peak efficiency
    - nearly 85% efficiency at 20% load



# BladeCenter Cooling is Hands Down Better

*(New HP cClass Changed Everything and Nothing)*

## **IBM BladeCenter H** **Two N+N Hot Swap Blowers + Power Supply/Fabric Fans**



- Few moving parts
- All Hot Swap
- Requires 100W of power in normal operation (<25C)
- Same design as BC - years of proven reliability

# IBM® *Systems Director Active Energy Manager*

™ in action!

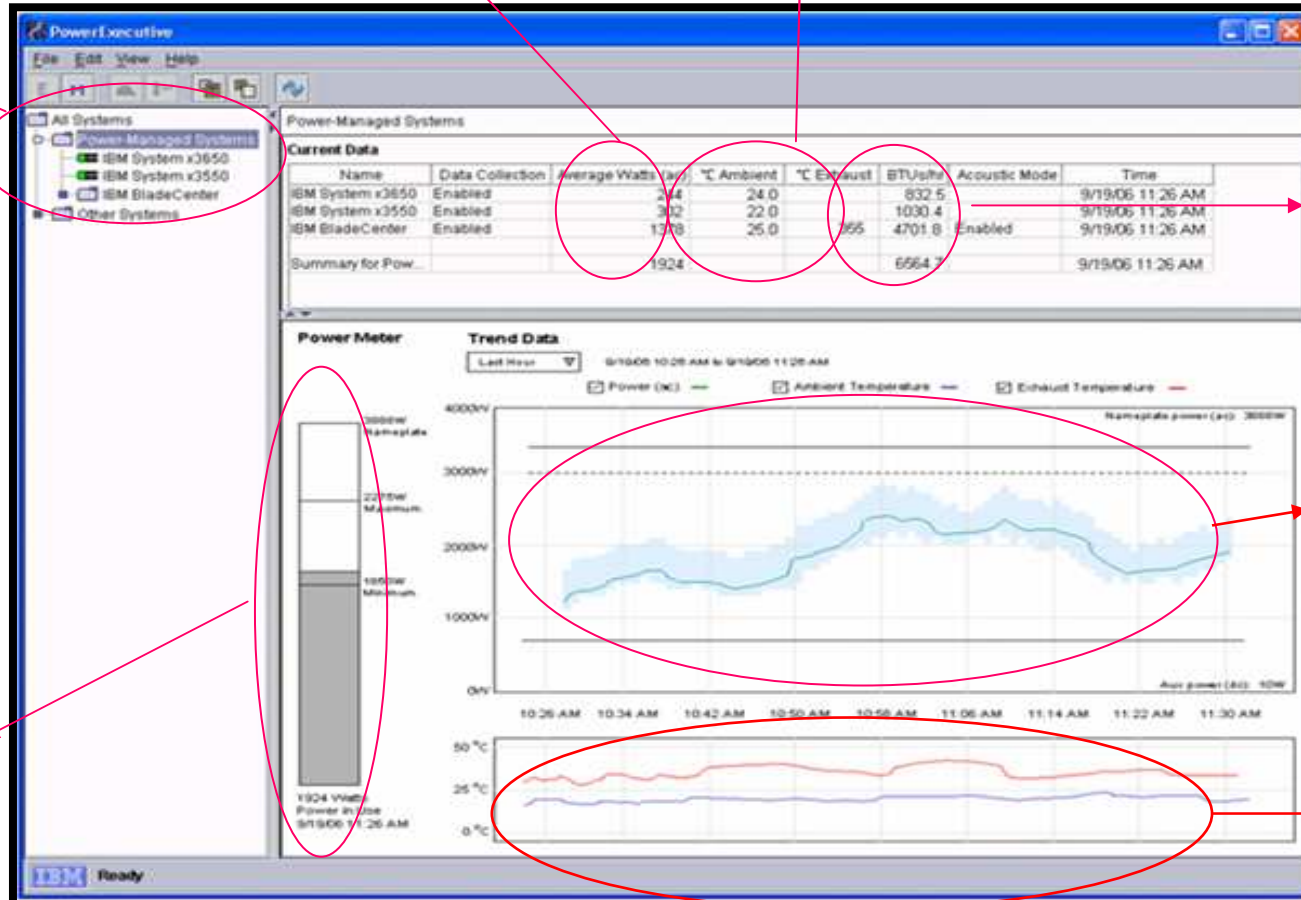
Manage Power at the rack and server level

Monitor:

- Power supply
- Blades
- I/O modules
- Mgmt module
- Blowers
- Media tray
- Midplane

Compare actual vs. name plate power at system level

View inlet and exhaust temperatures



Track heat emitted

Trend power use over time

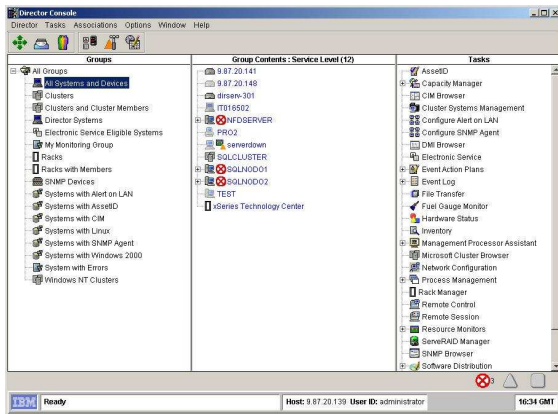
Trend temperature over time

Compare rack actual power vs. Label Power

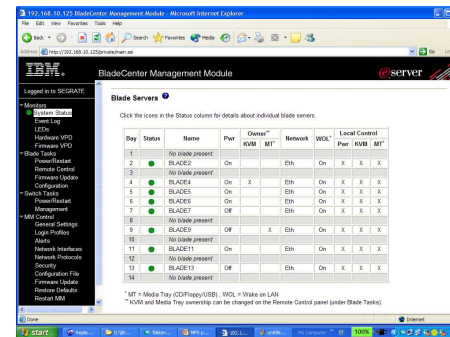
Supported systems: BladeCenter BC-H 8852, BC-E 8677, BC-T 8730/8720, BC-HT 8750/8740, BC-S 8886. Blades HS20 8843, HS21 8853, LS20 8850, LS21 7971, LS41 7972, HS21 XM, HC10 7996 . System x: x3550, x3650, x3655, x3755, x3850, x3950, and the new x3350, x3850 M2, and x3950 M2

# BladeCenter management

## 2. Director Console

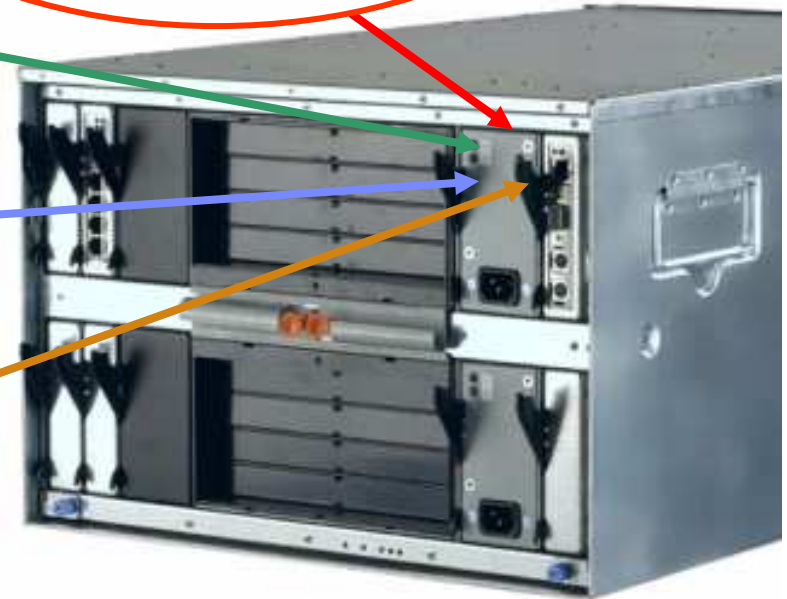


## 1. Web Interface



## 3. Telnet Interface

## 4. Command Line Interface (MPCLI)





## Blade Deployment Made Easy: ***IBM BladeCenter Open Fabric Manager***

### *...What is Open Fabric Manager?*

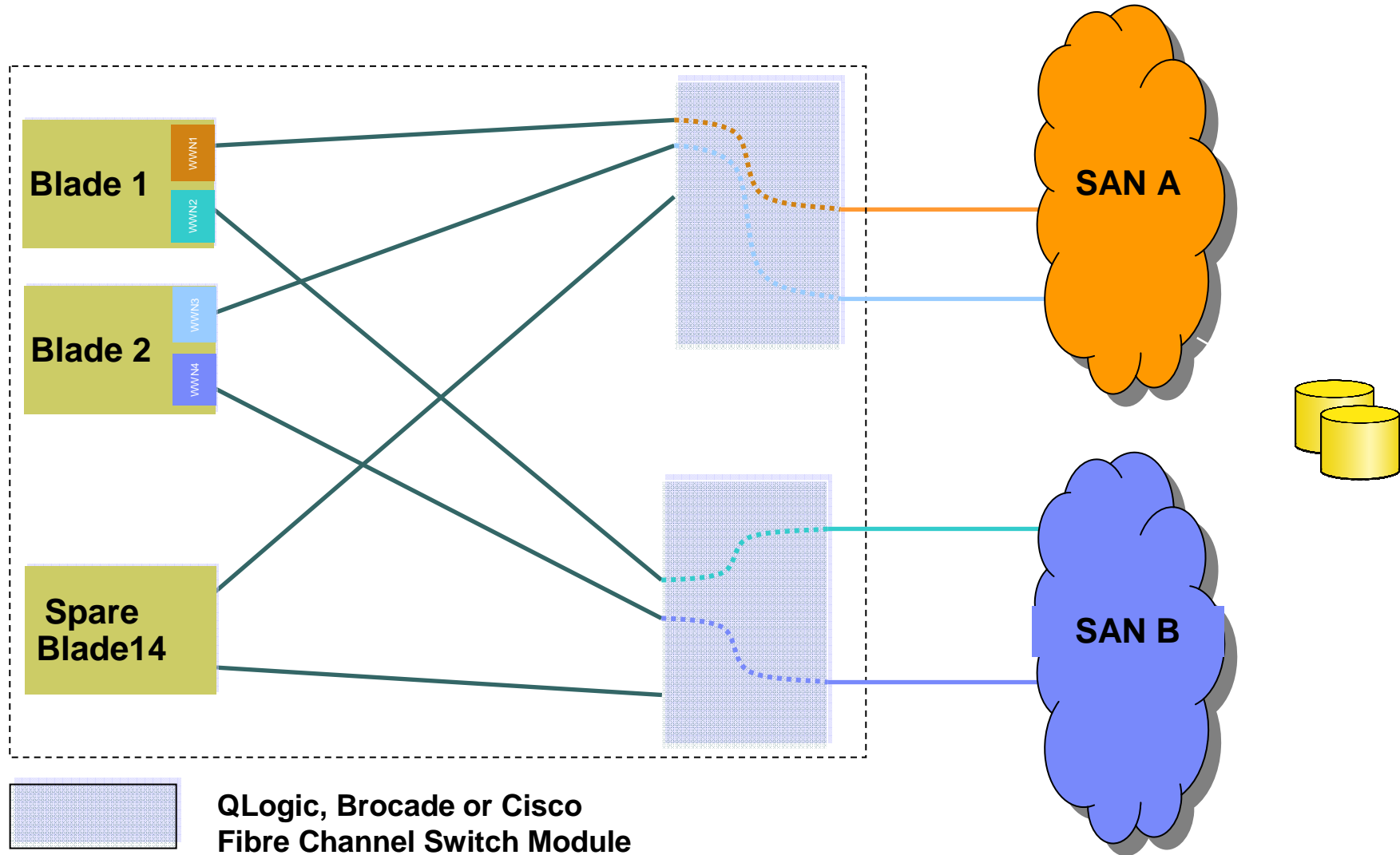
- **Advanced Management Module-based Firmware**
  - MAC, WWN address assignment and management for initial blade deployment and re-deployment
- **Optional Advanced Upgrade: Standalone Utility or IBM Director Extension**
  - MAC, WWN Address assignment and management for initial blade deployment and re-deployment
  - Creates blade failover pools – Event Action Plans
  - Provides I/O parameter and VLAN migration in case of failover
- **Embedded switch enhancements**
  - Easy to use GUI for switch configuration
  - Switch stacking for network simplification



**announce 13 november 2007**  
**availability: 21 december 2007**

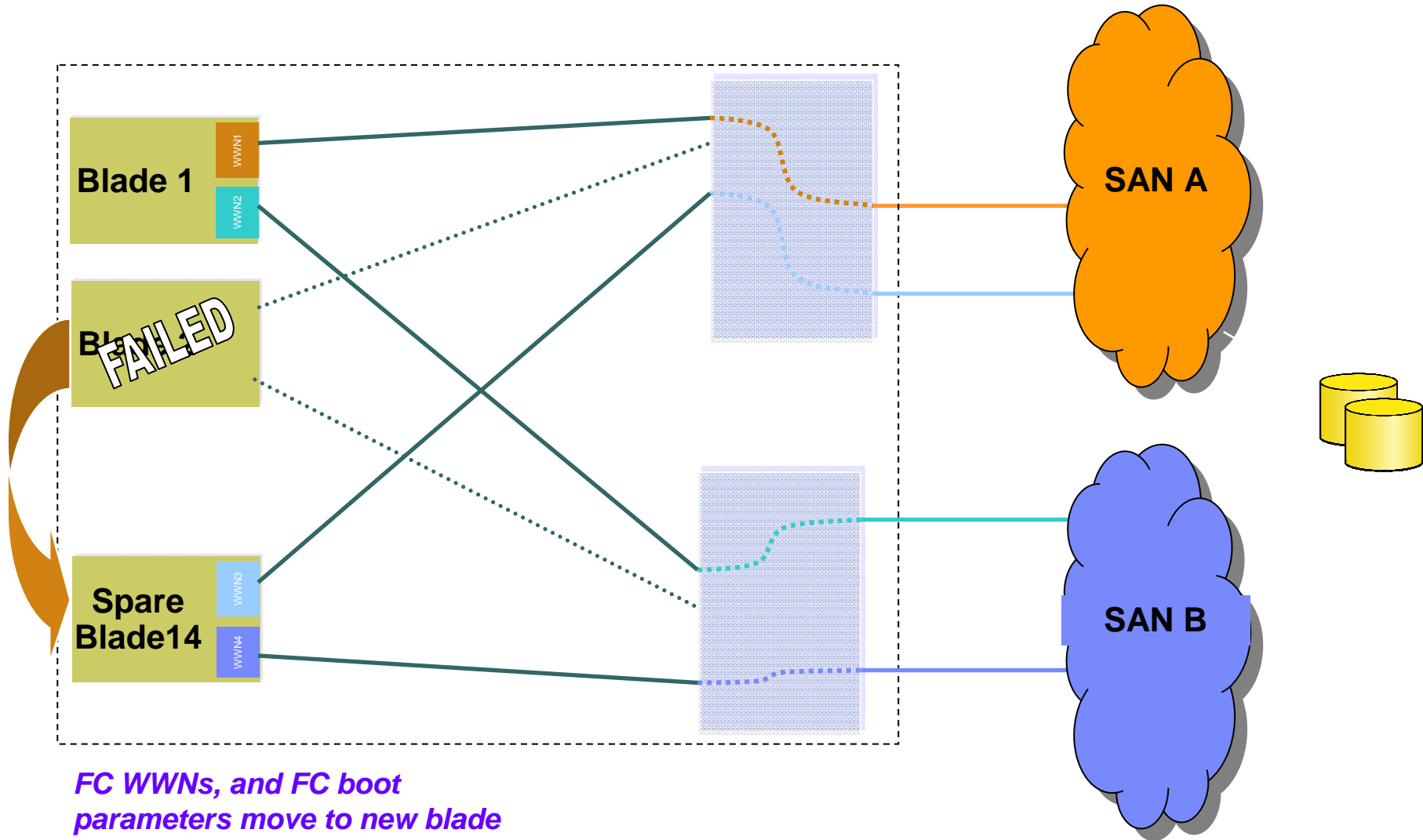
# Open Fabric Manager

*Open Fabric Manager simplifies server deployment and failover*

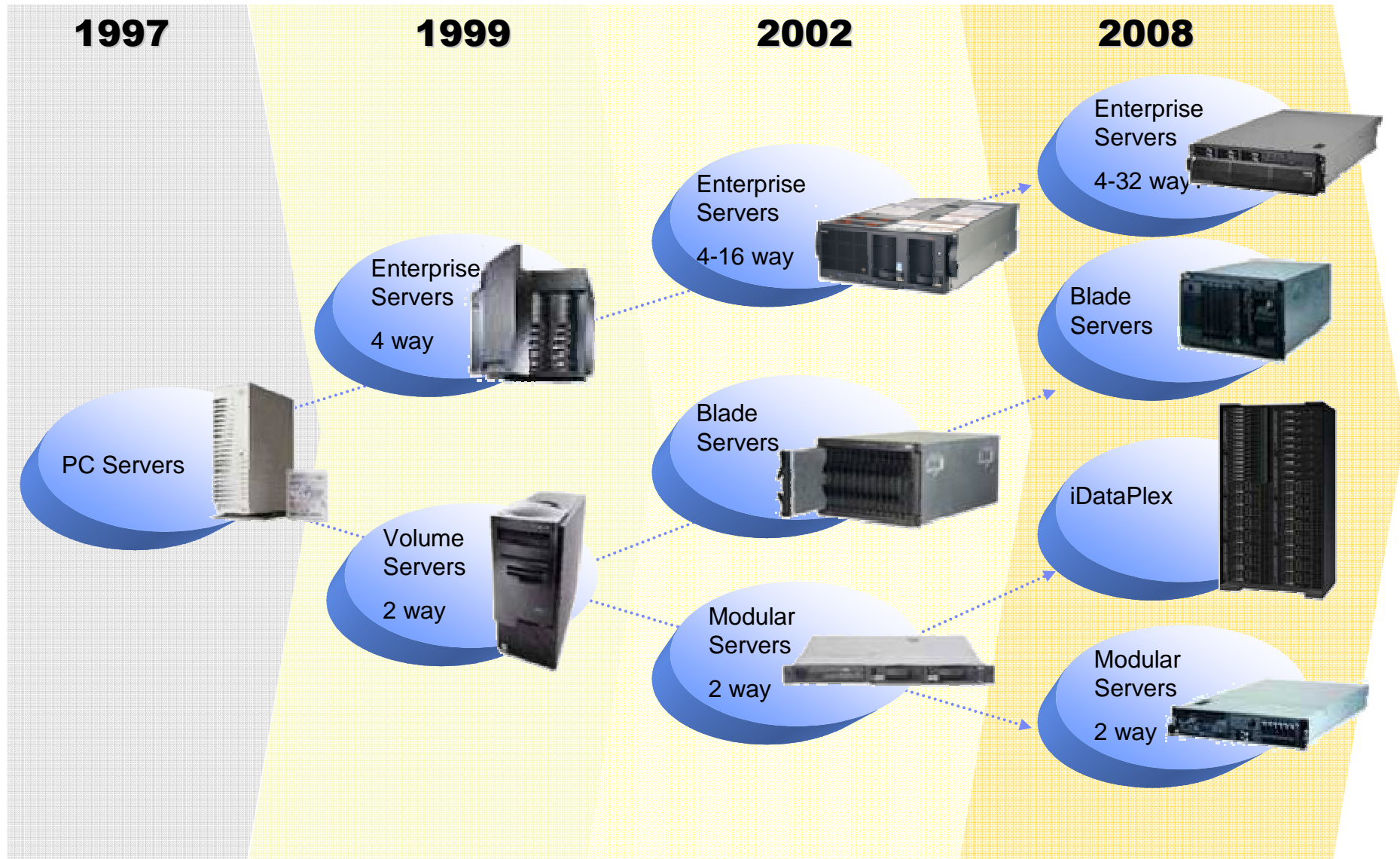


# Open Fabric Manager

*Open Fabric Manager simplifies server deployment and failover*



# Decade Of Innovation



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The IBM benchmarks results shown herein were derived using particular, well configured, development-level and generally-available computer systems. Buyers should consult other sources of information to evaluate the performance of systems they are considering buying and should consider conducting application oriented testing. For additional information about the benchmarks, values and systems tested, contact your local IBM office or IBM authorized reseller or access the Web site of the benchmark consortium or benchmark vendor.

IBM benchmark results can be found in the IBM System p5, ~ p5, pSeries, OpenPower and IBM RS/6000 Performance Report at [http://www.ibm.com/servers/systems/p/hardware/system\\_perf.html](http://www.ibm.com/servers/systems/p/hardware/system_perf.html).

All performance measurements were made with AIX or AIX 5L operating systems unless otherwise indicated to have used Linux. For new and upgraded systems, AIX Version 4.3 or AIX 5L were used. All other systems used previous versions of AIX. The SPEC CPU2000, LINPACK, and Technical Computing benchmarks were compiled using IBM's high performance C, C++, and FORTRAN compilers for AIX 5L and Linux. For new and upgraded systems, the latest versions of these compilers were used: XL C Enterprise Edition V7.0 for AIX, XL C/C++ Enterprise Edition V7.0 for AIX, XL FORTRAN Enterprise Edition V9.1 for AIX, XL C/C++ Advanced Edition V7.0 for Linux, and XL FORTRAN Advanced Edition V9.1 for Linux. The SPEC CPU95 (retired in 2000) tests used preprocessors, KAP 3.2 for FORTRAN and KAP/C 1.4.2 from Kuck & Associates and VAST-2 v4.01X8 from Pacific-Sierra Research. The preprocessors were purchased separately from these vendors. Other software packages like IBM ESSL for AIX, MASS for AIX and Kazushige Goto's BLAS Library for Linux were also used in some benchmarks.

For a definition/explanation of each benchmark and the full list of detailed results, visit the Web site of the benchmark consortium or benchmark vendor.

TPC	<a href="http://www.tpc.org">http://www.tpc.org</a>
SPEC	<a href="http://www.spec.org">http://www.spec.org</a>
LINPACK	<a href="http://www.netlib.org/benchmark/performance.pdf">http://www.netlib.org/benchmark/performance.pdf</a>
Pro/E	<a href="http://www.proe.com">http://www.proe.com</a>
GPC	<a href="http://www.spec.org/gpc">http://www.spec.org/gpc</a>
NotesBench	<a href="http://www.notesbench.org">http://www.notesbench.org</a>
VolanoMark	<a href="http://www.volano.com">http://www.volano.com</a>
STREAM	<a href="http://www.cs.virginia.edu/stream/">http://www.cs.virginia.edu/stream/</a>
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# Notes on Performance Estimates

## rPerf

rPerf (Relative Performance) is an estimate of commercial processing performance relative to other IBM UNIX systems. It is derived from an IBM analytical model which uses characteristics from IBM internal workloads, TPC and SPEC benchmarks. The rPerf model is not intended to represent any specific public benchmark results and should not be reasonably used in that way. The model simulates some of the system operations such as CPU, cache and memory. However, the model does not simulate disk or network I/O operations.

rPerf estimates are calculated based on systems with the latest levels of AIX 5L and other pertinent software at the time of system announcement. Actual performance will vary based on application and configuration specifics. The IBM @server pSeries 640 is the baseline reference system and has a value of 1.0. Although rPerf may be used to approximate relative IBM UNIX commercial processing performance, actual system performance may vary and is dependent upon many factors including system hardware configuration and software design and configuration.

All performance estimates are provided "AS IS" and no warranties or guarantees are expressed or implied by IBM. Buyers should consult other sources of information, including system benchmarks, and application sizing guides to evaluate the performance of a system they are considering buying. For additional information about rPerf, contact your local IBM office or IBM authorized reseller.

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