IBM ~ p5 Product Line
IBM POWER5 Servers

Entry deskside:
- p5-520
- p5-550

Entry rack:
- p5-510

Mid-range:
- p5-570

High-end:
- p5-575
- p5-590
- p5-595

Cluster 1600
## POWER5 Technology Bottom to Top

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<th>Model</th>
<th>Footprint, packaging</th>
<th>19-inch rack</th>
<th>19-inch rack, deskside</th>
<th>19-inch rack, deskside</th>
<th>19-inch rack</th>
<th>24-inch frame by node</th>
<th>24-inch frame</th>
<th>24-inch frame</th>
</tr>
</thead>
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<tr>
<td>p5-510</td>
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<td>p5-520</td>
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<td>p5-550</td>
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<td>p5-570</td>
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<tr>
<td>p5-575</td>
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<tr>
<td>p5-590</td>
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<tr>
<td>p5-595</td>
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<td></td>
</tr>
</tbody>
</table>

### Footprint, packaging
- **19-inch rack**: 1, 2
- **19-inch rack, deskside**: 1, 2
- **24-inch frame by node**: 8
- **24-inch frame**: 8 to 32
- **24-inch frame**: 16 to 64

### No. of SMPs
- **1, 2**
- **2, 4, 8, 12, 16**
- **8**
- **16 to 64**

### GHz clock
- **1.5, 1.65**
- **1.5, 1.65**
- **1.5, 1.65, 1.9**
- **1.65**
- **1.65, 1.9**

### GB memory
- **0.5 to 32**
- **0.5 to 64**
- **2 to 512**
- **1 to 256**
- **8 to 1,024**
- **8 to 2,048**

### Int. storage*
- **1.2TB**
- **16.8TB**
- **31.2TB**
- **79.2TB**
- **1.7TB**
- **9.3TB**
- **14.0TB**

### PCI-X slots*
- **3**
- **5 to 60**
- **6 to 163**
- **0 to 24**
- **20 to 160**
- **20 to 240**

### GB memory
- **16 to 64**
- **1, 2, 4, 8, 12, 16**
- **19.66**
- **77.45**
- **46.36**
- **151.72**
- **306.21**

### Micro-partitions**
- **20**
- **40**
- **160**
- **80**
- **254**
- **254**

### Max. rPerf
- **9.86**
- **19.66**
- **77.45**
- **46.36**
- **151.72**
- **306.21**

### Cluster 1600
- **Yes**
- **Yes**
- **Yes**
- **Yes**
- **Yes**
- **Yes**

### HACMP (AIX 5L V5.2)
- **Yes**
- **Yes**
- **Yes**
- **Yes**
- **Yes**
- **Yes**

---

*Note: Includes maximum I/O drawer capacity
**Require Advanced POWER™ Virtualization option

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POWER5 Reliability Across the Line

Selectivity dynamic firmware updates (2Q05)
First Failure Data Capture
DDR ECC Chipkill™ memory
Bit-steering/redundant memory
Memory soft scrubbing
Redundant power, fans
Dynamic Processor Deallocation
Deallocate PCI-X bus, L2/L3 cache
Persistent memory deallocation
Hot-plug fans and power
Internal LED diagnostics
Hot-swappable disk drives

*Note: Some RAS functions may not be available at the same time on SLES 9 and RHEL AS 3
## IBM POWER technology roadmap for pSeries

<table>
<thead>
<tr>
<th>Year</th>
<th>Platform</th>
<th>Process</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>POWER4</td>
<td>180 nm</td>
<td>1+ GHz Core, 1+ GHz Core, Shared L2</td>
</tr>
<tr>
<td>2002-4</td>
<td>POWER4+</td>
<td>130 nm</td>
<td>1.5+ GHz Core, 1.5+ GHz Core, Shared L2, Distributed Switch</td>
</tr>
<tr>
<td>2004</td>
<td>POWER5</td>
<td>130 nm</td>
<td>&gt; GHz Core, &gt; GHz Core, Shared L2, Distributed Switch</td>
</tr>
<tr>
<td>2005-6</td>
<td>POWER5+</td>
<td>90 nm</td>
<td>&gt;&gt; GHz Core, &gt;&gt; GHz Core, Shared L2, Distributed Switch</td>
</tr>
<tr>
<td>2006-7</td>
<td>POWER6</td>
<td>65 nm</td>
<td>Ultra-high frequency cores, L2 caches, Advanced System Features</td>
</tr>
</tbody>
</table>

### Autonomic Computing Enhancements
- **POWER4**
  - Chip multiprocessing
    - Distributed switch
    - Shared L2
  - Dynamic LPARs (16)
- **POWER4+**
  - Reduced size
  - Lower power
  - Larger L2
  - More LPARs (32)
- **POWER5**
  - Simultaneous multi-threading
  - Micro-Partitioning
  - Dynamic firmware updates
  - Enhanced scalability
  - High throughput performance
  - Enhanced cache/memory subsystem

*All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.*
POWER5 Multichip Module (MCM)

- MCM Package
  - Four POWER5 chips
  - Four L3 cache chips

- 90.25 cm$^2$

- 4,491 signal I/Os

- 89 layers of metal
Modifications to IBM POWER4 to create POWER5

POWER4

POWER5

Larger L2 and L3
Reduced latencies
Faster memory access
~ p5: Simultaneous multi-threading

POWER5 (simultaneous multi-threading)

FX0  FX1  LSO  LS1  FP0  FP1  BRZ  CRL

Thread0 active
No thread active
Thread1 active

System throughput

ST  SMT

Utilizes unused execution unit cycles

Presents symmetric multiprocessing (SMP) programming model to software

Natural fit with superscalar out-of-order execution core

Dispatch two threads per processor: “It’s like doubling the number of processors.”

Net result:
  – Better performance
  – Better processor utilization
## POWER4+ to POWER5 comparison

<table>
<thead>
<tr>
<th></th>
<th>POWER4+ design</th>
<th>POWER5 design</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L1 cache</strong></td>
<td>2-way associative</td>
<td>4-way associative</td>
<td>Improved L1 cache performance</td>
</tr>
<tr>
<td><strong>L2 cache</strong></td>
<td>8-way associative 1.5MB</td>
<td>10-way associative 1.9MB</td>
<td>Fewer L2 cache misses Better performance</td>
</tr>
<tr>
<td><strong>L3 cache</strong></td>
<td>32MB 8-way associative 118 clock cycles</td>
<td>36MB 12-way associative</td>
<td>Better cache performance</td>
</tr>
<tr>
<td><strong>Simultaneous multi-threading</strong></td>
<td>No</td>
<td>Yes</td>
<td>Better processor utilization 30%* system improvement</td>
</tr>
<tr>
<td><strong>Partitioning support</strong></td>
<td>1 processor</td>
<td>1/10th of processor</td>
<td>Better usage of processor resources</td>
</tr>
<tr>
<td><strong>Floating-point registers</strong></td>
<td>72</td>
<td>120</td>
<td>Better performance</td>
</tr>
<tr>
<td><strong>Chip interconnect:</strong></td>
<td>Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intra MCM data bus</td>
<td>Enhanced dist. switch Processor speed ½ proc. speed</td>
<td>Better systems throughput Better performance</td>
</tr>
<tr>
<td></td>
<td>Inter MCM data bus</td>
<td>Distributed switch ½ proc. speed</td>
<td></td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>412mm²</td>
<td>389mm²</td>
<td>50% more transistors in the same space</td>
</tr>
</tbody>
</table>

* Based on IBM rPerf projections
Virtualization
~ p5 systems virtualization architecture

- Workload management and provisioning
  - AIX 5L V5.3 partitions
  - AIX 5L V5.2
  - Linux partitions
  - i5/OS™
  - Virtual I/O server
  - Unassigned on demand resources

- Hardware Management Console
  - Hypervisor
    - Virtual processors
    - Virtual adapters
      - Processors
      - Memory
      - Expansion slots
      - Local devices & storage
      - Networks and network storage
  - Service processor

*Planned for select p5-570 models
~ p5 advanced virtualization option

**Virtual I/O server**
- Shared Ethernet
- Shared SCSI and Fibre Channel-attached disk subsystems
- Supports AIX 5L V5.3 and Linux* partitions

**Micro-Partitioning**
- Share processors across multiple partitions
- Minimum partition 1/10\(^\text{th}\) processor
- AIX 5L V5.3 or Linux*

**Partition Load Manager**
- Both AIX 5L V5.2 and AIX 5L V5.3 supported
- Balances processor and memory request

Managed via HMC

* SLES 9 or RHEL AS 3
Virtual I/O server disk sharing

One physical drive can appear to be multiple logical drives
- LUNs appear as individual logical drives
Minimizes the number of adapters

Can have mixed configuration (virtual and real adapters)
SCSI and Fibre supported
Supports AIX 5L V5.3 and Linux partitions
Configured like a standard Ethernet
IP forwarding / bridging provided by I/O server partition
Can have multiple connections per partition
Virtual “MAC” addressing
Each adapter can support 16 virtual Ethernet LANs
Micro-Partitioning

Increased number of LPARs
- Micro-Partitions: 160*
- Dynamic LPARs: 16*

Configured via the HMC

Number of logical processors
- Minimum/maximum

Entitled capacity
- In units of 1/100 of a CPU
- Minimum 1/10 of a CPU

Variable weight
- % share (priority) of surplus capacity

Capped or uncapped partitions

* on p5-570
Partition Load Manager for AIX 5L p5 Systems

Policy-based, automatic partition resource tuning
Dynamically adjust CPU and memory allocation

Before resource tuning

<table>
<thead>
<tr>
<th>Unbalanced resource allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 CPU Agent Test LPAR</td>
</tr>
<tr>
<td>5 CPU Agent CRM LPAR</td>
</tr>
<tr>
<td>6 CPU Agent Finance LPAR</td>
</tr>
</tbody>
</table>

After resource tuning

<table>
<thead>
<tr>
<th>Adjust resource allocation based on business priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CPU Agent Test LPAR</td>
</tr>
<tr>
<td>3 CPU Agent CRM LPAR</td>
</tr>
<tr>
<td>10 CPU Agent Finance LPAR</td>
</tr>
</tbody>
</table>
IBM ~ p5 590

Operating System Options
POWER5 transitions on AIX 5L V5.2 and V5.3

<table>
<thead>
<tr>
<th>AIX 5L V5.2</th>
<th>AIX 5L V5.3</th>
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<tbody>
<tr>
<td><strong>POWER5 Hardware</strong></td>
<td><strong>Simultaneous Multithreading</strong></td>
</tr>
<tr>
<td><strong>POWER5 RAS functions</strong></td>
<td><strong>Dynamic LPAR</strong></td>
</tr>
<tr>
<td><strong>Dynamic LPAR</strong></td>
<td><strong>Advanced POWER Virtualization</strong></td>
</tr>
<tr>
<td><strong>Partition Load Manager</strong></td>
<td>- Partition Load Manager</td>
</tr>
<tr>
<td></td>
<td>- Micro-Partitioning</td>
</tr>
<tr>
<td></td>
<td>- Shared processor pool</td>
</tr>
<tr>
<td></td>
<td>- Virtual I/O Server</td>
</tr>
</tbody>
</table>
Linux on POWER*

- Enterprise Class Computing with Linux and POWER5
  - Flexibility with LPAR, dynamic LPAR, and virtualization features
  - Reliability with built-in self-healing capabilities

- Linux distributions available for IBM ~ p5 are:
  - SUSE LINUX Enterprise Server 9 for POWER (SLES 9)
  - Red Hat Enterprise Linux AS 3 for POWER Update 4 (RHEL AS 3)

- SUSE LINUX and Red Hat, Inc. also provide support, upgrades and maintenance. Technical support is also available through IBM SupportLine contract.

- Linux on pSeries remains orderable from IBM or directly from Linux distributors

- For more information about Linux running on IBM ~ p5 or pSeries systems:
  http://www.ibm.com/servers/eserver/pseries/linux
  http://www.redhat.com/software/rhel/as/

*Note, many of the features described in this document are operating system dependent and may not be available in Linux.
For more information, please check: www.ibm.com/servers/eserver/pseries/linux/whitepapers/linux_pseries.html.
Primary System Frame Organization

- 24-inch System Frame, 42U
- Bulk Power Assembly (second fully redundant Bulk Power Assembly on rear)
- Central Electronics Complex (CEC)
- Up to four 16-way books
- Each book contains:
  - Two Multi-chip Modules
  - Up to 512GB memory
  - Six RIO-2 I/O hub adapters
- Two hot-plug redundant blowers with two more on the rear of the CEC
- Optional storage device media drawer
- Optional I/O drawer or internal batteries
- First I/O drawer (required)
- Optional I/O drawer or High Performance Switch
Primary System Frame Organization (rear view)

- Fully redundant Bulk Power Assembly
- Two hot-plug redundant blowers
- Two service processors (Auto Failover redundancy planned for 2H05*)
- Two redundant clocks. Second clock is activated on a re-boot basis
- Twelve hot-plug redundant power supplies. Three required per each 16-way book
- PCI-X slots and RIO-2 ports on rear (up to four I/O drawers on this frame)

*Note see statement of direction
Redundant Bulk Power Assembly

Two fully redundant power subsystems integrated into primary frame (8U high), front and rear

- Both p5-590 and p5-595 have three phase power (200 to 240v, 380 to 415v, 480v)
- Twelve hot-plug redundant power supplies in back of CEC (three per book)
- Internal battery backup features available
Central Electronics Complexes for p5-590/595

- Full 64-bit POWER5 implementation
- AIX 5L V5.2 and V5.3, Linux, HACMP
- IBM Virtualization Engine systems technology
- Redundant service processors
- Redundant system clocks
- Up to 254 logical partitions
- 7.6MB L2 ECC cache per MCM
- 144MB L3 ECC cache per MCM

p5-595 CEC: up to four CEC books
- 1.65 GHz or 1.9 GHz 64-bit processors
- 16- to 64-way SMPs
- 8GB to 2048GB ECC DDR1 memory or
- 8GB to 256GB ECC DDR2 memory
- up to 12 RIO-2 I/O drawers

p5-590 CEC: up to two CEC books
- 1.65 GHz 64-bit processors
- 8- to 32-way SMPs
- 8GB to 1024GB ECC DDR1 memory or
- 8GB to 128GB ECC DDR2 memory
- up to eight RIO-2 I/O drawers
CEC Book Configurations for p5-590 and p5-595

- 16-way p5-590
  - 1.65 GHz

- 16-way p5-595
  - 1.65 or 1.9 GHz

- 32-way p5-590
  - 1.65 GHz

- 32-way p5-595
  - 1.65 or 1.9 GHz

- 48-way p5-590
  - 1.65 or 1.9 GHz

- 48-way p5-595
  - 1.65 or 1.9 GHz

- 64-way p5-590
  - 1.65 or 1.9 GHz

- 64-way p5-595
  - 1.65 or 1.9 GHz

- p5-590 may be upgraded to a p5-595 1.65 GHz
- Clock speeds may not be mixed on a server
## p5-590 and p5-595 Functional Relationships

<table>
<thead>
<tr>
<th>MCMs</th>
<th>Processors</th>
<th>Memory</th>
<th>I/O Drawers</th>
<th>Slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>16-way</td>
<td>8 to 512GB</td>
<td>6</td>
<td>120</td>
</tr>
<tr>
<td>4</td>
<td>32-way</td>
<td>16 to 1024GB</td>
<td>12</td>
<td>240</td>
</tr>
<tr>
<td>6</td>
<td>48-way</td>
<td>24 to 1536GB</td>
<td>12</td>
<td>240</td>
</tr>
<tr>
<td>8</td>
<td>64-way</td>
<td>32 to 2048GB</td>
<td>12</td>
<td>240</td>
</tr>
</tbody>
</table>

- **p5-590**
  - 2 MCMs: 16-way, 8 to 512GB, 6 I/O Drawers, 120 Slots
  - 4 MCMs: 32-way, 16 to 1024GB, 12 I/O Drawers, 240 Slots
  - 6 MCMs: 48-way, 24 to 1536GB, 12 I/O Drawers, 240 Slots
  - 8 MCMs: 64-way, 32 to 2048GB, 12 I/O Drawers, 240 Slots

- **p5-595**
  - 2 MCMs: 16-way, 8 to 512GB, 6 I/O Drawers, 120 Slots
  - 4 MCMs: 32-way, 16 to 1024GB, 8 I/O Drawers, 160 Slots
Memory Cards per 16-way Book

- It is recommended that each book at a minimum, have four memory cards for best performance.
- 32GB max per memory card using 8GB DDR1 DIMMs yielding 512GB per 16-way book or 2 terabytes for 4 books.
- 16GB max per memory card using 4GB DDR1 DIMMs yielding 256GB per 16-way book or 1 terabyte for four books.
- 4GB max per card using 512MB DDR2 SDRAM non-stacked, yielding 64GB per 16-way book.
Capacity Upgrade on Demand – Processors

_Up to half the total number of processors installed may be inactive until needed for growth, at which time they may be permanently or temporarily activated one at a time._

- **p5-590**
  - Minimum of 8-way activation
  - Maximum of 50% may be inactive
  - Activations required by number of processor books
    - One book server requires 8 active out of 16
    - Two book server requires 16 active out of 32
    - Three book server requires 16 active out of 48
    - Four book server requires 32 active out of 64

- **p5-595**
  - Minimum of 16-way activation
  - Maximum of 50% may be inactive
  - Activations required by number of processor books
    - One book server requires 16 active out of 16
    - Two book server requires 16 active out of 32
    - Three book server requires 24 active out of 48
    - Four book server requires 32 active out of 64
Capacity Upgrade on Demand – Memory

- CUoD for processors and memory are separate operations
- Memory cards are configured in pairs half enabled / half CUoD
- Activation granularity of 1GB of standby capacity
- Choices of 2/4GB and 4/8GB
- Temporary memory on demand available using On/Off CoD
- Activation process same as for processors

8GB Installed

- 4GB Enabled
- 4GB Available

16GB Installed

- 8GB Enabled
- 8GB Available

- 4GB Enabled
- 4GB Available

- 2/4
- 2/4

- 4/8
- 4/8

- 8GB Installed

- 8GB Enabled
- 8GB Available
Hardware Management Console (HMC)

Desktop or rack installed HMC* options

System control software
- On demand CUoD control
- Service focal point for problem determination and service support
- Virtualization management functions
- Control point for managing clustered server environments
- Controls multiple non-clustered pSeries servers
  (the number dependent on server type and mixture)

* Note: The same HMC will not manage both POWER4 and POWER5 servers
24-inch I/O Drawer* (features 5791, 5794)

**FRONT**
- Contains up to 16 hot-swappable disks structured into four 4-packs of 36.4GB or 73.4GB 15K rpm disk drives (1.1 terabytes maximum per I/O drawer)
- Feature options for two or four backplanes
- Existing IBM 7040-61D I/O drawers may be moved to these servers

**REAR**
- Twenty hot-plug PCI-X slots per drawer
- Maximum of 160 hot-plug slots per system
- Hot-plug slots permit PCI-X adapters to be added or replaced without extending the I/O drawer while system remains available via blind-swap cassettes
- Any slot can be assigned to any partition

*Note, the IBM 7040 61D I/O drawer may be migrated from another system and used*
I/O Drawer (Front View)

Four x 4-packs per drawer

Two or four separately powered backplanes

Each 4-pack can be assigned to a partition.

16 hot-swappable disks (36.4GB, 73.4GB at 15K rpm)

9.3 terabytes maximum per p5-590 using all eight I/O drawers

14.0 terabytes maximum per p5-595 using all eight I/O drawers

Light Path Diagnostics with LEDs for:
- Fans, blowers, power, disk removal and faults.
I/O Drawer Rear View (PCI-X slots)

- Two x 10 PCI-X slots per drawer, either 32-bit or 64-bit adapters
- 160 slots maximum per system using eight I/O drawers
- Each 10 slots are powered separately
- Slots are all hot-plug to allow for application growth or replace faulty adapters while the server remains operational
- Adapter cards are protected by a blind-swap plastic cassette to permit installation without moving drawer and cables

64-bit PCI-X slots capable of supporting 3.3V signaling PCI or PCI-X adapters operating at speeds up to 133 MHz
UTEP p5-590 Configuration

24-inch System Frame, 42U
Bulk Power Assembly
(second fully redundant Bulk Power Assembly on rear)
Central Electronics Complex (CEC)
One 16-way book
Each book contains:
- Two Multi-chip Modules
- 16GB active memory (32GB tot)
- Six RIO-2 I/O hub adapters

Two hot-plug redundant blowers with two more on the rear of the CEC
Space for Media Drawer
Space for I/O drawer or internal batteries
First I/O drawer (16-73.4GB 15K disk drives and 8 eth)
Space for Additional I/O Drawer

Note: I/O components include 4mm Tape Drive and 4.7GB DVDRAM Drive
IBM® TotalStorage® DS4300
DS4300 Dual Controller Features

Models
DS4300 Storage Server 1722 – 60U, 172260U

RAID controller
Dual 2Gbp/s FC controller, high-performance RAID controller, upgradeable to DS4300 Turbo feature

Controller cache
512 MB

Battery backup for cache
Yes, mirrored

Host interface
Auto sense 1/2 Gb Fibre Channel Arbitrated Loop (FC-AL), Fibre Channel Switched Fabric, Fibre Channel Point-to-Point

Supported drives
36.4GB, 73.4GB, 146.8GB and 300GB 10,000 rpm; 18.2GB, 36.4GB, 73.4GB and 146.8 15,000 rpm
14 FC drives inside the controller
Hot pluggable drives - Hot add new drives for extra capacity without booting server

Supported capacity
Supports up to 56 FC drives with three DS4000 EXP700 Expansion Unit’s(16.8TB)
Supports up to 112 SATA drive with eight DS4000 EXP100 SATA Expansion Unit’s (28TB)

RAID levels
0, 1, 3, 5 and 10

Partitioning
1 Partition/host group standard, upgradeable to 4, 8 or 16 storage partitions
DS4300 Dual Controller Features and Expansion Units

Supports global hot spares

Hub or switch support

DS4000 Storage Manager
   SM version 9.10 (highest supported version)
   Firmware version 5.34 (highest supported version)

Power supplies and fans
   Dual power supplies, redundant cooling, hot pluggable

IBM DS4000 EXP700/EXP710 FC Expansion Unit
   Supports up to 14 FC disk drives (18.2GB, 36.4GB, 73.4GB, 146.8GB, 300GB)
   Power supplies and fans dual redundant, hot-pluggable

IBM DS4000 EXP100 SATA Expansion Unit
   Supports up to 14 serial ATA (SATA) disk drives (250GB)

Expansion Units Supported
   Up to three DS4000 EXP700 FC Expansion Unit ’s
   Up to eight DS4000 EXP100 SATA Expansion Unit ’s
DS4000 Storage Expansion Units

**DS4000 EXP700/EXP710 FC Expansion Unit**
- Supported on DS4500, DS4400, DS4300 Turbo, DS4300, FASTT200
- 2 Gbps Full Fibre Channel support
- Supports up to 14 hot-swap FC drives
- 36.4, 73.4, 146.8 GB and 300GB 10K RPM drives
- 18.2 GB, 36.4, 73.4 GB and 146.8GB 15K RPM drive

**DS4000 EXP100 SATA Expansion Unit**
- Supported on DS4500, DS4400, DS4300 Turbo, DS4300 Dual, DS4100
- 2 Gbps FC attach to FAST Storage Server
- Supports up to 14 hot-swap serial ATA drives
- 250 GB, 7.2K RPM SATA drive

**Expansion Unit Intermixing**
- SATA and FC Intermix attached to same controller
- EXP700 and EXP710 attached to same controller

**DS4000 Intermix Attachment feature for Fibre Channel and Serial ATA Disk Expansion Units**
- With this new feature, the TotalStorage DS4500, DS4400, and DS4300 Turbo Mid-range Disk Systems are capable of supporting concurrent attachment of DS4000 EXP700/EXP710, and DS4000 EXP100 Storage Expansion Units.
## DS4000 Specification Comparison

<table>
<thead>
<tr>
<th></th>
<th>DS4500</th>
<th>DS4400</th>
<th>DS4300 Turbo</th>
<th>DS4300 Dual</th>
<th>DS4300 Single</th>
<th>FASTT200</th>
<th>DS4100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Host Interfaces</strong></td>
<td>2 Gbps FC</td>
<td>2 Gbps FC</td>
<td>2 Gbps FC</td>
<td>2 Gbps FC</td>
<td>2 Gbps FC</td>
<td>1 Gbps FC</td>
<td>2 Gbps FC</td>
</tr>
<tr>
<td><strong>SAN attachments (max)</strong></td>
<td>4 FC-SW</td>
<td>4 FC-SW</td>
<td>4 FC-SW</td>
<td>4 FC-SW</td>
<td>4 FC-SW</td>
<td>2 FC-SW</td>
<td>4 FC-SW</td>
</tr>
<tr>
<td><strong>Direct attachments (max)</strong></td>
<td>8 FC-AL</td>
<td>8 FC-AL</td>
<td>4 FC-AL</td>
<td>4 FC-AL</td>
<td>2 FC-SW</td>
<td>2 FC-AL</td>
<td>4 FC-AL</td>
</tr>
<tr>
<td><strong>Redundant drive channels</strong></td>
<td>Four 2 Gb FC</td>
<td>Four 2 Gb FC</td>
<td>Two 2 Gb FC</td>
<td>Two 2 Gb FC</td>
<td>One 2 Gb/s</td>
<td>Two 1 Gb FC</td>
<td>Two 2 Gb FC 14 SATA</td>
</tr>
<tr>
<td><strong>Drive types supported</strong></td>
<td>FC or SATA</td>
<td>FC or SATA</td>
<td>FC or SATA</td>
<td>FC or SATA</td>
<td>FC</td>
<td>FC</td>
<td>SATA</td>
</tr>
<tr>
<td><strong>Max drives</strong></td>
<td>224</td>
<td>224</td>
<td>112</td>
<td>56 FC 112 SATA</td>
<td>14</td>
<td>66</td>
<td>56</td>
</tr>
<tr>
<td><strong>Max capacity with FC</strong></td>
<td>67.2 TB</td>
<td>67.2 TB</td>
<td>33.6 TB</td>
<td>16.8 TB</td>
<td>4.2TB</td>
<td>9.6 TB</td>
<td>---</td>
</tr>
<tr>
<td><strong>Max capacity with SATA</strong></td>
<td>56 TB</td>
<td>56TB</td>
<td>28 TB</td>
<td>28 TB</td>
<td>---</td>
<td>---</td>
<td>28TB</td>
</tr>
<tr>
<td><strong>Processor</strong></td>
<td>Intel Pentium III 850 MHz</td>
<td>Intel Celeron 566 MHz</td>
<td>Intel xScale 600MHz</td>
<td>Intel xScale 600MHz</td>
<td>Intel xScale 600MHz</td>
<td>Intel i960RN 100 MHz</td>
<td>Intel xScale 600MHz</td>
</tr>
<tr>
<td><strong>XOR technology</strong></td>
<td>ASIC</td>
<td>ASIC</td>
<td>Integrated</td>
<td>Integrated</td>
<td>Integrated</td>
<td>Integrated</td>
<td>Integrated</td>
</tr>
<tr>
<td><strong>Cache memory</strong></td>
<td>2 GB</td>
<td>2 GB</td>
<td>2 GB</td>
<td>512 MB</td>
<td>256 MB</td>
<td>256 MB</td>
<td>512 MB</td>
</tr>
</tbody>
</table>