IBM zEnterprise System 196 Overview
Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries.

<table>
<thead>
<tr>
<th>Trademark</th>
<th>Trademark</th>
<th>Trademark</th>
<th>Trademark</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX®</td>
<td>HiperSockets*</td>
<td>POWER7®</td>
<td>System z10</td>
</tr>
<tr>
<td>BladeCenter®</td>
<td>IBM®</td>
<td>PowerVM*</td>
<td>WebSphere*</td>
</tr>
<tr>
<td>DataPower®</td>
<td>IBM eServer</td>
<td>RP/SM</td>
<td>z9®</td>
</tr>
<tr>
<td>DB2®</td>
<td>IBM (logo)*</td>
<td>RACF®</td>
<td>z10 BC</td>
</tr>
<tr>
<td>FICON®</td>
<td>InfiniBand®</td>
<td>System x®</td>
<td>z10 EC</td>
</tr>
<tr>
<td>GDPS®</td>
<td>Parallel Sysplex®</td>
<td>System z®</td>
<td>zEnterprise</td>
</tr>
<tr>
<td>Geographically Dispersed Parallel Sysplex</td>
<td>POWER*</td>
<td>System z9®</td>
<td>z/OS*</td>
</tr>
</tbody>
</table>

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries. Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license there from. Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both. InfinitBand is a trademark and service mark of the InfinitBand Trade Association. Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. UNIX is a registered trademark of The Open Group in the United States and other countries. Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both. ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office. IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency, which is now part of the Office of Government Commerce.

* All other products may be trademarks or registered trademarks of their respective companies.

Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here. IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply. All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions. This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area. All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products. Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.
Business processes and the applications that support them are becoming more service oriented, modular in their construction, and integrated.

The components of these services are implemented on a variety of architectures and hosted on heterogeneous IT infrastructures.

Approaches to managing these infrastructures along the lines of platform architecture boundaries cannot optimize: alignment of IT with business objectives; responsiveness to change; resource utilization; business resiliency; or overall cost of ownership.

Customers need a better approach: The ability to manage the IT infrastructure and Business Application as an integrated whole.
zEnterprise System Hardware
Overview Introduction

IBM zEnterprise 196 (z196)

IBM zEnterprise BladeCenter® Extension (zBX™) Model 002

IBM System z10® EC or BC

IBM zEnterprise BladeCenter® Extension (zBX™) Model 001
IBM z196 Continues the CMOS Mainframe Heritage

- **G4** – 1st full-custom CMOS S/390®
- **G5** – IEEE-standard BFP, branch target prediction
- **G6** – Copper Technology (Cu BEOL)
- **z900** – Full 64-bit z/Architecture®
- **z990** – Superscalar CISC pipeline
- **z9 EC** – System level scaling
- **z10 EC** – Architectural extensions
- **z196** – Out of order, improved superscalar, new architecture
System z “Specialty Engine” Evolution to the zEnterprise Ensemble
IBM zEnterprise System – Best in Class Systems and Software Technologies

A system of systems that unifies IT for predictable service delivery

Unified management for a smarter system: zEnterprise Unified Resource Manager

- Part of the IBM System Director family, provides platform, hardware and workload management
- Unifies management of resources, extending IBM System z® qualities of service across the infrastructure

The world’s fastest and most scalable system: IBM zEnterprise™ 196 (z196)

- Ideal for large scale data and transaction serving and mission critical applications
- Most efficient platform for Large-scale Linux® consolidation
- Leveraging a large portfolio of z/OS® and Linux on System z applications
- Capable of massive scale up, over 50 Billion Instructions per Second (BIPS)

Scale out to a trillion instructions per second: IBM zEnterprise BladeCenter® Extension (zBX)

- Selected IBM POWER7® blades and IBM System x® Blades1 for tens of thousands of AIX® and Linux applications
- High performance optimizers and appliances to accelerate time to insight and reduce cost
- Dedicated high performance private network

1 All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

© 2010 IBM Corporation
The Value Begins At the Heart of z196 …

**zEnterprise 196 (z196) Machine Type: 2817 Models: M15, M32, M49, M66, M80**

- **Improved connectivity**
  - One to four books
  - Hot pluggable I/O drawer
  - InfiniBand Coupling links

- **Focus on the environment**
  - Options to help eliminate hotspots and save on energy
  - Static power savings
  - Query maximum potential power
  - Leadership technology for cooling and power distribution

- **Operating System Flexibility**
  - z/OS, z/VM®, z/VSE™, z/TPF and Linux on System z

- **Security and reliability**
  - Elliptic curve cryptography
  - Concurrent patch update enhancements

---

1 For average LSPR workloads running z/OS 1.11.
z196 – IBM Leadership Technology At the Core

- **New 5.2 GHz Quad Core Processor Chip boosts hardware price/performance**
  - 100 new instructions – improvements for CPU intensive, Java™, and C++ applications
  - Over twice as much on-chip cache as System z10 to help optimize data serving environment
  - Out-of-order execution sequence gives significant performance boost for compute intensive applications
  - Significant improvement for floating point workloads
- **Performance improvement for systems with large number of cores – improves MP ratio**
- **Data compression and cryptographic processors right on the chip**
zEnterprise Quick Facts

- Type 2817  Models M15 M32 M49 M66 M80

- 5.2 GHz clock speed
- 4 cores per chip
- 45 nanometer copper/silicon-on-insulator technology
- 1.4 billion transistors within 512.3 square millimeters
- Superscalar pipeline can decode three z/Architecture CISC instructions per clock cycle and execute up to five operations per cycle
- Each core has 6 execution units: 2 integer units, 1 floating point unit, 2 load/store units and 1 decimal (or money math) unit.
- 64 KB of L1 instruction cache and 128 KB of L1 data cache
- 1.5 MB L2 cache
- 24 MB of eDRAM L3 cache, which is split into two banks and managed by two on-chip L3 cache controllers.
- 24 MB L4 cache per core
- Each z196 chip also has two cryptographic and compression co-processors

- MCM is 96 MM x 96 MM
- Each MCM has 6 quad core processor chips and 2 SC chips
- On models M15 M32 M49 M66  there are 20 PUs 3 SAPs and 17 configurable CP (2 Spares on 1st MCM)
- On model 80 there are 24 CPs per MCM = 96, 2 spares 14 SAPs and 80 configurable CPs
- 6 sockets on the MCM are linked to each other with 40 GB/sec links
z196 PU chip, SC chip and MCM
z10 EC MCM vs z196 MCM Comparison

### z10 EC MCM

- **MCM**
  - 96mm x 96mm in size
  - 5 PU chips per MCM
    - Quad core chips with 3 or 4 active cores
    - PU Chip size 21.97 mm x 21.17 mm
    - 4.4 GHz
    - Superscalar, In order execution
    - L1: 64K I / 128K D private/core
    - L1.5: 3M I+D private/core
  - 2 SC chips per MCM
    - L2: 2 x 24 M = 48 M L2 per book
    - SC Chip size 21.11 mm x 21.71 mm
  - 1800 Watts

### z196 MCM

- **MCM**
  - 96mm x 96mm in size
  - 6 PU chips per MCM
    - Quad core chips with 3 or 4 active cores
    - PU Chip size 23.7 mm x 21.5 mm
    - 5.2 GHz
    - Superscalar, OOO execution
    - L1: 64K I / 128K D private/core
    - L2: 1.5M I+D private/core
    - L3: 24MB/chip - shared
  - 2 SC chips per MCM
    - L4: 2 x 96 M = 192 M L4 per book
    - SC Chip size 24.5 mm x 20.5 mm
  - 1800 Watts
z196 Book Level Cache Hierarchy

PU Chip 4 Cores

1.5MB L1 1.5MB L1 1.5MB L1 1.5MB L1

24MB eDRAM Inclusive L3

1.5MB L2 1.5MB L2 1.5MB L2 1.5MB L2

192MB eDRAM Inclusive L4
2 SC Chips

LRU Cast-Out
CP Stores
Data Fetch Return
z196 Out-of-Order (OOO) Value

- z196 has the first System z CMOS out-of-order core
- z196 has the first System z out-of-order core since 1991
- OOO yields significant performance benefit for applications through
  - Re-ordering instruction execution
    - Later (younger) instructions can execute ahead of an older stalled instruction
  - Re-ordering storage accesses and parallel storage accesses
- OOO maintains good performance growth for traditional apps
z196 New instructions and instruction enhancements Designed to provide new function and improve performance

- **High-Word Facility** (30 new instructions)
  - Independent addressing to high word of 64 bit General Purpose Registers
  - Effectively provides software with 16 additional registers for arithmetic
- **Interlocked-Access Facility** (12 new instructions)
  - Interlocked (atomic) load, value update and store operation in a single instruction
- **Load/Store-on-Condition Facility** (6 new instructions)
  - Load or store conditionally executed based on condition code
  - Dramatic improvement in certain codes with highly unpredictable branches
- **Distinct-Operands Facility** (22 new instructions)
  - Independent specification of result register (different than either source register)
  - Reduces register value copying
- **Population-Count Facility** (1 new instruction)
  - Hardware implementation of bit counting ~5x faster than prior software implementations
- **Floating-Point-Extension Facility** (21 new instructions, 34 instruction enhancements)
- **Message-Security Assist Extensions 3 and 4** – (5 new instructions, 6 instruction enhancements)
- And more ..........
System Offering Overview

z196 machine type: 2817

Processors
- 20 or 24 available cores per book
- Sub-capacity available up to 15 CPs
  - 3 sub-capacity points
  - 2 spares designated per system

Memory for customer purchase
- System minimum = 32 GB
  - 16 GB separate HSA
- Maximum: 3TB / 768 GB per book
- Increments: 32 to 256 GB

I/O Interconnects: (Same as z10 EC)
- 6 GB/sec
  - Up to 16 per book (8 fanouts)
  - Up to 48 per CEC (24 fanouts)

Capacity compared to z10 EC
- z196 M80 compared to z10 EC E64
  - 60% more capacity
- Equal “n-way” – 1.3 to 1.5 ITR ratio depending on workload
- Some workloads could gain up to 30% additional improvement if optimized to new z196 instructions and architecture
z196 Book Layout

- 16X DIMMs
  - 100mm High
- MCM
  - @ 1800W
  - Refrigeration Cooled or Water Cooled
- Memory
- DCA Power Supplies
- 3x DCA
- 11 VTM Card Assemblies
  - 8 Vertical
  - 3 Horizontal
- 14X DIMMs
  - 100mm High
- Cooling
- Front
- I/O
- Fanout Cards
## z196 Processor Features

<table>
<thead>
<tr>
<th>Model</th>
<th>Books/ PUs</th>
<th>CPs</th>
<th>IFLs uIFLs</th>
<th>zAAPs</th>
<th>zIIPs</th>
<th>ICFs</th>
<th>SAPs Std</th>
<th>Optional SAPs</th>
<th>Std. Spares</th>
</tr>
</thead>
<tbody>
<tr>
<td>M15</td>
<td>1/20</td>
<td>0-15</td>
<td>0-15 0-14</td>
<td>0-7</td>
<td>0-7</td>
<td>0-15</td>
<td>3</td>
<td>0-4</td>
<td>2</td>
</tr>
<tr>
<td>M32</td>
<td>2/40</td>
<td>0-32</td>
<td>0-32 0-31</td>
<td>0-16</td>
<td>0-16</td>
<td>0-16</td>
<td>6</td>
<td>0-10</td>
<td>2</td>
</tr>
<tr>
<td>M49</td>
<td>3/60</td>
<td>0-49</td>
<td>0-49 0-48</td>
<td>0-24</td>
<td>0-24</td>
<td>0-16</td>
<td>9</td>
<td>0-15</td>
<td>2</td>
</tr>
<tr>
<td>M66</td>
<td>4/80</td>
<td>0-66</td>
<td>0-66 0-65</td>
<td>0-33</td>
<td>0-33</td>
<td>0-16</td>
<td>12</td>
<td>0-20</td>
<td>2</td>
</tr>
<tr>
<td>M80</td>
<td>4/96</td>
<td>0-80</td>
<td>0-80 0-79</td>
<td>0-40</td>
<td>0-40</td>
<td>0-16</td>
<td>14</td>
<td>0-18</td>
<td>2</td>
</tr>
</tbody>
</table>

- z196 Models M15 to M66 use books each with a 20 core MCM (two 4-core and four 3-core PU chips)
- Concurrent Book Add is available to upgrade from model to model (except to the M80)
- z196 Model M80 has four books each with a 24 core MCM (six 4-core PU chips)
- Disruptive upgrade to z196 Model M80 is done by book replacement

Notes:
1. At least one CP, IFL, or ICF must be purchased in every machine
2. One zAAP and one zIIP may be purchased for each CP purchased even if CP capacity is “banked”.
3. “uIFL” stands for Unassigned IFL
z196 Full and Sub-Capacity CP Offerings

- Subcapacity CPs, up to 15, may be ordered on ANY z196 model.
  If 16 or more CPs are ordered all must be full 7xx capacity.
- All CPs on a z196 CEC must be the same capacity.
- All specialty engines run at full capacity. The one for one entitlement to purchase one zAAP and one zIIP for each CP purchased is the same for CPs of any capacity.
- Only 15 CPs can have granular capacity but other PU cores may be characterized as full capacity specialty engines.
z196 I/O Drawer

**Front view**
- Introduced with z10 BC
  - Up to 8 I/O cards in each drawer
    - 4 in front and 4 in rear
- Concurrent add, repair and replacement for systems with more than one I/O drawer
- Drawer can be removed without affecting system input power or power to any other unit
- Drawers are favored on z196

**New Build Examples**
- Up to 32 I/O cards use 1 to 4 drawers
- 33 to 72 I/O cards use 1 or 2 z10 I/O cages plus up to 2 drawers

**Rear view**
- I/O cards
- STI-A mother card
- Air exhaust
- DCA
- DCA
z196 Channel Type and Crypto Overview

- **I/O Channels**
  - FICON Express 8
  - FICON Express 4 (CF only on type upgrade)
  - ESCON – (240 or fewer channels)
- **OSA-Express (Up to 24 features)**
  - OSA-Express 3
    - 10 Gigabit Ethernet LR and SR
      - Intraensemble data network (IEDN) requires two 10 GbE CHPIDs (LR or SR) on two different feature cards. OSX CHPID type.
    - Gigabit Ethernet LX and SX
    - 1000BASE-T Ethernet
      - Intranode Management Network (INMN) requires two 1000BASE-T CHPIDs on two different feature cards. OSM CHPID type.
  - OSA-Express 2 (CF only on type upgrade)
    - 1000BASE-T Ethernet
    - Gigabit Ethernet LX and SX
- **HiperSockets (Define only, no additional charge)**
  - Up to 32 (was 16)

- **Coupling Links**
  - Up to 80 external coupling ports (was 64)
  - Up to 128 CHPIDs (was 64)
  - InfiniBand Coupling Links (Up to 32)
    - 12x InfiniBand DDR
    - 1x InfiniBand DDR
  - ISC-3 (Up to 48, Peer mode only)
  - IC (Define only, no additional charge)

- **Crypto**
  - Crypto Express 3 (Up to 8 features)
    - New function

- **Not supported:**
  - More than 240 ESCON channels
    - RPQ – 8P2507 (Please don’t.)
  - More than 72 I/O feature cards
    - RPQ – 8P2506 (Please don’t. REALLY!)
**z196 FICON Express8**

- Auto-negotiate to 2, 4, or 8 Gbps
  1 Gbps devices not supported point to point
- **Connector - LC Duplex**
- **Four LX ports (FC #3325)**
  - 9 micron single mode fiber
  - Unrepeated distance - 10 km (6.2 miles)
  - Receiving device must also be LX
- **Four SX ports (FC #3326)**
  - 50 or 62.5 micron multimode fiber
    (50 micron fiber is preferred)
  - Unrepeated distance varies fiber type and link data rate
  - Receiving device must also be SX
- LX and SX performance is identical
- Additional buffer credits supplied by a director or DWDM are required to sustain performance beyond 10 km

Small Form Factor Pluggable (SFP) optics. Concurrent repair/replace action for each SFP
Protecting with IBM’s World-Class Security and Business Resiliency Solutions

- **Cryptographic enhancements on z196**
  - Support for the next generation of public key technologies with ECC (Elliptic Curve Cryptography) support that is ideal for constrained environments such as mobile devices.
  - Compliance and security improvements for the payment card industry.
  - With today's focus on compliance, the Crypto Express3 is enhanced for the banking and finance industry.

- **PR/SM™ designed for EAL5 certification.**

- **Policy driven flexibility to add capacity to real or virtual processors.**

- **Backup and Disaster Recovery solutions**
  - Geographically Dispersed Parallel Sysplex™ (GDPS®) offers business continuity for Linux applications on System z.
  - Reduce complexity by consolidating multiple open platform backup processes into a single System z-controlled process.
  - Simplify disaster recovery with TS7680 automated replication to remote site.
z196 zHPF supports data transfers larger than 64 k bytes

- **zHPF multi-track data transfers are no longer limited to 64 k bytes**
  - Up to 256 tracks can be transferred a single operation
  - Eliminating the 64 k byte limit is designed to allow a FICON Express8 channel to fully exploit its available bandwidth
  - This enhancement is exclusive to z196

- **Designed to help provide**
  - Higher throughput for zHPF multi-track operations
  - With lower response time

- **Requires:**
  - FICON Express8 or FICON Express4 channel
  - CHPID TYPE=FC definition
  - Control unit support for zHPF (no change to previous zHPF support)

- **z/OS operating system support**
z196 Parallel Sysplex InfiniBand coupling (PSIFB) ready for even the most demanding data sharing workloads

- **Simplify Parallel Sysplex connectivity**
  
  *Do more with less*
  
  - Can share physical links by defining multiple logical links (CHPDs) up to 128
  - Can consolidate multiple legacy links (ISC and/or ICB)
  - Easily address link constraints (e.g. define another CHPID to increase available subchannels instead of having to add physical links)
  - PSIFB and ISC-3 links allow for a total of **80 physical links** on z196

- **More flexible placement of systems in a data center**
  
  - InfiniBand coupling links (FC 0163 and 0167) take advantage of optical cables **up to 150m long**. No longer restricted to only 10m between System z CECs when using these high performance links.
  
  - InfiniBand coupling link Long Reach (LR FC 0168) features use the same 9 micron fibre cables as ISC-3 and FICON/FCP for **unrepeated distances of up to 10km**, and metropolitan distances with qualified DWDM solutions.
z196 Parallel Sysplex coexistence of Servers/CFs and coupling connectivity

IBM eServer®
zSeries™ z800,
z900
z890 and z990
Not supported!

z9 EC and z9 BC
PSIFB, ISC-3

z10 EC and z10 BC™
PSIFB, ISC-3,

PSIFB
z9 to z9 NOT supported

PSIFB
Up to 150 meters

PSIFB
Up to 100 KM

PSIFB
150 meters

PSIFB
10/100 KM

ICB-4s and ETR
NOT supported on z196

PSIFB 12x IB-SDR or IB-DDR
PSIFB 1x IB-DDR
z196 – Helping to Control Energy Consumption in the Data Center

- Better control of energy usage and improved efficiency in your data center

- New water cooled option allows for energy savings without compromising performance
  - Maximum capacity server has improved power efficiency of 60% compared to the System z10 and a 70% improvement with water cooled option

- Savings achieved on input power with optional High Voltage DC by removing the need for an additional DC to AC inversion step in the data center

- Improve flexibility with overhead cabling option while helping to increase air flow in a raised floor environment

- z196 is same footprint as the System z10 EC\(^1\)

\(^1\) With the exception of water cooling and overhead cabling
## zEnterprise System Functional Comparison to z10 EC

<table>
<thead>
<tr>
<th>Processor / Memory</th>
<th>Virtualization and Alternative Processors</th>
<th>Connectivity</th>
<th>On Demand / RAS</th>
<th>Environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uniprocessor Performance</td>
<td>Virtualization</td>
<td>HiperSockets™</td>
<td>On Demand Offerings</td>
<td>Energy</td>
</tr>
<tr>
<td>System Capacity</td>
<td></td>
<td>FICON</td>
<td>RAS Focus</td>
<td></td>
</tr>
<tr>
<td>Processor Design</td>
<td></td>
<td>I/O subsystem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Models</td>
<td></td>
<td>Internal I/O Bandwidth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processing cores</td>
<td></td>
<td>Coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Granular Capacity</td>
<td></td>
<td>Cryptography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed HSA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 40% performance improvement over z10 EC uniprocessor</td>
<td>zEnterprise Unified Resource Manager has “workload awareness” where workloads consist of virtual images across the hybrid. This awareness allows Unified Resource Manager to optimize resources according to business policies established for a workload.</td>
<td>z196 support of 32 HiperSockets versus z10 EC supporting 16</td>
<td>Administrative Test for On/Off Capacity on Demand</td>
<td>z196 offers Power Save modes for processor, I/O and memory – not on z10 EC</td>
</tr>
<tr>
<td>Up to 60% system capacity performance improvement over z10 EC 64-way</td>
<td></td>
<td>High Performance FICON for z (zHPF) enhancements</td>
<td></td>
<td>z196 offers optional water cooling and DC power – not available on z10 EC</td>
</tr>
<tr>
<td>New 5.2GHz processor chip versus 4.4GHz</td>
<td></td>
<td>Both I/O cage and new I/O drawer (with concurrent add/remove/repair) versus only I/O cage on z10 EC</td>
<td>z196 offers advanced memory enhancements (RAIM) and advanced power and thermal optimization and management that can help to control heat / improve RAS</td>
<td></td>
</tr>
<tr>
<td>z196 will have 5 and z10 EC has 5 models, both with up to 4 books</td>
<td>z196 has industry standard 6 GBps InfiniBand® supports high speed connectivity and high bandwidth</td>
<td>z196 has 80 cores to configure, up to 64 on z10 EC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>z196 has up to 125 capacity settings versus 100 on the z10 EC</td>
<td>Coupling with InfiniBand – improved distance and potential consolidation savings</td>
<td>z196 has up to 3 TB with improved RAS vs. up to 1.5 TB on z10 EC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>z196 has up to 3 TB with improved RAS vs. up to 1.5 TB on z10 EC</td>
<td>z196 has programmable functions for Elliptic Curve Cryptography (ECC) not available on z10 EC</td>
<td>z196 and z10 EC both have fixed 16 GB HSA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For average LSPR workloads running z/OS 1.11.
2 All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only
Synergy with z196 Operating Systems

**z/OS**

- New automatic discovery and configuration for fabric-attached FICON® disk and tape devices can save you hours on storage configuration time
- New definitions for new management network and data network
- New “off the wire” network traffic separation improves performance for your critical interactive and streaming workloads, as well as sysplex distributor traffic
- Support for the next generation of public key technologies with ECC support that is ideal for constrained environments such as mobile devices.
- Participation with new z196 management capabilities by allowing monitoring of z/OS workloads - a new agent can send high level z/OS WLM data to the Unified Resource Manager

**z/VM and Linux on System z**

- Server and application consolidation on System z using Linux and z/VM is the industry leader in large-scale, cost-efficient virtual server hosting
- zEnterprise introduces virtual server provisioning and management for Linux guests running on z/VM
  - Use the Unified Resource Manager to create z/VM virtual machines
  - Simplify the skill level needed to manager a Linux on z/VM environment
- Faster cores and a bigger system cache on the z196 let you do even more with less when running Linux on z/VM
- Plus integrated blades on zBX offer added dimension for workload optimization
Currency is key to operating system support and exploitation of future servers

The following are the minimum operating systems planned to run on z196:

- z/OS
  - z196: z/OS V1.9 for toleration only; exploitation starts with z/OS V1.10 with full exploitation with z/OS V1.12
  - Ensemble support: z/OS V1.10
- Linux on System z distributions:
  - Novell SUSE SLES 10 and SLES 11
  - Red Hat RHEL 5
- z/VM
  - z196: z/VM V5.4 or higher
  - Ensemble support: z/VM V6.1
- z/VSE V4.1 or higher
- z/TPF V1.1 or higher

Using the general purpose blades:
- AIX 5.3, 6.1
- Linux on System x2 (SOD)
IBM zEnterprise BladeCenter Extension (zBX)  
**Machine Type: 2458 – Model 002**

- **Integrated IBM Certified Components driven by System z order**
  - Standard parts – TOR switch, BladeCenter Chassis, Power Distribution Units, Optional Acoustic Panels

- **System z support**
  - Problem reporting, hardware and firmware updates

- **Expanding operating system support for zEnterprise**
  - AIX, Linux on System x¹

- **Simplified management**
  - Improved time to install and implement new applications
  - Central point of management for heterogeneous workloads
  - No change to applications

---

**Optimizers**
- IBM Smart Analytics Optimizer
- WebSphere® DataPower® appliance¹

**Select IBM Blades**
- BladeCenter PS701 Express
- System x¹

---

One to four – 42u racks – capacity for 112 blades
No System z software running in zBX – Passport Advantage software licensed to blades
No MIPS/MSU rating
Configured for high availability
Optional rear door heat exchanger

---

³ All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
zBX … Infrastructure to Support More Resources

- **zBX houses the multiplatform solutions key to the zEnterprise System.**
  - Optimizers that are dedicated to workloads.
    - IBM Smart Analytics Optimizer and WebSphere DataPower appliance\(^1\)
    - Closed environments with hardware and software included in solution
    - Individualized tools for sizing and customizing – dependant on the optimizer
  - Select IBM POWER7 and System x\(^1\) blades – running any application supported by the operating system installed on the blade – with no change.
  - Mix and match Optimizer and select general purpose POWER7 and System x blades in the same rack.
  - zBX is a System z machine type for integrated fulfillment, maintenance, and support

- **Secure network connection between zBX and z196 for data and support.**
  - Fast 10 Gb Ethernet connection to the data
  - Less latency – fewer ‘hops’ to get to the data and no need for encryption / firewall
  - Traffic on user networks not affected.

- **Sharing of resources** – up to eight z196 servers can attach to the zBX and have access to solutions

- **Configuration, support, monitoring, management** – all by Unified Resource Manager

\(^1\) All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
IBM Smart Analytics Optimizer
Capitalizing on breakthrough technologies to accelerate business analytics

What is it?
The IBM Smart Analytics Optimizer is a workload optimized, appliance-like, add-on, that enables the integration of business insights into operational processes to drive winning strategies. It accelerates select queries, with unprecedented response times.

How is it different?
- **Performance**: Unprecedented response times to enable 'train of thought' analyses frequently blocked by poor query performance.
- **Integration**: Connects to DB2® through deep integration providing transparency to all applications.
- **Self-managed workloads**: Queries are executed in the most efficient way.
- **Transparency**: Applications connected to DB2, are entirely unaware of IBM Smart Analytics Optimizer.
- **Simplified administration**: Appliance-like hands-free operations, eliminating many database tuning tasks.

Faster insights for enabling new opportunities
Putting zEnterprise System to the task

*Use the smarter solution to improve your application design*

---

1 All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
IBM POWER7 and System x\(^1\) Blades

*General purpose processors under one management umbrella*

**What is it?**

*The zBX infrastructure can host select IBM POWER7 and System x blades. Each blade comes with an installed hypervisor that offers the possibility of running an application that spans z/OS, Linux on System z, AIX on POWER\(^\circledast\), or Linux on System x (SOD)\(^1\) but have it under a single management umbrella.*

**How is it different?**

- **Complete management:** Advanced management brings operational control and cost benefits, improved security, workload management based on goals and policies.
- **Virtualized and Optimized:** Virtualization means fewer resources are required to meet peak demands with optimized interconnection.
- **Integrated:** Integration with System z brings heterogeneous resources together that can be managed as one.
- **Transparency:** Applications certified to run on AIX 5.3 or 6.1 will also be certified and run on the POWER7 blade. No changes to deployed guest images.
- **More applications:** Brings larger application portfolio to System z.

---

\(^1\) All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
Unified Resource Manager (aka zManager)

Two suites of tiered functionality

- **Manage**
  - Monitor and trend reporting of CPU energy efficiency.
  - New dashboard interface enabling a broader view of system resource consumption.
  - Integrated hardware / asset management across all elements of the system.
  - Private and physically isolated connections for secure support and data sharing.
  - Administrative simplification (wizard) for virtual server provisioning and enablement of integrated storage and network across hypervisors.

- **Automate**
  - Additional wizard function to set up resources associated with a workload the capability to associate those resources with a named business process.
  - Ability to manage to a user defined performance service level policy and enable performance monitoring, reporting and resource optimization.
  - Static power savings and energy management capabilities.
zEnterprise Unified Resource Manager

**Hardware Management**

**Hypervisor Management**
- Integrated deployment and configuration of hypervisors
- Hypervisors (except z/VM) shipped and serviced as firmware.
- Management of ISO images.
- Creation of virtual networks.

**Operational Controls**
- Auto-discovery and configuration support for new resources.
- Cross platform hardware problem detection, reporting and call home.
- Physical hardware configuration, backup and restore.
- Delivery of system activity using new user interface.

**Network Management**
- Management of virtual networks including access control

**Energy Management**
- Monitoring and trend reporting of CPU energy efficiency.

**Key**
- Manage suite
- Automate suite
zEnterprise Unified Resource Manager

Platform Management

**Hypervisor Management**
- Manage and control communication between virtual server operating systems and the hypervisor.

**Energy Management**
- Static power savings
- Ability to query maximum potential power.

**Workload Awareness and Platform Performance Management**
- Wizard-driven management of resources in accordance with specified business service level objectives
- HMC provides a single consolidated and consistent view of resources
- Monitor resource use within the context of a business workload
- Define workloads and associated performance policies

**Virtual Server Lifecycle Management**
- Single view of virtualization across platforms.
- Ability to deploy multiple, cross-platform virtual servers within minutes
- Management of virtual networks including access control

**Key**
- Manage suite
- Automate suite
IBM zEnterprise System:
A revolutionary change has come to IT bringing a new dimension in computing

- Redefining IT frameworks to bring change to operational silos and extend System z governance to POWER7 and System x\(^1\) blades
- Driving business decisions based on insight rather than hindsight
- Improving agility to compete with consolidation and simplification
- Delivering consistent business controls across applications and platforms
- Focused on integration and collaboration to fuel business growth

\(^1\) All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
Logical Design - *What are Ensemble Networks?*
zEnterprise Planned Availability Dates

- **September 10, 2010**
  - All z196 features except as indicated
  - All z196 models new build - air or water cooled
  - z9 EC upgrades to z196 - air or water cooled
  - z10 EC upgrades to z196 - air or water cooled
  - Manage suite (FC #0019) for z196

- **November 19, 2010**
  - Manage suite enhanced functions for z196
  - Automate suite (FC #0020) for z196
  - Ensemble capability (FC #0025)
  - zBX Model 002 new build or MES add to z196* with:
    - IBM Smart Analytics Optimizer (7, 14 and 28 blades)
    - POWER7 blades

- **December 17, 2010**
  - zBX Model 002 new build or MES add to z196* with:
    - IBM Smart Analytics Optimizer (42 and 56 blades)
  - zBX Model 002 MES feature upgrades
  - z10 IBM Smart Analytics Optimizer enablement
  - zBX Model 001 new build or MES add to z10
    - IBM Smart Analytics Optimizer (all sizes)
  - zBX Model 1 MES feature upgrades

- **December 31, 2010**
  - MES features for all z196 models
  - Model conversions for z196

**zBX add to an installed z196**

A zBX can NOT be added to an installed z196 until the December 31 z196 MES date **UNLESS** required OSA-Express3 and HMC features were included in the z196 order.

**Plan ahead!**
Questions
Thank you