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IBM UK Limited

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IBM zEnterprise System – Overview



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Naming

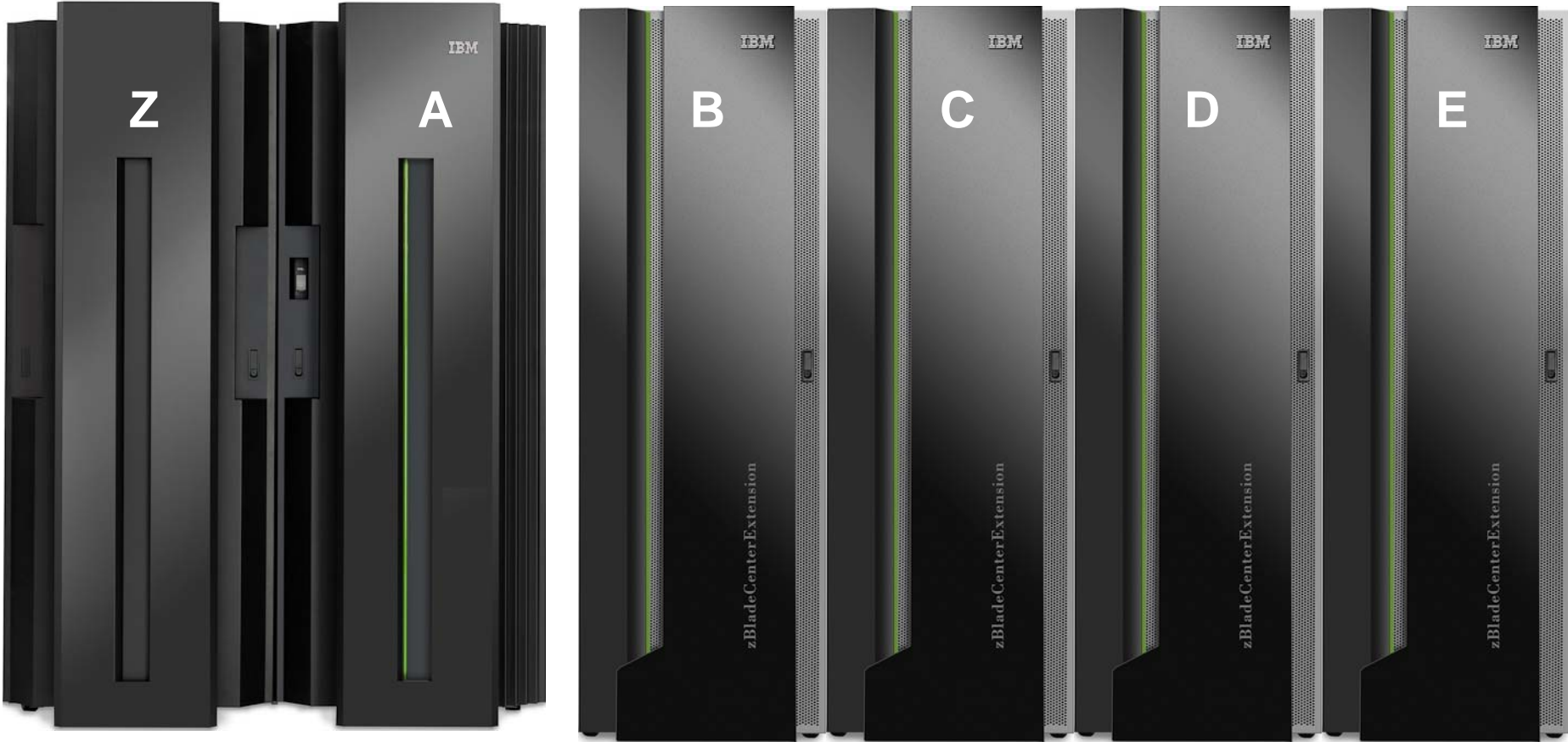
IBM zEnterprise System naming guidelines

Description	Full name – first use	Name after first use
Family name	IBM System z®	System z
System name	IBM zEnterprise™ System	zEnterprise System or zEnterprise
Name on the outside of the server	zEnterprise	N/A
CPC name	IBM zEnterprise 196 (z196)	zEnterprise 196 or z196
Model numbers	M15, M32, M49, M66, M80	N/A
Hybrid infrastructure name	IBM zEnterprise BladeCenter®Extension (zBX) - This is for BOTH the Model 001 and Model 002	zEnterprise BladeCenter Extension or zBX
Name on the outside of the zBX	z BladeCenter Extension (note that there is a space between z and BladeCenter)	Do not use this on documents – not approved form except on the physical zBX
Management Firmware (ensemble management)	IBM zEnterprise Unified Resource Manager (Unified Resource Manager)	zEnterprise Unified Resource Manager or Unified Resource Manager
Bundles	Two suites of tiered functionality – Manage suite and Automate suite	Manage, Automate
System x blade and WebSphere DataPower Appliance	IBM System x® blade* WebSphere® DataPower® Appliance *	Comment : Use the Statement of Direction footnote.
Linux running on a System x	Linux® on System x	Do not use other forms like Linux/x86. They are not correct.
Thus : z196 + zBX + Unified Resource Manager = zEnterprise System		

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IBM System z High End Family

IBM® zEnterprise™ System



1) IBM® zEnterprise™ 196 (z196)

2) IBM® zEnterprise™ BladeCenter® Extension (zBX)

3) Unified Resource Manager

IBM System z10 and zBX Model 001



IBM System z10

zBX Model 001

Availability Dates

IBM zEnterprise System Key Dates

- **IBM zEnterprise System Announce – July 22, 2010**
 - First Day Orders for GA Systems
 - Resource Link™ support available
 - Capacity Planning Tools (zPCR, zTPM, zCP3000) - updated
 - SAPR Guide and SA Confirmation Checklist available
 - New, SAPR Guide for z196, SA-10-010
 - New, SAPR Guide for zBX Model 002, SA10-006

- **ITSO Redbooks® (Draft versions) – July 22, 2010**
 - New - z196 Technical Introduction, SG24-7832 - Draft will be available at announce
 - New - z196 Technical Guide, SG24-7833 - Draft will be made available within a week after announce
 - Updated - IBM System z Connectivity Handbook, SG24-5444 - Draft will be made available within a week after announce
 - New - z196 Configuration Setup, SG24-7834 - Draft will be available sometime during August 2010.
 - New - z196 Unified Resource Management, SG24-7835 - Draft will be available November 19, 2010.



IBM zEnterprise System Key Dates

▪ Planned Availability Dates:

– September 10, 2010

- Features and functions for z196
- z196 Models M15, M32, M49, M60 and M80
- Manage Suite for zEnterprise
- Water Cooling for z196
- z9 EC upgrades to air-cooled z196
- z9 EC upgrades to water-cooled z196
- z10 EC upgrades to air-cooled z196
- z10 EC upgrades to water-cooled z196
- 3-in-1 Bolt Down Kit for new build z196
- **System z discovery and autoconfiguration(zDAC)**

– November 19, 2010

- Manage suite enhancement functions for zEnterprise
- Automate suite for zEnterprise
- IBM Smart Analytics Optimizer for DB2 for z/OS for z196 in blade quantities of 7, 14 and 28
- POWER7 blade for z196 in a zBX

– December 17, 2010

- IBM Smart Analytics Optimizer for DB2 for z/OS for z196 in blade quantities of 42 and 56
- Model 002 MES feature upgrades within model

– December 31, 2010

- 3-in-1 Bolt Down Kit Mes for z196
- MES features for Models M15, M32, M49, M66 and M80
- Model conversions for z196



IBM System z10 Key Dates for new functions/features

▪ **Planned Availability Dates:**

– **November 09, 2010**

- HMC w/Dual Ethernet (#0091) on z10 EC and z10 BC
- TKE workstation (#0841) on z10 EC and z10 BC
- TKE 7.0 LIC (#0860) on z10 EC and z10 BC

– **December 17, 2010**

- IBM Smart Analytics Optimizer enablement (#0251) on z10 EC and z10 BC
- IBM Smart Analytics Optimizer for DB2 for z/OS for z10 in blade quantities of 7, 14, 28, 42 and 56
- Model 001 MES feature upgrades within model

– **March 17, 2011**

- z10 EC with zBX 2458 Model 001 upgrades to z196 with zBX 2458 Model 002



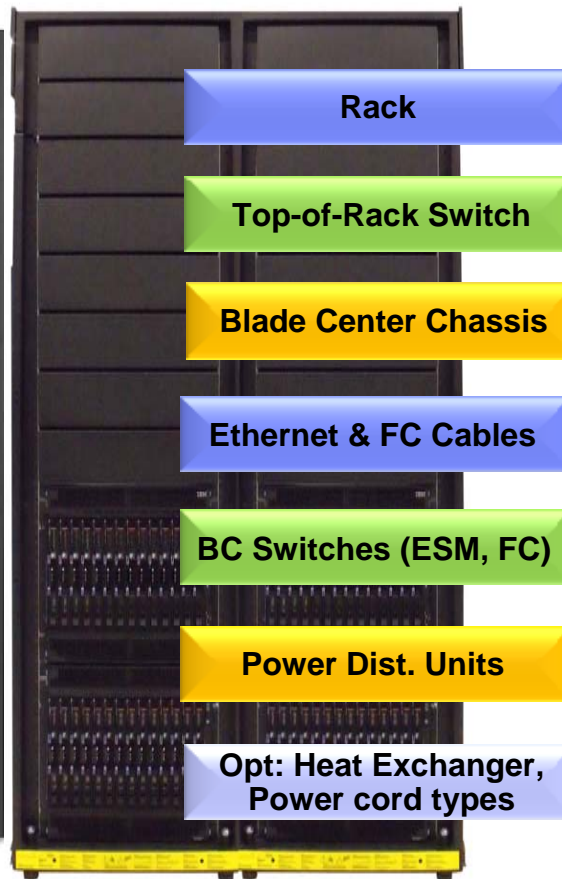
Key Components of zEnterprise

zEnterprise System Hardware Components

zEnterprise 196



zBX Infrastructure



▪ New System z Machine Types:

- CPC = 2817
- zBX = 2458 Model 002
 - WebSphere Data Power Appliance*
 - Customer supplied IBM System x* and p Blades

Key points:

1. CPC Availability and Integrity
2. Independent Lifecycles
 - Asynchronously Upgradeable
 - Enhancements not tied to CPC HW
3. Data availability not tied to single CPC
 - Shareable between CPCs
4. Growth
5. System z service

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zEnterprise BladeCenter Extension Hardware Components

zBX Infrastructure

Blades and Optimizers

zBX Model 002

- Rack
- Top-of-Rack Switch
- Blade Center Chassis
- Ethernet & FC Cables
- BC Switches (ESM, FC)
- Power Dist. Units
- Opt: Heat Exchanger, Power cord types

- For IBM Smart Analytics Optimizer
- System p Blades
- System x Blades*
- WebSphere DataPower Appliance*

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zEnterprise – Unified Resource Manager

zEnterprise 196

zBX

Change Management
Configuration Management
Operations Management
Performance Management

Serviceability Management
Problem Management
Service Reporting

Rack

Top-of-Rack Switch

Blade Center Chassis

Ethernet & FC Cables

BC Switches (ESM, FC)

Power Dist. Units

Opt: Heat Exchanger,
Power cord types



IBM zEnterprise System

z196 Overview



- **Machine Type**
 - 2817
- **5 Models**
 - M15, M32, M49, M66 and M80
- **Processor Units (PUs)**
 - 20 (24 for M80) PU cores per book
 - Up to 14 SAPs per system, standard
 - 2 spares designated per system
 - Dependant on the H/W model - up to 15,32,49,66 or 80 PU cores available for characterization
 - Central Processors (CPs), Integrated Facility for Linux (IFLs), Internal Coupling Facility (ICFs), System z Application Assist Processors (zAAPs), System z Integrated Information Processor (zIIP), optional - additional System Assist Processors (SAPs)
 - Sub-capacity available for up to 15 CPs
 - 3 sub-capacity points
- **Memory**
 - System Minimum of 32 GB
 - Up to 768 GB per book
 - Up to 3 TB for System and up to 1 TB per LPAR
 - 16 GB Fixed HSA, standard
 - 32/64/96/112/128/256 GB increments
- **I/O**
 - Up to 48 I/O Interconnects per System @ 6 GBps each
 - Up to 4 Logical Channel Subsystems (LCSSs)
- **STP - optional**

zBX Overview



- **Machine Type/Model 2458-002**
 - 1 Model with 5 pre-configured options for IBM Smart Analytics Optimizer
- **Racks – Up to 4 (B, C, D and E)**
 - 42U Enterprise, (36u height reduction option)
 - 4 maximum, 2 chassis/rack
 - 2-4 power line cords/rack
 - Non-acoustic doors as standard
 - Optional Acoustic Doors
 - Optional Rear Door Heat Exchanger (conditioned water required)
- **Chassis – Up to 2 per rack**
 - 9U BladeCenter
 - Redundant Power, cooling and management modules
 - Network Modules
 - I/O Modules
- **Blades (Maximum 112 in 4 racks)**
 - IBM Smart Analytic Optimizer Blades (7 to 56)
 - Can not mix other Blades in the same Chassis
 - POWER7 blades (0 to 112)
 - System x* blades (0 to 112)
 - WebSphere DataPower Appliance* blades (0 to 28)
 - Non-IBM Smart Analytic Optimizer Blades can be mixed in the same chassis
- **Management Firmware**
 - SE/HMC Hardware management
- **Top of Rack (TOR) Switches - 4**
 - 1 GbE intranode management network (INMN)
 - 10 GbE intraensemble data network (IEDN)
- **Network and I/O Modules**
 - 1 GbE and 10 GbE modules
 - 8 Gb Fibre Channel (FC) connected to customer supplied disks
 - IBM Smart Analytic Optimizer uses DS5020 disks

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z196 Functions and Features (GA Driver 86 – September 10, 2010)

Five hardware models
Quad core PU chip
Up to 80 processors configurable as CPs, zAAPs, zIIPs, IFLs, ICFs, or optional SAPs
Increased capacity processors
Out of order instruction execution
Over 100 new instructions
Improved processor cache design
Up to 15 subcapacity CPs at capacity settings 4, 5, or 6
Up to 3 TB of Redundant Array of Independent Memory (RAIM)
Unified Resource Manager
Cryptographic enhancements
On Demand enhancements
Energy efficiencies



2 New OSA CHPIDs – OSX and OSM
Three subchannel sets per LCSS
8 slot, 2 domain I/O drawer
Concurrent I/O drawer add, remove, replace
Doubled HiperSockets to 32
Physical Coupling Links increased to 80
Doubled Coupling CHPIDs to 128
CFCC Level 17
Optional water cooling
Optional High Voltage DC power
Optional overhead I/O cable exit
STP enhancements
zBX-002 with IBM Smart Analytics Optimizer, IBM Blades
Additional traditional HMC required for Systems maintained by Third Parties for zBX maintenance

zBX Functions and Features (GA Driver 86 – November 19, 2010)

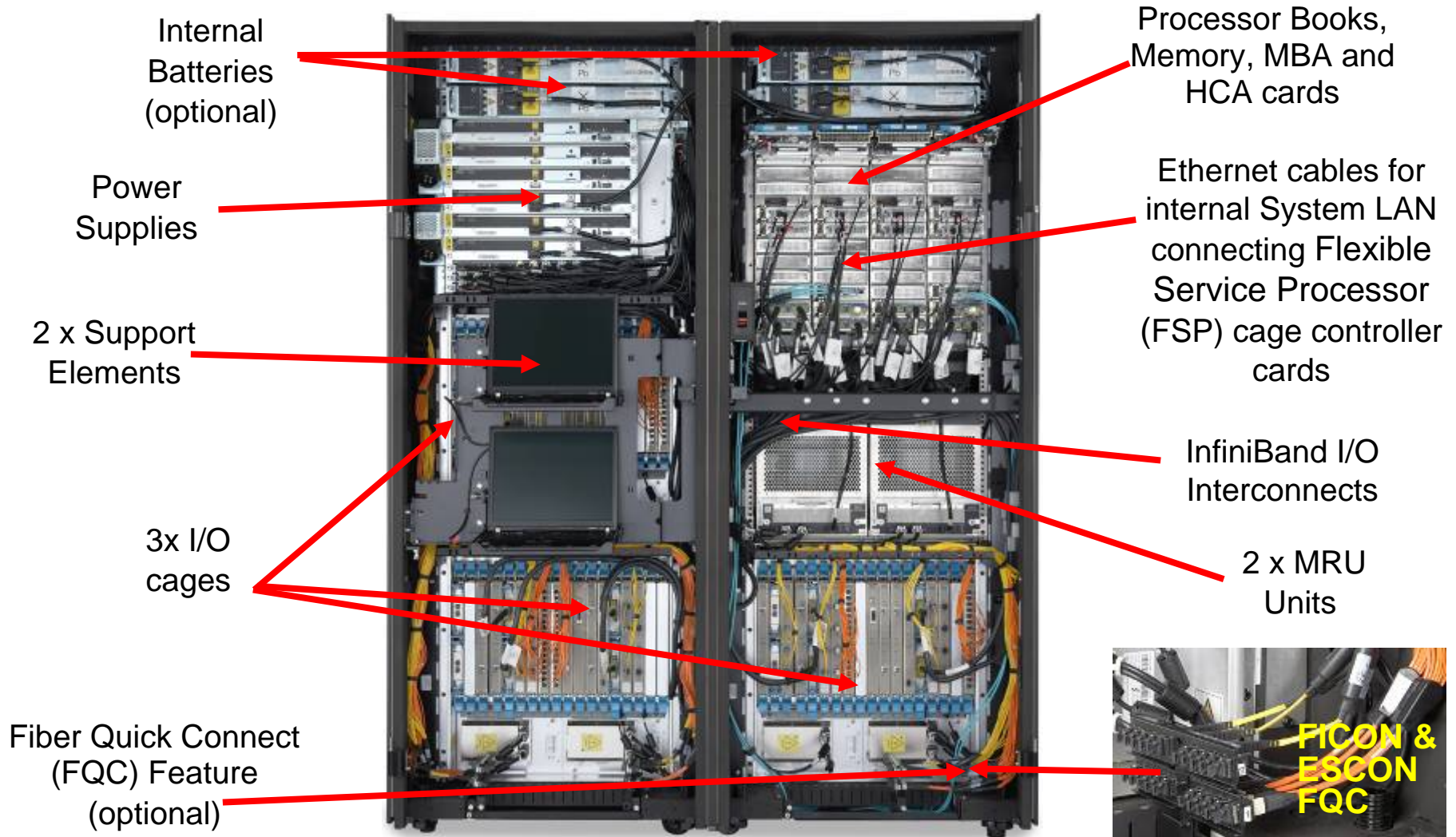
One hardware model
zBX is controlled by one specific z196
Up to 4 Racks (B, C, D and E)
2 BladeCenters Chassis per rack
Non-acoustics doors standard
Optional Rear Door Heat Exchanger
Optional acoustic doors
Redundant Power, Cooling and Management Modules
10 GbE and 1 GbE Network modules
8 Gb SR FC modules



Advance Management Module
1 GbE and 10 GbE TORs
Up to 112 Blades
IBM Smart Analytics Optimizer Blades
System p Blades
System x Blades*
WebSphere DataPower Appliances*
HMCs required for Unified Resource Manager
Additional zBX owned HMC required if System maintained by Third Party

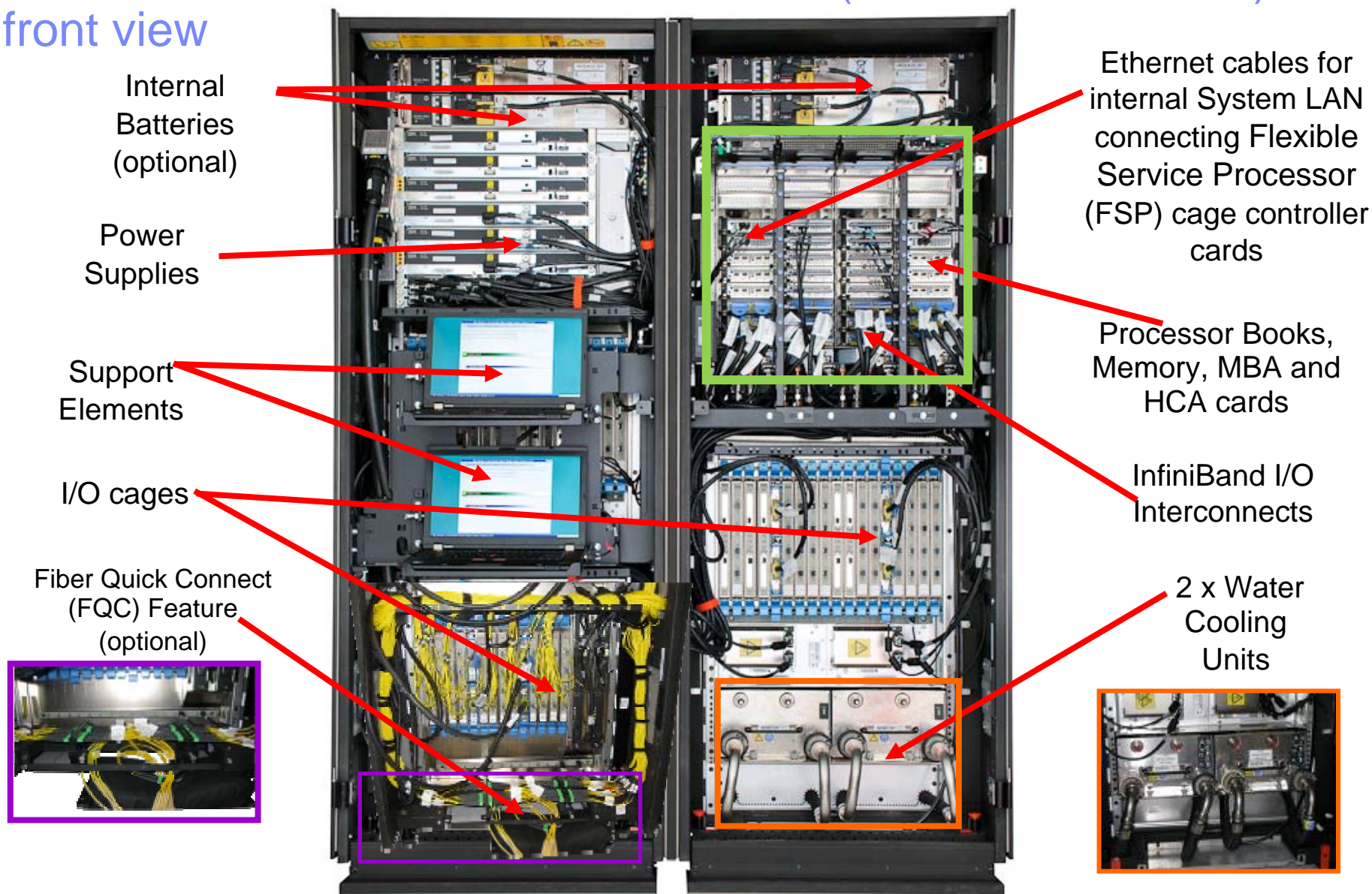
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z196 – Under the covers (Model M66 or M80)



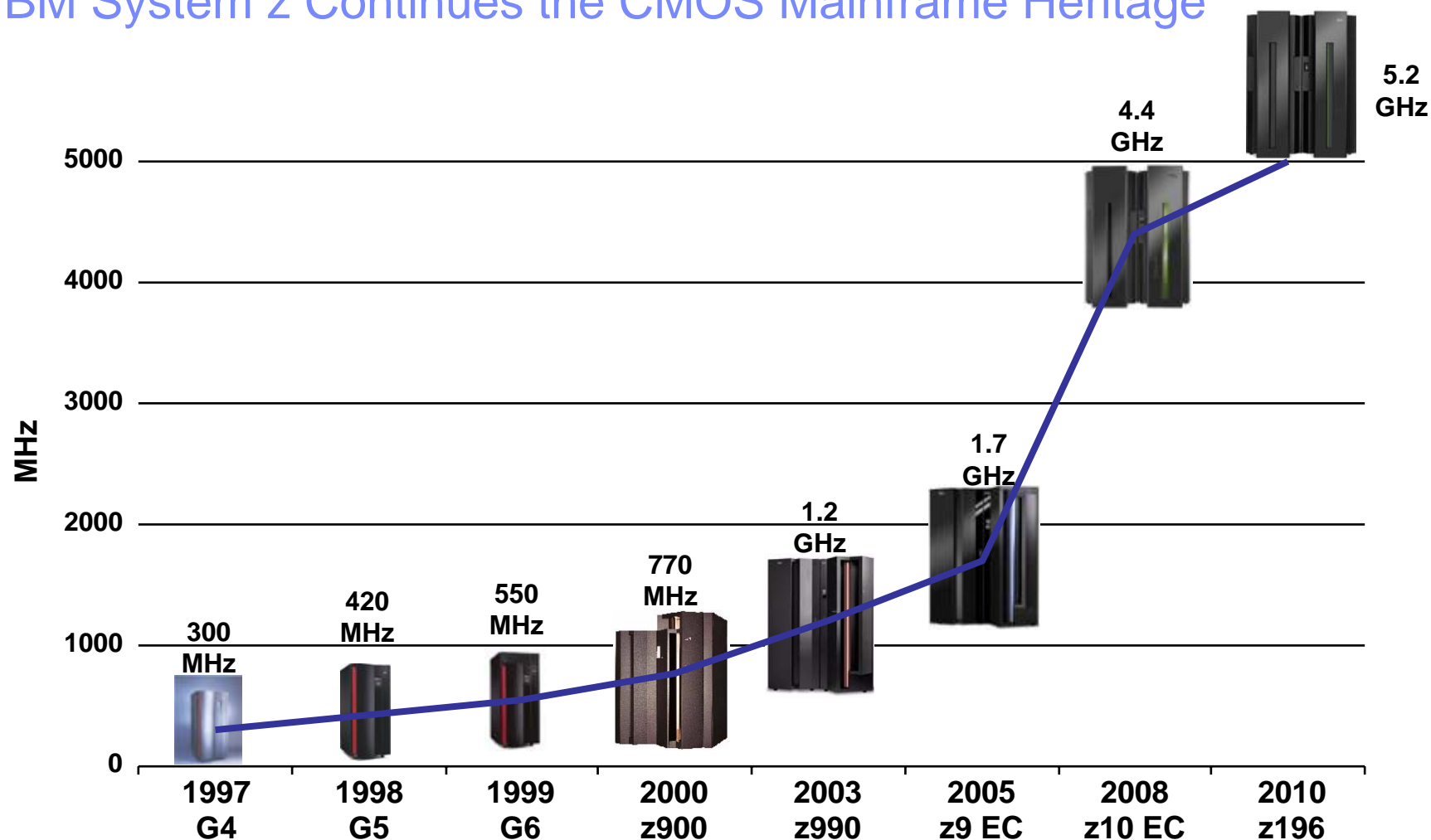
PLACE HOLDER for zEnterprise Air Cooled

z196 Water cooled – Under the covers (Model M66 or M80) front view



z196 Processor and Memory Structure

IBM System z 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** – Additional Architectural extensions

z10 EC MCM vs zEnterprise 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
- Power 1800 Watts

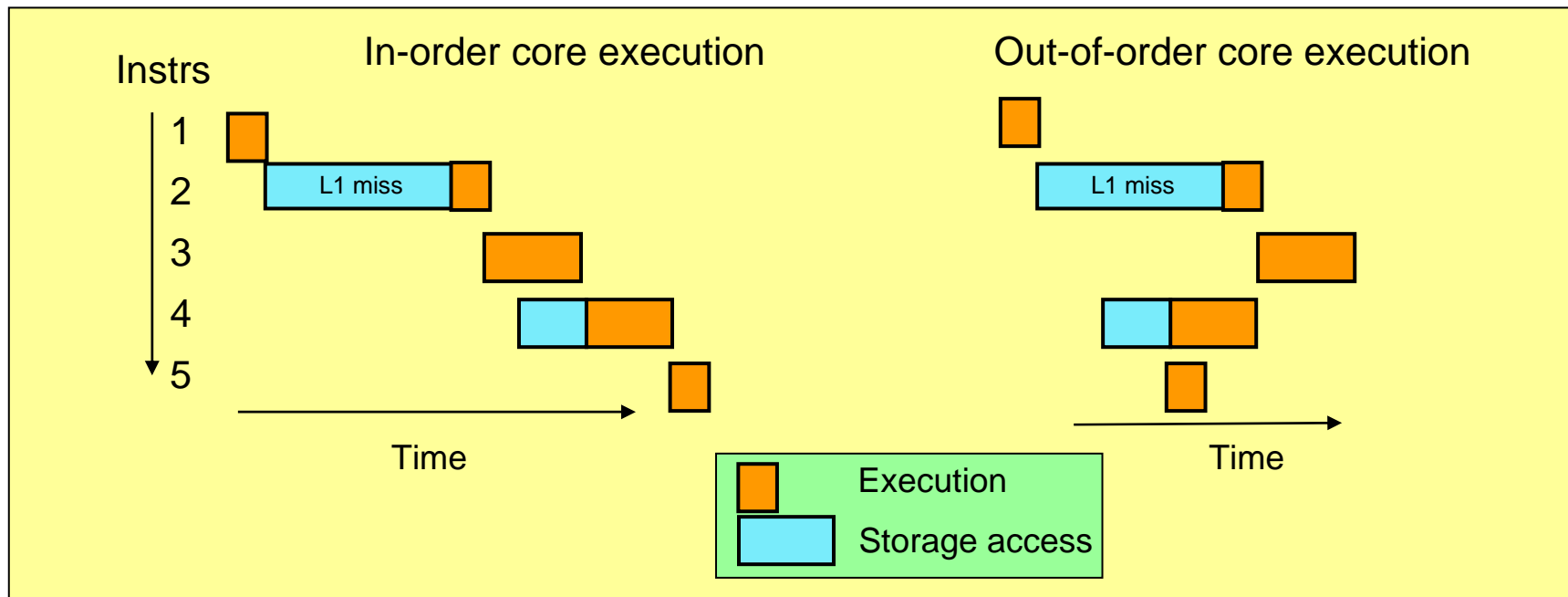
z196 MCM

▪ MCM

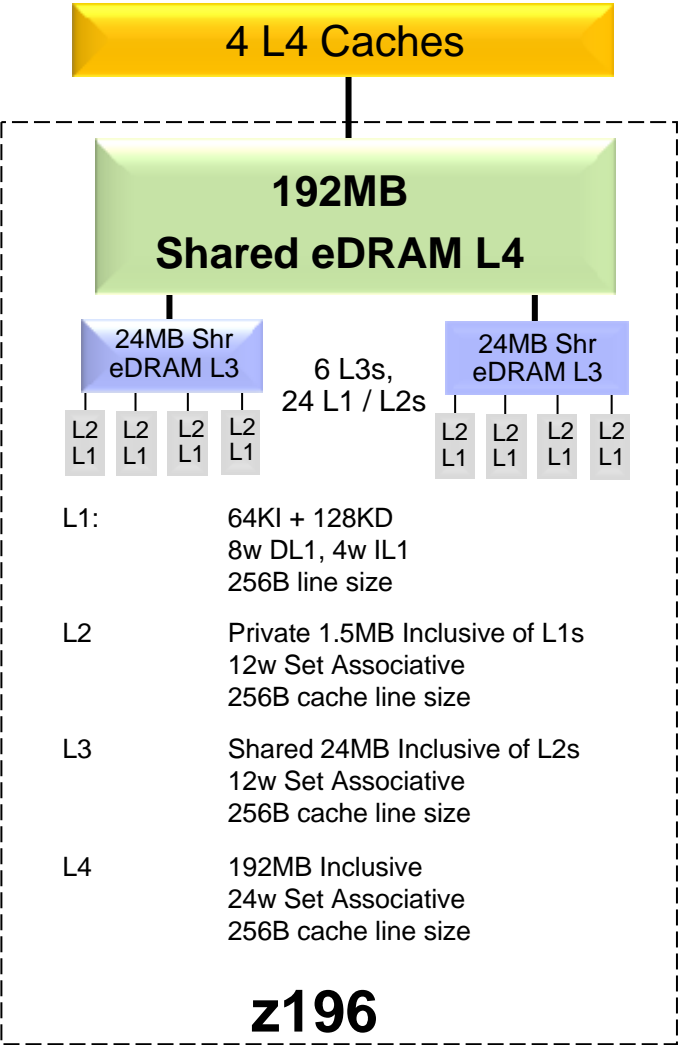
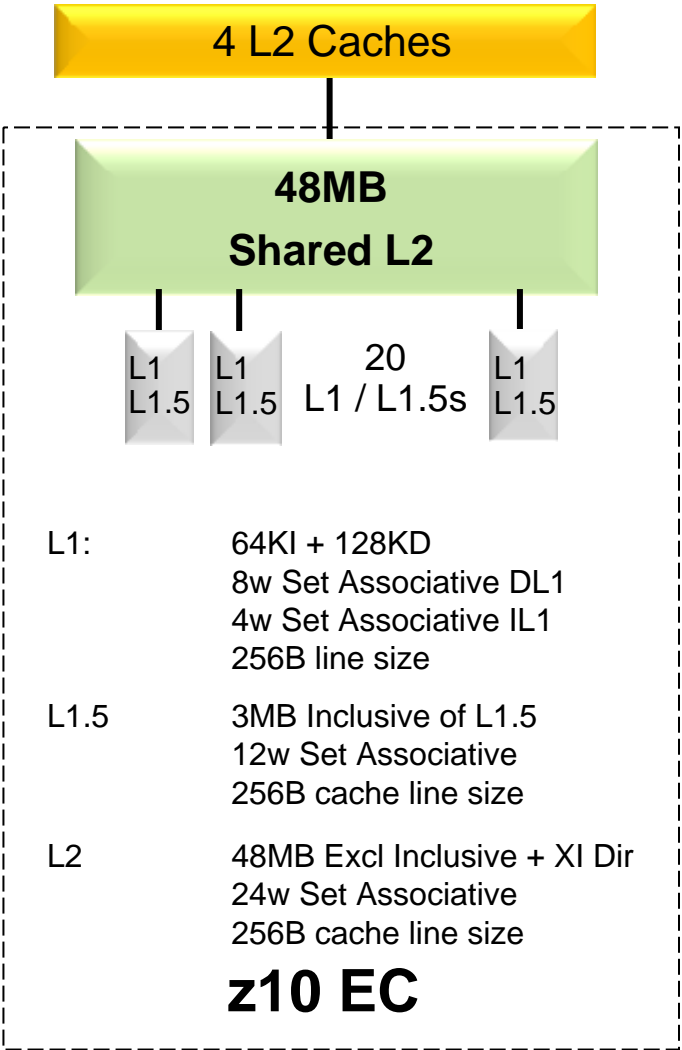
- 96mm x 96mm in size
- 6 PU chips per MCM
 - Quad core chips with 3 or 4 active cores
 - PU Chip size 23.5 mm x 21.8 mm
 - 5.2 GHz
 - Superscalar, OOO execution
 - L1: 64K I / 128K D private/core
 - L2: 1.5M I+D private/core
 - L3: 24MB/chip - shared
- 2 SC chips per MCM
 - L4: 2 x 96 MB = 192 MB L4 per book
 - SC Chip size 24.4 mm x 219.6 mm
- Power 1800 Watts

z196 Out-of-Order (OOO) Value

- z196 is System z's 1st CMOS OOO core
- z196 is System z's 1st OOO core since 1991
- OOO yields significant performance benefit for compute intensive apps through
 - Re-ordering instruction execution
 - Later (younger) instructions can execute ahead of a stalled instruction
 - Re-ordering storage accesses and parallel storage accesses
- OOO maintains good performance growth for traditional apps



System z Cache Topology – z10 EC Vs z196 Comparison



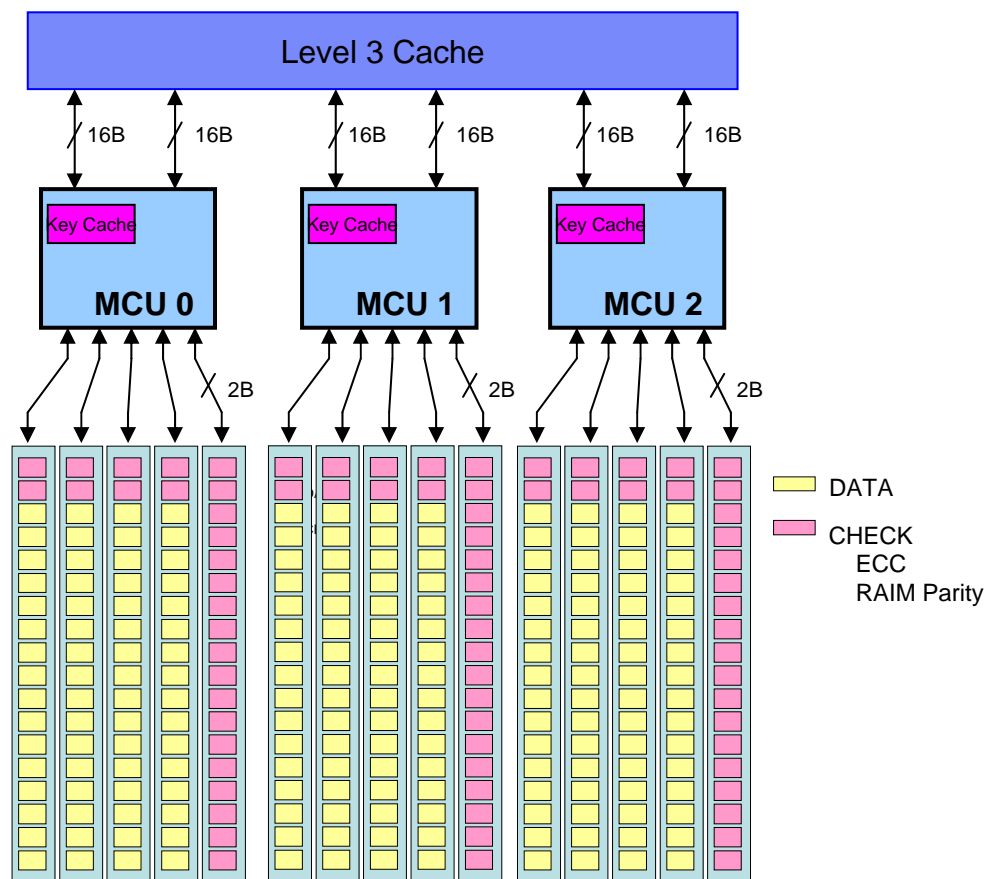
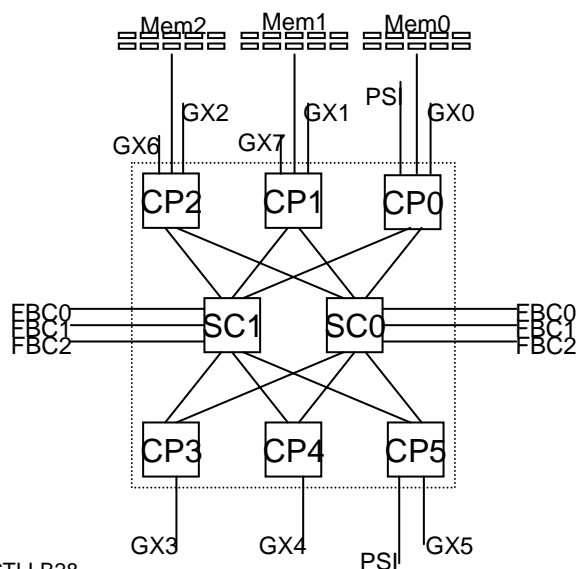
z196 RAIM Memory Structure

- **Redundant Array of Independent Memory**

- 5 channel memory controller
- DIMM bus CRC error retry
- Industry leading reliability

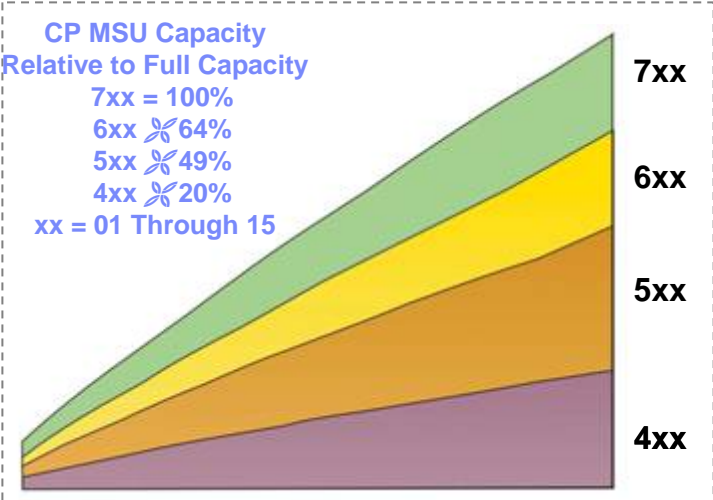
- **Up to 3TB Memory capacity**

- 3 MCUs per MCM
- 2-deep DIMM cascade



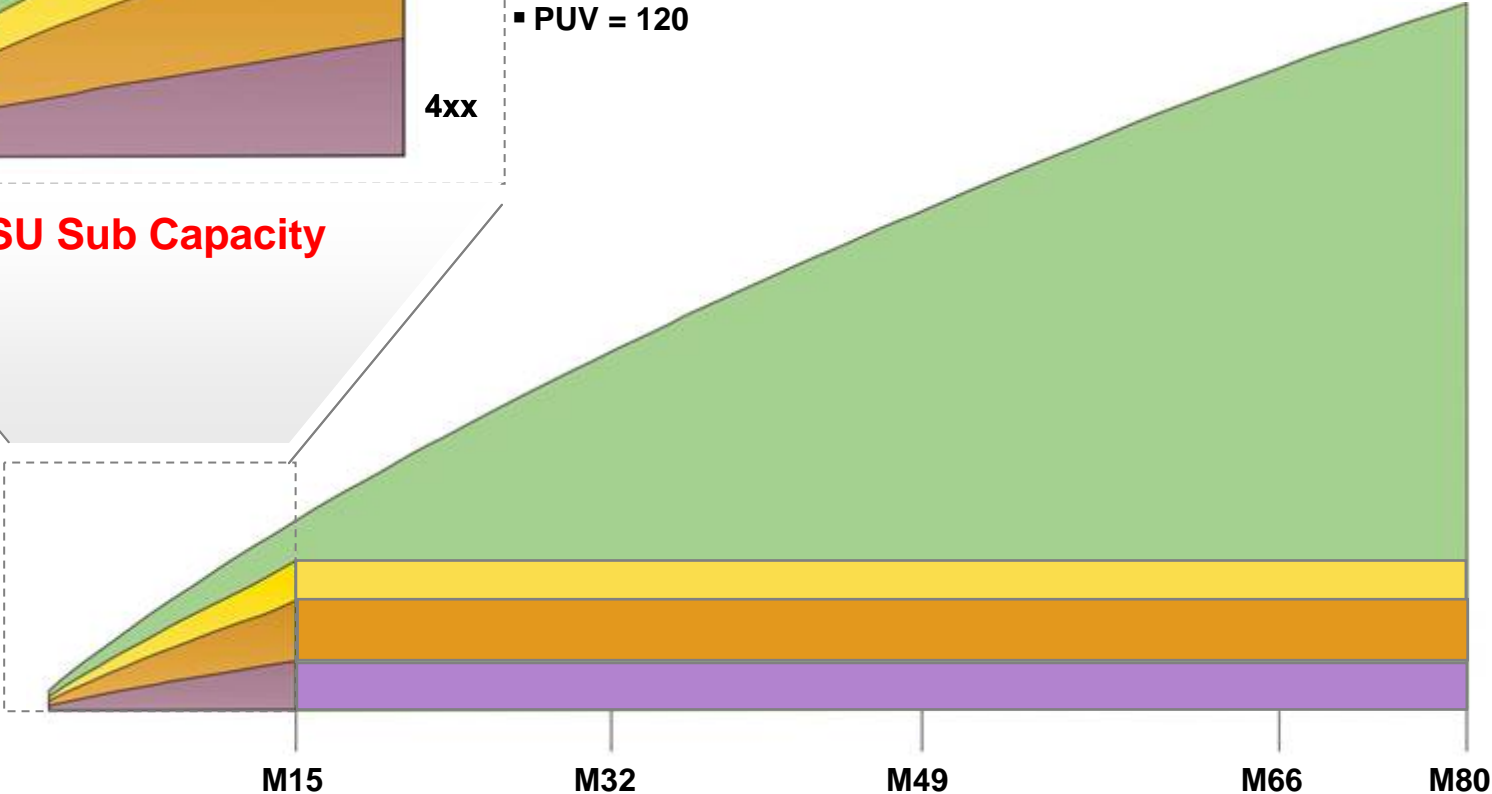
z196 Capacity and Performance Planning

z196 Full and Sub-Capacity CP Offerings



- Subcapacity CPs may be ordered on ANY z196 model with 1 to 15 CPs. If 16 or more CPs are ordered all must be full 7xx capacity
- All CPs on a z196 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
- PUV = 120

MSU Sub Capacity



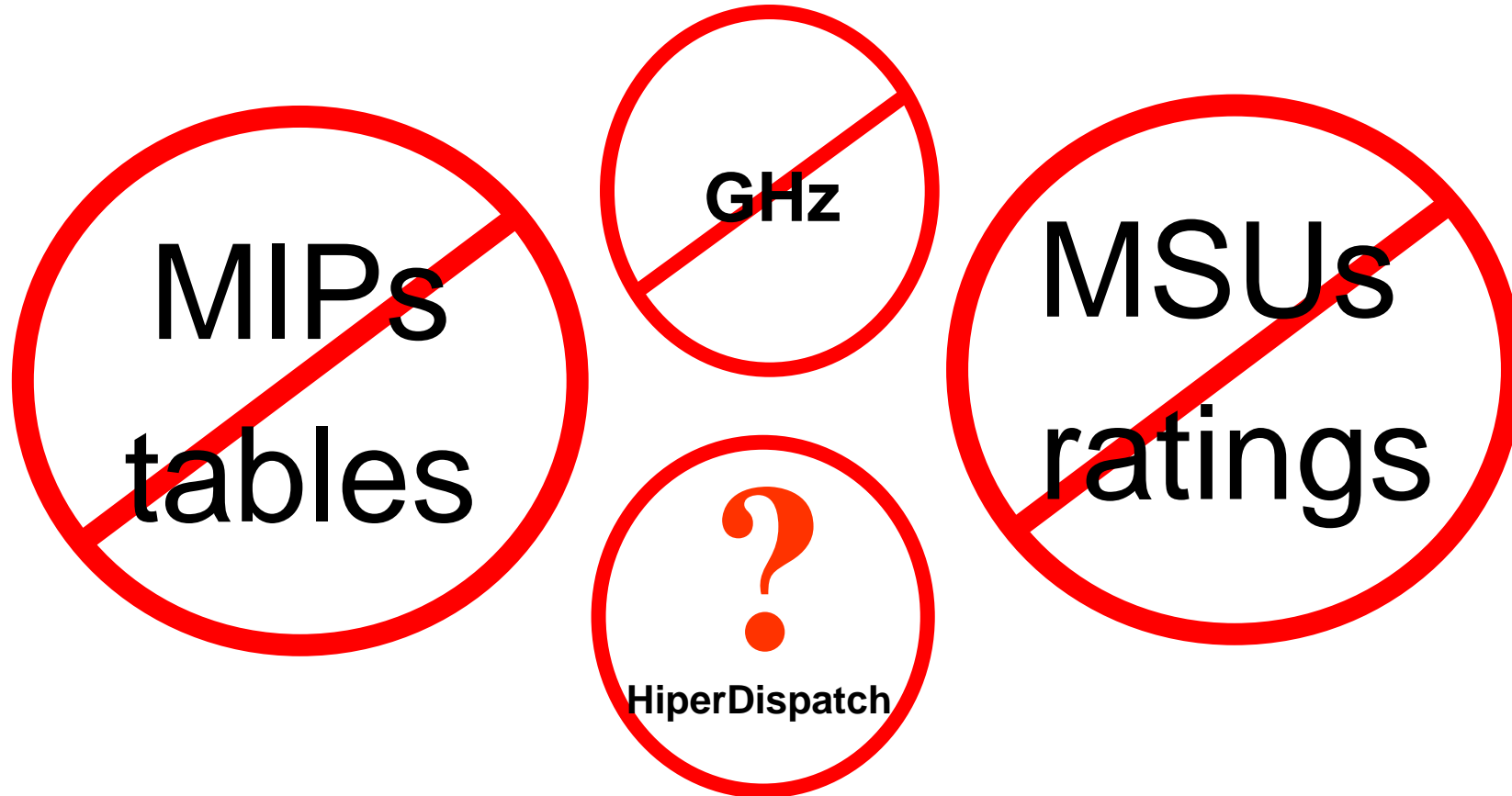
z196 Performance

- **Robust capacity growth for enterprise data serving workloads**
 - High-frequency, Out-of-Order processor core
 - Efficient shared-cache multiprocessor fabric
 - Up to 80-way SMP
 - Balanced performance across a broad range of configurations

- **CPU-intense applications**
 - C/C++/Java co-optimization with compilers
 - Single-thread performance competitive with industry leaders
 - Substantial boost to floating-point performance from OOO cores

- **Business analytics**
 - Ongoing collaboration to optimize HW/SW stack
 - Complementary strategy to right-place work across zEnterprise system

z196 Capacity Planning in a nutshell



Don't use "one number" capacity comparisons!
Work with IBM technical support for capacity planning!
Customers can now use zPCR

The IBM Processor Capacity Reference (zPCR) is a free tool available for download that can be used to size your System z processors.
<http://www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/PRS1381>

z196 Upgrades

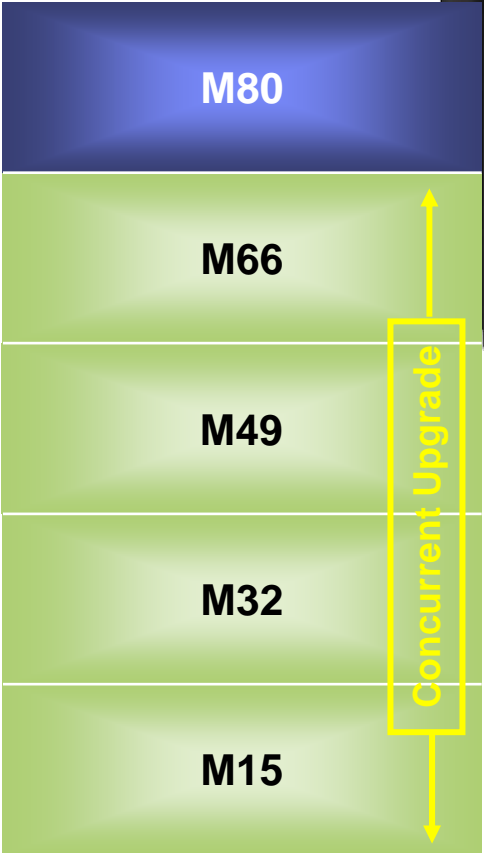
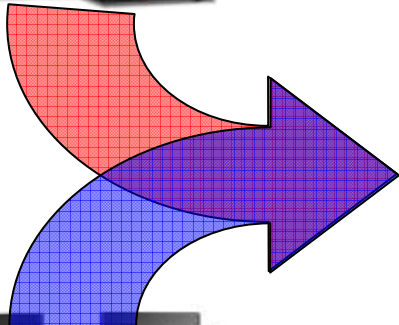
z196 System Upgrades



z9 EC



z10 EC



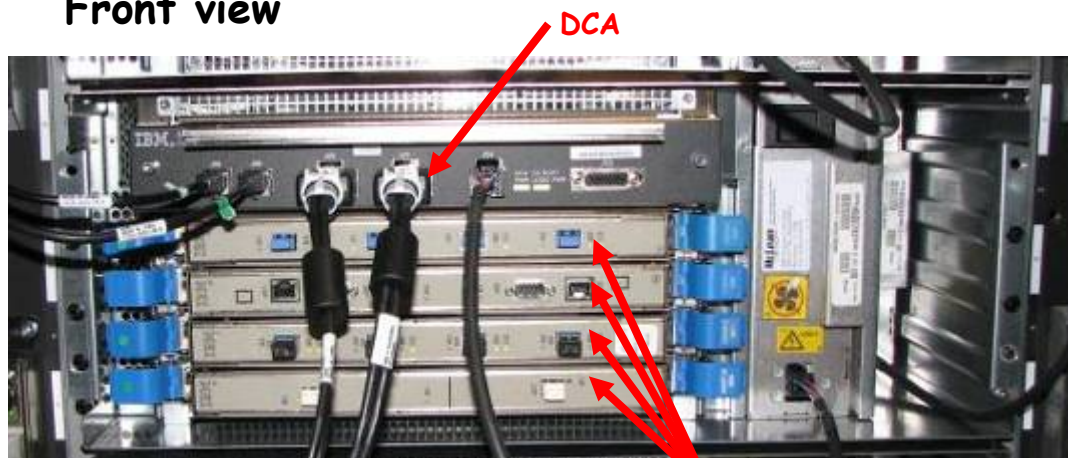
z196 CPC

- **z196 to higher hardware z196 model**
 - Upgrade of z196 Models M15, M32, M49 and M66 to M80 is disruptive
 - When upgrading to z196 all the Books are replaced
 - Upgrade from Air to Water cooled not available
- **Any z9 EC to any z196**
- **Any z10 EC to any z196**

z196 I/O Connectivity

z196 I/O Drawer

Front view



I/O cards



Rear view

I/O cards

STI-A mother card

Air exhaust

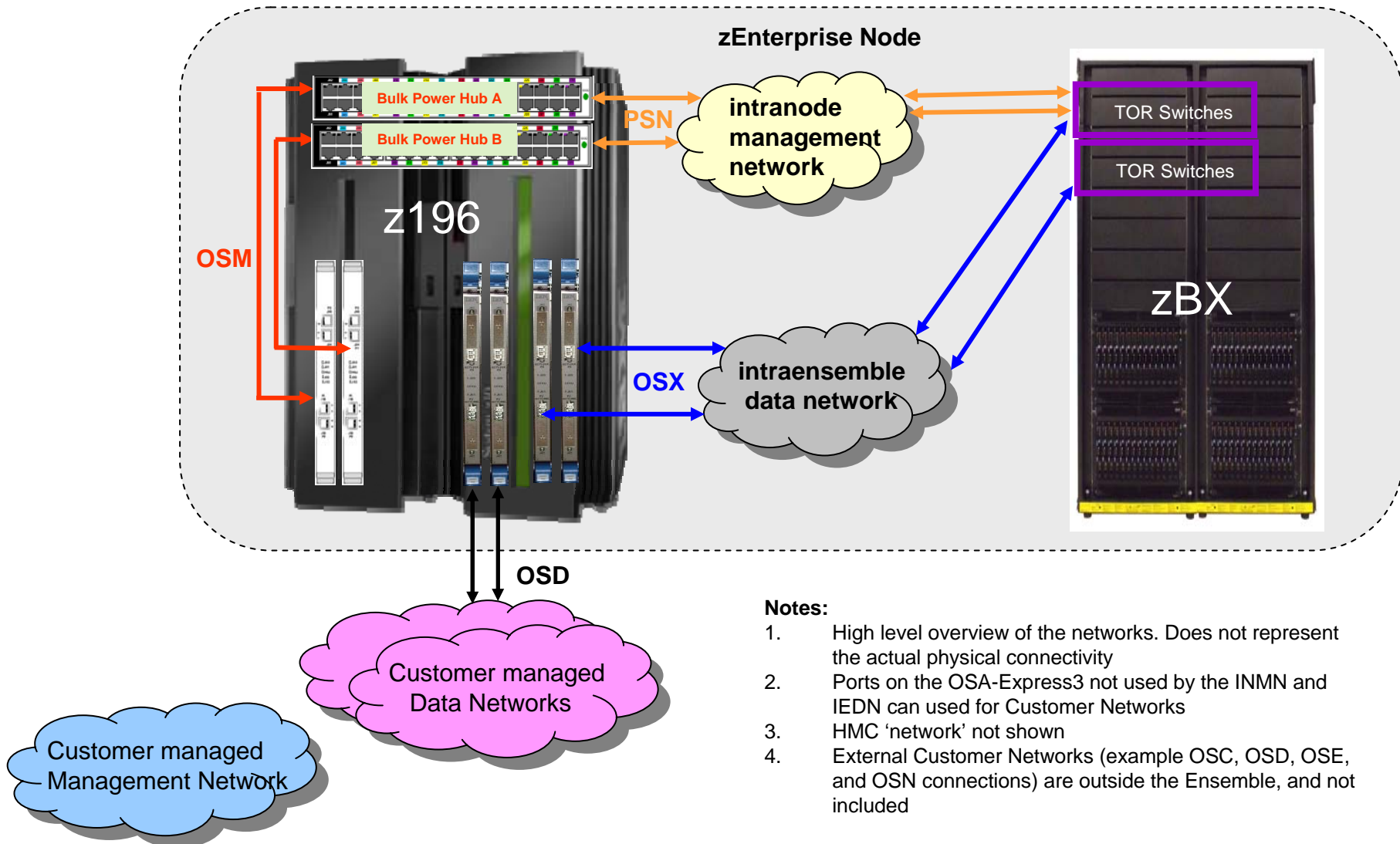
- **Introduced with z10 BC**
 - Up to 8 I/O cards in each drawer
 - 4 in front and 4 in rear
- **Concurrent add, repair and replacement for systems with more than one I/O drawer**
- **Drawer can be removed without affecting system input power or power to any other unit**
- **Drawers are favored on z196**
- **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
- **I/O cards are horizontal**
- **IBM Service will route cables to the side so as not to block concurrent replacement of I/O cards or drawers**

z196 Channel Type and Crypto Overview

- I/O Channels
 - FICON Express8
 - FICON Express4 (CF only on type upgrade)
 - ESCON – **(240 or fewer channels)**
- OSA-Express (Up to 24 features)
 - OSA-Express3
 - 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-Express2 (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 Express3 (Up to 8 features)
 - **New function**
- Not supported:
 - **I/O drawer or cage plan ahead**
 - **More than 72 feature cards**
 - **FICON (before FICON Express4)**
 - **FCV – ESCD Model 5 Bridge Card**
 - **OSA-Express2 10 GbE LR**
 - **OSA-Express (pre OSA-Express2)**
 - **ICB-4 and earlier ICB**
 - **Crypto Express2 and earlier**
 - **Sysplex Timer (ETR) Attachment**

Bold – available on new build *CF* – carry forward

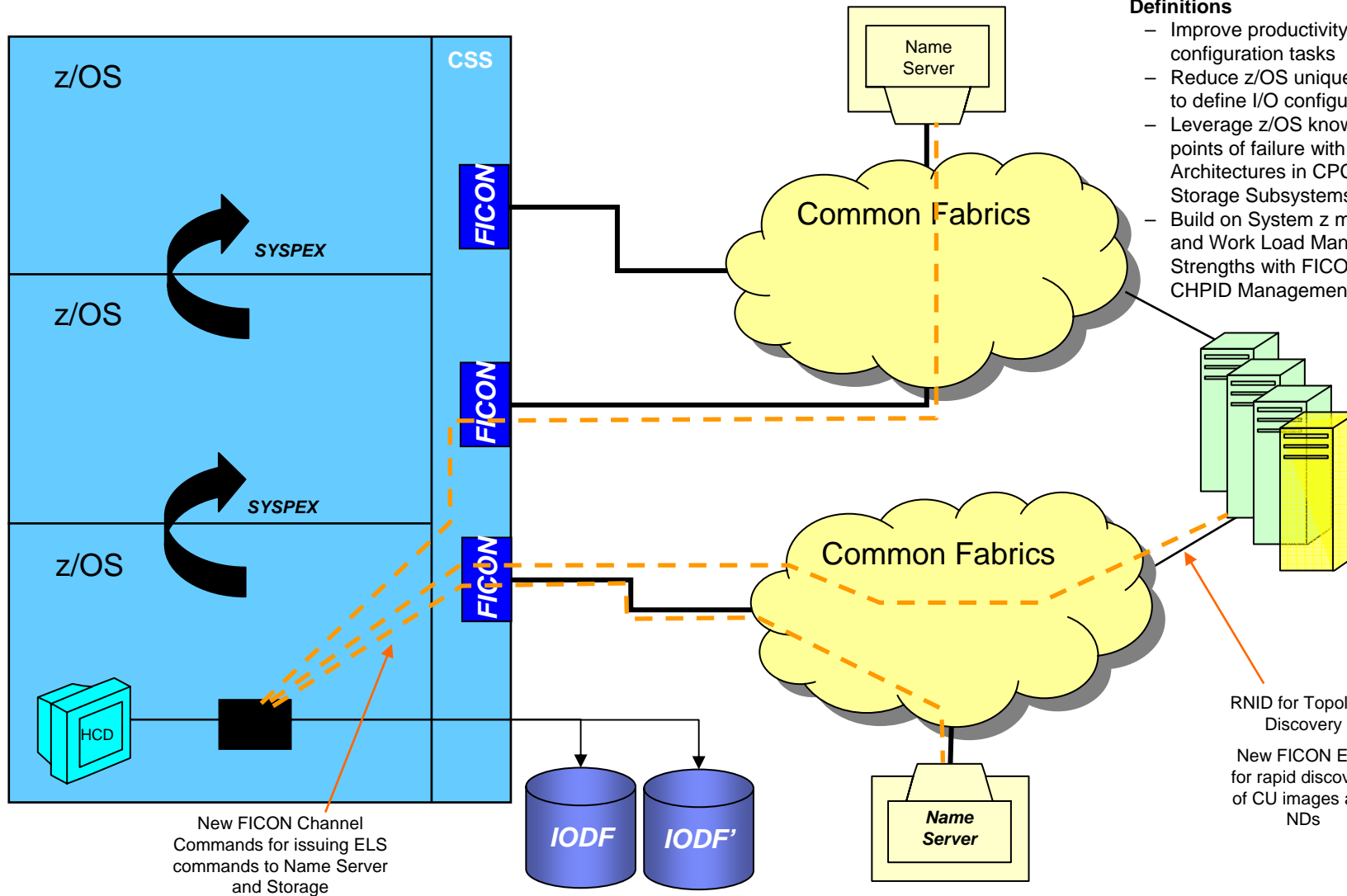
zEnterprise – What are the INMN, IEDN and Customer networks?



Notes:

1. High level overview of the networks. Does not represent the actual physical connectivity
2. Ports on the OSA-Express3 not used by the INMN and IEDN can be used for Customer Networks
3. HMC 'network' not shown
4. External Customer Networks (example OSC, OSD, OSE, and OSN connections) are outside the Ensemble, and not included

z196 Discovery and Auto-Configuration (zDAC)

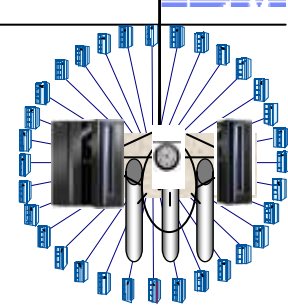


- **Simplify System z I/O Configuration Definitions**
 - Improve productivity for existing I/O configuration tasks
 - Reduce z/OS unique skills required to define I/O configurations for z/OS
 - Leverage z/OS knowledge of single points of failure with SPODF Architectures in CPC, Fabric and Storage Subsystems
 - Build on System z measurements and Work Load Management Strengths with FICON Dynamic CHPID Management

RNID for Topology Discovery
 New FICON ELS for rapid discovery of CU images and NDs

z196 Sysplex

Server Participation in a Parallel Sysplex



- **z196 does not support active participation in the same Parallel Sysplex with:**

- IBM eServer zSeries 900 (z900), IBM eServer zSeries 800 (z800),
- IBM eServer zSeries 990 (z990), IBM eServer zSeries 890 (z890),
- and older System/390 Parallel Enterprise Server systems

This means:

- Configurations with z/OS on one of these servers can't add a z196 to their sysplex for either a z/OS image or a CF image
- Configurations with a CF on one of these servers can't add a z196 to their sysplex for either a z/OS image or a CF image

- **z196 does not support ICB-4 Coupling Links**

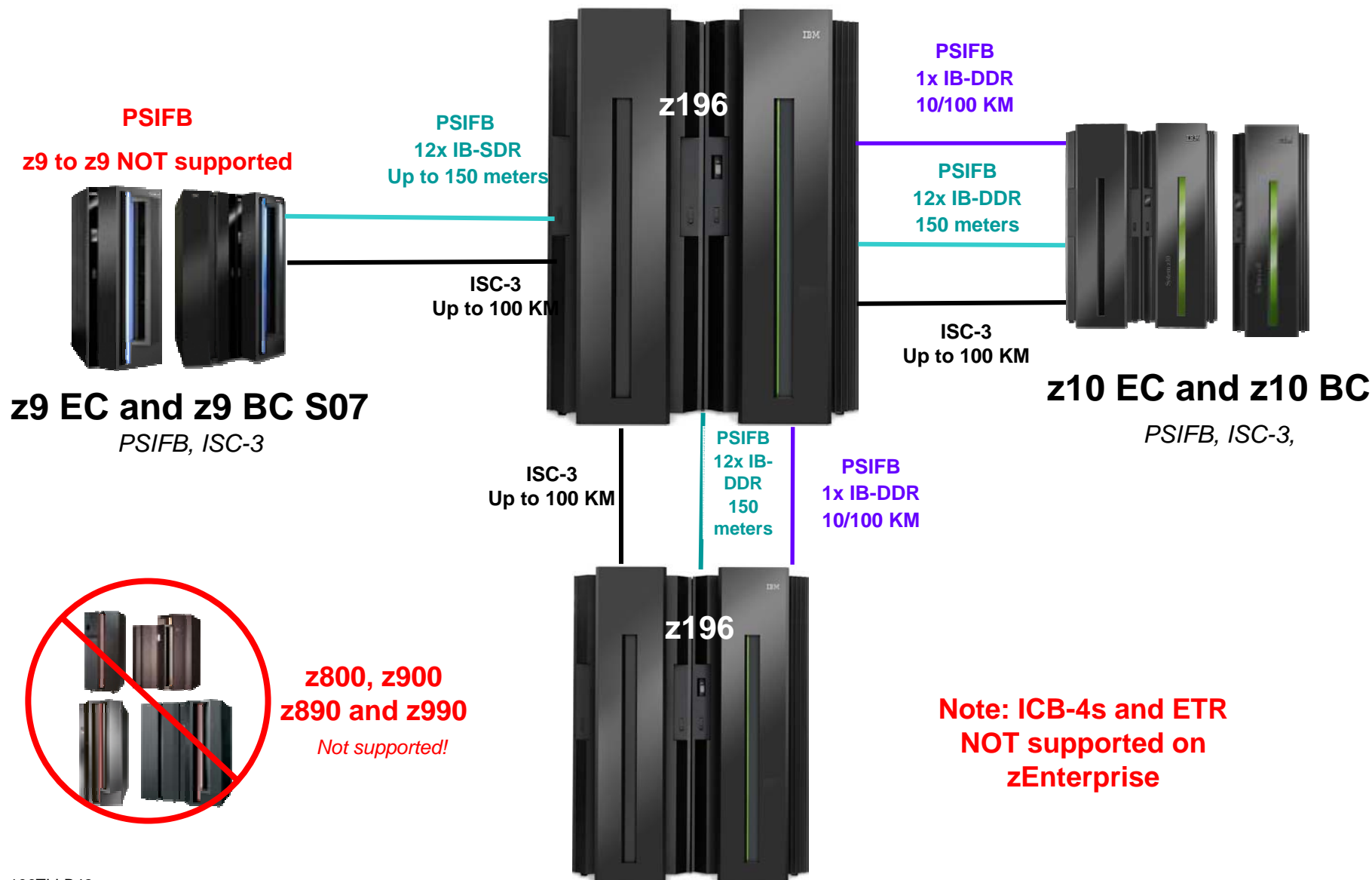
- Customers should plan their coupling link technology

- **z196 does not support connection to an ETR**

- Customers should migrate to STP prior to z196

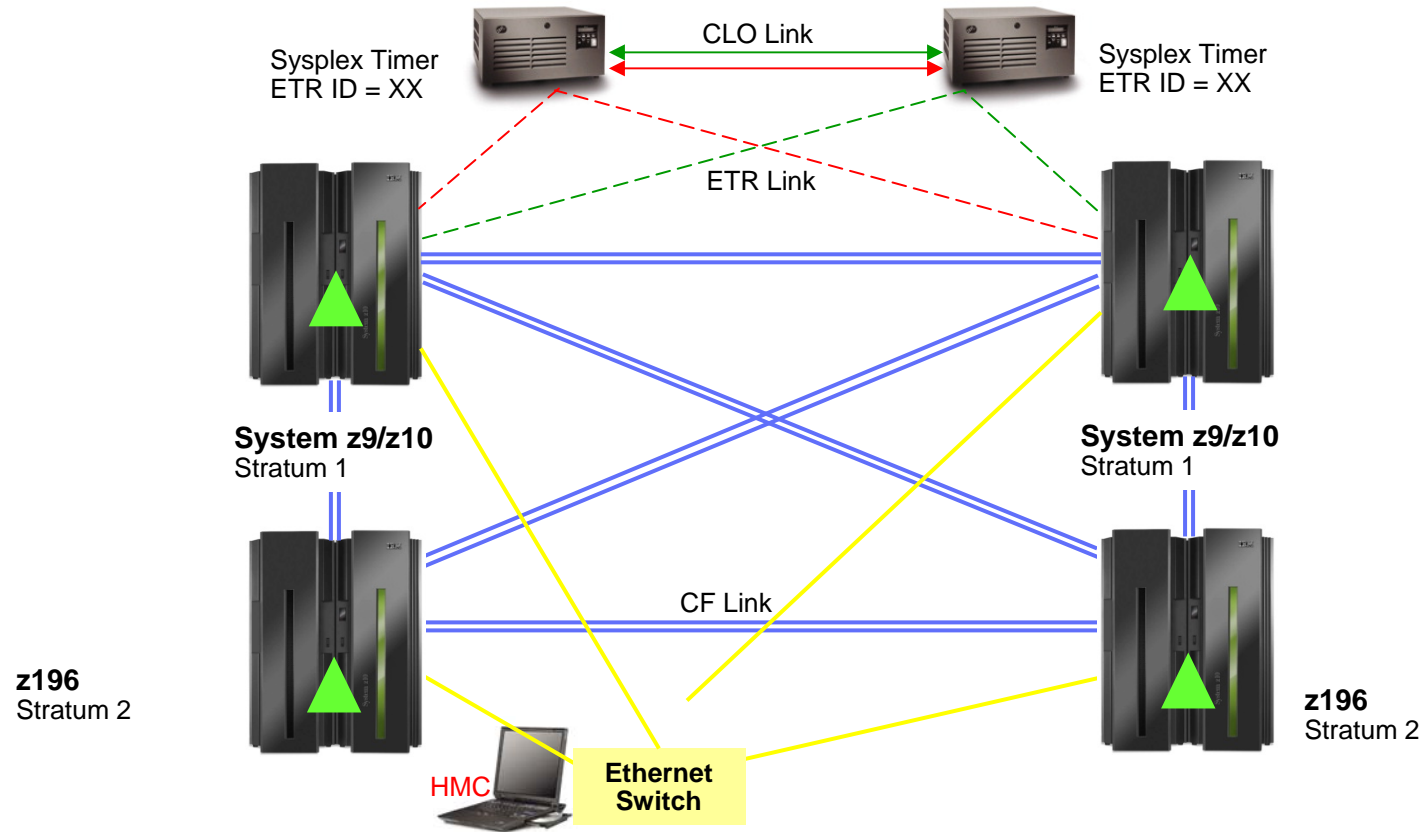
- **CFCC Level 17**

z196 Parallel Sysplex[®] coexistence of Servers/CFs and coupling connectivity



z196 Server Time Protocol

No Support for ETR with z196 – Use Mixed CTN

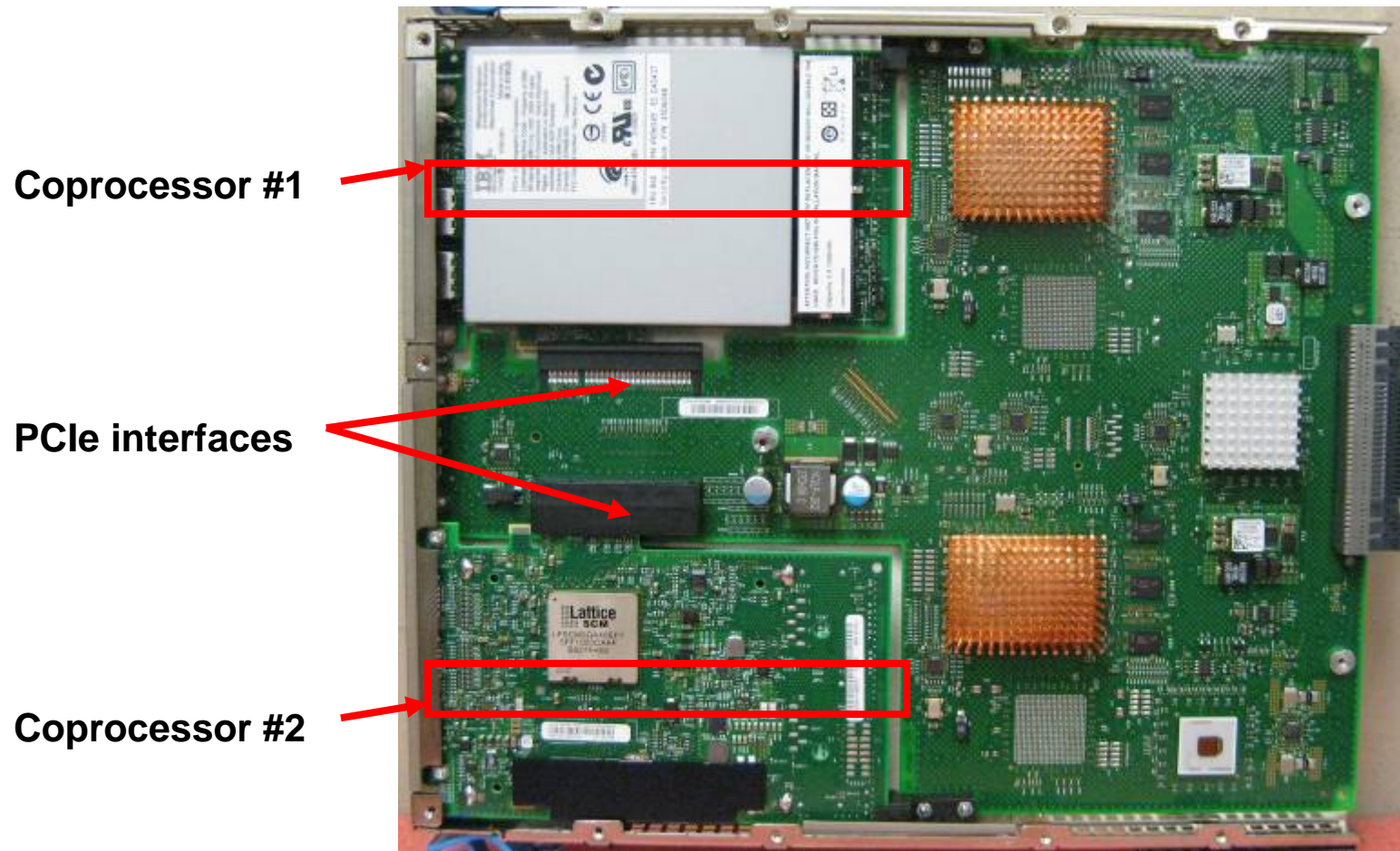


- z196 DOES NOT support ETR.
- It is possible to have a z196 server as a Stratum 2 or Stratum 3 server in a Mixed CTN as long as there are at least two z10s or z9s attached to the Sysplex Timer operating as Stratum 1 servers
- Two Stratum 1 servers are recommended but not required to provide redundancy and avoid a single point of failure
- Suitable for a customer planning to migrate to an STP-only CTN.

z196 Cryptography

z196 Crypto Express3 2-P (Introduced z10 EC GA3)

- Earlier cryptographic features not supported
- Supported: 0, 2, 3 – 8 features = 0, 4, 6 – 16 cryptographic engines.
Each can be individually configured as Coprocessor or Accelerator.



zCPC New and exclusive cryptographic capabilities

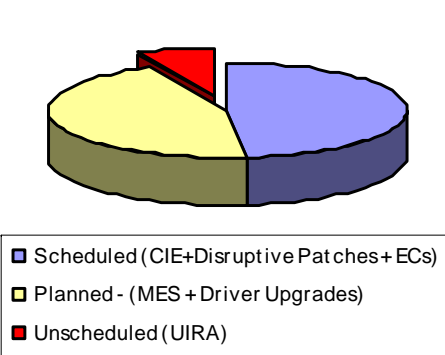
- **Elliptic Curve Cryptography Digital Signature Algorithm**, an emerging public key algorithm expected eventually to replace RSA cryptography in many applications. ECC is capable of providing digital signature functions and key agreement functions. The new CCA functions provide ECC key generation and key management and provide digital signature generation and verification functions compliance with the ECDSA method described in [ANSI X9.62 "Public Key Cryptography for the Financial Services Industry: The Elliptic Curve Digital Signature Algorithm \(ECDSA\) "](#). ECC uses keys that are shorter than RSA keys for equivalent strength-per-key-bit; RSA is impractical at key lengths with strength-per-key-bit equivalent to AES-192 and AES-256. So the strength-per-key-bit is substantially greater in an algorithm that uses elliptic curves.
- **ANSI X9.8 PIN security** which facilitates compliance with the processing requirements defined in the new version of the [ANSI X9.8 and ISO 9564 PIN Security Standards](#) and provides added security for transactions that require Personal Identification Numbers (PIN).
- **Enhanced Common Cryptographic Architecture (CCA)**, a Common Cryptographic Architecture (CCA) key token wrapping method using Cipher Block Chaining (CBC) mode in combination with other techniques to satisfy the key bundle compliance requirements in standards including [ANSI X9.24-1](#) and the recently published [Payment Card Industry Hardware Security Module \(PCI HSM\) standard](#).
- **Secure Keyed-Hash Message Authentication Code (HMAC)**, a method for computing a message authentication code using a secret key and a secure hash function. It is defined in the standard [FIPS 198, "The Keyed-Hash Message Authentication Code "](#). The new CCA functions support HMAC using SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512 hash algorithms. The HMAC keys are variable-length and are securely encrypted so that their values are protected.
- **Modulus Exponent (ME) and Chinese Remainder Theorem (CRT)**, RSA encryption and decryption with key lengths greater than 2048-bits and up to 4096-bits.



z196 RAS

System z overall RAS StrategyContinuing our RAS focus helps avoid outages

Sources of Outages - Pre z9
-Hrs/Year/Syst-



Impact of Outage

	Prior Servers	z9 EC	Z10 EC	z196
Unscheduled Outages	✓	✓	✓	✓
Scheduled Outages	✓	✓	✓	✓
Planned Outages		✓	✓	✓
Preplanning requirements			✓	✓
Power & Thermal Management				

Increase Focus over time

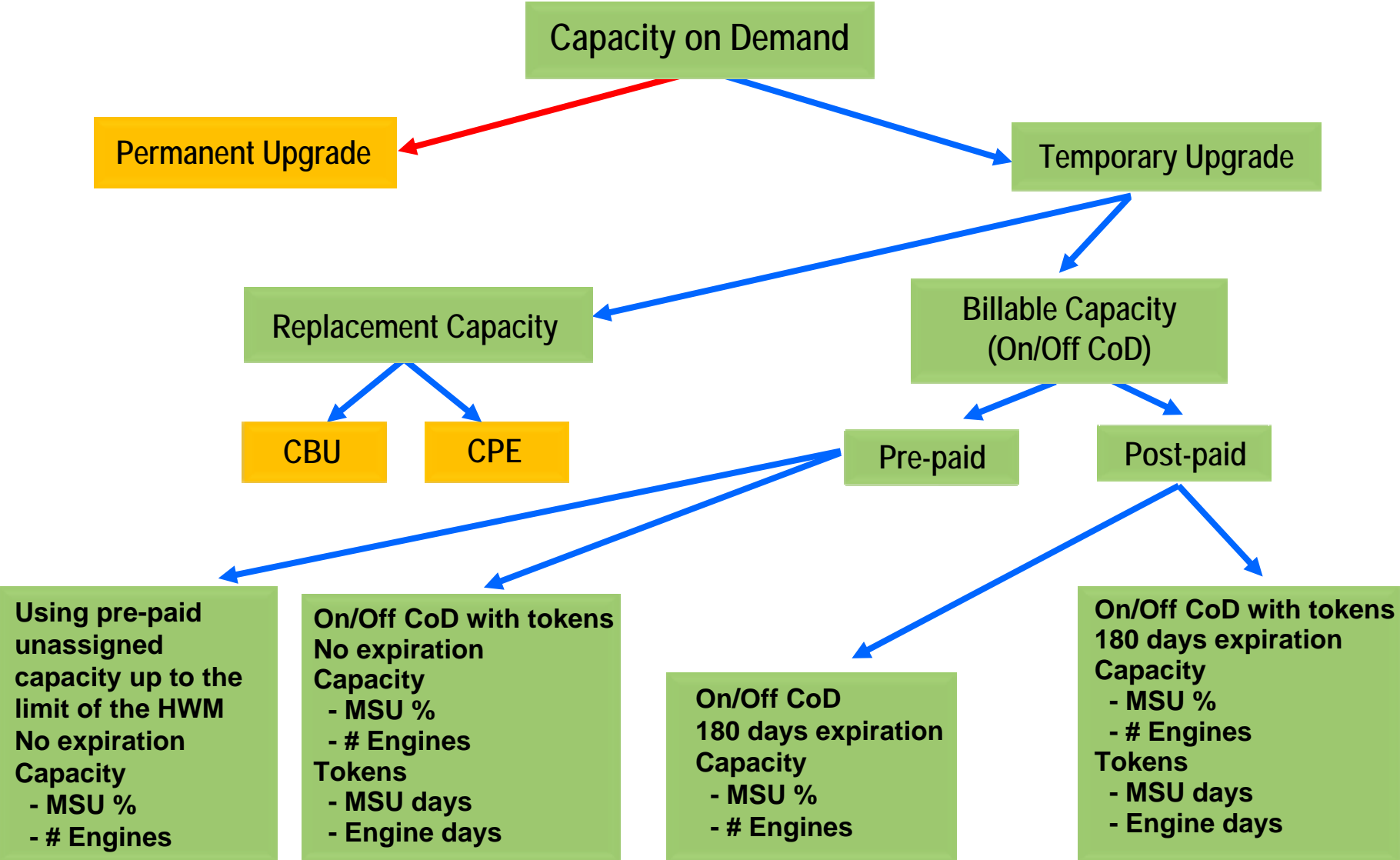
Temperature = Silicon Reliability Worst Enemy
Wearout = Mechanical Components Reliability Worst Enemy.

z196 RAS

- **The z196 processor continues to reduce customer down time by focusing on all sources of outages: unscheduled outages, scheduled outages and planned outages. Power and cooling requirements were reduced while still managing reliability.**
 - Major new Memory design for preventing outages
 - Introducing new IO drawers, IO technologies with full concurrent service
 - Introducing z system management to the mixed computing environment
 - Delivering Green functions and RAS together

z196 Capacity on Demand

z196 – Basics of CoD



z10 to z196 Capacity on Demand Enhancements

System z10

z196

Separate orders for purchase of unassigned engines

On/Off CoD records must be replenished manually

CoD records staged on machine deliver

No On/Off CoD administrative test



Unassigned engine purchase via CIU

Auto replenishment of On/Off CoD records

Manufacturing install of up to 4 CoD records with system ship.

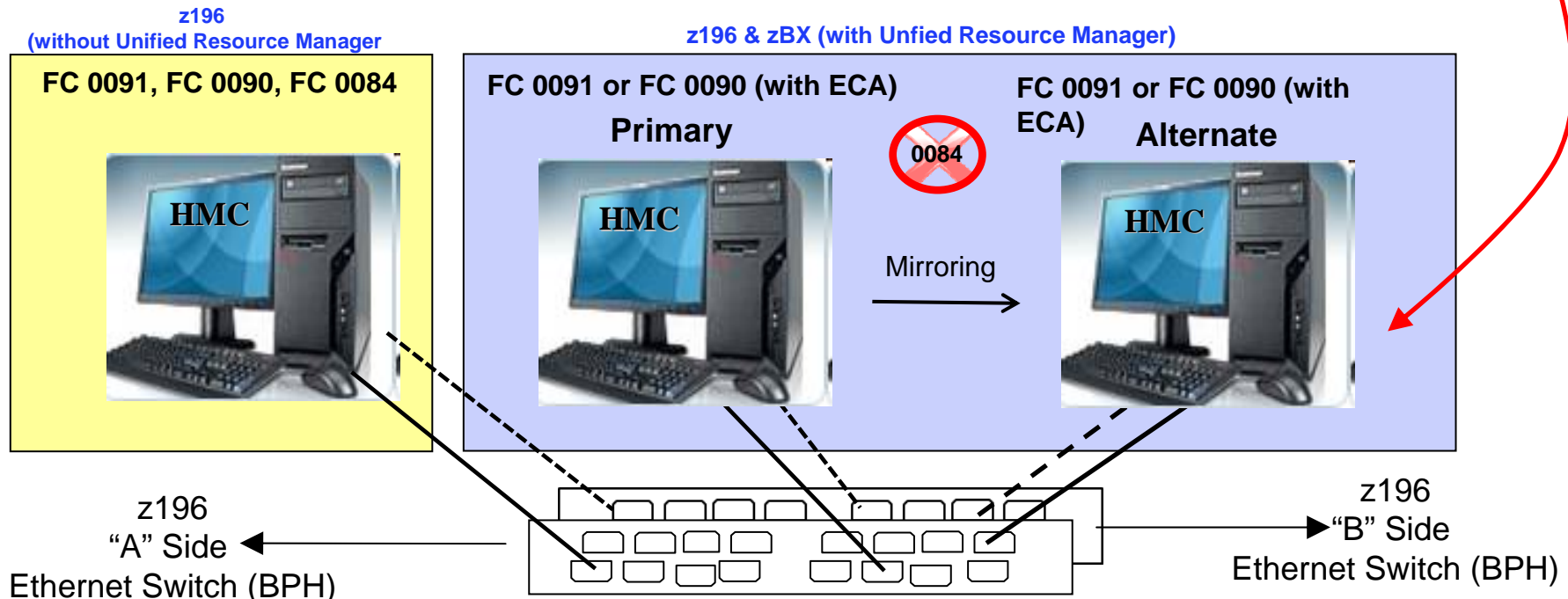
On/Off CoD Administrative tests

z196 Support Element and Hardware Management Consoles

zEnterprise and HMC's

New HMC

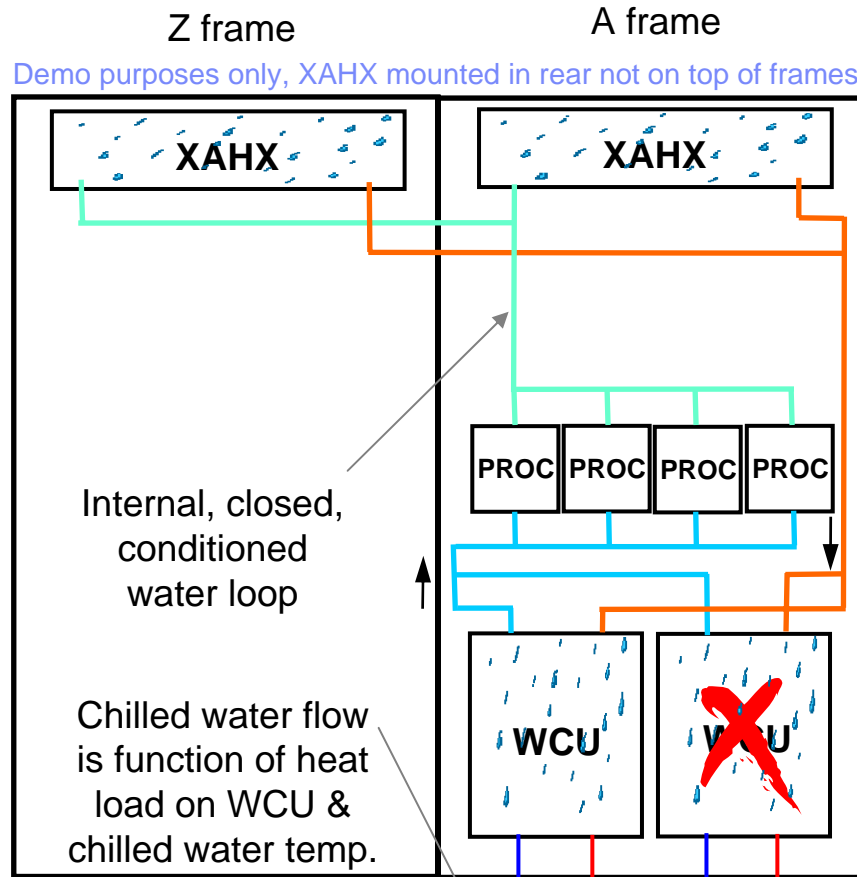
- New HMC feature Code 0091, New Switch feature code 0070
- Additional HMC's required for Unified Resource Manager and z196 zBX (if installed)
 - Alternate HMC used for Unfied Resource Manager is allocated for backup purposes only, cannot be used for daily HMC activities. Consider the need for additional HMC's (command center, computer room, etc).
- Can have a mix of traditional and Ensemble HMC's



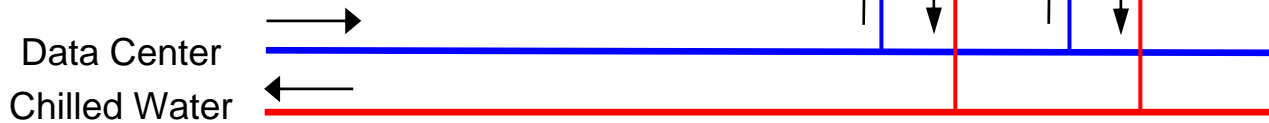
New Switch FC 0070, multiple switches required for redundancy

zEnterprise Energy Management

z196 water cooling option



Not to scale, not physically representative



- Water cooled cold plate on processor MCM in each processor book
- N+1 Water Conditioning Unit (WCU) with independent chilled water connections
- One WCU can support system
- Heat Exchanger (HX) removes heat from exhaust air at back of both frames
- Target to remove 60-65% of air heat load from the System z
- Results in ~10kW system air heat load max (5kW per frame)
- Input energy savings of ~2-3kW/system for 3 and 4 book system.
- Additional power savings in data center for reduced air cooling heat load
- Air cooling back-up mode for maximum robustness if lose chilled water to system

Air cooling back-up mode for maximum robustness if complete loss of chilled water occurs!

zEnterprise Quick Energy Estimator

IBM and IBM BP Pre-sales tool to quickly compare energy consumption between air-cooled and water-cooled zEnterprise and project potential energy savings.


Sample Run

Power comparisons on two 2817-M32 for 3 years based on 10 cents per KWH.

Power & Cooling

Energy Cost Savings

Your Data Center May Realize these Benefits!



There are several benefits that a data center may realize with water-cooled servers. The greater the number of water-cooled servers the greater these benefits. It is important to note that there may be energy savings realized from the data center's cooling system after the client re-optimizes their cooling systems after installation of the water-cooled server(s).

Based on your selections, the highlighted benefit(s) may be apply to your data center:

Power Exhaustion:
Your data center has maxed out its available power from the grid. The water-cooled server may allow you to get more computing capacity per kilo-watt of power drawn. There may be a cost-avoidance today or a deferral of time to consider new data acquisition or outsourcing

Cooling Capacity Exhaustion:
Your data center cannot install any other CRACs to for cooling. The water-cooled server has a reduced heat-load expended into the data center. You may be able to run more servers without adding more CRACs.

Data Center Height Constraints:
Your data center has low ceilings that impedes air-flow and hence increased cooling requirement. The water-cooled option reduces the heat-load from the server to the data center and hence reduces your cooling requirements.

Hot Spots:
Your data center has hot spots with significant cooling requirements as a result. A significant amount of the heat from the water-cooled server is passed into the water significantly reducing the incidence of hot spots and the cooling required.

Space Exhaustion:
Your data center can no longer add any new CRAC units for cooling because of a space constraint. The water-cooled server has a reduced heat-load expended into the center. You may be able to run more servers without adding more CRACs.

BackUp Servers:
You have disaster recovery systems with low utilization in your data center. You will have reduced power consumption of unused servers.

Public Relations:
It may be beneficial to the client's image to be seen as 'going green' in their operations.

Tool output can be shared with customers however the tool is for IBM and IBM BP use only, not to be given to customers.

zEnterprise Physical

Data Center Comparisons – System z9, z10 & z196

z10 EC to z196

- **Straight forward upgrade path**

- Approx one inch wider than the z10 EC.
 - Water option adds 4” depth & Overhead I/O option adds 12” width)
- Same floor cutouts
- Approximately same power for comparable configs (but for more capacity)
- Approx. same airflow for comparable configurations
- Approx. same weight for comparable configs (Water option adds ~50 lb, Overhead I/O adds ~200 lb)
- Fewer line cords for some systems
- Air temperature, altitude and humidity requirements are the same as z10 (Class 1 ASHRAE/Acoustic Category 1B)

z9 EC to z196

- **More data center issues – like z9 EC to z10 EC transition**

- Larger system footprint (9” deeper front cover to back cover, 3” taller)
 - In addition Water option adds 4” more depth & Overhead I/O option adds 12” width
- Different floor cutouts – floor reinforcement
- Typically more power for comparable configs (but for more capacity)
- Some configs need to add 2 more line cords
- Significantly more airflow for comparable configurations
- Some weight increase for comparable configurations

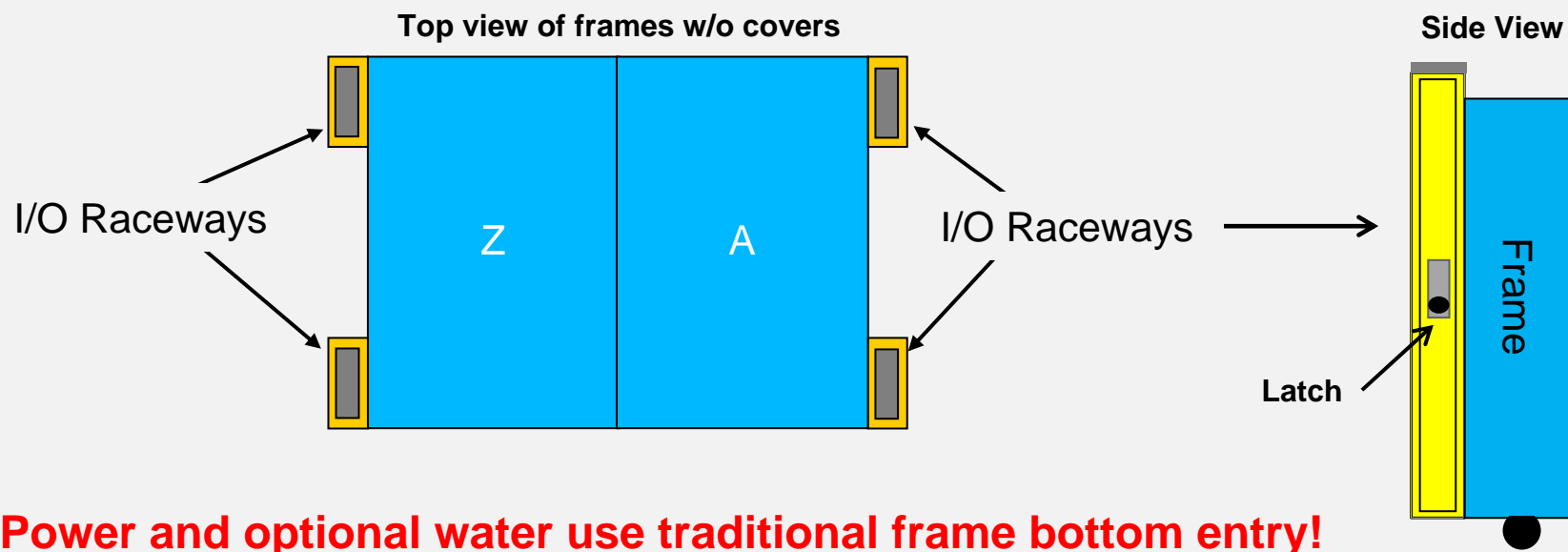
Raised Floor required for zEnterprise high end Servers

z196 Overhead Cabling Option

Overhead cabling is designed to provide increased flexibility and increase air flow in raised-floor environments.

- **Design is side cable “chimneys” or raceways**
 - Fiber I/O and Fiber Trunking
 - 1000BASE-T Ethernet (copper)

- **Physical Planning**
 - Weight add 95 lbs per frame
 - Width add 12 inches
 - Height add 5.5 inches



zEnterprise Operating System Support

zEnterprise Operating System Support

- **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
 - CPC: z/OS V1.9 ¹ for toleration only; exploitation starts with z/OS V1.10 with full exploitation with z/OS V1.12
 - zBX: z/OS V1.10
 - Linux on System z distributions:
 - Novell SUSE SLES 10 and SLES 11
 - Red Hat RHEL 5
 - z/VM
 - CPC: z/VM V5.4 or higher
 - zBX support: z/VM V6.1
 - z/VSE V4.1 or higher
 - z/TPF V1.1 or higher
- **Using the general purpose application server blades we have:**
 - AIX 5.3, 6.1
 - Linux on System x² (SOD)

¹ z/OS V1.9 support ends on Sept. 30, 2010. Lifecycle Extension for z/OS 1.9 is available Oct. 1, 2010. Note that z/OS 1.8 with the Lifecycle Extension for z/OS 1.8 and z/OS 1.7 with the Lifecycle Extension for z/OS 1.7 are also available with toleration support only.

² All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

Statements of Direction

z196 Statements of Direction (SODs)

- In the first half of 2011, IBM intends to provide support in the z196 Unified Resource Manager for a System x Blade running Linux on System x.
- By the first half of 2011, IBM intends to offer a WebSphere DataPower Appliance for zEnterprise
- The z196 will be the last high-end server to offer ordering of ISC-3. Enterprises should begin migrating from ISC-3 features (#0217, #0218, #0219), to 12x InfiniBand (#0163 - HCA2-O fanout) or 1x InfiniBand (#0168 - HCA2-O LR fanout) coupling links.
- The z196 will be last high-end server to offer ordering of the PSC feature. IBM intends to not offer the Power Sequence Controller (PSC feature #6501) on future servers. The PSC feature is used to turn on/off specific control units from the central processor complex (CPC).
- The z19 will be the last high-end server to offer ordering of ESCON channels. This applies to channel path identifier (CHPID) types CNC, CTC, CVC, and CBY. Enterprises should begin migrating from ESCON to FICON. Alternate solutions are available for connectivity to ESCON devices. IBM Global Technology Services, through IBM Facilities Cabling Services, offers ESCON to FICON Migration (Offering ID #6948-97D), to help facilitate migration to FICON to simplify and manage a single physical and operational environment while maximizing green-related savings.
- The z196 will be the last high-end server to support FICON Express4 channels: Enterprises should begin migrating from FICON Express4 channel features (#3321, #3322, #3324) to FICON Express8 channels.
- The z19 will be the last high-end server to support OSA-Express2 features: Enterprises should begin migrating from OSA-Express2 features (#3364, #3365, #3366) to OSA-Express3 features.
- The zEnterprise is planned to be the last high-end server to support dial-up modems for use with the Remote Support Facility (RSF), and the External Time Source (ETS) option of Server Time Protocol (STP). The currently available Network Time Protocol (NTP) server option for ETS as well as Internet time services available using broadband connections can be used to provide the same degree of accuracy as dial-up time services. Enterprises should begin migrating from dial-up modems to Broadband for RSF connections.

All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice. Any reliance on these Statements of General Direction is at the relying party's sole risk and will not create liability or obligation for IBM.

End of Presentation