IBM

IBM eServer zSeries 890 Overview

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IBM

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ESCON*	Multiprise*	VSE/ESA
FICON	OS/390*	WebSphere*
FICON Express	Parallel Sysplex*	z/Architecture
HiperSockets	Performance Toolkit for z/VM	z/OS
HiperSpace	PR/SM	z/VM
IBM*	Resource Link	zSeries

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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.

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Terminology

APAR	- Authorized Program Analysis Report	CIU	- Customer Initiated Upgrade
ATM	- Asynchronous Transfer Mode	CLK	- Clock
CBP	- Coupling Facility Peer Channel (copper)	CMOS	- Complementary metal oxide semiconductor
CBR	- Coupling Facility Receiver Channel (ICB)	CNC	- ESCON Channel
CBS	- Coupling Facility Sender Channel (ICB)	CP	- Central Processor
CBU	- Capacity Backup	CPACF	- CP Assist for Cryptographic Function
CBY	- ESCON Converter Channel (byte mode)	CTC	- Channel to channel
CEC	- Central Electronics Complex	CU	- Control Unit
CF	- Coupling Facility	DB2	- Database 2
CFCC	- Coupling Facility Control Code	BTU	- British Thermal Unit
CFM	- Cubic Feet per Minute	DCA	- Distributed Converter Assembly
CFP	- Coupling Facility Peer Channel (fiber)	ECKD	- Extended Count Key Data
CFR definition)	- Coupling Facility Receiver Channel (ISC-3	ESA	- Enterprise System Architecture
		ESCON	- Enterprise Systems CONNection
CFS	- Coupling Facility Sender Channel (ISC-3)	ETR	- External Time Reference (Sysplex Timer)
CHPID	- Channel Path Identifier		

Terminology

FCP	- Fibre Channel Protocol	ICC	- Integrated Console Controller
FCTC	- Ficon Channel to Channel	ICB	- Integrated Cluster Bus
FDDI	- Fiber Distributed Data Interface	ICF	- Internal Coupling Facility
FENET	- Fast Ethernet (100 bps)	ICP	- Internal Coupling Peer Channel
FICON	- Fibre CONnection	ICSF	- Integrated Cryptographic Service Facility
FIPS	- Federal Information Processing Std (USA)	IBF	- Internal Battery Feature
FQC	- Fiber Quick Connect (ESCON Trunk)	ICKDSF	- Device Support Facility (software)
G4	- IBM 9672 Generation 4 eServer	IFL	- Integrated Facility for Linux
G5	- IBM 9672 Generation 5 eServer (etc)	IGS	- IBM Global Services
GbE	- Gigabit Ethernet	IMPP	- Installation Manual – Physical Planning
GUI	- Graphical User Interface	IOCP	- Input Output Control Program
HCD	- Hardware Configuration Definition	IPL	- Initial Program Load
HCM	- Hardware Configuration Manager	IQD	- HiperSocket channel type definition
HZ	- Hertz (ISO 1000)	ISC	- InterSystem Coupling
IC	- Internal Coupling	JVM	- Java Virtual Machine

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Terminology

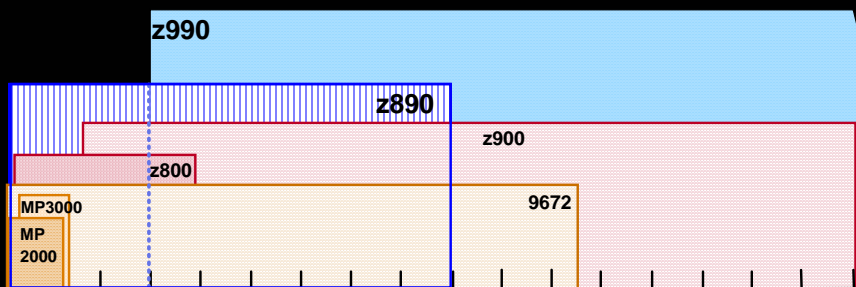|			
KBTU	- 1000 BTU	MPCIPA	- Multipath Channel with IP Assist
KVA	- Kilovolt - Amperes	MSU	- Million Service Units
LAN	- Local Area Network	MTU	- Maximum Transmission Unit
LCSS	- Logical Channel SubSystem	N/C	- No Charge
LIC	- Licensed Internal Code	OAT	- OSA Address Table
LICCC Code	- Licensed Internal Code Configuration	OOCoD	- On/ Off Capacity on Demend
LPAR	- Logically Partitioned mode	OSA	- Open Systems Adapter
LSPR	- Large Systems Performance Reference	OSA-ICC Console Controller	- Open Systems Adapter – Integrated
LX	- Long Wave Fiber (single mode fiber)	OSA/SF	- OSA/Support Facility
MBA	- Memory Bus Adapter	OSC	- Oscillator
MCM	- Multiple Chip Module	PCHID	- Physical Channel Identifier
MCP	- Mode Conditioning Patch	PCI	- Peripheral Component Interconnect
MES	- Miscellaneous Equipment Specification	PCICA	- PCI Cryptographic Accelerator
MIF ID	- Multiple Image Facility Identifier	PCIXCC	- PCI X Cryptographic Coprocessor
MIP	- Millions of Instructions per Second	PKDS	- Private/Public Key Data Set
		PR/SM	- Processor Resource / Systems Manager

Terminology

PTF	- Temporary Program Fix	SW	- Software (programs and operating systems)
PU	- Physical Unit	SX	- Short Wave Fiber (multimode fiber)
QDIO	- Queued Direct Input and Output	TCA	- Total Cost of Acquisition
QoS	- Quality of Service	TDES	- Triple Data Encryption Standard
RPQ	- Request for Price Quotation	TKE	- Trusted Key Entry
SAP	- System Assist Processor	TPF	- Operating System
SC	- Storage Control	TR	- Token Ring
SD	- System Data	TRLE	- Transport Resource List Entry
SHA	- Secure Hash Algorithm	VA	- Volt Amperes
SCSI	- Small Computer System Interface	VM/ESA	- Operating System
SDK	- Software Development Kit	VSE/ESA	- Operating System
SOD	- Statement of Direction	WAN	- Wide Area Network
SSL	- Secure Sockets Layer	zAAP	- zSeries Application Assist Processor
STI	- Self Timed Interconnect	z/OS	- Operating System
STSI	- Store System Information	z/VM	- Operating System

Agenda

- **Introduction**
- **Book Structure**
- **Upgrades**
- **I/O**
- **Sysplex Considerations**
- **Statements of Direction**
- **Operating Systems**
- **Cryptography**
- **Hardware Management Console**
- **Migration Planning**
- **Physical Planning**
- **Reference Material**

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z890 Positioning

z990

z890

z900

z800

MP3000

MP 2000

9672

z890 Performance Comparison (28 levels of capacity)

zSeries 890

Z890 entry point is 32 % less capacity than the smallest z800
z890 Uni is 1.98 - 2.09 times the z800 Uni
z890 4-way is 2.19 - 2.28 times the z800 4-way (123%)

Capacity Settings*: 110 120 130 140 150 160 170 210 220 230 240 250 260 270 310 320 330 340 350 360 370 410 420 430 440 450 460 470

Model A04

■ 1-Way   ■ 2-way   ■ 3-way   ■ 4-way

* Capacity setting refers to number of installed CPs and the capacity. Reported by STSI instruction.

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z890 MSU's

zSeries 890

1-Way			2-Way			3-Way			4-Way		
Feature Code	MSU	Capacity Setting	Feature Code	MSU	Capacity Setting	Feature Code	MSU	Capacity Setting	Feature Code	MSU	Capacity Setting
6110	4	110	6210	8	210	6310	11	310	6410	15	410
6120	7	120	6220	13	220	6320	20	320	6420	26	420
6130	13	130	6230	26	230	6330	38	330	6430	49	430
6140	17	140	6240	32	240	6340	47	340	6440	62	440
6150	26	150	6250	50	250	6350	74	350	6450	97	450
6160	32	160	6260	62	260	6360	91	360	6460	119	460
6170	56	170	6270	107	270	6370	158	370	6470	208	470

Note: For MSU values, refer to: ibm.com/**servers/eserver/zseries/library/swpriceinfo/**
www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100258 **(fewer faster engines)**

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z890 System Overview

One Frame System

Processor -- 2086 Model A04
- 1 flexible model
- 64-bit z/Architecture
- Up to 5 PUs (in single book)
  - up to 4 PUs characterizable
- CMOS9S-SOI Technology
- SuperScalar
- Crypto assist for DES and SHA in every PU
- Capacity Upgrade on Demand
- On/Off Capacity on Demand
  - For CPs, IFL, ICF, zAAP
- Capacity Backup (CBU)
- Customer Initiated Upgrade (CIU)
- Air cooled
- Up to 30 LPs active
- Optional ETR attachment

Memory
- Maximum system memory 32 GB
  - Minimum system memory 8 GB
- Card sizes 8, 16, 32 GB

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zSeries Application Assist Processor (zAAP or AAP)

- A new zSeries Application Assist Processor for Java (zAAP)
  - zAAPs are designed exclusively for z/OS and z/OS.e Java code execution
  - z/OS & z/OS.e JVMs assists with the execution of Java code from CP's to zAAPs
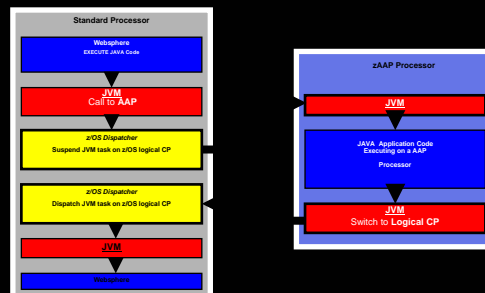
- Provides a true Single Tier integrated application and database server
  - Potential performance and QoS improvement over typical 2-tier front-end application server TCP/IP connected back-end data server platforms

- The zAAP assists reduce the CP time needed to run WebSphere applications, freeing capacity for additional workloads
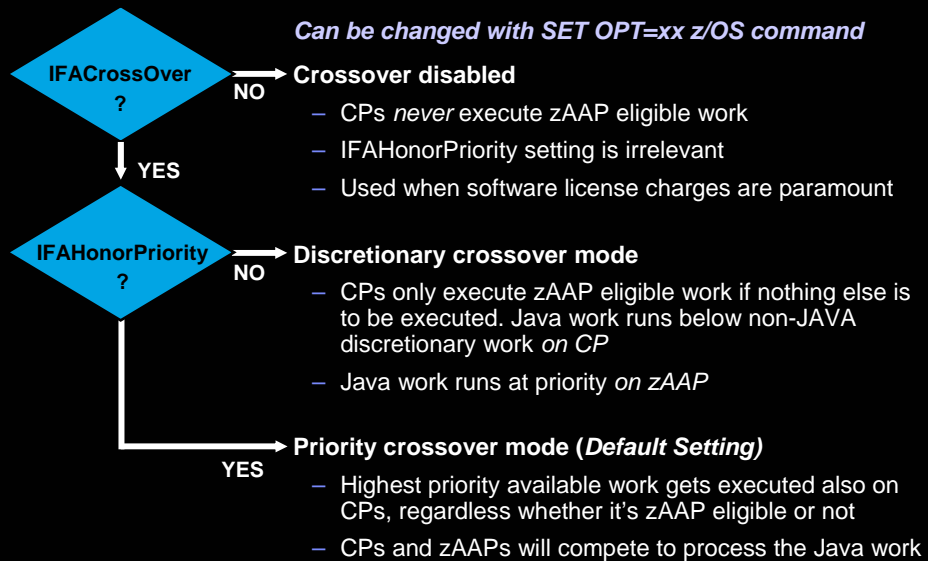
6

zAAP Characteristics

- Orderable by feature code (FC6520), up to one for each CP

- The zAAP assist can run all Java code

- Users can manage the use of CPs such that Java code runs only on a CP, only on a zAAP, or on both, when zAAPs are busy

- Subsystems that will exploit zAAPs include:
  - ► WAS 5.1
  - ► CICS/TS 2.3
  - ► DB2 V8
  - ► IMS V8
  - ► WebSphere WBI for z/OS

- Required Software
  - ► z/OS 1.6 and z/OS.e 1.6
  - ► JVM 1.4.1
  - ► SDK 1.4.1
  - ► IBM, Vendor and Customer Java

CP's + zAAP's

0-way	1-way	2-way	3-way	4-way
------	------	------	------	------
0+0	1+0	2+0	3+0	4+0
	1+1	2+1	3+1	
		2+2		

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z/OS Dispatcher Options for zAAP - IEAOPTxx

Can be changed with SET OPT=xx z/OS command

IFACrossOver? — NO → **Crossover disabled**
- CPs *never* execute zAAP eligible work
- IFAHonorPriority setting is irrelevant
- Used when software license charges are paramount

YES ↓

IFAHonorPriority? — NO → **Discretionary crossover mode**
- CPs only execute zAAP eligible work if nothing else is to be executed. Java work runs below non-JAVA discretionary work *on CP*
- Java work runs at priority *on zAAP*

YES →

Priority crossover mode (*Default Setting*)
- Highest priority available work gets executed also on CPs, regardless whether it's zAAP eligible or not
- CPs and zAAPs will compete to process the Java work

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z890 ESA/390 Partition for z/OS - zAAP support

Customize Image Profiles: TC4Q04

Logical processor assignment
- Dedicated central processors
- Dedicated central processors and integrated facility for applications
- Not dedicated central processors
- Not dedicated central processors and integrated facility for applications

Not dedicated central processor details
Initial processing weight [200] 1 to 999 □ Initial capping
☑ Enable WorkLoad Manager
Minimum processing weight [100]
Maximum processing weight [900]

Number of processors – Initial [2]   Reserved [0]
Number of integrated facility for application – Initial [1]   Reserved [0]

zAAP called "Integrated Facility for Applications" (IFA)

General | Processor | Security | Storage | Options | Load | PCI Crypto

Save | Copy notebook | Paste notebook | Assign profile | Cancel | Help

Dedicated

Shared

Weight = CP weight,
but share based on
ICF + IFL + zAAP

Init and Rsvd zAAPs

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zAAP Benefits

- **Help improve standard CP and system productivity**
  - zAAPs can reduce CP capacity requirements for JAVA based applications which may free up capacity for other workloads

- **Help simplify and reduce server infrastructures and improve operational efficiencies**
  - Help reduce hardware/network latency as might be seen in distributed web application environments
  - Integrate web applications with mission critical database workloads

- **zAAPs may be able to deliver significant TCA savings**
  - Reduced need for networking infrastructure
  - Low acquisition cost and operating cost ($125K per zAAP)
  - No effect on software MSU costs
  - No additional IBM software charges

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zAAP Projection Tool

- **"zAAP Projection Tool for Java 2 Technology Edition, SDK1.3.1 Users"**

- **URLs:**
  - www6.software.ibm.com/dl/zosjava2/zosjava2-p
  - ibm.com/servers/eserver/zseries/software/java/

- **Referred to in:**
  - z/OS R6 Introduction and Release Guide
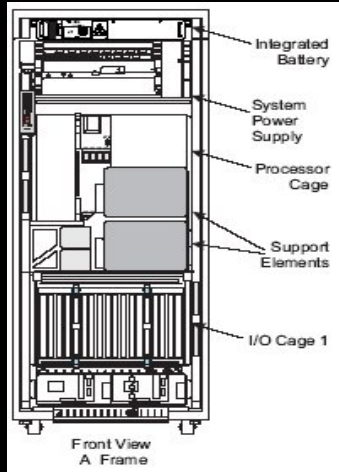 - R6 Hot Topics

- **White Paper:**
  - http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100417

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zAAP Performance White Paper

Title: z/OS Performance: Capacity Planning Considerations for zAAP Processors
  http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100417

Provide several alternatives to estimate the potential to exploit the zAAP

1. **The first portion of the paper will show the <u>results of measurements</u> done inside of IBM with various Java based workloads. These results can be used to estimate the typical ratios of Java to non-Java processor consumption for different workload types.**

2. **The next section of the paper will explain a technique which can be used for workloads currently in the <u>development phase</u>. These workloads are typically run for short periods of time to allow measurements to be made.**

3. **The final section of the paper will explain a technique which can be used for workloads currently running in a <u>production environment</u>. These are workloads which run for extended periods of time, often in a 24 by 7 environment.**

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z890 System Overview

- Integrated Battery
- System Power Supply
- Processor Cage
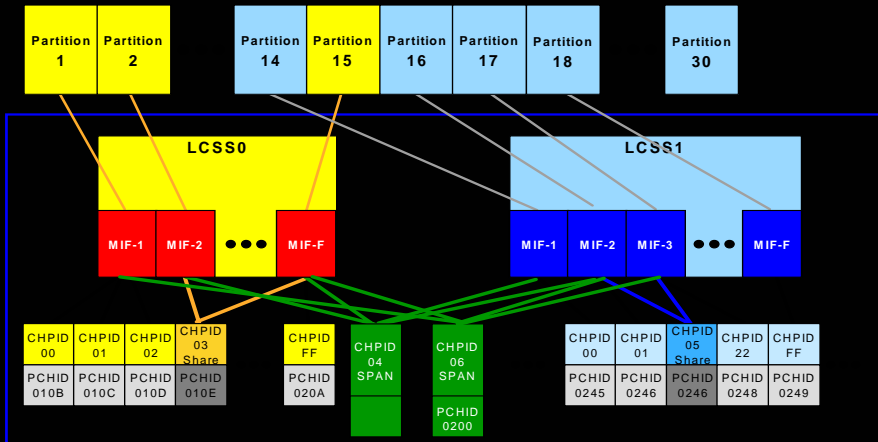- Support Elements
- I/O Cage 1

Front View
A Frame

- **I/O**
  - ►64-bit Architecture (42/48-bit I/O addressing in hardware)
  - ►Up to 8 x 2 GB/s Self-Timed Interconnects (STIs)
    - –7 I/O Domains plus 1 STI for ICB-3/ICB-4
  - ►Up to 2 Logical Channel SubSystems (LCSS)
    - –Up to 256 channels per LCSS, 512 total
    - –Spanning allowed between LCSS's
    - –Dynamic I/O support for 2 LCSS's
  - ►Up to 40 OSA-Express or OSA-Express2 network connectors
    - –24 on Capacity Setting 110
    - –Checksum Offload in hardware
    - –Intrusion Detection
    - –OSA-Integrated Console Controller (ICC)
  - ►**Up to 80 FICON™ Express2 Channels**
    - –**64 on Capacity Setting 110**
  - ►SCSI over Fibre Channel (FCP for Linux, VM, z/VSE
    - –IPL from FCP disk for Linux and VM SA dump
  - ►Up to 16 HiperSockets
- **Crypto function**
  - –CPACF in every PU
  - –PCICA
  - –PCIXCC
  - –Crypto Express2
  - –TKE 4.2
  - –No CHPID numbers required
- **Parallel Sysplex®**
  - ►ICB-4 (2 GB/s), ICB-3, ISC-3, IC, CF Duplexing

NEW!

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z890 Channel Subsystem

| Partition 1 | Partition 2 | | Partition 14 | Partition 15 | Partition 16 | Partition 17 | Partition 18 | | Partition 30 |

LCSS0　　　　LCSS1

MIF-1　MIF-2　●●●　MIF-F　　　MIF-1　MIF-2　MIF-3　●●●　MIF-F

| CHPID 00 | CHPID 01 | CHPID 02 | CHPID 03 Share | CHPID FF | CHPID 04 SPAN | CHPID 06 SPAN | CHPID 00 | CHPID 01 | CHPID 05 Share | CHPID 22 | CHPID FF |
| PCHID 010B | PCHID 010C | PCHID 010D | PCHID 010E | PCHID 020A | | PCHID 0200 | PCHID 0245 | PCHID 0246 | PCHID 0246 | PCHID 0248 | PCHID 0249 |

256 channels per logical channel subsystem

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Channel Maximums

	Z890 (6110)	Z890	Z800	Z990
LPARs	15	30	15	20
I/O Slots	16	28	16	84
LCSS	2	2	1	4
Channels	256	512	256	1024
ESCON	240	420	240	1024
FICON Express	32	40	32	120
FICON Express2	64	80	0	0
OSA-Express	24 ports	40 ports	24 ports	48 ports
OSA-Express2	24 ports	40 ports	0	48 ports
HiperSockets	16	16	4	16
ISC-3	48	48	24	48
ICB-3	16	16	5 (6 on 0CF)	16
ICB-4	8	8	0	16
IC	32	32	32	32
OSA-E ATM	0	0	24	0

Capacity Setting 110

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- **Hardware Management Console**
- **Migration Planning**
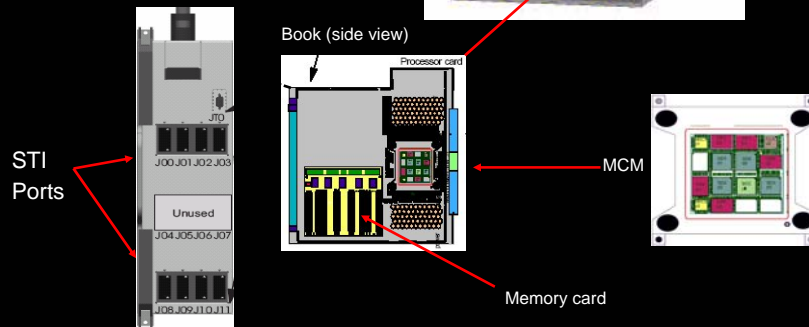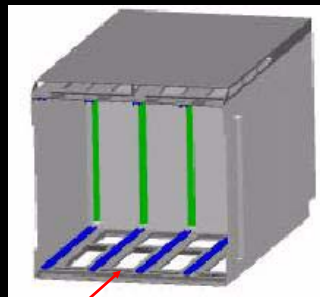- **Physical Planning**
- **Reference Material**

What does z890 look like?

- Always one frame
  - ► Slightly shorter than a G5/G6
  - ► Slightly taller than z800
  - ► Smaller floor space clearance dimensions than a z800

- All new CEC cage
  - ► Top of the Frame
- ► One processor book

- I/O Cage
  - ► One, same as z990 Cargo cage
    - – 28 I/O Slots for zSeries I/O cards
  - ► No longer available
    - – z900 style "compatibility" cage
    - – Older S/390 9672 I/O cards
    - – ICB-2, OSA-2 FDDI
   - – OSA-Express ATM 155

A-Frame

CEC Cage

I/O Cage

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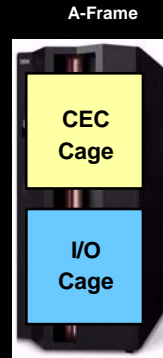
z890 CEC Cage

- Single book
- Multichip module with 5 processor units
- One memory card - 8, 16 or 32 GB each (8,16,24, 32 offered)
- Channel busses - 2.0 GB/sec
- 8 Self-Timed Interconnect (STI) ports
- 2 Memory Bus Adapters (MBA)

Power DCAs, OSC and ETR slots in the rear

STI Ports

Book (side view)

Processor card

MCM

Memory card

z890 5-way MCM

- Advanced 93mm x 93mm MCM
  - ► 100 Glass Ceramic layers
  - ► 16 chip sites, 13 in use
  - ► 0.4 km of internal wire
  - ► 46% smaller than IBM zSeries 900 (z900)
  - ► 23% more I/O connections
  - ► 133% I/O density improvement
  - ► 5,184 LGA connectors vs 1,849 pins for z800
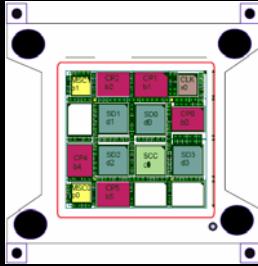
Note: MBA not on MCM

- CMOS 9S-SOI chip Technology
  - ► PU, SC, SD and MSC chips
  - ► Copper interconnections, 8 copper layers
  - ► 5 PU chips/MCM
    - • 14.1 mm x 18.9 mm
    - • 122 million transistors/PU
    - • L1 cache/PU
      - • 256 KB I-cache
      - • 256 KB D-cache
    - • 1.0 ns Cycle Time
  - ► 4 System Data (SD) cache chips/MCM
    - • 17.5 mm x 17.5mm
    - • World's densest chip
    - • L2 cache
      - • 521 million transistors/chip
      - • 32 MB
  - ► One Storage Control (SC) chip
    - – 17.3mm x 17.3mm
    - – 98 million transistors
    - – Densest I/Os
    - – 3692 Power Signal I/Os
    - – L2 access to/from MBAs (off MCM)
  - ► Two Storage Control (MSC) chips
    - – Memory cards (L3) interface to L2
  - ► One Clock (CLK) chip - CMOS 8S
    - – Clock and ETR Receiver

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z890 Upgrades/Downgrades (any to any)

1-Way		2-Way		3-Way		4-Way	
Feature Code	Capacity Setting	Feature Code	Capacity Setting	Feature Code	Capacity Setting	Feature Code	Capacity Setting
6110	110	6210	210	6310	310	6410	410
6120	120	6220	220	6320	320	6420	420
6130	130	6230	230	6330	330	6430	430
6140	140	6240	240	6340	340	6440	440
6150	150	6250	250	6350	350	6450	450
6160	160	6260	260	6360	360	6460	460
6170	170	6270	270	6370	370	6470	470

- Any horizontal upgrade is concurrent (i.e. 6130 to 6230)
- Others (vertical or diagonal) require an IPL (except z/VM)
- OA07510 (z/OS 1.4 +) permits all upgrades as concurrent
- z/VM 5.1 concurrent upgrades for z/OS 1.4+ and Linux guests

- Capacity setting is reported by the STSI instruction
- 6070 = zero CP's (ICF's or IFL's only)

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6150	150	6250	250	6350	350	6450	450
6160	160	6260	260	6360	360	6460	460
6170	170	6270	270	6370	370	6470	470

- Vertical upgrades may require an IPL (except z/VM)
- OA07510 (z/OS 1.4 +) permits all upgrades as concurrent
- z/VM 5.1 concurrent upgrades for z/OS 1.4+ and Linux guests

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6160	160	6260	260	6360	360	6460	460
6170	170	6270	270	6370	370	6470	470

- Any horizontal upgrade is concurrent (i.e. 6140 to 6240)
- Others (vertical or diagonal) require an IPL (except z/VM)
- OA07510 (z/OS 1.4 +) permits all upgrades as concurrent
- z/VM 5.1 concurrent upgrades for z/OS 1.4+ and Linux guests

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z890 Upgrades/Downgrades (any to any)

1-Way		2-Way		3-Way		4-Way	
Feature Code	Capacity Setting	Feature Code	Capacity Setting	Feature Code	Capacity Setting	Feature Code	Capacity Setting
6110	110	6210	210	6310	310	6410	410
6120	120	6220	220	6320	320	6420	420
6130	130	6230	230	6330	330	6430	430
6140	140	6240	240	6340	340	6440	440
6150	150	6250	250	6350	350	6450	450
6160	160	6260	260	6360	360	6460	460
6170	170	6270	270	6370	370	6470	470

---

z890 Configuration Rules

- 5 PU's
  - ► Total (CP, SAP, ICF, IFL, zAAP, spares, On/Off CoD or CBU) activated cannot exceed 5

- Mandatory
  - ► 1 SAP and one other PU type - CP, ICF, IFL
  - ► Can be all CP, ICF or IFL, but not all zAAPs
    - – A zAAP requires a "partner CP" (1:1) ratio
      - • z890 maximum zAAP = 2

- Unconfigured PU's are spares

- **Capacity Setting "xyz"** for software pricing
  - ► Preceded by a 6 (feature code) - 6xyz
  - ► X indicates number of CPs (6270)
  - ► Y indicates capacity setting (6270)
  - ► Z indicates (6270, 6271, 6272)
    - – 0 = CP
    - – 1 = On/Off CoD Use Day
    - – 2 = Capacity Marker
  - ► 6070 for no CPs (ICFs, IFLs only)

1-Way		2-Way		3-Way		4-Way	
Feature Code	Capacity Setting	Feature Code	Capacity Setting	Feature Code	Capacity Setting	Feature Code	Capacity Setting
6110	110	6210	210	6310	310	6410	410
6120	120	6220	220	6320	320	6420	420
6130	130	6230	230	6330	330	6430	430
6140	140	6240	240	6340	340	6440	440
6150	150	6250	250	6350	350	6450	450
6160	160	6260	260	6360	360	6460	460
6170	170	6270	270	6370	370	6470	470

CAPACITY MARKER of "high watermark"

1-Way		2-Way		3-Way		4-Way	
Feature Code	Capacity Setting	Feature Code	Capacity Setting	Feature Code	Capacity Setting	Feature Code	Capacity Setting
6110	110	6210	210	6310	310	6410	410
6120	120	6220	220	6320	320	6420	420
6130	130	6232	230	6330	330	6430	430
6140	140	6240	240	6340	340	6440	440
6150	150	6250	250	6350	350	6450	450
6160	160	6260	260	6360	360	6460	460
6170	170	6270	270	6370	370	6470	470

FC6232 reflects the downgrade history

If upgraded later to a CP =< FC6230 again, only a service charge is required.

Conversions are not supported.

Z800 to z890 Upgrades – Frame roll MES

To ANY Capacity Setting

E-Config will default to the next closet Capacity setting model, but the user may change to any capacity setting desired.

Models

0X2, 0A2, 002, 003, 004

Model A04

The z800 serial number is preserved on the z890

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z800 to z890 Features that carry forward on upgrade

- OSA-Express
  - All except ATM 155
- FICON Express
- ESCON
- ICB-3
- FC0218, ISC-3 Daughter card
- RPQ 8P2197 ISC-3 Daughter card (10-20 km)
- PCICA
- TKE 3.x for legacy control only
  - If Crypto Express2 is ordered, TKE must be updated with TKE 4.2
    - Could be a multi-step upgrade depending on level of 3.x
- TKE 4.0 (for legacy)
  - If Crypto Express2 is ordered, TKE must be updated with TKE 4.2
- TKE features (Token Ring/Ethernet adapters)
- HMC's
  - FC0073
  - FC0074
  - FC0075
- FC0089 Ethernet Hub for HMC network
- On/Off CoD if applicable

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z800 to z890 to z990 Upgrades

- z800
  - Model 0X2
  - Model 0A2
  - Model 002
  - Model 003
  - Model 004

- z890
  - starting with capacity setting of...
  - 170 (1-way)
  - 250 (2-way)
  - 330 (3-way)
  - 430 (4-way)
  - 070 (0-way) to A08 (0-way)

- z990
  - Model A08
  - (1 to 8-way)

- Any z890 >220 MIPs to z990 Model A08

- No upgrade from any IBM S/390® 9672, Multiprise or IBM @server zSeries 900 (z900)

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z890 Memory Planning

- **Memory scrubbing**

- **Redundant memory throughout to minimize memory outages.**

- **No spare DIMMs. Memory card replacement requires an outage**

- **HSA is LARGE (1.0 to 2.0 GB)**
  - **FIX**
    - **MCL F35031.029**
    - **MCL F35031.032**
  - **768 MB to 1897 MB**

Memory Cards	PU's	Card Feature Code	LICC enabled feature code	Memory Size	Memory Cards
8 GB	1-4	FC2008	FC3102	8 GB	1
16 GB	1-4	FC2016	FC3104	16 GB	1
32 GB	1-4	FC2032	FC3106	24 GB	1
32 GB	1-4	FC2032	FC3108	32 GB	1

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z890 Upgrade Options

- **On/Off Capacity on Demand - Temporary upgrade (FC9898 & FC9896)**
  - Nondisruptive* temporary addition of CPs, IFLs, ICFs and zAAPs
  - "Right to use" feature - Orderable as MES or with new build to initiate contract and administrative setup
  - Customer orders and installs upgrade via Resource Link and IBM RSF
  - Nondisruptive removal when capacity is no longer wanted
  - **OCTOBER 29, 2004**
    - **On/Off CoD TEST up to 24 hours with NO CHARGE from IBM**
    - **Order can remain on RETAIN for an extended period (was 30 days)**
  - **Currently, no maintenance charges are incurred, but plans are in place to add Maintenance charges in the future**

- **CIU – Customer Initiated Upgrade - Express - Permanent upgrade (FC9898)**
  - Customer capability to order and install permanent upgrade
  - Any LICCC enabled engine
  - Memory increment from 24GB to 32GB
  - CIU feature - MES ordered to initiate contract and administrative setup
  - Customer orders and installs upgrade via Resource Link and IBM RSF

- **CBU – Capacity Backup - Temporary emergency capacity upgrade****
  - Nondisruptive temporary addition of CPs ONLY in an emergency situation
  - Not applicable to zAAPs, IFL's, ICF's
  - CBU contract required to order CBU features and CBU LIC CC
  - Customer activates upgrade for test or temporary emergency
  - Nondisruptive downgrade after test or recovery completed
  - Five CBU ten day tests

Free 24 hour test

NEW!
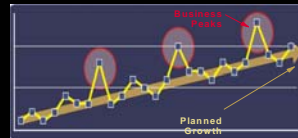
"Right to Use" features for On/OFF CoD + CBU can be loaded simultaneously

* For z890 CPs only for horizontal upgrade. OS may require IPL for vertical or diagonal upgrades (see APAR OA07510)

** For z890 - To FULL size engines only

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On/Off Capacity on Demand

From	To
110	120, 210
120	130, 210, 220, 310
130	140, 150, 220, 230, 320, 410, 420
140	150, 160, 230, 240, 320, 420
150	160, 240, 250, 330, 340, 420, 430
160	170, 240, 250, 260, 330, 340, 430, 440
170	260, 270, 350, 360, 440, 450
210	220, 310, 410
220	230, 320, 410, 420
230	240, 250, 330, 340, 420, 430
240	250, 260, 330, 340, 430, 440
250	260, 350, 360, 440, 450
260	270, 350, 360, 440, 450, 460
270	370, 460, 470

From	To
310	320, 410
320	330, 420
330	340, 350, 430, 440
340	350, 360, 430, 440
350	360, 450, 460
360	370, 450, 460
370	470
410	420
420	430
430	440, 450
440	450, 460
450	460
460	470
470	n/a

Capacity Back Up

From	To
110	270, 370, 470
120	270, 370, 470
130	270, 370, 470
140	270, 370, 470
150	270, 370, 470
160	270, 370, 470
170	270, 370, 470
210	370, 470
220	370, 470
230	370, 470
240	370, 470
250	370, 470
260	370, 470
270	370, 470

From	To
310	470
320	470
330	470
340	470
350	470
360	470
370	470
410	n/a
420	n/a
430	n/a
440	n/a
450	n/a
460	n/a
470	n/a

Agenda

- **Introduction**
- **Book Structure**
- **Upgrades**
- **I/O**
- **Sysplex Considerations**
- **Statements of Direction**
- **Operating Systems**
- **Cryptography**
- **Hardware Management Console**
- **Migration Planning**
- **Physical Planning**
- **Reference Material**
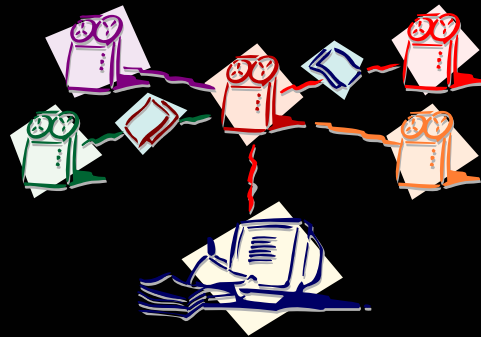
DS6000 Highlights

NEW!

ESS reliability and host attachment features now available in an incredibly small, modular, affordable package

- **DS6000**
  - 3U package for controllers and disk expansion units
  - Open systems and mainframe support
  - Advanced functions interoperate with DS8000, ESS
  - High storage density footprint
    - 16 drives per 3U package, including controller
  - Up to 13 expansion units
    - Scalable to 224 Disk Drives; 67.2TB

- **Differentiators**
  - zSeries and iSeries native attachment
    - Including Parallel Access Volumes support
  - Same advanced software features as DS8000, ESS 800, ESS 750
  - High availability features not generally found in midrange storage products

www.storage.ibm.com

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zSeries 16 port ESCON Feature

- **High density package**
  - Carry forward from z800
  - 16-port feature (FC 2323)
    - Ordering increment, four channels (FC 2324)
  - At least one spare channel port per card
  - Active ports - LIC CC controlled
  - Active channels balanced across all installed features
  - After the first pair, ESCON features are installed in increments of one

- **Small form factor MTRJ connector**
  - 62.5 micron multimode fiber
  - Conversion kit available from IGS for existing ESCON duplex fiber infrastructure

- **Fiber Quick Connect (FQC)**
  - Factory installation of direct-attach fiber harness
  - Supports all installed ESCON features
    - New builds or conversions to z890
  - Enables attachment to fiber trunking

Note: ESCON Director 9032-005 withdrawn from marketing December 31, 2004
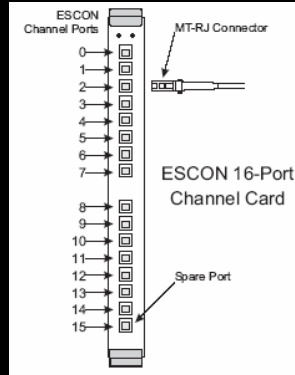
Number of Channels	Cards
4 - 28	2
32 - 44	3
48 - 60	4
(...)	(...)
244 - 268	18
(...)	(...)
408 - 420	28

Number of Channels	Cards
4 - 28	2
32 - 44	3
48 - 60	4
(...)	(...)
228 - 240	16

Capacity Setting 110

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zSeries FICON Express
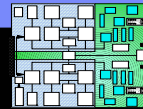
- **FICON Express LX (long wavelength) - FC 2319**
  - Carry forward from z800
  - Supports 9 micron single mode fiber

- **FICON Express SX (short wavelength) - FC 2320**
  - Carry forward from z800
  - Supports 50 or 62.5 micron multimode fiber
  - Not Compatible with FICON Bridge (FICON Bridge is LX only)

- **Port capacity**
  - Maximum of 20 features / 40 ports (32 on Capacity Setting 110)
  - All ports on each feature identically configured (LX or SX)

  FC 2319 (LX), FC2320 (SX)

- **Modes of Operation: applicable to each port**
  - FCV (FICON Bridge Converted); applicable to LX feature only (NOT AVAILABLE ON FICON EXPRESS2)
    - FICON to FICON Bridge on ESCON Director Model 5
  - FC (Fibre Channel)
    - Native FICON
    - FICON Channel-To-Channel
  - FCP (Fibre Channel Protocol)
    - Support of SCSI devices in Linux, VM, z/VSE environments

- **Bandwidth**
  - 1 or 2 Gbps link data rate
  - Auto-negotiated with device

- **Service Enhancement**
  - Support for FCP Concurrent Patch (z890/z990 only)
  - CNFG ON/OFF - Not required for most LIC changes

- **Improved Performance**
  - Z890/z990 only
 - Data with small blocksizes (4K) could see improvement relative to z800/z900 up to 15 percent

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FICON EXPRESS2 (January 28, 2005)

New

- **4 channels per feature**
- **Now up to 80 channels in the same amount of physical space (see following slide)**
- **Two CHPID types**
  - FC - native FICON and CTC
  - FCP - communicating with SCSI devices
- **Connectivity options for each channel**
  - 1 or 2 Gbps, auto-negotiated
  - Can be shared among LPARs
  - Can be defined as a spanned channel
  - Intermix of FC and FCP in the same director
  - Supports cascading - connecting directors in succession

- **Supported connectivity devices**
  - Refer to: http://www.ibm.com/servers/eserver/zseries/connectivity/
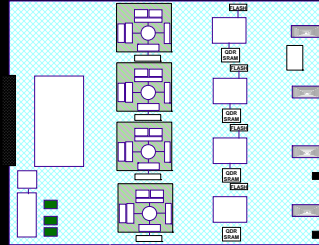
LX = FC3319
SX = FC3320

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FICON EXPRESS2 (January 28, 2005)

New

- **Connector - LC Duplex**
- **LX - 9 micron single mode fiber**
  - Unrepeated distance - 10 kilometers (6.2 miles)
  - Receiving device must also be LX
- **SX - 50 or 62.5 micron multimode fiber**
  - Variable distance & speed and fiber type
  - Receiving device must also be SX

- **Maximum (all "flavors" of FICON)**
  - z990 - 60 features, 240 channels
    - 48 features, Model A08
  - z890 - 20 features, 80 channels
    - 16 features, smallest sub-uni

- **4 channels of LX or SX (no mix)**

LX   or   **SX**

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23
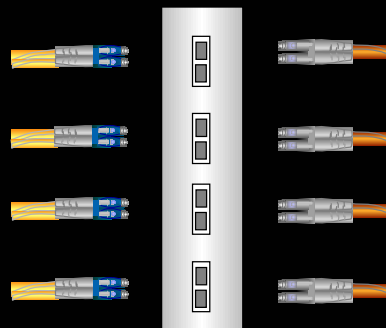
FICON EXPRESS2 – Minimum Software

- **FICON EXPRESS2 (CHPID TYPE FC), on z890 and z990 including Channel-To- Channel (CTC)**
  - z/OS and z/OS V1.3, and later (HCD PTF for APAR OA09114)
  - z/VM V3.1, V4.3 and later (may require PTFs), and V5.1
  - VSE/ESA V2.6, and later
  - TPF V4.1 at PUT 16
  - Linux on zSeries
    - The currently available distributions: SUSE SLES 8 and SLES 9, Red Hat RHEL 3, and Conectiva CLEE

- **FICON EXPRESS2 (CHPID TYPE FCP) on z890 and z990 for support of SCSI disks**
  - PTF for APAR VM63610
  - z/VM V5.1 (for z/VM install, IPL, and operation from SCSI disks)
  - z/VM V4.4, and later for
    - Performance Assist for Adapter Interruptions
    - Performance Assist for V=V Guests
    - Guest IPL from SCSI devices
  - z/VM V4.3, and later (for Linux as a guest under z/VM)
  - z/VSE V3.1 (available March 4, 2005)
  - Linux on zSeries
    - The currently available distributions: SUSE SLES 8 and SLES 9, Red Hat RHEL 3, and Conectiva CLEE

- **FCV (CONVERTER) Channels are NOT SUPPORTED on FICON EXPRESS2**
  - If FCV required, use RPQ 8P2295 to enable order of FICON Express for transitioning purposes

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FICON EXPRESS2 Estimated Performance

I/O per second (k)
4k block size,
100% utilized

Legend: ESCON, G5/G6 FICON, z900 FICON, FICON E, FICON E, FICON E2

Values: 1000, 3600, 6000, 7200, 9200, 13000
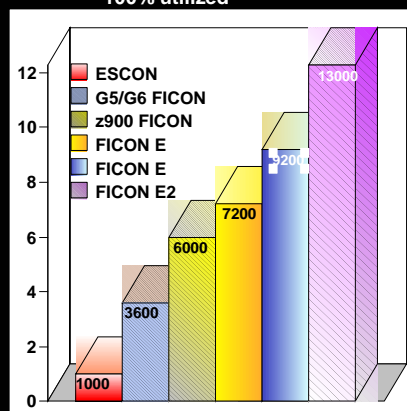
MB/sec throughput (Full Duplex)

Legend: ESCON, G5/G6 FICON, 1 Gbps FICON Express, 2 Gbps FICON Express, FICON Express2

Values: 17, 74, 120, 170, 270
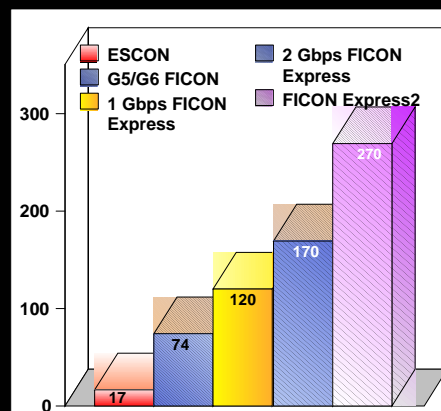
This performance data was measured in a controlled environment on a z990 running an I/O driver program under z/OS 1.6. The actual throughput or performance that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed.
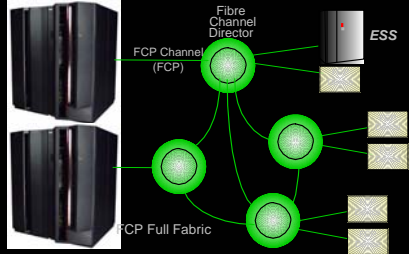
24

zSeries SCSI IPL Feature

- **SCSI IPL is available as an optional, no-charge feature FC9904 for all zSeries**
  - FICON Express or FICON Express2 channel is required

- **FCP without SCSI IPL Feature**
  - Allows Linux, VM and z/VSE data to be stored on SCSI or FCP device
  - IPL to SCSI disk results in an error
    - An ECKD device is required

- **FCP with SCSI IPL Feature**
  - Allows Linux, VM and z/VSE data to be stored on SCSI or FCP device
  - Allows Linux, VM and z/VSE to install and load (IPL) on SCSI or FCP disk
    - IPL from both LPAR and/or z/VM guests
      - For z/VM guest IPL, z/VM 4.4 is required.

- **Standalone dump program can be loaded SCSI or FCP disk in order to dump the contents of a logical partition, and the dump data can be written to this same disk (except z/VSE).**

- **Linux LPARs can be started and run completely from SCSI or FCP disk**
  - z/VM continues to require ESCON or FICON attached disk or tape for its own IPL, storing of guest dumps, and other functions
    - Except for z/VM 5.1 (available 09/24/2004)
      - Emulates FBA 9336-20 on SCSI disk

Fibre Channel Director

ESS

FCP Channel (FCP)

FCP Full Fabric
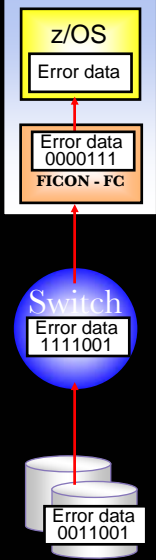
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FICON Purge Path Extended
for native FICON (CHPID type FC)

NEW!

- **Designed to enhanced FICON problem determination**

- **Error-recovery function is extended**
  - Transfers error-related data and statistics
    - Between the channel and entry switch
    - Control unit and its entry switch
    - To the host z/OS operating system
      - Reported in EREP

- **Exclusive to z990 and z890**

- **Supported by z/OS and z/OS.e V1.4, and later, with PTFs for APAR 0A06846 and EREP APAR IR51695**
  - APAR OA06846 requires IPL

- **Requires supporting LIC on control units**
  - For 2105-800   LIC R6G.8B040701
  - For 2105-800   LIC R9Z.8B040805 w/VRMF 2.3.2.118
  - For 2105-F20   LIC R9Z.FB040805 w/VRMF 2.3.2.117
 - DS6000/DS8000 GA

z/OS

Error data

Error data
0000111
FICON - FC

Switch
Error data
1111001

Error data
0011001

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OSA-Express2

NEW!

- **Newest member - 10 Gigabit Ethernet LR (long reach)**
  - One port per feature
  - 9 micron single mode fiber, SC Duplex connector
- **New - Gigabit Ethernet features**
  - Gigabit Ethernet LX (Long wavelength)
    - 9 micron single mode fiber, LC Duplex connector
  - Gigabit Ethernet SX (Short wavelength)
    - 50 or 62.5 micron multimode fiber, LC Duplex connector
  - Designed to achieve line speed - 1 Gbps in each direction
- **Support offered by both 10 GbE and GbE:**
  - Queued Direct Input/Output (QDIO) for TCP/IP traffic only
    - Use TN3270 or Enterprise Extender for SNA traffic
  - **Layer 2 support** for flexible and efficient data transfer
  - **640 TCP/IP stacks** for improved virtualization
  - **Large send** for CPU efficiency
  - **Concurrent LIC update** to help minimize network traffic disruption
- **CHPID type for all features and functions listed is OSD**
- **Availability – January 28, 2005**

PCI-X

SC Duplex SM

PCI-X

PCI-X

LC Duplex SM

LC Duplex MM

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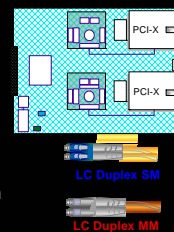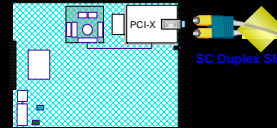
OSA-Express2 Support Requirements

- **OSA-Express2 Gigabit Ethernet requires:**
  - z890 or z990 hardware LIC support for GA2/4 (January 2005)
  - z/OS 1.3 or z/OS.e 1.3 or later
  - z/VM 3.1 or z/VM 4.3 or later with service
  - z/VSE 3.1 (planned March 4, 2004) and VSE/ESA™ 2.6 with service or later
  - TPF 4.1 PUT13 with service for APAR PJ27333
  - Linux on zSeries with Gigabit Ethernet support:
    - SUSE LINUX SLES 8 or 9, Red Hat RHEL 3, Turbolinux TLES 8 or Conectiva CLEE
  - See the 2084DEVICE or 2086DEVICE PSP for any additional service required
- **OSA-Express2 10 Gigabit Ethernet requires:**
  - z890 or z990 hardware LIC support for GA2/4 (January 2005)
  - z/OS 1.3 or z/OS.e 1.3 or later
  - For Checksum Offload, z/OS or z/OS.e 1.5 or later
  - z/VM 3.1 or z/VM 4.3 or later with service (January 2005)
  - z/VSE 3.1 and VSE/ESA 2.6 or later with service
  - TPF 4.1 PUT13 with service for APARs PJ27333 and PJ29930
  - Linux on zSeries with code IBM plans to deliver as Open Source in early 2005
  - See the 2084DEVICE or 2086DEVICE PSP for any additional service required
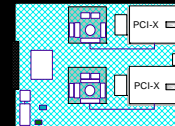- **For CHPID Mapping (optional), updated CHPID Mapping Tool from Resource Link**

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OSA-Express2 & OSA-Express features

- **Up to 40 network connections - z890**
  - 24 on z890 capacity setting 110
- **Choose from 5 features**
  - OSA-Express2 10 GbE, GbE LX and SX
  - OSA-Express 1000BASE-T Ethernet
    - 10/100/1000 mbps
    - Same Cat 5 cable as Fast Ethernet
    - OSA ICC support
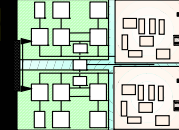 - OSA-Express Token-Ring (4/16/100 Mbps)
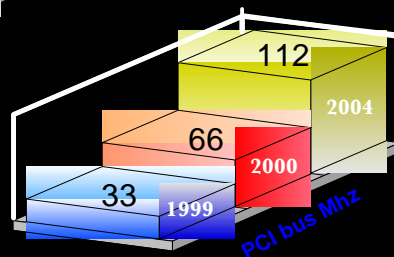   - Cat 5 copper cable

- **Modes of Operation for 1000BASE-T Ethernet, Token-Ring**
  - QDIO = TCP/IP traffic only
    - TN3270 or Enterprise Extender for SNA traffic
  - Non-QDIO = TCP/IP and/or SNA/APPN®/HPR
  - OSA-ICC for 1000BASE-T only

- **SOD - z990/z890 are the last zSeries servers to support Token-Ring OSA - new build, upgrade, MES, or carry forward**

10 Gigabit Ethernet Feature 3368 ①
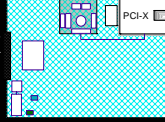
②③
Gigabit Ethernet Features 3364 (LX), 3365 (SX)

Ethernet (1000BASE-T) Feature 1366
④

Token Ring Feature 2367
⑤

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OSA-Express2 – Third Generation OSA-Express

35% increase > from the second generation

448 — 2004
333 — 2000
166 — 1999

Processor Mhz
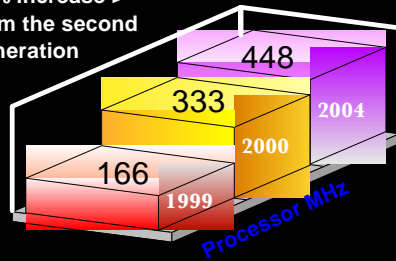
Third . . . .
Second . . . .
First . . . .

112 — 2004
66 — 2000
33 — 1999

PCI bus Mhz

- OSA-Express2 is the **3rd generation** of Ethernet technology to deliver the throughput to help satisfy bandwidth-hungry applications

70% increase from the second generation

- OSA-Express2 GbE is designed to achieve line speed - 1 Gbps in each direction
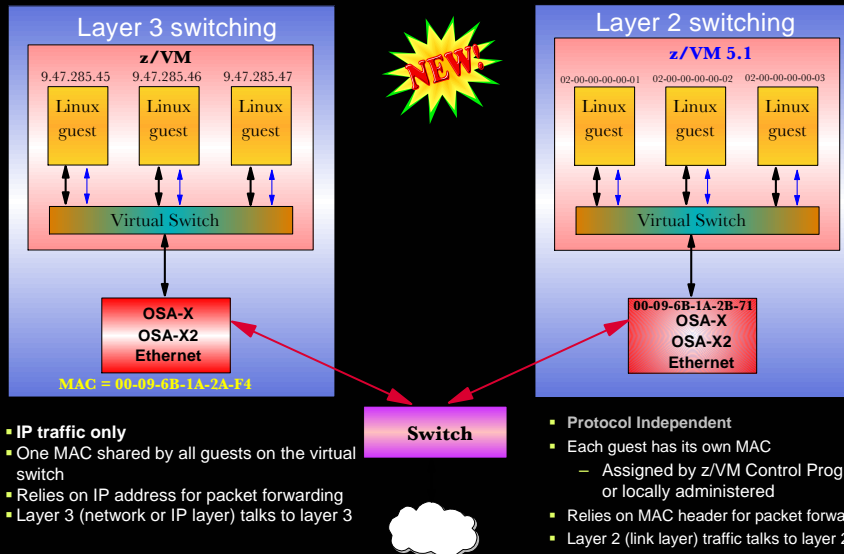
© 2004 IBM Corporation

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OSA-Express2 Large Send Support

- **OSA-Express2 (GbE and 10 GbE)**
  (January 28, 2005)

- **Segmentation of IP packets done**
  by OSA NIC, not IP stack
    - Offloads the TCP segmentation
      processing from host TCP/IP stack
    - Host code path length reduced
    - Sends 64 KB blocks to OSA
- **Processing performed by OSA NIC**
    - TCP/IP checksum processing
    - TCP packet processing
    - Sends out 1.5 KB packets (1492 byte)

- **QDIO mode only (CHPID type OSD)**
    - For outbound traffic only
    - For IPv4, IPv6
    - For unicast datagrams

- **Supported by**
    - Linux on zSeries
        - SUSE as part of SLES 9 SP2 (service pack)
          Available July 7, 2005
    - z/OS Communications Server with z/OS
      or z/OS.e 1.7 (1.6 with PTF) for IPv4
      traffic only
        - z/OS 1.6 APARS PK02490, OA11148

	Ethernet frame	Jumbo frame	TCP large send
Application send buffer	63 KB	63 KB	63 KB
TCP	1.5 KB / 1.5 KB	9 KB / 9 KB	64 KB
OSA NIC	1.5 KB / 1.5 KB	9 KB / 9 KB	1.5 KB / 1.5 KB

© 2004 IBM Corporation
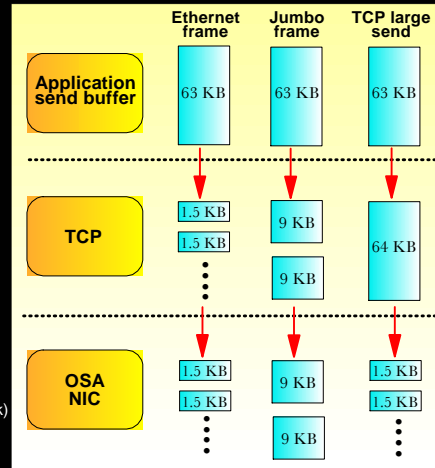
Link layer transport for protocol-independent data transfer

Layer 3 switching

z/VM

9.47.285.45   9.47.285.46   9.47.285.47

Linux guest   Linux guest   Linux guest

Virtual Switch

OSA-X
OSA-X2
Ethernet

MAC = 00-09-6B-1A-2A-F4

- **IP traffic only**
- One MAC shared by all guests on the virtual switch
- Relies on IP address for packet forwarding
- Layer 3 (network or IP layer) talks to layer 3

NEW!

Switch

Layer 2 switching

z/VM 5.1

02-00-00-00-00-01   02-00-00-00-00-02   02-00-00-00-00-03

Linux guest   Linux guest   Linux guest

Virtual Switch

00-09-6B-1A-2B-71
OSA-X
OSA-X2
Ethernet

- **Protocol Independent**
- Each guest has its own MAC
    - Assigned by z/VM Control Program or locally administered
- Relies on MAC header for packet forwarding
- Layer 2 (link layer) traffic talks to layer 2

© 2004 IBM Corporation

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## OSA-Express2 and OSA-Express Layer 2 Support

- **Function and Potential Benefits**
  - Provides protocol independence for network traffic
    - IPX, NetBios, SNA, AppleTalk, Decnet, IPv4, IPv6
  - May facilitate server consolidation onto z990 and z890
  - May reduce CPU utilization for router images/LPAR/guests
  - May reduce network configuration complexity

- **Support and Requirements**
  - Requires z890/990 hardware LIC support for GA2/4
    - z890/990 OSA-Express Ethernet (October 29, 2004)
      - All Ethernet features **EXCEPT** Fast Ethernet (FC #2366)
    - All z890/990 OSA-Express2 Ethernet (January 28, 2005)
  - Requires z/VM 5.1
    - OSA-Express: APAR VM63538 (December 3, 2004)
    - OSA-Express2: With additional service (January 28, 2005)
  - Requires Linux with code IBM plans for Open Source delivery in:
    - October 2004 for kernel 2.4
    - Early 2005 for kernel 2.6
  - See 2084DEVICE or 2086DEVICE PSP for any additional service required

NEW!

IPX

NetBIOS

SNA

---
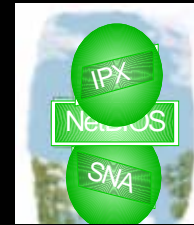
OSA-Express Stack Utilization Improvement

NEW!

- **Function and Potential Benefits**
  - OSA-Express features support 160 TCP/IP stacks. Previously, to use all those stacks, the CHPID had to be shared by multiple logical partitions (LPARs). There was a restriction (only allowing a single control unit definition per CHPID) that limited the number of stacks to 84 per LPAR. That restriction is lifted. Now, a single LPAR can contain all 160 stacks offered by OSA-Express.
  - Provides flexibility for OSA-Express configuration, especially with z/VM
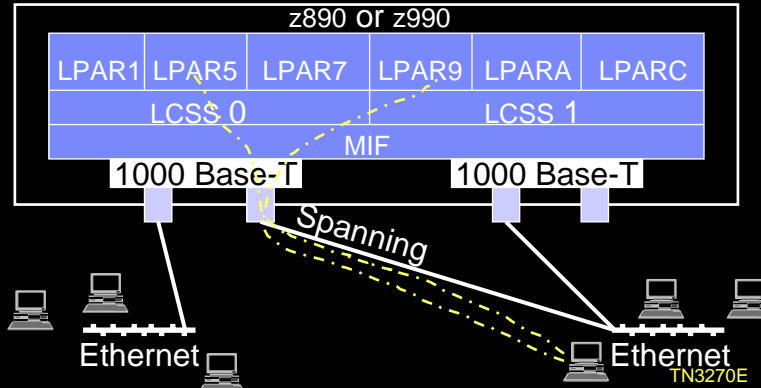 - Note: OSA-Express2 supports 640 stacks per LPAR.

- **Support and Requirements**
  - Requires z890/990 hardware LIC support for GA 2/4 (October 29, 2004)
  - OSA-Express features Gigabit Ethernet (any), 1000Base-T Ethernet, Fast Ethernet, or Token-Ring configured as OSD (TCP/IP only)
  - Requires z/OS and z/OS.e 1.6 with service for HCD APAR OA03689
  - z/VM 3.1, 4.3 or later with service for APARs VM63524 and PQ91421 (January 28, 2005)
  - z/VSE 3.1
  - See 2084DEVICE or 2086DEVICE PSP for any additional service required
  - Linux on zSeries current distributions:
    - SUSE SLES 8 or 9, Red Hat RHEL 3, or Conectiva CLEE

640

160
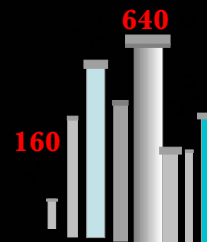
OSA-Integrated Console Controller (OSA-ICC)

- Console Controller for z990 and z890
  - System Console (IPL) and operations support for multiple LPARs
  - 120 Sessions per port (2 ports per feature)
  - **Exclusive to OSA-Express 1000BASE-T Ethernet**
- Minimum software:
  - z/OS V1.3, z/VM V4.4, VSE/ESA™ V2.6, TPF 4.1
- Supports Ethernet-attached TN3270E emulated sessions
- Can coexist in configurations using prior IBM 2074 models and older 3174 controllers

---

OSA-ICC Resources

- SA22-7990   OSA-ICC User's Guide

- SG24-6364   OSA-ICC Implementation Redbook

- http://w3-1.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/FLASH10295

Slide 1

zSeries 890

IBM

HiperSockets

- **Four times the connectivity of z800/z900**
  - From 4 to 16 HiperSockets
  - Connect four times more TCP/IP stacks
    - Increased number of communication queues (from 1,024 to 4,096)
  - Support for multiple LCSS
    - Single LP can connect to 16 HiperSockets
- **Support for spanned CHPIDs across multiple LCSS**
  - One HiperSocket can be shared by up to 30 LPARs
- **Support for 64-bit HSA address space**
- **Virtual LAN (IEEE 802.1q) support**
- **Broadcast for IPv4**
- **Support of additional IP assist features for IPv6**
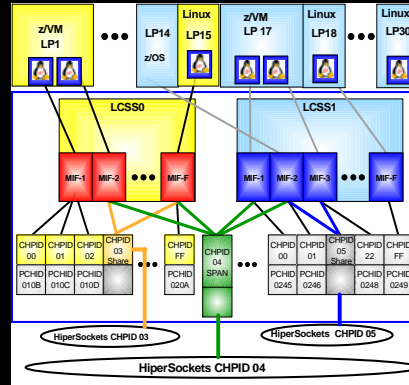
Very High Speed Interconnection between programs running z/OS, z/VM , VSE/ESA or Linux®

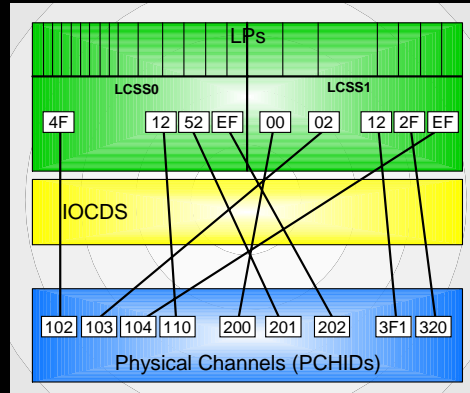© 2004 IBM Corporation

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Slide 2

zSeries 890

IBM

Spanned Channel Support
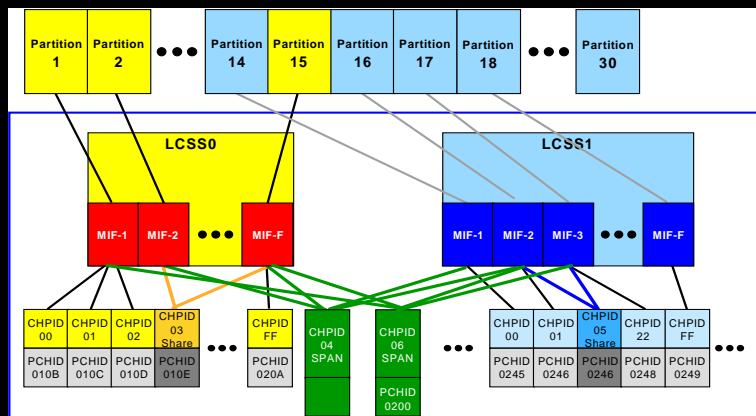
- CHPID 04 shows example of a spanned channel (HiperSockets or Internal Coupling links)
- CHPID 06 shows example of a spanned channel (FC, FCP, OSE, OSD, OSC, CBP, CBS, CFP, CFS)
- Not supported: ESCON, FICON Conversion, Coupling Receiver (CBR, CFR)

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CHPID Mapping Tool

- **Ease of use tool to simplify mapping of CHPIDs to PCHIDs**
- **Availability and manual mapping functions**
- **Tool used with HCD/HCM for assigning PCHIDs to CHPIDs**
  - Requires changes to current HCD process
- **Supports channel MESs**
  - CHPID to PCHID mapping contained in IOCP
- **"Mandatory"**
- **Customer Responsibility!**

LPs

LCSS0   **LCSS1**

| 4F | | 12 | 52 | EF | | 00 | | 02 | | 12 | 2F | EF |

IOCDS

| 102 | 103 | 104 | 110 | | 200 | 201 | 202 | | 3F1 | 320 |

Physical Channels (PCHIDs)

www.ibm.com/servers/resourcelink

Default Priorities-Availability Option Chosen

- **Previously-**
  - If no priority defined, order of processing based on CNTLUNIT number only when "Process CU Priority" executed
    - *This has caused some issues and should be used with care*
- **New Algorithm**
  - CNTLUNITs with multiple paths will now be given a default priority by the tool based on number of paths
    - This does not solve the issue of related single path control units
      - e.g. Console controllers used for Master and Alternate consoles

New Sorting Order Algorithm for Availability

- All user assigned priorities

- C/Us with 8 CHPIDs (sorted by C/U number)

- C/Us with 7 CHPIDs (sorted by C/U number)

- ....

- C/Us with 1 CHPID (sorted by C/U number)

- Pseudo C/Us (CHPIDs without C/Us, sorted by C/U number)

  - This case can occur for CHPIDs which have no control units defined

---

CHPID Mapping Tool Configuration Inputs (All models)

- **Previously**

  - *Final Mapping*: hwc file based on CCN number
    - Obtained from ResourceLink
  - *Planning*: cfr file from econfig

- **Now**

  - *Final Mapping*: cfr file based on CCN number
    - Obtained from ResourceLink
  - *Planning*: cfr file from econfig

Plus….

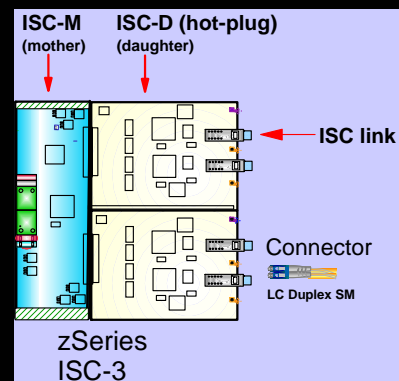Validated IOCP file for the target machine from HCD/HCM or with IOCP

Agenda

- **Introduction**
- **Book Structure**
- **Upgrades**
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- **Sysplex Considerations**
- **Statements of Direction**
- **Operating Systems**
- **Cryptography**
- **Hardware Management Console**
- **Migration Planning**
- **Physical Planning**
- **Reference Material**

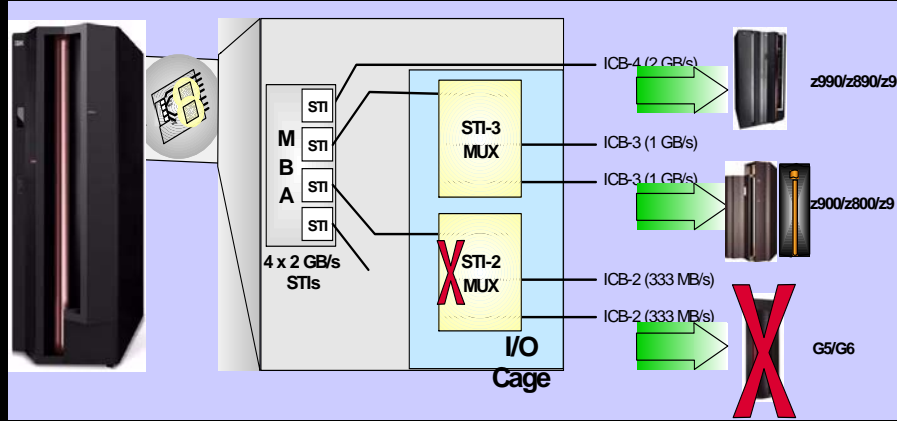# zSeries Coupling Links for Parallel Sysplex

- **InterSystem Channel-3**
  - ISC-3 links ordered in increments of one
  - Activated links balanced across features
  - Maximum of 12 features / 48 links
- **Two modes of operation**
  - Peer Mode (2 Gigabits per second - Gbps)
  - Compatibility Mode (1 Gbps)

- **Feature Codes**
  - ISC-3 FCs 0217(ISC-M) 0218 (ISC-D / ISC link)
  - FC0218 carry forward from z800
  - Activate link - FC 0219
  - Four ports per feature (two ports per ISC-D)
  - Supports 9 micron single mode fiber

- **ISC-3 Peer Mode Supported Distance Increased**
 - 100 km with repeaters
    - Peer Mode ONLY

ISC-M (mother)   **ISC-D (hot-plug) (daughter)**

← **ISC link**

Connector

LC Duplex SM

zSeries ISC-3

34

ICB-3 & ICB-4 Support

ICB-4 (2 GB/s)	z990/z890/z9
ICB-3 (1 GB/s)	
ICB-3 (1 GB/s)	z900/z800/z9
ICB-2 (333 MB/s)	
ICB-2 (333 MB/s)	G5/G6

MBA

STI
STI
STI
STI

4 x 2 GB/s STIs

STI-3 MUX

STI-2 MUX

I/O Cage

Internal Coupling Links - IC

- **Defined as ICP in HCD/HCM/IOCP**
  – Peer mode only
- **Avoid over defining**
  – Uses real CP resources
  – Maximum: (#CPs + #ICFs) -1
  – Recommended maximum is two links per sysplex
    • Two links requires four CHPIDs
    • Can use the bi-directional capability

ibm.com/support/techdocs/atsmastr.nsf/WebIndex/FLASH10271

FE ◄─────────────► FC

C F A	O S 1 B	O S 2 B	O S 2 A	O S 1 A	C F B

Example: Single Link shared by two sysplexes
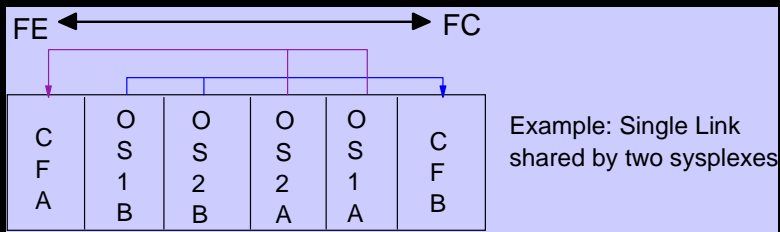
z890 CF Link to G5/G6 and z800/z900

Connectivity Options	z890/z990 ISC-3	z890 ICB-2	z890/z990 ICB-3	z890/z990 ICB-4
G5/G6 ISC	1 Gbit/sec Compat Mode	Not Supported	n/a	n/a
z900/z800 ISC-3	2 Gbit/sec Peer Mode*	Not Supported	n/a	n/a
z890/z990 ISC-3	2 Gbit/sec Peer Mode	Not Supported	n/a	n/a
G5/G6 ICB	n/a	Not Supported	n/a	n/a
z900 ICB-2	n/a	Not Supported	n/a	n/a
z990 ICB-2	n/a	Not Supported	n/a	n/a
z900/z800 ICB-3	n/a	Not Supported	1 GByte/sec Peer Mode	n/a
z990 ICB-3	n/a	Not Supported	Requires IO Slot ICB-4 Preferred	n/a
z890/z990 ICB-4	n/a	Not Supported	n/a	2 GBytes/sec Peer Mode

* RPQ - 20Km for 1Gbit/sec in peer or compatibility mode

---

zSeries Coupling Link Maximums

Link Type	z890	z890 Capacity Setting 110	z800	z990
IC	32	32	32	32
ISC-3	48*	48*	24	48*
ICB-2	0	0	0	8
ICB-3	16	16	5 (6 for 0CF model)	16
ICB-4	8	8	0	16
Maximum Number of *All Links*	64	64	26	64

* Up to 32 ISC-3's in compatibility mode

ICB-2 is NOT supported on z890

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# Parallel Sysplex Enhancements – CFCC Level 13

- **Support for up to 48 links**
- **Availability enhancement**
  - CFCC Patch Apply enhancement (DRIVER 55 – z890 & z990 only)
    - Disruptive patches affect one CF LPAR at a time
    - Rolling patch on separate CF LPARs without the need for a System Power On Reset
    - Excellent for testing in test sysplexes without impact to production
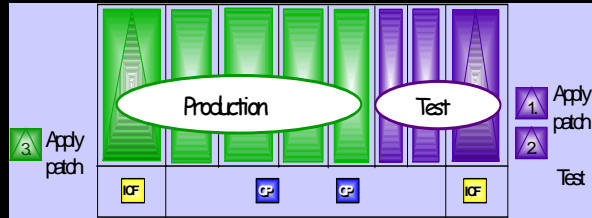
- **Performance enhancements**
  - DB2 data sharing
    - Potentially improved performance for "Cast out process" when using large DB2 buffer pools
  - APAR OA01517 enables exploiters to request placement into a CF with CFCC Level 13, but it's not a requirement
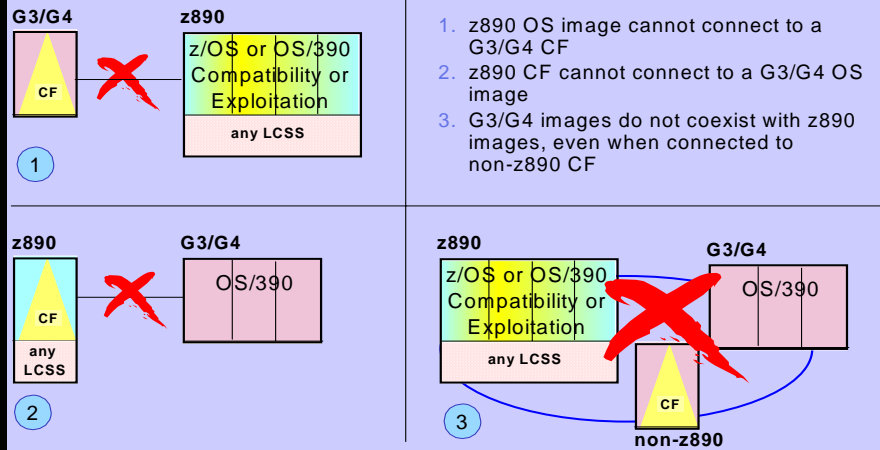
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z990 CFCC Level 14 – z890/990 GA2/4

- **Function and Potential Benefit**
  - Contains improvements to the CF dispatcher and internal serialization mechanisms designed to better manage coupled workloads

- **Requirements and Support**
  - Requires z890/990 hardware LIC support for GA2/4 (October 29, 2004)
  - z/OS 1.3 or z/OS.e 1.3 and higher
    - Optional APAR fix OA08556 to improve performance when duplexing structures
  - z/OS 1.4 and higher
    - Optional APAR fix OA08742 to allow sysplex connectors to request structure allocation in a Level 14 Coupling Facility
      - APAR OA08742 requires IPL
  - z/VM 3.1 and z/VM 4.3 and higher for virtual CF support

- **CF Storage Sizing with CFCC level 14**
  - May increase storage requirements
  - Use CFSSIZER tool to determine:
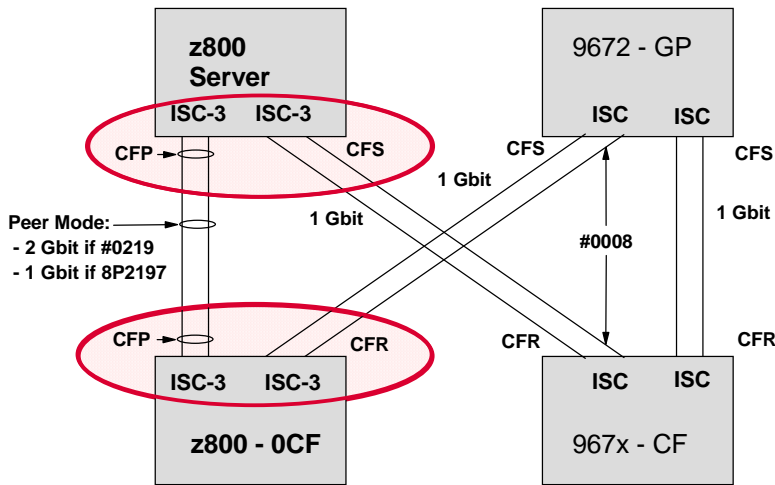 www.**ibm.com**/servers/eserver/zseries/cfsizer/
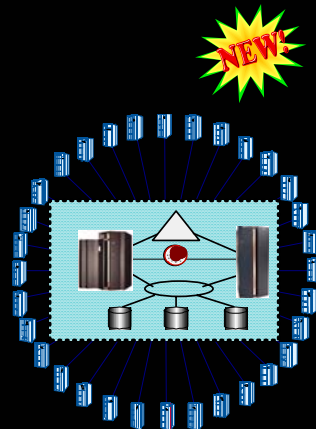
zSeries continues to meet the requirements for advanced clustering

oration
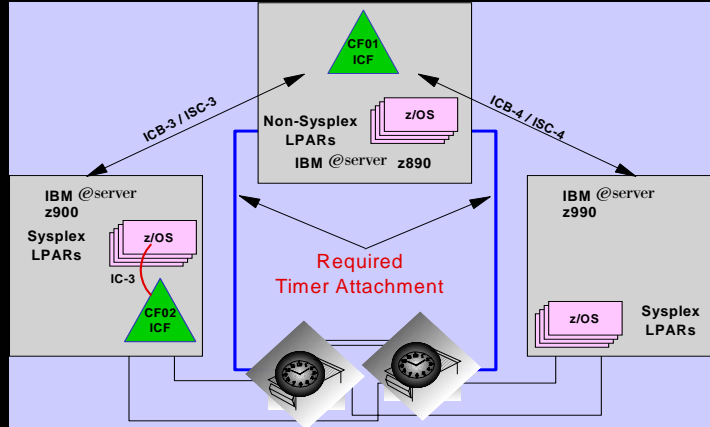
37

Parallel Sysplex coexistence with 9672 G5 or higher

G3/G4   **z890**

CF — ✗ — z/OS or OS/390 Compatibility or Exploitation

any LCSS

(1)

1. z890 OS image cannot connect to a G3/G4 CF
2. z890 CF cannot connect to a G3/G4 OS image
3. G3/G4 images do not coexist with z890 images, even when connected to non-z890 CF

z890   **G3/G4**

CF — ✗ — OS/390

any LCSS

(2)

z890   **G3/G4**

z/OS or OS/390 Compatibility or Exploitation — ✗ — OS/390

any LCSS

CF

non-z890

(3)

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z800 ISC-3 Fiber Configurations

z800 Server

ISC-3   ISC-3

CFP ➜ ◯   CFS

Peer Mode: ➜ ◯
- 2 Gbit if #0219
- 1 Gbit if 8P2197

CFP ➜ ◯   CFR

ISC-3   ISC-3

z800 - 0CF

9672 - GP

ISC   ISC

CFS   CFS

1 Gbit

1 Gbit

#0008

CFR   CFR

ISC   ISC

967x - CF

1 Gbit

1 Gbit

z800 CANNOT connect to 9672 500 Mbit links (#0007)

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Message Time Ordering - MTO

CF01
ICF

Non-Sysplex
LPARs

z/OS

IBM @server z890

ICB-3 / ISC-3

ICB-4 / ISC-4

IBM @server z900

Sysplex
LPARs

z/OS

IC-3

CF02
ICF

Required
Timer Attachment

IBM @server z990

z/OS

Sysplex
LPARs

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- **Physical Planning**
- **Reference Material**

Statements of Direction may be changed by IBM at any time.

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Statements of Direction

- **Token Ring on HMC, SE, TKE workstations and IBM 2074 Console Controller to be discontinued: The z890 and z990 are the last zSeries servers to offer Token Ring on these devices.**

- **HMC's are to become "closed" platforms**
  - This has implications for customers using the ESCON Director Console or Sysplex Timer Console installed as an application on HMC's.
    - The ESCON Director and Sysplex Timer will require a separate console that supports Token Ring ===>> BUY A CONSOLE NOW !
  - Support for 9672 G5 and above
  - TCP/IP only

- **OSA-Express**
  - Layer 2 Support (QDIO mode only) – Satisfied October 2004
    - Allowing protocol-independent network connectivity
    - Initially available to z/VM and Linux (z/OS later)
  - Z890 and z990 are the last IBM mainframes to offer OSA Token Ring

- **Future zSeries processors will not use ISC-3 to connect to 9672 G5/6 HiperLinks (ISC-2)**
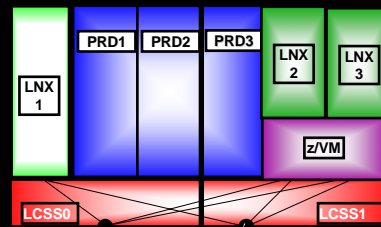
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FCP LUN Access Control

Preview *

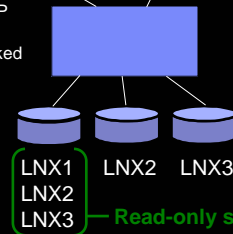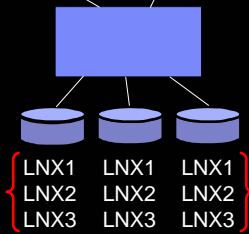**Without LUN Access Control**
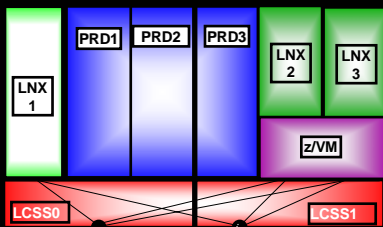
With LUN Access Control

- **No LUN Access Control**
  - Image access to shared FCP channel allows read-write access to all LUNs not masked
  - No concurrent LUN sharing
- **With LUN Access Control**
  - Image defined LUN access on shared FCP channel
  - Read-only LUN sharing
    * Planned availability to be announced

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Statement of Direction - z/OS Communications Server (satisfied in announcement letter 205-030, February 15, 2005)

- **August 2004: It is IBM's intent to support VTAM® in z/OS Communications Server for the foreseeable future.** Customers have a substantial investment in 3270 and SNA applications. We continue to support and enhance VTAM's capabilities while integrating it with new technologies. IBM has no plans at this time to discontinue SNA support in z/OS Communications Server. As of June 2004, customers can, for selected SNA workloads, use Communications Server products for Linux, Linux on zSeries, Microsoft® Windows®, and AIX® to replace some of the old SNA infrastructure components, such as the IBM 3745/46 or other channel-attached SNA controllers. z/OS Communications Server can replace some SNA Network Interconnect (SNI) workloads using Enterprise Extender and Extended Border Node functions.
 **It is IBM's intent to introduce an additional solution in 2005 that uses NCP (Network Control Program) software running within Linux on zSeries.** The intent is to provide a migration path for customers who use traditional SNA (including SNA Network Interconnect (SNI)) to communicate with their business partners. This solution can allow them to continue using traditional SNA without a dependency on IBM 3745 and 3746 Communications Controller hardware.

- http://www.ibm.com/software/network/ccl

All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. Any reliance on this Statement of Direction is at the relying party's sole risk and will not create any liability or obligation for IBM.


SNA support options

- **Options for z/OS environments:**
  - Communications Server for z/OS
    - Helps reduce dependency on 3745/46 with Enterprise Extender EBN support for B2B SNA communications

- **Options for Linux environments**
  - Communications Server for Linux on zSeries
    - New options for environments with outboard SNA/IP integration points
    - For selected SNA workloads

- **Communication Controller for Linux on zSeries**
  - Selected NCP (Network Control Program) Software functions running within Linux on zSeries are planned
  - Can allow customers to continue using traditional SNA without a dependency on IBM 3745 and 3746 Communications Controller hardware.
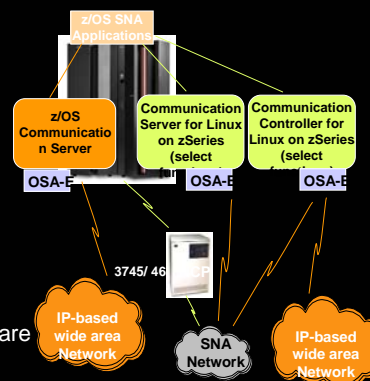
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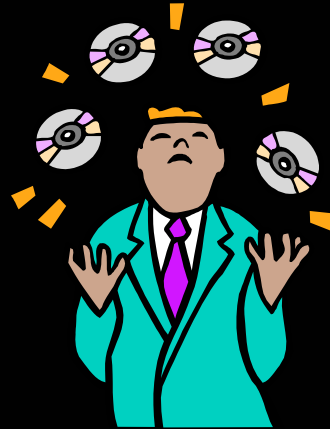
Multiple Logical Channel Subsystems and up to 30 LPARs

30 LPARs

LCSS0 — Up to 256 CHPIDs

LCSS1 — Up to 256 CHPIDs
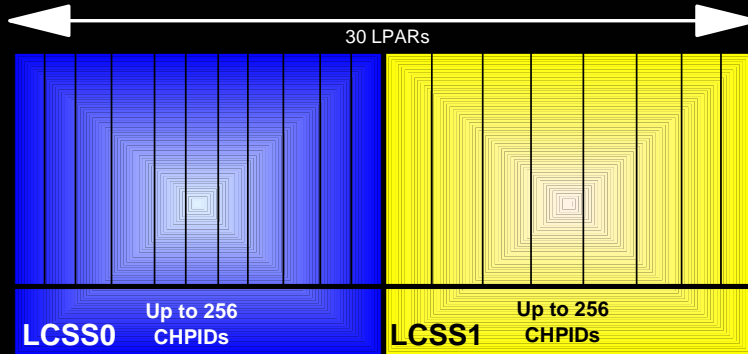
2 Logical Channel SubSystems (LCSS)

30 LPARs across 2 LCSS

or

15 LPARs per LCSS

Maximum of 15 LPARs on Capacity Setting 110 (FC6110)

Compatibility versus Exploitation

Compatibility
– Can use HCD to create an IODF with multiple LCSSs
– Software ACTIVATE can be performed
  • Number of defined LCSSs is irrelevant
– Can only perform a hardware ACTIVATE if:
  • The changed/new resources are restricted to LCSS-0
– POR is required for activating IODF:
  • with additional LCSSs
  • with new LPARs
  • with changed/new resources in LCSS-1
– Sysplex Considerations

Exploitation
– Can perform full hardware ACTIVATE
  • With multiple LCSSs defined
– Run in LCSS-1
– > 15 LPARs
– Dynamic I/O changes in LCSS-1
– Extended Channel Measurement Block (ECMB) support
– 48 ISC Links
– QDIO Multiple Control Units
– CF Level 13

http://www-1.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/FLASH10236

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Z890: Operating System Support Summary

Operating Systems	ESA/390 (31-bit)	z/Arch (64-bit)	Compatibility	Exploitation
OS/390 2.10 **support ended	Yes	Yes	Yes[3]	No
z/OS 1.2 ** support ended	No	Yes	Yes[3]	No
z/OS 1.3 & z/OS.e 1.3	No	Yes	Yes[3]	No
z/OS 1.4 & z/OS.e 1.4	No	Yes	Yes[3]	Yes
z/OS 1.5 & z/OS.e 1.5	No	Yes	Included[3]	Included[3]
z/OS 1.6/1.7 & z/OS.e 1.6	No	Yes	Included[3]	Included[3]
Linux for S/390	Yes	No	Yes	Yes
Linux for zSeries	No	Yes	Yes	Yes
z/VM 3.1	Yes	Yes	Yes	No
z/VM 4.3	Yes	Yes	Yes	No
z/VM 4.4	Yes	Yes	Included	Included
z/VM 5.1/5.2	No	Yes	Included	Included
VSE/ESA 2.6, 2.7	Yes	No	Yes	No[2]
z/VSE 3.1	Yes	No	Yes	Yes
TPF 4.1	Yes	No	Yes	No[1]
z/TPF 1.1	No	Yes	Yes	No[1]

1 – TPF and zTPF (64-bit) use LCSS-0 only, but more than 15 LPARs are permitted. See APAR PJ29309 (included in z/TPF).
2 - VSE 2.7 exploits Thin Interrupts with 4Q04 SPE
3 - Web Deliverable for Secure Crypto
4 - z/VSE can execute in 31-bit mode only. It does not implement z/Architecture, and specifically does not implement 64-bit mode capabilities.

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- **Hardware Management Console**
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- **Physical Planning**
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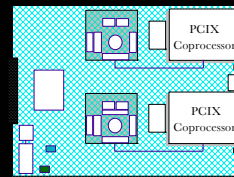© 2004 IBM Corporation

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Cryptography

- **CP Crypto Assist for Cryptographic Functions (CP Assist)**
  - High performance clear key DES and SHA-1 engine in every CP
    - Shipped with SHA-1 enabled. DES & TDES require enablement FC3863
    - CHPID no longer required

- **PCI Cryptographic Accelerator (PCICA) -- increments = 0, 1 or 2 features (2 engines per card)**
  - High performance Public Key (SSL) Acceleration
  - Carried forward on z800 upgrades

- **PCIXCC Cryptographic Coprocessor -- increments = 0, 2, 3 or 4 features**
  - I/O Cage installable PCIXCC feature
    - Adds security rich functions previously found in CCF and PCICC
  - CHPID not required
  - Service offering for User Defined eXtensions (UDX)
  - PCIXCC Receives EAL 5, FIPS 140-2 Level 4 Validation

- **New function**
  - 19 digit Personal Account Numbers
  - TKE 5.0 Code and Workstation
  - TKE 4.2 Code
  - TKE 4.1 Operational Key Entry
  - EMV (Europay Mastercard and Visa) 2000 Standard
  - PKE/PKD Service Enhancements
  - Double Length Derived Unique Key Per Transaction (DUKPT) – PCIXCC

- **Performance Reports**
  - http://www-1.ibm.com/servers/eserver/zseries/security/cryptography.html

NEW!

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The total quantity of FICON Express, OSA-Express, PCICA, and PCIXCC cannot exceed 20 features per server

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Crypto Express2 (FC0863)

NEW!

- **Dual Integrated Cryptographic Coprocessors**
  - Provides PCIXCC and PCICA functionality
- **Improved throughput over the PCIXCC**
- **Scalable (no CP affinity) - 0 to 8 features**
  - The total number of Crypto Express2, PCICA and PCIXCC features cannot exceed 8 features per server
  - Minimum purchase increment is two (Crypto Express2 and/or PCIXCC)
- **Current applications expected to run without change**
- **Connection to STI interface; no external cables**
- **Fully programmable, User Defined Extensions (UDX) support**
- **Designed for FIPS 140-2 Level 4 Certification**
- **Trusted Key Entry (TKE) 4.X support**
  - Secure operational and master key loading
  - Smart Card Reader support (TKE 4.2 only)

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Crypto Express2 Support Requirements

- **z890 or z990 hardware LIC support for GA2/4 (January 28, 2005)**

- **z/OS 1.2 or z/OS.e 1.3 or later with Web Deliverable:**
  - z990 Cryptographic support   OR
  - z990 and z890 Enhancements to Cryptographic Support

- **z/VM 5.1 or later with service (January 28, 2005)**
  - Support for z/OS and Linux on zSeries guests

- **VSE/ESA 2.7 and IBM TCP/IP for VSE/ESA 1.5**

- **Linux on zSeries with code IBM plans to deliver Open Source in:**
  - October 2004 for kernel 2.4
  - Early in 2005 for kernel 2.6

- **NOTE: z/VM, VSE/ESA and Linux support clear key SSL ONLY.**

- **See the 2084DEVICE or 2086DEVICE PSP for any additional service.**
  - Requires ICSF toleration APAR OA099157

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19-digit Personal Account Numbers on z890/990

NEW!

- **Function and Potential benefits**
  - Designed to meet the industry requirement for Card Validation Value (CVV) generate and verification services for 19-digit Personal Account Numbers (PANs).
    - Old: 13-digit & 16-digit PANs
    - New: 19-digit PAN
  - Designed to increase anti-fraud security
- **Requirements and Support**
  - Exclusive to z890 and z990 PCIXCC and Crypto Express2
  - PCIXCC with z890 or z990 hardware LIC support for GA2/4 (October 29, 2004)
    OR
  - Crypto Express2 with z890 or z990 hardware LIC support for GA2/4 (January 28, 2005)
  - Requires z/OS or z/OS.e 1.6 with the **ICSF 64-bit Virtual Support for z/OS 1.6 and z/OS.e 1.6 Web deliverable planned for December 17, 2004.**
  - See the 2084DEVICE or 2086DEVICE PSP for any additional service required

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2048-bit clear and secure key RSA operations

NEW!

- **Function and Potential Benefits**
  - 2048-bit clear and secure key RSA management capability
    - Support of new Automated Teller Machine (ATM) standards
  - The 2048-bit functional control vector will support four ICSF services: Public Key Decrypt, Symmetric Key Import, Symmetric Key Export, and Symmetric Key Generate
  - Designed to increase anti-fraud security
- **Requirements and Support**
  - PCICC with **Feature #0867 for z800 and z900** (**Not applicable to CCF**) **OR**
  - PCIXCC on z890 or z990 **OR**
  - Crypto Express2 with z890 or z990 hardware LIC support for GA2/4 (Jan 28, 2005)
  - On z800 or z900 with PCICC: z/OS 1.3 or z/OS.e 1.3 or later
  - On z890 or z990: z/OS 1.3 or z/OS.e 1.3 or later with:
    - For PCIXCC: z990 Cryptographic Support
    - For Crypto Express2 and PCIXCC: z990 and 890 Enhancements to Cryptographic Support
  - On z800 or z900 with PCICC, z/VM 4.3 or later for Linux on zSeries guests.
  - On all hardware, z/VM 5.1 for support of z/OS and Linux on zSeries guests.
    - For Crypto Express2, with service planned January 28, 2005
  - See 2084DEVICE or 2086DEVICE PSP bucket for any required service
  - For Crypto Express2, Linux on zSeries with code IBM plans to deliver Open Source in:
    - October 2004 for kernel 2.4
    - Early in 2005 for kernel 2.6
  - For PCIXCC or PCICC, Linux on zSeries with clear key RSA support:
    - SUSE SLES 8 or 9, Red Hat RHEL 3, Turbolinux TLES 8, or Conectiva CLEE

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Less than 512-bit clear key RSA operations on z890/990

- **Function and Potential Benefits**
  - Designed to allow clear key RSA operations using keys less than 512-bits including ICSF Callable services and their corresponding verbs: Digital Signature Verify (CSNDDSV), Public Key Encrypt (CSNDPKE), and Public Key Decrypt (CSNDPKD).
  - May allow the migration of some additional cryptographic applications to z890 and z990 servers without rewriting the applications.

- **Requirements and Support**
  - **Currently Available for PCICC on z800 and z900**
  - New for z890 and z990 PCIXCC and Crypto Express2
  - PCIXCC with z890 or z990 hardware LIC support for GA2/4 (October 29, 2004)
    OR
  - Crypto Express2 with z890 or z990 hardware LIC support for GA2/4 (Planned January 28, 2005)
  - z/OS 1.3 or z/OS.e 1.3 or later with Web Deliverable:
    - For PCIXCC: z990 Cryptographic Support
    - For Crypto Express2 and PCIXCC: z990 and 890 Enhancements to Cryptographic Support
  - z/VM 5.1 or later with service (Planned January 28, 2005)
    - Support for z/OS guests
  - See the 2084DEVICE or 2086DEVICE PSP for any additional service required

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Trusted Key Entry – TKE Workstation

- **TKE 4.2 Workstation support (FC0853) - New Build after Jan. 2005**
  - **FC08599 NEW TKE Workstation – (Ethernet only)**
  - **FC0846 TKE with DVD-RAM drive and Token-Ring (November 2004)**
    - Withdrawn October 2005
  - **FC0849 TKE with DVD-RAM drive and Ethernet (November 2004)**
    - Withdrawn October 2005
  - Smart Card Reader (FC0887)
    - Additional Cards (FC0888)
- **TKE 4.1 Workstation support (FC0852) - Prior to January 2005**
- **TKE 4.0 Workstation support (FC0851) - Carry forward from z800**
  - MCL update to 4.1 required to control PCIXCC
- **TKE 3.x Workstation support - Carry forward to control legacy systems only**
  - MCL update to TKE 4.1 control PCIXCC
    - Previous TKE upgrades required ordering a new TKE workstation

- **Read the 'Migration and Use' chapters of the ICSF Systems Programmer's Guide (SA22-7540) for tips on PCIXCC**
  - Appendix E

NOTE: TKE customers will now need to enable TKE commands from the SE panel

for each PCIXCC before using TKE commands. No impact to non-TKE customer.

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# System z9 Trusted Key Entry Workstation 5.0

- **Optional TKE Workstation:**
  - **The only TKE feature that supports z9-109**
  - Orderable on z9-109, z990, z890, z900 and z800
  - TKE 5.0 LIC: FC 0855
    - **Requires TKE 5.0 hardware**
  - TKE 5.0 hardware: FC 0859
    - **Requires TKE 5.0 LIC**
    - xSeries-based system unit, keyboard, flat panel, mouse
    - PCI-X Crypto Coprocessor
    - **Ethernet connectivity only**
  - Optional Smart Card Reader: FC 0887
  - Optional Additional Smart Cards: FC 0888
- **TKE 5.0 Hardware and LIC support to enter secure cryptographic keys for:**
  - z9-109: Crypto Express2
  - z990 and z890: PCIXCC and Crypto Express2
  - z900 and z800: CCF and PCICC

PCI-X Crypto Coprocessor

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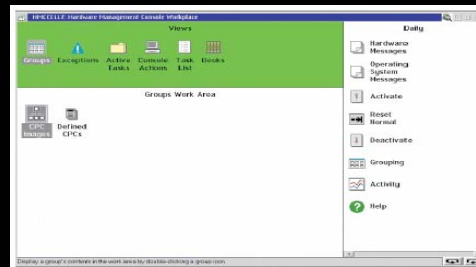
zSeries Hardware Management Console

- **Supported HMCs are 0073, 0074, 0075, <u>0076</u>, 0077, 0078, <u>0079, 0080</u>**
  - FC0073 - G1-G6, C02-C05, 2003, 7060, all zSeries (withdrawn)
  - FC0074, FC0075 - G4, G5, G6, C05, 7060, all zSeries (withdrawn)
  - <u>FC0076</u> - G5, G6, all zSeries
    - Feature Code to exchangeT/R-Ethernet for Dual-Ethernet on FC0075
  - **FC0077** - Dual-Ethernet - G6, all zSeries
  - **FC0078** - Ethernet and Token-Ring - G6, all zSeries
  - <u>**FC0079 - Dual Ethernet – G6, all zSeries**</u> (November 2004)
  - <u>**FC0080 - Ethernet and Token Ring – G6, all zSeries**</u> (November 2004)
  - <u>**FC6094 - 17 inch Flat Panel**</u> (November 2004)
  - <u>**FC6095 - 20 inch Flat Panel**</u> (November 2004)

- Can now order up to 10 HMC's, Ethernet Switches, MAU's (November 2004)

- **HMC Version Code 1.8.2 supports...**
  - G6 / Driver 26
  - z900/z800 / Driver 3G
  - z890 / Driver level 55 (GA)

- *Last zSeries to offer Token-Ring connection to HMC/SE or TKE*
  - *Migrate to Ethernet in the future*
    - *ESCON Director and Sysplex Timer Console networks will remain Token-Ring*
    - *Future server HMC will not permit ESCON Director or Sysplex Timer Console function*

- New build - MAU supplied in Frame if Token Ring is ordered
- Ethernet Switch (16 port)
  - FC0089
  - 10/100 mbps
  - Carry forward FC0089 from z800 (8-port)

Hardware Management Console Requirements and limitations

- The 2094 HMC will **NOT** support the following systems; G1, G2, G3 or G4

- The following legacy systems will be supported, but they must be upgraded to a new AROM level, and support will be provided for the specified driver.
  - **z990 & z890 (Driver 55)**
  - **z900 & z800 (Driver 3G)**
  - **G5 & G6 (Driver 26)**
  - **M3000 (Driver 24)**

- The minimum HMC for the 2094 is the HMC FC0075 or FC0076 with 1 GB of memory.

Transitioning

- **Existing HMC Feature Codes 0075,0076,0077,0078**
  - Will require additional memory to be added
    - 512MB to 1GB
  - Field EC to install new driver to existing legacy HMCs
    - *Caveat:* New driver does not support all legacy machines
    - Existing machines will need to have MCLs applied to communicate with the new HMC driver
- **In September 2005, all HMC orders will be shipped with the new driver level**
  - Even on z890 or z990 orders
    - As above, these new HMCs will not be able to support all of the legacy machines
    - Existing machines will need to have MCLs applied to communicate with the new HMC driver

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Customize Activation Profiles: P0016F5A : LPAR : General

- P0016F5A
  - LPAR
    - General
    - Storage
    - Dynamic
    - Options
    - CP/SAP
    - Partitions
  - CRY
  - CT1
  - ST2
  - ST3
  - TPRF1
  - ZPER
  - ST1
  - TPAT
  - BIG
  - VMT1

Profile name: LPAR

Type new entry he

Description: G28 in LPAR mode.

Select	Input/Output Configuration Data Set	Type	Allow Dynamic I/O	Partitions
○	A0 ENDGECKO	Partition	Yes	CT1 ST2 ST3 TPRF1 ZPER ST1 TPAT BIG VMT1
●	A1 HCDREEF	Partition	Yes	CRY CT1 ST2 ST3 TPRF1 ZPER ST1 TPAT BIG VMT1
○	A2 TREX	Partition	Yes	CT1 ST2 ST3 TPRF1 ZPER ST1 TPAT
○	A3 TOLERATE	Partition	Yes	CT1 ST1 ST2 ST3 TPAT TPRF1 ZPER
○	D0 DIAGNOSE	Partition	No	0D0LP01 0D0LP02 0D0LP03 0D0LP04
○	Use Active IOCDS	Currently A0		

Page 1 of 1   Total: 6 Displayed: 6 Selected: 1

Mode: Logically partitioned

Load Delay for Power Sequencing

*0 minutes *0 seconds

Save | Copy Notebook | Paste Profile | Assign Profile | Cancel | Help

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zSeries 890

# Channels not support on the z890

- **No Internal-Disk**
  - Consider the IBM DS6000 or DS8000
  - Consider the IBM 2105-750
  - Consider IBM Certified used DASD

- **No emulated I/O**
  - Use OSA-ICC or IBM 2074

- **Parallel channels**
  - Same as z800
  - Use Optica ESCON® Converter or IBM 9034

- **OSA-Express Fast Ethernet features**
  - Carried forward on upgrades - not orderable on new builds
  - Use 1000BASE-T Ethernet for new builds

- **PCICC features**
  - No carry forward
  - Replaced by PCIXCC for most commonly used functions

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zSeries 890

Channels not support on the z890

- **OSA-2 adapters**

  - Use equivalent OSA-Express adapter
    - May require a different connector
  - No equivalent OSA-Express for FDDI OSA-2
    - Use multiprotocol switch or router with appropriate network interface
    - ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100340

- **OSA-Express adapters**

  - OSA-Express ATM adapters
    - Not available on upgrades or new builds
    - Use multiprotocol switch or router with appropriate network interface (e.g., 1000BASE-T or Gigabit Ethernet)

T/R
ATM
GbE
10/100 Ethernet
FDDI
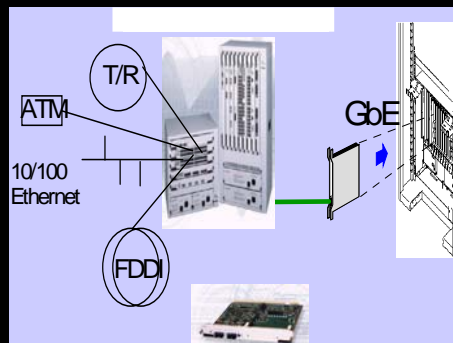
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Server Time Protocol (STP) Overview

- **Designed to provide capability for multiple System z9 and zSeries servers to maintain time synchronization with each other**
  - Does not require the 9037 Sysplex Timer if all servers STP capable
- **Timing information transmitted over ISC-3 links (Peer mode), ICB-3 and ICB-4 links**
- **Supports a multi-site timing network of up to 100 km (62 miles)**
  - Allows a Parallel Sysplex cluster to span up to 100 km
- **May reduce the cross-site connectivity required for a multi-site Parallel Sysplex cluster**
- **Can coexist with an External Time Reference (ETR) network (9037 based)**
  - Mixed Timing Network
- **Designed to allow use of dial-out time services to set the time to international time standard (UTC) as well as adjust to UTC**
- **Planned to be available as a feature on z9-109, z990 and z890**
- **Prerequisites**
  - z9-109 HMC
  - z/OS V1.7

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

Implementation Assistance Program (IAP)

- **Objective**
  - Accelerate the adoption of STP with IBM assistance
- **Assistance planned**
  - Consultation
  - Review of migration plans
  - Technical support
- **Planned Availability dates**
  - October 2005 (z990, z890)
  - 1Q06 (z9)

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zSeries 890

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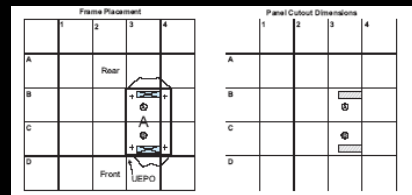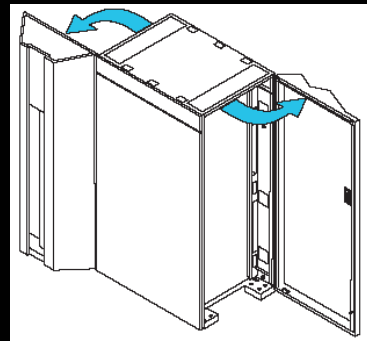
Physical Planning – IMPP (GC28-6828)

zSeries 890

- **All systems are air cooled, one frame systems**
  - raised floor (recommended) or non-raised floor

- **Height reduction (FC9975 no charge)**
  - Accommodates door height restrictions
  - IBF batteries will come unplugged if height reduction is ordered

- **Optional Internal Battery Feature-IBF (FC3210 chargeable)**
  - Installed as a pair (top - front and back)
  - No width reductions are required
  - Can be added later via MES

- **Power - Dual power cables (Hubbell) 50/60Hz**
  - 3 Phase, 200V-480V
  - 1 Phase, 200V-415V
  - Cabled in upper CEC cage

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A look inside

z890 SE trays

Book position

IBF

node

Dual SEs

40U 76.4"

Dual SEs

Cargo

MDA

FIBRE TRUNK

z890 (front)

IBF

PCA DCA

Cargo

PSC boxes

z890 (rear)

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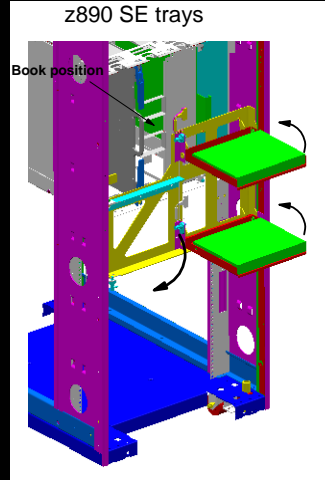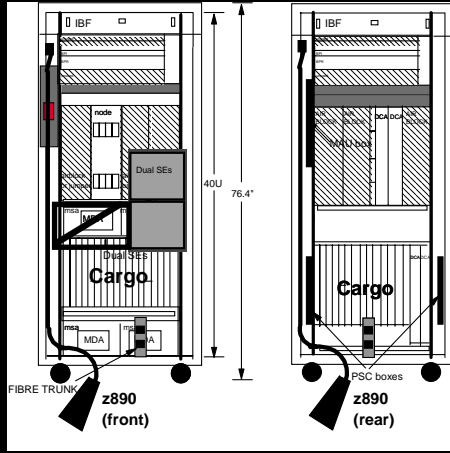
Top section can be removed for shipping, but only if really necessary.

Dimensions

A

Top View

46.1"   62.1" with front and rear covers

72"

A

Front View

76.4"

30.87"
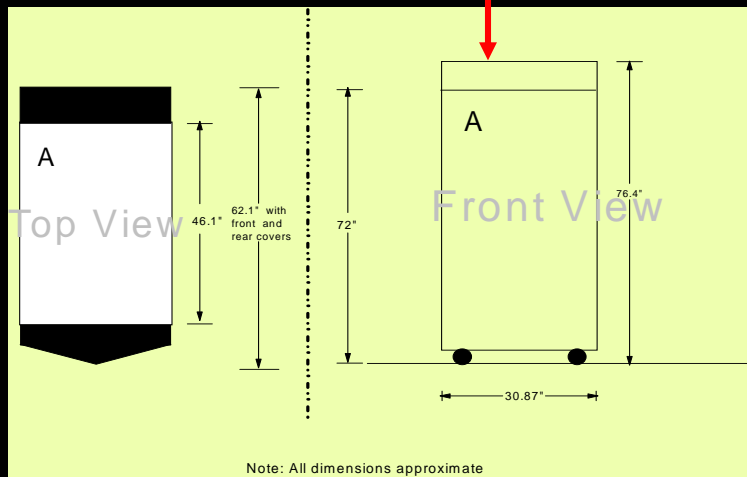
Note: All dimensions approximate

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Heat Exchange
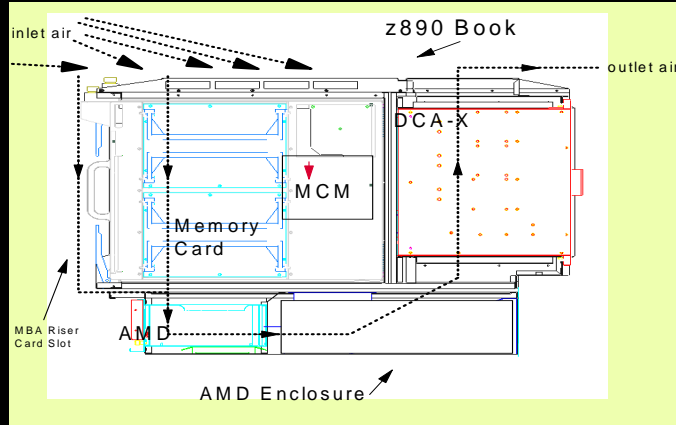
Cold air in from the front.   **Heated air out through the back.**

G5/G6, MP3000, z800, z890 Physical Characteristics

	G5 / G6 Minimum 1 Frame System	G5 / G6 Maximum 2 Frame System	Multiprise 3000 1 Frame System Maximum	z800 Maximum	z890 Minimum	z890 Maximum
Power 50/60 Hz, kVA	0.6 / 1.0	5.5 / 5.5	1.32	2.95KW	1.5	4.7
Heat Output KBTU/hr	2.0 / 2.5	18.8 / 18.8	4.5	10.0	5.12	16.05
Air Flow CFM **Air Flow m*3/min**	290 / 290 7.1 / 7.1	1400 / 1400 38.6 / 38.6		400 11.1	640 17.64	640 17.64
Floor Space - Sq. meters - Sq. feet	1.0 / 1.6 10.4 / 16.4	1.8 / 1.8 19.7 / 19.7		0.83 8.9	1.24 13.33	1.24 13.33
Including service clearance - Sq. meters - Sq. feet	2.5 / 2.5 27.4 / 27.4	4.8 / 4.8 51.9 / 51.9		6.0 64.5	3.03 32.61	3.03 32.61
Approximate weight - kg - lbs	612 / 612 1346 / 1346	938 / 938 2057 / 2057	236 520	545 1201	674 1482	785 1730
Approximate height - cm - inches	199.8 78.7	199.8 78.7	80 31.5	181.1 71.3	194.1 76.4	194.1 76.4

I/O Features: Connectors / Cables

Feature Code	Feature Name	Connector Type	Cable Type
0219	ISC-3 link	LC Duplex	9 micron SM
6154	External Time Reference (ETR)	MTRJ	62.5 micron MM
2324	ESCON channel	MTRJ	62.5 micron MM
2319	FICON Express LX	LC Duplex	9 micron SM
2320	FICON Express SX	LC Duplex	50, 62.5 micron MM
3319	FICON Express2 LX	LC Duplex	9 micron SM
3320	FICON Express2 SX	LC Duplex	50, 62.5 micron MM
2364	OSA-Express GbE LX	SC Duplex	9 micron SM
2365	OSA-Express GbE SX	SC Duplex	50, 62.5 micron MM
2366	OSA-Express Fast Ethernet	RJ-45	Category 5 UTP
2367	OSA-Express Token-Ring	RJ-45	STP or UTP
1364	OSA-Express GbE LX	LC Duplex	9 micron SM
1365	OSA-Express GbE SX	LC Duplex	50, 62.5 micron MM
1366	OSA-Express 1000BASE-T Ethernet	RJ-45	Category 5 UTP
3364	OSA-Express2 GbE LX	LC Duplex	9 micron SM
3365	OSA-Express2 GbE SX	LC Duplex	50, 62.5 micron MM
3368	OSA-Express2 10 GbE LR	SC Duplex	9 micron SM

SM = Single mode fiber, MM = Multimode fiber, LX = Long wavelength transceiver,
SX = Short wavelength transceiver, UTP = Unshielded Twisted Pair,
STP - Shielded Twisted Pair, LR = Long Reach transceiver

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z890 Publications via ResourceLink

Agreement for Licensed Internal Code	SC28-6822
Application Programming Interfaces	SB10-7030
Capacity Backup User's Guide	SC28-6823
CHPID Mapping Tool User's Guide	SC28-6825
CF Channel I/O Interface Physical Layer	SA23-0395
ESCON and FICON Channel-to-Channel	SB10-7034
ESCON Physical Layer	SA23-0394
FICON I/O Interface Physical Layer	SA24-7172
Hardware Management Console Operations Guide (V1.8.2) SC28-6830	
Installation Manual for Physical Planning	GC28-6828
Installation Manual	GC28-6826
IOCP User's Guide	SB10-7037

Maintenance Information for Desktop Consoles	GC38-3115
Maintenance Information for Fiber Optic Links	SY27-2597
Maintenance Information for Thinkpad Consoles	GC38-3117
Parts Catalog	GC28-6829
Planning for Fiber Optic Links	GA23-0367
PR/SM Planning Guide	SB10-7036
Safety Notices	G229-9054
Safety Inspection	GC28-6833
Service Guide	GC28-6827
Standalone IOCP User's Guide	SB10-7040
SCSI IPL - Machine Loader Messages	SC28-6839
Support Element Operations Guide (Version 1.8.2)	SC28-6831

www.redbooks.ibm.com	
z890 Technical Introduction	SG24-6310
zAAP Implementation	SG24-6386
z890 SAPR Guide	SA04-002

End of Presentation

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@server

zSeries 890

Questions ?!?

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Backup/Miscellaneous Material

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STSI Instruction - Interface change

- **Both SW model (capacity setting) and HW model are reflected in the result of a STSI instruction**

- **Prior to this, the result was only the SW model**

```
PROCESSOR STATUS

ID  CPU        SERIAL
0   +          00AB7A2086
1   +          00AB7A2086
2   + A        00AB7A2086
3   +          00AB7A2086


CPC ND = 002086.A04.IBM.00.00000002AB7A
CPC SI = 2086.340.IBM.00.000000000002AB7A
CPC ID = 00
CPC NAME = TC9N01
LP NAME = TC9N01    LP ID = 0
CSS ID  = 0
```
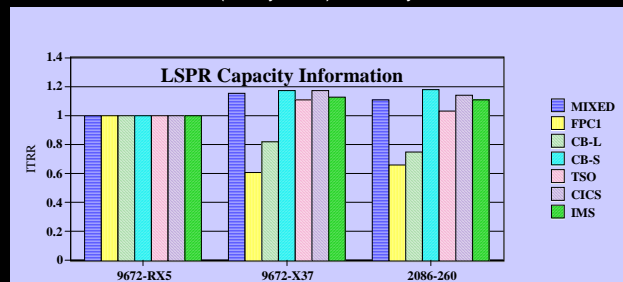
zAAP

NEW!

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Capacity Planning Challenge – 9672 G4

- **MIP representations for processor sizing is dangerous and can cause a processor to be significantly undersized**
  - Seen when migrating from 9672 G4 to other platforms
    - G5 / G6 / z900 / z800 / z990/ z890
- **Workloads which look more like CB-L and CB-S will cause the capacity of the G5/6 or zSeries to be less than expected**
  - CB-S = Commercial Batch, formerly CB84
  - CB-L = Commercial Batch (heavy CPU), formerly CBW2

LSPR Capacity Information

Legend: MIXED, FPC1, CB-L, CB-S, TSO, CICS, IMS

Categories: 9672-RX5, 9672-X37, 2086-260

www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS135

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z/OS Support

		G3-G4	G5/G6 Multiprise 3000	z800 z900	z890 z990	End of Service	Coexistence Migration Policy	Ship Date
OS/390	2.8	x	x	x		9/02	1.2	9/99
	2.9	x	x	x		3/03	1.3	3/00
	2.10	x	x	x	x^c	9/04	1.4	9/00
z/OS	1.1		x	x		3/04	1.4	3/01
	1.2		x	x	x^c	10/04	1.5	10/01
	1.3		x	x	x^c	3/05	1.6	3/02
	1.4		x	x	x	3/07*	1.7*	9/02
	1.5		x	x	x	3/07**	1.8*	3/04
	1.6			x	x	9/07**	1.8*	9/04

Orderable: z/OS 1.6, z/OS 1.4 SystemPac until 3/2005*, z/OS 1.4 exploitation feature until 12/2006*.
x^c Compatibility support – does not exploit new z990 features. **Web download withdrawn 12/31/2004**
Bimodal Accommodation Offering is available for z/OS 1.2, 1.3, and 1.4. It is not available for later releases.
*Planned date or release

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z/VM 4.4 - Exploitation of the z890 Server

- **Support for multiple Logical Channel SubSystems (LCSS)**
  - **Allows the definition of more than one channel subsystem**
  - **Each channel-subsystem image can be configured with up to 256 channel paths**
  - **Each logical partition has access to one channel-subsystem image**
  - **Dynamic-I/O configuration support has been extended to allow channel paths, control units, and devices to be dynamically added, changed, and deleted**
  - **I/O configuration can be dynamically changed with:**
    - **CP suite of interactive dynamic-I/O-configuration commands**
    - **HCM and HCD - new configuration-management tools**
- **Support for spanned channels**
  - **Helps enable inter-process communication (IPC) among Linux guests**
- **Extended Channel Measurement Data Support (ECMDS)**
  - **Improved capacity planning and I/O performance measurement**
- **Support for more than 15 Logical Partitions (LPARs)**
  - **Handles I/O-configuration definition and dynamic-I/O configuration logical partitions**
  - **CP Monitor will allow performance data to be collected and recorded**
- **z/VM V3.1, V4.2, and V4.3 support the z890 in compatibility mode**

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z/VM Version 5.1

- Virtualization technology and Linux enablement
  - Deployment of a Linux server farm on z/VM using only SCSI disks
  - Improved cryptographic performance with PCIXCC support for Linux and z/OS guests
- Network virtualization and security
  - Enhanced network recovery and virtual switch failover support
  - Improved authorization for z/VM Guest LANs and virtual switches
- Technology exploitation
  - Support for the OSA-Express Integrated Console Controller
  - Support of Logical Channel SubSystems (LCSS)
  - Capability to route IPv6 packets and develop IPv6 applications
- Increased use of 64-bit functions
  - Still fully supports 24-bit and 31-bit application interfaces
  - Requires z/Architecture™ servers: z990, z900, z890, z800

Put the power of zSeries partitioning and z/VM virtualization technology to work for you and reap the benefits of the most advanced workload isolation, resource sharing, and utilization available in the computing industry today!

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Updated Engine-based Pricing for z/VM V5.1

- **Lower entry price point than z/VM V4**

- **Decreasing price curve as more engines are added**

- **Manage software costs better by using z/VM V5, Linux and IFLs to run new workload applications**

- **On/Off CoD -processor engine per-day basis**

- **z/VM V5 is able to aggregate licenses across machines within the enterprise**

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z/VM and VSE/ESA Support Summary Dates

		G3-G4	G5/G6 Multiprise 3000	z800	z890	z900	z990	End of Market	End of Service	Ship Date
VSE/ESA	2.5	x	x	x		x	x^c	12/01	12/03	9/00
	2.6*	x	x	x	x^c	x	x^c	****	3/06**	12/01
	2.7*		x	x	x	x	x			3/03
z/VSE***	3.1		x	x	x	x	x			2005**
z/VM	3.1	x	x	x	x^c	x	x^c	8/04	12/05**	2/01
	4.1		x	x		x	x^c	10/04	6/03	7/01
	4.2		x	x		x	x^c	5/02	12/03	10/01
	4.3		x	x	x^c	x	x^c	8/03	5/05**	5/02
	4.4*		x	x	x	x	x		9/06**	8/03
	5.1*			x	x	x	x		9/07**	9/04

x^c - Compatibility support
* Releases currently orderable
** Announced date

*** z/VSE 3.1 is designed to exploit some features of IBM zSeries processors but does not implement z/Architecture and does not implement 64-bit mode capabilities.
**** VSE/ESA 2.6 can be ordered only as a "Service Option" with VSE/ESA 2.7.

Key References for z990 and z890 Operating Systems

- **Primary Operating System Web sites for z990 and z890**
  - z/OS: www.**ibm.com**/servers/eserver/zseries/zos/
    - Downloads: www.**ibm.com**/servers/eserver/zseries/zos/downloads/
    - Migration: www.**ibm.com**/servers/eserver/zseries/zos/bkserv/zos_migration_manuals.html
    - Library: www.**ibm.com**/servers/eserver/zseries/zos/bkserv/
  - z/VM: www.vm.**ibm.com**/
  - Linux on zSeries: www.**ibm.com**/servers/eserver/zseries/os/linux/
  - VSE/ESA: www.**ibm.com**/servers/eserver/zseries/os/vse/
- **OS Preventative Service Planning (PSP) Buckets for z990 and z890**
  - z/OS: Upgrade = 2084DEVICE, Subset = 2084/ZOS
    Upgrade = 2086DEVICE, Subset = 2086/ZOS
  - z/VM: Upgrade = 2084DEVICE, Subset = 2084Z/VM
    Upgrade = 2086DEVICE, Subset = 2086Z/VM
  - VSE/ESA: Upgrade = 2084DEVICE, Subset = 2084VSE/ESA
    Upgrade = 2086DEVICE, Subset = 2086VSE/ESA

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Linux on IBM z890

- **Support for zSeries functions delivered as Open Source Contribution in June 2003 via -**
  http://www10.software.ibm.com/developerworks/opensource/linux390

- **Currently available distributions**
  - **SUSE SLES 7**
  - **SUSE SLES 8**
  - **Red Hat REHL 3.0**
  - **Turbolinux TLES 8**
  - **Conectiva CLEE**

- **January 2004 – to Developerworks web site**
  - **FCP SAN management - OSA Express 1000BASE-T Ethernet – New**
  - **PCI X Cryptographic Coprocessor (PCIXCC)**
  - **Linux kernel 2.2.16 and higher**

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TPF 4.1

- Protect investments in your core TPF assets – z890 support
  - OSA-Integrated Console Controller
  - FICON, FICON Express, FICON Express2
  - OSA-Express
  - Up to 30 LPARs (PJ29309 required)
  - Server Consolidation

- Integrate TPF with your datacenter
  - WebSphere™ MQ
  - Web Services/SOAP/XML/IIOP and more

- Leverage your TPF investments with Linux on zSeries

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