



IBM Systems & Technology Group

E54 Bringing You Up To Date with zSeries 890 Hardware: 2005

What's new!

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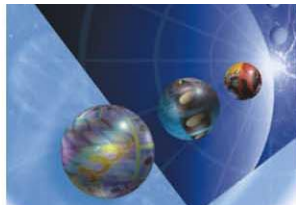


ON DEMAND BUSINESS™

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Agenda

- What's New Since We Last Met
- Introduction
- Under the Covers and I/O
- Software Support and Pricing
- Migration Planning
- Reference Material



What's Since We Last Met?

- **September 24, 2004**
 - ▶ GA for z/VM 5.1

- **December 31, 2004**
 - ▶ End of Service: 9662 (P/390), 9672-Rx2 & Rx3 (US letter # 903-118)

- **October 2004 & January 2005**
 - ▶ z890 - New Features
 - OSA-Express2, Crypto Express2, FICON Express2, EAL5 Certification, FIPS 140-2 Level 4
 - ▶ TotalStorage DS6000 and DS8000

- **March 4, 2005**
 - ▶ GA for z/VSE

- **July 26, 2005**
 - ▶ IBM System z9 109

Introduction



zSeries customers recognize highly differentiated value across the zSeries platform



- Extremely High Availability and Overall Reliability
- Massive end-to-end Scalability
- Capacity on Demand
- Rock Solid Security and Privacy
- Advanced Virtualization Capabilities
- Utilizes Open and Industry Standards
- World-class Integrated Support
- Higher Utilization and Balanced System Design

zSeries Leadership: Now 40+ years in the making!

zSeries average system utilization often exceeds 80%, and zSeries servers are designed to handle sustained peak workload utilization of 100% without service level degradation to high priority workloads.

It is no longer unpopular to design or move applications to the Mainframe

- **"Basically, the market is moving toward the mainframe,"**
said Jonathan Eunice, an analyst with tech consultant Illuminata.
- Don't look now, but the dinosaurs are making a comeback.
- Though pundits have long dismissed mainframe computers as throwbacks to a long-gone era, the big, brawny machines are very much alive. And in recent quarters, they've been reclaiming lost ground. IBM's z990, which in a bit of Big Blue humor it nicknamed "T-Rex," and the new z890 "Baby T-Rex" are biting into sales of midrange Unix (news - web sites) systems that once threatened mainframes with extinction.
- "A lot of people have them (mainframes), even if they don't talk about them,"
said IDC analyst Jean Bozman. "It's very hard to run a large corporation without a (mainframe) of some kind."

Marketplace Feedback...

Illuminata, Jonathan Eunice

"... IBM's zSeries mainframes remain the Gold Standard for system virtualization..."

Meta Group, Will Cappelli

"...on average, approximately 15% of Global IT budgets are attributable to mainframe-related purchases, contracts, and activities, but, at the same time, 25-30% of the IT budget is recovered via billing for mainframe-resident services..."

Clipper Group, Mike Kahn

"... Betting against the mainframe goes against forty years of success. The last forty years are not just about the mainframe hardware. It's the whole mainframe offering, now including open-systems middleware, like WebSphere and MQseries, plus a strong heritage of customer support and service, that has moved the mainframe to its royal status."

Hewitt – Dan Kaberon, IT Systems

"To build a test Parallel Syplex would have normally required lots and lots of computers, lots and lots of cables.... a tremendous amount of complexity. Instead of doing that, what we decided to do was put up a logical partition with z/VM... It was completely done dynamically, which quite amazed our friends in distributed systems as well as delighted our business people."

Home Depot – Barbara Sanders, VP Engineering and Architecture

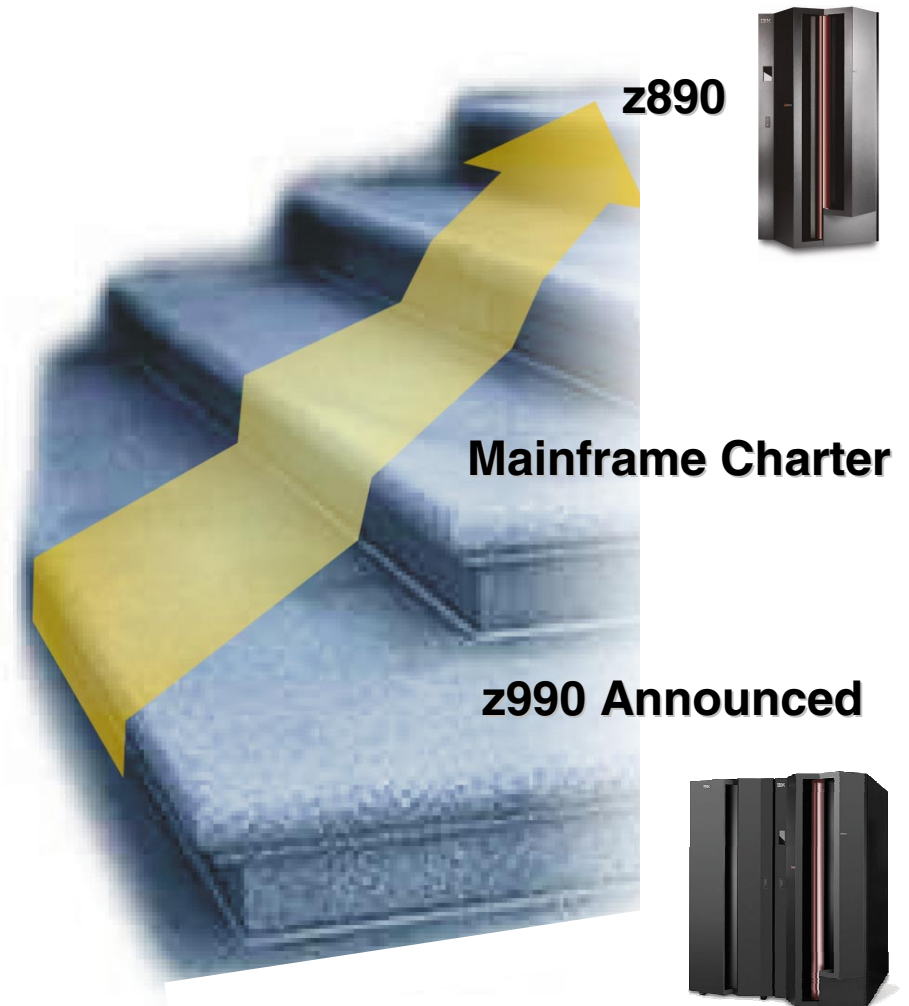
"The benefits I was looking for in the zSeries platform were the low cost-of-unit transaction volumes. The zSeries is a very compact footprint, and also a staffing footprint. So we were able to aggregate those critical resources into the zSeries and we feel that we were able to drive down our unit cost of processing."

"Fidelity Information Services is pleased to team with IBM as part of the on demand bank of the future. Fidelity provides the solution assets that will enable IBM and Fidelity to deliver the roadmap for on demand banking efficiencies for the financial services industry."

Michelle Bowen, senior vice president marketing and sales support – International Division, Fidelity, October 2004

The newest member of the zSeries family

- The IBM eServer zSeries 990 was announced in May 2003
- IBM announced our Mainframe Charter framework in August 2003
- **z890 announced in April 2004 with enhancements delivered in October 2004 and January 2005**



z890 – Bringing latest generation zSeries on demand technology to a new audience!



Processor -- 2086 Model A04

- ▶ 1 flexible model
- ▶ 64-bit z/Architecture
- ▶ Up to 5 PUs (in single book)
- ▶ up to 4 PUs characterizable
- ▶ One PU standard as an SAP
- ▶ Capacity Upgrade on Demand
- ▶ On/Off Capacity on Demand
 - for CPs, IFL, ICF, and zAAP
- ▶ Capacity Backup (CBU)
- ▶ Customer Initiated Upgrade (CIU)
- ▶ Air cooled

z890 PU Characterization

■ Processing Units (PUs) types that can be enabled / assigned include:

▶ Central Processors (CPs)

- Provides processing capacity for z/Architecture™ and ESA/390 instruction sets
- Runs z/VSE, z/VM, z/OS, TPF and Linux

▶ Integrated Facility for Linux (IFL)

- Provides additional processing capacity for Linux workloads
- Runs Linux or Linux under z/VM Version 4 and Version 5

▶ IBM eServer zSeries Application Assist Processor (zAAP)

- Under z/OS, the Java Virtual Machine (JVM) assists with Java processing to a zAAP

▶ System Assisted Processors (SAPs)

- SAPs manages the start and ending of I/O operations for all logical partitions and all attached I/O

▶ Internal Coupling Facility (ICF)

- Provides additional processing capacity for the execution of the Coupling Facility Control Code (CFCC) in a CF LPAR

Note: Specialty Engines run at full uni speed

z890 – Technology Features

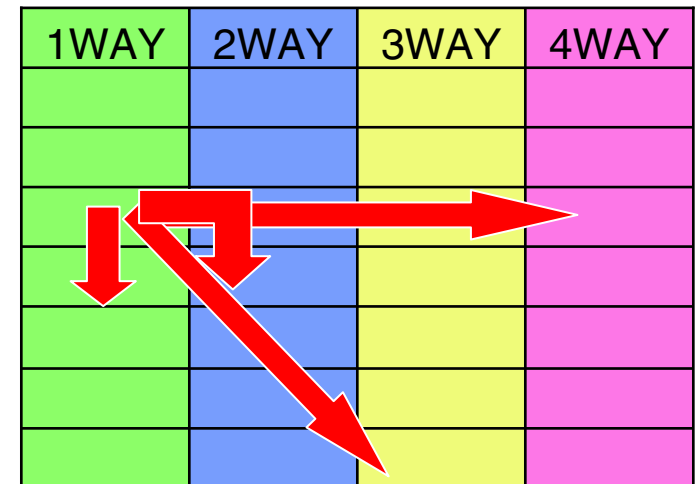
- **Memory**
 - ▶ 8 GB Standard
 - ▶ 8 GB increments to 32 GB (8, 16, 24, 32 GB)
- **Support for up to 30 LPARs**
 - ▶ Except for Capacity setting 110 which supports up to 15 LPARs
- **Cryptographic coprocessor optional**
- **New packaging for I/O with Two Logical Channel SubSystems (LCSS)**
 - ▶ 28 slot I/O cage supports up to 420 ESCON® channels
 - z890 110 capacity setting only has 16 I/O slots available
 - ▶ OSA-Express2
 - Gigabit Ethernet, 10 Gigabit Ethernet
 - ▶ OSA-Express
 - 1000BASE-T Ethernet, Token-Ring, Integrated Console Controller
 - ▶ FICON® Express2
 - ▶ Open FCP
 - ▶ Quadrupled HiperSockets™ support over z800 to 16
- **Single frame**
 - ▶ One and three phase options
 - ▶ Raised floor recommended but not required
 - ▶ Internal Battery Option



Front View

z890 on demand – A new way to think about granularity

- **A dramatic new way to consider upgrading**
- **Single Machine: 2086 and a single Model: A04**
- **Standard CPs**
 - ▶ Four full capacity processors **each** with 7 capacity settings
 - Entry point is approximately 32% less capacity than z800-0E1 and largest capacity setting is up to 123% more than z800-004
 - ▶ Upgrades can be horizontal, vertical, diagonal, to best fit your needs *

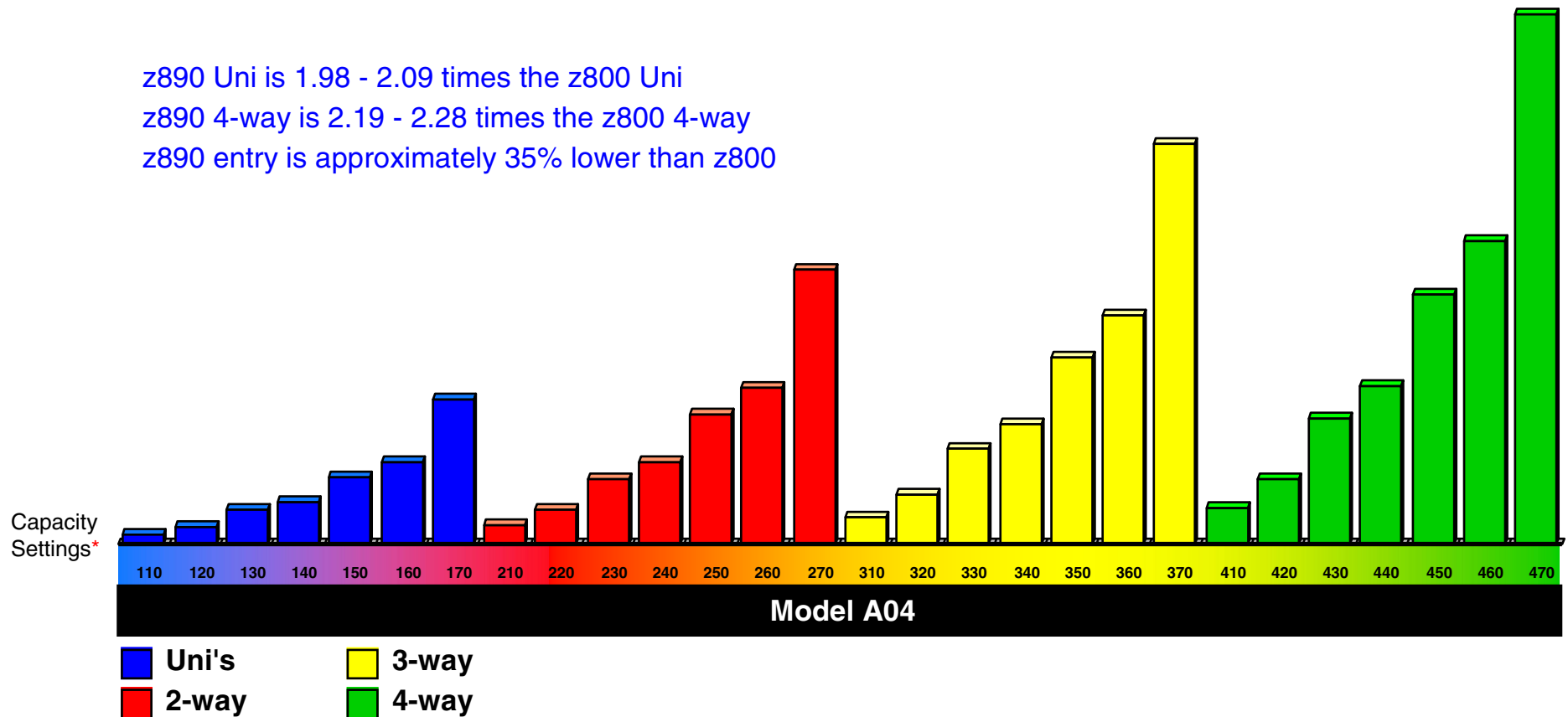


* Note: No mixing of standard CP capacity sizes in multi-engine machines.

**Think of the possibilities:
Order the server the way your On Demand business requires !**

z890 Performance Comparison

z890 Uni is 1.98 - 2.09 times the z800 Uni
 z890 4-way is 2.19 - 2.28 times the z800 4-way
 z890 entry is approximately 35% lower than z800



Note: For MSU values, refer to: ibm.com/servers/eserver/zseries/library/swpriceinfo/

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

z890 Capacity Setting and MSUs

1-WAY	MSUs	2-WAY	MSUs	3-WAY	MSUs	4-WAY	MSUs
110	4	210	8	310	11	410	15
120	7	220	13	320	20	420	26
130	13	230	26	330	38	430	49
140	17	240	32	340	47	440	62
150	26	250	50	350	74	450	97
160	32	260	62	360	91	460	119
170 Full 1-way	56	270 Full 2-way	107	370 Full 3-way	158	470 Full 4-way	208

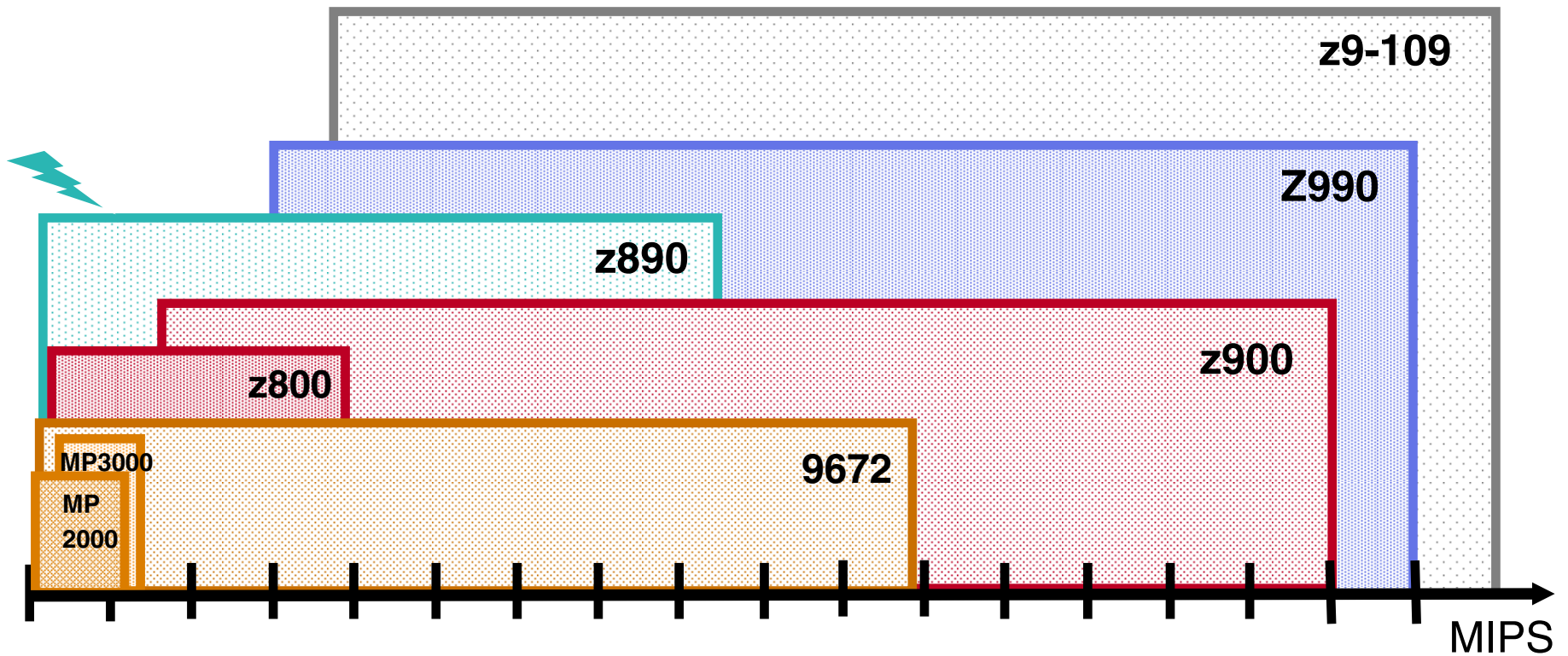
z890 Upgrades/Downgrades

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

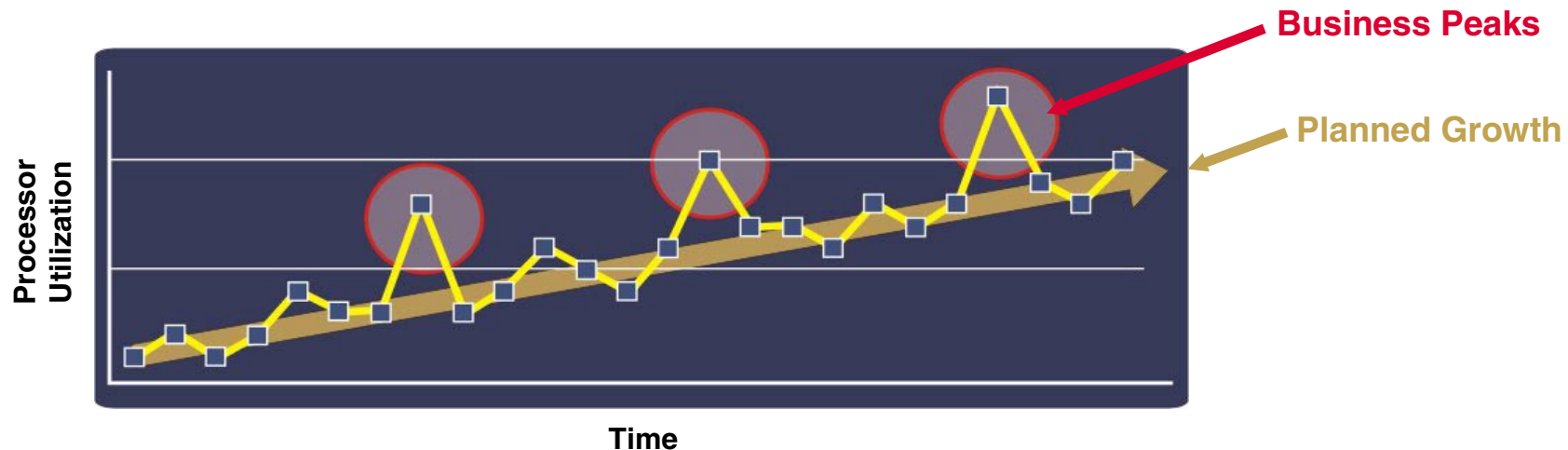
Any horizontal upgrade is concurrent (i.e. 6140 to 6240)
 Others (vertical or diagonal) may require an IPL (except z/VM)
 6070 = zero CP's (ICF's or IFL's only)

Capacity Setting "xy" for software pricing
 Preceded by a 6 (feature code) - **6xy0**
 X indicates number of CPs (6**2**70)
 Y indicates capacity setting (62**7**0)

z890 Positioning



Capacity on demand (upgrades): permanent or temporary?



Permanent Capacity Upgrade

Planned Growth (HW pay when purchased)

Temporary Capacity Upgrade

Business peaks (HW pay after use on a daily basis)

Special Purpose: Seasonal spikes, new market offering or application rollouts

zSeries Capacity on Demand Summary

Capacity Backup Upgrade (CBU)**	Customer Initiated Upgrade (CIU)**	On/Off Capacity on Demand (On/Off CoD)**
Temporary reserve backup PU capacity for specified duration; original config must be restored after test or disaster recovery	Permanent - Facility for ordering, configuring, pricing & installing capacity upgrade. Web-based solution avail via Resource Link	Temporary capacity upgrade (CP, ICF, IFL, zAAP) of unlimited duration; orderable through CIU; customer activates and deactivates.
Available on z800, z890, z900 and z990	Available on LIC enabled z800, z890, z900 and z990	Available only on z890/z990; orderable feature
A CBU contract must be in place prior to implementation and reserve PUs available for test or disaster recovery	A CIU contract must be in place prior to implementation	A CIU contract with special On/Off CoD terms and conditions and right-to-use feature must be in place prior to implementation
Capacity reserve installed by customer or IBM Service representative for predetermined period of use	CIU contract and registration required to use CIU application to order capacity	Feature ordered through IBM Sales; once enacted, customer orders temporary CP, ICF, IFL or zAAP upgrade through CIU
Customer or IBM planning required	Customer planning required	Customer planning required
Nondisruptive* capacity activation z800, z890, z900 and z990	Ordering facility available with the z800, z890, z900 and z990	Nondisruptive temporary CP, ICF, IFL or zAAP upgrade; customer deactivates; mutually exclusive with CBU

* CUoD and CBU may need IPL for z800/z890 "sub" model upgrades with older levels of OS

** Additional terms and conditions apply

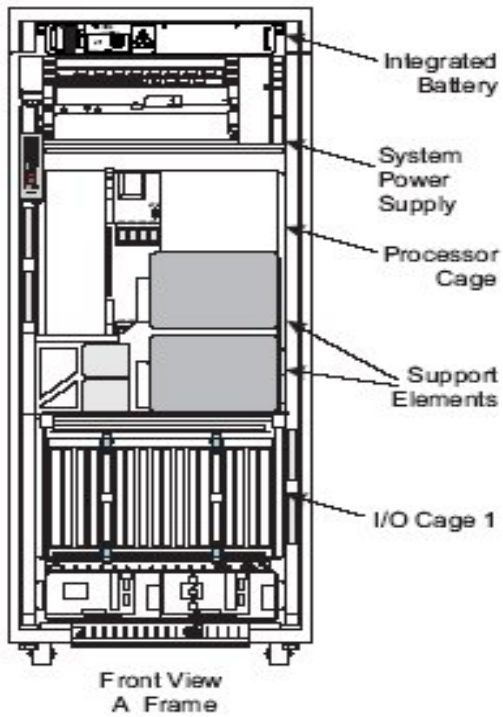
z890 – Capacity Setting 110 Overview

- **Built on same zSeries technology – but available in our smallest capacity setting**
- **Full zSeries Availability support**
- **Memory**
 - ▶ 8 GB Standard, with 8 GB increments to 32 GB (8, 16, 24, 32 GB)
- **Specially-designated Workload Processors for Coupling, Java and Linux workloads**
- **Single frame**
 - ▶ One and three-phase options
 - ▶ Raised floor recommended but not required
 - ▶ Internal Battery Option
- **New packaging for I/O with Two Logical Channel SubSystems (LCSS)**
 - ▶ I/O cage supports up to 240 ESCON channels and/or 32 FICON Express or 64 FICON Express2 channels (16 I/O slot max)
 - ▶ 24 OSA-Express or OSA-Expres2 ports available – 10 Gigabit Ethernet, Gigabit Ethernet, 1000BASE-T Ethernet, Token-Ring, Integrated Console Controller
 - ▶ Open FCP
 - ▶ HiperSockets support for 16 internal LANS
- **Support for up to 15 LPARS**
- **zSeries Entry License Charge™ (zELC) pricing on Capacity Setting 110 only**

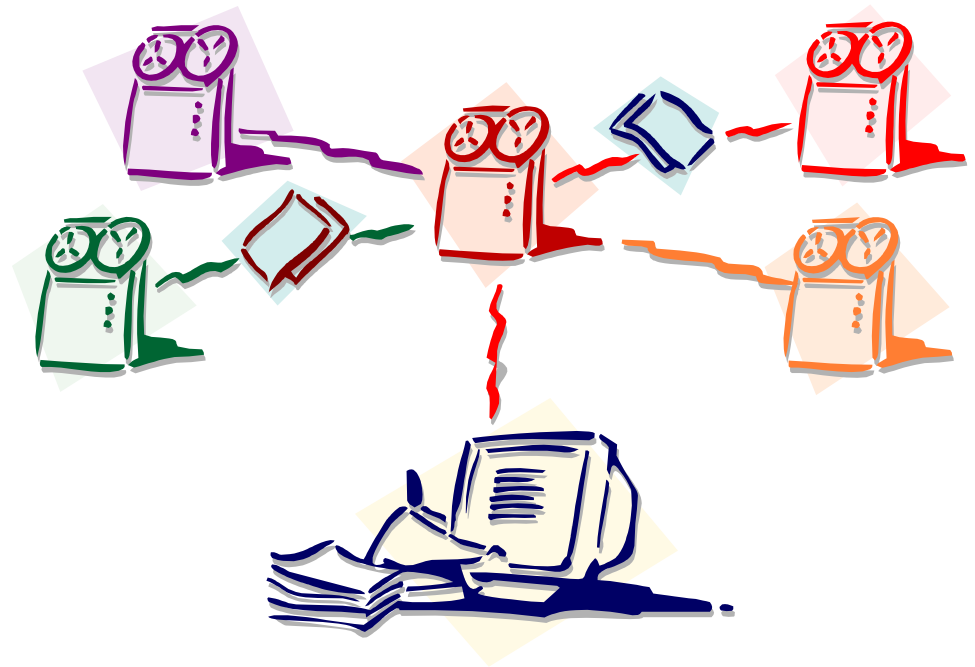
Channel/Slot Maximums

Channel Type	z890 FC6110	z890	z800	z990*
LPARs	15	30	15	30
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
OSA-Express	24	40	24	48
HiperSockets	16	16	4	16
ISC-3	48	48	24	48
ICB-3	16	16	5 (6 on OCF)	16
ICB-4	8	8	0	16
IC	32	32	32	32
OSA ATM 155	0	0	24	0
Crypto - PCICC	0	0	16 engines	0
Crypto - PCICA	4 engines	4 engines	12 engines	12 engines
Crypto - PCIXCC	4	4	0	4
Crypto Express2	8	8	0	8

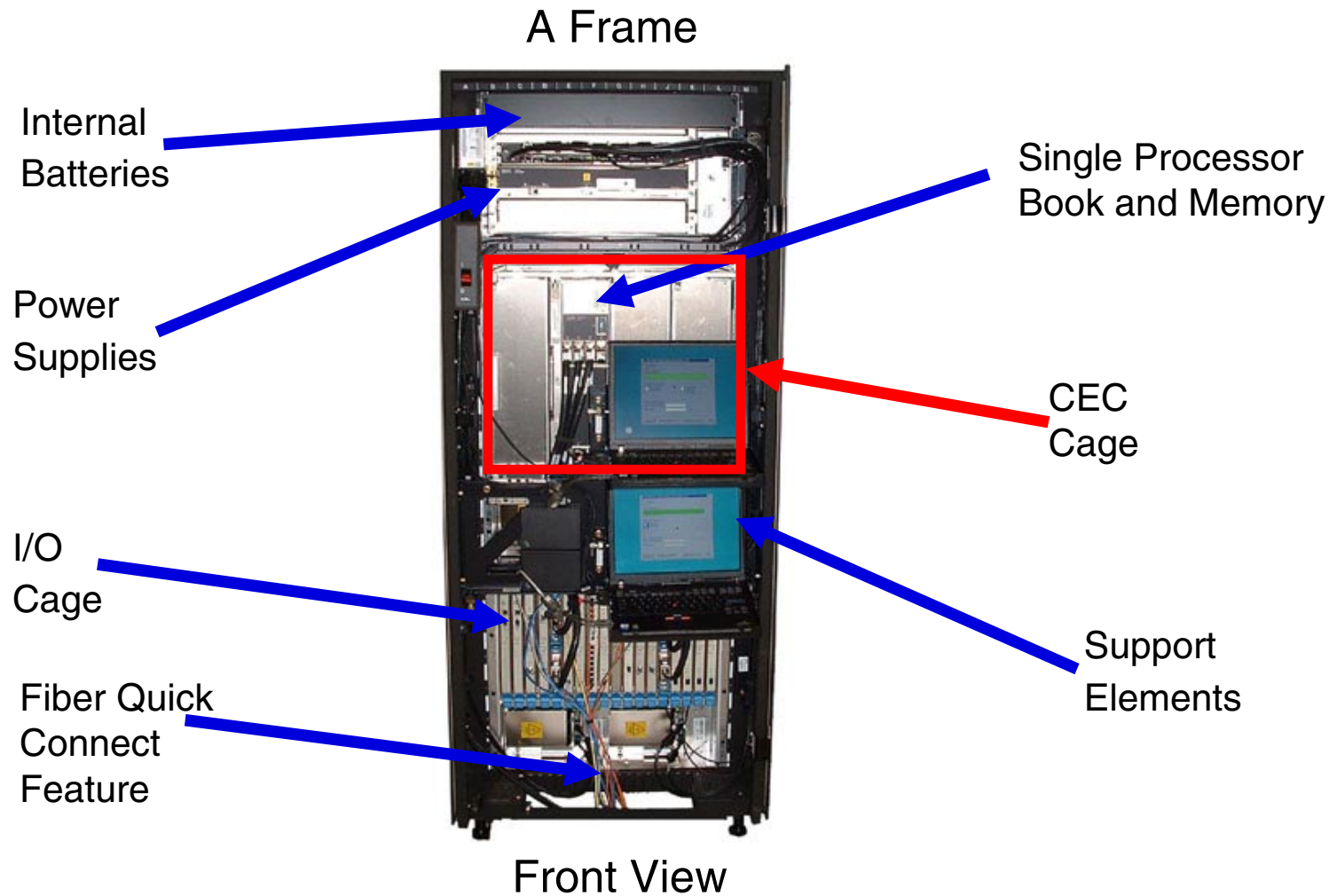
* Model B16 and higher



Under the Covers and I/O



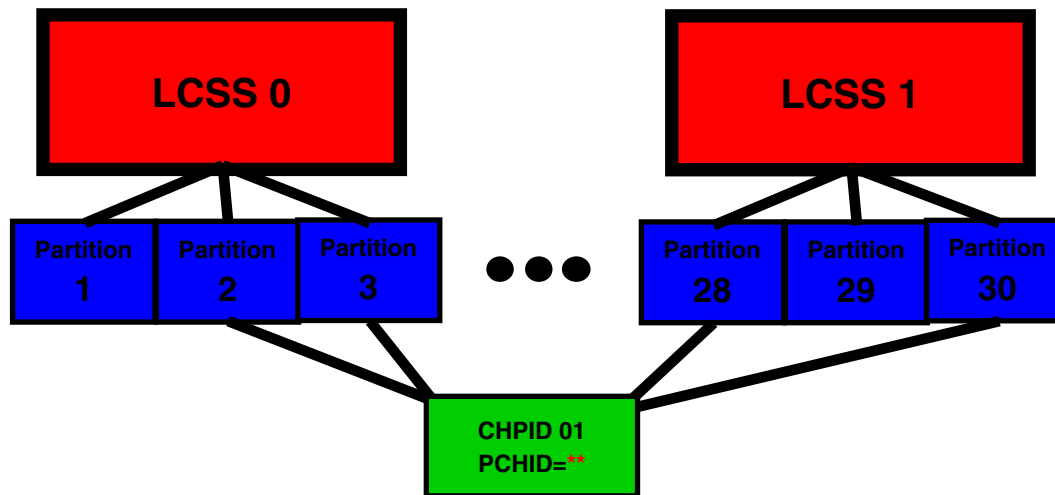
z890 - Under the Covers



Channel Spanning

Share Channels among LPARs across LCSSs

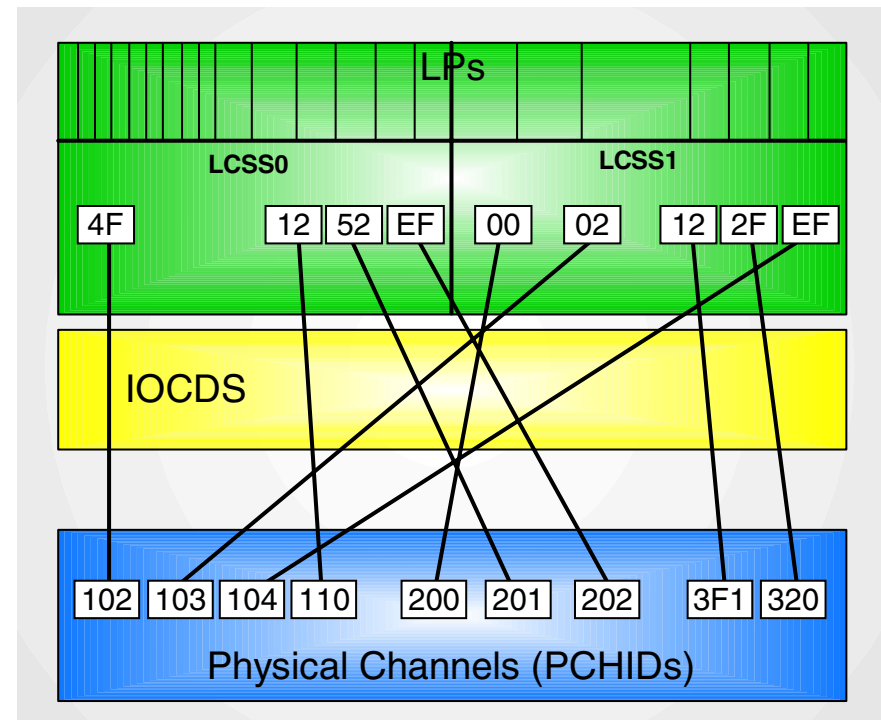
- Internal spanned channels
 - HiperSockets and Internal Coupling links
- External spanned channels
 - FICON Express and FICON Express2 (FC and FCP CHPID types) **NEW!**
 - OSA-Express and OSA-Express2 **NEW!**
 - ISC-3, ICB-2, ICB-3, and ICB-4



** No PCHID for HiperSockets and Internal Coupling links. It is required for FICON/OSA/External Coupling Links
 Spanning reduces the number of channels that can be defined for all LCSSs on CEC - worst case - 256 if all channels are spanned between all LCSSs
 ESCON, DCM and FICON Bridge will not support spanning

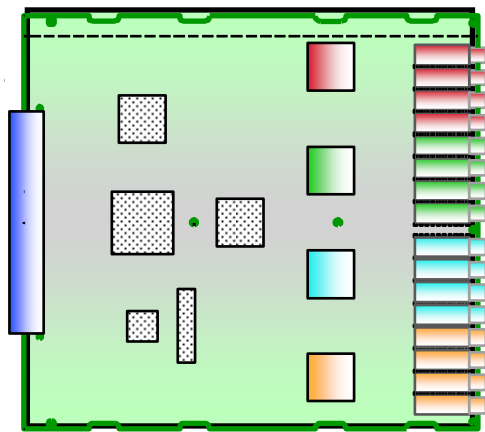
CHPID Mapping Tool

- **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 MESSs**
 - ▶ CHPID to PCHID mapping contained in IOCP



www.ibm.com/servers/resource link

zSeries 16-port Enterprise Systems Connection (ESCON) card



MTRJ MM

- **High density package**
 - ▶ 16-port feature (FC 2323)
 - Ordering increment, four channels (FC 2324)
 - eConfig selects feature quantity
 - ▶ At least one spare channel port per card
 - ▶ Active ports - LICCC 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 in all installed I/O cages
 - New builds or conversions to z890
 - Enables attachment to fiber trunking

Number of Channels	Cards
4 - 28	2
32 - 44	3
48 - 60	4
...	...
244 - 268	18
...	...
420	28

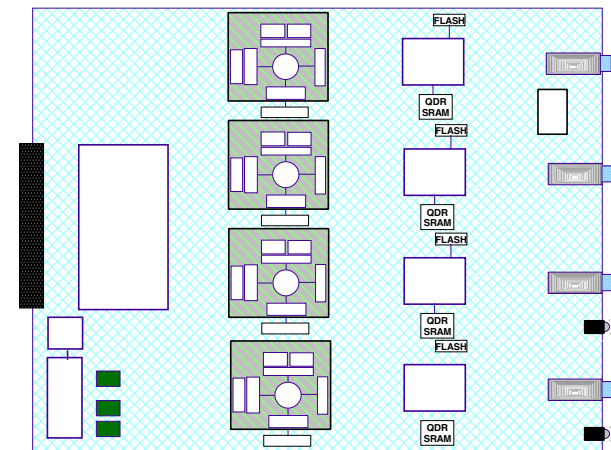
Capacity Setting 110

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



zSeries Fibre Connection (FICON) Express2 Card

- **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
- **Performance improvements**
 - Up to 50% in full duplex large sequential R/Ws*
 - Up to 40% in start I/Os per second*
- **Supported connectivity devices**
 - Refer to: <http://www.ibm.com/servers/eserver/zseries/connectivity/>



LX = FC3319
SX = FC3320

*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.

zSeries - FICON Express advantages over ESCON

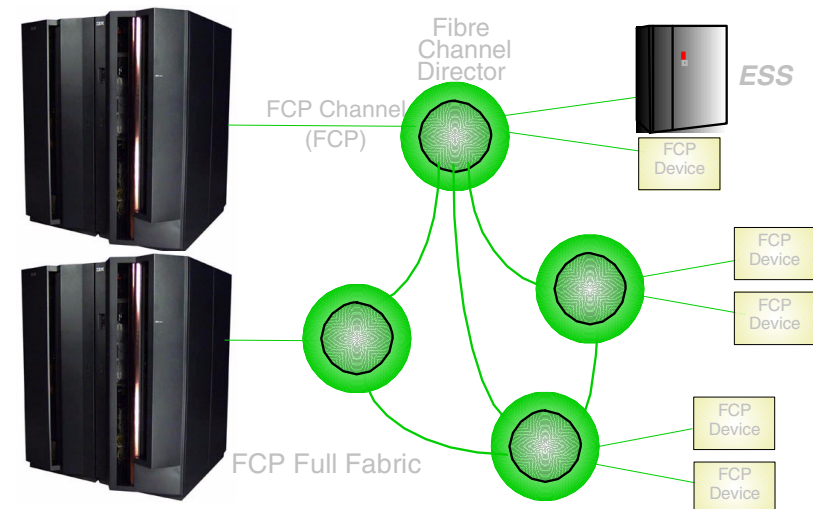
- **FICON Express provides up to a 10X improvement in distance solutions supporting disaster recovery applications**
- **FICON Express provides up to 10X the effective bandwidth per channel**
 - Maximum ESCON rate is 17 MB/s
 - Maximum FICON Express rate is 170 MB/s for either all reads or all writes and greater than 170 MB/sec for a combination of large sequential read and write operations
- **FICON Express supports up to 6X the I/O operations per second**
 - ESCON provides up to 1200 4K IOs/sec
 - FICON Express provides up to 7200 4K IOs/sec
- **FICON Express provides 16X as many devices**
 - ESCON supports 1K unit addresses per channel
 - FICON Express supports 16K unit addresses per channel
- **FICON Express uses fiber more efficiently**
 - ESCON has half duplex transfer data
 - FICON Express has **full duplex data transfer**
- **FICON Express provides relief for "channel constrained" systems**
 - 350% to 400% current ESCON channel utilization can be consolidated onto a single FICON Express channel for reasonable response times in a production workload environment

Note: FICON Express2 offers even greater advantages

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.
- **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
- 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).



The IBM TotalStorage DS Family

The industry's broadest range of disk storage systems



Common management platform
 Common suite of copy services
 Virtualization
 Compelling price points
 Industry leading service and support

IBM TotalStorage DS Family innovations can help you:

Simplify the underlying IT infrastructure and its management to help lower cost and complexity while increasing your ability to respond to changing demands

Assure **business continuity**, security and data durability

Efficiently manage information **throughout its lifecycle**, relative to its business value

IBM TotalStorage Disk: A Continuum of Enterprise Functionality

Enterprise Storage Continuum

New Standard in Pricing and Packaging



DS6000

- Supports all major types of servers including zSeries, UNIX, iSeries, Windows,...
- Helps lower administrative costs with common management tools and interfaces
- Designed for enterprise class reliability to help support continuous operations
- 4-year warranty

New Standard in Functionality, Performance, TCO



DS8000

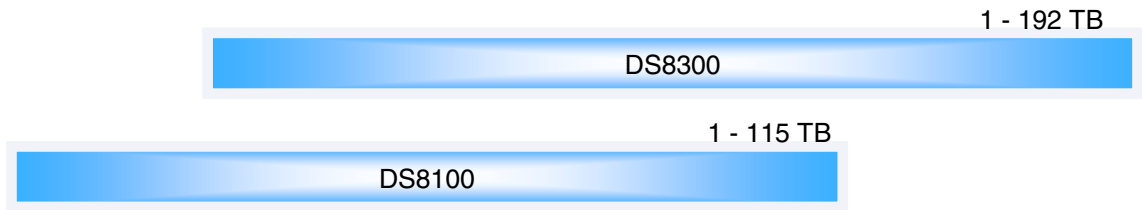
- A fraction of the price with all the capability of traditional enterprise products
- Easy to install, easy to service, modular packaging
- Can start small and grow up to 67TB physical capacity
- Up to 8 FC/FICON host ports, 4GB Cache
- **No ESCON connection**

- Dramatic performance yields up to 6X ESS 800 throughput
- New levels of simplification with storage system LPARs
- First class storage consolidation platform with physical capacity up to 192TB, architected to scale 1 Petabyte
- Up to 128 FC/FICON ports or 64 ESCON ports, up to 256GB Cache

IBM TotalStorage Disk Positioning with eServer zSeries

Choose IBM TotalStorage DS8000 if need

**Highest Performance / Scalability,
ESCON or FICON/FC attach,
Storage System LPAR Capability
with DS8300**



Choose IBM TotalStorage DS6800 if need

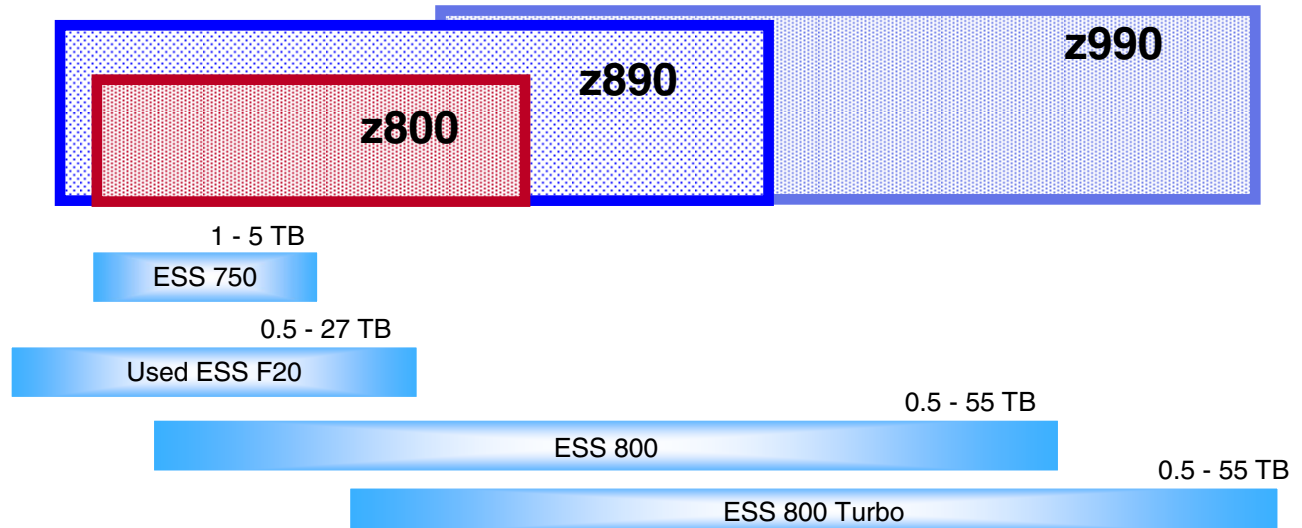
**Lowest price,
FICON/FC attach,
Modular/small footprint,
Easy install / serviceability**



**Previous
Generation
DASD**

IBM TotalStorage ESS

**ESCON or FICON/FC attachment,
Many references showing wide
customer acceptance**

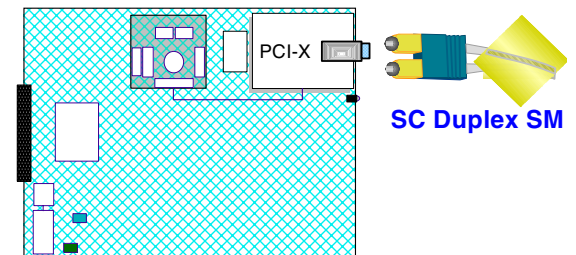


OSA-Express2

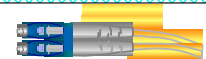
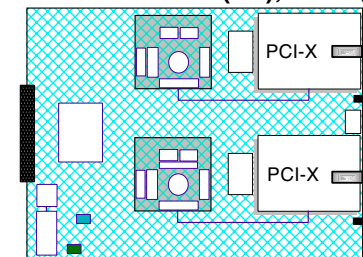
- **Newest member - 10 Gigabit Ethernet LR (long reach)**
 - ▶ One port per feature
 - ▶ 9 micron single mode fiber, SC Duplex connector
- **New - Gigabit Ethernet features**
 - ▶ Gigabit Ethernet LX (Long wavelength)
 - 9 micron single mode fiber, LC Duplex connector
 - ▶ Gigabit Ethernet SX (Short 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**



10 Gigabit Ethernet
Feature 3368



Gigabit Ethernet
Features 3364 (LX), 3365 (SX)



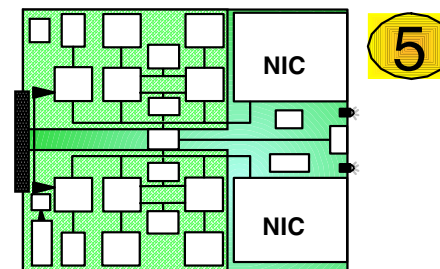
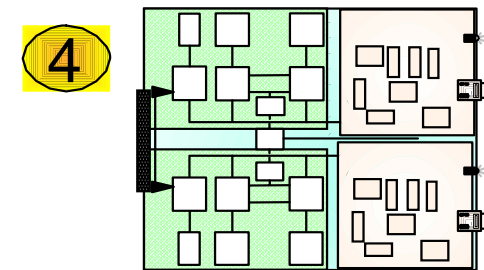
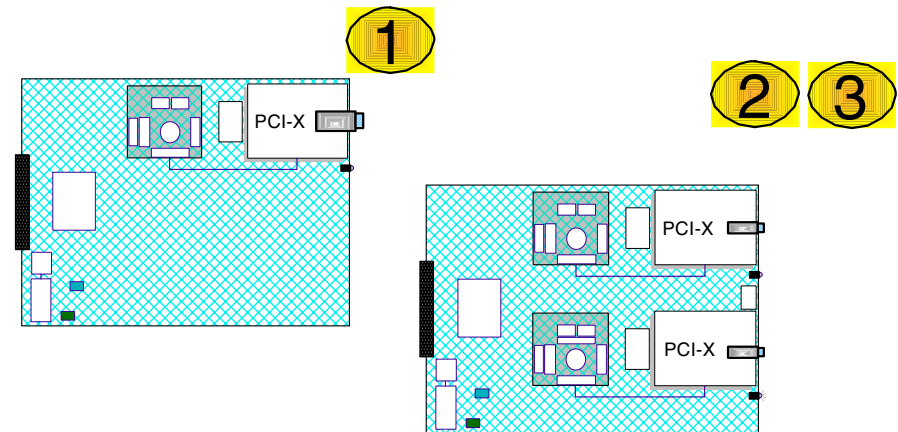
LC Duplex SM



LC Duplex MM

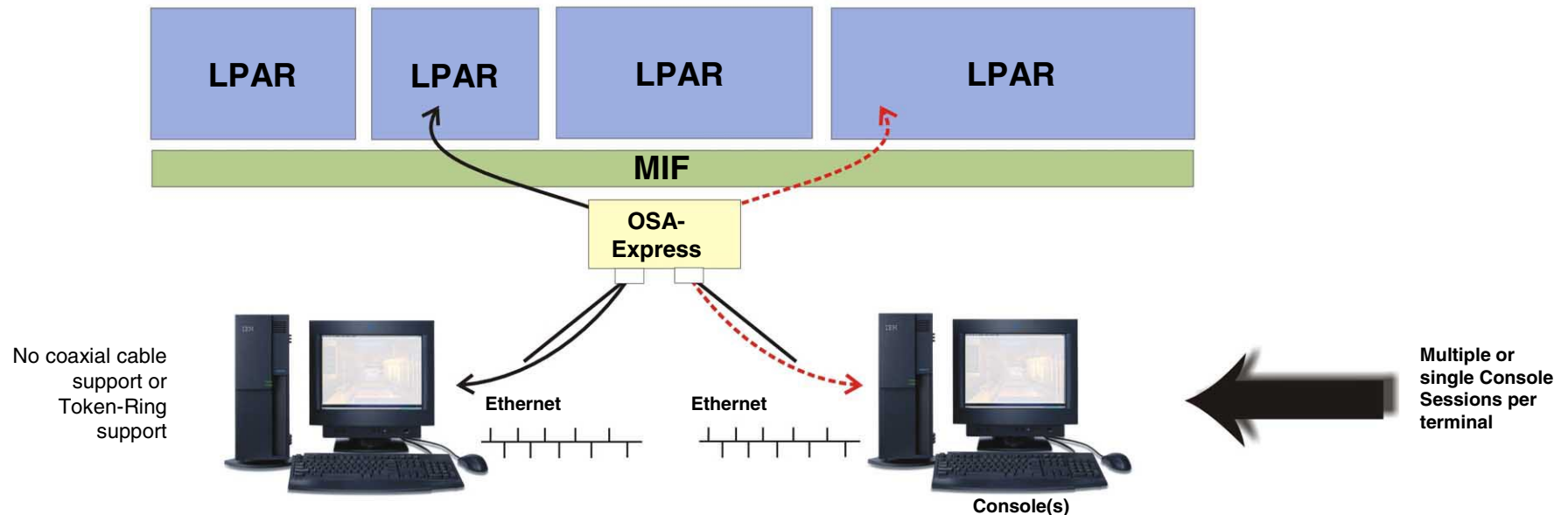
OSA-Express2 & OSA-Express features

- **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






OSA-Integrated Console Controller (OSA-ICC)

- **Console Controller for z890 and z990**
 - System Console (IPL) and operations support for multiple LPARs
- **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**



Enhanced multi-session LPAR control capability provides operational flexibility

z890 Security Options

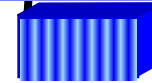
- Common Criteria EAL5 Certification ← 
- Crypto Express2 feature ← 
 - ▶ Support high levels of security for demanding applications
 - ▶ Current applications expected to run without change
 - ▶ Fully programmable
 - ▶ Certified FIPS 140-2 level 4 ← 
 - ▶ Offers high-scale performance for SSL transactions
- Trusted Key Entry 4.2 workstation optional smart card reader
- CP Assist for Cryptographic Function (CPACF) delivers balanced support
 - ▶ Enabled via a no charge feature code
 - ▶ On every central processor (CP)



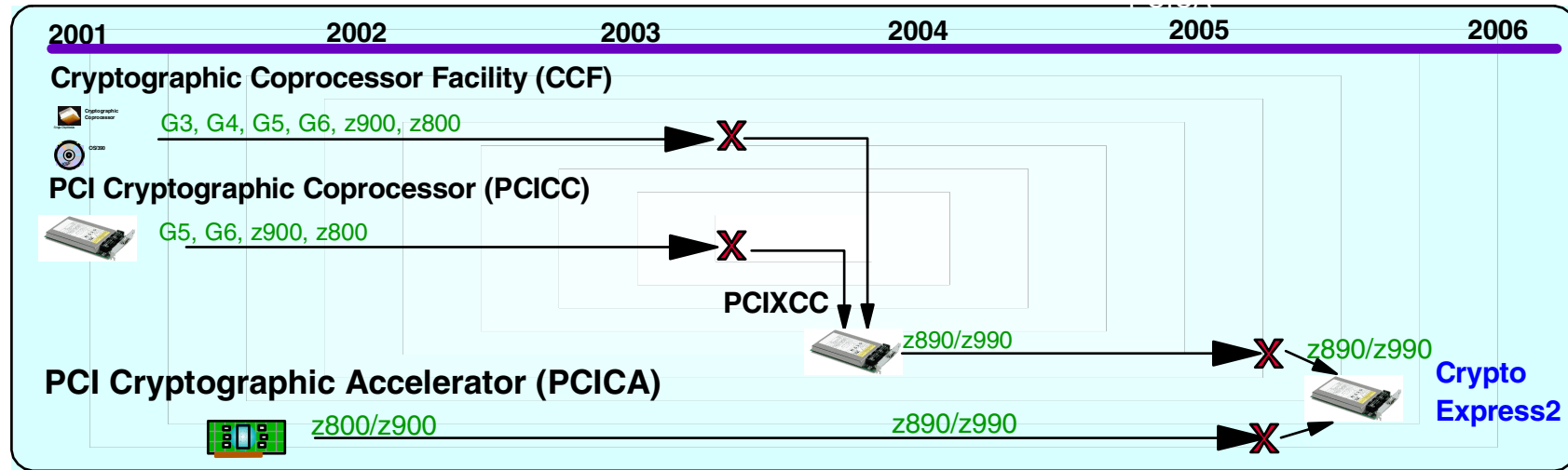
zSeries continues to address the requirements for on demand security

z890/z990 Crypto Roadmap to Crypto Express2

Integrated Cryptographic Service Facility (ICSF)



PU PU PU PU PU PU PU PU



- z990/890 includes NO standard cryptographic function
- CP Assist for Cryptographic Function (message security assist) Feature #3863
- PCIXCC Feature – Supports “Secure key” cryptographic processing
- PCICA Feature – Supports “Public key” SSL cryptographic processing
- Crypto Express2 – Combines function and performance of PCICA and PCICC
- Migration to z990 when CCF, PCICC or PCICA is in use on an older machine usually requires Crypto Express2, PCIXCC and/or PCICA on z890/990.

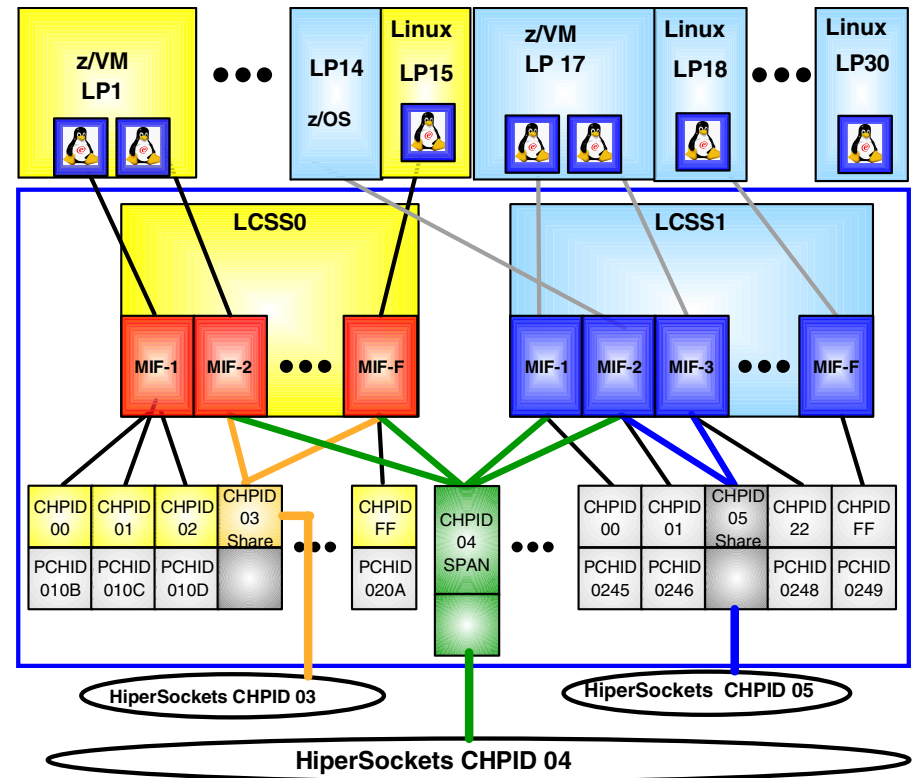
HiperSockets

- **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 Logical Partitions

- **Virtual LAN (IEEE 802.1q) support**

- **Broadcast for IPv4**

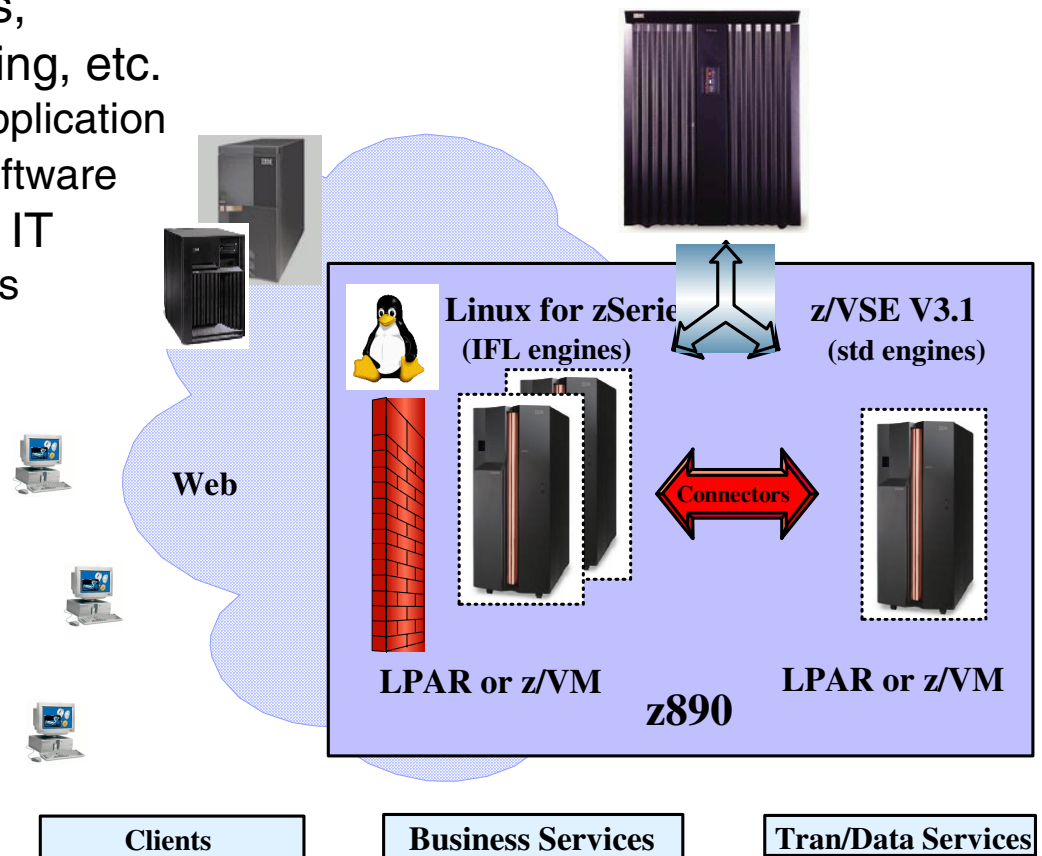


Very High Speed Interconnection between programs running VSE/ESA, z/VM , z/OS or Linux®

z890 and z/VSE

- **Protect** existing client investments in VSE programs, data, equipment, IT skills, business processes, end user training, etc.
 - Modernize, Web-enable CICS® application
 - z890 servers, IBM storage and software
- **Integrate** VSE with the rest of your IT
 - VSE connectors and Web services
 - IBM middleware
- **Extend** with Linux on zSeries
 - New applications
 - Infrastructure simplification

Why Not Think Inside the Box?



Note: z/VSE can execute in 31-bit mode only. It does not implement z/Architecture, and specifically does not implement 64-bit mode capabilities. z/VSE is designed to exploit selected features of IBM zSeries hardware.

Software Support and Pricing

z890 Software Support Summary

Operating System	ESA/390 (31-bit)	z/Arch. (64-bit)	Compatibility	Exploitation
z/VSE Version 3 Release 1	Yes	No	Yes	Yes
VSE/ESA Version 2 Release 6 and 7	Yes	No	Yes	Yes
z/VM Version 5 Release 1	No	Yes	Included	Yes
z/VM Version 4 Release 4	Yes	Yes	Included	Yes
z/VM Version 4 Release 3	Yes	Yes	Yes	No
z/VM Version 3 Release 1	Yes	Yes	Yes	No
Linux on zSeries	No	Yes	Yes	Yes
Linux on S/390	Yes	No	Yes	Yes
z/OS and z/OS.e Version 1 Release 5, 6	No	Yes	Included	Included
z/OS and z/OS.e Version 1 Release 4	No	Yes	Yes	Yes
z/OS and z/OS.e Version 1 Release 3	No	Yes	Yes	No
z/OS Version 1 Release 2	No	Yes	Yes	No
OS/390 Version 2 Release 10	Yes	Yes	Yes	No
TPF Version 4 Release 1 (ESA mode only)	Yes	No	Yes	No

VSE Pricing for zSeries 890

1-way	2-way	3-way	4-way
110 (zELC)	210 (EWLC Tier A)	310 (EWLC Tier A)	410 (EWLC Tier B)
120 (EWLC Tier A)	220 (EWLC Tier B)	320 (EWLC Tier C)	420 (EWLC Tier C)
130 (EWLC Tier B)	230 (EWLC Tier C)	330 (EWLC Tier C)	430 (EWLC Tier D)
140 (EWLC Tier C)	240 (EWLC Tier C)	340 (EWLC Tier D)	440 (EWLC Tier D)
150 (EWLC Tier C)	250 (EWLC Tier D)	350 (EWLC Tier D)	450 (EWLC Tier E)
160 (EWLC Tier C)	260 (EWLC Tier D)	360 (EWLC Tier E)	460 (EWLC Tier E)
170 (EWLC Tier D)	270 (EWLC Tier E)	370 (EWLC Tier E)	470 (EWLC Tier E)

Note: For z890, VSE is priced using EWLC – Tiered Price Structure.
zELC prices are used for Capacity Setting 110 (only).

Replace your Multiprise[®] 2000 running VSE with an IBM eServer zSeries 890 and Save!



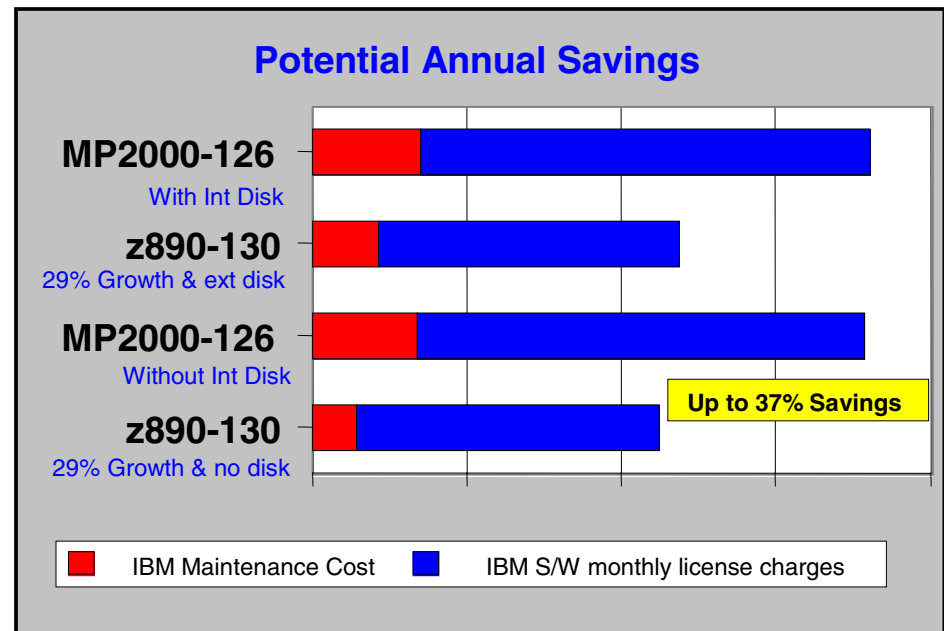
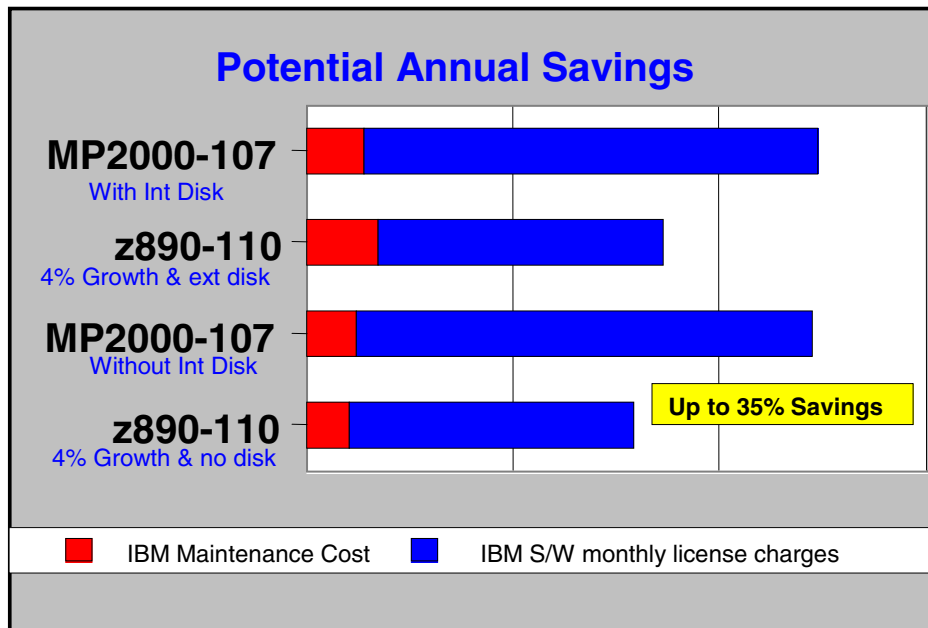
Innovation on IBM eServer[™] zSeries[®] 890

- ▶ High Capacity IFL
- ▶ OSA-Express, OSA-ICC
- ▶ On/Off Capacity on Demand
- ▶ PCI Crypto
- ▶ HiperSockets[™]

Ongoing Savings help you offset the cost of your hardware investment.

Savings driven by:

- ▶ Lower priced VSE/ESA[™] on the z890 with zELC or EWLC Tiered Price Structure versus Model Group software pricing

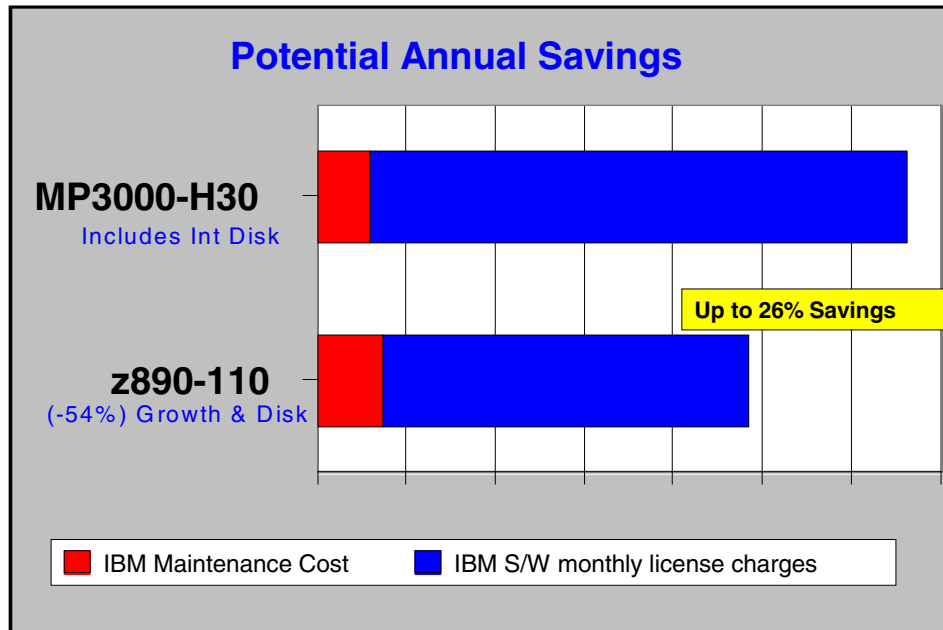


* Hardware configuration based on general purpose central processors only (no IFLs) and similarly configured for costing purposes. VSE software stack based on VSE/ESA, CICS, DITTO, SSP, VTAM, COBOL, LE and HLA.

Too much capacity on your Multiprise 3000 running VSE today? Consider a z890 to bring new technology to your firm!

■ **Innovation on z890**

- ▶ High Capacity IFL
- ▶ OSA-Express, OSA-ICC
- ▶ On/Off Capacity on Demand
- ▶ PCI Crypto
- ▶ HiperSockets



■ **Ongoing Savings help you offset the cost of your hardware investment.**

■ **Savings driven by:**

- ▶ Providing a solution with the granularity you need
- ▶ Lower priced VSE on the 110 with full capacity zELC versus GOLC software pricing

■ **Additional Value considerations:**

- ▶ IGF certified used ESS F20 – 420 GB capacity
- ▶ Granular upgradeability
- ▶ Temporary capacity available with On/Off Capacity on Demand

* Hardware configuration based on general purpose central processors only (no IFLs) and similarly configured for costing purposes. VSE software stack based on VSE/ESA, CICS, DITTO, SSP, VTAM, COBOL, LE and HLA.

Replace your 9672 G4 running VSE with a z890 and Save!



■ Innovation on z890

- ▶ High Capacity IFL
- ▶ OSA-Express, OSA-ICC
- ▶ On/Off Capacity on Demand
- ▶ PCI Crypto
- ▶ HiperSockets

■ Ongoing Savings help you offset the cost of your hardware investment.

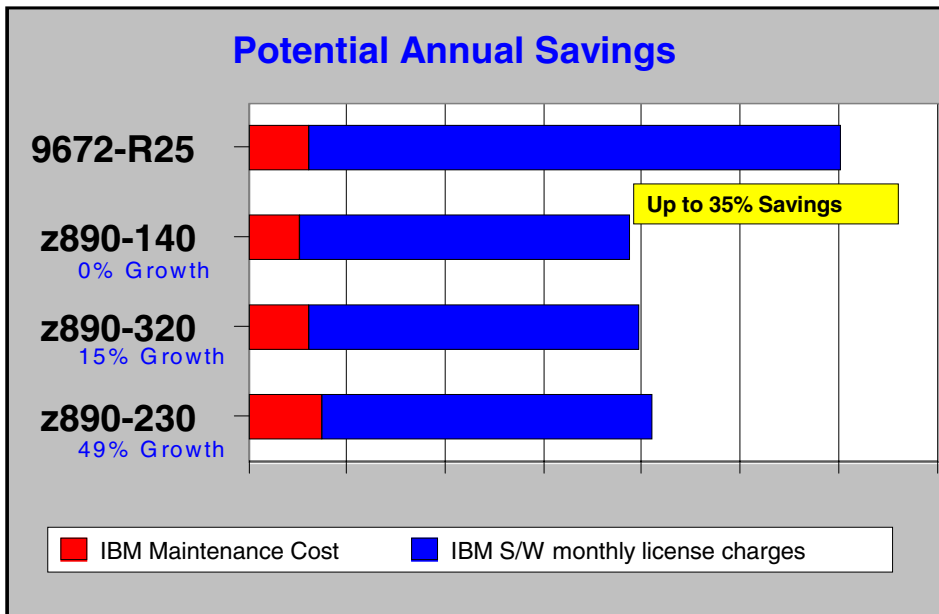
■ Savings driven by:

- ▶ Lower priced IBM hardware maintenance on z890-140
- ▶ Lower priced VSE on the 140, 320 and 230 with Tiered Price Structure versus Model Group software pricing

■ Additional Value considerations:

- ▶ Granular upgradeability
- ▶ Temporary capacity available with On/Off Capacity on Demand

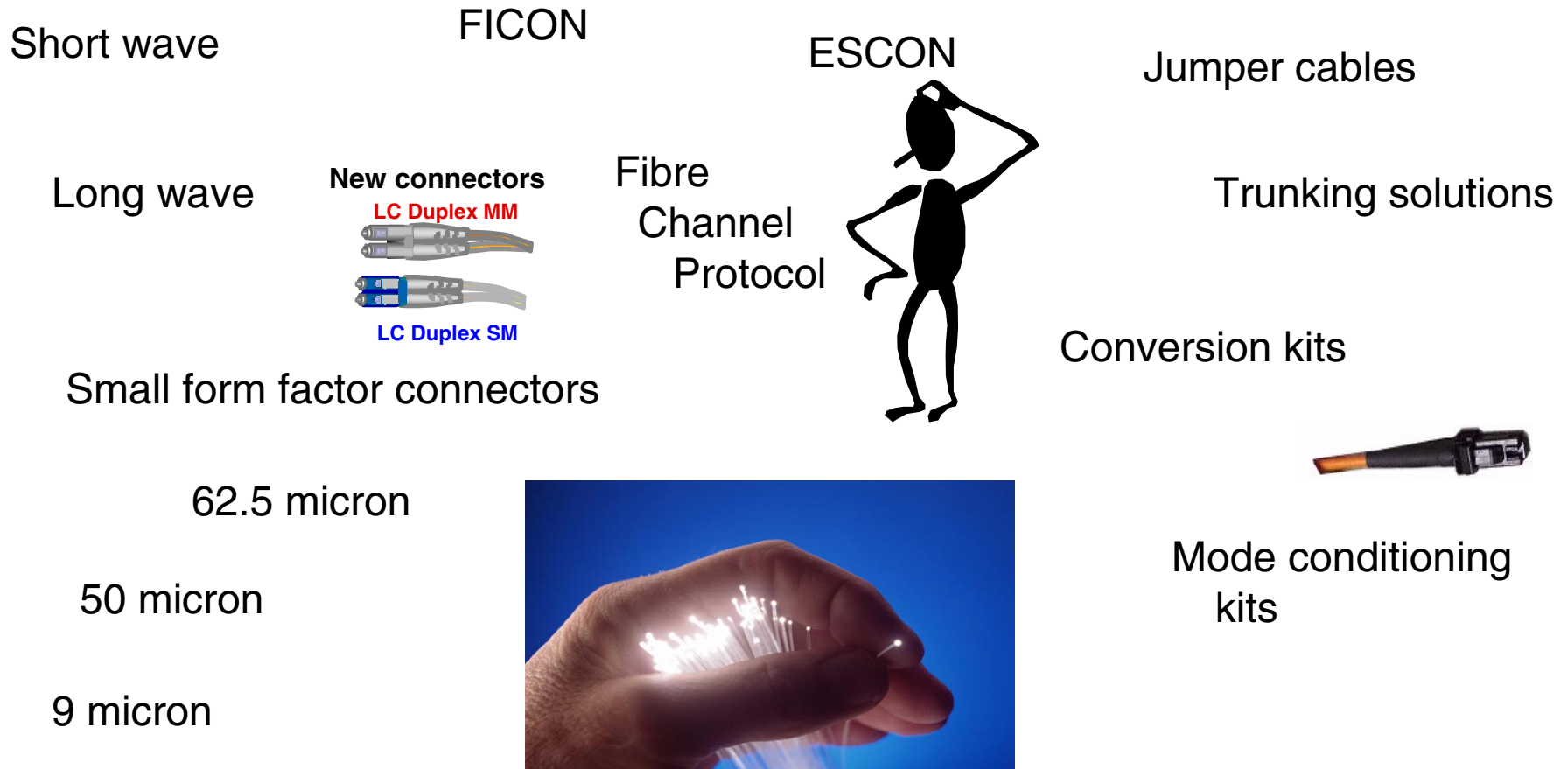
* Hardware configuration based on general purpose central processors only (no IFLs) and similarly configured for costing purposes. VSE software stack based on VSE/ESA, CICS, DITTO, SSP, VTAM, COBOL, LE and HLA.



Migration Planning



IBM Networking Services for zSeries fiber cabling



A seamless, comprehensive, integrated fiber cabling service

IBM Networking Services for zSeries fiber cabling

- Changing environments, protocols and products
 - ▶ System or enterprise-wide view
 - ▶ Multitude of choices
 - Connectors, cables, products
 - Tactical and strategic decisions
- Right-sized packaged offering
 - ▶ Contracted, fixed-price service
 - ▶ End-to-end service
 - Planning -> Consultation -> Cables -> Installation -> Connection report

Plan
Procure
Install
Document



A seamless, comprehensive, integrated fiber cabling service

Considerations

- No Internal-Disk
 - ▶ DS6000 or ESS 750 Shark
 - ▶ IGF certified used ESS F20 – 420 GB capacity
- LPAR mode only (no basic mode)
 - ▶ No I/O Assist for V=F or V=R guests
- Parallel channels
 - ▶ Same as z800
 - ▶ Use Optica ESCON® Converter or IBM 9034
- OSA-2 ATM or FDDI
 - ▶ Migrate to OSA-Express Ethernet or use multi-purpose switch

z890 Summary



- **New IBM eServer zSeries 890 delivered with price/performance and technology-driven business value**

- ▶ 28 capacity settings provide flexibility and granular growth
- ▶ Specially designated workload processors available for Coupling, Linux and Java™ workloads
- ▶ Entry point at 4 MSUs and 28 capacity settings can help you to better manage software costs
- ▶ Up to 140% price/performance improvement for Linux IFLs over z800
- ▶ Up to 10% price/performance improvement on Maintenance over z800
- ▶ Entry Workload License Charge (EWLC) and EWLC Tiered Price Structure introduced for flat charged products
- ▶ New cost effective z/VM V5.1 with engine-based pricing
- ▶ New z/VSE
- ▶ Linux for Infrastructure Simplification or application modernization
- ▶ On/Off Capacity on Demand
- ▶ OSA-Integrated Console Controller
- ▶ New and Improved Networking and Connectivity Options

Introducing the new IBM System z9™



IBM System z9 — redefines the role of the mainframe



IBM's **Systems Agenda** at work

Delivers:



Virtualization



Openness



Collaboration

- ▶ Double the power
- ▶ Twice the capacity
- ▶ Twice the memory
- ▶ Breakthrough security
- ▶ Superior economics

IBM System z9-109 overview

- Machine Type

- ▶ 2094

- 5 Models

- ▶ S08, S18, S28, S38 and S54*

- Processor Units (PUs)

- ▶ 12 PUs (16 for Model S54) per book
- ▶ 2 SAPs per book, standard
- ▶ 2 spares per server
- ▶ 8, 18, 28, 38 or 54 PUs available
 - CPs, IFLs, ICFs, zAAPs, optional SAPs

- Memory

- ▶ Minimum of 16 GB
- ▶ Up to 128 GB per book
 - 16 GB increments
- ▶ Up to 512 GB

- Bandwidth for I/O cage

- ▶ Up to 16 STIs per book
 - 2.7 GB/s for each I/O and 2.0 GB/s for ICBs
- ▶ Total system I/O bandwidth capability of 172.8 GB**



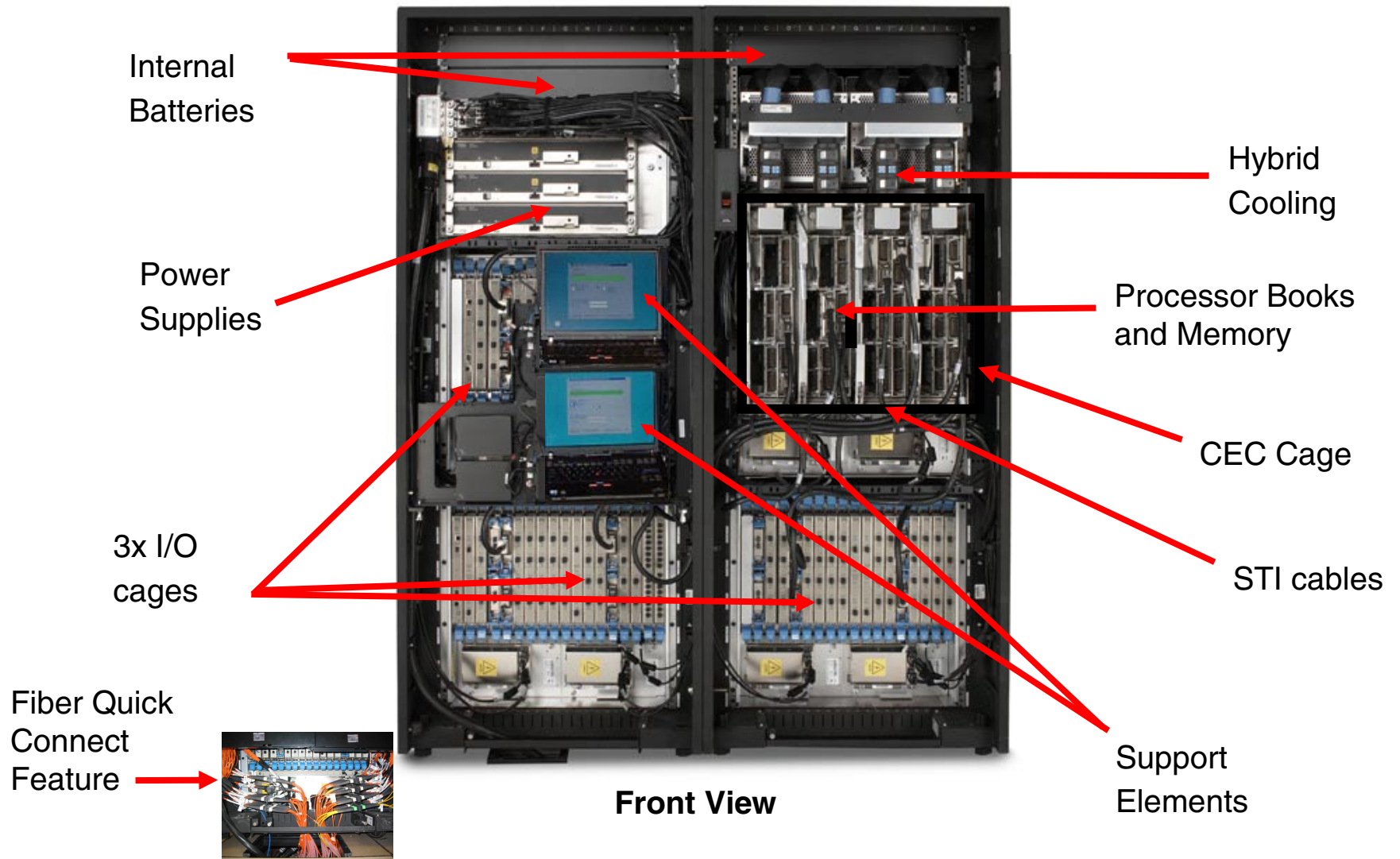
- Economics

- ▶ 10% lower chargeable MSUs
- ▶ Lower Maintenance price/MIPS
- ▶ 35% larger specialty engines (SEs) at same price
- ▶ No charge MES upgrades to existing SEs
- ▶ 20% lower memory prices
- ▶ Attractive financing

* S54 planned availability Nov. 2005

** z9-109 exploits a subset of its designed I/O capacity

z9-109 – Under the covers

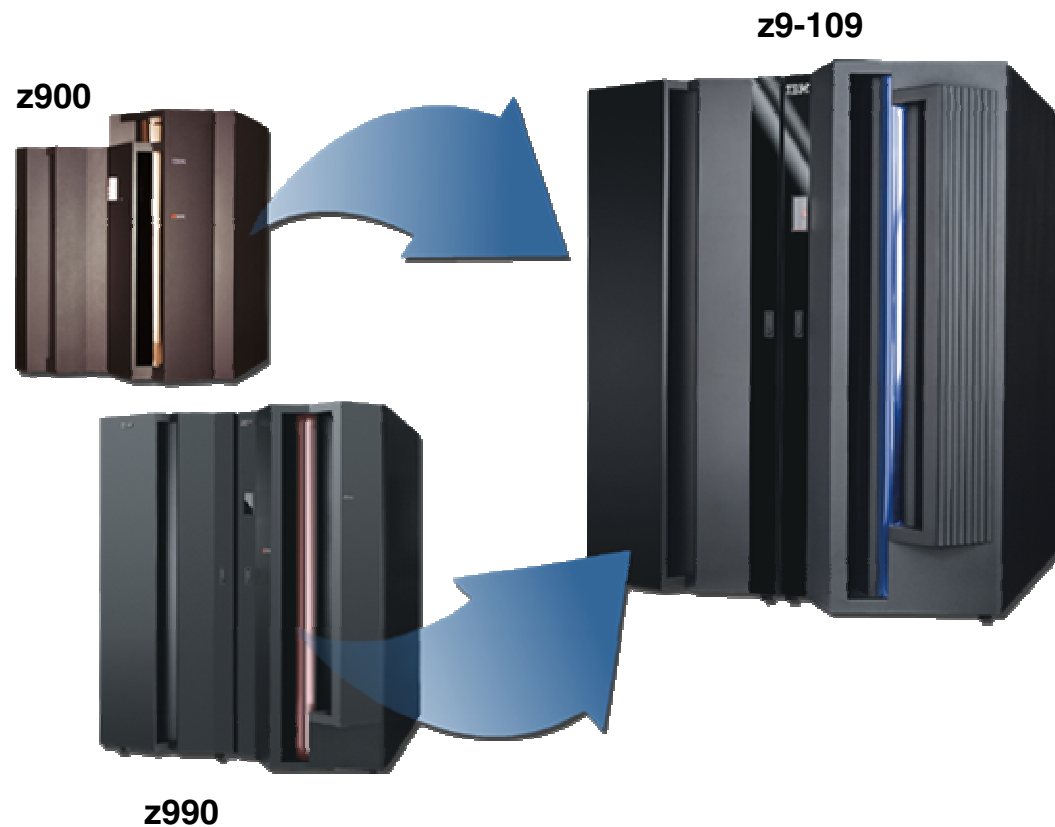


Flexible upgrades

Protecting your investment in zSeries technology

- Full upgrades within the z9-109*
- Any to any upgrade from IBM eServer zSeries 990 (z990)
- Any to any upgrade from IBM eServer zSeries 900 (z900), except Model 100

* Upgrading to an S54 (planned availability Nov. 2005) from other z9-109 models will require a planned outage



z9-109 – Delivering increased capacity and performance

- Delivering new levels of scalability

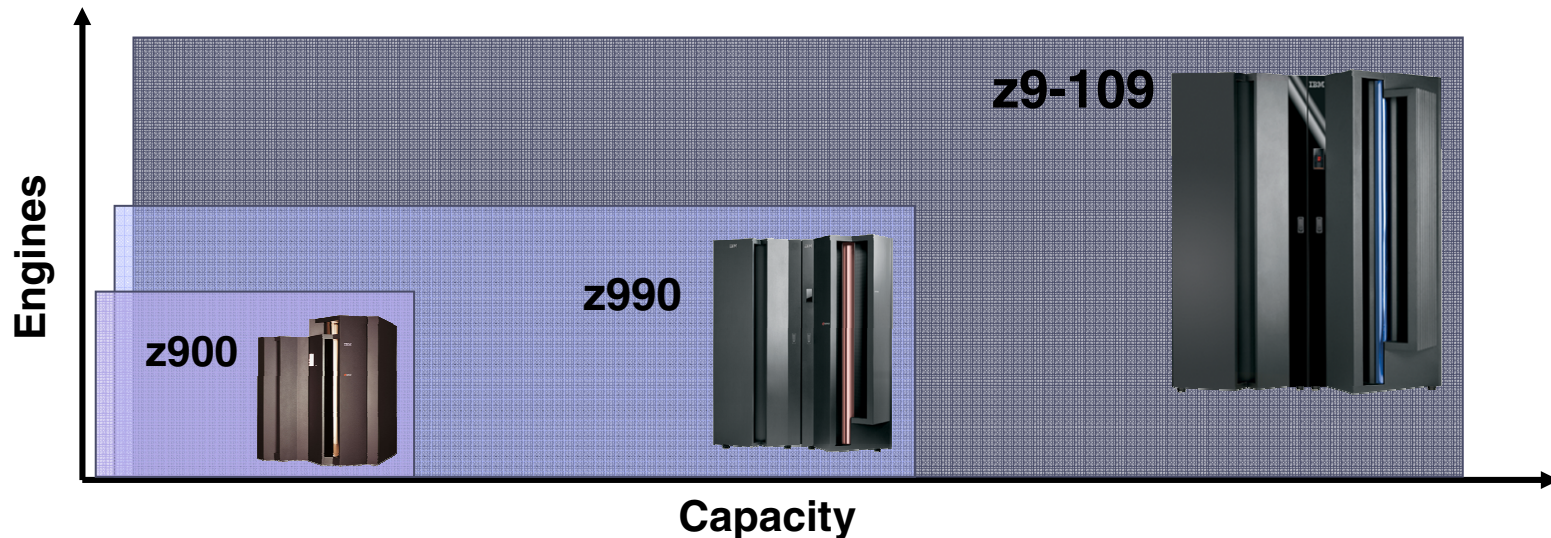
- ▶ Built on modular book design – one to four books
- ▶ Five models with one machine type
 - 1 to 38-way high performance server (four models)
 - Up to 54-way enhanced model for high performance and maximum capacity
- ▶ The z9-109 uniprocessor is expected to deliver 35% more capacity than the z990 uniprocessor *
- ▶ The S54 offers 95% more server capacity than z990 **
- ▶ Two spare processor units per server
- ▶ Increased memory – up to 512 GB per server
- ▶ Multiple Subchannel Sets (MSS) for an increased number of logical volumes
- ▶ Up to 60 logical partitions (2X improvement)

- Improved I/O Performance

- ▶ Up to 80% more bandwidth than the IBM eServer zSeries 990 (z990)
- ▶ Can improve FICON performance with Modified Indirect Data Address Word (MIDAW) facility

* LSPR mixed workload average. z9-109-701 Vs z990-301

** This is a comparison of the z9-109 54-way and the z990 D32 and is based on LSPR mixed workload average.



z9-109 – Delivering enhanced connectivity for the system

Within the server, between servers, to the data and to the network



Within the Server

Network in a box with HiperSockets
 Integrated console controller
 Integrated communications controller support (OSA for NCP)★

To the Data

Up to 336 FICON or 1024★
 ESCON channels★
 NPIV provides channel virtualization for Fibre channels★
 FICON performance improvement with MIDAW facility★

To the Network

Performance assists for z/VM guests
 HiperSockets IPv6 support★
 New 1000BASE-T support★
 VLAN Mgmt – GVRP★

For Clustering

Parallel Sysplex®
 Preview STP

z9-109 – Providing new levels of availability

- **New enhanced book availability and redundant I/O interconnect – increasing z9-109's availability by helping to avoid unplanned outages:***
 - ▶ Enhancing recovery of resources
 - ▶ Improving ability to nondisruptively add and repair memory resources
- **Improving the application of hardware driver maintenance:***
 - ▶ Potentially reducing planned outages using enhanced driver maintenance
- **Extending capability for Capacity Backup Upgrade (CBU) to include specialty engines**
- **Improving memory availability with flexible memory offering**

*Customer pre-planning is required and may require purchasing additional hardware resources

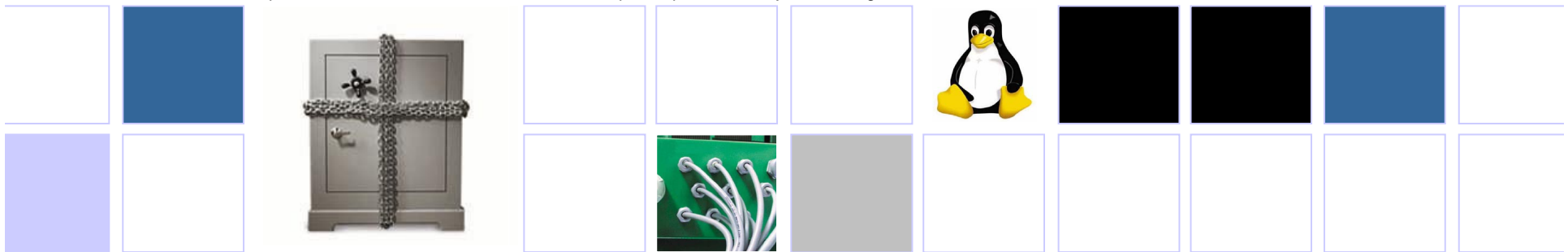


z9-109 – Enhancing security

- ★ **New integrated cryptography features offer more clear key security options on z9-109**
 - ▶ Advanced Encryption Standard (AES) support in z9-109 hardware
 - ▶ Stronger hash algorithm with SHA-256
 - ▶ Pseudo Random Number Generator
- ★ **Crypto Express2 improved flexibility and speed for secure key encryption**
 - Configurability options, two coprocessors, two accelerators or one of each
 - With both adapters configured as accelerators each Crypto Express2 card is designed to provide up to 6000 SSL handshakes per second *
- **Secure encryption facility for z/OS to help protect data shared with partners, suppliers, and customers ****
 - ▶ Designed to leverage z/OS key management and high performance hardware encryption
- **Can help to achieve higher levels of certifications and compliance**
- **Virtualized cryptographic capabilities for card sharing by Linux virtual servers**
- **Complementary IBM technology and vendors' advanced security solutions**
 - ▶ Can enable a cross-platform model that can extend RACF capabilities to the enterprise
 - May provide the capability of integrating security enforcement across the networking enterprise

* These measurements are examples of the maximum transaction/second achieved in a lab environment with no other processing occurring and do not represent actual field measurements. Details available on request.

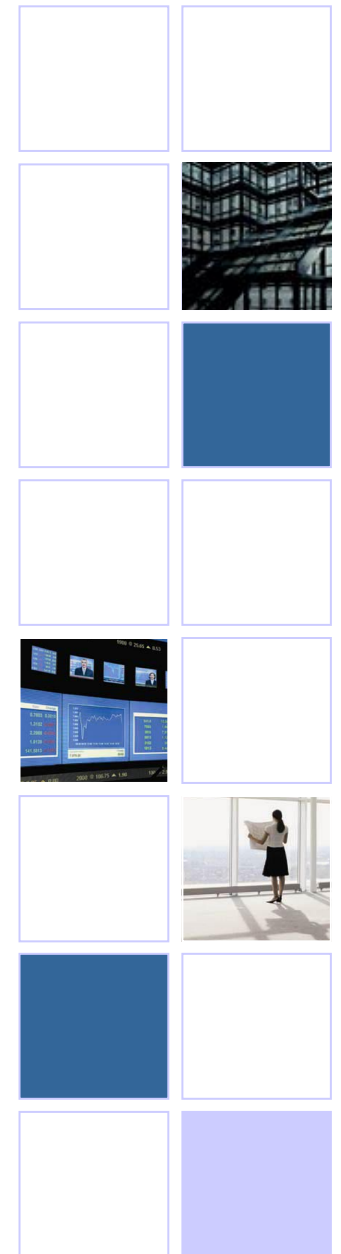
** This statement represents IBM's current intentions. IBM development plans are subject to change or withdrawal without further notice.



z9-109 Operating System Software

Operating System	ESA/390 (31-bit)	z/Arch (64-bit)
z/OS Version 1 Release 4, 5, 6, 7	No	Yes
Linux, 64-bit distribution	No	Yes
Linux, 31-bit distribution	Yes	No
z/VM Version 5 Release 1, 2	No	Yes
z/VM Version 4 Release 4	Yes	Yes
z/VSE™* 3.1, VSE/ESA™ 2.6, 2.7	Yes	No
z/TPF Version 1	No	Yes
TPF Version 4 Release 1 (ESA mode only)	Yes	No

*z/VSE can execute in 31-bit mode only. It does not implement z/Architecture™ and specifically does not implement 64-bit mode capabilities. z/VSE is designed to exploit select features of IBM System z9 and eServer zSeries hardware.



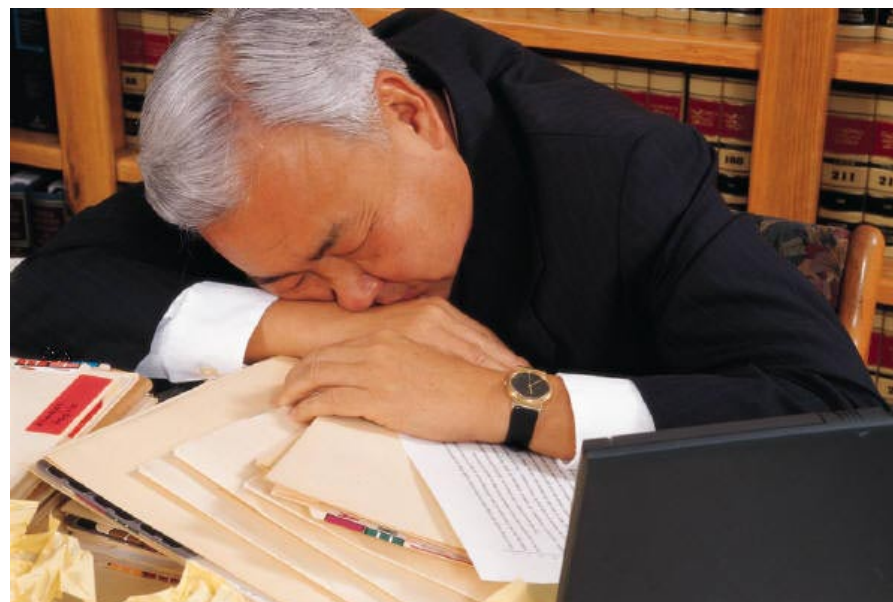
z9-109 delivering new functions and features



Five New Hardware Models	Faster 2.7 GB STI and more of them
Faster Uni Processor	MIDAW facility
Up to 54 CPs	Multiple Subchannel Sets per LCSS
Up to 512 GB Memory	63.75K Subchannels for Set-0
Up to 60 LPARs	Up to 336 FICON® Express2 Channels
CBU for IFL, ICF and zAAP	N_Port ID Virtualization
Separate PU Pool Management	IPv6 Support for HiperSockets™
Redundant I/O Interconnect	OSA-Express2 1000BASE-T
Enhanced Driver Maintenance	OSA-Express2 OSN (OSA for NCP)
Enhanced Book Availability	Enhanced CPACF with AES, PRNG and SHA-256
Dynamic Oscillator Switchover	Configurable Crypto Express2
Preview* Server Time Protocol	

*This statement represents IBM's current intentions. IBM development plans are subject to change or withdrawal without further notice.

Reference Material



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 | | |
| ▪ HW 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

IBM

@server



*Thank you for your
time and for doing
business with IBM*



© The History of IBM

1964



1972



1982



1999



2004

2005

Backup/Miscellaneous Material

We have come a long way in 40 years!!!!

	System/360 Model 50	z/890
Introduction	April 7, 1964	April 7, 2004
Typical arithmetic operations per second	20 to 50,000	Billions
Machine cycle time	500 nanoseconds	1 nanosecond
Memory cycle time	2 microseconds	2 nanosecond
Registers	20 32-bit	Over 200 64-bit
On chip L1, off chip L2	Not invented	512KB/chip, 32MB/MCM
Storage Main Memory	64KB, 128K, 256K	8-32 GB
Channel attached storage	1-8 MB(Bulk core storage)	Terabytes (Disk)
Channel high speed	.8 MB/sec.	2 Gb/sec. (using FICON)
Performance	Under 1 MIPS (.13958)	Approx. 26-1365 MIPS
Price	\$ Millions	Starting <\$200K to +\$1M
Reliability	Days	Decades

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_manu.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

Where to Find More Information...

- zSeries Home Page
 - ▶ <http://www-1.ibm.com/servers/eserver/zseries/>
- eServer Home Page
 - ▶ <http://www.ibm.com/eserver>
- zSeries Announcement Landing Page
 - ▶ <http://www.ibm.com/servers/eserver/zseries/feature100704>
- IBM Scholars Program & IT Co-op Program
 - ▶ **Scholars zSeries Program & University Participants:** <http://ibm.com/university/zseries>
 - ▶ **Scholars zSeries & Co-op Program contact:** univprg@us.ibm.com
- IBM ITTS Offerings - shorten
 - ▶ **IBM ITTS zSeries Curriculum View:** <http://ibm.com/services/learning/us/catalog/zseries/zSeries>
 - ▶ **Roadmaps:** <http://ibm.com/services/learning/us/catalog/zseries/roadmaps/>
 - ▶ **Digital Video Library:** <http://ibm.com/services/learning/us/elearning/dv/>
 - ▶ **1-800-IBM-TEACH**
- IBM zSeries Technical Support
 - ▶ **IBM zSeries Technical Support:** <http://www-1.ibm.com/servers/eserver/support/zseries/>
- IBM zSeries Open Source Information
 - ▶ **See Open Source page earlier in package**
- Virtual Innovation Center for Enabling Solutions on zSeries
 - ▶ <http://www-1.ibm.com/servers/enable/z/index.html>
- IBM's Global Solutions Directory - thousands of applications, tools and services from IBM and IBM Business Partners
 - ▶ <http://www.developer.ibm.com/solutions/isv/igssg.nsf/LanguageSelector?OpenForm>
- Business Partner Search
 - ▶ <http://www.developer.ibm.com/bpconnections/bpcms.nsf/publicsearchGUI?OpenFrameset&NL=en>
- ISV Solution Link- **Automated Sales Channel Enablement for ISV and IBM Solutions**
 - ▶ <http://www-1.ibm.com/servers/solutions/finder/CSFServlet.wss>
- Consultant and Integrator info and activities
www.ibm.com/partner/consultants **click on your region, then Hardware/Servers, then zSeries**

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.

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		9/03	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*.

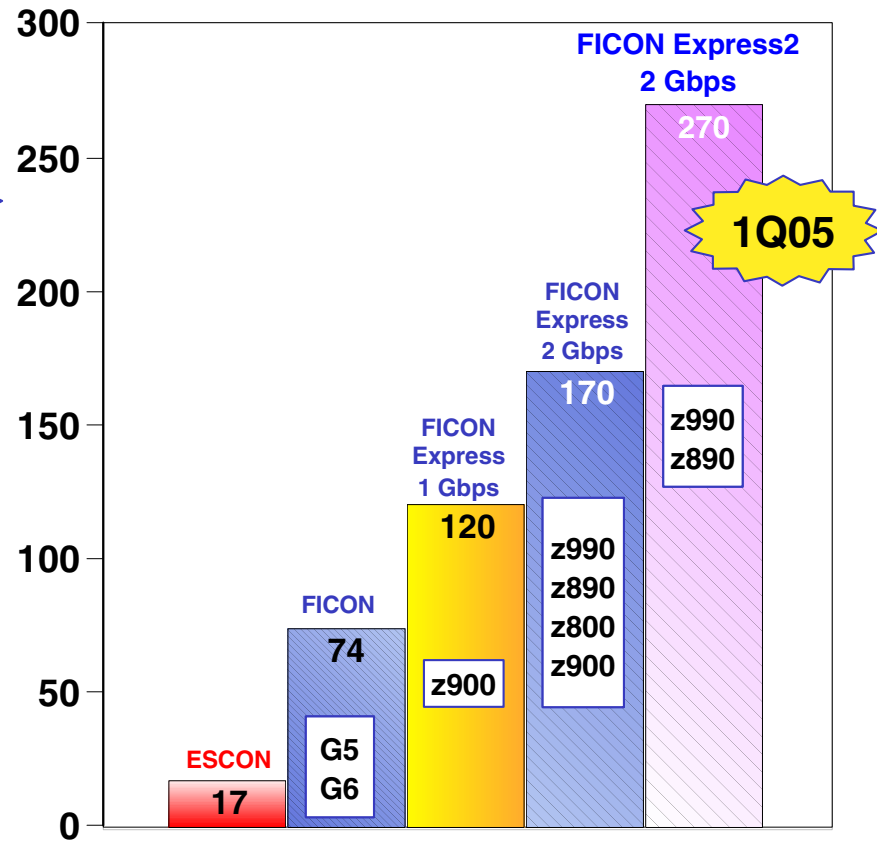
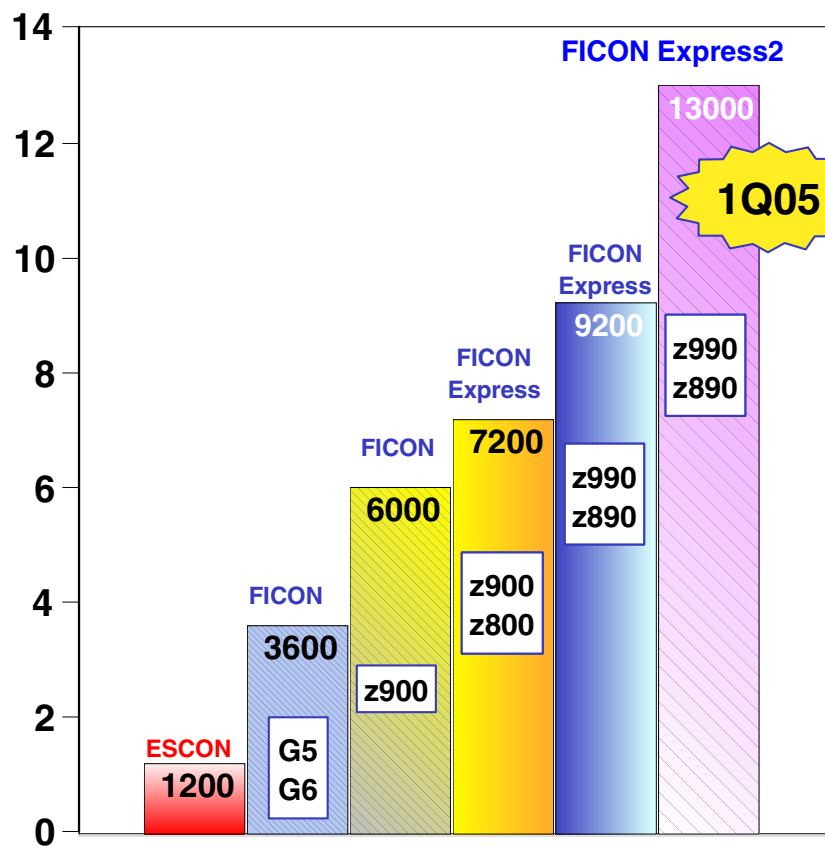
x^c Compatibility support – does not exploit new z990 features. **Web download withdrawn 12/31/2004.**

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



FICON Express2 Performance (FC channel)

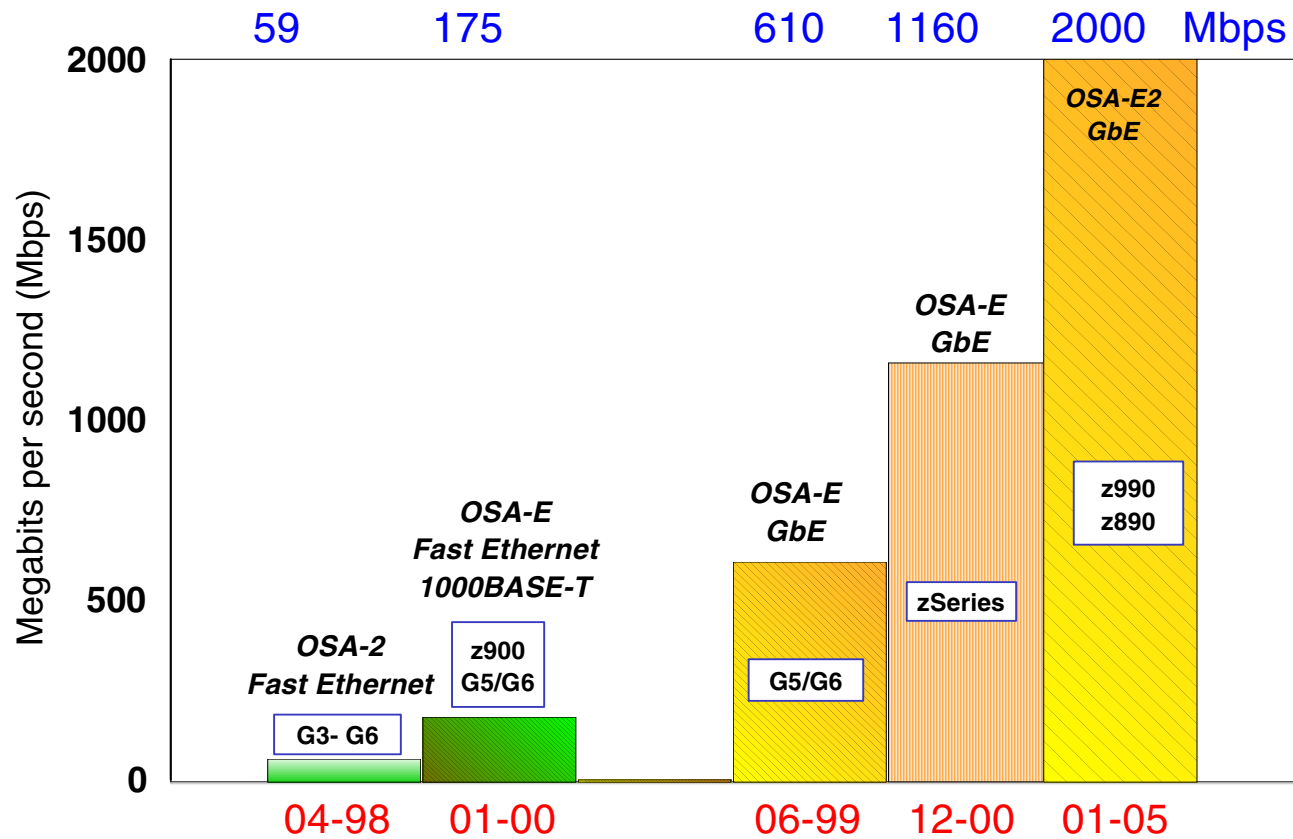


I/O Features: Connectors / Cables

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

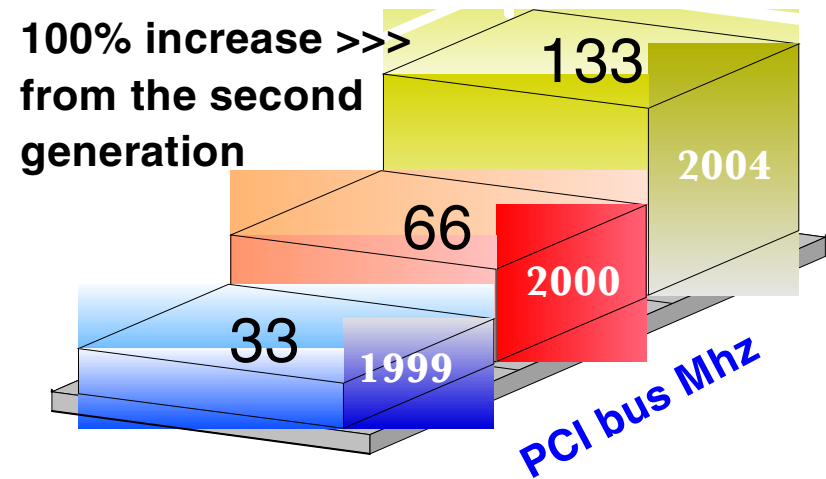
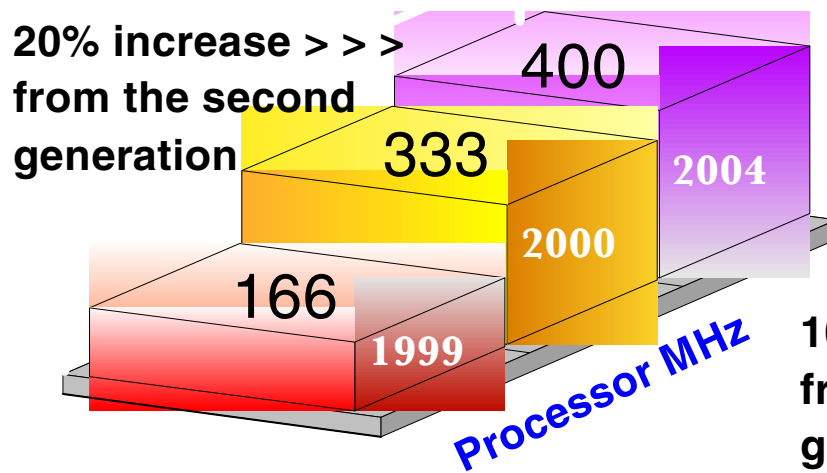
Breaking the Barrier

OSA-Express2 (OSA-E2), OSA-Express (OSA-E)



OSA-Express2 – Third Generation OSA-Express

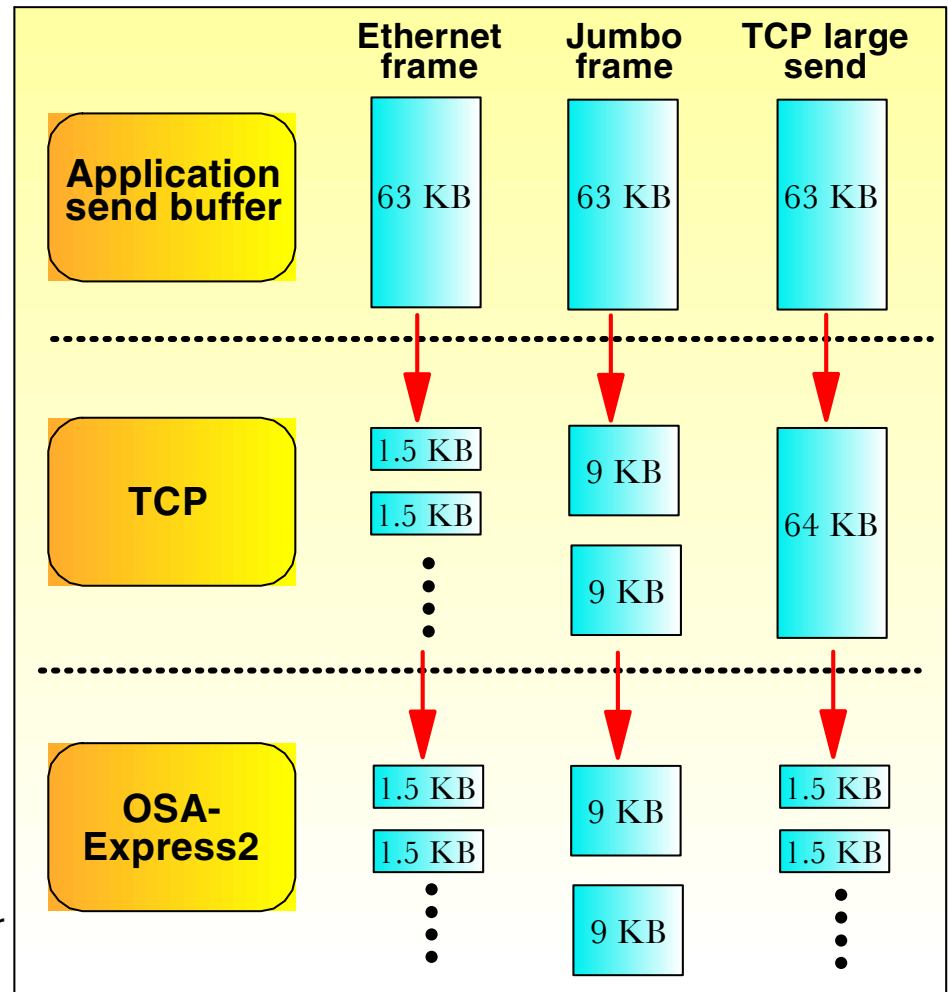
Generation
Third
Second
First



- OSA-Express2 is the 3rd generation of Ethernet technology to deliver the throughput needed to satisfy bandwidth-hungry applications
- OSA-Express2 GbE is designed to achieve line speed - 1 Gbps in each direction

OSA-Express2 Large Send Support

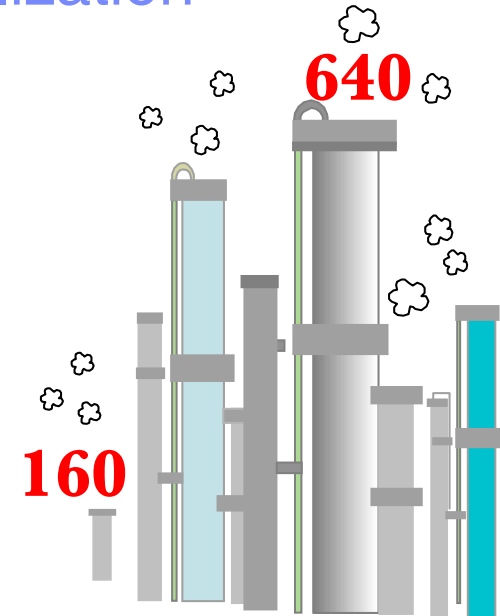
- OSA-Express2 (GbE and 10 GbE)
(Available January 28, 2005)
- Segmentation of IP packets done by OSA-Express2, not TCP/IP stack
 - ▶ **Offloads the TCP segmentation processing from CPs or IFLs**
 - ▶ Host code path length reduced
 - ▶ Sends 64 KB blocks to OSA-Express2
- Processing performed by OSA-Express2
 - ▶ 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
- Support planned:
 - ▶ **z/OS Communications Server with z/OS or z/OS.e 1.7** (1.6 with PTF) for TCP/IPv4 traffic only
 - ▶ **Linux® on zSeries** with code IBM intends to deliver Open Source in early 2005





Up to 640 TCP/IP stacks for improved virtualization

- Exclusive to OSA-Express2
 - 640 TCP/IP stacks per OSA-Express2 port/CHPID
- For hosting more images on zSeries
- Reduce the number of OSA features required to host multiple images
- Exclusive to OSA-Express2 (GbE, 10 GbE)
 - QDIO mode only (CHPID type OSD)
- Supported by
 - z/OS and z/OS.e V1.6 with PTF
 - z/VM V5.1
 - Linux on zSeries



Limits	S/390 G5/G6	z900 Dec 00	z900 Oct 01	zSeries May 02	z990 June 03	z990,z890 Oct 04 OSA-E	z990,z890 Jan 05 OSA-E2
OSD							
Subchannels per stack	3	3	3	3	3	3	3
IP Stacks per port/CHPID on server	15	80	80	80	160	160	640 \$
Subchannels per port	240	240	240	240	480	480	1920 \$
IP stacks per LPAR	15	80	80	80	84	160	640 \$
Devices per LPAR	240	240	240	240	254	480	1920 \$
Maximum Control Units Supported	1	1	1	1	1	16	16

On/Off Capacity on Demand Information

- On/Off CoD upgrades / downgrades - Resource Link knows the "from" and "to" throttle points (MIPS values) and calculates the billing accordingly
 - ▶ Downgrade will not be considered feature conversions and they will not be listed in the announcement doc
 - ▶ Horizontal On/Off CoD upgrades will be non-disruptive, all others may be disruptive :
 - **disruptive means Operating System IPL but does not require hardware Power-On-Reset.**
 - ▶ Temporary capacity must be greater than permanent capacity
 - ▶ Temporary capacity can not be more than double the capacity of permanent capacity
 - ▶ Restriction: On/Off CoD can not decrease the number of engines on the machine

Capacity Setting	O/O CoD Info
110	210, 120
120	210, 310, 130, 220
130	410, 140, 320, 230, 420, 150
140	320, 150, 420, 230, 160, 240
150	160, 240, 330, 340, 430, 250
160	330, 340, 430, 250, 170, 260, 440
170	260, 440, 350, 360, 450, 270
210	310, 220, 410
220	410, 320, 230, 150, 420
230	420, 240, 330, 340, 430, 250
240	330, 340, 430, 250, 260, 440
250	260, 440, 350, 360, 450
260	440, 350, 360, 450, 270, 460
270	460, 370, 470
	Capacity settings in blue have same engine size as from capacity setting

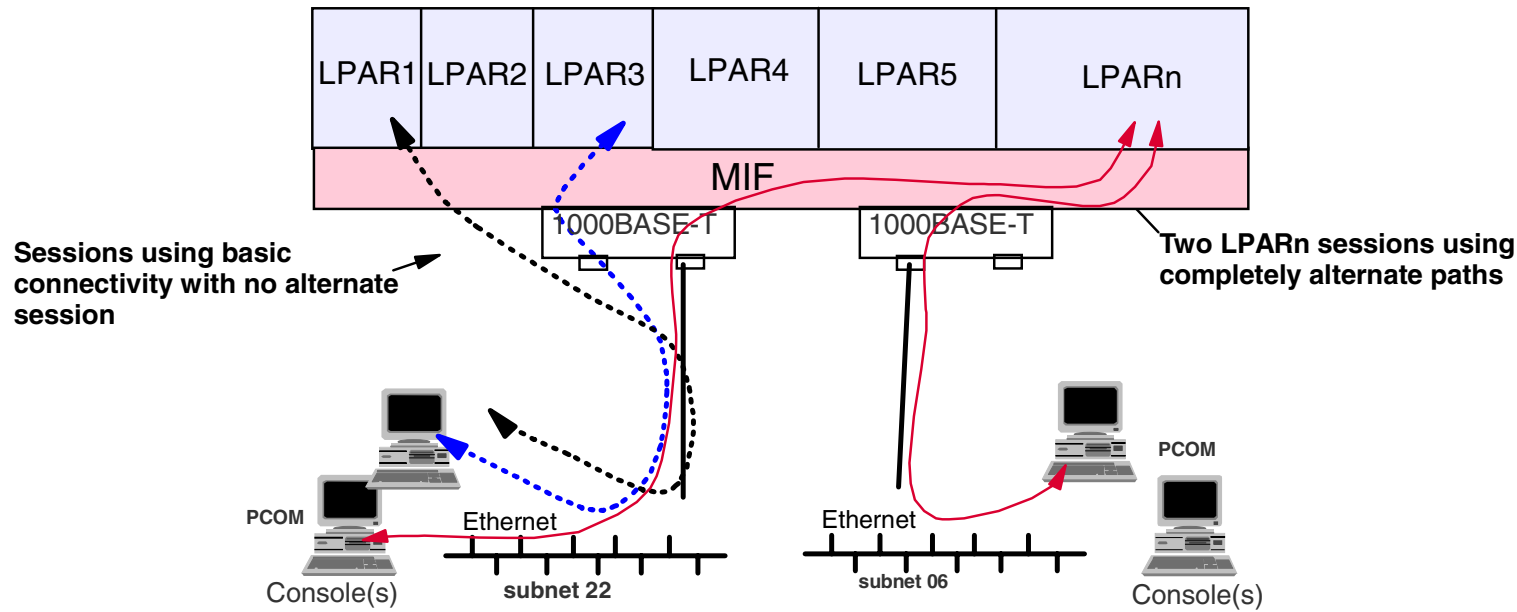
Capacity Setting	O/O CoD Info
310	410, 320
320	420, 330
330	340, 430, 440, 350
340	430, 440, 350, 360
350	360, 450, 460
360	450, 460, 370
370	470
410	420
420	430
430	440, 450
440	450, 460
450	460
460	470
470	N/A
	Capacity settings in blue have same engine size as from capacity setting

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

z890/z990 OSA-ICC Single System with Redundancy Configuration



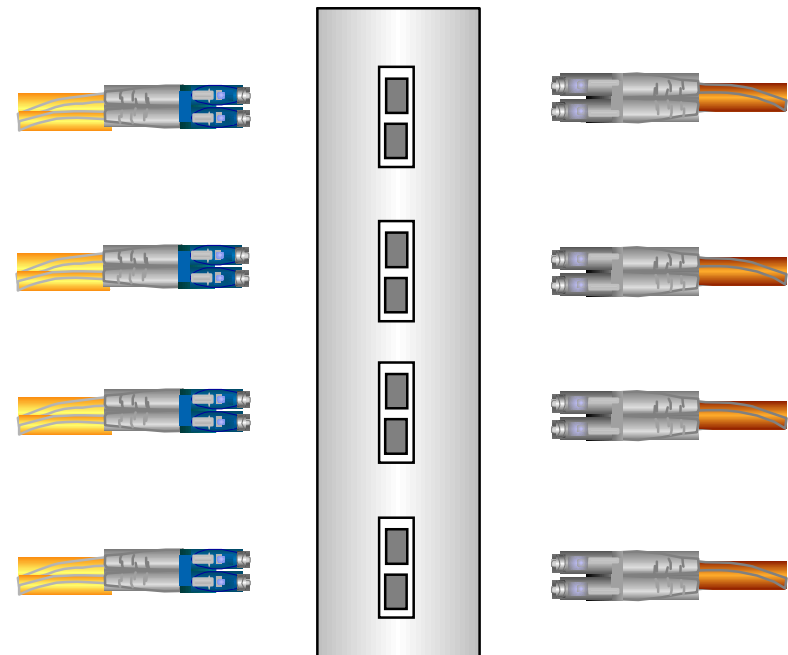
- Up to two hundred forty (240) sessions to multiple Logical Partitions on the CEC
- Session-level redundancy using different paths on ports, LANs, and consoles
 - ▶ Different console sessions from different LAN to same Logical Partitions for dual connectivity
 - ▶ Manual, disruptive console session switch possible for failed session
 - ▶ Individual session cannot be shared between Logical Partitions
 - ▶ LAN ports must attach to different subnets
- Loss of one port does not nondisruptively switch sessions to second port on same or different OSA-Express

SAN



FICON Express2

- Connectors - LC Duplex (same as FICON Express)
- LX - 9 micron single mode fiber
 - ▶ Maximum unrepeated distance 10 km (6.2 miles)
 - ▶ Maximum repeated distance 100 km (62 miles)
 - ▶ Supports MCP cables to reuse multimode infrastructure
 - Only at 1Gbps, not at 2 Gbps
 - Maximum unrepeated distance up to 550 meters
 - ▶ Receiving port must also be LX
- SX - 50 or 62.5 micron multimode fiber
 - ▶ Maximum unrepeated distance 120 to 500 meters depending on multimode fiber specification
 - ▶ MCP cables not applicable
 - ▶ Maximum repeated distance 100 km (62 miles)
 - ▶ Receiving port must also be SX
- Maximum number of features supported
 - ▶ z990 – 60 features, 20 per cage, 240 channels
 - 48 features, Model A08
 - ▶ z890 – 20 features, 80 channels
 - 16 features, 64 channels on z890 capacity setting 110



#3319 – LX or **#3320 - SX**

All LX or **All SX**



FICON Express2 – minimum software

- FICON Express2 (CHPID Type FC), on z890 and z990 including Channel-To-Channel (CTC), requires at a minimum:
 - ▶ z/OS and z/OS.e 1.3, and later
 - HCD APAR OA09114
 - HCM (optional feature) APAR IR54497
 - For FICON purge path extended: z/OS and z/OS.e 1.4, and later, with PTFs for APAR OA06846 and EREP APAR IR51695.
 - ▶ z/VM 3.1, and 4.3, 4.4, 5.1 and later.
 - HCD APAR VM63610 is required
 - ▶ VSE/ESA 2.6, and later
 - ▶ TPF 4.1 at PUT 16 and later
 - ▶ Linux on zSeries
 - The currently available distributions: SUSE SLES 8 and SLES 9, Red Hat RHEL 3
- FICON Express2 (CHPID Type FCP) on z890 and z990 for support of SCSI disks requires at a minimum (refer to 2084 and 2086 PSP buckets for any required service):
 - ▶ z/VM 5.1 (for z/VM install, IPL, and operation from SCSI disks)
 - ▶ z/VM 4.4, 5.1 and later, for
 - Performance Assist for Adapter Interruptions
 - Performance Assist for V=V Guests
 - Guest IPL from SCSI devices
 - FCP LUN Access Control - APAR VM63328 is required
 - ▶ z/VM 4.3, 4.4, 5.1 and later for Linux as a guest under z/VM.
 - ▶ Linux on zSeries
 - The currently available distributions: SUSE SLES 8 and SLES 9, Red Hat RHEL 3
- For CHPID Mapping (optional), updated CHPID Mapping Tool from Resource Link

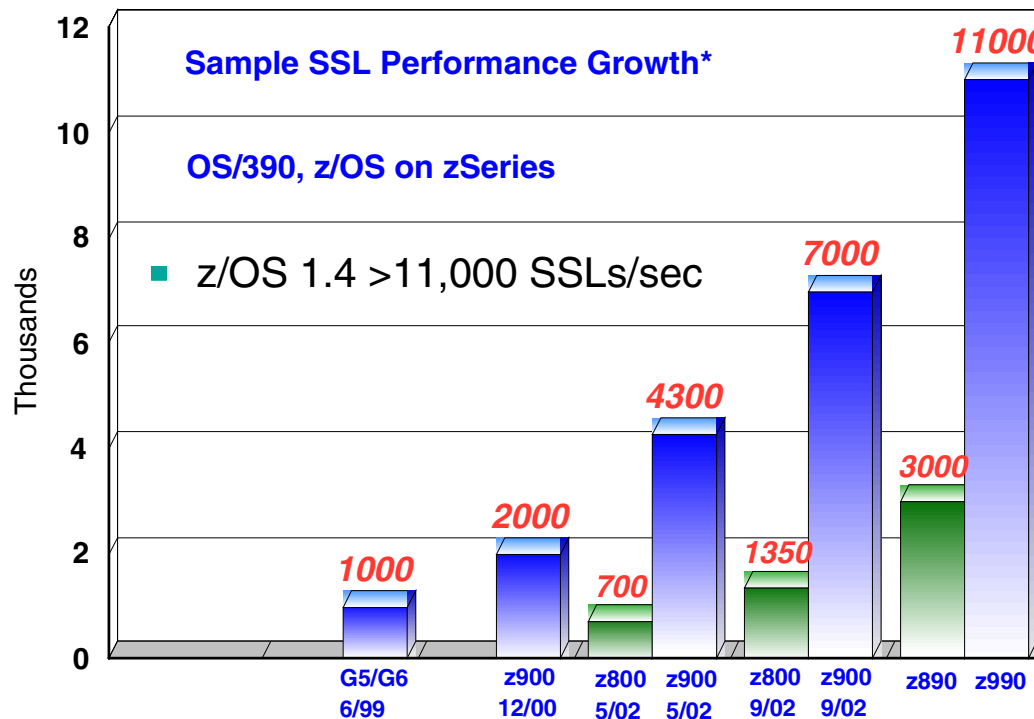
Crypto

zSeries Cryptographic Technology

- Focus on Secure Sockets Layer (SSL) encryption
- Continue to provide competitive symmetric performance in a security-rich environment
- Provide integration of Crypto features via ICSF
- Focus on required certifications and open standards



Linux 13,000 SSLs/sec*



z990/z890 – Jan.05
Crypto Express2

z890 - May, 2004
PCIXCC/PCICA

z990 - Sept., 2003
PCIXCC

z990 - June, 2003
CPACF/PCICA

z900/z800 - Dec, 2000/ May, 2002
2 Chips on CEC Board - CMOS7s+ PCICC/PCICA (10/01)

G6 - June, 1999
2 Chips on Processor MCM - CMOS5x + PCICC (6/99)



G5 - Sept., 1998
2 Chips on Processor MCM - CMOS5x + PCICC (6/99)



G4 - Sept., 1997
SCMs on Planar Board - CMOS5x



G3 - June, 1997
SCMs on Planar Board - CMOS5x



*These measurements are examples of the maximum transactions/second achieved in a lab environment with no other processing occurring and do not represent actual field measurements. Details available upon request.

Crypto Express2 Support Requirements

- 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:
 - ▶ z990 and z890 Enhancements to Cryptographic Support
- z/VM 5.1 or later with service (Planned January 28, 2005)
 - ▶ Dedicated queue support for clear-key and secure-key functions for z/OS guests
 - ▶ Shared and dedicated queue support for clear-key functions for Linux on zSeries guests, with up to 256 dedicated queues
- VSE/ESA 2.7 and IBM TCP/IP for VSE/ESA 1.5
 - ▶ Clear-key functions only
- Linux on zSeries with IBM Open Source code:
 - ▶ Delivered in October 2004 for kernel 2.4
 - ▶ Planned for delivery early in 2005 for kernel 2.6
- See the 2084DEVICE or 2086DEVICE PSP for any additional service.

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ESCON*	On demand business logo	TotalStorage*	zSeries Entry License Charge
FICON*	OS/390*	VM/ESA*	
FlashCopy*	PR/SM	VSE/ESA	
GDPS*	pSeries	VTAM*	
HyperSwap	RACF*	WebSphere*	
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DS6000 Highlights

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



Introducing IBM TotalStorage DS8000



- **Setting a “New Standard” in Cost Effectiveness**
 - ▶ **Balanced Performance** – Up to 6X ESS Model 800
 - ▶ **Model to Model upgradeability** – Up to 192TB
 - (designed for > 1PB)
 - ▶ **Integrated Solution Capability** – Storage System LPARs
 - ▶ **Flexibility** – Dramatic addressing enhancements
 - ▶ **Extendability** – Designed to add/adapt new technologies
 - ▶ **Storage Management** – All New Management Tools
 - ▶ **Availability** – Designed for 24X7 environments
 - ▶ **Resiliency** – Industry Leading Copy and Mirroring Capability
 - ▶ **Long Term Cost** – Four Year Warranty

- **Delivered through**
 - ▶ Server/Storage Integration – POWER5™ Technology
 - ▶ Exploitation of IBM Virtualization Engine™ Technology
 - ▶ Innovation by leveraging IBM technology leadership
 - ▶ Extension of a proven microcode base to offer stability but allow exploitation of new technologies
 - ▶ Timely integration of new technologies

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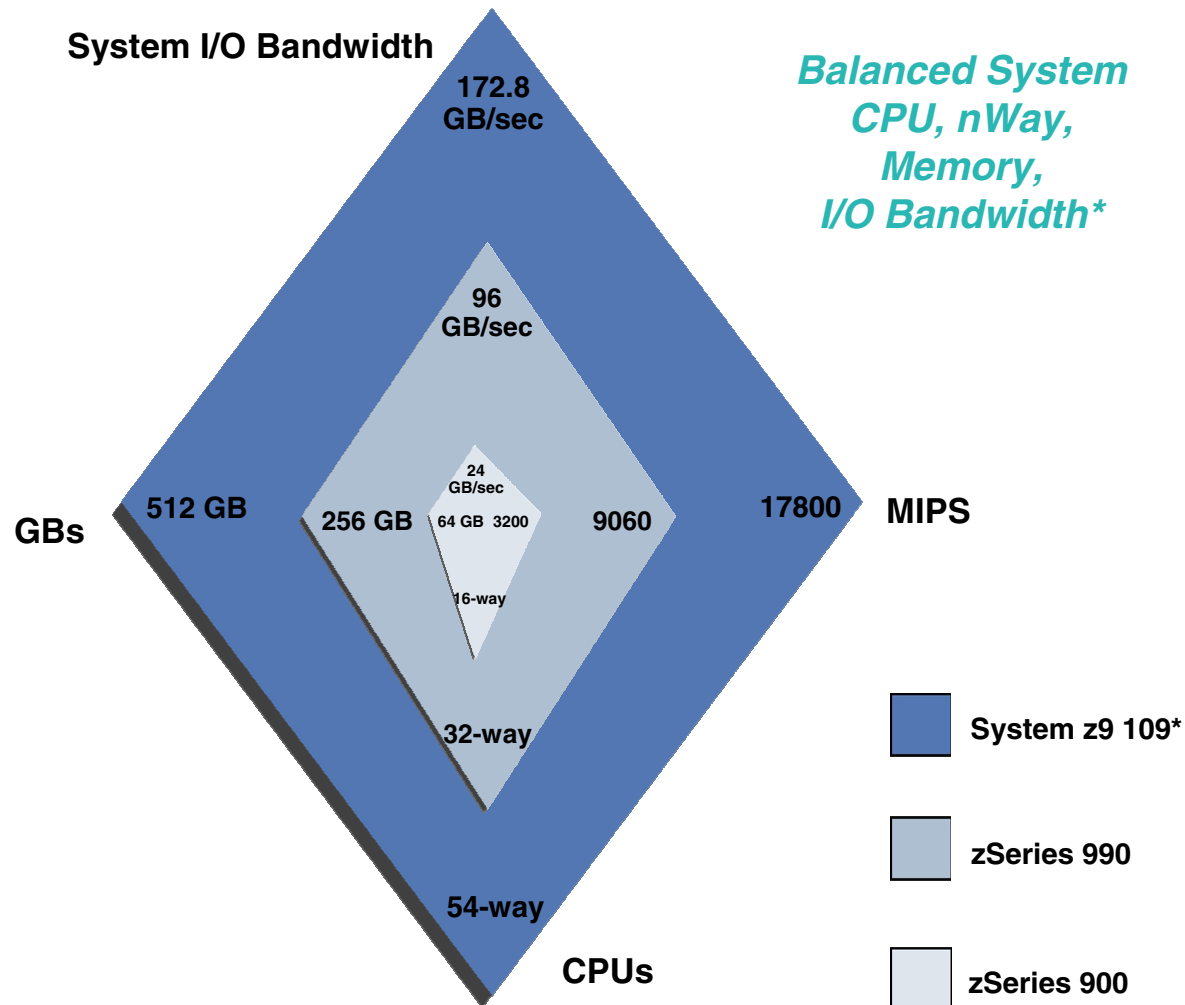
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IBM Announces the IBM System z9

Balanced System Design Approach to Meet Today's On Demand Challenges



IBM System z9 and the IBM eServer zSeries zSeries Family

IBM eServer zSeries 900 – z900 (2064)



- Announced 10/00 – first 64-bit zSeries
- 42 models – Up to 16-way
- Specialty Engines
 - CP, IFL, ICF
- On Demand Capabilities
 - CUoD, CIU, CBU
- Memory – up to 64 GB
- Channels
 - Up to 256 ESCON channels
 - FICON Express, Parallel
 - Token-Ring, FDDI, Ethernet, ATM
 - Coupling Links
- Crypto coprocessors, accelerators
- Parallel Sysplex clustering
- HiperSockets – up to 4
- Up to 15 logical partitions
- Operating Systems
 - z/OS, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on zSeries

IBM eServer zSeries 800 – z800 (2066)



- Announced 2/02 – first 64-bit zSeries for mid market
- 10 models – Up to 4-way
- Specialty Engines
 - CP, IFL, ICF
- On Demand Capabilities
 - CUoD, CIU, CBU
- Memory – up to 32GB
- Channel
 - Up to 240 ESCON Channels
 - FICON Express
 - Networking Adapters (OSA)
 - Coupling Links
- Cryptographic Coprocessors
- Parallel Sysplex clustering
- HiperSockets – up to 4
- Up to 15 partitions
- Operating Systems
 - z/OS, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on zSeries

IBM eServer zSeries 990 – z990 (2084)



- Announced 5/03 – first zSeries Superscalar Server
- 4 models – Up to 32-way
- Specialty Engines
 - CP, IFL, ICF, zAAP
- On Demand Capabilities
 - CUoD, CIU, CBU, On/Off CoD
- Memory – up to 256 GB
- Channels
 - Four LCSSs
 - Up to 1024 ESCON channels
 - Up to 240 FICON Express2 channels
 - Token-Ring, GbE, 1000BASE-T Ethernet
 - Coupling Links
- Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 30 logical partitions
- Operating Systems
 - z/OS, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on zSeries

IBM eServer zSeries 890 – z890 (2086)



- Announced 4/04 – zSeries Superscalar Server for mid market
- 1 model – Up to 4-way
 - 28 capacity settings
- Specialty Engines
 - CP, IFL, ICF, zAAP
- On Demand Capabilities
 - CUoD, CIU, CBU, On/Off CoD
- Memory – up to 32 GB
- Channel
 - Two LCSSs
 - Up to 420 ESCON channels
 - Up to 80 FICON Express2 channels
 - Networking Adapters (OSA)
 - Coupling Links
- Cryptographic Coprocessors
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 30 partitions
- Operating Systems
 - z/OS, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on zSeries

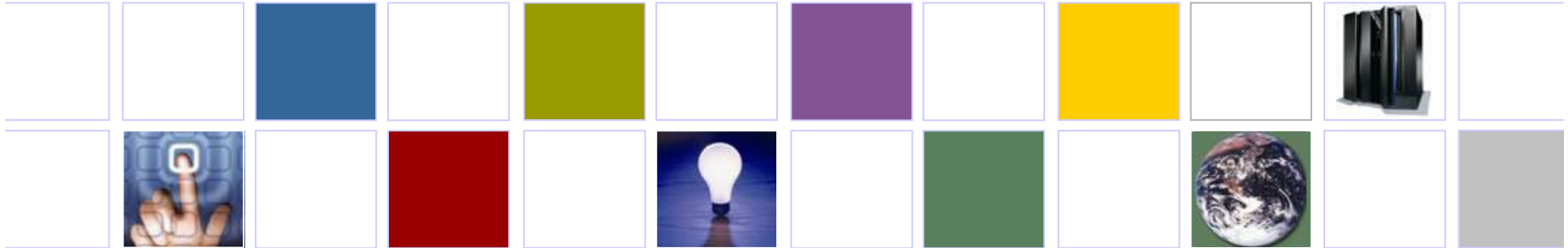
IBM System z9 (z9-109) (2094)



- Announced 7/05
- Superscalar Server
- 5 models – Up to 54-way
- Specialty Engines
 - CP, IFL, ICF, zAAP
- On Demand Capabilities
 - CUoD, CIU, CBU, On/Off CoD
- Memory – up to 512 GB
- Channels
 - Four LCSSs
 - Multiple Subchannel Sets
 - MIDAW facility
 - 63.75 subchannels
 - Up to 1024 ESCON channels
 - Up to 336 FICON channels
 - 10 GbE, GbE, 1000BASE-T
 - Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 60 partitions
- Enhanced Availability
- Operating Systems
 - z/OS, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on System z9

The Mainframe Charter – Providing a Strategic Framework

It is our intention to...



Innovation

Provide leadership in innovation to enhance the use of the IBM mainframe to support increasingly integrated and flexible business processes for the on demand business.*

Value

Enhance the value proposition and lower the cost of computing of mainframe solutions in a way that is compelling, clear, and consistent.*

Community

Support programs designed to foster vitality in the IBM mainframe community, helping to promote a strong application portfolio and world-class support services.*

Continued investment in skills for the IBM Mainframe community

- Enhancing mainframe skills today
 - ▶ Training for customer "in-house" skills
 - ▶ Global road shows and workshops assisting in customer system designs
- Advancing toward goal of 20,000 skilled mainframe professionals in marketplace by 2010
 - ▶ Exponential growth in IBM Academic Initiative for System z9
- Extending application choice — 50 new ISVs and 150 new applications per year
 - ▶ Double-digit growth of WebSphere applications on z/OS systems
 - ▶ Over 40 percent growth in Linux technology-supported software
 - ▶ Alliance with Cisco for enterprise network infrastructure transformation
- Leveraging reference architectures to help build better industry solutions
 - ▶ New stock exchange and brokerage, insurance and social services reference architectures

