

**UNIVERSITÉ DU  
MAINFRAME**

**3 et 4 mai 2006**

**Les annonces hardware System z  
Z9 BC et z9 EC**

**François Launay**  
Product manager hw System z  
flaunay@fr.ibm.com



Now there are 2 System z9 . . .



. . . which one is right for my business ?



# IBM System z9

*The server designed to help protect, grow and meet the demands of enterprise of all sizes . . .*



**z9 EC**



**z9 BC**

**The IBM System z9™ Enterprise Class (z9 EC) – formerly called z9-109 – and the new IBM System z9 Business Class (z9 BC) deliver excellence in enterprise computing and are designed and optimized for on demand business**

# IBM System z9 EC

# z9 EC – New functions/features enhancements

**24 New  
subcapacity settings**

**New Specialty  
Engine – IBM zIIP**

**CBU for zIIP**

**PU Conversions for  
zAAPs and zIIPs**

**CBU  
Enhancements**

**On/Off CoD  
Enhancements**



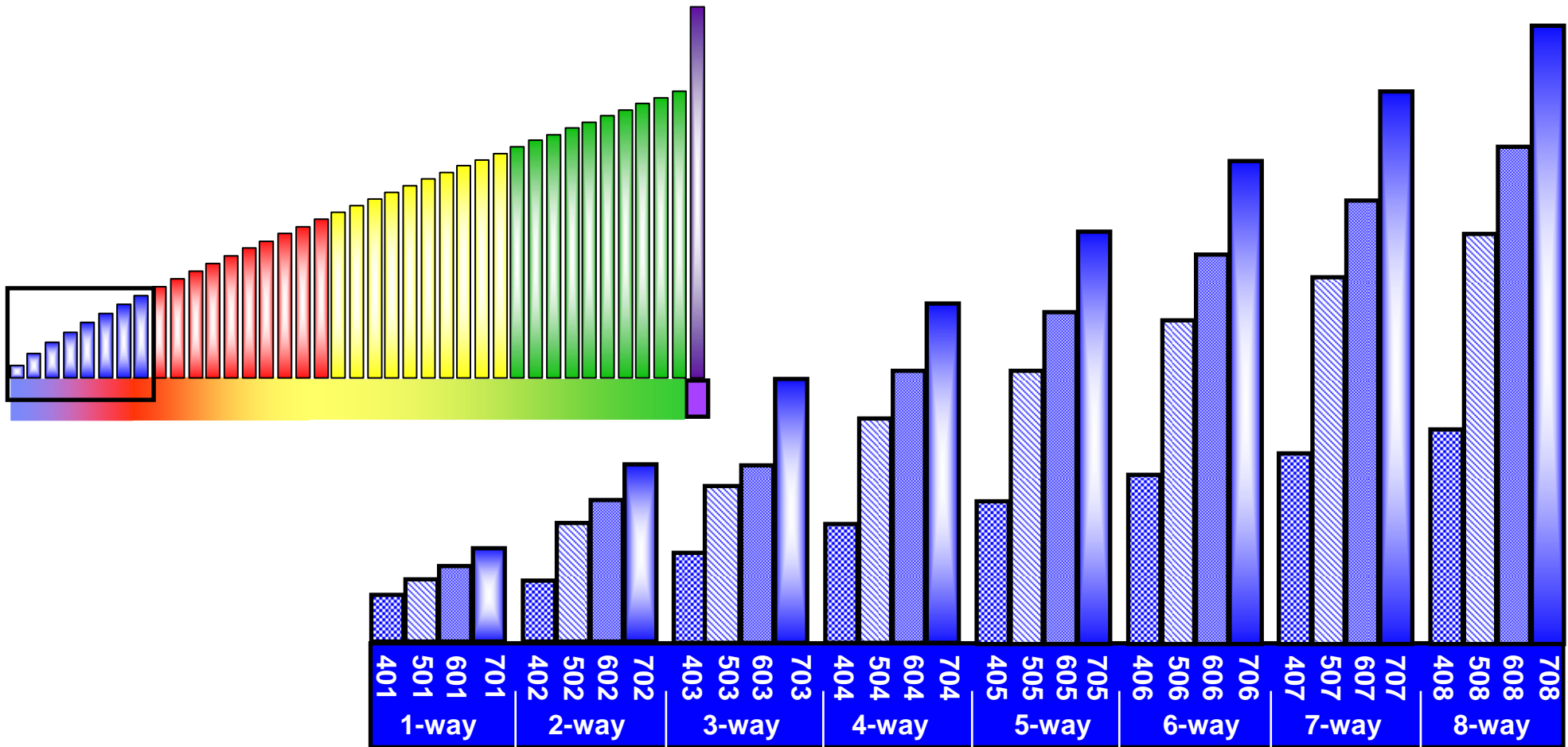
**New FICON  
Express4**

**Improved FICON  
Error Recovery**

**OSA Layer 2/3  
Enhancements**

**Crypto  
Enhancements**

## z9 EC Granular Capacity for up to 8 CPs



- The z9 EC will now offer 24 additional sub-capacity settings with the first eight general purpose (CP) engines
- Entry point is approximately one third the capacity of the 701
- All general purpose processors must be the same capacity within one z9 EC
- Only 8 CPs can have granular capacity, other PUs must be CBU or characterized as specialty engines

# Extending sub-capacity to the z9 EC

## *Increased business flexibility with more choices*

- **Choose a server sized to meet your business objectives**
  - ▶ Introducing sub-capacity engines on the z9 EC
  - ▶ Four capacity settings per engine
  - ▶ New lower entry – 66% smaller than z9 EC current entry
  - ▶ A total of 24 new settings, each with less capacity than the full capacity 8-way
  - ▶ Additional engines can be specialty engines or CBUs
- **Availability of all current z9 EC features and functions when running with sub-capacity processors \***
  - ▶ Enhanced book availability and advanced driver maintenance functions are available on multi book systems
- **Any to any upgradeability available within the new sub-capacity matrix, as well as to current z9 EC capacity settings**
- **Sub-capacity CBUs now available on z9 EC**



*Granularity, bringing the System z9 to a new set of customers*

\* Only 8 general purpose processors can be sub-capacity



# Introducing FICON Express4 for System z9

- **Designed to improve capacity and performance with next generation 4 Gbps FICON/FCP**
    - ▶ Up to 25% improvement in FICON channel throughput when processing a mix of read and write data transfers<sup>1</sup>
    - ▶ Up to 65% improvement in FICON channel throughput when processing all read or all write data transfers<sup>1</sup>
    - ▶ 220% cumulative MB/sec throughput improvement in DB2 table scan tests for EF datasets with FICON Express4 on z9 EC with the MIDAW facility compared to FICON Express2 without the MIDAW facility on z9 EC<sup>2</sup>
  - **FCP channel performance for z/VM and Linux environments<sup>1</sup>**
    - ▶ Up to 50% improvement in FCP channel throughput when processing a mix of read and write large data transfers
    - ▶ Up to 100% improvement in FCP channel throughput when processing all read or all write large data transfers
  - **Helps to support reduced cost of storage operations and shorter backup windows with faster channel link data rates**
  - **Enables migration to higher performance with 1/2/4 Gbps auto-negotiating links**
  - **4-port cards**
1. Large sequential data transfers on z9 EC with FICON Express4 operating at 4 Gbps when compared to FICON Express2 on z9 EC
  2. Results of internal DB2 table scan tests with the z9 EC, the MIDAW facility, FICON Express4 operating at 4 Gbps, and the DS8000 compared to z9 EC, and FICON Express2 operating at 2 Gbps



# Protecting Your Investment in System z Technology

## *Enhanced flexibility for upgradeability*

- **Full upgrades within the z9 EC**

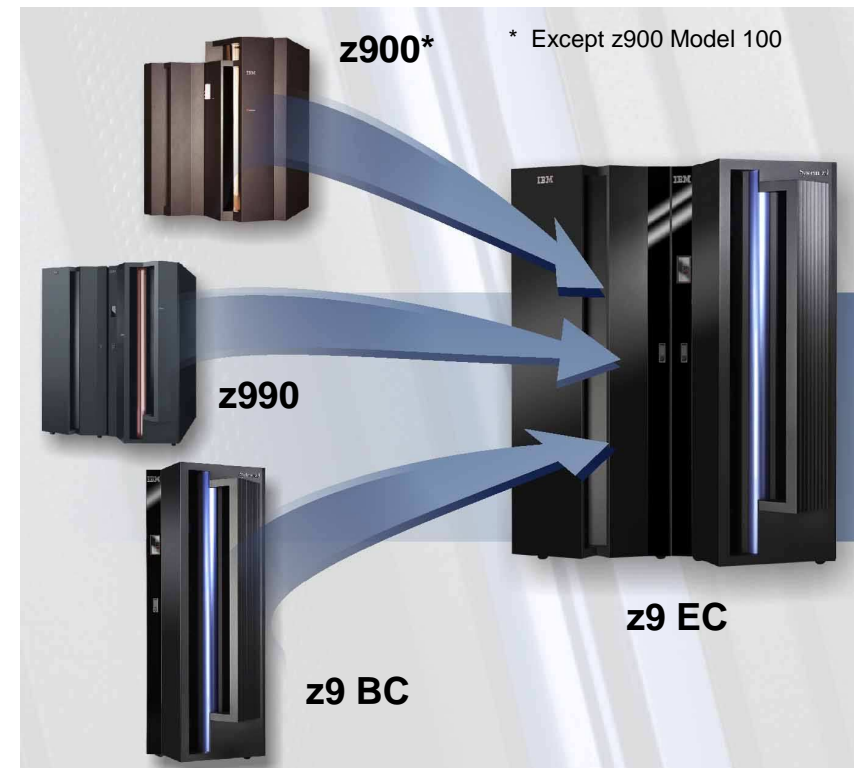
- ▶ Including any to any upgradeability in the 32 sub-capacity matrix 🌟

- **Any to any upgrade from the IBM eServer zSeries 990 (z990), IBM eServer zSeries 900 (z900) - except Model 100, or IBM System z9 BC Model S07 🌟**

- **Capability of the System z9 servers to nondisruptively increase computing resources within the server such as processors, memory and I/O\***

- ▶ Can enable dynamic and flexible capacity growth for mainframe servers
- ▶ Temporary capacity upgrade available through On/Off Capacity on Demand of CP processors, IFLs, ICFs, zAAPs or zIIPs 🌟
- ▶ New options for reconfiguring specialty engines if the business demands it 🌟
- ▶ New options for changing On/Off CoD configurations 🌟
- ▶ Sub-capacity CBU engines 🌟

\* When properly configured. Also, upgrading to an S54 from other z9 EC models will require a planned outage



# IBM System z9 BC

## z9 BC – The modern mainframe for the small to medium enterprise

- **Based on System z9 technology**
- **Designed for flexibility in 2 new models**
- **More engines for more workloads**
  - ▶ System z™ Application Assist Processor (zAAP), Integrated Facility for Linux (IFL), Internal Coupling Facility (ICF), zIIP
- **On demand upgrade capability**
  - ▶ Exceptional upgradeability
  - ▶ On/Off Capacity on Demand (On/Off CoD) functions available
- **Enhanced networking and connectivity options**
- **Built with System z9's cryptographic and encryption functions**



*Low entry point and more choices*

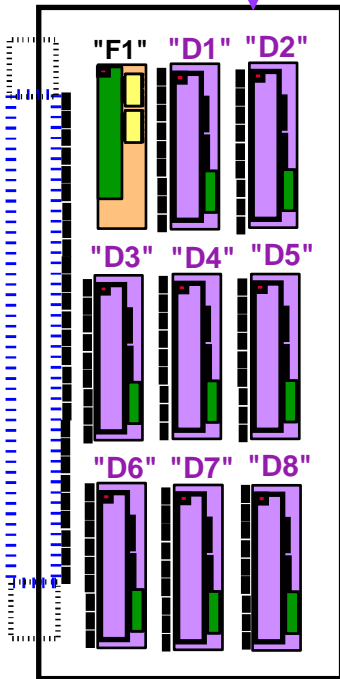
# z9 BC Processor Book Layout





# z9 BC Processor Book Layout

Up to 8  
Hot pluggable MBA/STI  
fanout cards

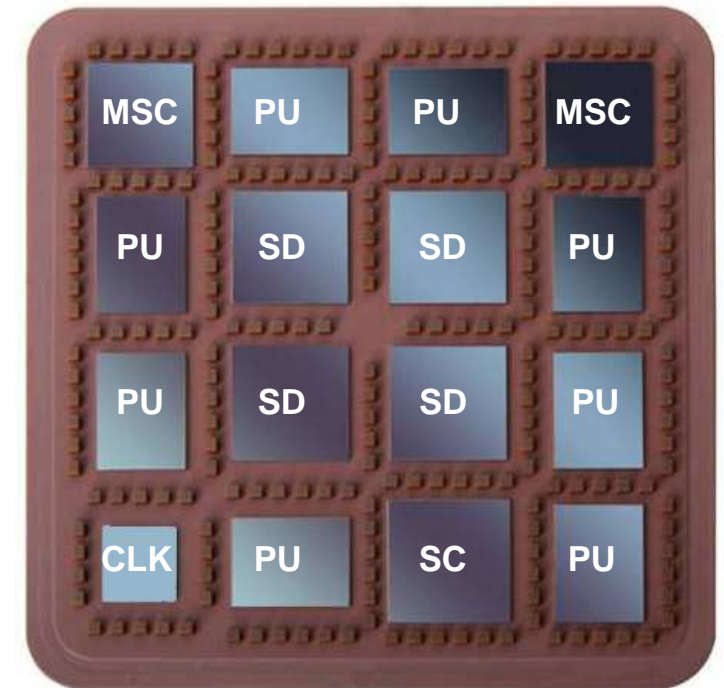
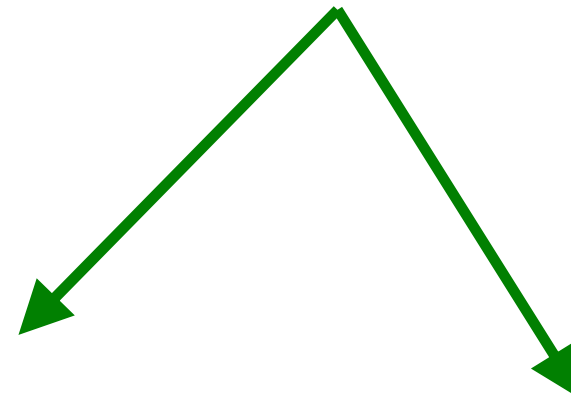


Front View



Memory Cards  
Up to 64 GB

MCM



- Note:**
1. Concept Illustration only - not to scale
  2. 4 or 8 pluggable Memory Cards
  3. Each MBA fanout card is hot-pluggable and has 2 STIs

# z9 BC – Delivering increased capacity and performance

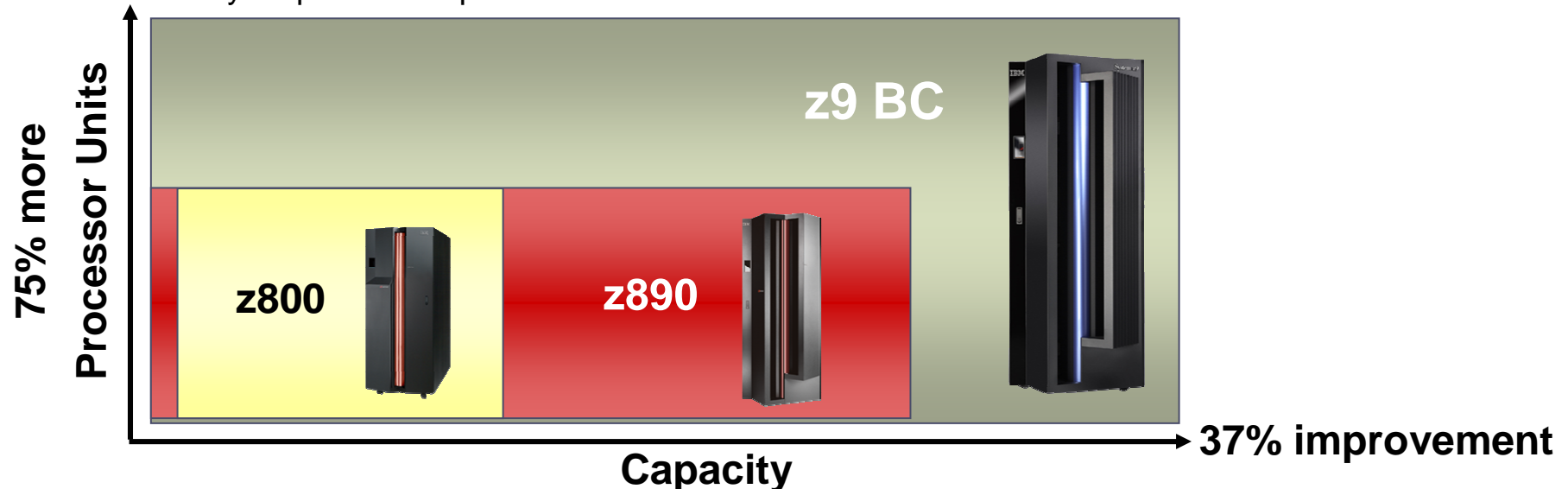
## *Flexibility for growth*

### ▪ Greater granularity and scalability

- ▶ Two models with one machine type (2096)
  - 1 to 4-way high performance server standard engines
  - Entry model with 1 to 3-way standard engines
  - Up to a 7-way with specialty engines
- ▶ 73 capacity settings for a 2.6 times increase in flexibility over IBM eServer™ zSeries® 890 (z890)
- ▶ Delivers over 37% more capacity with the same low entry point as the z890
- ▶ Up to 37% hardware performance improvement for Linux® (IFLs), Java™ (zAAPs) and coupling (ICFs)
- ▶ New zIIP for data serving workloads
- ▶ Double the memory – up to 64 GB per server

### ▪ Improved I/O Performance

- ▶ 40% more FICON® channels – up to 112
- ▶ Up to 170% more bandwidth than z890
- ▶ Can improve FICON performance with Modified Indirect Data Address Word (MIDAW) facility
- ▶ Double the FICON concurrent I/O operations from 32 to 64 on FICON channel
- ▶ Multiple Subchannel Sets (MSS) for an increased number of logical volumes



## z9 BC Model Structure

- **One machine type – 2096 – two hardware models, R07 and S07**
- **Model number indicates PUs available for characterization**
  - ▶ Single serial number
  - ▶ PU characterization is identified by number of features ordered
- **One System Assist Processors (SAPs) per System**
- **z9 BC software models**
  - ▶ nxx, where n = subcapacity engine size and xx = number of CPs
    - For Model R07 n = A up to J and xx = 1 to 3
    - For Model S07 n = K up to Z and xx = 1 to 4
  - ▶ Total 73 Capacity Indicators for software models
    - 20 for Model R07 and 53 for Model S07

Models	MCMs	Available PUs	Max Available Subcapacity CPs	Standard SAPs	Standard Spares	CP/IFL/ICF/zAAP/zIIP ****	Max Memory	Max Channels
R07*	1	8	3	1	0	3/6/6/3/3	64 GB	240 ***
S07**	1	8	4	1	0	4/7/7/3/3	64 GB	420 ***

### Notes:

\* Must have a minimum of 1 CP

\*\* Must have a minimum of 1 CP, IFL or ICF

\*\*\* Max is for ESCON channels.

\*\*\*\* For each zAAP and/or zIIP installed there must be a corresponding CP. The CP may satisfy the requirement for both the zAAP and/or zIIP. The combined number of zAAPs and/or zIIPs can not be more than 2x the number of general purpose processors (CPs).

# IBM System z9 BC model comparison

## Model R07

### Processor Units (PUs)

- ▶ 7 PUs + 1 SAP
- ▶ 1 - 3 CPs
- ▶ 0 – 3 zAAPs or zIIPs
- ▶ 0 – 6 IFLs or ICFs
- ▶ 20 Capacity Settings

### Memory

- ▶ 8 – 64GB

### I/O

- ▶ 240 ESCON®
- ▶ 64 FICON Express4
- ▶ 32 OSA-Express2 (2-port);  
with 24 on A01
- ▶ 8 Crypto Express2
- ▶ 16 STIs



## Model S07

### Processor Units (PUs)

- ▶ 7 PUs + 1 SAP
- ▶ 0 - 4 CPs
- ▶ 0 – 3 zAAPs or zIIPs
- ▶ 0 – 7 IFLs or ICFs
- ▶ 53 Capacity Settings

### Memory

- ▶ 8 – 64GB

### I/O

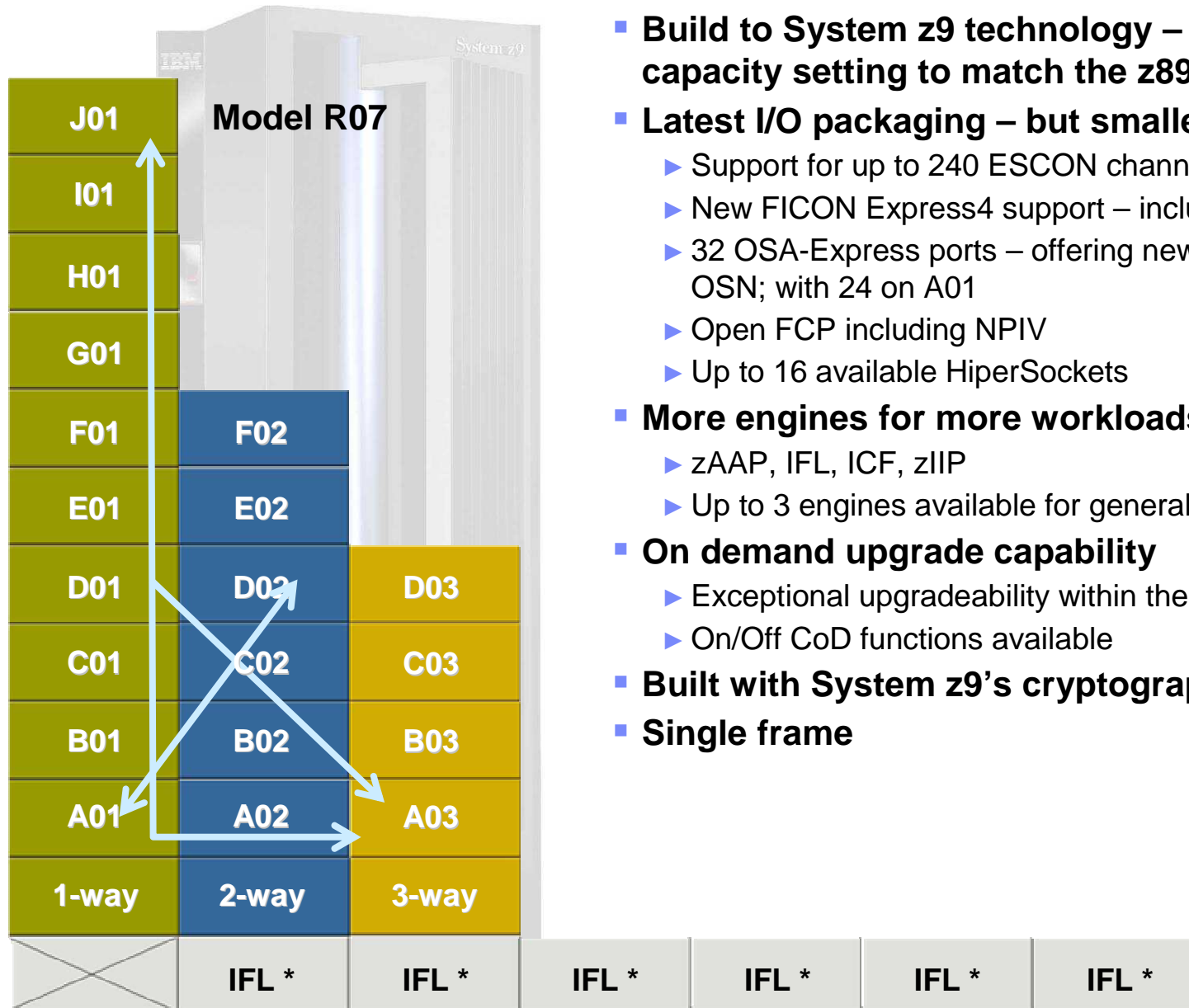
- ▶ 420 ESCON
- ▶ 112 FICON Express4
- ▶ 48 OSA-Express2 (2-port)
- ▶ 16 Crypto Express2
- ▶ 16 STIs

Both models have Sub-capacity CBU CPs and Specialty Engine CBU capabilities for more robust disaster recovery possibilities



# z9 BC – Model R07 – An entry mainframe for the small enterprises

*More flexibility, more specialty engines, more choices*



- **Build to System z9 technology – but available in the smallest capacity setting to match the z890 110**
- **Latest I/O packaging – but smaller capacity**
  - ▶ Support for up to 240 ESCON channels and/or 64 FICON channels
  - ▶ New FICON Express4 support – including a new 2-port card
  - ▶ 32 OSA-Express ports – offering newest functions like OSA ICC and OSN; with 24 on A01
  - ▶ Open FCP including NPIV
  - ▶ Up to 16 available HiperSockets
- **More engines for more workloads**
  - ▶ zAAP, IFL, ICF, zIIP
  - ▶ Up to 3 engines available for general purpose (CP)
- **On demand upgrade capability**
  - ▶ Exceptional upgradeability within the R07 and to the S07
  - ▶ On/Off CoD functions available
- **Built with System z9's cryptographic and encryption functions**
- **Single frame**



## z9 BC Concurrent PU Conversions

- **Must order (characterize one PU as) a CP, an ICF or an IFL**
- **Concurrent processor upgrade is supported if PUs are available**
  - ▶ Add CP, IFL, unassigned IFL, ICF, zAAP, zIIP or optional SAP
- **Conversion of unassigned IFL to any other PU type direct is supported on the z9 BC . Conversion to unassigned IFL is via a IFL**

From/To->	CP	IFL	Unassigned IFL	ICF	zAAP	zIIP
CP	x	Yes	No	Yes	Yes	Yes
IFL	Yes	x	Yes	Yes	Yes	Yes
Unassigned IFL	Yes	Yes	x	Yes	Yes	Yes
ICF	Yes	Yes	No	x	Yes	Yes
zAAP	Yes	Yes	No	Yes	x	Yes
zIIP	Yes	Yes	No	Yes	Yes	x

Exceptions: Disruptive if ALL current PUs are converted to different types may require individual LPAR disruption if dedicated PUs are converted.

# z9 BC I/O Overview

## ■ I/O Enhancements

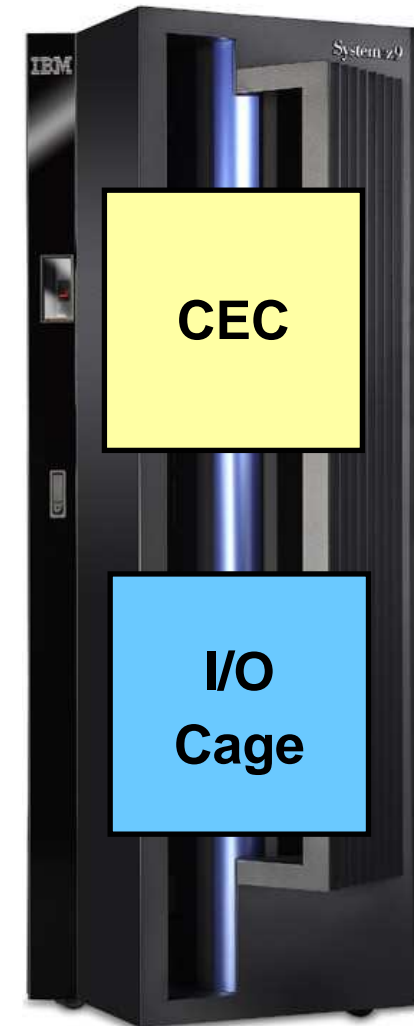
- ▶ Up to 28 FICON Express, FICON Express2, FICON Express4 features
  - 4 channels/feature FICON/FCP
  - 1, 2, 4 Gbps auto-negotiated. 4 Gbps for FICON Express4
- ▶ Modified Indirect Data Address Word (MIDAW) facility
- ▶ Multiple (2) Subchannel sets (MSS)
  - Increase to 63.75K Subchannels for Set-0
- ▶ Up to 16 x 2.7GB STI's (7 STIs max for the single I/O cage. Possible to use remaining STIs for ICB-4s)

## ■ Storage Area Networks (SANs) enhancements

- ▶ N\_Port ID Virtualization
- ▶ Program Directed re-IPL
- ▶ FICON Link Incident Reporting

## ■ Networking enhancements

- ▶ HiperSockets IPv6
- ▶ OSA-Express2 1000BASE-T Ethernet
- ▶ OSA-Express2 OSN (OSA for NCP support)
- ▶ GARP VLAN management (GRVP)





## z9 BC FICON Express4

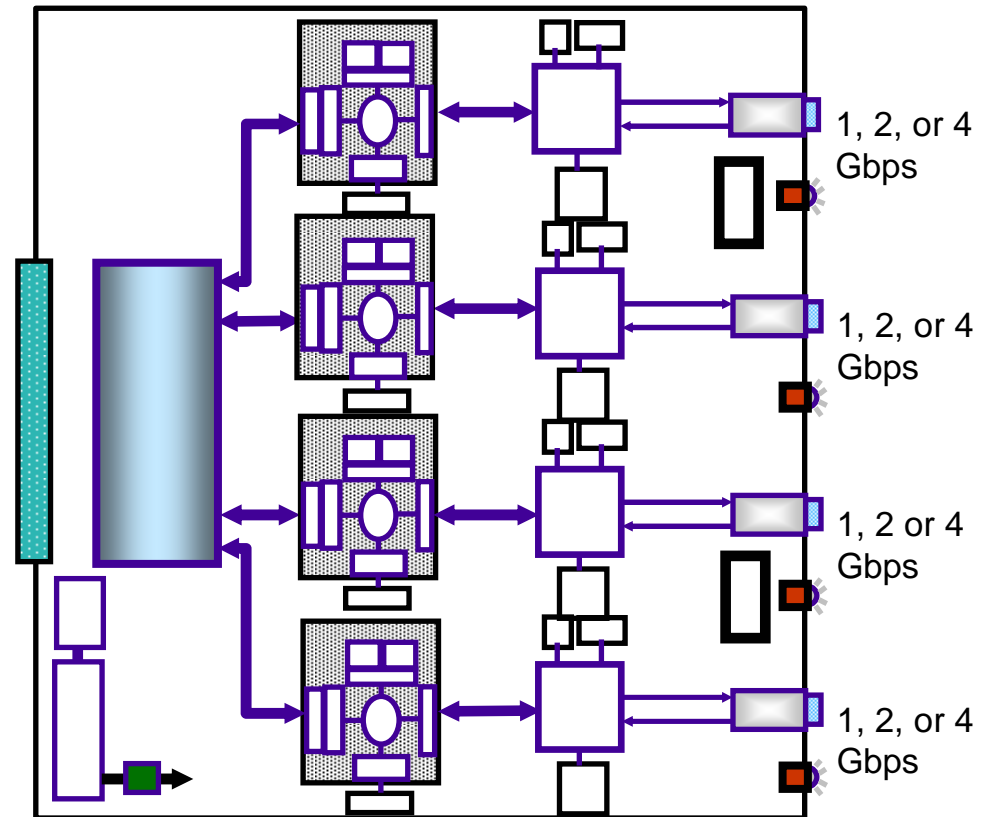
### Supports all the function of the FICON Express2 feature plus:

- ▶ 4 Gbps with Auto-negotiate capability (1, 2, or 4 Gbps)
- ▶ Can be shared among LPARs, and defined as spanned
- ▶ Small Form Factor Pluggable (SFP) optics for Service / Repair
  - Concurrent repair/replace action for each SFP

### Ordering

- ▶ Two or Four port increments
- ▶ Intermix is not supported on a single card
- ▶ All ports must be of the same type, either LX or SX.
  - LX Feature Code 3321/24 - gives 4 SFP
  - SX Feature Code 3322 - gives 4 SFP
  - LX Feature Code 3323 - gives 2 SFP

FICON Express4 4 Port card shown



**FC 3321 FICON Express4 10 KM LX**  
**FC 3322 FICON Express4 SX**  
**FC 3323 FICON Express4-2C 4KM LX (2 ports)**  
**FC 3324 FICON Express4 4KM LX**

# Protecting your investment in System z technology

- **Full upgrades within the z9 (R07 to S07 to z9 EC)** ☀
- **Any to any upgrade from the z890**
- **Upgrade from the z800 model 004**
- **No charge MES upgrades on IFLs and zAAPs**
- **Capability of the System z9 servers to nondisruptively increase computing resources within the server**
  - ▶ Can enable dynamic and flexible capacity growth for mainframe servers
  - ▶ Temporary capacity upgrade available through On/Off Capacity on Demand
  - ▶ Temporary, nondisruptive addition of CP ☀ processors, IFLs, ICFs, zAAPs or zIIPs
  - ▶ New options for reconfiguring specialty engines ☀ if the business demands it
  - ▶ New options for changing On/Off CoD ☀ configurations
  - ▶ Sub-capacity CBU engines ☀



## z9 BC CBU Enhancements

### ▪ CBU for Specialty Engines

- ▶ CBU is available for CPs, IFLs, ICFs, zAAPS and zIIPs
- ▶ FULL size specialty engines for CBU
- ▶ During CBU can't reduce engine count or convert engine types of the base machine

### ▪ CBU for CPs

- ▶ No change for FULL size CPs
- ▶ CBU for sub-capacity CPs
  - In CBU mode CP engine count must be equal or greater than purchased CPs
- ▶ Example below (**xx = number of CPs**) shows valid directions of CBU 'paths' for CI U02

	1-way	2-way	3-way	4-way
CI Txx	34	66	95	124
CI Uxx	38	73	106	138
CI Vxx	42	82	119	155
CI Wxx	47	92	134	174

MSU values shown in above table

### ▪ CBU Pricing

- ▶ Cost is per CBU feature
- ▶ Its not always cost effective to have larger number of sub-capacity CPs
  - In the above example, if a CI U02 is CBUed to CI U04, its 2 CBU features, however if CBU goes to CI V04, its 4 CBU features

# System z9 On/Off CoD Enhancements

## ■ Full Function Test

- ▶ One no-charge test per Server contract.
- ▶ Enables customer to use On/Off CoD function and install/remove additional capacity
- ▶ A maximum duration of 24 hours commencing with the download and activation of an On/Off CoD order

## ■ Introducing special Administrative On/Off CoD Test

- ▶ Enables customers to order 'zero' quantity features via Resource Link for:
  - Pre-staging On/Off CoD order
  - Activating and deactivating 'zero' quantity On/Off CoD
- ▶ To allow customer staff to order/test/rehearse/document whole On/Off CoD process without incurring any cost. Zero quantity features = zero cost
- ▶ Unlimited number of tests, No time period restrictions

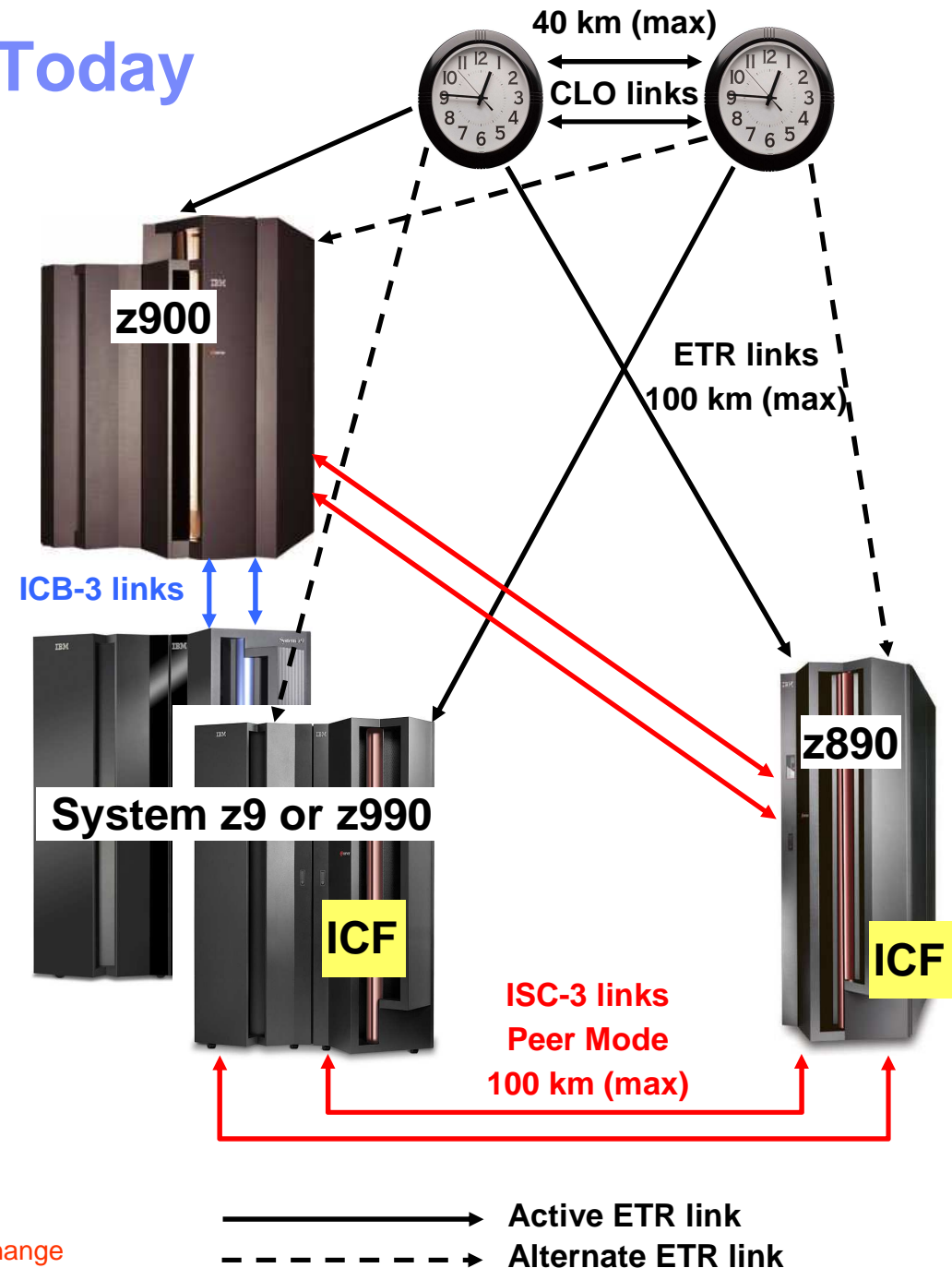
## ■ Additional flexibility for OOCOD function

- ▶ With OOCOD already activated, customer can add additional OOCOD capacity without having to restore system to 'purchased' capacity – as today
- ▶ Customer can keep adding or removing capacity using OOCOD without have to go back to 'purchased' capacity using OOCOD
  - Linked to purchased capacity rule i.e. maximum capacity customer can have with OOCOD is 2 x of purchased capacity
  - Limit controlled by Capacity Marker feature.
- ▶ Customer charged for additional capacity on 24 hour basis
- ▶ If customer increases capacity multiple times during a 24 hour period, charge applies to the highest amount of capacity activated



## ETR Network Limitations – Today

- **Fiber distance between 9037 Sysplex Timers cannot exceed 40 km**
  - ▶ Requires intermediate site for second timer if data centers more than 40 km apart
- **“Best case” messaging times over ICB links in Parallel Sysplex cluster (8 us approximately) approaching “Worst case” TOD synchronization between CECs stepping to 9037s 40 km apart (4 us approx.)**
- **Announced : withdrawn of 9037 Model 2 from marketing (June 30, 2006 )**



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

## Server Time Protocol (STP) Preview

- **Designed to provide capability for multiple System z platforms 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 clusters**
- **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 System z9 and as a RPQ on z990 and z890**
- **Prerequisites**
  - ▶ z9 EC HMC and SE Code load
  - ▶ 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.

# IBM System z family

## IBM eServer zSeries 990 z990 (2084)



- Announced 5/03 – first zSeries Superscalar Server with up to 48 PUs
- 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 with 5 PUs
- 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
- Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 30 logical partitions
- Operating Systems
  - ▶ z/OS, z/OS.e, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on zSeries

## IBM System z9 (z9 EC) (2094)



- Announced 7/05 - Superscalar Server with up to 64 PUs
- 5 models – Up to 54-way
- Granular Offerings for up to 8 CPs
- Specialty Engines
  - ▶ CP, IFL, ICF, zAAP, zIIP
- 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
  - ▶ Enhanced FICON Express2 and 4
  - ▶ 10 GbE, GbE, 1000BASE-T
  - ▶ Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 60 logical partitions
- Enhanced Availability
- Operating Systems
  - ▶ z/OS, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on System z9

## IBM System z9 (z9 BC) (2096)



- Announced 4/06 - Superscalar Server with 8 PUs
- 2 models – Up to 4-way
- High levels of Granularity available
  - ▶ 73 Capacity Indicators
- Specialty Engines
  - ▶ CP, IFL, ICF, zAAP, zIIP
- On Demand Capabilities
  - ▶ CUoD, CIU, CBU, On/Off CoD
- Memory – up to 64 GB
- Channels
  - ▶ Two LCSSs
  - ▶ Multiple Subchannel Sets
  - ▶ MIDAW facility
  - ▶ 63.75 subchannels
  - ▶ Up to 420 ESCON channels
  - ▶ Up to 112 FICON channels
  - ▶ Enhanced FICON Express2 4 Gbps
  - ▶ 10 GbE, GbE, 1000BASE-T
  - ▶ Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 30 logical partitions
- Enhanced Availability
- Operating Systems
  - ▶ z/OS, z/OS.e/z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on System z9

## Withdrawn from Marketing (WDFM)

<b>M/C Type</b>	<b>EMEA</b>
<b>9036-003</b>	June 30, 2006
<b>9037-002</b>	June 30, 2006
<b>2074 All</b>	June 30, 2006
<b>z800 All</b>	December 31, 2005
<b>z900 All</b>	June 30, 2006
<b>z890 &amp; z990 All</b>	June 30, 2006

Announcement Letter No. ZG06-0355 dated April 27, 2006.

# System z9 EC and BC – delivering new functions and features



- New IBM zIIP
- Granularity with entry one third the size of the 701
- Up to 54 configurable CPs
- Premier Availability server – with Enhanced Book Availability, RII and Enhanced Driver Maintenance
- MIDAW Facility
- FICON Express4
- Enhanced CPACF and Crypto Express2
- ATM/POS remote key loading
- Administrative On/Off CoD test
- Sub-capacity CBUs



- New low entry model
- New IBM zIIP
- Extreme Granularity
- Up to 7 PUs
- 37% more uni processor, up to 64 GB memory, 170% more bandwidth
- Sub-capacity CBUs and Administrative On/Off CoD Test
- Enhanced Driver Maintenance and RII
- MIDAW Facility and MSS
- NPIV and IPV6 Support for HiperSockets OSA-Express2 OSN (OSA for NCP)
- Enhanced CPACF with AES, PRNG and SHA-256 and Configurable Crypto Express2
- Temporary state changes allowed and new test/training option for On/Off CoD



## The Mainframe Charter



*Investing in the future*



**Innovation**



**Value**



**Community**

# IBM System z9



**z9 EC**



**z9 BC**

*The server designed to help protect, grow and meet the demands of enterprise of all sizes . . .*