IBM System z9 Technology Innovation

A System z9 for Everyone

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IBM Systems

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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.*

* Excerpted from the Mainframe Charter – August 2003

Agenda

- What is being announced ?
  - Part I: IBM System z
  - Part II: Operating System Support
- Summary

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- What is being announced ?
  - Part I: IBM System z
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IBM System z Family

New Announcement 2006

IBM eServer zSeries
900 – z900 (2064)

IBM eServer zSeries
990 – z990 (2084)

IBM System z9 109
z9-109 (2094)

IBM System z9
Enterprise Class
– z9 EC (2094)

IBM System z9
Business Class
– z9 BC (2096)

IBM eServer zSeries
800 – z800 (2066)

IBM eServer zSeries
890 – z890 (2086)

IBM System z9

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

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

z9 EC

- **Built on more than 40 years of industry leadership and taking that leadership to new levels**
  - Scalability
  - Availability
  - Security
- **It's time to rethink the role of the mainframe**
  - A mainframe for everyone
  - Helping to drive increased value from data and applications including announcing the availability of System z9 Integrated Information Processor (zIIP)
  - Helping to simplify management and reduce costs of storage subsystems with new connectivity options

z9 BC

Now there is a System z9 for everyone

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 z9 Application Assist Processor (zAAP), Integrated Facility for Linux (IFL), Internal Coupling Facility (ICF), System z9 Integrated Information Processor (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**
  - ATM/POS Remote Key Load
- **EWLC and Tiered EWLC Software Pricing Structure**
- **Operating system support – similar to z9 EC**
  - z/OS.e continues to be supported
  - Significant news about z/VSE

Low entry point and more choices

z9 BC – Delivering increased capacity and performance

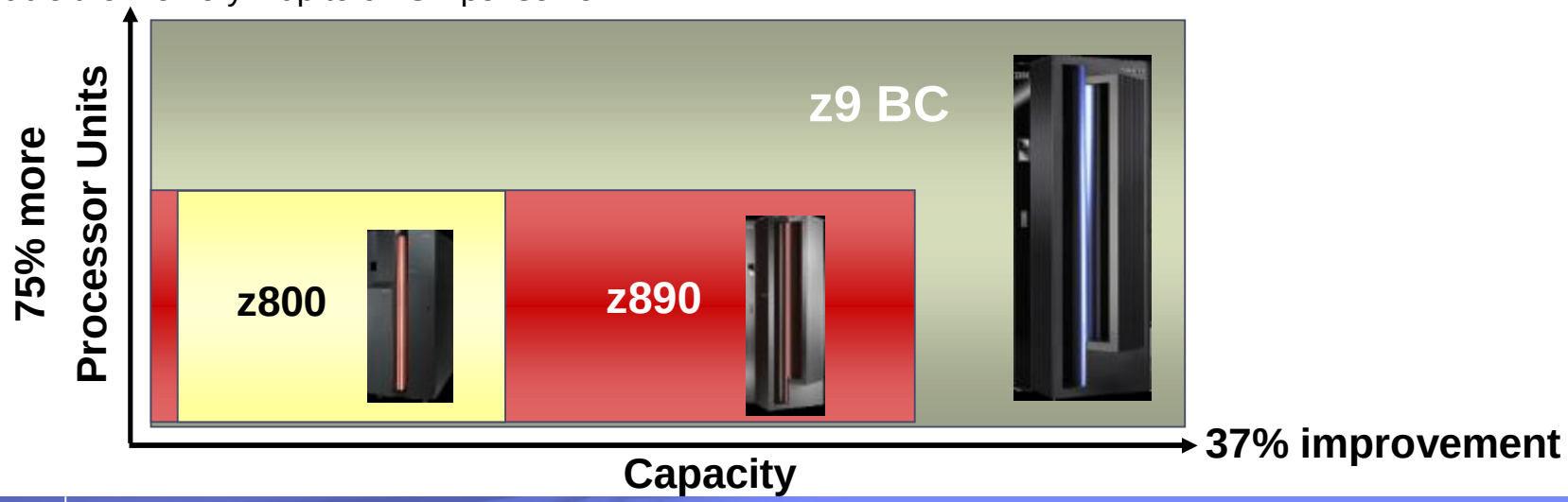
Flexibility for growth

§ 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



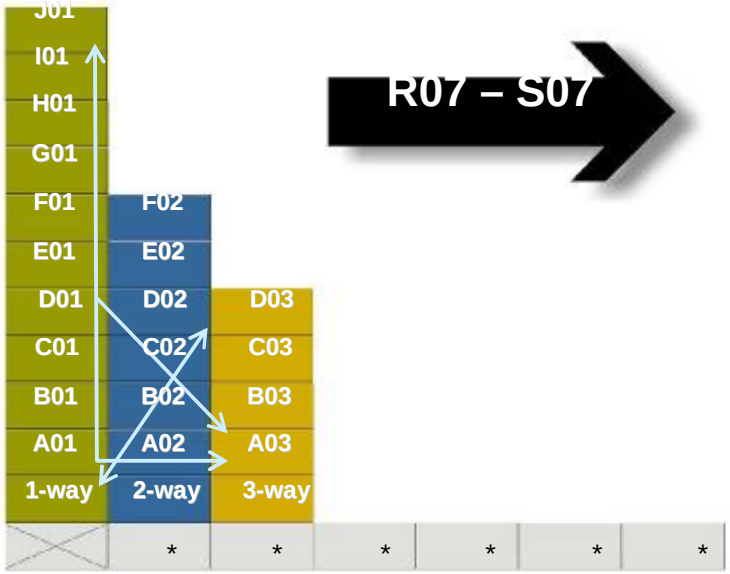
Improved granularity and scalability

A choice that is just right

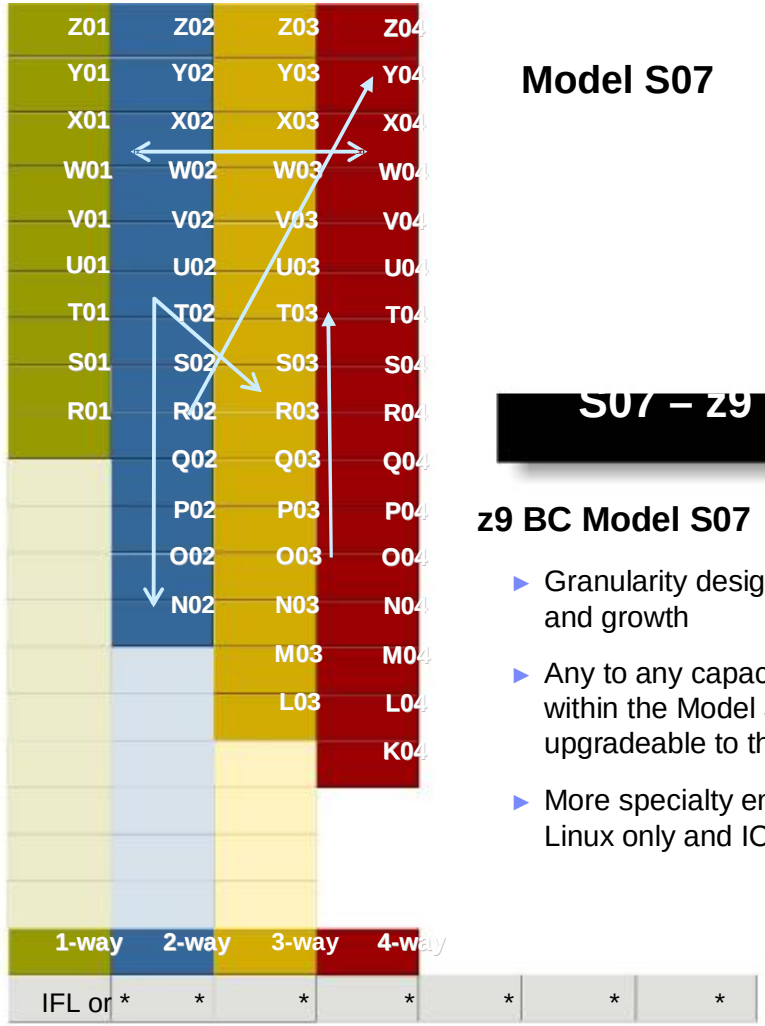
z9 BC Model R07

- Low entry point
- Granularity for cost effective growth
- System z9 I/O packaging on a smaller scale
- More specialty engines compared to z890
- Any to any capacity upgradeability within the Model R07 and an upgrade path to the S07

Model R07



R07 – S07



Model S07

S07 – z9 EC

z9 BC Model S07

- Granularity designed for flexibility and growth
- Any to any capacity upgradeability within the Model S07 and upgradeable to the z9 EC
- More specialty engines including Linux only and ICF only servers

***** Specialty Engines

IBM System z9 BC model comparison

2096 Model R07

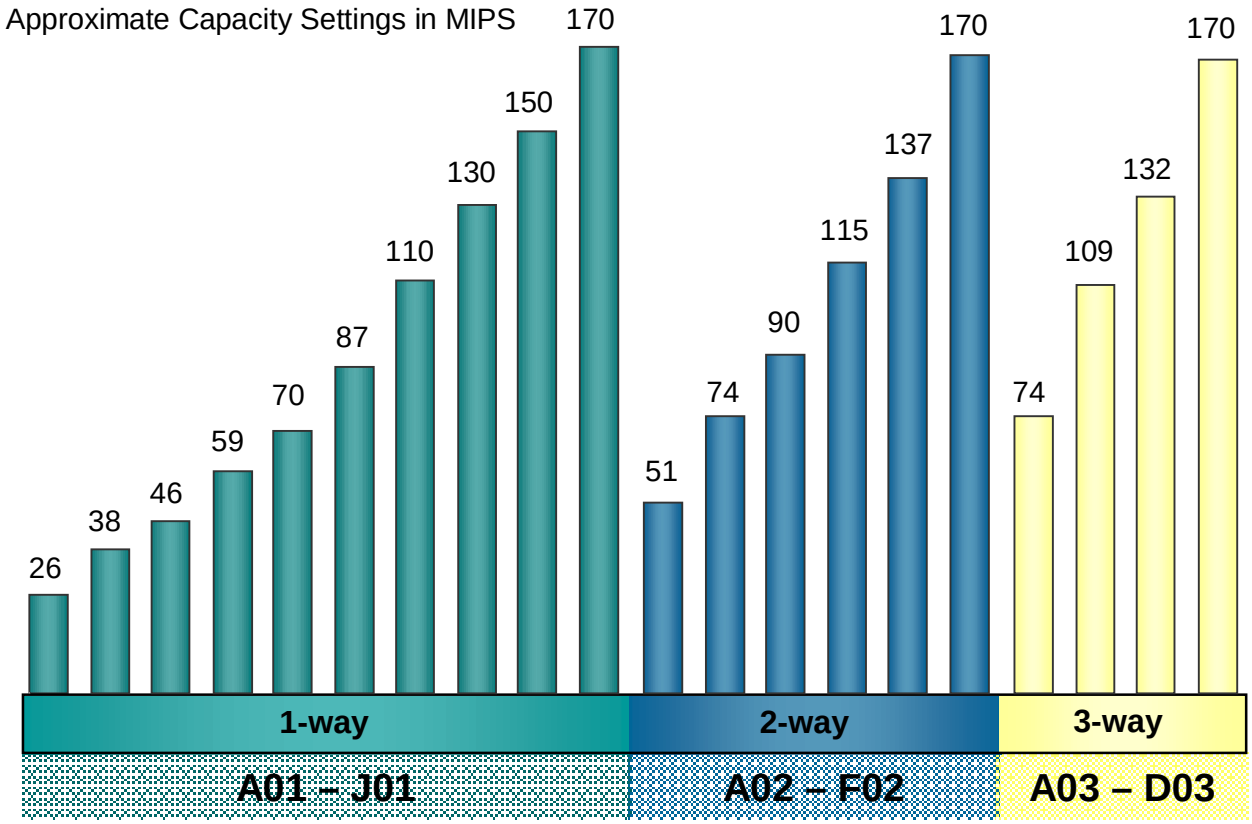
- **Processor Units (PUs)**
  - 7 PUs + 1 SAP
  - 1 - 3 CPs
  - 0 – 3 zAAPs or zIIPs
  - 0 – 6 IFLs or ICFs
  - 20 Capacity Settings
- **Memory**
  - 8 – 64GB
- **I/O**
  - 240 ESCON
  - 64 FICON Express4
  - 32 OSA-Express2 (2-port)
    on A01: 16 OSA-Express2
  - 8 Crypto Express2
  - 16 STIs

2096 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 Subcapacity CBU CPs and Specialty Engine CBU capabilities for more robust disaster recovery possibilities

z9 BC Model R07 - Capacity and Performance Comparison

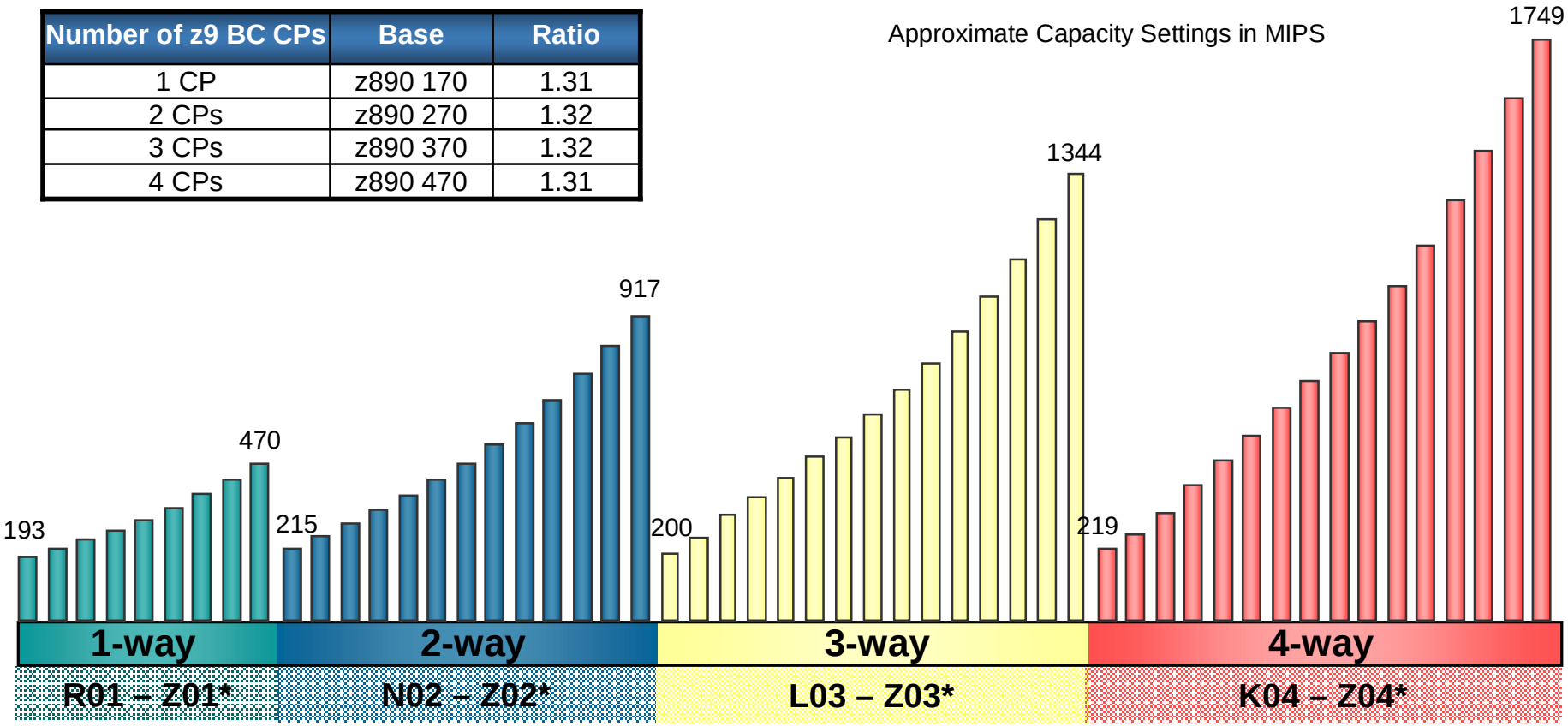


Note: For MSU values, refer to:
www-1.**ibm.com**/servers/eserver/zseries/library/swpriceinfo/
For ITRs refer to: www-1.**ibm.com**/servers/eserver/zseries/lspr/zSerieszOS.html

* CI = Capacity Indicator and refers to number of installed CPs and capacity setting as reported by STSI instruction. CI Z00 does not have any CPs.

z9 BC Model S07 - Capacity and Performance Comparison

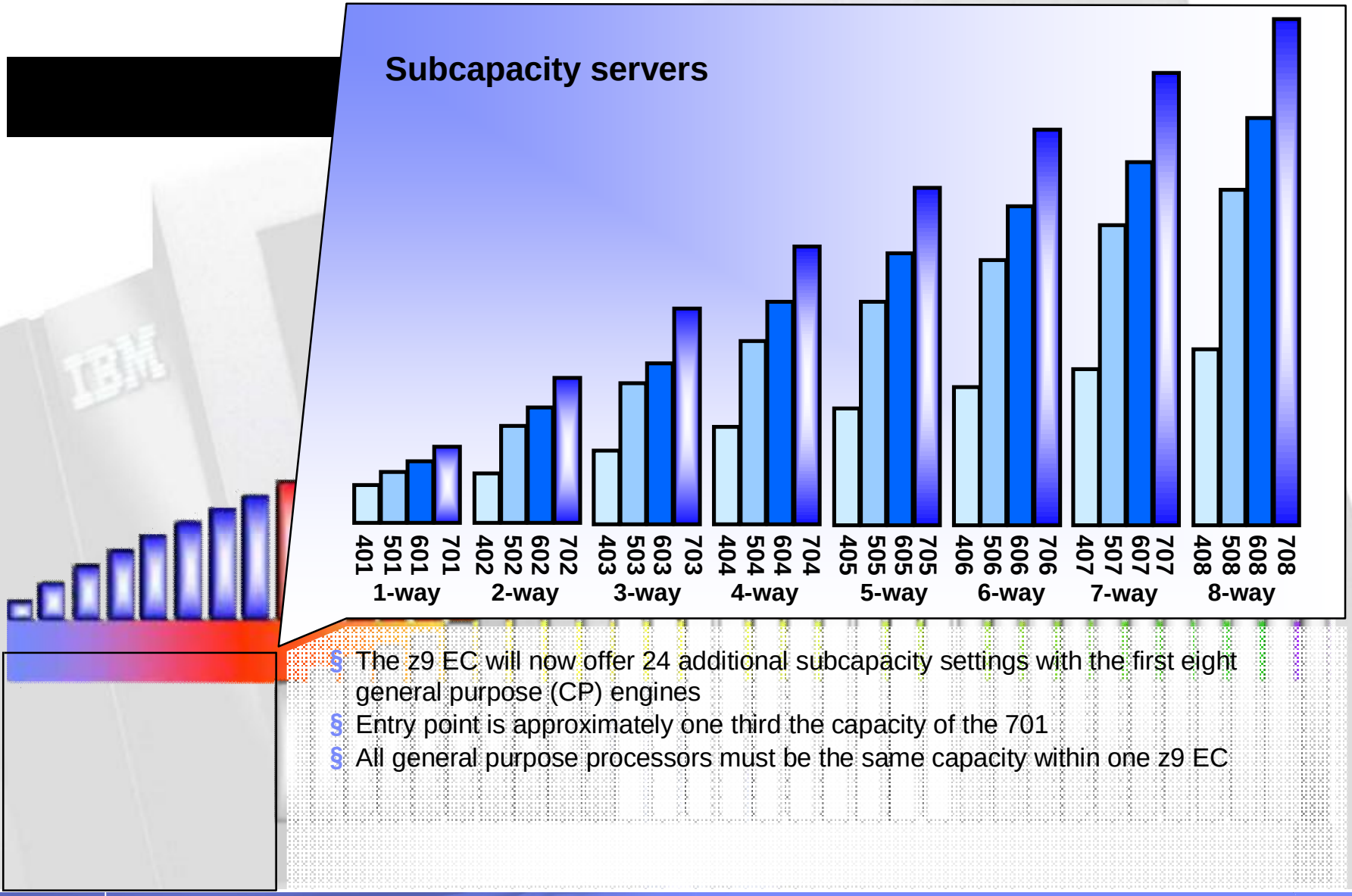
Number of z9 BC CPs	Base	Ratio
1 CP	z890 170	1.31
2 CPs	z890 270	1.32
3 CPs	z890 370	1.32
4 CPs	z890 470	1.31



Note: For MSU values, refer to:
www-1.**ibm.com**/servers/eserver/zseries/library/swpriceinfo/
For ITRs refer to: www-1.**ibm.com**/servers/eserver/zseries/lspr/zSerieszOS.html

* CI = Capacity Indicator and refers to number of installed CPs and capacity setting as reported by STSI instruction. Model CI Z00 does not have any CPs.

z9 EC - Capacity and Performance Comparison

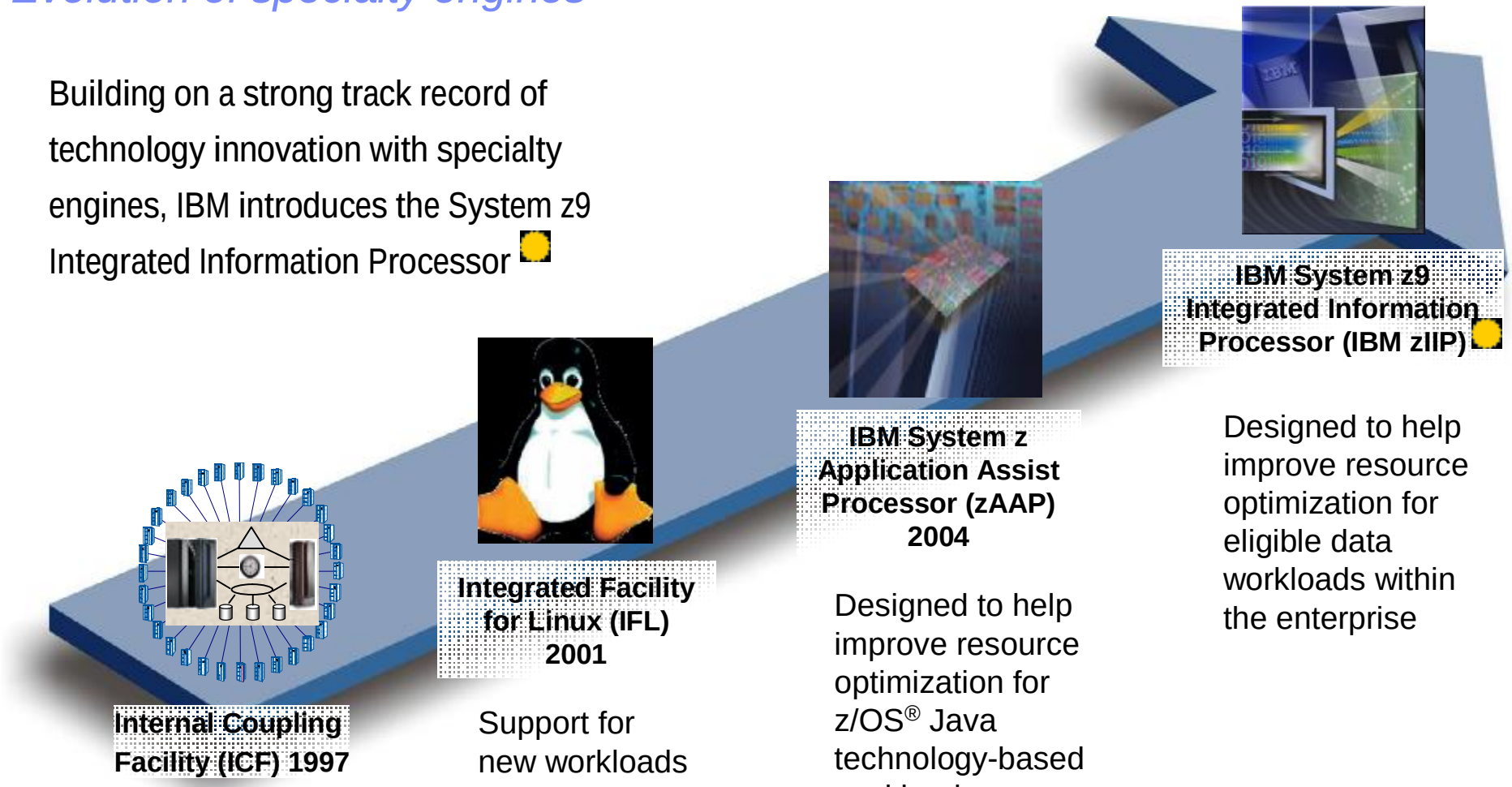


- The z9 EC will now offer 24 additional subcapacity settings with the first eight general purpose (CP) engines
- Entry point is approximately one third the capacity of the 701
- All general purpose processors must be the same capacity within one z9 EC

More choice for your business

Evolution of specialty engines

Building on a strong track record of technology innovation with specialty engines, IBM introduces the System z9 Integrated Information Processor



Internal Coupling Facility (ICF) 1997

Centralized data sharing across mainframes

Integrated Facility for Linux (IFL) 2001

Support for new workloads and open standards

IBM System z Application Assist Processor (zAAP) 2004

Designed to help improve resource optimization for z/OS® Java technology-based workloads

IBM System z9 Integrated Information Processor (IBM zIIP)

Designed to help improve resource optimization for eligible data workloads within the enterprise

z9 BC – 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

- Next generation 4 Gbps FICON/FCP
- Up to 112 FICON
- 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 BC – Enhancing Security

Protecting critical business data

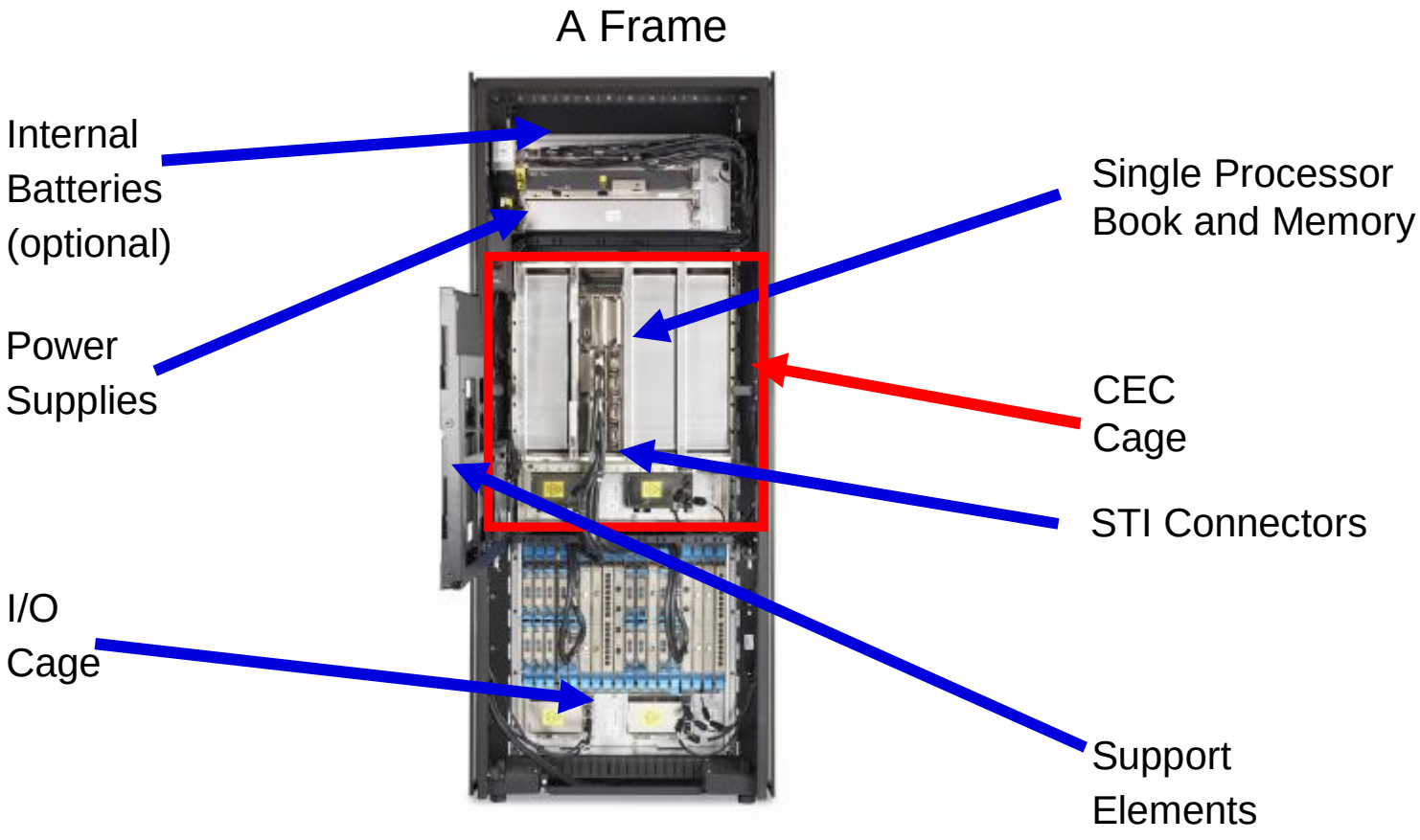
- **New integrated cryptography features offer more security options**
  - Advanced Encryption Standard (AES) support in z9 BC hardware
  - Stronger hash algorithm with SHA-256 than available on z890
  - Pseudo Random Number Generator
  - ATM/POS Remote Key Loading support
- **Crypto Express2 improved flexibility and speed**
  - 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 *
- **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
  - Expansion of ISV community ensures application availability

* 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.

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
  - Subcapacity CBU engines

z9 BC – Under the covers



Summary: z9 BC delivering new functions and features

Leadership in Systems Innovation

The server built to protect and grow with your on demand enterprise

- Two New Hardware Models
- Extremely High Granularity
- 37% Faster Uni Processor – up to 7 PUs*
- Full capacity specialty engine – ICF, IFL, zAAP and zIIP
- Up to 64 GB Memory
- CBU for specialty engines and subcapacity
- Enhanced Driver Maintenance
- Redundant I/O Interconnect
- Dynamic Oscillator Switchover
- Separate PU Pool Management
- Faster 2.7 GB/s STI and more of them
- On/Off CoD Change State
- Up to 112 FICON Channels
- New FICON Express4 Channels
- New 2-port FICON Express4 card
- MIDAW facility
- Multiple Subchannel Sets per LCSS
- N_Port ID Virtualization
- IPv6 Support for HiperSockets
- OSA-Express2 1000BASE-T
- OSA-Express2 OSN (OSA for NCP)
- Enhanced CPACF with AES, PRNG and SHA-256
- Configurable Crypto Express2

* Compared to z890

Agenda

- What is being announced ?
  - Part I: IBM System z
  - Part II: Operating System Support
- Summary

System z9 Minimum Operating System Support - 1 of 2

	z/OS.e z/OS	z/VM	Linux on System z	z/VSE VSE/ESA(1)	z/TPF TPF(2)
Basic System z9 support	1.4(4)	4.4	SLES 9 RHEL 4	3.1 2.7(1)	1.1) 4.1(2)
60 Logical Partitions (30 for z9 BC)	1.4(4)	4.4	SLES 9 RHEL 4	3.1 2.7(1)	1.1) 4.1(2)
63.75K Subchannels	1.4(4)	4.4	SLES 9 RHEL 4		
OSA-Express2 1000BASE-T Ethernet	1.4(4)	4.4	SLES 9 RHEL 4	3.1 2.7(1)	1.1 4.1 PUT 13(2)
MIDAW Facility	1.6	Not supported	N/A	Not supported	
CPACF Enhancements	1.6(4)	4.4	SLES 9 SP3(5) RHEL 4 U3(5)	3.1	
Crypto Express2 exploitation	1.6(4)	5.1	SLES 9	3.1	
HiperSockets IPv6	1.7	5.2	N/A		
OSA-Express2 Large send	1.6	Not supported	SLES 9 SP2 IBM work with LDPs(3)		
OSA-Express2 CDLC support	1.4(4)	5.1	SLES 9 SP3 RHEL 4 U3	3.1 2.7(1)	
Multiple Subchannel Sets (MSS)	1.7	Not supported	IBM work with LDPs(3)		
FICON Link Incident Report	1.7	4.4	IBM work with LDPs(3)		
Single System Image	1.6 up to 32	5.1 up to 24	SLES 9 up to 32 RHEL 4 up to 32		1.1 up to 54

1. indicates VSE/ESA
2. indicates TPF
3. IBM is working with its Linux Distribution Partners (LDPs) that this function will be provided in future Linux on System z distribution releases/service updates
4. Additional features or Web downloads required
5. IBM is working with LDPs on Kernel space exploitation(3)

Note: Please refer to the latest PSP bucket for latest PTFs for new functions/features z/OS.e - z800, z890 and z9 BC only

SLES = SUSE Linux Enterprise Server
RHEL = Red Hat Enterprise Linux

System z9 Minimum Operating System Support – 2 of 2

	z/OS.e z/OS	z/VM	Linux on System z	z/VSE VSE/ESA(1)	z/TPF TPF(2)
Enhanced Perf. Assist for z/VM Guests	N/A	5.2	IBM work with LDPs(3)		
N_Port ID Virtualization	N/A	4.4	SLES 9 SP3 IBM work with LDPs(3)	3.1	
FCP Program Directed re-IPL	N/A	Not supported	SLES 9 SP3 IBM work with LDPs(3)		
SubCapacity	1.4(4)		IBM Software Group products are enabled(6)	Statement of Direction	1.1
zIIP Support	1.6	Not supported	N/A	Not supported	Not supported
Crypto Remote Key Loading	1.6(4)	5.1	N/A		
Crypto ISO 16609	1.6(4)	5.1	N/A		
FICON Express4 (CHIPD type FC)	1.4(4)	4.4	SLES 9 RHEL 4	3.1 2.7(1)	1.1 4.1PUT 16(2)
FICON Express4 (CHIPD type FCP)	N/A	4.4	SLES 9 RHEL 4	3.1	

1. indicates VSE/ESA
2. indicates TPF
3. IBM is working with its Linux Distribution Partners (LDPs) that this function will be provided in future Linux on System z distribution releases/service updates
4. Additional features or Web downloads required
5. IBM is working with LDPs on Kernel space exploitation(3)
6. Linux and z/VM do not support it, the IBM Software Group products are enabled for it on all distributions

Note: Please refer to the latest PSP bucket for latest PTFs for new functions/features z/OS.e - z800, z890 and z9 BC only

SLES = SUSE Linux Enterprise Server
RHEL = Red Hat Enterprise Linux

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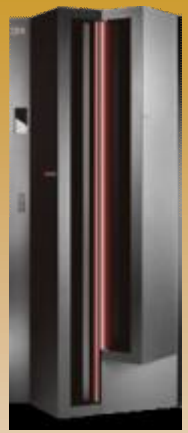
IBM System z family

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 range
- §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/OS.e, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on zSeries

IBM System z9 EC – z9 EC (2094)

- §Announced 7/05
- §Superscalar Server
- §5 models – Up to 54-way
- §Granular Offerings for 8 CP engines and below
- §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 Express4 Gbps
  - ► 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 z

IBM System z9 BC – z9 BC (2096)

- §Announced 4/06
- §Superscalar Server
- §2 models – 7 configurable PUs
- §Extreme Granularity
- §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 Express4 Gbps
  - ► 10 GbE, GbE, 1000BASE-T
  - ► Coupling Links
- §Configurable Crypto Express2
- §Parallel Sysplex clustering
- §HiperSockets – up to 16
- §Up to 30 partitions
- §Enhanced Availability
- §Operating Systems
  - ► z/OS, z/OS.e, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on System z