IBM System z9 Enterprise Class: A security-rich, resilient and scalable mainframe for managing on demand infrastructures

Overview
For over four decades, the IBM mainframe has been a leader in data and transaction serving. Our announcement of the IBM System z9™ 109 (z9-109) in July of 2005, provided a strong combination of mainframe characteristics plus new functions designed around scalability, availability, security, and virtualization. With today’s announcement, the z9-109 will be known as the System z9 Enterprise Class (z9 EC) and we continue that leadership with the introduction of new capacity settings with subcapacity central processors, the hardware availability of our new IBM System z9 Integrated Information Processor (IBM zIIP), and continue to help improve our FICON™ performance and throughput.

With the demands customers face from mergers and acquisitions, consolidation of servers, on demand processing and support for legacy systems, the z9 EC’s solid foundation makes it an ideal server to help meet changing business priorities. Realizing the requirement for more granular capacity settings within the z9 EC, we now will offer our customers central processors with a larger variety of capacity choices that can help meet their business requirements. These processors will continue to have the ability to support all z9 EC features and functions.

The mainframe has evolved our use of specialty engines over time starting with the Internal Coupling Facility (ICF). The latest specialty engine, announced in January of 2006, is the zIIP. The zIIP, when combined with an enabling Web deliverable for z/OS® V1.6 and V1.7 and enabling PTFs for DB2® UDB for z/OS V8, is designed to help improve resource utilization and lower the cost of eligible workloads, enhancing the role of the z9 EC as the data hub of the enterprise.

The z9 EC will now include FICON Express4 for potential improved I/O capacity and performance with the next generation of FICON/FCP. This new feature may offer increased channel aggregation and shorter backup windows to help reduce the cost of storage operations and infrastructure.

IBM has a broad range of disk, tape, and SAN products that are ready to support FICON Express4. And IBM TotalStorage® DS8000 Series and IBM TotalStorage DS6000 Series disk systems, part of IBM’s System Storage™ portfolio, support the MIDAW facility to help enable the potential throughput and response time benefits that the MIDAW facility can bring.

With today’s enhanced capabilities, the z9 EC is intended to help increase the flexibility to configure a server to meet current needs, provide a powerful and advanced data serving environment, and help drive down risks and business costs. The z9 EC is designed to optimize your resources without sacrificing features or functions, both within the server and within the enterprise.

Key prerequisites
Refer to the Hardware requirements and Software requirements sections of this announcement.

At a glance
The IBM System z9 Enterprise Class is designed to provide:

- IBM System z9 Integrated Information Processor
- 24 New capacity settings
- FICON Express4 supporting
  - Connectivity with 1, 2, or 4 Gbps
  - Either 4 km or 10 km distance options
- Conversions to and from zAAPs
- Integration of new crypto functions such as:
  - Remote Keyload for ATMs
  - Implementation of ISO 16609 CBC Mode TDES for MAC
- OSA/SF enhancements to facilitate management of IP and MAC addresses
- OSA Layer 2/Layer 3 transport enhancement
- On/Off Capacity on Demand enhancements
- GDPS™ enhancements
**Integration of new crypto functions such as:**

- 24 New subcapacity settings for z9 EC
- System z9 Integrated Information Processor (zIIP) (#7815) with:
  - Conversion of a CP, IFL, zAAP, or ICF to and from a zIIP
  - CBU, CIU, and On/Off CoD support
- FICON Express4 (#3321, 3322, 3324)
- Conversion of a CP, IFL, zIIP, or ICF to and from a zAAP
- Remote Keyload for ATMs
- ISO 16609 CBC mode TDES for MAC
- OSA/SF enhancements
- OSA Layer2/Layer3 transport enhancement
- New OSA-Express2 1000BASE-T Ethernet (#3366) for z990 and z890
- New HMC (#0081) and TKE (#0839)

The MES availability date for the features and functions described in this announcement is May 26, 2006, with the exception that the upgrade path from a z9 BC Model S07 to a z9 EC Model S08 will be available August 25, 2006.

Availability of Programs with encryption algorithm in France is subject to French government approval.

**System z9 Integrated Information Processor**

The System z9 Integrated Information Processor (zIIP) is the latest customer-inspired specialty engine planned for the IBM System z9. Following on the success of the widely accepted Integrated Facility for Linux™ (IFL) and System z9 Application Assist Processors (zAAP), the zIIP is designed to help improve resource optimization and lower the cost of eligible workloads enhancing the role of the mainframe as the data hub of the enterprise.

The zIIP’s execution environment will accept eligible work from z/OS. The operating system is designed to manage and direct the work between the general purpose processor (CP) and the zIIP. DB2 UDB for z/OS V8 will exploit the zIIP capability for eligible workloads.

The zIIP is available on the System z9 Enterprise Class and System z9 Business Class (z9 BC). Its introduction can help increase the value that customers may derive from the IBM System z9 over previous generations of the IBM mainframe. With the introduction of the zIIP with the general purpose processor (CP), and optionally including an IFL, or a zAAP, customers will be able to take advantage of IBM System z9’s advanced management of multiple workloads and high resource utilization to configure a system that can be optimized to their business objectives.

The zIIP is designed so that a program can work with z/OS to have eligible portions of its enclave Service Request Block (SRB) work directed to the zIIP. The z/OS operating system, acting on the direction of the program running in SRB mode, controls the distribution of the work between the general purpose processor (CP) and the zIIP. Using a zIIP can help free up capacity on the general purpose processor. When the zIIP is available, DB2 UDB for z/OS V8 will exploit the zIIP by sending eligible work to z/OS that can be directed to the zIIP.

- Types of DB2 UDB for z/OS V8 workloads executing in SRB mode, all or a portion of these workloads can be sent to the zIIP include:
  - Network Connected Applications — An application (running on UNIX®, Linux including Linux on System z™, Intel®, or z/OS) may access a DB2 UDB for z/OS V8 database that is hosted on a z9 EC. Eligible work that can be directed to the zIIP is a portion of those requests made from the application server, to the host, through SQL calls over a DRDA® over TCP/IP connection. Examples of workloads that may be running on the server connected over DRDA using TCP/IP to the z9 EC may include BI, ERP, or CRM application serving.
  - Data Warehousing Applications Requests that utilize DB2 UDB for z/OS V8 star schema parallel queries may have portions of these SQL requests directed to the zIIP. Examples of these applications may include BI applications.
  - Index Maintenance Utilities — A portion of DB2 utility functions that are used to maintain index maintenance structures (LOAD, REORG, and REBUILD INDEX) can be redirected to zIIP.
- zILPs are designed to help improve resource optimization and help lower the cost of ownership of the System z9 for eligible workloads by:
  - Leveraging existing multi-tiered DB2 applications that use TCP/IP to access the DB2 database server from the application
  - Offering new opportunities to deploy data warehousing and BI solutions that leverage star schema queries on the System z9
  - Providing no known changes to DB2 applications in order to take advantage of the zILP
  - Providing no IBM software charges for zILP capacity
- zILPs are designed to help free up capacity on the general purpose processor (CP) which may make it available for use by other System z9 workloads.
- zILP requires a System z9 server and software support. The software support is provided by a Web deliverable with PTFs for z/OS V1.6 and V1.7 which enables the redirecting of eligible workloads to the zILP and DB2 UDB for z/OS V8 with enabling PTFs. The software support is planned to be available on June 30, 2006. The zILP is planned to be available on May 26, 2006.

This is an exclusive offering to the IBM System z9, and is supported by z/OS and DB2 UDB for z/OS. Refer to the Software requirements section.

New increased flexibility and upgradeability

System z9 EC is now designed to offer 24 flexible new subcapacity settings, available when you have eight or less general purpose processors (CPs). The use of subcapacity settings has been termed “granularity” and having this ability to offer just a portion of the full capacity allows greater flexibility to configure a server to meet current customer needs. A subcapacity central processor can be purchased to satisfy the CP requirement for either or both of the zILP and zAAP specialty engines.

For detailed performance information on the z9 EC and the new capacity settings, consult the Large Systems Performance Reference (LSPR) available at

http://www-1.ibm.com/servers/eserver/zseries/lspr/

Conversions from and to the System z9 Application Assist Processor

To provide further optimization and flexibility, the z9 EC is now designed to provide conversions for the System z9 Application Assist Processor (zAAP) from and to the Integrated for Linux (IFL) processor, System z9 Integrated Information Processor (zIIP), the Integrated Coupling Facility (ICF), and all Central Processor (CP) features. These feature conversions are chargeable.

FICON and FCP enhancements

FICON Express4 — 1, 2, or 4 Gbps

A new generation of FICON features, FICON Express4, are now being offered. FICON Express4 continues the tradition of offering more capabilities with each new generation.

FICON Express4:
- Is designed to deliver increased performance compared to the FICON Express2 features on z990
- Offers two unrepeated distance options (4 kilometer and 10 kilometer) when using single mode fiber optic cabling
- Supports a 4 Gbps link data rate with auto-negotiation to 1 or 2 Gbps for synergy with existing switches, directors, and storage devices

The FICON Express4 features have two modes of operation designed for connectivity to servers, switches, directors, disks, tapes, and printers:

1. Native FICON and FICON Channel-to-Channel (CTC) traffic (CHPID type FC) in the z/OS, z/VM®, z/VSE®, VSE/ESA**, z/TPF, TPF, and Linux on System z9 environments
2. Fibre Channel Protocol traffic (CHPID type FCP) in the z/VM, z/VSE, and Linux on System z9 environments

The FICON Express4 features are exclusive to System z9. Refer to the Software requirements section for operating system support for CHPID types FC and FCP.

There are three FICON Express4 features on z9 EC from which to choose:

1. FICON Express4 10KM LX (#3321), with four channels per feature, is designed to support unrepeated distances up to 10 kilometers (6.2 miles) over single mode fiber optic cabling. Use this feature when the unrepeated distance between devices is greater than 4 kilometers (km) or your link loss budget requirements exceed 2 dB end-to-end between devices.
2. FICON Express4 SX (#3322), with four channels per feature, is designed to carry traffic over multimode fiber optic cabling. Refer to the Standards section for the supported unrepeated distances.
3. FICON Express4 4KM LX (#3324), with four channels per feature, is designed to support unrepeated distances up to 4 kilometers (2.5 miles) over single mode fiber optic cabling. This feature is designed to offer a cost-effective solution to satisfy the majority of your FICON/FCP single mode fiber optic cabling distance requirements.

Note: The ANSI Fibre Channel Physical Interface (FC-PI-2) standard defines 10 kilometer (km) transceivers and 4 km transceivers when using 9 micron single mode fiber optic cabling. IBM supports these FC-PI-2 variants.

IBM supports interoperability of 10 km transceivers with 4 km transceivers provided the unrepeated distance between a 10 km transceiver and a 4 km transceiver does not exceed 4 km (2.5 miles).

All channels on a single FICON Express4 feature are of the same type — 4KM LX, 10KM LX, or SX. You may carry forward, from z990 or z900, your current FICON Express2 and FICON Express features (#3319, #3320, #2319, #2320).

FICON Express4 — change in unrepeated distances at 4 Gbps

As the link data rate increases, the distance decreases when using multimode fiber optic cabling. Care should be taken when migrating from a 2 Gbps infrastructure to a 4 Gbps infrastructure.

Refer to the Standards section for the maximum unrepeated distances when using 50 or 62.5 micron multimode fiber optic cabling. Refer also to Planning for Fiber Optic Links (GA23-0367) for link loss budget changes at 4 Gbps link data rates.

FICON Express4 availability enhancement: The FICON Express4 features have Small Form Factor Pluggable (SFP) optics to permit each channel to be individually serviced in the event of a fiber optic module failure. The
traffic on the other channels on the same feature can continue to flow if a channel requires servicing.

**FICON Express4 performance improvement for native FICON on z9 EC:** A FICON Express4 channel, when operating at 4 Gbps, is designed to achieve a maximum throughput of up to 330 MBps when processing all read or all write (half-duplex data transfers) large sequential data transfer I/O operations. This represents approximately a 65% increase compared to a FICON Express2 channel operating at 2 Gbps on z9-109.

A FICON Express4 channel, when operating at 4 Gbps, is designed to achieve up to 350 MBps when processing a mix of read and write large sequential data transfer I/O operations. This represents approximately a 25% increase compared to a FICON Express2 channel operating at 2 Gbps on z9-109.

These large sequential data transfer measurements for native FICON (CHPID type FC) are examples of the maximum throughput that can be achieved in a laboratory environment using one FICON Express4 channel on a z9 EC with z/OS V1.7 with no other processing occurring and do not represent actual field measurements. Details are available upon request.

**FICON Express4 performance improvement for FCP on z9 EC:** A FICON Express4 FCP channel, when operating at 4 Gbps, is designed to achieve a maximum throughput of up to 400 MBps when processing all read and up to 392 MBps when processing all write (half-duplex data transfers) large sequential data transfer I/O operations. This represents greater than a 100% increase compared to a FICON Express2 channel operating at 2 Gbps on z9-109.

A FICON Express4 FCP channel, when operating at 4 Gbps, is designed to achieve up to 525 MBps when processing a mix of read and write large sequential data transfer I/O operations. This represents approximately a 50% increase compared to a FICON Express2 channel operating at 2 Gbps on z9-109.

These large sequential data transfer measurements for FCP (CHPID type FCP to communicate with SCSI devices) are examples of the maximum throughput that can be achieved in a laboratory environment using one FICON Express4 FCP channel on a z9 EC with Linux on System z9, SUSE Linux SLES 9 SP3, with no other processing occurring and do not represent actual field measurements. Details are available upon request.

**MIDAW facility performance improvement — z9 EC,** **MIDAW facility, FICON Express4, DB2, DS8000:** Results of internal DB2 table scan tests with Extended Format datasets on the z9 EC with the Modified Indirect Data Address Word (MIDAW) facility and the IBM TotalStorage DS8000 yielded the following results when using FICON Express4 operating at 4 Gbps on a z9 EC compared to FICON Express2 operating at 2 Gbps on a z9 EC:

- A 46% improvement in throughput for all reads (270 MBps versus 185 MBps)
- A 35% reduction in response times

Use of the MIDAW facility with FICON Express4, operating at 4 Gbps, compared to use of Indirect Data Address Words (IDAWs) with FICON Express2, operating at 2 Gbps, showed an improvement in throughput of greater than 220% for all reads (270 MBps versus 84 MBps) on DB2 table scan tests with Extended Format datasets.

These measurements are examples of what has been achieved in a laboratory environment using one FICON Express4 channel operating at 4 Gbps (CHPID type FC) on a z9 EC with z/OS V1.7 and DB2 UDB for z/OS V8.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user may experience will vary depending upon considerations such as the amount of multiprogramming in the user’s job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput or performance improvements equivalent to the numbers stated here.

**Improved FICON error recovery:** System z9 and z/OS V1.7 I/O recovery processing improvements are designed to allow for the system to detect switch/director fabric problems that may cause FICON links to fail and recover multiple times in a short period of time.

This enhancement is designed to allow the system to detect these conditions and keep an affected path offline until an operator action is taken. This is expected to help limit the performance impacts of switch/director fabric problems. The improved FICON error recovery function is planned to be available in the first half of 2008, and available on z/OS V1.4, or later with PTFs.

**2000 MHz-km multimode fiber optic jumper cables:** IBM has qualified the 50 micron multimode 2000 MHz-km ISO/IEC OM3, TIA 850 nanometer laser-optimized 50/125 micrometer fiber optic cable for use when attaching System z9 to servers, switches/directors, disks, tape units, and printers. As of the date of this announcement, support of the OM3 cable is designed to help facilitate use of the latest industry-standard fiber optic cabling when the unrepeated distances offered by 50 micron 500 MHz-km multimode fiber optic cabling are insufficient for your data center cabling requirements.

Fiber optic jumper cables continue to be provided by IBM Networking Services and are not available as features on System z9.

**OSA Layer 2/Layer 3 transport enhancement**

Hosts and virtual switches, sharing the same OSA-Express2 or OSA-Express feature on System z9, can now communicate directly through an OSA port, whether configured as Layer 2 or Layer 3 transport mode. Prior to this support, Layer 2 and Layer 3 connections on the same OSA (CHPID) were unable to communicate directly requiring that all traffic between these sharing connections be sent out on the physical LAN and routed back into an OSA port.

This virtualization enhancement is designed to facilitate the deployment of Layer 2 virtual switches and hosts. It also allows the LAN administrator to configure and manage their mainframe network topology using the same techniques as their non-mainframe topology.

The Layer2/Layer 3 transport sharing enhancement is applicable to CHPID type OSD (QDIO traffic) and to all of the OSA features supported on System z9. This enhancement is designed to be transparent to operating systems.

**OSA/SF z9 EC, z990, z890 enhancements — for IP and MAC addressing**

The Open Systems Adapter/Support Facility (OSA/SF) is an integrated component of the z/OS, z/VM, z/VSE, and VSE/ESA operating systems. The following enhancements are being offered:

- Layer 3 OSA Address Table (OAT): The Layer 3 OAT is now designed to display all IP addresses registered to an OSA port. There is an indicator that can be used...
to determine the registration status of each IP address (IP addresses in use as well as IP addresses not in use).

- **OSA/SF Virtual MAC and VLAN ID display capability:** OSA/SF now has the capability to support virtual Medium Access Control (MAC) and Virtual Local Area Network (VLAN) identifications (IDs) associated with OSA-Express2 and OSA-Express features configured as a Layer 2 interface. This information will now be displayed as a part of an OAT entry and is independent of IPv4 and IPv6 formats. There can be multiple Layer 2 VLAN IDs associated to a single unit address and one group MAC can be associated to multiple unit addresses.

- **Multicast information in OAT entry:** Group MAC addressing information is being moved from the port section and is now integrated into the Layer 3 OAT entry. These OSA/SF enhancements are applicable to CHPID type OSD (QDIO traffic) and to all of the OSA features supported on z9 EC, z990, and z890. Refer to the Software requirements section.

**OSA-Express2 enhancement on z990 and z890**

Introducing OSA-Express2 1000BASE-T Ethernet on z990 and z890: Today, IBM is expanding the family of OSA-Express2 features available on z990 and z890 to include 1000BASE-T Ethernet, supporting a link data rate of 10, 100, or 1000 Mbps over a copper infrastructure. OSA-Express2 1000BASE-T Ethernet feature #3366 replaces the currently available OSA-Express 1000BASE-T Ethernet feature #1366. The OSA-Express2 1000BASE-T Ethernet feature on z990 and z890 provides support for:

- CHPID type OSD — Queued Direct Input/Output (QDIO) for TCP/IP traffic when using Layer 3, and protocol-independent packet forwarding when using Layer 2 (z/VM and Linux on System z).
- CHPID type OSE — Non-QDIO for SNA/APPN®/HPR and/or TCP/IP traffic.
- Checksum Offload (exclusive to QDIO mode, CHPID type OSD).
- Spanned channels and sharing among LPARs.
- Jumbo frames in QDIO mode (when operating at 1 Gbps).
- Auto-negotiation (the target device must also be set to auto-negotiate).
- Category 5 Unshielded Twisted Pair (UTP) cabling with RJ-45 connector.
- 640 TCP/IP stacks per port/CHPID, for hosting more images on z990 and z890.
- Large send for IPv4 packets — the host sends 64 KB blocks to OSA for packet processing returning CPU cycles for application use.
- Concurrent LIC update capability — when properly configured, this capability is designed to avoid a configuration off/on, minimizing the disruption of network traffic during an update (applicable to CHPID type OSD).

When OSA-Express2 1000BASE-T Ethernet feature #3366 becomes available on z990 and z890, feature #1366 is longer be orderable. Refer to the Software requirements section for operating system support.

**Further cryptographic enhancements**

**Key management enhancements for remote loading of ATM keys and key exchange with non-CCA systems:** Remote Key Loading refers to the process of loading Data Encryption Standard (DES) keys to Automated Teller Machines (ATMs) and Point of Sale (POS) devices from a central administrative site without the need for personnel to visit each machine to manually load DES keys. These enhancements provide two important new features:

- The ability to load initial keys to an ATM from a remote location in a security-rich environment.
- Enhanced capabilities for exchanging keys with non-CCA cryptographic systems.

**Remote loading of initial ATM and POS keys**

The process encompasses two phases of key distribution:

1. Distribution of initial key encrypting keys (KEKs) to a newly installed ATM.
2. Distribution of operational keys or replacement KEKs, enciphered under a KEK currently installed in the ATM.

Typically, a new ATM or POS has none of the financial institution’s keys installed. Until now, this has been generally done by manually loading each of the two clear text key part individually and separately into ATMs and POS devices.

Loading initial cryptographic keys into ATMs and POS devices are a fact of life for financial institutions. For most machines this means having two technical personnel visit each ATM or POS to load the key. Manual entry of keys is one of the most error-prone and labor-intensive activities that occur during an installation, making it expensive for banks and financial institutions.

**Remote Key Loading potential benefits**

- Provides a mechanism to load initial of keys without the need to send technical staff to the location of the device.
- Can reduce downtime due to key entry errors.
- Can reduce service call and key management costs.
- Improves the ability to manage ATM or POS conversions.


**Improved key exchange with non-CCA Cryptographic systems**

IBM Common Cryptographic Architecture (CCA) employs Control Vectors to control usage of cryptographic keys. Non-CCA systems use other mechanisms, or may use keys that have no associated control information.

The new features added to CCA can enhance the ability to exchange keys between CCA systems, and systems that do not use Control Vectors, by allowing the CCA system owner to define permitted types of key import and export, and is designed to prevent uncontrolled key exchange that can open the system to an increased threat of attack.
These enhancements are exclusive to System z9 and supported by z/OS operating system and by z/VM for z/OS guests. Refer to Software requirements section for operating system support.

ISO 16609 CBC Mode T-DES MAC enhancement

Supports the requirements for Message Authentication using symmetric techniques: The Integrated Cryptographic Service Facility (ICSF) is designed to use the following callable services to access the ISO 16609 CBC Mode T-DES MAC enhancement in the Cryptographic coprocessor:

- MAC Generate (CSNBMGN)
- MAC Verify (CSNB VMVR)

A new Rule Array keyword, TDES-MAC, is being added to these ICSF callable services. The padding used by TDES-MAC will pad x00 to the next 8 byte multiple before passing the data to the cryptographic coprocessor.

ISO 16609 CBC mode T-DES MAC is accessible through ICSF function calls made in the Cryptographic Adapter Segment 3 Common Cryptographic Architecture (CCA) code.

This enhancement is exclusive to System z9 and supported by z/OS operating system and by z/VM for z/OS guests. Refer to Software requirements section.

New and modified ICSF callable services

ICSF, together with Crypto Express2, support the basic mechanisms in Remote Key Loading: The implementation offers a security-rich bridge between the highly secure CCA environment and the various formats and encryption schemes offered by the ATM vendors.

The following new ICSF services are offered for Remote Key loading:

- Trusted Block Create (CSNDTBC): This callable service is used to create a trusted block containing a public key and some processing rules. The rules define the ways and formats in which keys are generated and exported.
- Remote Key Export (CSNDRKX): This callable service uses the trusted block to generate or export DES keys for local use and for distribution to an ATM or other remote device.

Modified ICSF Callable Services for Remote Key loading:

- PKA Key Import (CSNPKII)
- PKA Key Token Change (CSN DKTC)

Modified ICSF Callable Services for ISO 16609 CBC mode T-DES MAC:

- Digital Signature Verify (CSNDDS V)
- MAC Generate (CSNBMGN)
- MAC Verify (CSNBVMVR)

Refer to ICSF Application Programmers Guide, SA22-7522, for additional details.

Trusted Key Entry (TKE) 5.0 workstation to enhance security and convenience: The TKE workstation (#0839) and the TKE 5.0 level of Licensed Internal Code (#0855) are optional features on the z9 EC. The TKE 5.0 LIC is loaded on the TKE workstation prior to shipment. The TKE workstation offers security-rich local and remote key management, providing authorized persons a method of operational and master key entry, identification, exchange, separation, and update. The TKE workstation supports connectivity to an Ethernet Local Area Network (LAN) operating at 10, 100, or 1000 Mbps. Up to three TKE workstations can be ordered.

The TKE 5.0 workstation (#0839) is available on the z9 EC, z990, z890, and z900. Refer also to the “Special features” section of the Sales manual on the Web for further information.


Smart Card Reader: Support for an optional Smart Card Reader attached to the TKE 5.0 workstation allows for the use of smart cards that contain an embedded microprocessor and associated memory for data storage. Access to and the use of confidential data on the smart cards is protected by a user-defined Personal Identification Number (PIN).

The TKE 5.0 LIC continues to support the ability to store key parts on diskettes or paper, or optionally on smart cards, or to use a TKE authority key stored on a diskette, or optionally on a smart card, and to log on to the Cryptographic Coprocessors using a passphrase, or optionally a logon key pair.

The optional TKE features are:

- TKE 5.0 LIC (#0855) and TKE workstation (#0839)
- TKE Smart Card Reader (#0887)
- TKE additional smart cards (#0888)

The Smart Card Reader, which can be attached to a TKE workstation with the 5.0 level of LIC, is available on the z9 EC, z990, z890, z900, and z800.

z9 EC Cryptographic migration:

- The Crypto Express2 feature is supported on z990 and can be carried forward on an upgrade to the z9 EC.
- Customers may use TKE 3.x workstations to control z900, z800, and prior servers.
- Customers may use TKE 4.x workstations to control z990, z900, and prior servers.
- Customers must use TKE 5.0 workstation (#0839) to control the z9 EC and may also be used to control z990, z890, and z900 servers.

The PCICC (#0861), PCICA (#0862), and PCIXCC (#0868) features are not supported on the z9 EC or the z9-109.

EAL5 Certification

Today, IBM is also announcing that the IBM System z9 109 has received the Common Criteria Evaluation Assurance Level 5 (EAL5) certification for the security of its logical partitions (LPARs). The z9-109, along with the z990, z900 and z800, continues the System z leadership in achieving this prestigious assurance level for partitioning as of March 2006.

Enhancements to On/Off Capacity on Demand

On/Off CoD change in temporary capacity: Currently designed to remove temporary capacity when ordering a different capacity setting, the z9 EC will now support ordering a different capacity setting and switch to the different setting by downloading the second configuration while a previous setting is active.

API to activate On/Off CoD: The z9 EC is now designed to permit activation of On/Off CoD given the input parameter of an order number using an HMC SNMP API for activation.
Administrative On/Off Capacity on Demand test: IBM ResourceLink will accept orders for zero-capacity increases for all processor unit types for use in testing the ordering, staging, activation and deactivation steps of an On/Off CoD order. A new test panel has been created to supplement the existing CIU and On/Off CoD panels to accept test orders. The resulting LICCC record will be identical to actual On/Off CoD LICCC records; there is no change to actual hardware implementation. No additional feature numbers are required.

**GDPS enhancements**

IBM Global Services continues to enhance GDPS with:

- Extended HyperSwap™ functionality with IOS timing trigger
- Improved availability with enhanced recovery support in a CF structure duplexing environment
- Performance improvements for System Logger in a z/OS Global Mirror (previously known as XRC) environment
- Scalability improvements for XRC
- Unlimited distance solution for z/OS and open data with the new GDPS/Global Mirror offering

**Unplanned HyperSwap IOS timing trigger:** If a disk subsystem experiences a “hard failure” such as a boxed device, rank array failure, or disk subsystem failure, current versions of GDPS/PPRC and GDPS/PPRC HyperSwap Manager (GDPS/PPRC HM) are designed to detect this and automatically invoke HyperSwap to transparently switch all primary PPRC disks with the secondary disks within seconds.

The HyperSwap IOS timing trigger is designed to allow HyperSwap to be invoked automatically when user-defined I/O timing thresholds are exceeded. In a matter of seconds, transactions can now resume processing on the secondary disk, providing availability benefits and avoiding operator intervention.

**GDPS enhanced recovery support:** In the event of a primary site failure, the current GDPS/PPRC cannot ensure that the CF structure data is time-consistent with the “frozen” copy of data on disk. GDPS, therefore, must discard all CF structures at the secondary site when restarting workloads. This results in loss of “changed” data in CF structures. Users must execute potentially long-running and highly variable data recovery procedures to restore the lost CF data.

GDPS enhanced recovery is designed to ensure that the secondary PPRC volumes and the CF structures are time consistent, thereby helping to provide consistent application restart times without any special recovery procedures. This is especially significant for customers using DB2 data sharing, IMS™ with shared DEDB/VSO, or WebSphere® MQ shared queues.

**Improving performance:** System logger provides new support for XRC+ by allowing you to choose asynchronous writes to staging data sets for logstreams. Previously, all writes had to be synchronous. This limited the throughput for high-volume logging applications such as WebSphere, CICS®, and IMS. The ability to do asynchronous writes can allow the use of z/OS Global Mirror (XRC) for some applications for which it was not previously practical. XRC+ is available on z/OS and z/OS.e V1.7.

Refer to Preview: IBM z/OS V1.7 and z/OS.e V1.7: World-class computing for On Demand Business, Marketing Announcement letter ZA05-0104 dated February 15, 2005.

GDPS/XRC has extended its automation to support XRC+. It is designed to provide the ability to configure and manage the staging data set remote copy pairs.

**Scalability:** GDPS/XRC support is being extended to help improve XRC scalability for large systems by:

- Write Pacing support for XRC to self tune high-intensity update applications.
- Parallel execution of XRC commands across all SDMs that allows for improved responsiveness, improved usability, and reduced recovery time.
- Support for more than 14 SDMs, allowing GDPS/XRC to handle larger configurations and higher throughputs while maintaining the clients service level.

GDPS/Global Mirror is the latest member of the GDPS suite of offerings. It offers a multisite, end-to-end disaster recovery solution for your IBM z/OS systems and open systems data.

IBM GDPS/Global Mirror automation technology can help simplify data replication across any number of System z systems and/or open system servers to a remote site that can be at virtually any distance from the primary site. This can help ensure rapid recovery and restart capability of your environment for both testing and disaster recovery, and restart capability for your open systems environment for testing and disaster recovery. Being able to test and practice recovery allows you to build skills in order to be ready when a disaster occurs.

GDPS/Global Mirror automation technology is designed to manage the IBM TotalStorage Global Mirror copy services, the disk configuration, monitor the mirroring environment, and automate management and recovery tasks. It can perform failure recovery from a central point of control. This can provide the ability to synchronize System z and open systems data at virtually any distance from your primary site.

The point-in-time copy functionality offered by the IBM TotalStorage Global Mirror technology allows you to initiate a restart of your database managers on any supported platform, to help reduce complexity and avoid having to create and maintain different recovery procedures for each of your database managers.

All this helps provide a comprehensive disaster recovery solution.

**IBM Implementation Services for GDPS:** Through comprehensive GDPS services, IBM specialists can help customers reduce costs, speed delivery, and ensure a successful disaster recovery implementation. This is done by working with the customers from upfront project planning, to developing detailed implementation and testing plans to help meet their availability requirements, to implementation and verification of their solution.

GDPS V3.3 is available as of January 25, 2006. GDPS is designed to work in conjunction with the z9 EC, z9-109, z990, z980, z900, and z800 servers. For a complete list of other supported hardware platforms and software prerequisites, refer to the GDPS Web site: [http://ibm.com/systems/z/gdps/](http://ibm.com/systems/z/gdps/)

GDPS/Global Mirror has been available as of October 2005. Contact your IBM representative or send an e-mail to gdps@us.ibm.com for information regarding ordering GDPS.

More information on GDPS can be found in IBM GDPS V3.3: Improving disaster recovery capabilities to help ensure a highly available, resilient business environment.
Accessibility by people with disabilities

A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) containing details on the Lenovo™ ThinkPads and ThinkCenters accessibility compliance can be requested via the following Web site:


Product positioning

The System z9 Enterprise Class represents a continuing evolution of the mainframe. With a modular design for affordable scalability, the z9 EC Model S54 is designed to provide up to a 95% improvement in total system capacity compared to the z990 Model D32, up to a 40% increase in the number of FICON channels, up to double the amount of available memory, up to one third more internal I/O paths, and an increased number of open exchanges (concurrent I/O operations) that may be active simultaneously from 32 to 64 per FICON Express2 and FICON Express4 channels.

With a design for affordable scalability, the z9 EC is positioned to continue to help enable investment protection as well as improved price and performance with upgrades. Built on a foundation that is designed to improve recovery for unplanned outages, the z9 ECs innovative technologies are intended to help reduce planned outages by offering improved capabilities in the areas of downloading new function updates as well as upgrading and repairing memory, books, and I/O.

Today’s market finds that business needs are changing, and having a competitive advantage isn’t always about having more or being bigger, but more about being smarter and responding faster to change and to your clients. With a design for affordable scalability, On/Off Capacity on Demand and Customer Initiated Upgrade functions for temporary or permanent upgrades, and by extending subcapacity capability to the z9 EC, it is positioned to allow you to be able to get what you need, when and how you need it, as well as paying only for what is used.

Built on a foundation that is designed to improve recovery for unplanned outages, the z9 EC’s innovative technologies are intended to help reduce planned outages by offering improved capabilities in the areas of downloading new function updates as well as upgrading and repairing memory, books, and I/O.

The balancing of hardware and operating system interoperability continues with Multiple Subchannel Sets (MSS) and the Modified Indirect Data Address Word (MidAW) facility. The MidAW facility may benefit applications that use the following: DB2, VSAM, PDSE, HFS, zFS, and other datasets exploiting striping and compression.

The z9 EC offers more available channel bandwidth and FICON channels than the z990. The MidAW facility on the z9 EC can help improve FICON performance by reducing channel, director, and control unit overhead. Now with FICON Express4, we offer improved capacity and performance with the next generation of FICON/FCP. This new feature may reduce the cost of storage operations and infrastructure and shorten backup windows with faster channel link speeds. The FICON Express4 channel is designed to improve performance of FICON channel reads and writes for unidirectional transfers and total throughput for a mix of reads and writes.

The z9 EC is intended to provide the ability to improve application performance, increase the number of users and supported transactions, increase scalability, and consolidate workloads beyond what is available on a z990.

The new System z9 zIIP is designed to help improve resource optimization and lower the cost of portions of eligible workloads. DB2 for z/OS V8 will exploit the zIIP capability for portions of eligible workloads. The zIIP can help to strengthen the System z9 mainframe as the data serving hub, helping customers to more fully leverage their valuable assets.

Note: The comparison of the z9 EC Model S54 and the z990 Model D32 is based on the LSPR mixed workload average.

Statement of general direction

IBM System Storage encryption: To address customers’ growing concern with data security, IBM is planning for the development, enhancement, and support of encryption capabilities within storage environments such that the capability does not require the use of host server resources (so called “outboard” encryption capabilities). This includes the intent to offer, among other things, capabilities for products within the IBM System Storage portfolio to support outboard encryption and to leverage the key management functions provided by the Integrated Cryptographic Service Facility (ICSF). Our first implementation of outboard encryption is planned for the IBM System Storage TS1120 Tape Drive in the second half of 2006. The plan includes providing an optional, chargeable microcode and hardware upgrade for TS1120 Tape Drives shipped before encryption availability. Also planned is a new software program for management of encryption keys for tape drives across the enterprise. This new software program would utilize standard key repositories including ICSF on z/OS.

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

Trademarks

System z9, FICON, System Storage, GDPS, System z, VSE/ESA, HyperSwap, and IMS are trademarks of International Business Machines Corporation in the United States or other countries or both.

DB2, z/OS, TotalStorage, DRDA, z/VM, z/VSE, APPN, WebSphere, CICS, zSeries, and eServer are registered trademarks of International Business Machines Corporation in the United States or other countries or both.

Intel is a registered trademark of Intel Corporation.

UNIX is a registered trademark of the Open Company in the United States and other countries.

Linus is a trademark of Linus Torvalds in the United States, other countries or both.

Lenovo is a trademark of Lenovo in the United States, other countries, or both.

Other company, product, and service names may be trademarks or service marks of others.