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**IBM System z  
Introduction  
April 2009**

**IBM System z10 Enterprise Class  
(z10 EC)**

Frequently Asked Questions

Worldwide



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## Announcement Overview

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### **Question:**

What did IBM announce on April 28, 2009 in relation to the IBM System z10™ Enterprise Class (z10™ EC)?

### **Answer:**

IBM announced enhancements to the IBM System z10 Enterprise Class (z10 EC™) and IBM System z10 Business Class™ (z10 BC™) servers that demonstrate our commitment to the continuing evolution of the IBM mainframe. They offer continued focus on the mainframe's strengths - security, virtualization, availability, and scalability.

### **These include:**

**Preplanning for your Storage Area Network (SAN):** A new worldwide port name (WWPN) tool provides advance SAN preplanning so you are ready before a new System z10 server arrives.

**Server Time Protocol:** Enhancements will deliver improved installation, problem determination of errors and correction time.

**Fulfillment of a Statement of Direction (SOD):** IBM System z® now supports attachment between System z10 and IBM System z9® general purpose (no longer limited to standalone coupling facility) servers.

**Capacity Back Up (CBU):** Changes in the allocation of the default number of test activations; allowing the expiration of existing CBU to be extended up to an additional five years; offering additional CBU tests in single units.

**IBM System z10 BC memory increase:** Additional memory features up to 248 GB will be available May 29 2009, earlier than stated in Letter 108-754.

**EAL5 Certification:** The z10 EC has received Common Criteria Evaluation Assurance Level 5 (EAL5). The z10 BC has been designed for EAL5 Certification.

We have also announced some significant Statements of Direction concerning existing System z servers and future System z servers. These include the System z10 will be the last server to support connections to the Sysplex Timer®, the last server to support Dynamic ICF expansion, that IBM intends for the System z10 to be the last server to support ICB-4 links and that ESCON® channels will be phased out with the System z10 being the last server to support greater than 240 ESCON channels. Please refer to the Statement of Direction section of this document for more information.

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### **Question:**

What did IBM announce on October 21, 2008 in relation to the z10 EC?

### **Answer:**

The October 21 announcement for the z10 EC, continues the evolution of IBM's large-scale System z mainframe, fulfilling our promise to deliver technology improvements in reliability, availability, serviceability, security, scalability, virtualization, and energy efficiency. These core competencies make it an excellent choice to be the cornerstone of the IT infrastructure with innovative technologies to stay competitive. Controlling costs, improving provisioning speed,

and providing data center security and resiliency help create an environment to run modern applications side-by-side with traditional mission-critical workloads.

**Enhancements include:**

Improved access to data with High Performance FICON for System z (zHPF) on both FICON Express4 and FICON Express2

Enhanced problem determination, analysis, and manageability of the storage area network (SAN) by providing registration information to the fabric on the name server for both FICON® and FCP

Increased performance for Local Area Network connectivity with the introduction of Open Systems Adapter-Express3 (OSA-Express3) 1000BASE-T Ethernet with four ports per feature

A short reach version of OSA-Express3 10 Gigabit Ethernet with two ports per feature for infrastructures with multimode fiber optic cabling

OSA-Express3 Gigabit Ethernet and 1000BASE-T for the Network Control Program, providing Channel Data Link Control protocol support between the z10 EC and IBM Communications Controller for Linux® on System z (CCL) allowing systems administrators to configure, manage, and operate their CCL Network Control Programs in the same manner as their ESCON-attached 374x NCPs

Protection from network intrusion with OSA-Express QDIO data connection isolation for z/VM® virtualized environments on System z10 and System z9

Long reach 1x InfiniBand® coupling links - an alternative to ISC-3 facilitating coupling link consolidation

Coupling Facility Control Code Level 16 - to help deliver faster service time for CF Duplexing, and improvements to the efficiency of workload distribution when using shared queues in the Coupling Facility

Updates to Server Time Protocol for enhanced time accuracy to an External Time Source and support for running a Simple Network Time Protocol client on the Support Element for heterogeneous platforms in an enterprise to track to the same time source

Support for Longer Personal Account Numbers for stronger data protection on Crypto Express2

Trusted Key Entry Licensed Internal Code 5.3 enhancement to support Advanced Encryption Standard (AES) encryption algorithm, audit logging, and an infrastructure for payment card industry data security standard (PCIDSS)

Increased flexibility for just-in-time offerings with ability for more temporary offerings installed on the CPC and ways to acquire capacity backup

Plan Ahead Memory which provides the ability to plan for non-disruptive memory upgrades

The z10 EC announcement letters for the October announcement are: 108-794 (US), A08-1508 (Canada), ZG08-0843 (Europe) and AG08-0790 (AP).

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**Question:**

What did IBM announce on May 6, 2008 in relation to the z10 EC?

**Answer:**

IBM announced a new generation of Gigabit Ethernet (GbE) features, with double the port density of the OSA-Express2 GbE features. These features provide connectivity to multimode

and single mode fiber optic networks at a link data rate of 1 gigabit per second (1 Gbps). IBM also announced the availability date for the OSA-Express3 10 Gigabit Ethernet long reach feature and InfiniBand coupling links (IFBs) on z10 EC as well as IBM System z9 Enterprise Class (z9<sup>®</sup> EC) and IBM System z9 Business Class (z9 BC) Model S07 dedicated coupling facilities. All of these features will be available May 30, 2008.

A new feature called Balanced Power Plan Ahead (#3001) was announced, designed to allow ordering the full complement of bulk power regulators (BPRs) on any configuration, to help ensure that the configuration will be in a balanced power environment. This feature is available on new build z10 EC servers on May 30, 2008. Balanced Power Plan Ahead for z10 EC MES features is available for August 29, 2008.

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**Question:**

What is the IBM System z product that was announced on February 26, 2008?

**Answer:**

The System z10 EC is a world class enterprise server designed to meet your business needs. The z10 EC is built on the inherent strengths of the IBM System z platform and is designed to deliver technologies and virtualization that provide improvements in price/performance for key workloads. The z10 EC further extends System z leadership in key capabilities with the delivery of expanded scalability for growth and large scale consolidation, improved security and availability to reduce risk, and 'just-in-time' capacity deployment, helping to respond to changing business requirements.

The z10 EC delivers:

- Improved total system capacity in a 64-way server, offering increased levels of performance and scalability to help enable new business growth.
- The z10 EC Quad-Core 4.4 GHz processor chip that can help improve the execution of CPU intensive workloads.
- Up to 1.5 terabytes of available real memory per server for growing application needs (with up to 1 TB real memory per LPAR).
- Increased scalability with 36 available subcapacity settings.
- 'Just-in-time' deployment of capacity resources which can improve flexibility when making temporary or permanent changes. Activation can be further simplified and automated using z/OS<sup>®</sup> Capacity Provisioning (available on z/OS V1.9 with PTF and on z/OS V1.10).
- New temporary capacity offering Capacity for Planned Event (CPE), a variation on Capacity Back Up (CBU), CPE can be used when capacity is unallocated but available, and is needed for a short term event.
- A 16 GB fixed Hardware System Area (HSA) which is managed separately from customer memory. This fixed HSA is designed to improve availability by avoiding outages.
- Memory and books are interconnected with a point-to-point symmetric multi processor (SMP) network running with an InfiniBand host bus bandwidth at 6 GBps designed to deliver performance.
- The InfiniBand Coupling Links can facilitate communications at increased distance within a data center (150 meters compared to 10 meters).

- The OSA-Express3 10 GbE LR with double the port density, increased throughput and reduced latency.
- HiperSockets™ improvements with Multiple Write Facility for increased performance and Layer 2 support to host IP and non-IP workloads.
- Encryption accelerator provided on quad-core chip, which is designed to provide high-speed cryptography for protecting data in storage. CP Assist for Cryptographic Functions (CPACF) offers more protection and security options with Enhanced Encryption Standard (AES) 192 and 256 and stronger hash algorithm with Secure Hash Algorithm (SHA-512 and SHA-384).
- HiperDispatch for improved efficiencies between hardware and the z/OS operating system (z/OS V1.7<sup>1</sup> and above).
- Hardware Decimal Floating Point unit on each core on the Processor Unit (PU), which can aid in decimal floating point calculations and is designed to deliver performance improvements and precision in execution.
- Large page support (1 MB pages).
- Up to 336 FICON Express4 channels.
- Fiber Quick Connect (FQC), a fiber harness integrated in the z10 EC frame for a 'quick' connect to ESCON and FICON LX channels.
- Support for the IBM System Director Active Energy Manager™ (AEM) for Linux on System z V3.1 for a single view of actual energy usage across multiple heterogeneous IBM platforms within the infrastructure. AEM V3.1 is a key component of IBM's Cool Blue™ portfolio within Project Big Green.

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### Question:

What part does the z10 EC play in a “Smarter Planet” and Dynamic Infrastructure®?

### Answer:

IBM has a vision for ‘Smarter Planet’ and we are working to help our customers build it. The motto is that the world is flatter and smaller. Now it must become smarter. There are four initiatives under Smarter Planet, these are Dynamic Infrastructure, New Intelligence, Green and Beyond, and Smart Work. In February of 2009, the driving theme of that announcement was Dynamic Infrastructure – delivering superior business and IT services with agility and speed. System z10 plays very well in Dynamic Infrastructure, in fact for many years we have delivered leadership capabilities for enterprise computing, so it's no surprise that many of those capabilities are a good match.

There are three key themes and the System z10 plays nicely to all of them:

- **Improving service** – The System z10 offers a dynamic, policy based and automated infrastructure with the ability to adapt and respond quickly to changing business imperatives,

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<sup>1</sup> z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2010. With the Lifecycle Extension, z/OS V1.7 supports the z10 BC™ server. Certain functions and features of the z10 BC require later releases of z/OS. For the complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter, dated October 21, 2008.

- **Reducing costs** – The System z10 offers industry leading virtualization, energy efficiency and scale from 26 MIPS to over 30,000 MIPS.
- **Managing Risk** - not just managing the risk requirements that we are facing today, with security, resiliency and compliance challenges, but getting in front of new risks that may come with a more connected and collaborative world.

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**Question:**

Who would be interested in the z10 EC?

**Answer:**

The z10 EC has several audiences that will be interested in its announcements. The System z10 EC is a great fit for any customer who wants a system that with intelligent policy driven / workload management capabilities, a security rich environment, large scale data server abilities and superior virtualization technologies. Existing System z customers who are looking for massive scalability for their data center but want to minimize floor space will find the high performance, energy efficient, scalable z10 EC to be a perfect fit. Also, customers who want the financial and environmental benefits available by doing large scale consolidation will find the z10 EC, along with z/VM and Linux for System z, will hit the mark for their needs. The combination of Linux applications and z/OS backend can create a powerful IT infrastructure that is flexible and rugged and that can address the most demanding and changing needs.

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**Question:**

What did IBM announce on October 21, 2008 in relation to the IBM System z10 Business Class (z10 BC)?

**Answer:**

The z10 BC delivers innovative System z technologies for small and medium enterprises. The z10 BC is a world-class enterprise server built on the inherent strengths of the IBM System z platform. It is designed to deliver advanced technologies and virtualization that provide improvements in price/performance for key new workloads. The z10 BC further extends System z leadership in key capabilities with the delivery of granular growth options, business-class consolidation, improved security and availability to reduce risk, and just-in-time capacity deployment helping to respond to changing business requirements. Whether you want to deploy new applications quickly, grow your business without growing IT costs or consolidate your infrastructure for reduced complexity, look no further—**z Can Do IT**.

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**Question:**

Who would be interested in the z10 BC?

**Answer:**

The z10 BC is designed for System z small to medium size customers that want scalability, flexibility and breakthrough technology – at the capacity entry points they want. This is also the system for new customers that are looking for mainframe qualities of service in an economically smaller package. This is the system that fights old myths and perceptions • that's not just for banks and insurance companies. This is the system for any business that wants to ramp up innovation, boost efficiencies, and lower costs • from supermarket chains to online retailers to healthcare networks. This is a new mainframe system for a new kind of data center • resilient, responsive, energy efficient. Whether users want to deploy new applications quickly, grow

their business without growing IT costs, or consolidate their infrastructure for reduced complexity, look no further — z can do it all.

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**Question:**

How do I order the z10 EC or z10 BC?

**Answer:**

Contact your IBM System z Representative or IBM Business Partner.

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**Question:**

What are the planned availability dates for the z10 EC updates?

**Answer:**

2009

- HMC feature with dual Ethernet #0090 on z10 EC, z9 EC, z9 BC

**May 29, 2009:**

- Quantity of CBU test activations coincides with the number of CBU years assigned to the CBU record
  - Expiration date of CBU records may now be extended by up to five years.
  - CBU tests will now be offered in single quantities.
  - STP configuration and time information saved across Power on Resets (POR) or power outages for two servers
  - Improved STP System Management with new z/OS Alerts
  - EAL5 Certification for z10 Enterprise Class Server
  - WWPN Prediction Tool,
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**Question:**

What are the planned availability dates of the z10 BC announcements?

**Answer:****May 29, 2009:**

- Quantity of CBU test activations coincides with the number of CBU years assigned to the CBU record
  - Expiration date of CBU records may now be extended by up to five years.
  - CBU tests will now be offered in single quantities.
  - Up to 248 GB memory available on z10 BC
  - STP configuration and time information saved across Power on Resets (POR) or power outages for two servers
  - Improved STP System Management with new z/OS Alerts
  - WWPN Prediction Tool,
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**Question:**

Will IBM continue to market the IBM System z9 Enterprise Class (z9 EC) and IBM System z9 Business Class (z9 BC)?

**Answer:**

Yes, both the z9 EC and the z9 BC will continue to be manufactured and sold.

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**Question:**

What operating system software is supported on the z10 EC?

**Answer:**

Listed are the operating systems and the minimum versions and releases supported by z10 EC, its functions, and its features. Select the releases appropriate to your operating system environments.

Note: Refer to the z/OS, z/VM, z/VSE™ subsets of the 2097 DEVICE Preventive Planning (PSP) bucket prior to installing a z10 EC.

The z10 EC requires at a minimum:

- z/OS V1.8, V1.9, V1.10
- z/OS V1.7 with IBM Lifecycle Extension for z/OS V1.7<sup>2,3</sup>
- Linux on System z<sup>3</sup>: Red Hat RHEL4 and RHEL 5, & Novell SLES 9, 10 and 11
- z/VM Version 5 Release 2<sup>4</sup>, 3<sup>4</sup> and 4
- z/VSE Version 3 Release 1<sup>3,5,6</sup>
- z/VSE Version 4 Release 1<sup>3,7</sup> and 2<sup>7</sup>
- z/TPF V1.1 is required to support 64 engines per z/TPF LPAR
- TPF V4.1 (ESA mode only)

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**Question:**

Where can I find the FAQs on the z10 EC?

**Answer:**

The URL: [www.ibm.com/systems/z/faq/](http://www.ibm.com/systems/z/faq/) that carried this FAQ list.

Note: This URL will also have the z9 BC FAQs.

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<sup>2</sup> z/OS V1.7 + zIIP Web Deliverable required for System z10 to enable HiperDispatch on System z10 (does not require a zIIP). z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2009. With this Lifecycle Extension, z/OS V1.7 supports the z10 BC server. Certain functions and features of the z10 BC server require later releases of z/OS. For a complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter, dated October 21, 2008.

<sup>3</sup> Compatibility Support for listed releases. Compatibility support allows OS to IPL and operates on a z10 EC.

<sup>4</sup> Requires Compatibility Support which allows z/VM to IPL and operate on the System z10 providing System z9 functionality for the base OS and Guests.

<sup>5</sup> z/VSE v3. 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 z10, System z9, and zSeries hardware.

<sup>6</sup> End of Service has been announced for z/VSE 3.1 and will be effective July 31, 2009

<sup>7</sup> z/VSE V4 is designed to exploit 64-bit real memory addressing, but will not support 64-bit virtual memory addressing.

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**Question:**

Where can I find the data sheets for the System z10 EC?

**Answer:**

The URLs are as follows:

**z10 EC Data Sheet:**

[http://www.ibm.com/common/ssi/cgi-bin/ssialias?infotype=PM&subtype=SP&appname=STGE\\_ZS\\_ZS\\_USEN&htmlfid=ZSD03005USEN&attachment=ZSD03005USEN.PDF](http://www.ibm.com/common/ssi/cgi-bin/ssialias?infotype=PM&subtype=SP&appname=STGE_ZS_ZS_USEN&htmlfid=ZSD03005USEN&attachment=ZSD03005USEN.PDF)

**z10 BC Data Sheet:**

[http://www.ibm.com/common/ssi/cgi-bin/ssialias?infotype=PM&subtype=SP&appname=STGE\\_ZS\\_ZS\\_USEN&htmlfid=ZSD03011USEN&attachment=ZSD03011USEN.PDF](http://www.ibm.com/common/ssi/cgi-bin/ssialias?infotype=PM&subtype=SP&appname=STGE_ZS_ZS_USEN&htmlfid=ZSD03011USEN&attachment=ZSD03011USEN.PDF)

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**Question:**

Where can I find the FAQs for the Operating Systems that support the z10 EC?

**Answer:**

The URL: [www.ibm.com/systems/z/faq/](http://www.ibm.com/systems/z/faq/) #os has FAQs for z/VM, z/VSE, z/OS and Linux on System z.

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**Question:**

Where can I get more information on recent z/OS announcements?

**Answer:**

See the z/OS Website for specific announcement letter, release, component and migration information. <http://www.ibm.com/systems/z/os/zos>

See also the z/OS V1.11 Preview:

<http://www.ibm.com/common/ssi/cgi-bin/ssialias?subtype=ca&infotype=an&appname=iSource&supplier=897&letternum=ENUS209-029>

See the z/OS V1.10 Announcement:

<http://www.ibm.com/common/ssi/cgi-bin/ssialias?subtype=ca&infotype=an&appname=iSource&supplier=897&letternum=ENUS208-186>

## IBM Destination z

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### **Question:**

What is IBM Destination z?

### **Answer:**

IBM Destination z is a community of resellers, ISVs, SI's, Academic Institutions, Client groups, and Supporters engaged with IBM System z. These organizations have joined to actively participate in: the continuous improvement to the mainframe user experience, innovation on the mainframe making System z the computing platform for today and into the future, collaborating around best practices and ideas, and jointly offering customers a "one-stop shop." Announced world wide on June 21, 2007, IBM Destination z has grown its membership and has established foundations in key developing regions, including China and India.

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### **Question:**

What does IBM Destination z provide the IT community of: current customers, prospects, press and industry analysts, and academics?

### **Answer:**

IBM Destination z provides many real and potential benefits to the IT community. It first serves to remind the marketplace that System z has a broad, growing, and rich ecosystem of companies and institutions dedicated to mainframe innovation, value, and community. IBM Destination z also helps to build a tighter coupling between 500 plus worldwide academic institutions who are fortifying their respective curricula with mainframe courses, mastery standards, and certification. That, in turn, ensures that students are trained to support mainframes and enable IT to provide unprecedented value. IBM Destination z members have recently announced a scholarship program to help encourage students who take large enterprise (System z) topics at IBM Destination z member schools to continue their education in large systems. Information on the scholarship program and Fall 2008 winners can be found at <http://www.zjournal.com/scholarship>. IBM Destination z also provides industry influencers with incontrovertible proof and affirmation of this continuously growing mainframe support. Analysts cite IBM Destination z as a prime example that the mainframe is alive and well, and worthy of investment by companies, government and private institutions wanting a dynamic, flexible, controllable, cost-effective, secure and energy efficient infrastructure.

To hear a group of IBM Destination z members talk about their experience with IBM System z and the value they see in IBM Destination z, listen to the IBM Destination z video which can be found on the IBM Destination z home page at <http://www.ibm.com/systems/z/destinationz>.

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### **Question:**

Who belongs to IBM Destination z?

### **Answer:**

Community members of IBM Destination z vary from "small" ISVs to large organizations including Resellers, System Integrators, and supporting organizations such as the IBM Systems Magazine, Mainframe Edition, zJournal and Mainframe Executive magazines. Those who belong actively contribute knowledge, case studies, references, and points of view on the mainframe. This widely spread; diverse input assures vitality, relevance, and modernity to how

the mainframe environment matches to the current global IT challenges. Universities world wide belong, as do significant User communities, some with thousands of individual members representing a few thousand organizations. Simply, IBM Destination z seems highly representative.

To hear a group of IBM Destination z members talk about their experience with IBM System z and the value they see in IBM Destination z, listen to the IBM Destination z video which can be found on the IBM Destination z home page at <http://www.ibm.com/systems/z/destinationz>.

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**Question:**

How is IBM Destination z tied into the Academic Initiative (AI)?

**Answer:**

IBM Destination z ties into the IBM System z Academic Initiative by providing access through the Web (and other means) to the latest mainframe information. IBM Destination z members help align standards, content, and curriculum ideas with the colleges and universities, world wide, who participate in the Academic Initiative program. IBM Destination z also integrates with the Academic Initiative's Student Opportunity System, a beneficial approach to connecting Mainframe-trained talented students with organizations hiring those types of employees. The Academic Initiative and IBM Destination z also link with various faculty members to tap their expertise in mainframe disciplines, and provide incentives for more research, better student performance, and more mainframe-related courses. It is increasingly the case that Academic Initiative institutions take the "next step" in mainframe support, and join IBM Destination z. Another benefit to university members of IBM Destination z is the recently announced scholarship program intended to help member universities and colleges to help fill their classrooms with bright and interested students. Information on the scholarship program and Fall 2008 winners can be found at <http://www.zjournal.com/scholarship>. Very important to note: over 50,000 students worldwide have been trained on mainframe topics in recent years. These significant numbers help assure adequate-plus talent to make owning a mainframe an exceptionally prudent decision. For more information and a list of IBM Destination z academic members: <http://www-03.ibm.com/systems/z/destinationz/academia.html>.

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**Question:**

What is the process for joining IBM Destination z?

**Answer:**

Joining IBM Destination z is straightforward. There are enrollment forms that ask basic information about an organization interested in community membership. IBM Destination z wants to be sure those joining have mainframe expertise either developing software, implementing or integrating mainframe solutions, and/or selling IBM mainframe hardware, software, services and solutions. Business Partner applicants must be a PartnerWorld® member in good standing.

The applicant submits the form that is reviewed against defined criteria to ensure eligibility. The enrollment is confirmed when eligibility is confirmed and the applicant organization provides a public reference or proof of promoting growth on the IBM System z platform.

IBM Destination z will include their logo and reference on the IBM Destination z Web site with the intent of helping the new member to be visible to System z customers, and triggering collaboration and partnership within the IBM Destination z community.

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**Question:**

What can my organization expect when/if we enroll?

**Answer:**

Your organization, whether a Business Partner, University or Client Group, or other supporting organization can expect a welcome access to portals and resources containing vital information, in depth facts and technology, connectivity to other sites, co-marketing opportunities with other IBM Destination z members and with IBM, and a strong voice in determining the attributes of the mainframe as its worldwide uptake increases. You can also expect to provide, as a Business Partner member, a yearly public reference. Additionally, we carry your company's logo on our IBM Destination z home page, and we allow you to "fly" IBM Destination z emblem on your organization's Web site. Most interesting is the level of idea exchange, technical support, and open discussion through various Blogs and other Web-initiated exchanges on topics that further the utility, cost-effectiveness, and innovation in mainframe operating environments. You will also be included in early disclosure of new products, features and solutions as business practices allow.

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**Question:**

Who is the contact point for joining and other activities?

**Answer:**

From a Worldwide standpoint, the leader for IBM Destination z and contact for or Resellers and ISVs interested in joining is Marc Smith, whose e-mail is: [smarc@us.ibm.com](mailto:smarc@us.ibm.com)

Specifically for System Integrators interested in joining, the contact point is Travis Smith, whose e-mail is: [ttsmith@us.ibm.com](mailto:ttsmith@us.ibm.com)

For Academic Institutions interested in joining IBM Destination, the contact point is Michael Todd: [todd@us.ibm.com](mailto:todd@us.ibm.com)

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**Question:**

What is the progress in mainframe skills growth?

**Answer:**

The IBM Academic Initiative has assisted over 500 schools world wide with IBM mainframe courses and resources. There is a world wide list of schools and contacts who are teaching System z. See: [ibm.com/university/systemz](http://ibm.com/university/systemz) - Participating Schools.

Educators have reported that over 50,000 students have received some level of mainframe education.

Over 8630 students from 1167 schools world wide have participated in IBM's Student Mainframe Contests.

If you have specific questions about z skills, send an e-mail to [zSkills@us.ibm.com](mailto:zSkills@us.ibm.com)

## **z10 EC Hardware**

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### **Question:**

Tell me about the processor chip on the z10 EC:

### **Answer:**

The IBM Enterprise Quad Core z10 Enterprise Quad Core processor chip is the engine for the next generation of IBM System z mainframe systems. It features a microprocessor core which is a giant leap in operating frequency, from 1.7 GHz on System z9 to 4.4 GHz on the System z10. The z10 EC chip is made up of four microprocessor cores, each with a private 3 MB cache and its own Hardware Decimal Floating Point unit. There are two coprocessor units on the z10 EC chip, each of which implements cryptographic and data compression functions, and each shared by two of the four cores. The chip also includes a memory controller (MC), I/O bus controller and a switch which connects all four cores to a shared interface with the SMP (symmetrical multi processing) hub chip and its shared cache.

The rich shared cache structure of the chip is optimized for the enterprise data serving workloads which are the heart of the mainframe, and the comprehensive high frequency design helps the chip yield more performance for CPU-intensive applications which are a growing part of System z new workloads.

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### **Question:**

What about the z10 EC makes it so good for consolidation of server farms?

### **Answer:**

Scale is the first big factor making the z10 EC great for consolidation of distributed x86 servers. The 4.4 GHz chip means more processing power per chip, along with the increase in number of available processing units per z10 EC. And the z10 EC 64-way offers 1.7x more total server capacity than a System z9 EC 54-way. The z10 EC also delivers up to 3x (1.5 terabytes) the memory of the z9 EC (1.5 TB per server, 1 TB per LPAR).

You can also save real dollars when consolidating due to less software costs and less floor space requirements. Using z/VM, the gold standard of virtualization software, you have automation capabilities, provisioning, management and the most sophisticated and complete hypervisor available.

z/OS on System z10 scales big for consolidation opportunities too. z/OS V1.9 and later support up to 64 cores (zIIPs, zAAPs, CPs) per LPAR. Up to 32 z/OS LPARS can be configured in a single-image Parallel Syplex<sup>®</sup> cluster with shared data (that's up to 2,048 cores total). z/OS V1.8 and later support up to 4 TB of real memory; on the z10 EC, you can have up to 1 TB of real memory per LPAR. Support for large (1 MB) pages can be used in addition to the existing 4 KB page size, and this is expected to reduce memory management overhead for exploiting applications (z/OS 1.9 and later). Support for storage volumes with up to 262,668 cylinders, or up to 223 GBs of addressable storage per volume addresses current storage constraints and helps simplify storage management (z/OS V1.10 and IBM System Storage<sup>™</sup> DS8000<sup>™</sup>).

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**Question:**

It looks like you are using the same modular design you had on the z990 and the z9 EC – what is the significance of this design?

**Answer:**

The modular design creates the opportunity to address the ever increasing costs related to building systems with increasing capacities. The flexible 'book' design means that you can start with exactly the configuration you need, and expansion in the family can be easy and almost always concurrent (upgrading from any model to the enhanced capacity Model E64 will require a planned outage).

The modular book design also allows for a reduction in planned and unplanned outages by offering concurrent repair, replace and upgrade functions for processors, memory and I/O.

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**Question:**

Is the z10 EC still a superscalar processor?

**Answer:**

Yes. A scalar processor is a processor that is based on a single issue architecture, which means that only a single instruction is executed at a time. A superscalar processor allows concurrent execution of instructions by adding additional resources onto the microprocessor to achieve more parallelism by creating multiple, longer pipelines, each working on their own set of instructions. Software compilers and interpreters can be designed to work with superscalar processor implementations. In the case of the z10 EC, the C++ compiler and Java™ Virtual Machine for z/OS exploit microprocessor superscalar implementation. The intent is to improve the performance advantage for workloads such as WebSphere® and Java applications.

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**Question:**

What is the machine type of the z10 EC?

**Answer:**

The machine type is 2097.

---

**Question:**

What z10 EC models were announced?

**Answer:**

The following models were announced – note that the last two digits of the model indicate the maximum number of processor units (PUs) available for purchase on the model:

- A z10 EC E12 model can be a 1-way through 12-way – which means there are 12 processor units (PUs) contained on one book.
- A z10 EC E26 model can be a 1-way through 26-way (26 PUs) contained on two books.
- A z10 EC E40 model can be a 1-way through 40-way (40 PUs) contained on three books.
- A z10 EC E56 model can be a 1-way through 56-way (56 PUs) contained on four books.

The enhanced capacity z10 EC E64 model can be a 1-way through 64-way (64 PUs) contained on four books.

The PUs can be configured as general purpose processors (CPs), Integrated Facilities for

Linux (IFLs), System z10 Application Assist Processors (zAAPs), System z10 Integrated Information Processors (zIIPs), additional System Assist Processors (SAPs), Internal Coupling Facilities (ICFs) or used as additional spares.

Only twelve subcapacity processors can be active on the server (and it doesn't matter which model you have). When more than twelve CPs have been purchased on servers that have more than one book, a selection can be made to activate only 12 or fewer subcapacity features. This means that the subcapacity settings are available on any of the models as long as they are configured (not the same as purchased) with twelve or fewer general purpose processors.

---

**Question:**

Does the z10 EC offer more available subcapacity processors than the z9 EC?

**Answer:**

Yes up to 50% more subcapacity choices as compared to the z9 EC. The z10 EC can have up to 12 subcapacity Central Processors (CPs) per server while the z9 EC accommodates up to eight subcapacity CPs. These can reside in multiple books.

---

**Question:**

If the total memory available on the z10 EC is 1.5 TB, and I get 16 GB of memory for my HSA, how much memory is available per book?

**Answer:**

The z10 EC server supports up to 1.5 TB of real memory per server, and 1.0 TB per LPAR, but the actual maximum physical memory sizes are related to the number of books in the system. Each book may contain a maximum of 384 GB of physical memory and in a four book system up to 1520 GB (1.5 TB) of physical memory can be purchased. This is equal to four books times 384 GB minus 16 GB reserved for the HSA.

Memory sizes in each book do not have to be similar; different books may contain different amounts of memory.

The minimum initial amount of memory that can be ordered is 16 GB for all models.

---

**Question:**

How does the z10 EC report processor information such as model number and CPU ID information?

**Answer:**

There are two instructions used to obtain processor information. Store System Information Instruction (STSI) and Store CPU ID instruction (STIDP). In response to customer requests, the STSI instruction is modified on the z10 EC, to give more useful and detailed information about the base configuration as well as information about possible concurrent upgrade options. The change should make it easier for customers to resolve billing situations where Independent Software Vendor (ISV) products are in use.

The STSI instruction has been updated to return the Model Capacity Identifier for the permanent configuration, as well as the Model Capacity Identifier for any temporary capacity such as On/Off CoD or CBU capacity.

The Store CPU ID (STIPD) provides information about the processor type, serial number, and logical partition identifier.

---

**Question:**

What is different about the Model E64?

**Answer:**

The Model E64 is an enhanced capacity model, which contains a different configuration of MCMs. The z10 EC is fully populated with four books and 64 orderable PUs. You can customize the machine to be a 1 to 64-way. Like the other four book model, the E56, the E64 can be ordered with a minimum of 16 GB of memory up to a maximum of 1.5 TB.

Upgrade from any other model of the z10 EC to a Model E64 will require a planned outage.

---

**Question:**

How many spare processing units are on the z10 EC?

**Answer:**

There are two spare processing units on the z10 EC. These spares can be shared across the books. The z10 EC offers core (engine) level sparing.

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**Question:**

Can any of these spare processing units be used for other purposes?

**Answer:**

No. These spare processing units are only used to provide failover in the remote event of a processor failure: general purpose processors (CPs), Integrated Facilities for Linux (IFLs), System z10 Application Assist Processors (zAAPs), System z10 Integrated Information Processors (zIIPs) or Internal Coupling Facility (ICFs).

---

**Question:**

How many System Assist Processors (SAPs) are on the z10 EC?

**Answer:**

The answer depends on the model. The number of SAPs provided to the customer as standard are as follows:

- The z10 EC Model E12 has three.
- The z10 EC Model E26 has six.
- The z10 EC Model E40 has nine.
- The z10 EC Model E56 has ten.
- The z10 EC Model E64 has eleven.

Additionally, the customer can acquire more SAPs from among the pool of available processing units within the model.

---

**Question:**

What is different on the Hardware System Area (HSA) on the z10 EC compared to earlier servers?

**Answer:**

On the z10 EC, a 16 GB area is set aside for the HSA and will be managed independently of purchased memory. The fixed size of the HSA eliminates planning for future expansion of HSA since HCD/IOCP will always reserve:

- Four Channel Subsystems (CSSs)
- Fifteen logical partitions in each CSS for a total of 60 Logical Partitions
- Subchannel set 0 with 63.75 K devices in each CSS
- Subchannel set 1 with 64 K devices in each CSS.

---

**Question:**

What is meant by 'just-in-time' deployment of capacity on the z10 EC?

**Answer:**

Customers have asked us to ease the administrative tasks required to activate temporary capacity. There is a need to be able to access and implement our temporary offerings (CBU and On/Off CoD) much more quickly than we've been able to in the past, in some cases to automate it so the server itself can determine that capacity may be required or no longer required, and handle the changes automatically. Significant rework has been done in the provisioning architecture on the z10 EC to make your ability to handle capacity changes much more efficiently and 'just-in-time' to meet your needs.

---

**Question:**

What is different with z/VM mode partitions?

**Answer:**

System z10 EC (and the z10 BC) allows you to define a z/VM-mode partition (LPAR) containing a mix of processor types including CPs and specialty engines - IFLs, zIIPs, zAAPs, and ICFs. With z/VM V5.4 support, this capability increases flexibility and simplifies systems management by allowing z/VM to manage guests to operate Linux on System z on IFLs, to operate z/VSE and z/OS on CPs, to offload z/OS system software overhead, such as DB2® workloads on zIIPs, and to offer an economical Java execution environment under z/OS on zAAPs, all in the same z/VM LPAR.

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**Question:**

What is the Hardware Decimal Floating Point unit on the z10 EC processor chip and what types of applications will take advantage of it?

**Answer:**

Speed and precision in numerical computing are important for all our customers. Each core on the PU of the z10 EC has its own hardware decimal floating point unit, designed to improve performance of decimal floating point over that provided by the System z9. Decimal calculations are often used in financial applications and those done using other floating point facilities have typically been performed by software through the use of libraries. With a hardware decimal floating point unit some of these calculations may be done directly and accelerated.

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**Question:**

What is HiperDispatch?

**Answer:**

Please refer to the Performance Section of this document.

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**Question:**

What is the large page support announced for the z10 EC?

**Answer:**

Page frames are allocated with a 4K size. The z10 EC additionally supports a larger page frame size of 1 MB. It is expected that long running, memory access intensive applications will benefit from large page frames.

---

**Question:**

What Hardware Management Console (HMC) enhancements were announced in October 2008? Can we do messaging to other users off the HMC?

**Answer:**

The 2.10.1 HMC will continue to support up to two 10 Mbps or 100 Mbps Ethernet LANs. The 2.10.1 HMC applications have been updated to support HMC hardware without a diskette drive. DVD-RAM, CD-ROM, and/or USB flash memory data media will be used.

There is a console messenger task that offers basic messaging capabilities to allow system operators or administrators to coordinate their activities. The task may be invoked directly, or using a option in *Users and Tasks*. Note that this feature is a limited messenger application and does not interact with other messengers.

The HMC z/VM Systems Management enhancements allow selected virtual resources to be defined. Additional enhancements have been made for managing virtual resources. These enhancements are designed to deliver out-of-the-box integrated graphical user interface-based (GUI-based) management of selected parts of z/VM. This is especially targeted to deliver ease-of-use for enterprises new to System z. You will not be required to purchase additional hardware or software, perform installations, or utilize complicated setup procedures. You can more seamlessly perform hardware and selected operating system management using the HMC Web browser-based user interface.

HMC version 2.10.1 along with Support Element (SE) version 2.10.1 on z10 EC will now give you the ability to install Linux on System z in a z/VM virtual machine using the HMC DVD drive. This function does not require an external network connection between z/VM and the HMC, but instead, uses the existing communication path between the HMC and the SE.

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**Question:**

What is the Universal Lift Tool / Ladders feature (#3759)?

**Answer:**

The Universal Lift Tool / Ladders feature includes a custom lift / lower mechanism that is specifically designed for use with the z10 EC frames. It is designed to provide customers with enhanced system availability benefits by improving the service and upgrade times for larger, heavier devices.

It is recommended that one of these features be obtained for each customer account / data center.

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**Question:**

Can I buy a z10 EC that has only IFL or ICF processors without including a general purpose processor (CP)?

**Answer:**

Yes. Similar to the z9 EC, you can order only IFLs or ICFs in a z10 EC, using a model capacity of 700 with 1 to 64 IFLs or a maximum of 16 ICFs.

---

**Question:**

What is the Frame Bolt-Down kit used for?

**Answer:**

A Bolt-Down Kit for raised floor and non-Raised floor environments provides frame stabilization floor tie-down hardware to help secure a System z frame to a concrete floor beneath a 9- to 13-inch or 12- to a 22-inch raised floor.

These are designed to help secure the frames and their contents from damage when exposed to vibrations and shocks such as those in a seismic event. The frame tie downs are intended for securing a System z frame weighing less than 3600 lbs per frame. These tie downs are designed to help secure the frame on a raised floor.

These kits are provided on AN "AS IS" BASIS, WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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**Question:**

Are there different kits available?

**Answer:**

Yes, the following kits are available. For z10 EC, you need a quantity of two Bolt-Down kits.

(#7994) - Bolt-Down Kit, High-Raised Floor 2097 • This feature provides frame stabilization and bolt-down hardware to help secure a frame to a concrete floor beneath a 11.75- to 16.0-inch (298mm to 405mm) raised floor.

(#7993) - Bolt-Down Kit, Low-Raised Floor 2097 • This feature provides frame stabilization and bolt-down hardware to help secure a frame to a concrete floor beneath a 9.25- to 11.75-inch (235mm to 298mm) raised floor.

---

**Question:**

Will the z10 EC offer the Power Monitor and Power Estimation capabilities available on the System z9 servers?

**Answer:**

Yes. The tool is designed to help monitor the power consumption and temperature of the z10 EC or System z9 server. The System Activity Display (SAD) on the Hardware Management Console (HMC) can display the current total power consumption in watts and Btu/hour and can also display the input temperature.

When doing data center planning, or server upgrade planning, there is a tool on IBM Resource Link™ that can be used to estimate the anticipated power consumption of a particular machine model and its associated configuration. A user will input the machine model, memory, and I/O configuration and the tool will output an estimate of the power requirements needed for the system.

## **z10 EC Upgradeability**

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**Question:**

What are the upgrade paths from a z9 EC or a z990 to the z10 EC?

**Answer:**

All models of the z9 EC and the z990 can upgrade directly to a z10 EC.

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**Question:**

Is there an upgrade path from a z10 BC to the z10 EC?

**Answer:**

Yes. The z10 BC E10 can upgrade into a z10 EC Model E12.

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**Question:**

Can I upgrade any z10 EC to a Model E64?

**Answer:**

Yes, but it is important to note that upgrading other z10 EC models to the E64 will be disruptive due to the difference in MCMs on the E64.

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**Question:**

Will I be able to upgrade from a full capacity z10 EC to a subcapacity z10 EC?

**Answer:**

Yes. Each of first twelve general purpose processors on the z10 EC can be divided into one full capacity and three sub-units. This creates a 12 by 4 matrix of settings. As long as upgrades are positive capacity growth, you can move around anywhere within the matrix when adding capacity. When your number of general purpose processors exceeds twelve, then all of the general purpose processors must be full capacity.

---

**Question:**

Can I have subcapacity processors if I have more than one book?

**Answer:**

Yes. But remember that only twelve subcapacity processors can be active on the server (and it doesn't matter which model you have). When more than twelve CPs have been purchased on servers that have more than one book, a selection can be made to activate only 12 or fewer subcapacity features. This means that the subcapacity settings are available on any of the models as long as they are configured (not the same as purchased) with twelve or fewer general purpose processors.

---

**Question:**

I have a question about the 1:1 ration between CP processor cores and zAAPs/zIIPs and upgrading my processor. I have a z9 EC-S28-712 with 12 CP processors cores and 12 zAAPs and am planning to upgrade to a z10 EC-E26-708 with 8 CP processor cores. Due to the 1:1 will I only be able to upgrade 8 zAAPs and lose my investment in the 4 other zAAPs?

**Answer:**

No. Our System z configurator will NOT reduce the numbers of zAAPs since you have already bought them. In the example above, you will get 8 CP processor cores and 12 zAAPs. At the time of the upgrade, all 12 zAAPs will be available for use, but the configurator will not allow you to order any additional zAAPs until you are within the 1:1 ratio. That means that going forward, if you order 1, 2, 3 and 4 CPs, you can NOT get another zAAP. When you order 5 additional CPs then they could order another zAAP.

## Availability Enhancements

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**Question:**

What availability enhancements are on the z10 EC?

**Answer:**

Our availability focus in System z is to prevent failures from occurring in the first place. As our hardware products have matured, we continue to provide enhancements to avoid scheduled and unscheduled outages. For the z10 EC, updates that focused on these types of outages include concurrent firmware fixes, concurrent driver upgrades, concurrent parts replacement and concurrent hardware upgrades.

The z10 EC puts more focused attention on avoidance of planned outages. These include the 'just-in-time' deployment of capacity, the design to eliminate unnecessary CBU passwords, enhanced driver maintenance and the design to eliminate a logical partition deactivation/activate/IPL. Having the 16 GB defined HSA allows for changes such as the dynamic add of features and functions to the server without the need for Power-On-Reset.

The z10 EC also offers Plan Ahead Memory that provides the ability to plan for non-disruptive memory upgrades. With Plan Ahead Memory the z10 EC can be pre-plugged based on a target capacity. Pre-installed memory can be activated via a Resource Link or MES order. It is important to remember that removing memory is disruptive.

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**Question:**

What does it mean when IBM says the z10 EC will help 'eliminate' preplanned outages for hardware changes?

**Answer:**

Preplanning requirements have been reduced for the z10 EC primarily with the introduction of the fixed size reserved 16 GB HSA. By having enough memory available that is not carved from user purchased memory, a full I/O configuration can be created that takes into account configuration possibilities that might happen in the future. It is important to have these changes already defined, because with the z10 EC, it is now possible to dynamically:

- Add a logical partition
- Add a Logical Channel Subsystem (LCSS)
- Add a Subchannel set
- Add a logical CP to a logical partition
- Remove a logical CP from a logical partition
- Add a cryptographic coprocessor
- Remove a cryptographic coprocessor
- Enable I/O connections
- Swap processor types

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**Question:**

What is Plan Ahead Memory?

**Answer:**

Plan Ahead Memory allows for future memory upgrades to be preplanned and non-disruptive. The preplanned memory feature will add the necessary physical memory required to support target memory sizes. If you anticipate an increase in memory requirements, a "target" logical memory size can now be specified in the configuration tool along with a "starting" logical memory size. The configuration tool will then calculate the physical memory required to satisfy this target memory. Should additional physical memory be required, it will be fulfilled with the preplanned memory features. Activation of any preplanned memory requires the purchase of preplanned memory activation features. One preplanned memory activation feature (#1992) is required for each preplanned memory feature (#1991). You now have the flexibility to activate memory to any logical size offered between the starting and target size.

---

**Question:**

Will the z10 EC offer the flexible memory option?

**Answer:**

Yes. Flexible memory was introduced on the z9 EC as part of design changes and offerings to support enhanced book availability. Flexible memory provides the additional resources to maintain a constant level of memory when replacing a book. On z10 EC, the additional resources required for the flexible memory configurations are provided through the purchase of preplanned memory features (#1996) along with the purchase of your memory entitlement. Flexible memory configurations are available on the E26, E40, E56 and E64 only and range from 32 GB to 1136 GB, depending on the model.

---

**Question:**

How is Flexible memory different than the Plan Ahead memory?

**Answer:**

Flexible memory provides a constant level of memory when you are replacing a book on the z10 EC. Used during a repair action. Plan Ahead memory is pre-plugged in the anticipation of wanting to increase memory at some point in the future, and not wanting it to be disruptive. Memory is pre-plugged based on a target capacity.

---

**Question:**

What is Dynamic Memory Upgrade?

**Answer:**

System z servers provide a dynamic storage-reconfiguration capability to change the amount of main storage available for use in a logical partition (LPAR) which the partition is active. With z/VM V5.4, memory can be added non-disruptively to individual guests that support the dynamic memory reconfiguration architecture. Systems can now be configured to reduce the need to re-IPL z/VM. Processors, channels, OSA adapters, and now memory can be dynamically added to both the z/VM system itself and to individual guests.

Remember that z/VM does not support the release of real storage. Once storage has been added to a running z/VM configuration, it cannot be removed without a z/VM system shutdown,

LPAR deactivation and reactivation, and z/VM system IPL.

---

**Question:**

What is the cryptography availability enhancement designed into the z10 EC?

**Answer:**

With the cryptography availability enhancement to dynamically add cryptographic features to logical partitions you can make changes to image profiles to support Crypto Express2 features without outage to the logical partition. You can also dynamically delete or move Crypto Express2 features. And, all without preplanning.

---

**Question:**

Remind me about Enhanced Book Availability and Redundant I/O Interconnect?

**Answer:**

Introduced on the System z9, Enhanced Book Availability allows a single book in a multi-book server to be concurrently removed and reinstalled for an upgrade or a repair. Removing a book would mean that connectivity to the I/O connected to that book is lost – but to prevent connectivity loss, the Redundant I/O Interconnect feature allows you to maintain full connection to critical devices when a book is removed.

---

**Question:**

What is AutoIPL in the z/OS v1.10?

**Answer:**

AutoIPL is an availability function, introduced in z/OS 1.10, that allows the system to automatically IPL either stand-alone dump, z/OS, or both, either when the system requests certain disabled wait states to be loaded, or when specified as part of a request to VARY the system out of a sysplex. AutoIPL capability is intended to help you achieve faster failure data capture and recovery after system failures. Parallel Sysplex users see also FLASH 10655 <http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/FLASH10655>

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**Question:**

What changes were made to Enhanced Driver Maintenance (EDM) on the System z10?

**Answer:**

There are several reliability, availability and serviceability (RAS) enhancements that have been made to the HMC/SE based on customer input on EDM on the System z9. There will be a change to better handle intermittent customer network issues, performance improvements, EDM user interface features to allow for customers and service personnel to better plan for the EDM, and a option to check all licensed internal code which can be executed in advance of the EDM preload or activate.

## IFL, zAAP and zIIP specialty engines

### Question:

What were some of the recently announced System z Specialty Engine exploiters?

### Answer:

There are several recent exploiters for System z specialty engines.

**Intra-server communications** - z/OS V1.11 (previewed February 2009) is planned to be updated so z/OS CIM<sup>8</sup> server processing is enabled to run on the System z Integrated Information processor (zIIP). This means CIM client applications that use the CIM server for basic information interchange on z/OS resources (such as RMF™, WLM, DFSMS™ and BCP) or applications that use it for more sophisticated z/OS cross-platform system management (such as the System z Capacity Provisioning Manager, the z/OS Management Facility problem determination capability (statement of direction)) can benefit. Specifically, the CIM Server and the CIM Provider workloads are planned to be eligible for zIIP. Java-based CIM client applications on z/OS are already enabled to execute on the zAAP.

**TCP/IP large messages** - In z/OS V1.10, HiperSockets was enhanced for zIIP exploitation. Specifically, the z/OS Communications Server allows the HiperSockets Multiple Write operation for outbound large messages (originating from z/OS) to be performed by a zIIP. Application workloads based on XML, HTTP, SOAP, Java, etc as well as traditional file transfer can benefit. This function helps to reduce lower general purpose processor utilization by such traffic. This function is available with z/OS V1.10 and System z10 only.

**Large scall Business Intelligence reporting** - IBM Scalable Architecture for Financial Reporting™ (SAFR) is a solution from IBM Global Business Services that is designed to deal with the problem of efficiently reporting on large volumes of transaction data. SAFR is based on a set of software components with patented technology embedded, and may be customized for use with new or existing data extraction and reporting applications. SAFR provides a high-volume, high performance reporting solution by running many diverse queries in z/OS batch. GBS can architect SAFR to exploit the zIIP. SAFR is supported on a System z9 or System z10 server and z/OS V1.8 or later.

Another enhancement that affects the System z10 EC (and the z10 BC) engines is the z/VM 5.4 extension with z/VM mode partitions. This function allows you to define a z/VM-mode partition (LPAR) containing a mix of processor types including CPs and specialty engines - IFLs, zIIPs, zAAPs, and ICFs. With z/VM V5.4 support, this capability increases flexibility and simplifies systems management by allowing z/VM to manage guests to operate Linux on System z on IFLs, to operate z/VSE and z/OS on CPs, to offload z/OS system software overhead, such as DB2 workloads on zIIPs, and to offer an economical Java execution environment under z/OS on zAAPs, all in the same z/VM LPAR.

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<sup>8</sup> CIM is an industry standard for defining and sharing information between devices and programs and can be used for cross-platform and cross-system monitoring tools and management applications. A standard framework is used so CIM client applications can request CIM servers to return information about the resources they are aware of.

---

**Question:**

What other Specialty Engines exploiters have been introduced previously?

**Answer:**

There are several exploiters for System z specialty engines.

**Remote Mirror** - z/OS Global Mirror (formerly Extended Remote Copy XRC) is enabled for the zIIP. Specifically, z/OS DFSMS allows most System Data Mover (SDM) processing associated with z/OS Global Mirror to be eligible to run on the zIIP. The capability is available with: z/OS V1.10, or z/OS V1.9 and V1.8 with PTF; and IBM System Storage™ DS8000, or any storage controller supporting z/OS Global Mirror.

**Network encryption** - z/OS Communications Server IPsec is enabled for the zIIP. The z/OS Communications Server allows portions of IPsec processing to take advantage of zIIPs. With zIIP Assisted IPsec, the zIIPs, in effect, become an encryption engine. In addition to performing the encryption processing, the zIIP will also handle cryptographic validation of message integrity, and IPsec header processing. This capability was available August 2007 via z/OS V1.8 and PTFs and native in z/OS V1.9.

**Data serving and Business Intelligence** - DB2 UDB V8 and DB2 V9.1 can exploit the zIIP. There are several types of DB2 for z/OS workloads that may benefit from zIIP. These are:

- Data serving - For applications, running on z/OS, UNIX, Intel, or Linux on System z that access DB2 for z/OS on a System z9 or System z10, via DRDA over a TCP/IP connection, portions of DB2 SQL requests are eligible for the zIIP.
- Data Warehousing applications - Requests that utilize DB2 for z/OS for long running parallel queries, including complex star schema parallel queries, may have portions of these SQL requests directed to the zIIP. These queries are typical in data warehousing implementations.
- Some DB2 for z/OS V8 utilities - A portion of DB2 utility functions used to maintain index maintenance structures (LOAD, REORG, and REBUILD INDEX) that typically run during batch, can be redirected to the zIIP.
- DB2 9 pureXML™ - SEE the XML Section.

These capabilities are supported with z/OS V1.7 and later (DB2 9 pure XML exploitations z/OS XML System Services validating parsing available with z/OS V1.10). Please note, z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2010. With the Lifecycle Extension z/OS V1.7 supports the z10 BC. Certain functions and features of the z10 BC require later releases of z/OS. For the complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter dated October 21, 2008.

**Java** - All Java performed by the IBM Java Virtual Machine on z/OS is eligible for zAAP. This function is available with z/OS V1.7 and later. In addition you need the IBM Solution Developers Kit for z/OS, Java 2 Technology Edition, V1.4 (or later) and for WebSphere-based Java workloads, WebSphere Version 5.1 or later. Please note, z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2010. With the Lifecycle Extension z/OS V1.7 supports the z10 BC. Certain functions and features of the z10 BC require later releases of z/OS. For the complete list of software support, see the PSP buckets and the

Software Requirements section of the System z10 BC announcement letter dated October 21, 2008.

**XML** - All XML validating and non-validating parsing performed by z/OS XML System Services is enabled to take additional advantage of the zIIP or the zAAP. See subsequent question for more details on z/OS XML System Services exploiters.

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**Question:**

What is z/OS Global Mirror and what is the value of zIIP enabling it?

**Answer:**

z/OS Global Mirror (previously known as Extended Remote Copy or XRC) provides a long-distance remote copy solution across two sites for open systems and zSeries data using asynchronous technology. It uses System Data Mover (SDM) to perform the data movement and management of the consistency of the data. The z/OS Global Mirror maintains a copy of the data asynchronously at a remote location, and can be implemented over unlimited distances. It is a combined hardware and software solution that offers data integrity and data availability and can be used as part of business continuance solutions, for workload movement, and for data migration. Although the main z/OS Global Mirror implementation consists of host resident software, special z/OS Global Mirror support is required in the DS8000™ that attaches the z/OS Global Mirror primary volumes.

With zIIP assisted z/OS Global Mirror, the zIIP essentially becomes a z/OS data mirroring engine that can provide better price performance and improved utilization of resources at the recovery site. Most DFSMS system data mover (SDM) processing is eligible to be redirected to a zIIP processor, which can help lower server utilization at the recovery site, or create server "white space" to be used for other projects.

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**Question:**

Can I order subcapacity specialty engines?

**Answer:**

No. All specialty engines on the z10 EC run at full capacity.

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**Question:**

What is the value of the Integrated Facility for Linux (IFL)?

**Answer:**

The attractively priced IFL processor enables you to purchase additional processing capacity exclusively for Linux workloads, without affecting the MSU rating of the IBM System z model designation. This means that an IFL will not increase charges for System z software running on general purpose processors in the server.

---

**Question:**

How does Linux benefit from running on the z10 EC?

**Answer:**

The increased power of the z10 EC processor combined with other architectural advances like the increased number of Logical Partitions (LPARs) and the improved internal I/O throughput gives the z10 EC the ability to run increased workloads.

Since the price of the Integrated Facility for Linux (IFL) for this solution package is similar, whether you buy it for the z10 EC, z9 EC, z990, or z900, and the price for Linux software is typically processor-based. This can mean customers may be able to either support larger numbers of users for a similar software price, or provide greater performance for the same number of users at a similar price.

So customers get a price/performance improvement for Linux workload with each successive generation of mainframe technology. Actual improvements are dependent on the environment. The combination of Linux applications and z/OS backend can create a powerful IT infrastructure that is flexible and rugged and that can address the most demanding and changing needs.

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**Question:**

Is the functionality of the IFL the same as a general purpose processor?

**Answer:**

Yes, the IFL has the same functionality as a general purpose processor on a System z. It supports On/Off Capacity on Demand (On/Off CoD), Capacity Upgrade on Demand for the non-disruptive addition of one or more IFLs, and Capacity BackUp (CBU) for emergency situations. HiperSockets can be used for communication between Linux systems, or Linux and other operating systems on the same System z platform.

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**Question:**

Can I buy a System z10 EC server that is made up entirely of IFL processors and no general purpose processors?

**Answer:**

Yes. A dedicated System z10 EC Linux server is available, meaning that all processors are IFLs on this System z10 EC server. Please see your IBM or Business Partner representative for more information on it.

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**Question:**

What is a System z10 Application Assist Processor (zAAP)? What is the benefit to z/OS customers?

**Answer:**

zAAPs help enable customers to strategically integrate new application technologies such as their Java technology-based Web applications today and XML-based data interchange services with their core business database environment by providing a more cost-effective, specialized z/OS application Java execution environment.

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**Question:**

How do Java-based applications benefit from the zAAP?

**Answer:**

zAAPs can enable customers to run Java Web applications next to mission-critical data for integrated, security-rich and efficient application and database serving. Execution of these new applications within the same z/OS LPAR as their associated database subsystems can help simplify server infrastructures and improve operational efficiencies by reducing the number of

TCP/IP programming stacks, firewalls, physical interconnections and their associated processing latencies that might otherwise be required when the application servers and their database servers are deployed on separate physical server platforms.

By executing the Java cycles on a zAAP, you can reduce the demands and capacity requirements on general purpose CPs which may then be available for reallocation to other IBM mainframe workloads.

Furthermore, zAAPs allow customers to purchase additional processing power exclusively for Java workload execution without affecting the total MSU rating or machine model designation, as zAAPs do not carry a rated capacity. Consequently, IBM does not impose software charges on zAAP capacity. Additional IBM software charges will apply only when additional general purpose CP capacity is used.

Moreover, zAAPs may have the effect of reducing charges for subcapacity eligible IBM software products by lowering the rolling 4-hour average MSUs for LPARs with assigned zAAPs.

Best of all, the IBM JVM processing cycles can be executed on the configured zAAPs with no anticipated modifications to the Java application(s).

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**Question:**

What are the hardware and software prerequisites of the IBM zIIP?

**Answer:**

The z10 EC will ship with the appropriate driver code to support a zIIP should you order one. zIIP is supported by z/OS V1.8, V1.9, and V1.10. z/OS V1.7 is supported via the IBM Lifecycle Extension for z/OS V1.7<sup>(1)</sup> and the zIIP Web download.

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**Question:**

If my application is a business intelligence application that is also network attached (using DRDA over TCP/IP), does this mean that my workload can leverage the eligible redirect for star schema parallel processing and DRDA over TCP/IP?

**Answer:**

Yes, you can benefit from both eligible redirects. If a star schema parallel query comes in remotely via DRDA over TCP/IP, a portion of the workload coming across the DRDA over TCP/IP connection can be redirected to the IBM zIIP, as well as the portion of the star schema parallel query processing that is redirected.

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**Question:**

What is z/OS XML System Services?

**Answer:**

z/OS XML System Services (z/OS XML) is a system level XML parser that is integrated with the base z/OS operating system and is intended for use by system components, middleware and applications that need a simple, efficient, non-validating XML parsing solution. XML plays a vital role in the development and adoption of SOA (Service-Oriented Architecture) solutions because in many cases, the messages flowing between the SOA services are XML. As a result, having XML processing on z/OS and making portions of XML processing eligible for the

System z specialty engines is a logical direction for the adoption of XML-based technologies on z/OS.

z/OS XML System services is available with z/OS V1.8 and V1.7 with PTF. (Please note, z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2010. With the Lifecycle Extension z/OS V1.7 supports the z10 BC. Certain functions and features of the z10 BC require later releases of z/OS. For the complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter dated October 21, 2008).

**Question:**

What z/OS XML System Services processing is eligible for the zAAP and zIIP processors?

**Answer:**

All validating and non-validating XML parsing being performed by z/OS XML System Services (z/OS XML) is eligible for either zIIP or zAAP. The z/OS XML processing eligibility for zAAPs and zIIPs was rolled out over time and there are now many exploiters of these z/OS XML services. The following table summarizes the XML workload, the exploiter, its availability and other requirements.

Workload	Examples	Available	Redirect	Requirements	
z/OS XML System Services, non-validating parsing, – executing in TCB mode	- any SW using z/OS XML System Services parsing in TCB - EXAMPLE : local applications inserting/ saving XML data, and XML table loads on DB2 9 - select XML Toolkit for z/OS V1.9 parsing workloads	Sept. 2007 (with z/OS V1.9 GA)  May 2008	100% of z/OS XML System Services parsing - eligible for zAAP	Available with: - z/OS 1.9 - z/OS 1.8 (w/ OA20308) - z/OS 1.7 (w/ OA16303 and OA20308)  C API available with: - z/OS 1.9 - z/OS 1.7 & 1.8 w/ APAR OA18713	DB2 9 New Function Mode XML Toolkit for z/OS V1.9 (5655-J51) with PTFs UA40707 UA40708 Enterprise COBOL V4.1 (5655-J51) z/OS V1.7- V1.9 with APAR OA22777 Enterprise PL/I V3.8 (5694-A01) and z/OS V1.8
	- Enterprise COBOL V4.1, using XMLPARSE option	Dec. 2007			
	- Enterprise PL/I V3.8 using PLISAXC built-in subroutine	Oct. 2008			
z/OS XML System Services, non-validating parsing, executing in enclave SRB mode	- DB2 9 inserting/ saving XML data using DRDA via TCP/IP	Sept. 2006 (with GA of z/OS V1.8)	Same % as the zIIP-eligible work (DRDA)	Available with: - z/OS 1.8, - z/OS 1.7 w/ OA16303	DB2 9 New Function Mode
	- any SW (including DB2 9) using z/OS XML System Services in enclave SRB mode	Sept 2008 (w/GA of z/OS V1.10)	100% of z/OS XML System Services parsing eligible for zIIP		z/OS 1.9 and 1.8 (both with APAR OA22035) DB2 9 NFM
z/OS XML System Services with validating parsing, both enclave SRB and TCB modes.	- any SW using z/OS XML System Services validating parsing	Sept 2008 w/GA z/OS V1.10	100% of z/OS XML System Services validating parsing eligible zAAP or zIIP	Available with - z/OS V1.10 - z/OS V1.9 with PTF for APAR A25903	
	- select XML Toolkit for z/OS workloads	Dec 2008 (GA Toolkit 1.10)	TCB mode for zAAP, enclave SRB mode for zIIP		XML Toolkit V1.10
Java-based XML parsing	- applications using Java-based XML parser in IBM SDK - any SW performing XML parsing/ processing in Java	Yes (with availability of zAAP)	100% of Java-based XML parsing eligible for zAAP		Any z/OS, System z processor with zAAP support.

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**Question:**

If Linux on System z10 is running in an LPAR on the z10 EC, accessing DB2 UDB for z/OS V8, can portions of the eligible work be redirected to the zIIP?

**Answer:**

Yes. Whether the customer is using HiperSockets or some other network to access the DB2 database, the Linux application can take advantage of redirection of processing to the zIIP.

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**Question:**

Will the z/OS support for WLM goal mode management for zAAP processors be extended to the zIIP specialty engines?

**Answer:**

Yes. WLM will manage zIIPs the same way it already manages CPs and zAAPs.

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**Question:**

What does z/VM provide for zAAP and zIIP support?

**Answer:**

z/VM 5.3 introduced guest support for IBM System z10 Application Assist Processors (zAAPs) and System z10 Integrated Information Processors (zIIPs) including:

Simulation support – z/VM can create virtual specialty processors for virtual machines by dispatching the virtual processors on real Central Processors (CPs) allowing users to assess the operational and CPU utilization implications of configuring a z/OS system with zIIP or zAAP processors without requiring the real specialty processor hardware. zIIPs can be simulated only on z10 EC, z10 BC, System z9 (z9 EC and z9 BC) servers. zAAPs can be simulated only on z10 EC, z10 BC, z9 EC, z9 BC, z990, and z890 servers.

Virtualization support – z/VM can create virtual specialty processors for virtual machines by dispatching the virtual processors on corresponding real specialty processors of the same type and may help improve your total cost of ownership by allowing available zAAP and zIIP capacity not being used by z/OS LPARs to be allocated to a z/VM LPAR hosting z/OS guests running Java and DB2 workloads.

z/VM 5.4 extension with z/VM mode partitions - System z10 EC (and the z10 BC) allows you to define a z/VM-mode partition (LPAR) containing a mix of processor types including CPs and specialty engines - IFLs, zIIPs, zAAPs, and ICFs. With z/VM V5.4 support, this capability increases flexibility and simplifies systems management by allowing z/VM to manage guests to operate Linux on System z on IFLs, to operate z/VSE and z/OS on CPs, to offload z/OS system software overhead, such as DB2 workloads on zIIPs, and to offer an economical Java execution environment under z/OS on zAAPs, all in the same z/VM LPAR.

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**Question:**

Are there purchase restrictions limiting the number of zIIPs I can order?

**Answer:**

A customer may order zIIPs up to the number of permanently purchased general purpose processors (CPs) on a given z10 EC model. This requirement is at a server level, so a

customer could have an LPAR with more zIIPs than general purpose processors (CPs), as long as there are enough general purpose processors (CPs) in the entire server to meet the one-for-one requirement.

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**Question:**

If I currently have one general purpose processor (CP) and one zAAP, can I order one zIIP without needing to order another general purpose processor (CP) to meet the restriction listed above?

**Answer:**

Yes. One zAAP and one zIIP can share one general purpose processor (CP) to satisfy the ordering restrictions.

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**Question:**

Where can I get more information on the zIIP and zAAP?

**Answer:**

For more information, please look at the Web site:

[www.ibm.com/systems/z/advantages/specialtyengines/index.html](http://www.ibm.com/systems/z/advantages/specialtyengines/index.html) .

## **z10 EC Pricing**

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**Question:**

Were there any pricing actions or announcements made as part of the October 21, 2008 System z10 EC announcement?

**Answer:**

Yes. IBM announced a 62% reduction in memory prices when purchased with a new System z10 IFL, zIIP or zAAP. There is a 16GB limit per engine. The above prices are stated in US currency and may vary in other countries.

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**Question:**

Is hardware pricing for z10 EC similar to pricing on z9 EC?

**Answer:**

Yes, hardware pricing for z10 EC is very similar to z9 EC in approach. As in the past, each customer order will carry a unique price driven by the customer's specific configuration.

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**Question:**

How will diagonal upgrades from z9 EC (or z990) to z10 EC be priced?

**Answer:**

The platform's value proposition of net pricing diagonal upgrades (upgrades from z9 EC or z990) will not change. As in the past, microprocessor and memory feature conversions will be the key net priced items.

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**Question:**

I have an IFL on my existing z9 EC server. What will it cost me to upgrade that IFL to a z10 EC?

**Answer:**

Existing IFLs, as well as zIIPs and zAAPs, will typically upgrade for no charge as they migrate to a new z10 EC server. There are a few circumstances where this will not apply – such as an IFL only server.

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**Question:**

What is the memory pricing on the z10 EC?

**Answer:**

Standard System z10 EC memory will be priced at \$6K per GB, to the end user. However, for memory purchases coupled with new z10 IFL, zIIP and zAAP purchases, the end user price will be \$2250 per GB for up to 16 GB per engine. Pricing for memory requirements above 16 GB per specialty engine will be individually assessed but will not exceed the standard \$6K per GB price. The above prices are stated in US currency and may vary in other countries.

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**Question:**

Does the \$2250 per GB memory price apply to just z10 EC Specialty Engines?

**Answer:**

No. The price applies to z10 BC memory prices as well as long as the memory is purchased along with new IFLs, zIIPs and zAAPs and does not exceed 16 GB per engine. The memory pricing does not apply to the Internal Coupling Facilities (ICFs) or older technologies (System z9 and older). The above prices are stated in US currency and may vary in other countries.

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**Question:**

Did IBM lower the price of loose feature memory on the System z9 servers?

**Answer:**

Yes. The z9 EC and the z9 BC also have loose feature memory priced as low as \$6K per GB in the United States. Pricing may vary in other countries.

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**Question:**

How will maintenance be priced on z10 EC?

**Answer:**

Monthly 24x7 ESA list prices will exist and be applied against the z10 EC feature codes similar to z9 EC or z990. These prices will reflect a price performance improvement on a per MIPS basis over System z9 EC prices.

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**Question:**

What is the cost of the IFL, the zAAP and the zIIP?

**Answer:**

The end user price of the IFL, the zAAP and the zIIP will be US \$125,000 in the United States. Pricing may vary in other countries.

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**Question:**

Will there be a 10% software tech dividend on the z10 EC similar to what was offered on the z9 EC and the z990 before it? Will it be cumulative if I upgrade, for example if I'm two generations back do I get both pricing initiatives?

**Answer:**

Yes, the approach for pricing software on the z10 EC is similar to pricing on the z9 EC. The announced MSUs for software pricing purposes on the z10 EC are on average 10% less than those for z9 EC with equivalent capacity. With this, in many cases, software savings can be realized on the z10 EC versus the z9 EC. And yes, the announced MSU reductions that have been announced with prior generations is cumulative. If migrating from z990 the chargeable MSUs on the z10 EC with equivalent capacity are on the average 19% less than those for the z990 and on average 27% less than those migrating from a z900. The above prices are stated in US currency and may vary in other countries.

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**Question:**

How is IBM Software charged on the z10 EC?

**Answer:**

As with all System z10 servers, IBM software is priced through a Monthly License Charge (MLC) or an IPLA. In the industry, IPLA software is commonly referred to as one time charge (OTC) software.

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**Question:**

Tell me about the MLC options for the System z10 EC and how they apply?

**Answer:**

Customers may pay for Monthly License Charge software under either Workload License Charges (WLC) or Parallel Sysplex<sup>®</sup> License Charges (PSLC). Full-Capacity WLC is available on z10 EC with the z/OS operating system. Subcapacity WLC is available on a z10 EC that has the z/OS operating system and has discontinued both use and licensing of the OS/390<sup>®</sup> operating system, subject to applicable terms and conditions. Once qualified, customers may determine when they wish to adopt WLC. PSLC is available on z10 EC in all environments, including a standalone (non-coupled) z10 EC, subject to applicable terms and conditions.

IBM System z New Application License Charges (zNALC) for z/OS, announced January 9, 2007 offers a reduced price for z/OS operating system on LPARs where customers are running eligible 'new qualified workloads' such as Java language business applications running under WebSphere Application Server, Lotus<sup>®</sup> Domino<sup>®</sup>, SAP, PeopleSoft, Siebel, and BASE24-eps from ACI Worldwide. The zNALC offering continues the IBM commitment to subcapacity pricing, allowing customers with qualified new workload to obtain a reduced price for z/OS based on the size of the LPAR(s) executing new workload (assuming all applicable terms and conditions are met).

Customers using z/VSE V3.1 products running on a z10 EC server will qualify for the same announced pricing terms available on z9 EC. Extended License Charge (ELC) applies for servers over 80 MSUs.

Midrange Workload License Charge (MWLC) for z/VSE announced January 9, 2007. MWLC is a monthly license charge price metric on the z10 EC that applies to z/VSE V4 and 12 key VSE middleware programs such as CICS TS for VSE, DB2 Server for VSE, and ACF/VTAM<sup>®</sup> for VSE. MWLC is available on z10 EC servers with z/VSE 4.

z/VM 5.1 and later, and its support charges are priced based on the number of processors according to International Program License Agreement (IPLA) and Subscription and Support (S&S) terms and conditions.

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**Question:**

Can you tell me about the IPLA pricing options for System z10 EC?

**Answer:**

International Program License Agreement (IPLA) software, and covered under and IPLA contract, is commonly referred to as OTC software. IPLA software requires an up-front, one time license fee and ongoing, optional, annual support and subscription charges. IPLA pricing most commonly applies to IBM software products such as Data Management Tools,

Application Development Tools and Systems Management Tools and the WebSphere family of products.

There are three pricing metrics that apply to System z IPLA products:

- Value Unit pricing applies to the IPLA products that run on z/OS. Value Unit pricing is typically based upon a number of MSUs and allows for lower cost of incremental growth. The MSUs are based on the rated capacity of the server, although many products also have a sub-capacity option with varying terms and conditions.
- z/VM V5 has pricing based on the number of cores. Core based Value Unit pricing allows for a lower cost of incremental growth with additional core-based licenses purchased.
- Most Linux for System z middleware is priced based on the number of IFLs (or cores). The number of IFLs is converted into Processor Value Units (PVUs) under the Passport Advantage® terms and conditions.

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**Question:**

What is a Processor Value Unit (PVU) and what is the PVU of the z10 EC?

**Answer:**

A Processor Value Unit (PVU) is a unit of measure used to differentiate licensing of middleware on distributed processors, or in the case of System z on IFLs. The PVU per IFL or processor core on a z10 EC is 120.

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**Question:**

What is a "software model"?

**Answer:**

Like the previous System z mainframe servers, the machine type and model of the z10 EC does not indicate the machine's capacity. Instead, you must know the number of installed general purpose processors (CPs) to determine the machine's Model-Capacity Identifier for software licensing/charging purposes. The software model follows the nomenclature nxx, where the n indicates the subcapacity size (4, 5, or 6, and the original '7' will indicate a full capacity processor), and where xx indicates the number of installed general purpose processors. You may research MSU ratings per software model on the Web at [ibm.com/zseries/library/swpriceinfo](http://ibm.com/zseries/library/swpriceinfo).

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**Question:**

Are there purchase restrictions limiting the number of zIIPs I can order?

**Answer:**

A customer may order zIIPs up to the number of permanently purchased general purpose processors (CPs) on a given z10 EC model. This requirement is at a server level, so a customer could have an LPAR with more zIIPs than general purpose processors (CPs), as long as there are enough general purpose processors (CPs) in the entire server to meet the one-for-one requirement.

---

**Question:**

If I currently have one general purpose processor (CP) and one zAAP, can I order one zIIP without needing to order another general purpose processor (CP) to meet the restriction listed above?

**Answer:**

Yes. One zAAP and one zIIP can share one general purpose processor (CP) to satisfy the ordering restrictions.

---

**Question:**

What impact could the IBM zIIP have on IBM software charges?

**Answer:**

IBM does not impose software charges on zIIP capacity. Additional IBM software charges will apply when general purpose processor (CP) capacity is used. The amount of general purpose processor savings will vary based on the amount of workload executed by the zIIP, among other factors.

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**Question:**

What impact could the IBM zIIP have on non IBM software charges?

**Answer:**

Customers are encouraged to contact their specific ISVs/USVs directly to determine if or how their charges will be affected.

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**Question:**

What is DB2 for z/OS Value Unit Edition?

**Answer:**

On February 26<sup>th</sup> 2008, IBM announced an offering, DB2 for z/OS Value Unit Edition (VUE). This offering provides the same robust DB2 for z/OS data server at a One-Time Charge price. It can only be used for net new workloads that run on a zNALC LPAR or system. It is not intended to replace existing MLC workload, but instead to offer customers alternatives for net new workload on System z and DB2. DB2 for z/OS VUE gives customers the ability to grow their workload without increasing their existing MLC stack. This offering continues to strengthen the role of System z and DB2 as the cornerstone of new applications like SOA, dynamic data warehousing, operational BI, ERP and WebSphere. For further information contact your IBM Software Sales Rep.

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**Question:**

Where can I get more information on IBM software charges?

**Answer:**

[www.ibm.com/servers/eserver/zseries/swprice/](http://www.ibm.com/servers/eserver/zseries/swprice/)

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**Question:**

Were there any pricing actions or announcements made as part of the System z10 BC announcement?

**Answer:**

Yes with the z10 BC announcement we have taken the following actions:

- A 50% reduction in price for IFLs, zIIPS and zAAP for the z10 BC.
- A 62% reduction in memory prices when purchased with a new System z10 IFL, zIIP or zAAP. There is a 16GB limit per engine.
- A 10% reduction in chargeable MSUs on the z10 BC versus the z9 BC
- A 5% to 10% reduction in hardware maintenance price per MIPS. The higher reductions, up to 10% are available for growing customers.
- No charge upgrades for most IFL, zIIPs and zAAPs

Please see the z10 BC FAQs for more details. Note: Prices are stated in US currency and may vary in other countries

## Performance

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### Question:

What are the major changes to the z/OS V1R9 LSPR?

### Answer:

The LSPR ratios reflect the range of performance between zSeries servers as measured using a wide variety of application benchmarks. The latest release of LSPR contains several updates. First, the z10 BC models have been added to the tables. Second, the z/OS V1R9 single-image table shows ITRRs for greater than 32-way single-image z/OS. Third, a Processor Capacity Index (PCI) value has been added to the multi-image table (see below for further discussion on PCI).

For details on the workloads and performance ratios, please reference <http://www.ibm.com/systems/z/advantages/management/lspr/>

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### Question:

Why are there two tables in LSPR?

### Answer:

The LSPR was enhanced to include performance ratios reflecting both "single-image" z/OS and "multi-image" z/OS environments when System z9 was introduced. Typically, zSeries processors are configured with multiple images of z/OS. Thus, the LSPR continues to include a table of performance ratios based on average multi-image z/OS configurations for each processor model as determined from the profiling data. Since the multi-image z/OS table is much more representative of the vast majority of customer configurations, it is used as the basis for setting MIPS and MSUs for the z10 EC.

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### Question:

What multi-image configurations are used to produce the LSPR multi-image table?

### Answer:

A wide variety of multi-image configurations exist. The main variables in a configuration typically are: 1) number of images, 2) size of each image (number of logical engines), 3) relative weight of each image, 4) overall ratio of logical engines to physical engines, 5) the number of books and 6) the number of ICFs/IFLs. The configurations used for the LSPR multi-image table are based on the average values for these variables as observed across a processor family. It was found that the average number of images ranged from five at low-end models to eight at the high end. Most systems were configured with two major images (those defined with >10% relative weight). On low- to midrange models, at least one of the major images tended to be configured with a number of logical engines close to the number of physical engines. On high-end boxes, the major images were generally configured with a number of logical engines well below the count of physical engines reflecting the more common use of these processors for consolidation. The overall ratio of logical to physical engines (often referred to as "the level of over-commitment" in a virtualized environment) averaged as high as 5:1 on the smallest models, hovered around 2:1 across the majority of

models, and dropped to 1.3:1 on the largest models. The majority of models were configured with one book more than necessary to hold the enabled processing engines, and an average of two ICFs/IFLs were installed.

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**Question:**

Which LSPR table should I use for capacity sizing?

**Answer:**

For high-level sizing, most users will find the multi-image table to reflect configurations closest to their own. This is simply due to the fact that most systems are run with multiple z/OS images. However, the most accurate sizing requires the zPCR tool, which can be customized to match a specific multi-image configuration rather than the average configurations reflected in the multi-image LSPR table.

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**Question:**

What model is used as the "base" or "reference" processor in the z/OS V1R9 LSPR tables?

**Answer:**

The 2094-701 processor is used as the base in both the single-image and multi-image z/OS V1R9 tables. Thus, the ITRR for the 2094-701 appears as 1.00 in both tables. Note that this is a change from the z/OS V1R6 and z/OS V1R8 LSPR tables in which the multi-image and single-image table shared a common base from the single-image table.

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**Question:**

What "capacity scaling factors" are commonly used for the z/OS V1R9 tables?

**Answer:**

The LSPR provides capacity ratios among various processor families. It has become common practice to assign a capacity scaling value to processors as a high-level, gross approximation of their capacities. The commonly used capacity scaling factor for the z/OS V1R9 single-image table is 604. For the z/OS V1R9 multi-image table the commonly used scaling factor is  $.944 \times 604 = 570.176$ . Note the .944 factor reflects the fact that the multi-image table has processors configured based on the average client LPAR configuration; on a uniprocessor, the cost to run this complex configuration is approximately 5.6%. The commonly used capacity scaling values associated with the z10 BC may be approximated by multiplying the ITRRs in the LSPR z/OS V1R9 multi-image table by 570.176. The PCI (Processor Capacity Index) column in the z/OS V1R9 multi-image table shows the result of this calculation. Note that the PCI column was actually calculated using zPCR, thus the full precision of each ITRR is reflected in the values. Minor differences in the resulting PCI calculation may be observed when using the rounded values from the LSPR table.

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**Question:**

If I compare the two tables, why are the capacity ratios for some models higher in the single-image table while other models have higher ratios in the multi-image table?

**Answer:**

Just as capacity ratios are sensitive to workload characteristics (note the varying capacity ratios within a table associated with different workloads), capacity ratios will also be sensitive to the configuration of z/OS images on a processor. If one compares a processor configured only

with a single, large z/OS image to the same processor configured with multiple z/OS images, there are both pluses and minuses that come into play. There is a cost incurred to manage multiple z/OS images and their associated logical processors. There is also a cost incurred as the size of a z/OS image increases. Thus, if one compares a configuration of a single large z/OS image to a configuration of multiple but smaller z/OS images, the net result can vary as the magnitude of the pluses and minuses will vary. The sensitivity of the multi-image configurations to the number of images, size of each image, relative weights and overall logical: physical ratio will cause a fair amount of variability in the capacity ratios of these configurations. The multi-image table provides a representative view of these ratios based on average configurations. However, "your mileage will vary" applies here as configurations deviate from the average. The zPCR tool can provide capacity ratios customized to specific configurations.

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**Question:**

How much variability in performance should I expect when moving a workload to a z10 EC?

**Answer:**

As with the introduction of any new server, workloads with differing characteristics will see some variation in performance when moved to the z10 EC. The performance ratings for a server are determined by averaging the performance of a variety of workloads that represent what we understand to be the major components of our customers' production environments. While the ratings provide good "middle-of-the-road" values, they do represent an average, and by definition some workloads fall higher than the average and some workloads fall below. The z10 EC has been specifically designed to focus on new and emerging workloads where the speed of the processor is a dominant factor in performance. The result is a quantum jump in clock speed – the z10 EC runs at 4.4 GHz compared to the z9 EC which ran at 1.7 GHz. The storage hierarchy design of the z10 EC is also improved over z9 EC, however, the improvement is somewhat limited by the laws of physics so the latencies have increased relative to the clock speed. Thus, workloads that are CPU-intensive will tend to run above average while workloads that are storage-intensive will tend to run below average, and the spread around the average will likely be larger than seen in recent processors. Additionally, newer applications, such as those with compiler optimizations for the z10 EC may see even higher benefits, particularly those that may be enhanced over time to exploit some of the new instructions provided with the z10 EC.

The LSPR measurements can provide an indication of the potential variability when moving z/OS workloads to a z10 EC. For example, using the single-image z/OS V1R8 measurements on a 2097-716 versus a 2094-716, we saw performance ratios of: a) .51x for the average workload mix, b) 1.62x for the highest workload ODE-B (CPU-intensive), and c) 1.42x for the lowest workload OLTP-W (storage-intensive). The variation of individual jobs or transactions can be even larger, for example, the average job in our CB-L workload improved 1.58x but the range in individual job improvement was from 1.2x to 2.1x.

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**Question:**

Once my workload is up and running on a z10 EC, how much variability in performance will I see?

**Answer:**

Minute-to-minute, hour-to-hour and day-to-day performance variability generally grows with the size (capacity) of the server and the complexity of the LPAR configuration. With its improved processor speed and the capability to be configured with up to 64 engines, the z10 EC has the capability to deliver nearly 1.7 times the capacity of the largest previous server. Significant enhancements to the z/OS dispatcher and the PR/SM™ management algorithms (see HiperDispatch discussion below) have been made to help reduce the potential for increased performance variability. In the spirit of autonomic computing, PR/SM and the z/OS dispatcher cooperate to automatically place and dispatch logical partitions to help optimize the performance of the hardware, and minimize the interference of one partition to another. However, while the average performance of workloads is expected to remain reasonably consistent when viewed at small increments of time or by individual jobs or transactions, performance could potentially see more variation than in the past simply due to the expected larger and more complex LPAR configurations that can be supported by the z10 EC.

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**Question:**

What is HiperDispatch and how does it impact performance?

**Answer:**

HiperDispatch is the z/OS exploitation of the PR/SM new Vertical CPU Management (VCM) capabilities and is exclusive to the z10 EC. Rather than dispatch tasks randomly across all logical processors in a partition, z/OS will assign tasks to groups of about four logical processors, and dispatch work to a "high priority" subset of the logicals. PR/SM provides processor topology information and updates to z/OS, and ties the high priority logical processors to physical processors. HiperDispatch can lead to improved efficiencies in both the hardware and software in the following two manners: 1) work may be dispatched across fewer logical processors therefore reducing the "multi-processor (MP) effects" and lowering the interference among multiple partitions; 2) specific z/OS tasks may be dispatched to a small subset of logical processors which PR/SM will tie to the same physical processors thus improving the hardware cache re-use and locality of reference characteristics such as reducing the rate of cross-book communication.

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**Question:**

What kind of performance improvement can I expect to see from HiperDispatch?

**Answer:**

The magnitude of the potential improvement from HiperDispatch is related to: a) the number of physical processors, b) the size of the z/OS images in the configuration, c) the logical: physical overcommit ratio and, d) the memory reference pattern or storage hierarchy characteristics of the workload. Generally, a configuration where the largest z/OS image fits within a book will see minimal improvement. Workloads that are fairly CPU-intensive (like batch applications) will see only small improvements even for configurations with larger z/OS images since they typically have long-running tasks that tend to stick on a logical engine anyway.

Workloads that tend to have common tasks and high dispatch rates as often seen in transactional applications may see larger improvements, again depending on the size of the z/OS images involved. LPAR configurations that are over committed, i.e. have higher logical to physical ratios, may see some improvement although the benefit of dispatching to a reduced number of logicals overlaps with benefits already available with IRD and various automation techniques that tend to reduce the number of online logical processors to match capacity needs. The range in benefit is expected to be from 0% to 10% following the sensitivities described above; specifically, configurations with z/OS images small enough to fit in a book or running batch-like workloads will tend to fall at the low-end of the range, multi-book configurations with z/OS images in the 16-way to 32-way range and running transactional workloads will tend to fall toward the middle of the range, and very large multi-book configurations with very large z/OS images and running workloads with intense memory reference patterns will tend to fall toward the high end of the range.

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**Question:**

What is the performance improvement a z/VSE customer might experience on the z10 EC?

**Answer:**

The performance ratios that a z/VSE customer workload might experience when migrating from a zSeries server to the z10 EC is represented by the range of ratios seen by a comparable z/OS migration. For example, the published ratio in the LSPR between the z9 EC 2094-704 and the z10 EC 2097-704 is approximately 41% to 61%. z/VSE workloads could expect this same range of performance.

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**Question:**

What is the performance improvement a z/VM customer might experience on the z10 EC?

**Answer:**

The performance ratios that a z/VM customer workload might experience when migrating to z10 EC from older processors will vary. For z/VM, the published z10 EC to z9 EC ratio in the LSPR for a 16-way configuration is approximately 1.30. However, customers may experience a range of performance. It is suggested that you consult the full range of LSPR workloads. The 30% improvement is in the lower end of the improvement range. The lower the memory or processor over-commitment, the greater the potential for the improvement to be in the upper end of the range. A z/VM partition with a lower number of logical processors will also have more potential for being in the upper end of the range.

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**Question:**

Where can I read more about the performance of z/VM in relationship to the z10 EC processor family?

**Answer:**

The z/VM Performance Resources Page, located at <http://www.vm.ibm.com/perf/>, contains information on z/VM Performance.

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**Question:**

How do I get performance information for my TPF products running on a System z10 EC?

**Answer:**

For the TPF V4 and z/TPF 1.1 products, the TPF Workload Specifics ITRRs should be used. For more information please contact your TPF Support Representative, or send a request to [tpfga@us.ibm.com](mailto:tpfga@us.ibm.com).

## Networking Enhancements

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**Question:**

Tell me about the OSA Express3 features?

**Answer:**

The OSA-Express3 was first introduced in February 2008 with the z10 EC server. At that time 10 Gigabit Ethernet Long Reach was the only offering in the OSA-Express3 family.

OSA-Express3 was designed for use in high speed enterprise backbones, for local area network connectivity between campuses, to connect server farms to z10 EC server, and to consolidate file servers onto z10 EC server. With reduced latency and improved throughput, and you can “do more with less”.

In May 2008 we announced OSA-Express3 Gigabit Ethernet (GbE) and its availability date along with the availability date of 10 Gigabit Ethernet Long Range (LR). The OSA-Express3 features double the port density of the OSA-Express2 features. OSA-Express3 GbE provides connectivity to multimode and single mode fiber optic networks at a link data rate of 1 gigabit per second (1 Gbps). The OSA-Express3 features are designed to increase the throughput for standard frames (1492 byte) and jumbo frames (8992 byte) to help satisfy the bandwidth requirements of your applications. This increase in performance (compared to OSA-Express2) has been achieved through an enhancement to the architecture that supports direct host memory access by using Ethernet hardware data router, eliminating 'store and forward' delays – what was done in firmware is now done in hardware (packet construction, inspection and routing).

With the October 2008 announcement we introduced two more additional features – now there are five OSA-Express3 features from which to choose. The OSA-Express3 10 Gigabit Ethernet SR (short reach) with two ports per feature is for infrastructures with multimode fiber optic cabling, while the OSA-Express3 1000BASE-T Ethernet feature is for environments with copper cabling. Also introduced was OSA-Express for NCP, which was previewed in May. The OSA Express3 Gigabit Ethernet and 1000BASE-T features support the Network Control Program, providing Channel Data Link Control protocol support between the z10 EC and an IBM Communications Controller for Linux on System z (CCL) allowing operation of the CCL Network Control Programs in the same manner as their ESCON-attached 374x NCPs. The 1000BASE-T feature also supports configuration as an OSA Integrated Console Controller (OSA-ICC) in support of TN3270E and non-SNA DFT 3270 emulation.

Additional information on OSA-Express3 features can be found in the announcement letters: 108-794 (US), A08-1508 (Canada), ZG08-0843 (Europe) and AG08-0790 (AP).

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**Question:**

What is the advantage of Queued Direct Input/Output (QDIO) data connection isolation with z/VM? What level of z/VM is required?

**Answer:**

Multi-tiered security zones are becoming the network configuration standard for new workloads. It is essential for these workloads (servers/clients) which are hosted in a virtualized environment (shared resources) to be protected from intrusion or exposure of data and processes from other workloads. With QDIO data connection isolation, you have the ability to adhere to

security and HIPAA-security guidelines and regulations for network isolation between operating system instances sharing physical network connectivity. You can establish security zone boundaries that have been defined by the network administrator.

With QDIO Connection Isolation you can ensure all internal OSA routing between the isolated QDIO connections and all other sharing QDIO connections is disabled. In this state, only external communications to and from the isolated QDIO data connection are allowed.

OSA-Express QDIO data connection isolation is available with the OSA-Express3 and OSA-Express2 features on System z10, the OSA-Express2 features on System z9 and requires at a minimum z/VM V5.3 with PTFs. These PTFs are planned to be available 4Q2008.

---

**Question:**

What advantage will I get with the HiperSockets Multiple Write Facility?

**Answer:**

HiperSockets eliminates the need to utilize I/O subsystem operations and the need to transverse an external network connection to communicate between logical partitions in the same z10 EC server. HiperSockets is designed to offer significant value in server consolidation connecting many virtual servers, and can be used instead of certain coupling link configurations in a Parallel Sysplex environment.

HiperSockets has been enhanced on the z10 EC to support multiple output buffers on a single SIGA write instruction. This operation is designed to offer performance improvements for the streaming of bulk data and large messages over a HiperSockets link between two logical partitions. The receiving LPAR can now process a much larger amount of data per I/O interrupt. This enhancement is transparent to the operating system in the receiving LPAR, and is designed to reduce CPU utilization of the sending and receiving LPARs. This function is available starting with z/OS V1.9 via a PTF.

With z/OS V1.10 and a System z10, the z/OS Communications Server allows the HiperSockets Multiple Write operation for outbound large messages (originating from z/OS) to be performed by a zIIP. Having these messages transferred can reduce general purpose processor utilization.

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**Question:**

What will HiperSockets Layer2 support provide for me?

**Answer:**

HiperSockets is a virtual network and was originally designed to support only Network or IP (Layer 3) communications. Some non-IP based applications such as SNA or NetBios could not use HiperSockets because a Link Layer (Layer 2) network with Layer 2 addresses are required for these applications. This capability on the z10 EC means that it can host both IP and non-IP workloads utilizing HiperSockets internal networks. However, it should be noted that datagrams are delivered only between HiperSockets devices that are using the same transport mode (Layer 2 with Layer 2 and Layer 3 with Layer 3). A Layer 2 device cannot communicate directly with a Layer 3 device in another LPAR.

## I/O Enhancements

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**Question:**

What is the new worldwide port name (WWPN) tool and what advantage will it have for me?

**Answer:**

The worldwide port name (WWPN) prediction tool is now available to assist you with preplanning of your Storage Area Network (SAN) environment prior to the installation of your System z10 server.

This standalone tool is designed to allow you to setup your SAN in advance, so that you can be up and running much faster once the server is installed. The tool assigns WWPNs to each virtual Fibre Channel Protocol (FCP) channel/port using the same WWPN assignment algorithms a system uses when assigning WWPNs for channels utilizing N\_Port Identifier Virtualization (NPIV).

The tool needs to know the FCP-specific I/O device definitions in the form of a .csv file. This file can either be created manually, or exported from Hardware Configuration Definition/Hardware Configuration Manager (HCD/HCM). The tool will then create the WWPN assignments, which are required to set up your SAN. The tool will also create a binary configuration file that can later on be imported by your system.

The WWPN prediction tool can be downloaded from Resource Link and is applicable to all FICON channels defined as CHPID type FCP (for communication with SCSI devices).

<http://www.ibm.com/servers/resourcelink/>

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**Question:**

What will be the advantage of High Performance FICON for System z (zHPF)?

**Answer:**

Enhancements have been made to the z/Architecture and the FICON interface architecture to deliver optimizations for online transaction processing (OLTP) workloads. When exploited by either FICON Express4 or FICON Express2, z/OS V1.8 or above (with PTFs), and the control unit, zHPF is designed to help reduce overhead and improve performance.

Additionally, the changes to the architectures offer end-to-end system enhancements to improve reliability, availability, and serviceability (RAS).

zHPF channel programs can be exploited by OLTP I/O workloads - DB2, VSAM, PDSE, and zFS - which transfer small blocks of fixed size data (4K blocks). The maximum number of I/Os is designed to be improved up to 100% for small data transfers that can exploit zHPF. Realistic production workloads with a mix of data transfer sizes may see up to 30 to 70% of FICON I/Os that can utilize zHPF, resulting in up to a 10 to 30% savings in channel utilization. Sequential I/Os transferring less than a single track size (e.g. 12x4K bytes/IO) can also benefit.

zHPF is exclusive to the System z10 and is supported by z/OS 1.7 with the IBM Lifecycle Extension for z/OS V1.7<sup>9</sup>, z/OS V1.8, V1.9, or V1.10 with PTFs.

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<sup>9</sup> z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2010. With the Lifecycle Extension z/OS V1.7 supports the z10 BC. Certain functions and features of the z10 BC require later releases of z/OS. For the complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter dated October 21, 2008.

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**Question:**

What is required to exploit High Performance FICON for System z (zHPF)?

**Answer:**

In order to exploit zHPF, all of the channels in the path group of a logical control unit must be FICON Express2 and/or FICON Express4 channels. If a logical control unit has a mix of FICON Express and FICON Express2 or FICON Express4 channels defined in its path group the High Performance FICON protocol will not be exploited by z/OS for that control unit. The control unit must also be capable of supporting the zHPF protocol. Control unit manufacturers should be contacted to determine which hardware models support zHPF and their requisite firmware levels. zHPF is supported on System z10 by z/OS V1.7 with the IBM Lifecycle Extension for z/OS V1.7 (5637-A01), z/OS V1.8, V1.9, or V1.10 with PTFs.

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**Question:**

What is the performance enhancement introduced for Fibre Channel Protocol (FCP) on the z10 EC?

**Answer:**

The FCP Licensed Internal Code has been modified to help provide increased I/O operations per second for small block sizes. With FICON Express4, there may be up to 57,000 I/O operations per second (all reads, all writes, or a mix of reads and writes), an 80% increase compared to System z9. A significant increase in I/O operations per second for small block sizes can also be expected with FICON Express2.

These results were achieved in a laboratory environment using one channel configured as CHIPID type FCP with no other processing occurring and do not represent actual field measurements.

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**Question:**

Is MIDAW available on the z10 EC and what is the benefit of having it?

**Answer:**

The Modified Indirect Data Address Word (MIDAW) Facility was introduced with the System z9 servers and is also available on the z10 EC. It was designed to provide more capacity over native FICON channels for programs that process data sets exploiting striping and compression (such as DB2, VSAM, PDSE, HFS and zFS) by reducing channel, director and control unit overhead.

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**Question:**

Does the z10 EC offer an alternative solution for SNA configurations that require NCP functions?

**Answer:**

Yes. The OSA-Express2 Gigabit Ethernet and 1000BASE-T Ethernet features have the capability to provide channel connectivity from System z operating systems to IBM Communications Controller for Linux on System z (CLL) using the Open Systems Adapter for Network Control Program (OSA for NCP) supporting the Channel Data Link Control (CDLC) protocol. For SNA configurations that require NCP functions, CCL can be considered as a migration strategy to replace IBM Communications Controllers (374x). The CDCL connectivity option enables TPF environments to exploit CCL.

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**Question:**

Will FICON Express2 and FICON Express be available on the z10 EC?

**Answer:**

FICON Express2 and FICON Express are not orderable on the z10 EC models, but if they are moved from another system and installed at the time of an upgrade to the z10 EC, they may be retained.

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**Question:**

What networking functions were recently announced?

**Answer:**

z/OS Communications Server designs for z/OS V1.11 (previewed) include:

- IBM Health Checker for z/OS RFC4301 compliance
- IBM Health Checker for z/OS DNS server check
- New SMTP client for sending Internet mail
- AT-TLS enhancements
- Enhancements to Configuration Assistant - AT-TLS and IPSec improvements
- Enhancements to Configuration Assistant policy infrastructure simplification
- Enhancements to Configuration Assistant - new AT-TLS options
- Changes to make it easier for products and functions to map load modules and entry points
- The Advanced Communications Facility Trace Analysis Program (ACF/TAP) is made part of z/OS Communications Server element
- Changes to syslog daemon (syslogd) design to improve performance and add automated archival of log files
- New ISPF-based syslog daemon browser application and search facility
- Enhanced policy infrastructure management
- Improved responsiveness to storage shortage conditions
- Disabled use of moving DVIPA as source IP address

- Sysplex autonomics improvements for Fast Response Cache Accelerator (FRCA)
- TCP throughput improvements for high-latency networks
- Sysplex Distributor connection routing accelerator
- Enhanced resolver DNS cache
- Sysplex Distributor optimization for multitier z/OS workloads
- QDIO routing accelerator
- Improvements to TCP/IP pathlength
- Enhanced IPv6 stateless address autoconfiguration
- New API to obtain IPv4 network interface maximum transmission unit (MTU)
- Deprecated IPv6 type 0 route header
- Enhanced QDIO for WLM IO priority
- Enhanced network management interface - detailed Communications Storage Manager (CSM) usage
- New accept\_and\_recv socket API
- Enhanced SNA High Performance Routing (HPR)
- FTP access to z/OS UNIX named pipes
- Enhanced QDIO support for OSA interface isolation
- Sysplex Distributor support for enhanced WLM routing algorithms
- NSS private key and certificate services for XML appliances
- EE IPsec performance improvements
- IPsec enhancements

The z/OS Communications Server designs for z/OS V1.10 included:

1. New Defense Filtering capabilities designed to provide a mechanism for users to block detected attacks by dynamically installing defensive filters in a TCP/IP stack.
2. The z/OS Load Balancing Advisor and Agent are planned to be enhanced to allow users to exploit the AT-TLS feature to secure connections that carry SASP flows.
3. Network TCP/IP stack performance improvements in multiple areas, including CPU consumption, cache line contention, and common storage utilization.
4. Support to help you coordinate LU name assignments among TN3270 servers in a Sysplex.
5. Enhancements to SNA networking functions, and the z/OS FTP Server and Client.

## Capacity on Demand Offerings

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**Question:**

How does the System z10 Capacity on Demand architecture benefit me?

**Answer:**

The System z10 Capacity on Demand architecture offers you increased flexibility and capabilities over previous systems. Unlike previous systems, where only one temporary entitlement record (TER) could be active at a given time, with the latest Capacity on Demand architecture, you can have up to four different TERs active at the same time. In addition, the architecture allows for concurrent permanent upgrades while temporary capacity is active.

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**Question:**

What are the major differences from the System z9 on demand offerings?

**Answer:**

The z10 EC Capacity on Demand (CoD) implementation allows more flexibility and control over the way you can add temporary upgrades as well as the capability to permanently increase system capacity.

The z10 EC allows you to install up to eight<sup>10</sup> temporary records on the CEC and to have any or all these records active at any given time. This means that On/Off CoD can be active with up to seven other offerings simultaneously. Each record provides variability in the amount of resources that can be activated and can be controlled and updated independently of each other.

Also, you have the ability to store up to 200 temporary records on the z10 EC Support Element (SE) to provide as much flexibility in temporary record definition as you need. These capabilities provide the flexibility to monitor the state of each record as well as the ability to add capabilities to individual records concurrently, eliminating the need to order new temporary records as new customer upgrade scenarios develop.

The Customer Initiated Upgrade (CIU) application on Resource Link is designed to allow you to respond to sudden increased capacity requirements by requesting a permanent System z10 processor unit (PU) or memory upgrade through the Web. This permanent upgrade can occur while the requested resources are activated through a temporary On/Off CoD. Orders of all PU types and memory upgrades that can be delivered by Licensed Internal Code-Configuration Control (LIC-CC) can be delivered through the CIU application. Permanent upgrades may be performed up to the maximum available resources on the System z10.

With the proper contracts in place, all temporary capacity offerings, and the ability to replenish these offerings are available through Resource Link.

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<sup>10</sup> The number of temporary records that can be installed on the CEC doubled with the October 2008 announcement – going from four to eight.

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**Question:**

What changes were announced April 28, 2009 concerning Capacity Back Up (CBU)?

**Answer:**

The allocation of the default number of test activations changed. Rather than a fixed default number of five test activations for each CBU entitlement record (FC #6818), the number of test activations per instance of FC #6818 will coincide with the number of CBU years, FC #6817, the number of years assigned to the CBU record. This equates to, one test activation per year for each CBU entitlement purchased.

On system z10 the CBU entitlement records (FC #6818) contain an expiration date that is established at the time of order and is dependent upon the quantity of CBU years (FC #6817). You will now have the capability to extend your CBU entitlements through the purchase of additional CBU years. The number of FC #6817 per instance of FC #6818 remains limited to five and fractional years are rounded up to the near whole integer when calculating this limit. For instance, if there are two years and eight months to the expiration date at the time of order, the expiration date can be extended by no more than two additional years. One test activation is provided for each additional CBU year added to the CBU entitlement record.

Additional test activations are now available in quantities of one (FC #6805) and the number of test activations remains limited at 15 per CBU entitlement record (FC #6818).

These changes apply only to System z10 and to CBU entitlements purchased through the IBM sales channel or directly from Resource Link.

---

**Question:**

What is Capacity for Planned Event (CPE)?

**Answer:**

CPE is temporary access to dormant PUs, intended to replace capacity lost throughout the enterprise due to a planned event such as facility upgrade or system relocation. This is an offering and is available only on the System z10. CPE is similar to CBU in that it is intended to replace lost capacity; however, it differs in its scope and intent. Where CBU addresses disaster recovery scenarios that can take up to three months to remedy, CPE is intended for short-duration events lasting up to three days, maximum. Each CPE record, once activated, gives you access to all dormant PUs on the machine that can be configured in any combination of CP capacity or specialty engine types (zIIP, zAAP, SAP, IFL, ICF).

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**Question:**

How will CPE be priced?

**Answer:**

There is a fixed price for each CPE record (which is for a three day event). For the price you can enable any amount of dormant capacity on the server and dynamically move between various configurations within a 72 hour time line starting from the initial activation. There are no additional software charges for capacity activated by CPE.

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**Question:**

How does On/Off CoD work?

**Answer:**

On/Off CoD is available for up to twice the 'purchased' capacity for a given machine based on the LSPR mixed workload multi-image ITRR (Internal Throughput Rate Ratio). On/Off CoD upgrades are allowed for any processor configuration, up to the limit, as long as the number and / or capacity level of the processors is increased. Upgrades that decrease the number of processors, or decrease the capacity level of processors are not allowed. When ordering CP capacity, you will order your upgrades based on a percentage increase over the currently purchased capacity. Other engines are ordered in full engine increments.

Note that On/Off Capacity on Demand for specialty engines will always be full capacity processors.

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**Question:**

How do resource tokens work on the System z10?

**Answer:**

Management of temporary capacity through On/Off CoD is further enhanced through the introduction of resource tokens. For CP capacity, a resource token represents an amount of processing capacity that will result in one MSU of software cost for one day – an MSU-day. For specialty engines, a resource token represents activation of one engine of that type for one day – an IFL-day, a zIIP-day or a zAAP-day. The different resource tokens are contained in separate pools within the On/Off CoD record.

Using the Resource Link ordering process, you determine how many tokens go into each pool. Once On/Off CoD resources are activated, tokens will be decremented from their pools every 24 hours. The amount decremented is based on the highest activation level for that engine type during the previous 24 hours.

Resource tokens are intended to help you bound the hardware costs associated with using On/Off CoD. The use of resource tokens is optional and they are available on either a prepaid or post-paid basis. When prepaid, you are billed for the total amount of resource tokens contained within the On/Off CoD record. When post-paid, the total billing against the On/Off CoD record is limited by the amount of resource tokens contained within the record.

For more information, refer to the Capacity on Demand Users Guide, SC28-6871.

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**Question:**

Is there still an administrative On/Off Capacity on Demand (On/Off CoD) test?

**Answer:**

No. With System z10, the need for administrative On/Off CoD tests has been eliminated. Unlike early versions of System z9, On/Off CoD upgrades are not immediately activated on download, so you can perform and test the entire On/Off CoD process, short of engine activations, with standard On/Off CoD records and not incur any charges.

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**Question:**

What is the change available that allows me to change my On/Off CoD capacity without having to order and download a new On/Off CoD record?

**Answer:**

With the Capacity on Demand record structure, instead of ordering a separate On/Off CoD record for each possible configuration, you can now order a single reusable record that identifies the maximum possible configuration you want to activate. You order CP capacity based on a percentage increase over the currently purchased capacity. Other engines are ordered in full engine increments. When you need to activate temporary capacity, you identify the desired target configuration. Need more processing capacity? Select a new larger target configuration. You can also decrease the amount of temporary capacity active by selecting a lower target. When you are done, simply return to your base configuration. Your On/Off CoD record is still available and you can use it for additional capacity at any time. You are still restricted to an upper bound for temporary upgrade size of no more than double the machine's purchased capacity configuration. You will be charged for the additional capacity on a 24 hour basis, and if you increase capacity multiple times during a 24 hour period, the charge will apply to the greatest amount of capacity activated.

---

**Question:**

Can I have more than one record describing my On/Off CoD configuration loaded on my System z10?

**Answer:**

Yes, you can download and stage up to 200 separate Capacity on Demand records on the Support Element. Multiple records may also be loaded at the same time; however, only one On/Off CoD record may have active capacity at a given time.

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**Question:**

What is the API that is available for On/Off CoD?

**Answer:**

There is an API provided within the existing HMC SNMP command which is designed to enable customers to use other automation code (which conforms to the API) to enable activation of On/Off CoD on the HMC without human intervention. This will allow for flexibility of operation of the On/Off CoD function.

---

**Question:**

What is unassigned capacity?

**Answer:**

Unassigned capacity can be either general purpose or IFL capacity that has been purchased by the end user, but for business reasons has been unassigned (turned off) by the end user so no business processing can be executed on the unassigned capacity.

---

**Question:**

What is the hardware price of On/Off CoD when using unassigned capacity compared to capacity that has not been previously purchased?

**Answer:**

At this time there are no additional hardware or maintenance charges for activating unassigned CP or IFL capacity with an On/Off CoD record. You are still responsible for any additional software charges that may result from activating unassigned capacity. IBM, at its discretion, reserves the right to add maintenance charges at a later time.

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**Question:**

Can On/Off CoD use unassigned IFL or CP capacity for any purpose other than its original intended purpose?

**Answer:**

Yes. The processor reserved as the unassigned IFL capacity can be activated as any other On/Off CoD processor type. Note: if you activate unassigned capacity for any purpose other than its original intended purpose, you will be billed as if the capacity were unowned.

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**Question:**

Do I need to follow a different process to utilize unassigned capacity with On/Off CoD?

**Answer:**

No. The order process is the same. Resource Link will give you a priced option.

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**Question:**

Will temporary capacity be available for specialty PUs (IFLs, ICFs, zAAPs, zIIPs, SAPs) on the System z10?

**Answer:**

Yes. All engine types are available for temporary upgrades.

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**Question:**

Can I order On/Off CoD if I have subcapacity CP processors?

**Answer:**

Yes. Again, On/Off CoD is available for up to twice the 'purchased' capacity for a given machine and you can not decrease the number or the capacity level of installed general purpose processors. With the full 'matrix' upgradeability of the subcapacity processors you can temporarily change capacity with processors of equal, less or greater capacity depending on your requirements. When you use subcapacity settings for your temporary On/Off CoD capacity, you can not exceed 12 general purpose processors. (NOTE – you could have subcapacity general purpose processors and, when you execute On/Off CoD, as long as you don't exceed more than twice your purchased capacity, have 12 or more full capacity temporary general purpose processors.)

---

**Question:**

When can I begin placing On/Off CoD orders against my System z10?

**Answer:**

On/Off CoD can be initiated as soon as the profile for the System z10 is established. The prerequisite of establishing a profile is the signing of the necessary contract supplements associated with ordering features 9900 and 9896.

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**Question:**

Will my System z9 processors be able to use the Capacity on Demand features?

**Answer:**

No. These Capacity on Demand features are only available on the System z10 servers.

---

**Question:**

Will I be able to do Capacity Backup Upgrade (CBU) capability on any engine type?

**Answer:**

Yes. The System z10 is able to activate all processor types as part of CBU upgrades: IFLs, zAAPs, zIIPs, ICFs, CPs and SAPs.

---

**Question:**

Can I order CBU processors if I have subcapacity processors?

**Answer:**

Yes. CBU is available when you are running with subcapacity processors but you can not decrease the number or the capacity level of installed CP processors. Note that you can not exceed 12 subcapacity processors (CP or CBU) on the z10 EC. A customer no longer has to increase the quantity of CPs for CBU, but can just increase the capacity of the existing CP count by ordering CBU CP features with greater capacity. When the quantity of CBU processors on the z10 EC exceeds 12, all CBU processors will be full capacity.

---

**Question:**

Can I add CBU capacity by selecting CBU engines that have more capacity than my permanent configurations and have less actual engines than my original permanent capacity?

**Answer:**

No, you can not reduce the number of engines in your permanent configuration when you add CBU capacity.

---

**Question:**

Can I convert an active permanent engine to another engine type during CBU?

**Answer:**

No. All active permanent engines must remain as part of the CBU environment (although they may change in capacity) and you can not convert them to another type during the CBU event. Unassigned engines may be used as another engine type during a CBU event.

---

**Question:**

What can I do during a CBU test?

**Answer:**

Customers may now execute production workload on the capacity of a CBU upgrade during a CBU test provided that a) an amount of System z production workload Capacity equivalent to the CBU Upgrade is shut down or otherwise made unusable by the customer for the duration of the test, and b) the appropriate contracts are in place. All new CBU contract documents contain these new CBU Test terms. Existing CBU customers will need to execute IBM Customer Agreement Amendment for IBM System z Capacity Backup Upgrade Tests, form number Z125-8145.

---

**Question:**

What Capacity on Demand features can I order on IBM Resource Link?

**Answer:**

From Resource Link you can order permanent processor and memory upgrades, On/Off CoD, CPE, and CBU records.

---

**Question:**

Is FC 9898, the permanent upgrade feature, still a prerequisite to On/Off CoD?

**Answer:**

No. You can now enable your machine for temporary On/Off CoD upgrades without having to enable the machine for permanent upgrades.

---

**Question:**

If I have Capacity on Demand features on my system now will they be lost if I upgrade to a System z10?

**Answer:**

The CBU, CIU Enablement and On/Off Capacity on Demand Enablement features can be brought forward to the System z10. Any previously staged upgrades ordered through CIU for permanent or On/Off CoD upgrades will be lost.

---

**Question:**

Has the way I order Capacity on Demand features changed?

**Answer:**

Permanent processor and memory upgrades, CBU and the Capacity for Planned Event may be ordered either through your IBM or BP sales representative, or Resource Link. On/Off Capacity on Demand orders must still be placed through Resource Link only.

---

**Question:**

Tell me about the Capacity Provisioning capabilities of the System z10?

**Answer:**

A Capacity Provisioning Manager on z/OS V1.10, and available on z/OS V1.9 with PTF, can monitor z/OS systems on System z10 servers. Activation and deactivation of temporary capacity can be suggested or performed automatically based on user-defined schedules and workload criteria.

In addition, with z/OS V1.10, IBM plans to introduce the Capacity Provisioning Control Center, a tool for managing capacity provisioning for System z10 servers. It is designed to manage provisioning policies and domain configurations. Provisioning policies specify the criteria for capacity increases and decreases, while domain configurations specify systems to be observed and servers to be managed. Initial support is planned for a policy definition application which requires a workstation running Microsoft® Windows® XP.

Specifically, the Capacity Provisioning Control Center will provide the following functions:

- Create and edit Capacity Provisioning policies
- Create and edit Capacity Provisioning domain configurations
- Connect to the Provisioning Manager; Display the status of the Provisioning Managers
- Install Capacity Provisioning policies and domain configurations into the Provisioning Manager

## Cryptographic Enhancements

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**Question:**

Remote key loading capability was added to the z9 EC with the April 2006 announcement. Is Remote Key loading capability available on z10 EC?

**Answer:**

Yes, Remote key loading is available for capable Automated Teller Machines (ATM) and Point of Sale (POS) systems. Remote key loading refers to the process of loading DES (Data Encryption Standard) keys and T-DES (Triple DES) keys to ATMs and POS systems from a central administrative site without the need for personnel to visit each machine to manually load keys. In the past, key loading has been done by manually loading each of the two clear text key parts individually and separately into ATMs and POSs. Remote key loading provides a more cost-effective way of managing the terminals than by having several people travel to the ATM and POS system with key parts. This function is supported by Enhancement to Cryptographic Support for z/OS and z/OS.e 1.6/1.7<sup>11</sup> Web deliverable, Cryptographic Support for z/OS V1.7<sup>11</sup>, V1.8, V1.9 and z/OS.e V1.7<sup>11</sup> and V1.8 Web deliverable, z/VM 5.2 and above for guest exploitation. Linux can also take advantage of the robust set of functionality provided by the Common Cryptographic Architecture (CCA).

---

**Question:**

What advantages does remote key loading provide for businesses that manage ATMs and POS systems?

**Answer:**

By providing a way to load ATM and POS keys without sending staff on-site, remote key loading can reduce downtime due to key errors, reduce service call and key management costs and improve the ability to manage ATM/POS conversions and upgrades.

---

**Question:**

What ATMs and POS systems will support the z10 EC Remote Key Load function?

**Answer:**

IBM System z10 Remote Key Load capability will support ATMs and POS systems that adhere to the following standards:

- ISO/IEC 11770-3: Information Technology, Security Techniques, Key Management, Part 3: Mechanisms Using Asymmetric Techniques.
- ANSI X 9.24-2: Retail Financial Services, Symmetric Key Management, Part 2: Using Asymmetric Techniques for the Distribution of Symmetric Keys.

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<sup>11</sup> z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2010. With the Lifecycle Extension z/OS V1.7 supports the z10 BC. Certain functions and features of the z10 BC require later releases of z/OS. For the complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter dated October 21, 2008.

---

**Question:**

What is ISO 16609 CBC Mode T-DES MAC?

**Answer:**

International Standards Organization (ISO) 16609 supports the requirements for message authentication using T-DES symmetric encryption. Integrated Cryptographic Service Facility (ICSF) with the Crypto Express2 feature supports basic mechanisms in Remote Key loading. The implementation offers a secure bridge between the highly secure Common Cryptographic Architecture (CCA) environment and the various formats and encryption schemes offered by ATM vendors. Refer to Application Programmers Guide, SA22-7522, for additional details.

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**Question:**

What cryptographic hardware is supported on the z10 EC?

**Answer:**

CP Assist for Cryptographic Function (CPACF), which is shared between two Processor Units (PUs), and the Crypto Express2 feature.

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**Question:**

What cryptographic hardware is not supported on the z10 EC?

**Answer:**

PCI Cryptographic Coprocessor (PCICC), PCI X Cryptographic Coprocessor (PCIXCC), CMOS Cryptographic Coprocessor Facility (CCF), PCI Cryptographic Accelerator (PCICA) and the Crypto Express2-1P features are not supported on the z10 EC.

---

**Question:**

What cryptographic hardware is offered as standard features on the z10 EC?

**Answer:**

The CP Assist for Cryptographic Function (CPACF) is a standard feature on the z10 EC. A no-charge enablement feature #3863 is required to utilize the CP Assist for Cryptographic Function and for export control. The Crypto Express2 feature is an optional feature. The first order increment is two features.

---

**Question:**

What features are currently supported by the CP Assist for Cryptographic Function (CPACF) on the z10 EC?

**Answer:**

CPACF includes support of the DES, T-DES, Advanced Encryption Standard (AES), Secure Hash Algorithms and Pseudo Random Number Generation (PRNG).

CPACF, supporting clear key encryption, is activated using a no charge enablement feature #3863 and offers the following:

- Data Encryption Standard (DES)
- Triple Data Encryption Standard (T-DES)
- Advanced Encryption Standard (AES) - 128 bit
- SHA-1

- SHA-256
- Pseudo Random Number Generation (PRNG)

CPACF has been enhanced to include the following on CPs and IFLs:

- Advanced Encryption Standard (AES) for 192 bit and 256 keys
- SHA-224, SHA-384 and SHA-512 for message digest.

CPACF throughput scales linearly as CPACFs are added. SHA-1, SHA-256, and SHA-512 are shipped enabled on all servers and do not require the enablement feature. DES, T-DES and AES functions require enablement of the CPACF function (Feature Code 3863) for export control. CPACF cryptographic functions are aimed at encryption, decryption and hashing of data transferred over open networks and data sent to storage.

---

**Question:**

What features are available with Crypto Express2?

**Answer:**

Crypto Express2 is configurable. The Crypto Express2 feature has two PCI-X adapters, and each can be defined as either a Coprocessor or as an Accelerator:

- The Crypto Express2 Coprocessor (default):
  - Supports Secure key encrypted transactions
  - Supports highly secure cryptographic functions, use of secure encrypted key values, and User Defined Extensions (UDX)
  - Is designed for Federal Information Processing Standard (FIPS) 140-2 Level 4 certification.
- Crypto Express2 Accelerator – to enable SSL acceleration on z10 EC:
  - Supports clear key RSA acceleration
  - Offloads compute-intensive RSA public-key and private-key cryptographic operations employed in the SSL protocol.
- Up to eight Crypto Express2 features per server.
- All logical partitions (LPARs) in all Logical Channel Subsystems (LCSSs) have access to the Crypto Express2 feature, up to 32 LPARs per feature.

---

**Question:**

What are the functional differences between the Coprocessor and Accelerator configurations on Crypto Express2 features?

**Answer:**

The z10 EC provides the ability to configure Crypto Express2 PCI-X adapters as accelerators or as coprocessors. When both PCI-X adapters are configured as accelerators, the Crypto Express2 feature is designed to perform up to 6000 SSL handshakes per second. The SSL rate was achieved with a z10 EC environment with four processors and two PCI-X adapter cards (one Crypto Express2, both configured as accelerators), Cryptographic Support for z/OS V1.7<sup>12</sup>, V1.8, V1.9 and z/OS.e V1.7<sup>11</sup> and V1.8 Web deliverable.

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<sup>12</sup> z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2010. With the Lifecycle Extension z/OS V1.7 supports the z10 BC. Certain functions and features of the z10 BC require later releases of z/OS. For the complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter dated October 21, 2008.

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

Since the performance enhancements are implemented in Licensed Internal Code, Crypto Express2 features have been carried forward from z9 EC to z10 EC platforms.

---

**Question:**

Will the Crypto Express2, feature code 0863, support Linux running on System z on the z10 EC?

**Answer:**

Yes, Linux running on the z10 EC supports both secure and clear key operations. The Secure Sockets Layer (SSL) and Transport Layer Security (TLS) cryptographic operations are supported in both modes along with extensive secure key cryptographic support provided by the Common Cryptographic Architecture (CCA) library now available for Linux running on z10 EC. IBM is working with its distribution partners to continue providing cryptographic functions in future distribution releases, or service updates.

---

**Question:**

Besides System z, what other IBM server families support Crypto Express2 Coprocessor?

**Answer:**

IBM System i<sup>®</sup> and IBM System p<sup>®</sup> servers, where the coprocessor is available as a unique feature, 4764.

For information about the crypto coprocessor for System i, visit:

<http://publib.boulder.ibm.com/series/>. Click on the release in which you are interested and then search for 4764.

For information about the crypto coprocessor for System p, visit:

<http://www-03.ibm.com/security/cryptocards/pcixcc/overview.shtml>

For IBM System x<sup>™</sup> servers, the crypto coprocessor is offered as machine type /model, 4764-001. Supported System x servers are listed on the IBM ServerProven<sup>®</sup> Web site.

---

**Question:**

Will IBM offer, at some point in the future, support for RSA Keys greater than 2048 bits in length?

**Answer:**

RSA Keys, up to 4096 bits, are supported on z10 EC. The RSA services in the CCA API are extended to support RSA keys with modules lengths up to 4096 bits. The services affected include key generation, RSA-based key management, digital signatures, and other functions related to these services.

Crypto Express2, feature code 0863, along with Cryptographic Support for z/OS V1.7<sup>13</sup>, V1.8, V1.9 and z/OS.e V1.7<sup>12</sup> and V1.8 Web deliverable are required. RSA keys greater than 2048 bits, in length, are supported when running z/VM 5.2 and above for guest exploitation.

---

<sup>13</sup> z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2010. With the Lifecycle Extension z/OS V1.7 supports the z10 BC. Certain functions and features of the z10 BC require later releases of z/OS. For the complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter dated October 21, 2008.

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**Question:**

What Integrated Cryptographic Service Facility (ICSF) services are available with CP Assist for Cryptographic Function (CPACF)?

**Answer:**

All critical Integrated Cryptographic Service Facility (ICSF) services that currently execute on z890, z990, z9 EC and z9 BC PCIX Cryptographic Coprocessor (PCIXCC) feature are planned to be supported by the Crypto Express2 feature.

The following ICSF callable services will be available with CPACF and Cryptographic Support for z/OS V1.7<sup>12</sup>, V1.8, V1.9 and z/OS.e V1.7<sup>12</sup> and V1.8 Web deliverable.

CSNBSYE, CSNBSYE1, CSNBSYD, and CSNBSYD1 will provide support for clear-key AES encryption and decryption with 256-bit keys using the CPACF.

CSFNBOWH and CSNBOWH1 will provide support for SHA-1 and SHA-512 using CPACF.

These services continue to support DES and TDES.

---

**Question:**

What other means are available for customers to utilize CPACF?

**Answer:**

For IBM and customer written programs, CPACF function for DES, T-DES, AES-128, AES-192 and AES-256, SHA-1, SHA-224, SHA-256, SHA-384 and SHA-512 functions can be invoked by instructions as described in the z/Architecture Principles of Operation, SA22-7832-02. As a group, these instructions are known as the Message Security Assist (MSA). These are all problem state instructions and are all in RRE format.

Linux running on z10 EC can also utilize CPACF Function. IBM is working with its distribution partners to provide support for cryptographic functions in future distributions releases, or service updates.

---

**Question:**

Is a Trusted Key Entry (TKE) workstation mandatory for the use of the CP Assist for Cryptographic Function (CPACF) and Crypto Express2 feature?

**Answer:**

The CP Assist for Cryptographic Function (CPACF) supports clear key functions and does not require entering of master keys. The TKE workstation is an optional feature. It is not mandatory for use with the Crypto Express2 feature, however, the TKE workstation offers security-rich local and remote key management, and also provides authorized persons a method of operational and master key entry, identification, exchange, separation, and update.

---

**Question:**

Will there be an update to the ATS TechDocs Web site to provide additional technical information about z10 EC cryptographic hardware features?

**Answer:**

ATS TechDocs Web site and several z10 EC cryptographic technical papers will be updated as appropriate. The ATS TechDocs Web site URL is [ibm.com/support/techdocs/atsmastr.nsf](http://ibm.com/support/techdocs/atsmastr.nsf)

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**Question:**

What releases of operating systems are required to support the Crypto Express2 hardware feature and CP Assist for Cryptographic Function (CPACF) on the z10 EC?

**Answer:**

The minimum software support requirements for Crypto Express2 and CP Assist for Cryptographic Function (CPACF) features are as follows:

- Crypto Express2:
  - Cryptographic Support for z/OS V1.7<sup>14</sup>, V1.8, V1.9 and z/OS.e V1.7<sup>13</sup> and V1.8 Web deliverable.
  - z/VM 5.2 guest exploitation.
  - z/VSE 3.1
  - z/TPF V1.1 (acceleration mode only) with APAR PJ30717
  - Linux on System z. The latest levels of Novell Linux Enterprise Server and Red Hat Enterprise Linux distributions include the support necessary to utilize the Crypto Express2. Note: z/VSE supports clear key RSA operations only. Linux on System z and z/VM V5.2, and later, support clear and secure key operations.
- CPACF (DES, TDES, SHA-1, SHA0224, SHA-256, AES-128 and PRNG):
  - z/OS V1.7<sup>15</sup> with any of the following:
    - Cryptographic Support for z/OS V1R6/R7<sup>14</sup> and z/OS.e V1R6/ R7<sup>14</sup> Web download (no longer available),
    - Enhancements to Cryptographic Support for z/OS and z/OS.e V1R6/ R7<sup>14</sup> Web deliverable (no longer available),
    - Cryptographic Support for z/OS V1.7<sup>14</sup>, V1.8, V1.9 and z/OS.e 1 V1.7<sup>14</sup> and V1.8 Web deliverable
    - z/OS V1.8 or higher
    - z/VM V5.2 for guest exploitation.
    - z/VSE V3.1 and IBM TCP/IP for VSE/ESA™ V1.5e with PTFs.
    - z/TPF V1.1
    - TPF V4.1
    - Linux for System z – The latest levels of currently available distributions from Novell and Red Hat include the support necessary to utilize CP Assist for Cryptographic Function.
- Enhancements to CP Assist for Cryptographic Function (CPACF) on the z10 EC which includes SHA-384, SHA-512, AES-192 and AES-256 requires at a minimum:
  - Cryptographic Support for z/OS V1.7<sup>14</sup>, V1.8, V1.9 and z/OS.e 1 V1.7<sup>14</sup> and V1.8 Web deliverable.
  - z/VM V5.2 for guest exploitation.

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<sup>14</sup> z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2010. With the Lifecycle Extension z/OS V1.7 supports the z10 BC. Certain functions and features of the z10 BC require later releases of z/OS. For the complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter dated October 21, 2008.

<sup>15</sup> z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2010. With the Lifecycle Extension z/OS V1.7 supports the z10 BC. Certain functions and features of the z10 BC require later releases of z/OS. For the complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter dated October 21, 2008.

- z/VSE V4.1 and IBM TCP/IP for VSE/ESA V1.5e with PTFs.
- Linux on System z – IBM is working with its Linux distribution partners to support CPACF enhancements in future Linux on System z releases.

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**Question:**

What enhancement was introduced in October 2008 for Secure Key AES?

**Answer:**

The Advanced Encryption Standard (AES) is a National Institute of Standards and Technology specification for the encryption of electronic data. It is expected to become the accepted means of encrypting digital information, including financial, telecommunications and government data. AES is the symmetric algorithm of choice for the encryption and decryption of data. The AES encryption algorithm is supported with secure (encrypted) keys of 128, 192 and 256 bits.

**Note:** The z/OS ICSF will support Secure Key AES, November 21, 2008.

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**Question:**

What was introduced in October 2008 for Personal Account Numbers?

**Answer:**

Credit card companies sometimes perform card security code computations based on Personal Account Number (PAN) data. The Integrated Cryptographic Service Facility (ICSF) callable services currently support 13-, 16, and 19-digit PANs. To deliver additional flexibility, the keywords PAN-14, PAN-15, PAN-17 and PAN-18 are now available when using a System z10 with associated z/OS and z/VM software.

**Note:** The z/OS ICSF will support 14, 15, 17 and 18 digit PANs November 21, 2008.

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**Question:**

What z/OS Integrated Cryptographic Services Facility (ICSF) cryptographic support is planned?

**Answer:**

See the z/OS Announcement letter for more z/OS security enhancements

z/OS V1.11 Preview

<http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?subtype=ca&infotype=an&appname=iSource&supplier=897&letternum=ENUS209-029>

z/OS V1.10 Announcement

<http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?subtype=ca&infotype=an&appname=iSource&supplier=897&letternum=ENUS208-186>

With z/OS V1.11, IBM plans to update the z/OS Integrated Cryptographic Services Facility (ICSF) with the following functionality:

1. A new Key Store Policy that provides a set of policy controls designed to allow you to specify further limits on application control of key material and provide a central point of control. This new set of policy controls is planned to extend ICSF's use of the z/OS Security Manager and is intended to provide additional policy-based protection for key

material stored in the CKDS and PKDS data sets.

2. A new ICSF Query Algorithms service that returns a summary of available crypto algorithms, providing information applications and middleware can use to determine whether to use system services or provide their own cryptographic implementations.
3. Support for AES-based AES-XCBC-MAC-96 and AES-XCBC-PRF-128 algorithms. This will be intended to meet the government standard.
4. Support for 14-digit Diners Club primary account numbers (PANs). Support for additional lengths (15-digit, 17-digit, and 18-digit PANs) is planned to be included for future applications.

Additionally, z/OS V1.11 support for these functional enhancements to System SSL is planned:

1. A mode of operation designed to meet the National Institute of Standards and Technology agency NIST FIPS 140-2 Level 1 criteria. This mode is intended to restrict a System SSL application to using FIPS-approved algorithms, key sizes, and SSL protocols.
2. support of the Transport Layer Security (TLS) V1.1 protocol as defined in RFC4346. This support will be intended to allow System SSL applications to exploit the protocol as well as ensuring continued interoperability with other SSL implementations that support the TLS V1.1 protocol.
3. support for TLS Extensions at the RFC3546 level.
4. support for X.509 v3 certificates and X.509 v2 Certificate Revocation Lists (CRL) at the RFC3280 level.

With z/OS V1.10, IBM updated plans to update the z/OS Integrated Cryptographic Services Facility (ICSF) with the following functionality:

- **4096-bit RSA key support.** IBM plans to provide 4096-bit RSA support on System z servers. The servers must have the 4096-bit RSA signature generation and verification support available with feature 0863 installed, and the Crypto Express Coprocessor with microcode level MCL006-MCL009 on these servers: z10 EC, z9 EC and z9 BC.
- **ISO Format-3 PIN Block** support that meets the ISO 9564-1 Banking standard is planned by IBM. Feature 3863 must be installed, and the Crypto Express2 Coprocessor with microcode level MCL006-MCL009 on these servers: z10 EC, z9 EC and z9 BC.

Additionally, z/OS V1.10 support for these functional enhancements to System SSL is updated:

- **Utilize hardware support for RSA digital signature** generate and verification and RSA encrypt and decrypt available on z10 EC, z9 EC and z9 BC servers with feature 0863 installed with the latest Crypto Express2 Coprocessor with microcode level 3.30, which is provided by MCL006-MCL009.

---

**Question:**

Will UDXs written for zSeries servers function on the z10 EC?

**Answer:**

Customers should always contact IBM to understand the effects of a new environment on their UDXs. For further information, see the answer to the next question.

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**Question:**

Will new UDXs be supported on the z10 EC?

**Answer:**

Yes. If you wish to inquire further about UDX support for the Crypto Express2 feature, please contact one of the following IBM representatives: Leo Moesgaard (Leo.Moesgaard@dk.IBM.com) or David Evans (Davee@us.IBM.com)

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**Question:**

What are the functions and attributes of the CP Assist for Cryptographic Function (CPACF) and Crypto Express2 features?

**Answer:**

The following table highlights the features or attributes:

<b>Functions or attributes</b>	<b>CPACF</b>	<b>Crypto Express 2</b>
Supports z/OS applications using ICSF	X	X
SSL handshake capability – performance best when both PCI-X adapters are configured in accelerator mode		X
Provides highest symmetric encryption performance (clear key)	X	
Provides highest symmetric encryption performance (secure key)		X
Provides highest asymmetric (clear key) performance (in accelerator mode)		X
Provides highest asymmetric (encrypted key) performance (in coprocessor mode)		X
Uses CHPID numbers	N/A	N/A
Shared physically between two (2) Processor Units	X	
Requires CP Assist for Cryptographic Function (CPACF) enablement	X	X
Requires ICSF to be active, for z/OS users		X
Requires system master keys to be loaded (in coprocessor mode)		X
Offers user programming function support (UDX) (in coprocessor mode)		X
Usable for data privacy – encryption and decryption processing	X	X
Usable for data integrity – hashing and message authentication	X	X
Usable for financial processes and key management operations (in coprocessor mode)		X
Crypto performance RMF monitoring		X
System (master) key storage (in coprocessor mode)		X
Retained key storage (in coprocessor mode)		X
Designed for tamper-resistant hardware packaging (in coprocessor mode)		X
Designed for FIPS 140-2 Level 4 certification (in coprocessor mode)		X
Supports SSL functions	X	X

Supports Linux applications	X	X
RSA functions		X
High Performance SHA-1, SHA-128, SHA-224,SHA-256, 384, 512 Hash functions	X	
Clear key DES/T-DES	X	
Clear key RSA		X

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**Question:**

Does the use of RSA Retained private keys limit availability?

**Answer:**

Yes. The use of retained private keys creates an application single point of failure. Since RSA Retained private keys cannot be copied, backed up or scaled from a performance perspective, these keys should only be used if mandated by the customers' security policy. For those customers that require a private key that is intended to be shared across logical partitions, they should use RSA keys encrypted under a host master key instead of a retained key. The use of the RSA keys encrypted under a host master key is designed to prevent the loss of the key associated with the RSA Retained private key specific to the Crypto Express2 feature.

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**Question:**

What is with TKE 5.3?

**Answer:**

The TKE workstation offers security-rich local and remote key management, providing authorized persons a method of operational and master key entry, connectivity to an Ethernet Local Area Network (LAN) operating at 10 or 100 Mbps. Up to ten TKE workstations can be ordered. The TKE 5.3 level of Licensed Internal Code (LIC) includes support for the AES encryption algorithm, adds 256-bit master keys and includes the master key management functions required to load or generate AES master keys to cryptographic coprocessors in the host.

There is also an embedded screen capture utility to permit users to create and transfer TKE master key entry instructions to diskette or DVD.

The optional TKE features are:

- TKE 5.3 LIC (#0854) and TKE workstation (#0839)
- TKE Smart Card Reader (#0885)
- TKE additional Java-based smart cards (#0884)

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**Question:**

What functions are supported by TKE 5.2?

**Answer:**

The Trusted Key Entry (TKE) 5.2 level of Licensed Internal Code (LIC) is installed in TKE workstation feature code #0839. The TKE 5.2 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 pass phrase, or optionally a logon key pair. The benefits of TKE 5.2 LIC include service mode support and usability enhancements including a service user to improve access to operations and a new task layout display to maintain TKE console consistency. TKE 5.2 LIC is a

no-charge enablement feature which is loaded prior to shipment when a TKE workstation is ordered. The TKE 5.2 LIC includes support for the Smart Card Reader.

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**Question:**

Will there be an upgrade to the Trusted Key Entry (TKE) workstation?

**Answer:**

Yes, the current TKE workstation for z10 EC will be upgradeable. The TKE workstation is assigned feature code #0839 with LIC level 5.3. Customers must use the TKE workstation to control the z10 EC. Customers may continue to use the previous TKE, feature code #0859, with an upgrade of LIC level 5.3.

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**Question:**

Will customers have the option to order Trusted Key Entry (TKE) workstation with Token-Ring or Ethernet?

**Answer:**

No, a TKE workstation with Token Ring is not offered. Ethernet is the only option offered. This satisfies the Statement of General Direction in Hardware Announcement 104-115, dated April 7, 2004, Hardware Announcement 104-117, dated April 7, 2004, and Hardware Announcement 104-118, dated April 7, 2004.

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**Question:**

Will Smart Card Reader support be available with z10 EC TKE workstations?

**Answer:**

Yes, support is available for an optional Smart Card Reader to be attached to the TKE LIC level 5.3 workstation. Customers may also carry forward optional Smart Card Reader features.

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**Question:**

What feature is available on the Smart Card Reader?

**Answer:**

TKE 5.3 LIC has added the capability to store key parts on DVD-RAMs and continues to support the ability to store key parts on paper, or optionally on a smart card. TKE 5.3 LIC has limited the use of floppy diskettes to read-only.

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**Question:**

In an earlier question I saw mention of a Java-based smart card – what is that?

**Answer:**

You now have the capability to order Java-based blank smart cards which offers a highly efficient cryptographic and data management application built-in to read-only memory for storage of keys, certificates, passwords, applications and data. The TKE blank smart cards are compliant with FIPS 140-2 Level 2. Orders for smart cards are shipped 10 smart cards.

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**Question:**

Will the number of TKE workstations be limited to one per system?

**Answer:**

Up to ten (10) LIC level TKE 5.3 workstations per system will be supported on the z10 EC. This means that up to ten (10) smart card reader features, each feature consisting of two smart card readers, can be attached to the z10 EC.

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**Question:**

What was in the April 28, 2009 announcement for Cryptography on z9 servers?

**Answer:**

Yes, On April 28, 2009, more protection and security options for System z9 are announced with Advanced Encryption Standard (AES) 192 and 256, and support for Longer Personal Account Numbers for stronger data protection on Crypto Express2 and Crypto Express2-1P.

Secure Key AES: The Advanced Encryption Standard (AES) is a National Institute of Standards and Technology specification for the encryption of electronic data. It is expected to become the accepted means of encrypting digital information, including financial, telecommunications, and government data. AES is the symmetric algorithm of choice, instead of Data Encryption Standard (DES) or Triple-DES, for the encryption and decryption of data. The AES encryption algorithm is supported with secure (encrypted) keys of 128, 192, and 256 bits.

The secure key approach, similar to what is supported today for DES and TDES, offers the ability to keep the encryption keys protected at all times, including the ability to import and export AES keys, using RSA public key technology.

Support for AES encryption algorithm includes the master key management functions required to load or generate AES master keys, update those keys, and re-encipher key tokens under a new master key.

Secure key AES is exclusive to System z9 and System z10

Support for 13-through 19-digit Personal Account Numbers: Credit card companies sometimes perform card security code computations based on Personal Account Number (PAN) data. Currently, Integrated Cryptographic Service Facility (ICSF) callable services CSNBCSV (VISA CVV Service Verify) and CSNBCSG (VISA CVV Service Generate) are used to verify and to generate a VISA Card Verification Value (CVV) or a MasterCard Verification Code (CVC).

The ICSF callable services currently support 13-, 16-, and 19-digit PANs. To deliver additional flexibility, new keywords PAN-14, PAN-15, PAN-17, and PAN-18 are implemented in the rule array for both CSNBCSV and CSNBCSG to indicate that the PAN data is comprised of 14, 15, 17, or 18 PAN digits, respectively.

Support for 13-through 19-digit PANs is exclusive to System z9 and System z10

## Server Time Protocol (STP)

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**Question:**

What was announced on April 28, 2009 concerning STP?

**Answer:**

STP configuration and time information saved across Power on Resets (POR) or power outages for two servers: This enhancement delivers system management improvements by saving the STP configuration across PORs and power failures for a dual server STP-only Coordinated Timing Network (CTN). Previously, if both the Preferred Time Server (PTS) and the Backup Time Server (BTS) experienced a simultaneous power outage (site failure), the time, and assignment of the PTS, BTS, and CTS roles would have to be reinitialized. You will no longer need to reinitialize the time or reassign the roles across site power outage events.

Improved STP System Management with new z/OS Alerts z/OS messages will be generated for various hardware events that affect STP. This can improve problem determination and correction times. Previously, the errors were logged in the HMC console only. Events will be able to generate messages related to external time source failures.

The ability to generate z/OS alerts requires z/OS R11, planned to be available in September, 2009. This is planned to be rolled back to z/OS R9.

NOTE: Please use the updated STP FAQs to answer your questions on the Server Time Protocol feature of the z10 EC. These can be found at: [www.ibm.com/systems/z/faq/](http://www.ibm.com/systems/z/faq/)

## Parallel Sysplex Enhancements

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### Question:

What was in the April 28<sup>th</sup> announcement about System z9 supporting 12x IB-SDR on z9 EC and z9 BC general purpose servers?

### Answer:

Support for 12x InfiniBand single data rate (12x IB-SDR) has now been expanded on System z9 to include all z9 ECs and all z9 BCs and is no longer restricted to systems where the z9 is a standalone Coupling Facility.

The 12x InfiniBand coupling links can now be used for connections between any System z10 and System z9 including z9 ECs and z9 BCs with processor units (PUs) defined as a Central Processor (CP), Integrated Facility for Linux (IFL), System z9 Application Assist Processor (zAAP), System z9 Integrated Information Processor (zIIP), or System Assist Processor (SAP).

This fulfills the statements of direction in Hardware Announcement 108-154, (RFA46507) dated February 26, 2008 and Hardware Announcement 108-754, (RFA47533) dated October 21, 2008.

Note: IBM does not intend to support 12x InfiniBand coupling links on System z9-to-System z9 servers. 12x InfiniBand coupling links on System z9 are intended to support a migration to System z10.

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### Question:

What advantages will I have with 12x InfiniBand coupling links (12x IFBs)?

### Answer:

12x IFBs provide a high speed coupling connection up to 150 meters (492 feet). While ICB-4 still provide the fastest coupling service times for distances up to 10 meters (33 feet), IFBs can provide significantly improved service times compared to ISC-3s for distances up to 150 meters.

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### Question:

What other generations of servers can connect to a z10 EC server in a Parallel Sysplex environment?

### Answer:

System z10 servers are designed to coexist in the same Parallel Sysplex environment with (n-2) server families. This allows System z10 servers to coexist with the IBM System z9, as well as the IBM z890 and z990 server families.

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### Question:

Do the IBM System z9 servers support 12x IFB coupling links?

### Answer:

Yes, the IBM System z9 servers can be configured with 12x links to support connections to other System z10 servers. The System z9 servers can be running system images or coupling facility images.

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**Question:**

You just announced Long Reach 1x InfiniBand coupling links. What are they?

**Answer:**

Long Reach 1x InfiniBand coupling links (LR 1x IFBs), like ISC-3, support Parallel Sysplex and STP communications at an unrepeated distance of up to 10 km (6.2 miles) and greater distances when attached to qualified optical networking solutions. Also like ISC-3, LR 1x IFBs support use of 9 micron single mode fiber optic cables with LC Duplex connectors, easing migration from an ISC-3 environment to an LR 1x IFB environment.

Long reach 1x InfiniBand coupling links support single data rate (SDR) at 2.5 gigabits per second (Gbps) when connected to a qualified DWDM capable of SDR or double data rate (DDR) at 5 Gbps when connected directly or through a qualified DWDM capable of DDR.

Introduction of LR 1x IFBs fulfills a statement of direction from the February 2008 System z10 announcement.

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**Question:**

What servers support LR 1x InfiniBand coupling links?

**Answer:**

LR 1x IFB links are exclusive to System z10 EC and System z10 BC.

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**Question:**

What will I get with Coupling Facility Control Code (CFCC) Level 16?

**Answer:**

Up until now, System-Managed Coupling Facility (CF) Structure Duplexing required two duplexing protocol exchanges to occur synchronously during processing of each duplexed structure request. CFCC Level 16 allows one of these protocol exchanges to complete asynchronously. This allows faster duplexed request service time with more benefit when the Coupling Facilities are further apart, such as a multi-site Parallel Sysplex.

CFCC Level 16 may help improve the efficiency of coupling communications for IMS Shared Queue and WebSphere MQSeries® Shared Queue environment.

CFCC Level 16 is exclusive to System z10 and is supported by z/OS V1.8 with PTFs, and toleration with z/OS V1.7 with IBM Lifecycle Extension for z/OS V1.7, and z/VM V5.2 and later (with PTFs) for guest exploitation.

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**Question:**

What if the needed z/OS software is not installed with CFCC 16?

**Answer:**

CFCC Level 16 provides improved shared queue management for the IMS and MQ environment, and System Managed CF Structure Duplexing performance enhancements.

Without the z/OS PTFs installed, CFCC 16 can be run, but will not be able to take advantages of these features.

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**Question:**

What servers will support CFCC 16?

**Answer:**

CFCC 16 can be installed on System z10 servers. It is not rolled back to System z9.

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**Question:**

Are there enhancements to Server Time Protocol (STP)?

**Answer:**

Yes. There are several enhancements to STP: enhance time accuracy to an External Time Source (ETS), NTP server support on Hardware Management Console (HMC), continuous availability of NTP servers used as External Time Source, Application Programming Interface (API) to automate STP CTN reconfiguration, Enhanced STP recovery when Internal Battery Feature is in use and STP configuration and time information saved across power-on-resets or power outages. Please refer to the separate STP FAQ document to answer your questions on the Server Time Protocol on System z10. These can be found at: [www.ibm.com/systems/z/faq/](http://www.ibm.com/systems/z/faq/)

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**Question:**

What Parallel Sysplex and Parallel Sysplex-related improvements were announced for z/OS V1.10?

**Answer:**

With z/OS V1.10, IBM introduced the following enhancements:

- In z/OS V1.10, XCF and XES plan to extend and enhance their existing health checks to provide new and improved checks to detect single points of failure. Improved CF structure and duplexing checks are planned to help you avoid sysplex related problems. New checks are also planned for the Sysplex Failure Manager action specifications to help you improve sysplex availability.
- z/OS Communications Server designs for z/OS V1.10 includes support to help you coordinate LU name assignments among TN3270 servers in sysplex. With this enhancement, one TN3270E Telnet Server in the group acts as an LU Name Server and allocates shared LU names to other TN3270E Telnet Servers within the group. This allows load balancing across multiple TN3270E Telnet Servers with consistent configurations. High availability of the LU Name Server service is provided with automated takeover and recovery.
- In z/OS V1.10, IBM delivers the final phase of Consoles Enhancements. In this final phase, consoles processing is designed to reduce serialization contention by reducing the scope of serialization for many operations from a console class to an individual console. Additionally, support is provided to increase the maximum number of MCS, SMCS, and subsystem consoles in a Sysplex from 99 per Sysplex to 99 active consoles per system.

- In z/OS V1.10, RACE<sup>®</sup> can help you preserve RACF database data integrity and availability in a Sysplex, by eliminating potential causes of database corruption.
- A z/OS UNIX System Services function can allow you to change sysplex root data sets dynamically, without a sysplex-wide IPL. Commands can eliminate a cause for planned outages and to facilitate migration of Sysplex roots from HFS to zFS.
- Additional improvements are available for the Load Balancing Advisor and Load Balancing Agent, DFSMSHsm<sup>™</sup> CDS backup, GRS and RRS.

## GDPS Enhancements

### Question:

What Geographically Dispersed Parallel Sysplex™ GDPS® functions were announced with GDPS v3.6 on February 24, 2009?

### Answer:

GDPS V3.6 enhances IBM's current industry-leading Continuous Availability and Disaster Recovery (CA/DR) automation by extending the support for managing heterogeneous platforms, and continuing to exploit the advanced data replication technologies of IBM DS8000™ Storage to provide faster backup/restore solutions and improved ease of use. These benefits can be achieved through new functions such as:

- Improved coordinated disaster recovery across heterogeneous platforms by supporting:
  - Distributed Cluster Management (DCM) support for GDPS/Global Mirror with Veritas® Cluster Server
  - GDPS/PPRC Multiplatform Resiliency for System z (xDR) support for LSS sharing between z/VM LPARs
- Increased availability with:
  - Reduced-impact Metro Mirror initial copy and resynchronization for GDPS/PPRC and GDPS/PPRC HyperSwap™ Manager configurations
  - Enhanced timer support for GDPS/PPRC
  - GDPS/PPRC Multiplatform Resiliency for System z (xDR) support for two controlling systems (K-sys)
  - Remote Pair FlashCopy® support with GDPS/PPRC and GDPS/PPRC HyperSwap Manager configurations
- Simplified System Management with:
  - New GDPS Health Checks
  - Introduction of Query Services

IBM is announcing the following Statements of Direction:

- Improved scalability with GDPS/PPRC Alternate Subchannel Sets
- Increased disaster recovery protection with GDPS/MGM Incremental Resynchronization enhancement
- Improved automation with GDPS/PPRC timer support extensions
- Increased availability with New HyperSwap trigger for z/VM

More detailed information on GDPS service offerings is available at:

<http://www.ibm.com/systems/z/gdps>

Contact [gdps@us.ibm.com](mailto:gdps@us.ibm.com) to get more information on GDPS solutions.

## **IBM Systems Director for Linux on IBM System z**

Please use the IBM Systems Director for Linux on IBM System z to your questions. These can be found at: [www.ibm.com/systems/z/faq/](http://www.ibm.com/systems/z/faq/)

## IBM Global Financing (IGF)

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**Question:**

What can IGF offer customers interested in acquiring new System z10 technology?

**Answer:**

IBM Global Financing (IGF), the leasing and lending business segment of IBM, can offer financing terms and conditions that in many cases can make it possible for qualified clients to acquire the new IBM System z10 EC system with leases at lower monthly payments than they currently make today.

IGF can help customers:

- Upgrade to the new IBM System z10 EC technology: Swap out older equipment and provide attractive lease financing on new equipment with nondisruptive migrations.
- With financing for a field upgrade: Grow within new z10 EC technology with easy upgrade lease financing and extensions, often at the same payment level or less.
- A Sale Leaseback: IGF can purchase existing technology from the customer at its fair market value, and lease the base machine back to the client or upgrade it in place with a lease package for the new z10 EC technology.
- Equity Upgrade: IGF can offer to finance upgrades to a customer owned base server if the client agrees to special end of lease terms. This approach helps clients get upgrade financing when they need it and avoid ownership issues regarding non-severable upgrades, and certain accounting issues related to sale leasebacks. Check local country for availability.

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**Question:**

How can leasing with IGF lower a customer's monthly payments?

**Answer:**

1. The customer only pays for what is used. In fair market value leases, customers are effectively paying for the purchase price of the machine less the residual value (RV). The lessee benefits from a lower monthly payment. Full risk with respect to the residual value of the machine rests with the financing company, who in turn is looking to utilize the remaining RV at the end of lease. On the other hand, customers taking a loan to buy the equipment outright must pay based on the total 100% value of the equipment. And they also assume the technology obsolescence risk relating to asset ownership. Leasing is an excellent way to acquire usage of the equipment without actually owning the equipment.
2. A z10 EC upgrade can even lower a customer's existing monthly payments. When a customer decides to upgrade to a new z10 EC, the new lease on his older machine is extended to be co-terminus with the lease structured for the upgrade components. The benefits to the customer are that he now receives new technology easily and often can keep lease payments the same or actually lower his monthly payment.



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**Question:**

Can IGF help lower total cost of ownership?

**Answer:**

By leasing with IGF customers transfer technology risk and its implied cost to IGF, while preserving end of lease purchase, return or continuation options for themselves. By leasing rather than purchasing, the savvy customer can acquire the use of the equipment without actually owning the asset, leveraging residual value to drive total cost of 'ownership' downwards. This savings can be extended to follow on replacement equipment leases, providing a virtuous circle of TCO savings over multiple technology refresh cycles.

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**Question:**

How does IGF support the Dynamic Infrastructure?

**Answer:**

To realize a smarter and more dynamic infrastructure, you need a smart, dynamic way to finance it. While that may sound like a tall order in today's economy, IBM Global Financing can provide qualified customers the access to capital and customized financing structures you require to address your infrastructure needs.

As you initiate and evolve a dynamic infrastructure, IBM Global Financing can provide a long-term financing strategy with funding options that will help you reduce costs, manage risk and improve service levels. With the right funding strategy in place, you can acquire the technology and services you need in a way that meets your budget and ROI demands and lets you quickly adapt to changing business requirements and marketplace conditions.

Despite today's economic uncertainty, companies interested in their long-term survival must chart a course towards greater resiliency and develop a financing strategy to get them there. IBM Global Financing can help make this journey affordable—and help you get started immediately.

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**Question:**

Can IGF finance IT services?

**Answer:**

Yes, IGF can finance credit qualified customers' acquisition of hardware, software and IT services either in standalone transactions or in conjunction with an equipment hardware lease or as part of a large infrastructure project. Regardless of scope or size customers can choose to include IT services in their monthly payment schedule.

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**Question:**

Can IGF finance other products with z10 EC? (hardware, software and services)

**Answer:**

Yes, IGF can finance all the components of an IT solution for the customer. Components may be IBM products and services, or non-IBM IT related products and services. Total solution financing from IGF offers one-stop convenient financing for credit qualified customers, regardless if they buy direct from IBM or from IBM Business Partners.

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**Question:**

How is IGF able to offer such competitive rates?

**Answer:**

For credit qualified customers IBM Global Financing (IGF) offers attractive lease and loan pricing, oftentimes at below market rates in selected markets, along with equitable fair contract terms and conditions. IGF is able to be a manufacturer's source of reliable credit for IBM customers looking to access technology at attractive rates primarily because of our steady, conservative and vigorous approach to risk, the strong credit rating of IBM, and our understanding of technology and proven ability to extract the most value out of that technology.

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**Question:**

What offerings does IGF have for major infrastructure projects?

**Answer:**

For enterprise clients who are partnering with IBM on large infrastructure projects, IBM can assemble an Open Infrastructure Offering (OIO) that combines hardware, software, professional services, maintenance, financing and disaster recovery into a single, customized agreement. Every OIO agreement is tailored to a specific customer situation and provides the flexibility to make changes in response to changing needs, including the ability to substitute new technologies as needed. It combines a simplified acquisition process with a consolidated monthly bill. An OIO can reduce overall IT expenses and optimize asset management for in-place and future assets. A single contract, predefined interest rates and monthly billings reduce financial risks and make budget planning easier through improved IT expense forecasting.

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**Question:**

How does IGF support business partners?

**Answer:**

IGF works with IBM Business Partners who wish to offer our financing programs to their customers. In most of the developed IT markets worldwide, IGF enables IBM Business Partners to offer IGF financing with a Web based tool called Rapid Online Financing (RoF). Partners can use RoF to credit qualify their customer, price out financing proposals, and deliver contracts, all within minutes. In addition, IGF supports IBM Business Partners with working capital inventory financing programs to assist them to do more business in their markets for the IBM Corporation.

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**Question:**

How can customers engage IGF financing?

**Answer:**

Customers may contact IGF by engaging with their local IBM Client Rep or Business Partner; their supporting IGF financial sales executive, or by visiting <http://www.ibm.com/financing>.

Questions about the US Stimulus Bill (USA CUSTOMERS ONLY)

The US economic stimulus bill recently signed by President Bush includes a bonus depreciation provision available for all businesses on new equipment and software placed in service in 2008. As a response to the bill, IGF is offering eligible customers lower lease rates or interest free deferrals, using our special IBM Economic Stimulus Advantage pricing. Under the ESA pricing, Lessees will enjoy a reduced rate for the term of the lease, or they may choose a no charge deferral of three months, followed by 36 or 48 monthly payments. Leases must be true leases, where economic ownership remains with IGF. All new IBM or non-IBM equipment installed under a true lease may qualify for the ESA. If the lessee is executing a non-disruptive side-by-side migration, the ESA offering also applies, so long as the total value of the new machine is materially contained within the upgrade.

As an example, a client<sup>16</sup> acquiring 3000 MIPS of z mainframe platform prior to the stimulus bill or \$5M, as an example, could have leased the equipment for 36 months term on a true lease basis for \$136750 per month. Under the ESA pricing, the lease would now cost about \$135K/m, or a savings of \$63K over the term of the lease. If the client has a budgeting concern in the current year where a three month no interest deferral would be desirable, then the same equipment could be leased for 39 months, but the first three months would be no charge, followed by 36 payments of \$136750. The customer's total cash outlay in 2008 would be \$820K (assuming an April install) instead of 1.2M under the flat payments priced with ESA.

The Economic Stimulus Advantage pricing is applicable to all new IBM platform equipment and new non-IBM hardware acquired in 2008 and leased with a true lease structure from IGF. In addition, in order to acquire the complete, solution clients want, qualified clients can also take advantage of IGF's current 0% financing offer on IBM software products, along with below market rates on IBM services. There has never been a better time to acquire what you need of the newest technology and finance your total solution with IGF.

IBM and IBM Credit LLC neither provides, nor intends to, offer or provide tax or accounting advice to customers. Customers should consult with their own tax, financial and legal advisors. Any tax or accounting treatment decisions made by or on behalf of the customer are the sole responsibility of the customer.

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**Question**

How can customers who install new System z equipment in the US leverage the new stimulus package announced in Washington?

**Answer:**

The recently passed US economic stimulus bill includes a bonus depreciation provision available for all businesses on new equipment and software placed in service in 2008. For eligible customers, IGF will pass the economic advantages of bonus depreciation to the lessee

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<sup>16</sup> Represents a "best credit" client

in lower lease rates or interest free deferrals, using our IBM Economic Stimulus Advantage pricing. Under the ESA pricing, lessees may elect either a reduced rate for the term of the lease, or they may choose an interest free deferral of three months, followed by 36 or 48 monthly payments. Leases must be true leases, where economic ownership remains with IGF. Other new IBM or non-IBM equipment installed with the System z10 may also be eligible for the ESA offering pricing. If the lessee is executing a non-disruptive side-by-side migration, the ESA offering also applies, so long as the total value of the new machine is materially contained within the upgrade.

This puts the stimulus into perspective: Get a new System z10 on a 36 month lease from IGF, and enjoy three months of free usage, without any additional charge! Or, choose a pay through deferral, and make lower monthly payments for the 36 month term. Whichever way you choose, the advantage is yours.

In addition, in order to acquire the complete, bundled solutions clients need, qualified customers can also take advantage of IGF current 0% financing offer on IBM software products, along with below market rates on IBM services.

IBM and IBM Credit LLC neither provides, nor intends to, offer or provide tax or accounting advice to customers. Customers should consult with their own tax, financial and legal advisors. Any tax or accounting treatment decisions made by or on behalf of the customer are the sole responsibility of the customer.

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**Question:**

Why is a true lease necessary?

**Answer:**

In a true lease, ownership of the equipment resides with the lessor, and the lessee pays for the use of the equipment. In terms of the new stimulus bill, accelerated depreciation benefits accrue to the economic owner of the equipment, and that is why our lower pricing is only available on true lease structures.

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**Question:**

Why is a B lease necessary?

**Answer:**

B lease is IGF terminology for a true lease. Economic ownership has to reside with IGF for the accelerated depreciation benefits to materialize, and that is why our lower pricing is available only on true lease structures.

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**Question:**

Customers who have tax losses carried forward or who are in AMT or are non for profit ...can these customers also be eligible for the special stimulus advantage pricing from IGF?

**Answer:**

Yes. So long as these customers are credit qualified and put new equipment on true lease structures with IGF, IGF will provide them with the ESA pricing.

## Statements of Direction

All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

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**Question:**

What statements of direction has IBM made for future high end System z servers supporting optional water cooling?

**Answer:**

IBM intends to support optional water cooling on future high end System z servers. This cooling technology will tap into building chilled water that already exists within the datacenter for computer room air conditioning systems. External chillers or special water conditioning will not be required. Water cooling technology for high end System z servers will be designed to deliver improved energy efficiencies.

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**Question:**

What statements of direction has IBM made about the ability to optionally operate from High Voltage DC power in the future?

**Answer:**

IBM intends to support the ability to operate from High Voltage DC power (370/570v) on future System z servers. This will be in addition to the wide range of AC power already supported. A direct HV DC datacenter power design can improve data center energy efficiency by removing the need for an additional DC to AC inversion step.

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**Question:**

What statements of direction has IBM made about the support of Dynamic ICF expansion?

**Answer:**

The System z10 will be the last server to support Dynamic ICF expansion. Since there is a substantial performance impact of Dynamic ICF expansion for only small gains in capacity, and IBM recommends dedicated CPs for production Coupling Facilities. IBM will discontinue this Dynamic ICF Expansion Across Server and Dynamic ICF Expansion Across ICFs.

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**Question:**

What statements of direction has IBM made about supporting 9307-2 Sysplex Timers?

**Answer:**

The System z10 will be the last server to support connections to the 9037-2 Sysplex Timer. Servers that require a timing network such as to support a base or Parallel Sysplex will require Server Time Protocol (STP). STP has been available starting with the System z9 servers and zSeries 990 and zSeries 890 since October, 2006.

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**Question:**

What statements of direction has IBM made about ESCON?

**Answer:**

It is IBM's intent for ESCON channels to be phased out over time. System z10 EC and System z10 BC are planned to be the last servers to support greater than 240 ESCON channels.

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**Question:**

What statements of direction has IBM made for phasing out ICB-4 links?

**Answer:**

IBM intends to not offer Integrated Cluster Bus-4 (ICB-4) links on future servers. IBM intends for System z10 to be the last server to support ICB-4 links.

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**Question:**

What statements of direction has IBM made for support of CHPID type FCV to be removed?

**Answer:**

IBM does not intend to offer configuration support for Channel Path Identifier (CHPID) type Fibre Channel converted (FCV) on future servers. IBM intends for System z10 to be the last server to support FICON Express LX and CHPID type of FCV. This feature is not orderable on the z10 EC models. If the feature is installed at the time of an upgrade to the z10 EC it may be retained.

CHPID type FCV is currently used with the FICON Express LX feature (#2319) to communicate with Enterprise Systems Connection (ESCON) control units using the FICON bridge card in the ESCON Director Model 5.

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**Question:**

What are the most recent statements of direction has IBM made for z/OS environments?

**Answer:**

February 2009, IBM issued the following statements of direction:

IBM intends to update z/OS with a new function designed to generate messages for Server Time Protocol (STP)-related hardware events. This function will be designed to issue an operator message when an STP-related hardware event occurs. This function, in addition to messages already issued to the System z Hardware Management Console (HMC), may improve problem determination and correction times.

As part of IBM's commitment to simplify the mainframe environment, IBM intends to introduce the z/OS Management Facility, a separate product which will be designed to enable system programmers to more easily manage and administer a mainframe system by simplifying day to day operations and administration of a z/OS system. The initial release of z/OS Management Facility is planned to provide a problem data management capability which is intended to facilitate problem data management tasks for new or less-skilled system programmers and system administrators.

In a future release of z/OS, the BIND 9.2.0 function will be removed from the z/OS Communications Server component. Customers who currently use or plan to use the z/OS BIND 9.2.0 function as a caching-only name server should use the Resolver cache function, which will be available in z/OS V1.11, to cache DNS responses. Customers who currently use or plan to use the z/OS BIND 9.2.0 function as a primary or secondary authoritative name server should investigate using BIND on Linux for System z.

August 2008, IBM issued the following statements of direction:

z/OS V1.10 is planned to be the last release that includes IPCS Problem Management Subcommands. If you currently use the IPCS problem management subcommands to report and track problems, consider using IBM Tivoli Information Management for z/OS V7 (5698-A08) or a similar product.

IBM plans to discontinue delivery of software on 3480, 3480 Compressed (3480C), and 3490E tape media. IBM recommends using Internet delivery when ordering your z/OS products or service, which eliminates tape handling.

In a future release of z/OS, IBM plans to make RFC4301 compliance mandatory.

IBM plans to pursue an evaluation to the Federal Information Processing Standard (FIPS) 140-2 using National Institute of Standards and Technology's (NIST) Cryptographic Module Validation Program (CMVP) for the System SSL component of the Cryptographic Services element of z/OS.

z/OS V1.10 is planned to be the last release to allow attaching zSeries File System (zFS) multi-file system aggregates that are to be shared across systems in a sysplex. In a future release, IBM plans to withdraw support for zFS multi-file system aggregates.

All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.



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