The IBM zEnterprise System - A new dimension in computing

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At a glance

IBM® zEnterprise™ System is a first-of-a-kind workload-optimized multiplatform technology offering. The system consists of the IBM zEnterprise 196 (z196) central processor complex (CPC), the IBM zEnterprise Unified Resource Manager, and built-in support for the IBM zEnterprise BladeCenter® Extension (zBX) Model 002. The IBM zEnterprise 196 is designed with improved scalability, performance, security, resiliency, availability, and virtualization. The z196 Model M80 provides up to 1.6 times the total system capacity of the z10™ EC Model E64, and all z196 models provide up to twice the available memory of the z10 EC. The zBX infrastructure works with the IBM zEnterprise 196 to enhance System z® virtualization and management to deliver an integrated hardware platform that spans System z mainframe and POWER7™ technologies. The IBM zEnterprise Unified Resource Manager, delivered with the z196, is designed to deliver end-to-end virtualization and management along with the ability to optimize technology deployment according to individual workload requirements.

zEnterprise System is designed to deliver:

- **Improved total system capacity** in a 96-way core design.
  - Improved performance of all workloads
  - Massive scalability for secure data serving and transaction processing and large-scale consolidation
  - Up to 80 cores that are customer-configurable
- **Quad-core 5.2 GHz processor chips** with 100+ new instructions that enable improved code efficiency, and are designed to help improve the execution of CPU-intensive workloads.
- **Up to 3 terabytes (TB) of available real memory per server** for growing application needs (with up to 1 TB real memory per LPAR).
- Improved availability in the memory subsystem with **redundant array of independent memory (RAIM)** .
- Availability improvement - **concurrent add/delete of I/O drawer** .
- **Increased scalability** with 45 available subcapacity settings.
- **Crypto Express3 cryptographic enhancements** .
- **Auto-renewal of On/Off Capacity on Demand records** which is designed to eliminate the need to manually replenish your On/Off CoD records.
- **Purchase of unassigned CP or IFL capacity** via Customer Initiated Upgrade.
- **Up to 128 coupling CHPIDs** (double that of z10) and up to 80 physical external coupling links (12x InfiniBand, 1x InfiniBand, ISC-3), a 25% increase compared to z10 .
- Up to 72 I/O, networking, and crypto features.
- Up to 240 ESCON® channels.
- **Up to 32 HiperSockets™** (double the number available on z10 EC).
- **Energy efficiencies** - more performance to help you run more efficiently in the same footprint.
  - Energy monitoring capability and power save option for the processor, which is designed to provide a 25 - 30% reduction in power consumption depending on the system configuration
  - Optional water cooling, providing the ability to cool systems with user-chilled water
  - Optional high-voltage DC power, which can save System z customers 1 - 3%, on average, on their power bills
- **Top exit I/O cabling** , which is designed to provide increased flexibility and increase air flow in raised-floor environments.
- **Unified Resource Manager** , enabling management and virtualization of heterogeneous workloads. Unified Resource Manager manages the deployment of heterogeneous hardware resources based on individual workload requirements by providing:
  - Performance management
  - Integrated private data network
  - Virtual server lifecycle management
  - Hypervisor™ management
  - Integrated operational controls
  - Management as system z firmware

For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: YE001).

Overview

IBM System z is taking a bold step into the future. For the first time it is possible to deploy an integrated hardware platform that brings mainframe and distributed

technologies together - a system that can start to replace individual islands of computing and that can work to reduce complexity, improve security, and bring applications closer to the data they need.

IT today is all about creating an infrastructure that is dynamic and scalable as well as being flexible enough to satisfy both the needs of mission-critical work and the development and deployment of new workloads. This infrastructure must be able to make sense of data, a company's most valuable asset, with insight rather than hindsight, and it must allow a business to use IT to gain a competitive edge. In building such systems, multiplatform solutions have become the norm for handling computational acceleration and specialized processing. As these heterogeneous systems grow, the end-to-end management can become a burden on resources and the IT budget. A new technology is needed that can go to a new dimension in computing, where smarter systems and smarter software work together to address the needs of the business.

Today IBM is introducing IBM zEnterprise System - a system that combines the gold standard of enterprise computing with built-in function to extend IBM's mainframe-like governance and qualities of service to special-purpose workload optimizers and general-purpose application serving. End-to-end management is enabled for this heterogeneous environment by the IBM zEnterprise Unified Resource Manager, which provides energy monitoring and management, goal-oriented policy management, increased security, virtual networking, and data management, consolidated in a single interface that can be tied to business requirements. The IBM zEnterprise System is comprised of the IBM zEnterprise 196, the IBM zEnterprise Unified Resource Manager, built-in support for the IBM zEnterprise BladeCenter Extension (zBX), and optimizers or IBM blades.

The IBM zEnterprise 196 is designed with improved scalability, performance, security, resiliency, availability, and virtualization. The new 96-way core design delivers massive scalability for secure data serving and transaction processing for large-scale consolidation. As environmental concerns raise the focus on energy consumption, the IBM zEnterprise 196 central processor complex (CPC) is designed with new energy efficiencies that can reduce energy use and save floor space when consolidating workloads from distributed servers. For clients looking to build green datacenters, optional water cooling and high-voltage DC power allow a bold step into the future of cooler computing and increased energy efficiency without changing the system footprint.

The IBM zEnterprise Unified Resource Manager manages System z ensembles -- collections of one or more zEnterprise System nodes in which each node is comprised of a z196 and its optionally attached IBM zEnterprise BladeCenter Extension (zBX) Model 002. An ensemble can consist of a single z196 with no zBX attached, or two to eight CPCs where at least one of the z196s has a zBX attached. The resources of a zEnterprise System ensemble are managed and virtualized as a single pool of resources integrating system and workload management across the multisystem, multitier, multiarchitecture environment.

When IBM zEnterprise BladeCenter Extension (zBX) is attached to IBM zEnterprise 196, the zBX infrastructure works with the z196 to support the multiplatform environment, combining mainframe and distributed technologies. The zBX can support IBM Smart Analytics Optimizer for DB2® for z/OS® , V1.1 (5697-AQT) and certain POWER7 blades.

The IBM Smart Analytics Optimizer for DB2 for z/OS , V1.1 (5697-AQT) is designed to deliver improved service through accelerated and accurate business insight. This workload-optimized, appliance-like add-on is installed in the zBX and connects to DB2 , providing transparency to all applications. The optional POWER7 blade is installed in the zBX, enabling application integration with System z transaction processing, messaging, and data serving capabilities. The blades are managed as part of a single logical virtualized environment by IBM zEnterprise Unified Resource Manager.

IBM Global Technology Services (GTS) and Systems Lab Services can help you assess and perform application fit-for-purpose analysis, and design an IBM zEnterprise System that integrates IT strategy and business priority. This includes

developing the business case and high-level transition plan, and a roadmap for an adaptable and efficient infrastructure. GTS and Systems Lab Services can also enable you to build and run a smarter IBM zEnterprise System environment. With these services, you can migrate effectively and efficiently to an IBM zEnterprise System, create a more cost-effective and manageable computing environment with server, storage, and network optimization, integration, and implementation, and effectively run and manage the IBM zEnterprise System with maintenance and technical support services.

Today IBM is also announcing that the IBM System z10® Enterprise Class and IBM System z10 Business Class can now use operational controls on the Hardware Management Console (HMC) to manage IBM Smart Analytics Optimizer for DB2 for z/OS V1.1 (5697-AQT). This is a heterogeneous Business Intelligence (BI) infrastructure that is a single entity with minimal risk and improved costs. With today's announcement, the HMC provides extended support to manage the IBM zEnterprise BladeCenter Extension (zBX) Model 001 and IBM Smart Analytics Optimizer for DB2 for z/OS V1.1 (5697-AQT) capabilities.

The System z10 is also simplifying key management with Trusted Key Entry (TKE) workstation enhancements by allowing a writable USB-attached media to be used to help install TKE license Internal Code (LIC).

Key prerequisites

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

Planned availability date

- September 10, 2010
  - Features and functions for the z196
  - z196 Models M15, M32, M49, M66, and M80
  - Water Cooling (#0159) for z196
  - Manage suite (#0019) for z196
  - z9™ EC upgrades to air-cooled z196
  - z9 EC upgrades to water-cooled z196
  - z10 EC upgrades to air-cooled z196
  - z10 EC upgrades to water-cooled z196
  - 3-in-1 Bolt Down Kit (#8008 or #8009) for new build z196
- November 9, 2010
  - HMC with Dual Ethernet (#0091) on z10 EC and z10 BC
  - TKE workstation (#0841) on z10 EC and z10 BC
  - TKE 7.0 LIC (#0860) on z10 EC and z10 BC
- November 19, 2010
  - Manage suite enhancement functions for z196
  - Automate suite (#0020) for z196
  - IBM Smart Analytics Optimizer for DB2 for z/OS for z196 in blade quantities of 7, 14, or 28 (#0019 or #0020)
  - POWER7 blade for z196 in a zBX (#0019 or #0020)
- Third quarter 2010
  - Inbound workload queuing (IWQ) for OSA-Express3 on z10
- December 17, 2010
  - IBM Smart Analytics Optimizer enablement (#0251) on z10 EC and z10 BC

  - IBM Smart Analytics Optimizer for DB2 for z/OS for z196 in blade quantities of 42 or 56 (#0019 or #0020)
- December 31, 2010
  - 3-in-1 Bolt Down Kit (#8008 or #8009) MES z196
  - MES features for Models M15, M32, M49, M66, and M80
  - Model conversions for z196
- March 17, 2011
  - z10 EC with zBX Model 001 upgrades to z196 with zBX Model 002

Description

The **IBM zEnterprise System** offers a total systems approach to delivering advanced heterogeneous systems management functions that is unmatched in the industry. The announcement of zEnterprise System takes technology to the next level. The IBM zEnterprise System consists of the hardware management subsystems -- CPC, memory, I/O, power/packaging/cooling -- and platform management firmware that is designed to enable you to run heterogeneous workloads under the management of one system with IBM zEnterprise System (IBM zEnterprise 196 + IBM zEnterprise BladeCenter Extension (zBX) + IBM zEnterprise Unified Resource Manager).

The IBM zEnterprise System is designed to provide:

- Enablement of new workloads and improved management of heterogeneous workloads with Unified Resource Manager
- Improved performance - on average 40% faster processor unit than z10 EC
- Larger capacity with 80 user-configurable processor units
- Flexibility - offered by 45 subcapacity settings
- Improved power efficiency - 1.6x improvement (vs z10 EC)
- Investment protection
- Improved availability with a redesign of the memory subsystem
- Improved reliability with new multichip module (MCM) design
- New power delivery technology with triple redundancy
- Increased memory - up to 3 TB memory (with up to 1 TB real memory per LPAR)
- Crypto Express3 cryptographic enhancements
- I/O rejuvenation
  - Doubling of coupling CHPIDs vs z10 EC (up to 128), and up to 80 physical external coupling links (12x InfiniBand, 1x InfiniBand, ISC-3), a 25% increase compared to z10
  - Double the number of HiperSockets vs z10 EC (up to 32)
  - Availability enhancements such as allowing Concurrent Add/Delete of I/O drawers
- Optional water cooling
- Optional high-voltage DC power
- Optional top exit I/O cabling
- Static power save mode
- New Capacity on Demand architecture and enhancements
  - Auto-renewal of On/Off Capacity on Demand records
  - Purchase of unassigned CP or IFL capacity via Customer Initiated Upgrade

The performance advantage

IBM's Large Systems Performance Reference (LSPR) method is designed to provide comprehensive z/Architecture® processor capacity ratios for different

configurations of Central Processors (CPs) across a wide variety of system control programs and workload environments. For z196, the z/Architecture processor capacity indicator is defined with a (7XX) notation, where XX is the number of installed CPs.

In addition to the general information provided for z/OS 1.11, the LSPR also contains performance relationships for z/VM® and Linux® operating environments.

The performance of a z196 (2817) processor is expected to be 1.3 to 1.5 times the performance of a z10 EC (2097) based on workload and model. The largest z196 (2817-780) is expected to exceed 1.6 times the capacity of the largest z10 (2097-764).

The LSPR contains the Internal Throughput Rate Ratios (ITRRs) for the z196 and the previous-generation zSeries® processor families based upon measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user may experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated.

For more detailed performance information, consult the Large Systems Performance Reference (LSPR) available at

https://www-304.ibm.com/servers/resourcelink/lib03060.nsf/pages/lsprindex

Building a smarter business infrastructure

Introducing IBM zEnterprise Unified Resource Manager

In today's IT infrastructure, silos of computing are not aligned with the businesses they support. Additionally, corporations struggle with regulatory compliance, volume of information, integrity, and security. These limitations, along with resource constraints and difficulties managing complexity and change, present increasing challenges in managing the IT infrastructure.

A smarter business infrastructure provides integrated visibility, control, and automation across all business and IT assets. The smarter business infrastructure is highly optimized to do more with less and facilitates the intelligent use of the information available. By managing and mitigating risks and utilizing flexible delivery choices, a smarter business infrastructure addresses the challenges facing business today.

Implementing a smarter business infrastructure is a strategy that can help to provide better visibility, control, and automation across the business, drive up levels of efficiency and optimization of both resources and people, bring order to the information explosion, and manage risk more productively. In addition, this type of strategy positions the infrastructure to leverage new types of delivery choices that can flex as needed, such as cloud computing, helping clients address today's most persistent business and IT constraints.

IBM zEnterprise 196 provides a smarter business infrastructure through the introduction of the IBM zEnterprise Unified Resource Manager, which manages **System z ensembles** - collections of one or more zEnterprise System nodes in which each node is comprised of a z196 and its optionally attached IBM zEnterprise BladeCenter Extension (zBX) Model 002. An ensemble can consist of a single z196 with no zBX attached, using an OSA loopback cable, or two to eight CPCs where at least one of the z196s has a zBX attached. The resources of a zEnterprise System ensemble are managed and virtualized as a single pool of resources integrating system and workload management across the multisystem, multitier, multiarchitecture environment. Management actions for the ensemble are conducted from a designated primary Hardware Management Console. This HMC must be paired with an alternate HMC also designated to manage the ensemble, that can take over if the primary fails, in order to improve availability.

The functions of the Unified Resource Manager are grouped into two suites of tiered functionality that enable different levels of capability - **Manage suite** and **Automate suite** . Initial Manage suite functions are being delivered concurrently with the availability of the z196 with feature #0019. An enhanced set of Manage suite functions (#0019), as well as a set of Automate suite functions, with feature #0020, are being delivered concurrently with the availability of IBM zEnterprise BladeCenter Extension (zBX).

- The Manage suite is included in the base zEnterprise System as no charge for CPs, IFLs, zIIPs, and zAAPs. There is a charge for blades and IBM Smart Analytics Optimizer.
- The Automate suite is included in the base zEnterprise System as no charge for CPs, zIIPs, and zAAPs. There is a charge for IFLs, blades, and IBM Smart Analytics Optimizer.

The Unified Resource Manager is designed to provide the following **initial Manage suite functions:**

- Monitoring and trend reporting of CPU energy efficiency, which can be helpful in managing the costs of deployed workloads
- Delivery of system activity using a new user interface monitors dashboard (augmenting the existing System Activity Display), enabling a broader and more granular view of system resource consumption

The Unified Resource Manager is designed to provide the following **enhanced Manage suite functions:**

- Integrated hardware management across all elements of the system, including operational controls, which is designed to deliver:
  - Licensed internal code (LIC) inventory, update, and service
  - Hardware and LIC problem detection, reporting, and call home
  - Field-guided repair and verification
  - Physical hardware configuration, backup, and restore
  - Primary/alternate replication and recovery for the HMC
  - Integrated hardware management, including operational controls, which provides a single point of control, a consistent interface, and comprehensive insight across the elements of the system to better manage operations, change control, and service
- Enhanced Monitoring and reporting of CPU energy efficiency with the ability to query maximum potential power.
- Fully automatic and coherent integrated resource discovery and inventory for all elements of the system without requiring user configuration, deployment of discovery libraries or sensors, or user scheduling of resource discovery. These integrated functions enable a simplified deployment methodology, decreasing complexity, and increasing accuracy and completeness for discovery and inventory.
- A private and physically isolated OSA-Express3 1000BASE-T Ethernet internal management network (the intranode management network - INMN), operating at 1 Gbps, that connects all zEnterprise System resources (CPCs, BladeCenters, blades, top-of-rack switches, power distribution units, and hypervisors) for management purposes. This INMN is pre-wired, internally switched, configured, and managed with full redundancy for high availability. These characteristics of the INMN enable simplified and secure management with no effect on customer data traffic. The intranode management network (INMN) is exclusive to the IBM zEnterprise System and is supported by z/OS and z/VM . Refer to the Software requirements section.
- A private and secure OSA-Express3 10 Gigabit Ethernet intraensemble data network (IEDN) that connects all elements of a zEnterprise System ensemble. The IEDN is access-controlled using integrated virtual local area network (VLAN) provisioning. This requires no external customer-managed switches or routers, which helps to reduce the need for firewalls and encryption, and simplifies network configuration and management, while providing full redundancy for high

availability. IEDN management provides enforcement of strict access control across heterogeneous environments, further augmenting security and simplicity. The intraensemble data network is exclusive to zEnterprise System and is supported by z/OS and z/VM . Refer to the Software requirements section.

- Hypervisors, which, except for z/VM , are shipped, deployed, and serviced as zEnterprise System LIC and are booted automatically at power on reset. All hypervisors (PR/SM™ , z/VM , and PowerVM™) are isolated on the internal management network, providing intrusion prevention, integrity, secure virtual switches with integrated configuration, and monitoring, as well as problem management and reporting. Managed through the Unified Resource Manager, hypervisors become part of the trusted compute base and, except for z/VM , are deployed and maintained from a single point of control.
- Virtual server lifecycle management, which enables directed and dynamic virtual server provisioning across all hypervisors (PR/SM , z/VM , and PowerVM) from a single, uniform point of control. This enables integrated storage and network configuration and ensemble membership integrity. Virtual server lifecycle management provides an authoritative understanding of server, storage, and network elements within an ensemble. Augmenting the existing z/VM virtual server management functions available on System z10 , this support now also permits virtual servers to be created and deleted, and allows real and virtual networking resources to be managed by the Unified Resource Manager.

For more information on firmware managing the z/VM environment, refer to Software Announcement 210-234, dated July 22, 2010 .

The Unified Resource Manager is designed to provide the following **Automate suite** functions:

- Representation of the physical and virtual resources that are used in the context of a deployed business function as a named workload. Workload representation enables focus on business goals rather than individual elements and better aligns resources with business needs.
- Ability to define a performance service level policy and to enable performance monitoring, reporting, and resource optimization that are aligned with customer-defined workload service levels by allowing virtual CPU capacity to be adjusted automatically across virtual servers within a hypervisor. Automatic CPU adjustments are supported for z/VM and POWER7 blades.
- Static power savings and energy management capabilities. For more information see the Static power save mode description below.

POWER7 blades are supported in the zBX, providing logical device integration between System z and POWER7 for multi-tiered applications. POWER7 blades, along with PowerVM , are licensed separately and are enabled and managed, as part of the ensemble, by the Unified Resource Manager. For more information on POWER7 blades refer to " IBM BladeCenter P701 and P702 Express® blades deliver world's first IBM POWER7 processor-based blades to the marketplace," Hardware Announcement 110-061, dated April 13, 2010 .

IBM Smart Analytics Optimizer for DB2 for z/OS , V1.1 (5697-AQT) is being supported in the zBX, providing data-in-memory support to deliver significant performance and/or lower cost per transaction for queries redirected to the solution. It is enabled and managed, as part of the ensemble, by the Unified Resource Manager. For more information on IBM Smart Analytics Optimizer, refer to Software Announcement 210-266, dated July 22, 2010 .

For more information on IBM zEnterprise BladeCenter Extension (zBX), refer to Hardware Announcement 110-177, dated July 22, 2010 .

Reliability and availability enhancements

With the introduction of the IBM zEnterprise 196, IBM continues to deliver enterprise reliability and availability with enhancements to the memory subsystem, multichip module (MCM) design, and power delivery technology.

Major redesign of memory subsystem for improved availability: IBM's most robust error correction to date can be found in the memory subsystem. A new redundant array of independent memory (RAIM) technology is being introduced to provide protection at the dynamic random access memory (DRAM), dual inline memory module (DIMM), and memory channel level. Three full DRAM failures per rank can be corrected. DIMM level failures, including components such as the controller application specific integrated circuit (ASIC), the power regulators, the clocks, and the board, can be corrected. Memory channel failures such as signal lines, control lines, and drivers/receivers on the MCM can be corrected. Upstream and downstream data signals can be spared using two spare wires on both the upstream and downstream paths. One of these signals can be used to spare a clock signal line (one upstream and one downstream). Together these improvements are designed to deliver System z's most resilient memory subsystem to date.

Improved reliability of multichip module (MCM) design: IBM zEnterprise 196 has an improved MCM design with encapsulated processor unit connectors and soft error rate (SER) hardened latches throughout the design.

New power delivery technology with triple redundancy for increased reliability : With z196, we are introducing voltage transformation module (VTM) technology with triple redundancy on the VTM. This redundancy protects processor workloads from loss of voltage due to VTM failures. Triple redundancy is used by z196 on the environmental sensors (humidity and altitude), for increased reliability.

CP Assist for Cryptographic Function (CPACF) enhancements

The following are exploitation of Message-Security-Assist Extension 4:

New instructions:

- Cipher Message with CFB (KMF)
- Cipher Message with Counter (KMCTR)
- Cipher Message with OFB (KMO)

New function codes for existing instructions:

- Compute intermediate Message Digest (KIMD) adds KIMD, an extension for GHASH

More information on CPACF can be found in " IBM System z10 - Delivering security-rich offerings to protect your data," Hardware Announcement 109-678, dated October 20, 2009 .

This Crypto function is exclusive to z196.

Crypto Express3 enhancements

Crypto Express3 represents the newest-generation cryptographic feature designed to complement the cryptographic functions of CP Assist for Cryptographic Function (CPACF). The Crypto Express3 feature, residing in the I/O cage or I/O drawer of the z196, continues to support all of the cryptographic functions available on Crypto Express3 on z10 .

For more information on Crypto Express3 refer to " IBM System z10 - Delivering security-rich offerings to protect your data," Hardware Announcement 109-678, dated October 20, 2009 .

Concurrent Driver Upgrade (CDU) and Concurrent Patch Apply (CPA), a process to reduce outages for new releases. With concurrent driver upgrade and concurrent patch apply, most new cryptographic functions can be applied without cryptographic coprocessor card off / on. It is now possible to upgrade Common Cryptographic Architecture (CCA), segment 3, licensed internal code without any

performance impact during the upgrade. However, some levels of CCA or hardware changes still require cryptographic coprocessor card vary off / on.

This Crypto function is exclusive to z196.

When one or both of the two PCIe adapters of a Crypto Express3 feature are configured as a coprocessor, the following cryptographic enhancements are supported:

- **ANSI X9.8 PIN security** , which facilitates compliance with the processing requirements defined in the new version of the ANSI X9.8 and ISO 9564 PIN Security Standards and provides added security for transactions that require Personal Identification Numbers (PINs).

  This Crypto function is exclusive to z196 and is supported by z/OS and z/VM . Refer to the Software requirements section.

- **Enhanced Common Cryptographic Architecture (CCA) - a key wrapping to comply with ANSI X9.24-1 key bundling requirements** , a Common Cryptographic Architecture (CCA) key token wrapping method using Cipher Block Chaining (CBC) mode in combination with other techniques to satisfy the key bundle compliance requirements in standards including ANSI X9.24-1 and the recently published Payment Card Industry Hardware Security Module (PCI HSM) standard.

  This Crypto function is exclusive to z196 and is supported by z/OS and z/VM . Refer to the Software requirements section.

- **Secure Keyed-Hash Message Authentication Code (HMAC) -** a method for computing a message authentication code using a secret key and a secure hash function. HMAC is defined in the standard FIPS (Federal Information Processing Standard) 198, "The Keyed-Hash Message Authentication Code." The new CCA functions support HMAC using SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512 hash algorithms. The HMAC keys are variable-length and are securely encrypted so that their values are protected.

  This Crypto function is exclusive to z196 and is supported by z/OS and z/VM .

- **Elliptical Curve Cryptography Digital Signature Algorithm** - an emerging public-key algorithm to eventually replace RSA cryptography in many applications. ECC is capable of providing digital signature functions and key agreement functions. The new CCA functions provide ECC key generation and key management and provide digital signature generation and verification functions compliance with the ECDSA method described in ANSI X9.62 "Public Key Cryptography for the Financial Services Industry: The Elliptical Curve Digital Signature Algorithm (ECDSA)." ECC uses keys that are shorter than RSA keys for equivalent strength-per-key-bit. With RSA impractical at key lengths with strength-per-key-bit equivalent to AES-192 and AES-256, the strength-per-key-bit is substantially greater in an algorithm that uses elliptic curves.

  This Crypto function is exclusive to z196 and is supported by z/OS and z/VM . Refer to the Software requirements section.

When one or both of the two PCIe adapters of a Crypto Express3 feature are configured as an accelerator, the following cryptographic enhancement is supported:

- **Modulus Exponent (ME) and Chinese Remainder Theorem (CRT),** RSA encryption and decryption with key lengths greater than 2048-bits and up to 4096-bits.

  This Crypto function is exclusive to z196 and is supported by z/OS and z/VM . Refer to the Software requirements section.

Trusted Key Entry 7.0 Licensed Internal Code (LIC)

- ECC Master Key Support: From the Trusted Key Entry (TKE) workstation, administrators can generate key material, load or clear the new ECC master key register, or clear the old ECC master key register. The ECC key material can be stored on the TKE or on a smart card.

- CBC Default Settings Support: The TKE provides function that allows the TKE user to set the default key wrapping method used by the host crypto module.
- TKE Audit Record Upload Configuration Utility Support: The TKE Audit Record Upload Configuration Utility allows TKE workstation audit records to be sent to a System z host and saved on the host as z/OS System Management Facilities (SMF) records. The SMF records have a record type of 82 (ICSF) and a subtype of 29. TKE workstation audit records are sent to the same TKE Host Transaction Program that is used for Trusted Key Entry operations.
- USB Flash Memory Drive Support: The TKE workstation now supports a USB flash memory drive as a removable media device. When a TKE application displays media choices, the application allows you to choose a USB flash memory drive if the IBM-supported drive is plugged into a USB port on the TKE and it has been formatted for the specified operation.
- Stronger PIN Strength Support: TKE smart cards created on TKE 7.0 require a 6-digit PIN rather than a 4-digit PIN. TKE smart cards that were created prior to TKE 7.0 continue to use 4-digit PINs and will work on TKE 7.0 without changes. You can take advantage of the stronger PIN strength by initializing new TKE smart cards and copying the data from the old TKE smart cards to the new TKE smart cards.
- Stronger Password Requirements for TKE Passphrase User Profile Support: New rules are required for the passphrase used for passphrase logon to the TKE workstation crypto adapter. The passphrase must:
  - Be 8 to 64 characters long
  - Contain at least 2 numeric and 2 non-numeric characters
  - Not contain the user ID
- These rules are enforced when you define a new user profile for passphrase logon, or when you change the passphrase for an existing profile. Your current passphrases will continue to work.

Third subchannel set

You now have the ability to extend the amount of addressable storage capacity to help facilitate storage growth with the introduction of a third subchannel set - an additional 64K subchannels - to help complement other functions such as "large" or extended addressing volumes and HyperPAV. This may also help to facilitate consistent device address definitions, simplifying addressing schemes for congruous devices.

The first subchannel set (SS0) allows definitions of any type of device (such as bases, aliases, secondaries, and those other than disk that do not implement the concept of associated aliases or secondaries). The second and third subchannel sets (SS1 and SS2) can now both be designated for use for disk alias devices (of both primary and secondary devices) and/or Metro Mirror secondary devices only.

The third subchannel set applies ESCON , FICON® and zHPF protocols, and is supported by z/OS and Linux on System z . Refer to the Software requirements section.

A new I/O infrastructure for increased granularity and capacity flexibility

With the introduction of z196, we are also introducing increased granularity for your I/O infrastructure with the addition of an I/O drawer, a companion to the I/O cage.

Purchase the I/O you need for your storage area network (ESCON and FICON), local area network (Open Systems Adapter), Parallel Sysplex® (ISC-3), and security requirements (Crypto Express3) and the configurator tool selects the I/O packaging necessary to best optimize your infrastructure.

First offered on the z10 BC, the modular I/O drawer (8 slots) can be hot plugged in the field. This design allows installation of I/O based upon application growth and connectivity growth, obviating the requirement for plan ahead of I/O cages (28 slots) and I/O drawers.

Access to the SAN with FICON Express8

FICON Express8 provides growth opportunities for your storage area network (SAN) with its capability to autonegotiate the link data rate, providing synergy with existing switches, directors, and storages devices whether they are capable of 2 Gbps, 4 Gbps, or 8 Gbps.

FICON Express8 supports your storage devices using Fibre Connection (FICON), High Performance FICON for System z (zHPF), or Fibre Channel Protocol (FCP). You can have a point-to-point connection between z196 and a device or utilize a SAN, incorporating switches and directors in the configuration. FICON Express8 is designed to help you prepare for an end-to-end 8 Gbps infrastructure to meet the increased bandwidth demands of your applications.

FICON Express8 supports your traditional applications using the FICON architecture. Using zHPF, an extension to the FICON architecture, it also provides optimizations for online transaction processing (OLTP) workloads to help improve the execution of small block I/O requests, whether single-track or multitrack operations. zHPF streamlines the FICON architecture and reduces the overhead on the channel processors, control unit ports, switch ports, and links by improving the way channel programs are written and processed. The control unit must be zHPF-capable. zFS, HFS, PDSE, and other applications that use large data transfers with Media Manager are expected to benefit. For more information on the benefits of zHPF, refer to the I/O connectivity Web site and the FICON Express8 technical papers

http://www-03.ibm.com/systems/z/hardware/connectivity/

Extension to zHPF multitrack operations - removing the 64k byte data transfer limit : In October of 2008 we announced support for High Performance FICON for System z (zHPF), a protocol for performance optimization of online transaction processing (OLTP) workloads. At the time, this applied to I/Os transferring less than a **single track** of data - read or write sequential I/Os transferring less than a single track size (for example 12x4k bytes/IO). Support of zHPF for OLTP workloads resulted in reduced overhead and improved performance.

In July of 2009 we extended zHPF support to **multitrack** operations (for example reading 16x4k bytes/IO), also resulting in reduced overhead and improved performance but limiting transfers to 64k worth of data in a single operation.

We are now further extending zHPF support of multitrack operations to include even larger data transfers - fully supporting multiple tracks of data and removing the 64k byte data transfer limit. We are now raising the limit on the amount of data that can be transferred in a single operation, allowing the channel to operate at rates that are designed to fully exploit the bandwidth of a FICON Express channel.

Extension to multitrack operations for zHPF applies to the FICON Express8 and FICON Express4 features when configured as CHPID type FC using the zHPF path, and to z/OS . Refer to the Software requirements section. The control unit must support zHPF. Otherwise, extended mulitrack operations is transparent to the control unit.

FICON Express8 for channel consolidation: FICON Express8 may also allow for the consolidation of existing FICON Express , FICON Express2, or FICON Express4 channels onto fewer FICON Express8 channels while maintaining and enhancing performance. You can carry forward your FICON Express4 features to z196. FICON Express and FICON Express2 are not supported.

To request assistance for ESCON or FICON channel consolidation analysis using the zCP3000 tool, contact your IBM representative. They will assist you with a capacity planning study to estimate the number of FICON channels that can be consolidated onto FICON Express8.

Your IBM representative can also assist you with ESCON to FICON channel migration.

Assigning WWPNs to physical Fibre Channel Protocol (FCP) ports: This support extends the capabilities of the worldwide port name (WWPN) prediction tool to **physical** Fibre Channel Protocol (FCP) channel/ports, allowing the tool to now show WWPNs for both virtual and physical ports ahead of system installation time. In addition, you can retain your storage area network (SAN) configuration if a FICON feature is replaced instead of altering your SAN configuration based upon the FICON feature's "burned in" WWPN.

This enhancement applies to all of the FICON features supported on z196 when configured as CHPID type FCP, supporting attachment to SCSI devices. It is transparent to operating systems. For an update to the WWPN prediction tool, refer to the *Tools* section of Resource Link™ at planned availability of z196

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

z/OS discovery and autoconfiguration for FICON channels : With z196 and z/OS , a new function, z/OS discovery and autoconfiguration (zDAC), is designed to automatically perform a number of I/O configuration definition tasks for new and changed disk and tape controllers connected to a switch or director when attached to a FICON channel. When new controllers are added to an I/O configuration or changes are made to existing controllers, the system is designed to discover them and propose configuration changes based on a policy you define in the hardware configuration dialog (HCD). Your policy can include preferences for availability and bandwidth including parallel access volume (PAV) definitions, control unit numbers, and device number ranges.

zDAC is designed to perform discovery for all systems in a sysplex that support the function. The proposed configuration will incorporate the current contents of the I/O definition file (IODF) with additions for newly installed and changed control units and devices. zDAC is designed to help simplify I/O configuration on z196 running z/OS and reduce complexity and setup time.

zDAC applies to all FICON features supported on z196 when configured as CHPID type FC and is supported by z/OS . zDAC is exploited by the IBM System Storage® DS8700. For more information refer to Hardware Announcement 110-168, dated July 20, 2010 , IBM System Storage DS8700 (M/T 242x) delivers z/OS Distributed Data Backup and new functional capabilities. Refer to the Software requirements section.

Access to high-speed intraserver network - HiperSockets

A single logical partition can now connect up to 32 HiperSockets , double the number of HiperSockets previously supported. With HiperSockets , you have independent, integrated, virtual local area networks (LANs). No physical cabling or external connections are required. HiperSockets supports Internet Protocol version 4 (IPv4) and IPv6.

Up to 32 HiperSockets are supported by z/OS , z/VM , z/VSE™ , and Linux on System z . Refer to the Software requirements section.

HiperSockets network traffic analyzer (HS NTA) for Linux on System z environments: An enhancement to the HiperSockets architecture is designed to help simplify problem isolation and resolution. You now have the capability to trace Layer 2 and Layer 3 HiperSockets network traffic.

HS NTA allows Linux on System z to control the trace for the internal virtual LAN, to capture the records into host memory and storage (file systems). Linux on System z tools can be used to format, edit, and process the trace records for analysis by system programmers and network administrators.

HiperSockets network traffic analyzer is supported on IBM zEnterprise 196 and IBM System z10 .

Access to the LAN with OSA-Express3

The OSA-Express3 family of local area network (LAN) adapters is designed for use in high-speed enterprise backbones, for local area network connectivity between campuses, to connect server farms to the mainframe, and to consolidate file servers onto the mainframe.

The OSA-Express3 features incorporated a hardware data router in the design, as well as a faster microprocessor and PCIe bus; functions and components that help to reduce latency and improve throughput. Choose the features that satisfy your infrastructure requirements, now and in the future.

OSA-Express3 Ethernet features:

- 10 Gigabit Ethernet long reach (10 GbE LR) for single mode fiber infrastructures; supports 10 Gbps link data rate
- 10 Gigabit Ethernet short reach (10 GbE SR) for multimode fiber infrastructures; supports 10 Gbps link data rate
- Gigabit Ethernet long wavelength (GbE LX) for single mode fiber infrastructures; supports 1 Gbps link data rate
- Gigabit Ethernet short wavelength (GbE SX) for multimode fiber infrastructures; supports 1 Gbps link data rate
- 1000BASE-T Ethernet for Category 5 or Category 6 copper infrastructures; autonegotiates to 10, 100, or 1000 Mbps

The OSA-Express3 Ethernet features support:

- Queued Direct Input/Output (QDIO) - uses memory queues and a signaling protocol to directly exchange data between the OSA microprocessor and the network software for high-speed communication.
  - QDIO Layer 2 (Link layer) - for IP (IPv4, IPv6) or non-IP (AppleTalk DECnet, IPX, NetBIOS, or SNA) workloads. Using this mode the Open Systems Adapter (OSA) is protocol-independent and Layer-3 independent. Packet forwarding decisions are based upon the Medium Access Control (MAC) address.
  - QDIO Layer 3 (Network or IP layer) - for IP workloads. Support for packet forwarding is based upon IP address or virtual MAC address. Guests may share OSA's MAC address or guests may have their own unique virtual MAC address.

CHPID type	Applicable features	Purpose/Traffic
OSC	1000BASE-T	OSA-Integrated Console Controller (OSA-ICC). Supports TN3270E, non-SNA DFT to IPL CPCs & LPs.
OSD	All	Queue Direct Input/Output (QDIO) architecture; TCP/IP traffic when Layer 3 (uses IP address) and Protocol-independent when Layer 2 (uses MAC address).
OSE	1000BASE-T	Non-QDIO; For SNA/APPN/HPR traffic and TCP/IP passthru traffic.
OSM	1000BASE-T	OSA-Express for Unified Resource Manager. Connectivity to intranode management network (INMN) from z196 to Unified Resource Manager functions.
OSN	GbE 1000BASE-T	OSA-Express for NCP; Appears to OS as a device supporting channel data link control (CDLC) protocol. Enables Network Control Program (NCP) channel-related functions such as loading and dumping to NCP. Provides LP-to-LP connectivity OS to IBM Communication Controller for Linux (CCL).
OSX	10 GbE	OSA-Express for zBX. Provides connectivity and access control to the intraensemble data network (IEDN) from z196 to

Unified Resource Manager functions.

For network performance - inbound workload queuing : z/OS workloads are becoming more diverse; each type of workload may have unique service level requirements. OSA-Express-3 introduces inbound workload queuing (IWQ), which creates multiple input queues and allows OSA to differentiate workloads "off the wire" and then assign work to a specific input queue (per device) to z/OS . With each input queue representing a unique type of workload, each having unique service and processing requirements, the IWQ function allows z/OS to preassign the appropriate processing resources for each input queue. This approach allows multiple concurrent z/OS processing threads to then process each unique input queue (workload), avoiding traditional resource contention. In a heavily mixed workload environment, this "off the wire" network traffic separation provided by OSA-Express3 IWQ reduces the conventional z/OS processing required to identify and separate unique workloads, which results in improved overall system performance and scalability.

A primary objective of IWQ is to provide improved performance for business-critical interactive workloads by reducing contention created by other types of workloads. The types of z/OS workloads that are identified and assigned to unique input queues are:

1. z/OS Sysplex Distributor traffic - Network traffic that is associated with a distributed dynamic virtual IP address (DVIPA) is assigned a unique input queue, allowing the Sysplex Distributor traffic to be immediately distributed to the target host.
2. z/OS bulk data traffic - Network traffic that is dynamically associated with a streaming (bulk data) TCP connection is assigned to a unique input queue, allowing the bulk data processing to be assigned the appropriate resources and isolated from critical interactive workloads.

IWQ is supported on z196 and z10 and is exclusive to OSA-Express3 CHPID types OSD and OSX (exclusive to z196). IWQ is also supported by the z/OS operating system and by z/VM for guests. Refer to the Software requirements section.

For network management - query and display OSA configuration : Previously, OSA-Express system architecture introduced the capability for operating systems to dynamically register the OSA configuration. This approach significantly improved the OSA-Express usability by reducing the burden placed on the system administrator to manually configure OSA-Express for each unique operating system configuration. Traditionally, the Open Systems Adapter Support Facility (OSA/SF) has provided the administrator with the ability to monitor the OSA configuration.

As additional complex functions have been added to OSA, the ability for the system administrator to display, monitor, and verify the specific current OSA configuration unique to each operating system has become more complex. OSA-Express3 introduces the capability for the operating system to directly query and display the current OSA configuration information (similar to OSA/SF). z/OS exploits this new OSA capability by introducing a new TCP/IP operator command called **Display OSAINFO** . Display OSAINFO allows the operator to monitor and verify the current OSA configuration, which helps to improve the overall management, serviceability, and usability of OSA-Express3.

Display OSAINFO is exclusive to OSA-Express3 CHPID types OSD, OSM, and OSX, the z/OS operating system, and z/VM for guest exploitation.

Access to a Parallel Sysplex environment

Parallel Sysplex is a synergy between hardware and software - a highly advanced technology for clustering designed to enable the aggregate capacity of multiple z/OS systems to be applied against common workloads. z/OS combined with z196, z10 and z9 machines, coupling facilities, Server Time Protocol (STP), and coupling links (InfiniBand, ISC-3), allows you to harness the power of multiple systems as though they were a single logical computing system.

Coupling links provide a path to transmit/receive Coupling Facility (CF) data as well as Server Time Protocol (STP) time keeping messages. The CF data may be exchanged between z/OS and the CF or between CFs. The primary Coupling Facility configuration options are a stand-alone Coupling Facility or a CF LPAR on a server.

The primary ways to configure Coupling Facilities are:

- Stand-alone Coupling Facility, an option where the Coupling Facility LPAR running the CFCC code is not co-located with z/OS images of its Parallel Sysplex on the same System z server. This option provides for failure isolation, so that a single failure does not affect the z/OS images and the CF at the same time. The server itself may be configured with Integrated Coupling Facility specialty engines.
- Internal Coupling Facility, an option where the Coupling Facility is co-located with z/OS images of its Parallel Sysplex on the same System z server. This option can be used as a backup Coupling Facility in a data sharing environment or as the primary facility in a resource sharing environment.

InfiniBand coupling links are high-speed links, up to 6 GBps for 12x InfiniBand and up to 5 Gbps for 1x InfiniBand:

- 12x InfiniBand for short distances - up to 150 meters (492 feet)
- 1x InfiniBand for longer distances - up to 10 km (6.2 miles) unrepeated

InterSystem Channel-3 (ISC-3) links continue to be offered, as a migration aid, supporting a link data rate of 2 Gbps. ISC-3 is supported at the same distance as 1x InfiniBand. Internal coupling links (ICs) can also be used for internal communication between coupling facilities (CFs) defined in LPARs and z/OS images on the same server.

Note: The InfiniBand link data rates do not represent the performance of the link. The actual performance is dependent upon many factors including latency through the adapters, cable lengths, and the type of workload. Systems Lab Services can assist your migration to PSIFB coupling links by providing services to assess the impact of the migration or to assist with the implementation of the migration.

Parallel Sysplex enhancements

As data sharing workloads continue to grow, the Parallel Sysplex infrastructure needs to anticipate the increased requirements for coupling resources. To do this, we have added connectivity capabilities to support larger data sharing environments.

Connectivity improvements with up to 80 coupling links: The IBM zEnterprise 196 increases the number of external coupling links allowed from 64 to 80. This allows the full configuration of 32 PSIFB links and 48 ISC-3 links to be used. In addition, one can also configure up to 32 (internal) IC links for coupling between images defined on the same server. Having more coupling links is important to provide sufficient coupling connectivity for larger single Parallel Sysplexes, as well as for configurations where the same server hosts multiple Parallel Sysplexes and Coupling Facility images.

Connectivity improvements with 128 CHPIDs per server: To support larger Parallel Sysplexes with ever-increasing amounts of data sharing traffic to the Coupling Facility, the throughput and capacity of more coupling CHPIDs are also required. With z196, we have increased the number of coupling CHPIDs per server from 64 to 128. Since IFB links allow for multiple (logical) CHPIDs over the same (physical) link, this can also allow for larger Parallel Sysplexes without requiring more coupling link hardware.

Coupling Facility Control Code Level 17

Connectivity improvements with up to 2047 structures: CFCC Level 17 increases the number of structures that can be allocated in a CFCC image from 1023 to 2047. Allowing more CF structures to be defined and used in a sysplex permits more discrete data sharing groups to operate concurrently, and can help environments requiring many structures to be defined, such as to support SAP

or service providers. z196 and CFCC Level 17 provide improved serviceability of Coupling Facilities with enhanced data collection and triggering of nondisruptive CF dumps. Refer to the Software requirements section.

STP - Time synchronization for Parallel Sysplex

Server Time Protocol (STP) is designed to allow events occurring in different servers to be properly sequenced in time. STP is designed for servers that have been configured in a Parallel Sysplex or a basic sysplex (without a coupling facility), as well as servers that are not in a sysplex but need time synchronization.

STP is a server-wide facility that is implemented in the Licensed Internal Code (LIC), presenting a single view of time to Processor Resource/Systems Manager™ (PR/SM). STP uses a message-based protocol in which timekeeping information is passed over externally defined coupling links between servers. The coupling links that can be used to transport STP messages include 12x or 1x InfiniBand (IFB) links and InterSystem Channel-3 (ISC-3) links configured in peer mode. These can be the same links that already are being used in a Parallel Sysplex for coupling facility (CF) message communication. STP can also use ICB-3 and ICB-4 links on servers that support them.

The STP design introduced a concept called Coordinated Timing Network (CTN). A Coordinated Timing Network (CTN) is a collection of servers and coupling facilities that are time-synchronized to a time value called Coordinated Server Time.

A CTN can be configured in two ways:

- STP-only CTN which does not require a Sysplex Timer® .
- Mixed CTN (External Time Reference (ETR) and STP) which requires a Sysplex Timer . The Sysplex Timer provides the timekeeping information in a Mixed CTN. Even though the z196 does not support attachment to a Sysplex Timer , it can participate in a Mixed CTN that has either a z10 or z9 synchronized to the Sysplex Timer . This maintains the capability for enterprises to concurrently migrate from an existing ETR network to a Mixed CTN and from a Mixed CTN to an STP-only CTN.

Water cooling

z196 introduces water cooling unit (WCU) technology, which provides the ability to cool systems with user-chilled water. In order to allow users to remove additional heat produced by non-MCM components in the system such as power, memory, and I/O to water, z196 also supports the exhaust air heat exchange, which is standard on systems with the WCU.

Conversions from machine refrigeration unit (MRU) to WCU require a frame roll, and will not be done in the field.

High-voltage DC power

In data centers today, many businesses are paying increasing electric bills and are also running out of power. High-voltage DC power, an optional feature on z196, increases the voltage directly into the system. This can save System z users 1 - 3%, on average, on their power bills without having to go through a step-down.

High-voltage DC power is added to the universal power input that is available on the z196. The voltage level is in the range of 380V-570V DC, and requires 2 or 4 x 60A line cords, depending on configuration. These line cords (#8965, #8963) are offered on new build as well as MES orders.

Top exit I/O cabling

On z196 you now have the option of ordering the infrastructure to support top exit of your fiber optic cables (ESCON , FICON , OSA, 12x InfiniBand, 1x InfiniBand, and ISC-3) as well as your copper cables for the 1000BASE-T Ethernet features.

Top exit I/O cabling is designed to provide you with an additional option. Instead of all of your cables exiting under the server and/or under the raised floor, you now have the flexibility to choose the option that best meets the requirements of your data center. Top exit I/O cabling can also help to increase air flow. This option is offered on new build as well as MES orders.

Static power save mode

With the introduction of static power save mode, IBM is continuing to help provide energy management capabilities to facilitate energy savings. You now have the ability to reduce the power consumption of the IBM zEnterprise 196.

Static power save mode is designed to reduce power consumption on z196 when full performance is not required. It can be switched on and off during runtime with no disruption to currently running workloads, aside from the change in performance. On air-cooled models, static power save mode can be entered once in a calendar day.

Using the Hardware Management Console (HMC), as well as the Active Energy Manager (AEM), you can use static power save mode for:

- Periods of lower utilization - weekends, third shift.
- Capacity backup systems - systems used for emergency backup; keep them "running" but reduce energy consumption. Systems can quickly be brought back to full performance.

This could result in a 20% - 30% reduction in power consumption (depending on system configuration). If you have also implemented dynamic control of cooling (for example, through the integration of Active Energy Manager with facility management applications) the air conditioning for the cooling zone can be turned down and additional energy can be saved.

Static power save mode is supported by z/OS and z/VM . Refer to the Software requirements section.

Access to Capacity on Demand

Capacity on Demand - Temporary capacity :

z196 uses the Capacity on Demand (CoD) architecture implemented on z10 . This architecture improved the capability to access and manage processing capacity on a temporary basis, providing increased flexibility for On Demand environments.

Capacity Back Up (CBU) gives you temporary access to dormant processor units (PUs), intended to replace capacity lost within the enterprise due to a disaster. CP capacity or any and all specialty engine types (ICF, IFL, SAP, zAAP, zIIP) can be added up to what the physical hardware model can contain for up to 10 days for a test activation or 90 days for true disaster recovery. The CBU entitlement records (#6818) contain an expiration date that is established at the time of order and is dependent upon the quantity of CBU years (#6817).

You have the capability to extend your CBU entitlements through the purchase of additional CBU years. The number of #6817 per instance of #6818 remains limited to five. Fractional years are rounded up to the near whole integer when calculating this limit. One test activation is provided for each additional CBU year added to the CBU entitlement record. The number of test activations per CBU entitlement record coincides with the number of years assigned to the CBU record. This equates to one test activation per year for each CBU entitlement purchased. Additional test activations are available in quantities of one and the number of test activations is limited at 15 per CBU record.

Capacity for Planned Events (CPE) : Temporary access to dormant processing units (PUs), intended to replace capacity lost within the enterprise due to a planned event such as a facility upgrade or system relocation. CP capacity or any and all specialty engine types (zIIP, zAAP, SAP, IFL, ICF) can be added up to what the physical hardware model can contain for up to 3 days.

On/Off Capacity on Demand (On/Off CoD) : Temporary access to dormant PUs, intended to augment the existing capacity of a given system. On/Off CoD helps you contain workload spikes that may exceed permanent capacity such that Service Level Agreements cannot be met and business conditions do not justify a permanent upgrade. As on System z10 , On/Off CoD can be pre- or post-paid, token or non-token.

Capacity provisioning : An installed On/Off CoD record is a necessary prerequisite for automated control of temporary capacity through z/OS MVS™ Capacity Provisioning. z/OS MVS Capacity Provisioning allows you to set up rules defining the circumstances under which additional capacity should be provisioned in order to fulfill a specific business need. The rules are based on criteria such as a specific application, the maximum additional capacity that should be activated, and time and workload conditions. This support provides a fast response to capacity changes and ensures sufficient processing power is available with the least possible delay even if workloads fluctuate. Refer to *z/OS MVS Capacity Provisioning User's Guide* (SA33-8299) for more information.

Capacity on Demand - Permanent capacity :

Customer Initiated Upgrade (CIU) facility : When your business needs additional capacity quickly, Customer Initiated Upgrade (CIU) is designed to deliver it. CIU is designed to allow you to respond to sudden increased capacity requirements by requesting a z196 PU and/or memory upgrade via the Web, using IBM Resource Link , and downloading and applying it to your z196 server using your system's Remote Support connection. Further, with the Express option on CIU, an upgrade may be made available for installation as fast as within a few hours after order submission.

Permanent upgrades : Orders (MESs) of all PU types and memory for System z196 servers that can be delivered by Licensed Internal Code, Configuration Control (LICCC) are eligible for CIU delivery. CIU upgrades may be performed up to the maximum available processor and memory resources on the installed server, as configured. While capacity upgrades to the server itself are concurrent, your software may not be able to take advantage of the increased capacity without performing an Initial Programming Load (IPL).

Plan ahead memory : As on System z10 , memory upgrades can be preplanned to be nondisruptive. The preplanned memory feature adds 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 then calculates the physical memory required to satisfy this target memory. Should additional physical memory be required, it is fulfilled with the preplanned memory features.

Capacity on Demand - Enhancements

Auto renewal of On/Off CoD allows you to choose the automatic renewal of installed On/Off CoD records to automatically update the expiration date of those records.

Order Permanent Upgrade now allows you to order additional unassigned capacity by providing you with the options to adjust the system's total and active capacity levels. You are billed for the purchase of any new capacity, however no charges are made for deactivation of the capacity as long as new capacity is purchased.

On/Off CoD Administrative Test provides you the capability to test the Capacity on Demand process, for training and API testing. This differs from the On/Off CoD no-charge test in that no capacity is activated with the test.

With your z196, for Capacity on Demand records shipped with the system, such as CBU and/or CPE, up to 4 come pre-installed instead of being staged on the Service Element. If more than 4 records are ordered with the system, none will be installed and all will be staged. IBM installation service representatives will assist you with the installation of the staged records.

HMC system support

The new functions available on the Hardware Management Console (HMC) version 2.11.0, as described, apply exclusively to z196. However, the HMC version 2.11.0 will also support the systems listed in the table below.

The 2.11.0 HMC now supports up to two 10/100/1000 Mbps Ethernet LANs.

Family	Machine Type	Firmware Driver	SE Version
z10 BC	2098	79	2.10.2
z10 EC	2097	79	2.10.2
z9 BC	2096	67	2.9.2
z9 EC	2094	67	2.9.2
z890	2086	55	1.8.2
z990	2084	55	1.8.2
z800	2066	3G	1.7.3
z900	2064	3G	1.7.3
9672 G6	9672/9674	26	1.6.2
9672 G5	9672/9674	26	1.6.2

HMC Security

- Security Improvements

  The **Monitor System Events task** now allows for security logs to result in e-mail notifications using the same type of filters and rules that are used for both Hardware and Operating System messages.

  The **Password Profiles task** now allows for the removal of pre-defined password rules by the access administrator.
- Offload Support for Customer Audit

  The **Audit and Log Management task** adds the ability to offload a number of HMC and SE files (Audit Log, Console Event Log, Console Service History, Tasks Performed Log, and Security Logs). You can now offload to removable media as well as to remote locations via FTP. The offloaded data is available in two forms: human (HTML) readable and machine (XML) readable. Offloading can be manually initiated via the new Audit and Log Management task or scheduled via the Scheduled Operations task.
- HMC User ID Templates and Patterns

  This function allows the ability to manage adding and removing HMC users in an environment where an LDAP server is the central authority for specifying which users have access to an HMC.
- View Only User IDs/Access for HMC/SE

  HMC and SE User ID support allows the ability to create users who have View Only access to select tasks. The new View Only tasks are the existing tasks with minor modifications to their GUI controls to prevent any actions from being taken.

Monitoring

- Environmental Efficiency Statistics Task

  The Environmental Efficiency Statistics task adds the ability to show historical power consumption and thermal information as well as a historical summary

of processor and channel utilization. The data is presented in table form and graphical ("histogram") form, and it can also be exported to a Comma Separated Value (CSV) file.

- **Monitors Dashboard Task** provides the following capabilities:
  - A tree-based view of resources in the IBM System z .
  - Allows a user to view aggregated activity when looking at large configurations.
  - Allows for more detail for objects with smaller scope.
  - Supports new graphical ways of displaying data such as history charts.

  Future changes to the existing activity task will be minimized.

HMC User Interface Improvements

- Classic UI and User Settings Task Improvements

  The User Settings and Console Default User Settings console actions now have a "Classic Style" tab. This tab allows users to change the look of the Classic UI.
- Additional Control over the Toggle Lock and Details Tasks

  In prior releases, all Task Roles contain the Toggle Lock task and the Details tasks for the various managed objects. The Customize User Controls task now includes the Toggle Lock and Details tasks which gives the administrator the ability to remove these tasks for certain users.
- Allow setting Acceptable Status for Multiple Objects

  In prior releases setting up Acceptable Status on a new install requires the user to set the status one object at a time. A new field, "Save as default," was added to each Acceptable Status task to allow the user to change the acceptable status for all of the currently defined objects of that type.

LPAR Controls Enhancements

- Change LPAR Controls - Export to File

  The Change LPAR Controls task adds the ability to export the Change LPAR Controls table data to a Comma Separated Value (CSV) file. This support is available only when a user is connected to the HMC remotely via a Web browser.
- Change LPAR Controls Scheduled Operation now allows the partition capping value to be specified. Details about an existing Change LPAR Controls scheduled operation can now be viewed on the Support Element.

Capacity on Demand

- Auto-renewal of post-paid On/Off CoD records

  Resource Link will monitor all installed On/Off CoD records. Every 90 days, Resource Link will generate a replenishment record for each installed record that will move the expiration date out 180 days. The record must be "enabled" for auto-renewal. The next time the system connects to RETAIN® , a replenishment record is pushed to the system and installed. Once set, no customer renewal action is required.
- On/Off CoD Administrative Test

  Resource Link re-introduces the "Order Administrative On/Off CoD test," This option supports standard order flow, including approval steps that allow for testing of processes / procedures without any resulting Hardware or Software charges.
- Other CoD Enhancements

  Ordering options were added to Resource Link to allow the purchase of unassigned CP or IFL capacity and to allow users to explore capacity needs / upgrade options prior to purchasing a permanent engine upgrade.

SNMP and CIM API Enhancements

- SNMP v3.0 API Support adds authentication and privacy security enhancements to the HMC Java™ APIs. Users need to configure SNMPv3 authentication parameters using the Customize API Settings task.
- HMC SNMP and CIM API Enhancements

  The SNMP and CIM APIs now allow dynamic changes to the logical partition Group Capacity setting, and allow User ID audit reports to be generated and retrieved.

HMC Hardware

- Removable Writable Media to Replace HMC DVD-RAM

  A removable writable media was added as an alternate to the HMC DVD-RAM. This media is the USB Flash Memory Drive (UFD).
- HMC/SE Customer and SE Networks Gigabit LAN

  The Ethernet switch hardware used to interconnect various parts of the system has been upgraded. The SMC Networks switch now contains 16 ports which support 1 GB speeds.

Removal of Dynamic ICF Expansion Option

- Remove Support for Dynamic ICF Expansion Option

  Activation Profiles removed support for Dynamic ICF expansion both across ICFs and across pool of shared CPs. The following logical Processor Assignment selections for a Coupling Facility mode logical partition were removed:

  – Dedicated and not dedicated internal coupling facility processors
  – Dedicated internal coupling facility processors and not dedicated central processors

Advanced Workload License Charges

IBM is introducing a new software pricing structure, called Advanced Workload License Charges (AWLC), for eligible z/OS and z/TPF software programs running on a z196. AWLC is the default pricing metric for standalone z196 servers. IBM will also provide a transition program from Workload License Charges to AWLC for sysplex customers who have not yet fully migrated to z196 servers. This ensures that aggregation benefits are maintained and also phases in the benefits of AWLC pricing as customers migrate.

For information refer to Software Announcement 210-238, dated July 22, 2010 , Advanced Workload License Charges offers price performance for the IBM zEnterprise 196.

Solution Edition Series

The System z Solution Edition Series delivers mainframe qualities of service at attractive prices for new workloads. Offerings will continue to be enhanced to leverage new zEnterprise platform and IBM software functionality.

Accessibility by people with disabilities

A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Section 508 of the U.S. Rehabilitation Act

IBM zEnterprise 196 servers are capable on delivery, when used in accordance with IBM's associated documentation, of satisfying the applicable requirements of Section 508 of the Rehabilitation Act of 1973, 29 U.S.C. Section 794d, as implemented by

36 C.F.R. Part 1194, provided that any Assistive Technology used with the product properly interoperates with it.

Product positioning

The IBM zEnterprise System offers a total systems approach to delivering advanced heterogeneous systems management function that is unmatched in the industry. The announcement of zEnterprise System takes systems technology to the next level. The IBM zEnterprise System consists of the traditional subsystems -- CPC, memory, I/O, and power/packaging/cooling -- and new platform management firmware that is designed to enable you to run heterogeneous workloads under the management of one system.

The IBM zEnterprise System is a powerful yet flexible server that thinks beyond technology to drive business innovation. The server is designed to offer relief from increasing IT costs, particularly those associated with server sprawl. The zEnterprise System is designed to provide a secure, highly virtualized platform for application development. Its CPC has 80 user-customizable processor units (PUs) in a single footprint, providing the opportunity for growth. The IBM zEnterprise 196 is built on the inherent strengths of the System z platform, including scalability, availability, security, reliability, and world-class virtualization.

Statement of general direction

In the first half of 2011, IBM intends to offer a **System x® blade running Linux on System x** in the IBM zEnterprise System on zBX Model 002.

In the first half of 2011, IBM intends to offer a **WebSphere® DataPower® Appliance** for IBM zEnterprise System on zBX Model 002.

The IBM zEnterprise 196 will be the last high-end server to offer ordering of ISC-3 . Enterprises should begin migrating from ISC-3 features (#0217, #0218, #0219), to 12x InfiniBand (#0163 - HCA2-O fanout) or 1x InfiniBand (#0168 - HCA2-O LR fanout) coupling links.

The IBM zEnterprise 196 will be last high-end server to offer ordering of the PSC feature . IBM intends to not offer the Power Sequence Controller (PSC feature #6501) on future servers. The PSC feature is used to turn on/off specific control units from the central processor complex (CPC).

The IBM zEnterprise 196 will be the last high-end server to offer ordering of ESCON channels . This applies to channel path identifier (CHPID) types CNC, CTC, CVC, and CBY. Enterprises should begin migrating from ESCON to FICON . Alternate solutions are available for connectivity to ESCON and parallel devices. IBM Global Technology Services offers an ESCON to FICON Migration solution, Offering ID #6948-97D, to help facilitate migration from ESCON to simplify and manage a single physical and operational environment while maximizing green-related savings.

The IBM zEnterprise 196 will be the last high-end server to support FICON Express4 channels : Enterprises should begin migrating from FICON Express4 channel features (#3321, #3322, #3324) to FICON Express8 channels.

The IBM zEnterprise 196 will be the last high-end server to support OSA-Express2 features : Enterprises should begin migrating from OSA-Express2 features (#3364, #3365, #3366) to OSA-Express3 features.

The IBM zEnterprise 196 is planned to be the last high-end server to support dial-up modems for use with the Remote Support Facility (RSF), and the External Time Source (ETS) option of Server Time Protocol (STP). The currently available Network Time Protocol (NTP) server option for ETS as well as Internet time services available using broadband connections can be used to provide the same degree of accuracy as dial-up time services. Enterprises should begin migrating from dial-up modems to Broadband for RSF connections.

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

Reference information

For information on POWER7 blades, refer to Hardware Announcement 110-061, dated April 13, 2010 , IBM BladeCenter PS701 and PS702 Express Blades.

For information on IBM zEnterprise BladeCenter Extension (zBX), refer to Hardware Announcement 110-177, dated July 22, 2010 , System z BladeCenter Extension.

For information on IBM Smart Analytics Optimizer, refer to Software Announcement 210-266, dated July 22, 2010 , IBM Smart Analytics Optimizer for DB2 for z/OS , V1.1.

For information on firmware managing the z/VM environment, refer to Software Announcement 210-234, dated July 22, 2010 , IBM z/VM V6.1-Virtualization Growth for zEnterprise System and Unified Resource Manager.

For information on z/OS V1.12, refer to Software Announcement 210-235, dated July 22, 2010 , z/OS V1.12.

For information on IBM z/VSE V4.3, refer to Software Announcement 210-204, dated July 22, 2010 , Preview: IBM z/VSE V4.3 - More Capacity and zEnterprise Exploitation.

For information on Advanced Workload License Charges for IBM zEnterprise 196, refer to Software Announcement 210-238, dated July 22, 2010 , Advanced Workload License Charges offers price performance for the IBM zEnterprise 196.

For information on IBM System Storage DS8700 and zDAC, refer to Hardware Announcement 110-168, dated July 20, 2010 , IBM System Storage DS8700 (M/T 242x) delivers z/OS Distributed Data Backup and new functional capabilities.

Product number

Description	Machine type	Model	Feature
IBM zEnterprise 196	2817	M15 M32 M49 M66 M80	
Month indicator			0660
Day indicator			0661
Hour indicator			0662
Minute indicator			0663
MTU 1 - D			0001
MTU 100 - D			0002
MTU 1 - V			0003
MTU 100 - V			0004
GTU 1 - D			0005
GTU 100 - D			0006
GTU 1 - V			0007
GTU 100 - V			0008
Ethernet switch *			0070
HMC w/Dual EN			0090
HMC w/Dual EN			0091
I/O Cage ISC-D Airflow			0113
I/O Cage Full Card Airflow			0114
1 CPE Capacity Unit			0116
100 CPE Capacity Unit			0117

10000 CPE Capacity Unit	0118
1 CPE Capacity Unit-IFL	0119
100 CPE Capacity Unit-IFL	0120
1 CPE Capacity Unit-ICF	0121
100 CPE Capacity Unit-ICF	0122
1 CPE Capacity Unit-zAAP	0123
100 CPE Capacity Unit-zAAP	0124
1 CPE Capacity Unit-zIIP	0125
100 CPE Capacity Unit-zIIP	0126
1 CPE Capacity Unit-SAP	0127
100 CPE Capacity Unit-SAP	0128
CPC -Air	0158
CPC -Water	0159
HCA2-C Fanout	0162
HCA2-O fanout for 12x IFB	0163
Fanout Airflow	0165
HCA2-O LR fanout for 1x IFB	0168
ISC-Mother Card	0217
ISC-Daughter Card	0218
ISC-3 link on F/C 0218	0219
Manage Firmware Suite	0019
Automate Firmware Suite	0020
Ensemble membership	0025
Manage FW ISAOPT	0039
Manage FW Pwr Blade	0041
Automate FW ISAOPT	0043
Automate FW Pwr Blade	0045
Automate FW IFL	0052
IFB-MP Daughter Card	0326
STI-A8 Mother Card	0327
STI-A4 Mother Card	0328
TKE workstation	0841
TKE 7.0 LIC	0860
Crypto Express3	0864
TKE addl smart cards	0884
TKE Smart Card Reader	0885
UID Label for DoD	0998
STP Enablement	1021
EMEA Special Operations	1022
16 GB Mem DIMM(5/feat)-A	1616
16 GB Mem DIMM(5/feat)-W	1617
32 GB Mem DIMM(5/feat)-A	1632
32 GB Mem DIMM(5/feat)-W	1633
4 GB Mem DIMM(5/feat)-A	1640
4 GB Mem DIMM(5/feat)-W	1641
LICCC Ship Via Net Ind	1750
Preplanned memory	1996
16GB Memory Capacity Incr	1901
16GB Ftr Converted memory	1902
Line Cord Plan Ahead	2000
16-Port ESCON Card	2323
ESCON Channel port	2324
32 GB Memory	2425
64 GB Memory	2427
96 GB Memory	2429
128 GB Memory	2431
160 GB Memory	2433
192 GB Memory	2435
224 GB Memory	2437
256 GB Memory	2439
320 GB Memory	2441
384 GB Memory	2443
448 GB Memory	2445
512 GB Memory	2447
608 GB Memory	2449
704 GB Memory	2451
US English	2924
France	2928
German	2929
Spanish - Non Spain	2930

Spain	2931
Italian	2932
Canadian French	2935
Portuguese	2978
Brazilian Portuguese	2979
UK English	2980
Norwegian	2983
Sweden Finland	2987
Netherlands	2988
Belgian French	2989
Denmark	2993
Swiss French, German	2997
Balanced Power Plan Ahead	3003
BPR Pair Air Model	3004
BPD Pair Air Model	3005
BPR Pair Water Model	3006
BPD Pair Water Model	3007
Internal Battery IBF-ED	3212
FICON Express8 10KM LX	3325
FICON Express8 SX	3326
OSA-Express3 GbE LX	3362
OSA-Express3 GbE SX	3363
OSA-Express3 1000BASET-EN	3367
OSA-Express3 10 GbE LR	3370
OSA-Express3 10 GbE SR	3371
Fill and Drain Kit	3377
Universal Lift Tool/Ladder	3759
CPACF Enablement	3863
I/O Drawer-Air	4000
I/O Cage-Air	4002
I/O Drawer-Water	4004
I/O Cage-Water	4005
A Frame w/o Cargo-Water	4017
A Frame w Cargo-Water	4018
Luxembourg-Belgium ordered	5560
Iceland-Ordered in Denmark	5561
China-Ordered in Hong Kong	5562
Flat panel display	6096
Power Sequence Controller	6501
Additional CBU Test	6805
CBU Records Ordered	6818
FQC Bracket/Mount HW-A	7900
MT-RJ 6 ft harness-A	7902
MT-RJ 8.5 ft harness-A	7903
MT-RJ 5 ft harness-A	7904
MT-RJ 3.5 ft harness-A	7905
LC Dup 6 ft harness-A	7906
LC Dup 8.5 ft harness-A	7908
FQC Bracket/Mount HW-W	7910
MT-RJ 6 ft harness-W	7912
MT-RJ 8.5 ft harness-W	7913
MT-RJ 5 ft harness-W	7914
MT-RJ 3.5 ft harness-W	7915
LC Dup 6.6 ft harness-W	7916
LC Dup 8.5 ft harness-W	7918
(NOT TAIWAN) Top exit I/O cabling (NOT TAIWAN)	7942
Side covers	7949
3-in-1 Bolt Down Kit-A	8008
3-in-1 Bolt Down Kit-W	8009
14ft 380-520V DC line cord	8963
14ft 200V 3ph cord	8993
14ft 480V 3ph line cord	8983
Multi Order Ship Flag	9000

Multi Order Rec Only-NB	9001
Multi Order Rec Only-MES	9002
RPO Action Flag	9003
Downgraded PUs Per Request	9004
On/Off CoD Act IFL Day	9888
On/Off CoD Act ICF Day	9889
On/Off CoD Act zAAP Day	9893
On/Off COD authorization	9896
On/Off CoD Act Cap CP Day	9897
Perm upgr authorization	9898
CIU Activation (Flag)	9899
On Line CoD Buying (Flag)	9900
On/Off CoD Act zIIP Day	9908
On/Off CoD Act SAP Day	9909
CBU authorization	9910
CPE authorization	9912
OPO sales authorization	9913
1 MSU day	9917
100 MSU days	9918
10000 MSU days	9919
1 IFL day	9920
100 IFL days	9921
1 ICF day	9922
100 ICF days	9923
1 zIIP day	9924
100 zIIP days	9925
1 zAAP day	9926
100 zAAP days	9927
1 SAP day	9928
100 SAP days	9929
Site Tool Kit	9968
Weight Distribution Kit	9970
Height Reduce Ship	9975
Height Reduce for Return	9976
CP4	1877
CP5	1878
CP6	1879
CP7	1880
IFL	1881
ICF	1882
SAP (optional)	1883
zAAP	1884
zIIP	1885
Unassigned IFL	1886
Total CBU Years Ordered	6817
Single CBU CP-Year	6820
25 CBU CP-Year	6821
Single CBU IFL-Year	6822
25 CBU IFL-Year	6823
Single CBU ICF-Year	6824
25 CBU ICF-Year	6825
Single CBU zAAP-Year	6826
25 CBU zAAP-Year	6827
Single CBU zIIP-Year	6828
25 CBU zIIP-Year	6829
Single CBU SAP-Year	6830
25 CBU SAP-Year	6831
CBU Replenishment	6832
Capacity for Planned Event	6833
OPO Sales Flag	6835
OPO Sales Flag Alteration	6836
Feature Converted CBU CP	6837
Feature Converted CBU IFL	6838
Feature Converted CBU ICF	6839
Feature Converted CBU zAAP	6840
Feature Converted CBU zIIP	6841
Feature Converted CBU SAP	6842
1-Way Processor CP4	1751
2-Way Processor CP4	1752
3-Way Processor CP4	1753
4-Way Processor CP4	1754
5-Way Processor CP4	1755

6-Way Processor CP4	1756
7-Way Processor CP4	1757
8-Way Processor CP4	1758
9-Way Processor CP4	1759
10-Way Processor CP4	1760
11-Way Processor CP4	1761
12-Way Processor CP4	1762
13-Way Processor CP4	1763
14-Way Processor CP4	1764
15-Way Processor CP4	1765
1-Way Processor CP5	1766
2-Way Processor CP5	1767
3-Way Processor CP5	1768
4-Way Processor CP5	1769
5-Way Processor CP5	1770
6-Way Processor CP5	1771
7-Way Processor CP5	1772
8-Way Processor CP5	1773
9-Way Processor CP5	1774
10-Way Processor CP5	1775
11-Way Processor CP5	1776
12-Way Processor CP5	1777
13-Way Processor CP5	1778
14-Way Processor CP5	1779
15-Way Processor CP5	1780
1-Way Processor CP6	1781
2-Way Processor CP6	1782
3-Way Processor CP6	1783
4-Way Processor CP6	1784
5-Way Processor CP6	1785
6-Way Processor CP6	1786
7-Way Processor CP6	1787
8-Way Processor CP6	1788
9-Way Processor CP6	1789
10-Way Processor CP6	1790
11-Way Processor CP6	1791
12-Way Processor CP6	1792
13-Way Processor CP6	1793
14-Way Processor CP6	1794
15-Way Processor CP6	1795
0-Way Processor CP7	1796
1-Way Processor CP7	1797
2-Way Processor CP7	1798
3-Way Processor CP7	1799
4-Way Processor CP7	1800
5-Way Processor CP7	1801
6-Way Processor CP7	1802
7-Way Processor CP7	1803
8-Way Processor CP7	1804
9-Way Processor CP7	1805
10-Way Processor CP7	1806
11-Way Processor CP7	1807
12-Way Processor CP7	1808
13-Way Processor CP7	1809
14-Way Processor CP7	1810
15-Way Processor CP7	1811
401 Capacity Marker	7202
402 Capacity Marker	7203
403 Capacity Marker	7204
404 Capacity Marker	7205
405 Capacity Marker	7206
406 Capacity Marker	7207
407 Capacity Marker	7208
408 Capacity Marker	7209
409 Capacity Marker	7210
410 Capacity Marker	7211
411 Capacity Marker	7212
412 Capacity Marker	7213
413 Capacity Marker	7214
414 Capacity Marker	7215
415 Capacity Marker	7216
501 Capacity Marker	7217
502 Capacity Marker	7218

503 Capacity Marker			7219
504 Capacity Marker			7220
505 Capacity Marker			7221
506 Capacity Marker			7222
507 Capacity Marker			7223
508 Capacity Marker			7224
509 Capacity Marker			7225
510 Capacity Marker			7226
511 Capacity Marker			7227
512 Capacity Marker			7228
513 Capacity Marker			7229
514 Capacity Marker			7230
515 Capacity Marker			7231
601 Capacity Marker			7232
602 Capacity Marker			7233
603 Capacity Marker			7234
604 Capacity Marker			7235
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606 Capacity Marker			7237
607 Capacity Marker			7238
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611 Capacity Marker			7242
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614 Capacity Marker			7245
615 Capacity Marker			7246
700 Capacity Marker			7247
701 Capacity Marker			7248
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703 Capacity Marker			7250
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705 Capacity Marker			7252
706 Capacity Marker			7253
707 Capacity Marker			7254
708 Capacity Marker			7255
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710 Capacity Marker			7257
711 Capacity Marker			7258
712 Capacity Marker			7259
713 Capacity Marker			7260
714 Capacity Marker			7261
715 Capacity Marker			7262

IBM zEnterprise 196	2817	M15	
Model M15 - Air Cooled			1125
Model M15 - Water Cooled			1130
A Frame w/o Cargo-Air			4015
A Frame w Cargo-Air			4016
IBM zEnterprise 196	2817	M32	
Model M32 - Air Cooled			1126
Model M32 - Water Cooled			1131
IBM zEnterprise 196	2817	M49	
Model M49 - Air Cooled			1127
Model M49 - Water Cooled			1132
IBM zEnterprise 196	2817	M66	
Model M66 - Air Cooled			1128
Model M66 - Water Cooled			1133
IBM zEnterprise 196	2817	M80	
Model M80 - Air Cooled			1129
Model M80 - Water Cooled			1134

IBM zEnterprise 196	2817	M32	
		M49	
		M66	
		M80	
800 GB Memory			2453

896 GB Memory			2455
1008 GB Memory			2457
1136 GB Memory			2459
1264 GB Memory			2461
1392 GB Memory			2463
1520 GB Memory			2465
A Fr multinode w/o Cargo-A			4019
A Fr multinode w Cargo-A			4020
16-Way Processor CP7			1812
17-Way Processor CP7			1813
18-Way Processor CP7			1814
19-Way Processor CP7			1815
20-Way Processor CP7			1816
21-Way Processor CP7			1817
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23-Way Processor CP7			1819
24-Way Processor CP7			1820
25-Way Processor CP7			1821
26-Way Processor CP7			1822
27-Way Processor CP7			1823
28-Way Processor CP7			1824
29-Way Processor CP7			1825
30-Way Processor CP7			1826
31-Way Processor CP7			1827
32-Way Processor CP7			1828
716 Capacity Marker			7263
717 Capacity Marker			7264
718 Capacity Marker			7265
719 Capacity Marker			7266
720 Capacity Marker			7267
721 Capacity Marker			7268
722 Capacity Marker			7269
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728 Capacity Marker			7275
729 Capacity Marker			7276
730 Capacity Marker			7277
731 Capacity Marker			7278
732 Capacity Marker			7279
IBM zEnterprise 196	2817	M49	
		M66	
		M80	
1776 GB Memory			2467
2032 GB Memory			2469
2288 GB Memory			2471
33-Way Processor CP7			1829
34-Way Processor CP7			1830
35-Way Processor CP7			1831
36-Way Processor CP7			1832
37-Way Processor CP7			1833
38-Way Processor CP7			1834
39-Way Processor CP7			1835
40-Way Processor CP7			1836
41-Way Processor CP7			1837
42-Way Processor CP7			1838
43-Way Processor CP7			1839
44-Way Processor CP7			1840
45-Way Processor CP7			1841
46-Way Processor CP7			1842
47-Way Processor CP7			1843
48-Way Processor CP7			1844
49-Way Processor CP7			1845
733 Capacity Marker			7280
734 Capacity Marker			7281
735 Capacity Marker			7282
736 Capacity Marker			7283
737 Capacity Marker			7284
738 Capacity Marker			7285
739 Capacity Marker			7286
740 Capacity Marker			7287

741 Capacity Marker			7288
742 Capacity Marker			7289
743 Capacity Marker			7290
744 Capacity Marker			7291
745 Capacity Marker			7292
746 Capacity Marker			7293
747 Capacity Marker			7294
748 Capacity Marker			7295
749 Capacity Marker			7296
IBM zEnterprise 196	2817	M66	
		M80	
2544 GB Memory			2473
2800 GB Memory			2475
3056 GB Memory			2477
50-Way Processor CP7			1846
51-Way Processor CP7			1847
52-Way Processor CP7			1848
53-Way Processor CP7			1849
54-Way Processor CP7			1850
55-Way Processor CP7			1851
56-Way Processor CP7			1852
57-Way Processor CP7			1853
58-Way Processor CP7			1854
59-Way Processor CP7			1855
60-Way Processor CP7			1856
61-Way Processor CP7			1857
62-Way Processor CP7			1858
63-Way Processor CP7			1859
64-Way Processor CP7			1860
65-Way Processor CP7			1861
66-Way Processor CP7			1862
750 Capacity Marker			7297
751 Capacity Marker			7298
752 Capacity Marker			7299
753 Capacity Marker			7300
754 Capacity Marker			7301
755 Capacity Marker			7302
756 Capacity Marker			7303
757 Capacity Marker			7304
758 Capacity Marker			7305
759 Capacity Marker			7306
760 Capacity Marker			7307
761 Capacity Marker			7308
762 Capacity Marker			7309
763 Capacity Marker			7310
764 Capacity Marker			7311
765 Capacity Marker			7312
766 Capacity Marker			7313
IBM zEnterprise 196	2817	M80	
67-Way Processor CP7			1863
68-Way Processor CP7			1864
69-Way Processor CP7			1865
70-Way Processor CP7			1866
71-Way Processor CP7			1867
72-Way Processor CP7			1868
73-Way Processor CP7			1869
74-Way Processor CP7			1870
75-Way Processor CP7			1871
76-Way Processor CP7			1872
77-Way Processor CP7			1873
78-Way Processor CP7			1874
79-Way Processor CP7			1875
80-Way Processor CP7			1876
767 Capacity Marker			7314
768 Capacity Marker			7315
769 Capacity Marker			7316
770 Capacity Marker			7317
771 Capacity Marker			7318
772 Capacity Marker			7319
773 Capacity Marker			7320
774 Capacity Marker			7321

775 Capacity Marker				7322
776 Capacity Marker				7323
777 Capacity Marker				7324
778 Capacity Marker				7325
779 Capacity Marker				7326
780 Capacity Marker				7327
System z10 EC	2097	E12		
		E26		
		E40		
		E56		
		E64		
HMC w/Dual EN				0091
ISAOPT Enablement				0251
TKE workstation				0841
TKE 7.0 LIC				0860
System z10 BC	2098	E10		
HMC w/Dual EN				0091
ISAOPT Enablement				0251
TKE workstation				0841
TKE 7.0 LIC				0860

* Ethernet switch (#0070) is not available in the following countries: Belize, Brazil, Egypt, Haiti, Moldavia, Nicaragua, Oman, Qatar, and Venezuela. For alternatives, refer to the Ethernet LAN switch support section of *Installation Manual - Physical Planning* (IMPP), offering ID GC28-6897.

On IBM zEnterprise 196 we will continue to deliver a significant level of price performance and investment protection. We will allow carry forward of speciality engines and memory, with a charge to carry forward these assets. See your IBM sales representative for details.

The following features are not orderable on the IBM zEnterprise 196 models. If they are installed at the time of an upgrade to the z196 they may be retained.

Description	Feature
HMC	0084
SE-EN Switch (former HUB)	0089
FICON Express4 10KM LX	3321
FICON Express4 SX	3322
FICON Express4 4KM LX	3324
OSA-Express2 GbE LX	3364
OSA-Express2 GbE SX	3365
OSA-Express2 1000BASET-EN	3366
17 inch panel display	6094
21 inch panel display	6095
6ft 250V Line Cord, Chi	8992
6ft 480V 30A Line Cord, Chi	8994

Notes:

1. Memory DIMMs do NOT physically carry forward.
2. Support Elements do NOT carry forward.
3. FICON Express, features 2319 and 2320, are NOT supported on z196.
4. FICON Express2, features 3319 and 3320, are NOT supported on z196.
5. Crypto Express2, feature 0863, is NOT supported on z196.
6. OSA-Express2 10 GbE LR, feature 3368, is NOT supported on z196.

Model conversions

Hardware upgrades

From		To			
M/T	Model	M/T	Model		Description
2094	S08	2817	M15	(*)	S08 to M15

2094	S08	2817	M32	(*)	S08	to	M32
2094	S08	2817	M49	(*)	S08	to	M49
2094	S08	2817	M66	(*)	S08	to	M66
2094	S08	2817	M80	(*)	S08	to	M80
2094	S18	2817	M15	(*)	S18	to	M15
2094	S18	2817	M32	(*)	S18	to	M32
2094	S18	2817	M49	(*)	S18	to	M49
2094	S18	2817	M66	(*)	S18	to	M66
2094	S18	2817	M80	(*)	S18	to	M80
2094	S28	2817	M15	(*)	S28	to	M15
2094	S28	2817	M32	(*)	S28	to	M32
2094	S28	2817	M49	(*)	S28	to	M49
2094	S28	2817	M66	(*)	S28	to	M66
2094	S28	2817	M80	(*)	S28	to	M80
2094	S38	2817	M15	(*)	S38	to	M15
2094	S38	2817	M32	(*)	S38	to	M32
2094	S38	2817	M49	(*)	S38	to	M49
2094	S38	2817	M66	(*)	S38	to	M66
2094	S38	2817	M80	(*)	S38	to	M80
2094	S54	2817	M15	(*)	S54	to	M15
2094	S54	2817	M32	(*)	S54	to	M32
2094	S54	2817	M49	(*)	S54	to	M49
2094	S54	2817	M66	(*)	S54	to	M66
2094	S54	2817	M80	(*)	S54	to	M80
2097	E12	2817	M15	(*)	E12	to	M15
2097	E12	2817	M32	(*)	E12	to	M32
2097	E12	2817	M49	(*)	E12	to	M49
2097	E12	2817	M66	(*)	E12	to	M66
2097	E12	2817	M80	(*)	E12	to	M80
2097	E26	2817	M15	(*)	E26	to	M15
2097	E26	2817	M32	(*)	E26	to	M32
2097	E26	2817	M49	(*)	E26	to	M49
2097	E26	2817	M66	(*)	E26	to	M66
2097	E26	2817	M80	(*)	E26	to	M80
2097	E40	2817	M15	(*)	E40	to	M15
2097	E40	2817	M32	(*)	E40	to	M32
2097	E40	2817	M49	(*)	E40	to	M49
2097	E40	2817	M66	(*)	E40	to	M66
2097	E40	2817	M80	(*)	E40	to	M80
2097	E56	2817	M15	(*)	E56	to	M15
2097	E56	2817	M32	(*)	E56	to	M32
2097	E56	2817	M49	(*)	E56	to	M49
2097	E56	2817	M66	(*)	E56	to	M66
2097	E56	2817	M80	(*)	E56	to	M80
2097	E64	2817	M15	(*)	E64	to	M15
2097	E64	2817	M32	(*)	E64	to	M32
2097	E64	2817	M49	(*)	E64	to	M49
2097	E64	2817	M66	(*)	E64	to	M66
2097	E64	2817	M80	(*)	E64	to	M80
2817	M15	2817	M32	(*)	M15	to	M32
2817	M15	2817	M49	(*)	M15	to	M49
2817	M15	2817	M66	(*)	M15	to	M66
2817	M15	2817	M80	(*)	M15	to	M80
2817	M32	2817	M49	(*)	M32	to	M49
2817	M32	2817	M66	(*)	M32	to	M66
2817	M32	2817	M80	(*)	M32	to	M80
2817	M49	2817	M66	(*)	M49	to	M66
2817	M49	2817	M80	(*)	M49	to	M80
2817	M66	2817	M80	(*)	M66	to	M80

(*) Parts removed or replaced become the property of IBM and must be returned.

Feature conversions

The feature conversion list for IBM zEnterprise 196 is available now in the *Library* section of Resource Link . This list can be obtained at Resource Link by accessing the following Web site

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

Using the instructions on the Resource Link panels, obtain a user ID and password. Resource Link has been designed for easy access and navigation.

Business Partner information

If you are a Direct Reseller - System Reseller acquiring products from IBM , you may link directly to Business Partner information for this announcement. A PartnerWorld® ID and password are required (use IBM ID).

https://www.ibm.com/partnerworld/mem/sla.jsp?num=110-170

Publications

The following publications are available now in the *Library* section of Resource Link :

System Overview (SA22-1086)
Installation Manual - Physical Planning (IMPP) (GC28-6897)
PR/SM Planning Guide (SB10-7155)
IOCP User's Guide (SB10-7037)
CHPID Mapping Tool User's Guide (GC28-6825)
Functional Matrix (ZSW0-1335)
zBX Installation Manual for Physical Planning 2458-001 (GC28-6887)
zBX Installation Manual for Physical Planning 2458-002 (GC27-2611)

The following publications are shipped with the product and are available in the *Library* section of Resource Link :

Installation Manual (GC28-6890)
Service Guide (GC28-6892)
Safety Inspection (GC28-6894)
Safety Notices (G229-9054)
Environmental Notices and User Guide (Z125-5823)
Statement of Limited Warranty (GC28-6883)
License Agreement for Machine Code (SC28-6872)
License Agreement for Machine Code Addendum for Elliptical Curve Cryptography (GC27-2612)
Service Guide for TKE Workstations (GC28-6901)

The following publications will be available at planned availability in the *Library* section of Resource Link :

Application Programming Interfaces for Java (API-JAVA)
Application Programming Interfaces (SB10-7030)
Capacity on Demand User's Guide (SC28-2605)
Common Information Model (CIM) Management Interface (SB10-7154)
Hardware Management Console Operations Guide (V2.11.0) (SC28-6895)
Parts Catalog (GC28-6898)
SCSI IPL - Machine Loader Messages (SC28-6839)
Service Guide for HMCs and SEs (GC28-6861)
Stand-Alone IOCP User's Guide (SB10-7152)
Support Element Operations Guide (V2.11.0) (SC28-6896)
OSA-Express Customer's Guide and Reference (SA22-7935)
OSA-Express3 Integrated Console Controller Dual-Port User's Guide (SC23-2266)
Coupling Links I/O Interface Physical Layer (SA23-0395)
ESCON and FICON CTC Reference (SB10-7034)
ESCON I/O Interface Physical Layer (SA23-0394)
Fiber Optic Cleaning Procedures (SY27-2604)
Fibre Channel Connection (FICON) I/O Interface Physical Layer (SA24-7172)
Maintenance Information for Fiber Optic Links (SY27-2597)
Planning for Fiber Optic Links (GA23-0367)

z/Architecture Principles of Operation (SA22-7832)
z/Architecture Reference Summary (SA22-7871)

The following publications will be available on November 19, 2010, in the *Library* section of Resource Link :

Hardware Management Console and Support Element Operations Guide for Ensembles (SC27-2606)
Ensemble Performance Management Guide (GC27-2607)
Ensemble Planning and Configuring Guide (GC27-2608)
Introduction to Ensembles (GC27-2609)

Publications for IBM zEnterprise 196 can be obtained at Resource Link by accessing the following Web site

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

Using the instructions on the Resource Link panels, obtain a user ID and password. Resource Link has been designed for easy access and navigation.

The following publications are shipped with the IBM zEnterprise BladeCenter Extension (zBX) product and are available in the *Library* section of Resource Link :

zBX Service Guide (GC28-6884)
zBX Installation Manual 2458-001 (GC28-6885)
zBX Installation Manual 2458-002 (GC27-2610)
zBX Safety Inspection (GC28-6889)
Statement of Limited Warranty (GC28-6883)
Safety Notices (G229-9054)
Environmental Notices and User Guide (Z125-5823)

The following Redbook publication is available now:

IBM zEnterprise 196 Technical Introduction (SG24-7832)

The following Redbook publications will provide additional information, once they become available:

IBM zEnterprise 196 Technical Guide (SG24-7833)
System z Connectivity Handbook (SG24-5444)
IBM zEnterprise 196 Configuration Setup (SG24-7834)
System zEnterprise Platform Management (SG24-7835)

For other IBM Redbooks® publications, refer to

http://www.redbooks.ibm.com/

The IBM Systems Information Center provides you with a single information center where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find information and personalize your access. The IBM Systems Information Center is at

http://publib14.boulder.ibm.com/infocenter/systems

IBM Publications Center Portal

http://www.ibm.com/shop/publications/order

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided, as well as payment options via credit card. A large number of publications are available online in various file formats, which can currently be downloaded free of charge.

Services

Global Technology Services (GTS)

IBM Global Technology Services can leverage business, industry, and IT insights and view your infrastructure end-to-end to improve time to value and optimize your resources. These services can be delivered in a modular approach giving you flexibility to buy what you need when you need it, to help reduce risk and complexity.

For an IBM zEnterprise System environment, Global Technology Services helps you assess and perform application fit-for-purpose analysis of your current environment, design your IT architecture, and integrate your IT strategy and business priority. This includes developing the business case and high level transition plan, and a roadmap for an adaptable and efficient infrastructure. Global Technology Services also enables you to build and run a smarter IBM zEnterprise System environment. With these services, you can migrate effectively and efficiently to an IBM zEnterprise 196, create a more cost-effective and manageable computing environment with server, storage, and network optimization, integration, and implementation services, and effectively run and manage the IBM zEnterprise System with maintenance and technical support services.

The following services are available for the IBM zEnterprise System:

- Strategy, Design, Optimization and Integration services will help optimize computing environments to reduce IT infrastructure complexity, reduce energy consumption and operational management costs, while increasing availability and adaptability to facilitate business growth and change. These services include consulting and technology assessments, architecture design and planning, consolidation and virtualization, and high availability solutions for System z and Open Systems.
  - IBM Server Optimization and Integration Services - server consolidation (6948-39T)
  - IBM Server Optimization and Integration Services Healthcheck services for System z (6948-39J)
  - IBM Implementation Services for GDPS® (Geographically Dispersed Parallel Sysplex™) (6948-76L)
  - IBM Implementation Services for Parallel Sysplex (6948-74Z)
  - IBM Implementation Services for Parallel Sysplex Middleware (6948-84A)
  - IBM Middleware Strategy and Design (6948-74G)
  - IBM Networking Strategy and optimization services (6950-92Y)
  - Networking integration services for data center networks (6948-76K)
- Implementation & Migration services help shorten the time required to plan, implement, migrate, and deploy zEnterprise System, so you can adopt this new technology more quickly and speed the return on investment.
  - IBM Server Product Services for System z Migration Services for System z (6948-75B)
  - IBM Server Product Services for System z - Implementation Services for z - Server Time Protocol (6948-J56)
  - IBM Server Product Services for System z - Implementation Services for z - Capacity Provisioning (6948-J60)
  - IBM Server Product Services for System z - Implementation Services for z - CustomPac for z/OS (6948-A46)
  - IBM Server Product Services for System z - Implementation Services for z - IT Process Automation (6948-G57)
  - IBM Server Product Services for Linux - Implementation Services for Linux Distributions (6942-89P)
  - IBM Implementation Services for Power Systems™ BladeCenter - Power Blades (6948-84Z)

  - IBM Middleware Implementation Services (6950-92L)
- Facilities Cabling Services ease migration to FICON and reduce clogs of unstructured cabling under floor tiles.
  - IBM Facilities Cabling Services - Fiber Transport System (6948-83G)
  - IBM Facilities Cabling Services - ESCON to FICON Migration (6948-97D)

    For details on ESCON to FICON Migration visit

    http://www-935.ibm.com/services/us/index.wss/offering/its/c337386u66547p02
- Data Migration services and tools can enable nondisruptive, online migrations to reduce costs and risk of migrating to zEnterprise, optimize infrastructures, and increase productivity.
  - IBM Data Mobility Services - Softek TDMF™ for z/OS (6950-94Y)
  - IBM Data Mobility Services - Softek TDMF for UNIX® (6950-94Y)
  - IBM Data Mobility Services - Softek zDMF (6950-94Y)
  - IBM Data Mobility Services - data migration for System z data (6942-01E)
  - IBM Data Mobility Services - data migration for open systems data (6942-26E)
  - IBM Data Mobility Services - data migration with EAV enablement (6948-E94)
- Maintenance & Technical Support services offer comprehensive and flexible options of maintenance and warranty services as well as software and usage support designed to protect your zEnterprise System environment during both in-warranty and post-warranty periods.
  - MTS Hardware Maintenance Service (6950-95A)
  - MTS Enhanced Technical Support (6942-73J)
  - MTS Support Line Software Usage Support (6942-62D)

These services can help you integrate your server, storage, networks application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs. For details on available services for IBM zEnterprise System, contact your IBM representative or visit

http://www.ibm.com/services/us/gts/html/services-for-zenterprise.html

For details on education offerings related to specific products, visit

http://www.ibm.com/services/learning/index.html

Select your country, and then select the product as the category.

IBM Systems Lab Services and Technical Training

IBM Systems Lab Services and Technical Training has the intellectual and technical leverage of IBM's System z development lab, which can assist you in taking advantage of emerging technologies on the IBM System z platform.

Our teams span a wide breadth and scope of services that are designed to assist clients worldwide, including:

- Server and storage solutions for IBM System z
- Security, availability, and data serving solutions in Linux , z/VM , or IBM z/OS environments
- Platform-independent total cost of operating (TCO) consulting for IT Optimization, Information Lifecycle Management (ILM), and Virtualization studies, providing a business case comparison of your current and future costs as compared with the cost of running on IBM server and storage solutions
- Platform-agnostic data center facilities consulting for power, cooling I/O data center best practices, and data center energy efficiency studies

- Education and training

On a billable basis, IBM Systems Lab Services and Training can provide customized solutions, leading-edge consulting and support services, proof of concepts, and benchmarking to satisfy both your current business requirements and strategic initiatives, as well as your IBM zEnterprise System plans and objectives. If you are interested in engaging the team, contact Anthony DiLorenzo (dilorenz@us.ibm.com; 720.395.8643) or Gerald Koger (jerrykog@us.ibm.com; 720.395.5815).

The following services are available for the IBM System z :

- **Mainframe Services**
  - Accelerator Offerings
    - System z Accelerated Environmental Health Assessment
    - z/VM and Linux on System z Accelerated Health Check
    - Performance Environmental Changes Accelerated Study
    - DFSMShsm™ Accelerated Assessment
    - DFSMShsm Accelerated Assessment
    - Maintenance Currency Accelerated Assessment
    - DB2 on System z Accelerated Health Check
    - MQ on System z Accelerated Health Check
    - CICS® on System z Accelerated Health Check
    - Key & Certificate Management Review
    - Java Performance Accelerated Offering
  - z/VM and Linux
    - z/VM and Linux for IBM System z Security and Compliance
    - z/VM and Linux on System z Health Check
    - ACI Installation Services
  - z/OS Infrastructure, Performance and High Availability
    - NEW! Parallel Sysplex InfiniBand (PSIFB) Assessment Services
    - NEW! Parallel Sysplex InfiniBand (PSIFB) Migration Services
    - NEW! zEnterprise Set-up Services
    - High Availability Assessments
    - System z Currency and Migration Services
    - DFSMShsm Health Check
    - IBM System z Platform Performance Diagnosis and Remediation
    - z/OS Environmental Health Inspection
  - Middleware and Data Serving Solutions
    - CICS System Services
    - DB2 System Services
    - Java Performance Optimization for IBM System z
    - SAP on System z Services
    - WebSphere System Services
  - Security
    - z/OS Security Health Check
    - zSecure Component Installation and Basic Customization
    - z/OS PKI Services Enablement
    - TKLM Tape & Disk Encryption Services
- **Cross Platform Services**
  - Data Center Services

  - -- Active Energy Manager Implementation Jumpstart
  - -- Active Energy Manager Implementation Jumpstart with Tivoli® Monitoring for Energy Management
  - -- Data Center Thermal Analysis and Optimization
  - -- IBM Measurement and Management Technologies (MMT) Data Center Thermal Analysis
  - -- IT Systems Energy Efficiency Assessment
  - -- Dynamic Infrastructure® Workshop
  - -- Power/Cooling Trends and Data Center Best Practices
  - -- Data Center Baseline Cooling Assessment
- – IT Optimization and Virtualization
  - -- NEW! Workload Optimization Analysis and TCO for IBM zEnterprise System
  - -- NEW! Rapid Workload Optimization Assessment and TCO for IBM zEnterprise System
  - -- Advanced Virtualization Rapid Assessment
  - -- Cost Allocation Optimization Workshop
  - -- Cloud Infrastructure Workshop
  - -- Comparative Total Cost of Computing
  - -- IT Optimization Workshop
  - -- IT Systems Rationalization Study
  - -- IT Systems Energy Efficiency Assessment
  - -- Storage Energy Analysis
  - -- Storage Optimization Study
  - -- Storage Optimization Workshop
  - -- Storage Sen$e: Rapid Optimization Analysis
  - -- Systems and Service Management Total Cost of Ownership
  - -- Virtualization Rapid Assessment - Initializing Virtualization
  - -- Virtualization Rapid Assessment for UNIX
- **Education**
  - – NEW: IBM zEnterprise System
  - – NEW: IBM zEnterprise BladeCenter Extension (zBX): Configuration and Management
  - – Updated: IBM System z Hardware Management Console (HMC) Operations
  - – Updated: IBM System z : Technical Overview of Hardware and Software
  - – Updated: Basic z/OS Tuning Using the Workload Manager (WLM)

To find out more about the IBM System z portfolio and other related products and services contact stgls@us.ibm.com or visit

http://www.ibm.com/systems/services/labservices

Technical information

Specified operating environment

Physical specifications

Physical specifications - AIR cooled machine

```
Dimensions (rounded to the nearest 0.1 inch or 0.1 cm):

                                  Depth    Width    Height

Complete installed system
```

- Inches	71.0	61.6	79.3
- Centimeter	180.3	156.5	201.3
- Inches (O/H IO cable exit)	71.0	72.7	84.8
- Centimeter (O/H IO cable exit)	180.3	184.7	215.3
Each frame unpacked on casters with one side cover			
- Inches	50.0	30.2	79.3
- Centimeter	127.0	76.7	201.3
- Inches (O/H IO cable exit)	50.0	30.5	79.3
- Centimeter (O/H IO cable exit)	127.0	77.4	201.3
Each frame uncrated on casters with all packaging			
A-Frame with height reduction			
- Inches	56.5	32.5	71.0
- Centimeter	143.5	82.5	180.3
A-Frame no height reduction			
- Inches	56.5	32.5	80.0
- Centimeter	143.5	82.5	203.2
Z-Frame with height reduction			
- Inches	55.0	32.0	71.0
- Centimeter	139.7	81.3	180.3
Z-Frame no height reduction			
- Inches	55.0	32.0	80.0
- Centimeter	139.7	81.3	203.2
Crated frames (in ARBO crate)			
A-Frame			
- Inches	63.7	36.9	90.6
- Centimeter	161.6	93.7	230.2
Z-Frame			
- Inches	63.7	36.9	90.6
- Centimeter	161.6	93.7	230.2

Approximate weight:

	New Build Minimum System Model M15 One I/O Cage	New Build Maximum System Model M80 Max # of I/O Cages
System with IBF Feature		
- kg	1448.0	2271.0
- lb	3258.0	5110.0
- kg (O/H IO cable exit)	1532.4	2355.4
- lb (O/H IO cable exit)	3448.0	5300.0
System without IBF Feature		
- kg	1248.0	1968.0
- lb	2807.0	4430.0
- kg (O/H IO cable exit)	1332.4	2052.4
- lb (O/H IO cable exit)	2997.0	4620.0

To ensure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

The DC Power feature has no effect on the machine dimensions and weight.

Physical specifications - WATER cooled machine

Dimensions (rounded to the nearest 0.1 inch or 0.1 cm):

	Depth	Width	Height
System with all covers			
- Inches	75.0	61.6	79.3
- Centimeter	190.5	156.5	201.3
- Inches (O/H IO cable exit)	75.0	72.7	84.8
- Centimeter (O/H IO cable exit)	190.5	184.7	215.3

Each frame unpacked on casters with one side cover			
- Inches	54.0	30.2	79.3
- Centimeter	137.2	76.7	201.3
- Inches (O/H IO cable exit)	54.0	30.5	79.3
- Centimeter (O/H IO cable exit)	137.2	77.4	201.3
Each frame uncrated on casters with all packaging			
A-Frame with height reduction			
- Inches	63.0	32.5	71.0
- Centimeter	160.0	82.5	180.3
A-Frame no height reduction			
- Inches	63.0	32.5	80.0
- Centimeter	160.0	82.5	203.2
Z-Frame with height reduction			
- Inches	59.0	32.0	71.0
- Centimeter	149.9	81.3	180.3
Z-Frame no height reduction			
- Inches	59.0	32.0	80.0
- Centimeter	149.9	81.3	203.2
Crated frames (in ARBO crate)			
A-Frame			
- Inches	68.0	36.9	90.6
- Centimeter	172.7	93.7	230.2
Z-Frame			
- Inches	63.7	36.9	90.6
- Centimeter	161.6	93.7	230.2

Approximate weight:

	New Build Minimum System Model M15 One I/O Cage	New Build Maximum System Model M80 Max # of I/O Cages
System with IBF Feature		
- kg	1540.0	2296.0
- lb	3465.0	5167.0
- kg (O/H IO cable exit)	1624.4	2380.4
- lb (O/H IO cable exit)	3655.0	5357.0
System without IBF Feature		
- kg	1340.0	2019.0
- lb	3014.0	4543.0
- kg (O/H IO cable exit)	1424.4	2103.4
- lb (O/H IO cable exit)	3204.0	4733.0

To ensure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

The DC Power feature has no effect on the machine dimensions and weight.

Operating environment

Operating environment - AIR cooled machine

Temperature: 10 to 32 degrees C (50 to 89 degrees F) for all models up to 900 meters; maximum ambient reduces 1 degree C per 300 meters above 900 meters

Relative humidity: 8% to 80%

Wet bulb (caloric value): 23 degrees C (73 degrees F), operating mode

Maximum dew point: 17 degrees C (62.6 degrees F), operating mode

Electrical power:

- 27.8 kVA (typically 0.99 PF at 200V)
- 28.4 kVA (typically 0.97 PF at 380V)
- 28.95 kVA (typically 0.95 PF at 480V)

Capacity of exhaust: 5950 cubic meters / hour (3500 CFM)

Acoustical noise level (nominal conditions):

- Typical configuration: Model M32, 1 I/O cage, 1 I/O drawer
  - Declared A-Weighted Sound Power Level, LWAd(B) = 7.7
  - Declared A-Weighted Sound Pressure Level, LpAm(dB) = 59
- Maximum configuration: Model M80, 2 I/O cages, 2 I/O drawers
  - Declared A-Weighted Sound Power Level, LWAd(B) = 8.1
  - Declared A-Weighted Sound Pressure Level, LpAm(dB) = 62

Leakage and starting current: 70 mA / 270 A (~10ms)

Operating environment - WATER cooled machine

Temperature: 10 to 32 degrees C (50 to 89 degrees F) for all models up to 900 meters; maximum ambient reduces 1 degree C per 300 meters above 900 meters

Relative humidity: 8% to 80%

Wet bulb (caloric value): 23 degrees C (73 degrees F), operating mode

Maximum dew point: 17 degrees C (62.6 degrees F), operating mode

Electrical power:

- 27.8 kVA (typically 0.99 PF at 200V)
- 28.4 kVA (typically 0.97 PF at 380V)
- 28.95 kVA (typically 0.95 PF at 480V)

Capacity of exhaust: 5950 cubic meters / hour (3500 CFM)

Acoustical noise level (nominal conditions):

- Typical configuration: Model M32, 1 I/O cage, 1 I/O drawer
  - Declared A-Weighted Sound Power Level, LWAd(B) = 7.8
  - Declared A-Weighted Sound Pressure Level, LpAm(dB) = 59
- Maximum configuration: Model M80, 2 I/O cages, 2 I/O drawers
  - Declared A-Weighted Sound Power Level, LWAd(B) = 8.0
  - Declared A-Weighted Sound Pressure Level, LpAm(dB) = 61

Leakage and starting current: 70 mA / 270 A (~10ms)

To ensure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

Hardware requirements

The hardware requirements for the IBM zEnterprise 196 and its features and functions are identified.

A new driver level is required.

HMC (V2.11.0) plus MCLs and the Support Element (V2.11.1) are available on September 10, 2010.

You should review the PSP buckets for minimum Machine Change Levels (MCLs) and software PTF levels before IPLing operating systems.

Peripheral hardware and device attachments

IBM devices previously attached to IBM System z9® , System z10 , and zSeries servers are supported for attachment to IBM zEnterprise 196 channels, unless otherwise noted. The subject I/O devices must meet ESCON or FICON architecture requirements to be supported. I/O devices that meet OEMI architecture requirements are supported only using an external converter. Prerequisite Engineering Change Levels may be required. For further detail, contact IBM service personnel.

While the z196 supports devices as described above, IBM does not commit to provide support or service for an IBM device that has reached its End of Service effective date as announced by IBM .

Note: IBM cannot confirm the accuracy of performance, compatibility, or any other claims related to non-IBM products. Questions regarding the capabilities of non-IBM products should be addressed to the suppliers of those products.

Information on switches and directors qualified for IBM System z FICON and FCP channels can be found in the *Library* section of Resource Link

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

Software requirements

Operating System Support

Listed are the operating systems and the minimum versions and releases supported by IBM zEnterprise 196, 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 2817DEVICE Preventive Service Planning (PSP) bucket prior to installing a z196.

IBM zEnterprise 196 requires at a minimum:

- z/OS V1.12 with PTFs.
- z/OS V1.11 with PTFs.
- z/OS V1.10 with PTFs.
- z/OS V1.9 (1) with PTFs.
- z/OS V1.8 (2) with the IBM Lifecycle Extension for z/OS V1.8 (5638-A01) with required maintenance.
- z/OS V1.7 (3) with the IBM Lifecycle Extension for z/OS V1.7 (5637-A01) with required maintenance.
- z/VM V6.1 with PTFs.
- z/VM V5.4 with PTFs.
- z/VSE V4.1 with PTFs.
- z/TPF V1.1.
- Linux on System z distributions:
  - Novell SUSE SLES 10 and SLES 11.
  - Red Hat RHEL 5.

(1) z/OS V1.9 supports zEnterprise System, however, z/OS V1.9 support will be withdrawn September 30, 2010. After that date, the IBM z/OS Lifecycle Extension for z/OS V1.9 (5646-A01) is required for zEnterprise System. Talk to your IBM representative for details. No exploitation of new zEnterprise System functions is available with z/OS V1.9. Certain functions and features of the zEnterprise System require later releases of z/OS . For the complete list of software support, see the PSP buckets and the Software requirements section. For more information on the

IBM Lifecycle Extension for z/OS V1.9, see Software Announcement 210-027, dated May 11, 2010 .

(2) z/OS V1.8 support was withdrawn September 30, 2009. However, with the z/OS Lifecycle Extension (5638-A01), z/OS V1.8 supports the zEnterprise System. Talk to your IBM representative for details. No exploitation of new zEnterprise System functions is available with z/OS V1.8. Certain functions and features of the zEnterprise System require later releases of z/OS . For the complete list of software support, see the PSP buckets and the Software requirements section. For more information on the IBM Lifecycle Extension for z/OS V1.8 see Software Announcement 209-180, dated June 09, 2009 .

(3) z/OS V1.7 support was withdrawn September 30, 2008. However, with the z/OS Lifecycle Extension (5637-A01), z/OS V1.7 supports the zEnterprise System. Talk to your IBM representative for details. No exploitation of new zEnterprise System functions is available with z/OS V1.7. Certain functions and features of the zEnterprise System require later releases of z/OS . For the complete list of software support, see the PSP buckets and the Software requirements section. For more information on the IBM Lifecycle Extension for z/OS V1.7 see Software Announcement 208-283, dated August 12, 2008 .

IBM zEnterprise Unified Resource Manager requires at a minimum:

- z/OS V1.12 with PTFs.
- z/OS V1.11 with PTFs.
- z/OS V1.10 with PTFs.

  Older versions of z/OS will tolerate, but do not exploit, IBM zEnterprise Unified Resource Manager.

- z/VM 6.1 with PTFs for enablement of virtual server lifecycle management and support for managing real and virtual networking resources by the Unified Resource Manager.

CP Assist for Cryptographic Function (CPACF) (#3863) enhancements require at a minimum:

- z/OS V1.10, z/OS V1.11, or z/OS V1.12 with the Cryptographic Support for z/OS V1R10-V1R12 Web deliverable planned to be available September 10. 2010. This may be obtained at

  http://www.ibm.com/systems/z/os/zos/downloads/
- z/VM V5.4 with PTFs for guest exploitation.
- z/VSE V4.1 and later supports the CPACF features with the functionality supported on IBM System z10 .
- z/TPF V1.1.
- Linux on System z distributions:
  - Review Novell and Red Hat distribution support statements for a current list of supported hardware.

Crypto Express3 requires at a minimum:

- z/OS V1.10, z/OS V1.11, or z/OS V1.12 with the Cryptographic Support for z/OS V1R10-V1R12 Web deliverable planned to be available September 10, 2010. This may be obtained at

  http://www.ibm.com/systems/z/os/zos/downloads/
- z/VM V5.4 with PTFs for guest exploitation.

  Note: z/VM V5.4 and later support clear-and secure-key operations.
- z/VSE V4.2 and IBM TCP/IP for VSE/ESA™ V1.5.0 with PTFs.

  Note: z/VSE supports clear-key RSA operations only.
- z/TPF V1.1 (acceleration mode only).
- Linux on System z distributions:

- Review Novell and Red Hat distribution support statements for current list of supported hardware. Several current distributions support Crypto Express3 in toleration mode. Refer to each distribution for future exploitation support statements for Crypto Express3, as needed.

Crypto Express3 (when defined as a coprocessor) supporting **ANSI X9.8 PIN security** requires at a minimum:

- z/OS V1.10, z/OS V1.11, or z/OS V1.12 with the Cryptographic Support for z/OS V1R10-V1R12 Web deliverable planned to be available September 10, 2010. This may be obtained at

  http://www.ibm.com/systems/z/os/zos/downloads/
- z/VM V5.4 with PTFs for guest exploitation.
- Linux on System z :
  - Support is planned for a future release of Common Cryptographic Architecture Support Program for Linux on System z .

Crypto Express3 (when defined as a coprocessor) supporting **Enhanced CCA key wrapping** requires at a minimum:

- z/OS V1.10, z/OS V1.11, or z/OS V1.12 with the Cryptographic Support for z/OS V1R10-V1R12 Web deliverable planned to be available September 10, 2010. This may be obtained at

  http://www.ibm.com/systems/z/os/zos/downloads/
- z/VM V5.4 with PTFs for guest exploitation.
- Linux on System z :
  - Support is planned for a future release of Common Cryptographic Architecture Support Program for Linux on System z .

Crypto Express3 (when defined as a coprocessor) supporting **Secure Keyed-Hash Message Authentication Code (HMAC)** requires at a minimum:

- z/OS V1.10, z/OS V1.11, or z/OS V1.12 with the Cryptographic Support for z/OS V1R10-V1R12 Web deliverable, planned to be available first quarter 2011, in addition to PTFs. This may be obtained at

  http://www.ibm.com/systems/z/os/zos/downloads/
- z/VM V5.4 with PTFs for guest exploitation.
- Linux on System z :
  - Support is planned for a future release of Common Cryptographic Architecture Support Program for Linux on System z .

Crypto Express3 (when defined as a coprocessor) supporting **Elliptical Curve Cryptography (ECC) Digital Signature algorithm** requires at minimum:

- z/OS V1.10, z/OS V1.11, or z/OS V1.12 with the Cryptographic Support for z/OS V1R10-V1R12 Web deliverable planned to be available September 10, 2010. This may be obtained at

  http://www.ibm.com/systems/z/os/zos/downloads/
- z/VM V5.4 with PTFs for guest exploitation.
- Linux on System z :
  - Support is planned for a future release of Common Cryptographic Architecture Support Program for Linux on System z .

Crypto Express3 (when defined as an accelerator) supporting **Modulus Exponent (ME) and Chinese Remainder Theorem (CRT)** requires at a minimum:

- z/VM V5.4 with PTFs for guest exploitation.
- Linux on System z distributions:

  - Linux on System z - IBM is working with its Linux distribution partners to include support in future Linux on System z distribution releases.

Third subchannel set requires at a minimum:

- z/OS V1.12 with PTFs.
- z/OS V1.11 with PTFs.
- z/OS V1.10 with PTFs.
- Linux on System z distributions:
  - Novell SUSE SLES 10 and SLES 11.
  - Red Hat RHEL 5.

FICON Express8 (CHPID type FC) when utilizing native FICON or Channel-To-Channel (CTC) requires at a minimum:

- z/OS V1.7 (3).
- z/VM V5.4.
- z/VSE V4.1.
- z/TPF V1.1.

FICON Express8 (CHPID type FC) for support of zHPF single-track operations requires at a minimum:

- z/OS V1.10 with PTFs.
- z/OS V1.9 (1) with PTFs.
- z/OS V1.8 (2) with PTFs.
- z/OS V1.7 (3) with PTFs.
- Linux on System z distributions:
  - Novell SUSE SLES 11 SP1.
  - IBM is working with its Linux distribution partners to include support in future Linux on System z distribution releases.

FICON Express8 (CHPID type FC) for support of zHPF multitrack operations requires at a minimum:

- z/OS V1.10 with PTFs.
- z/OS V1.9 (1) with PTFs.

FICON Express8 and FICON Express4 (CHPID type FC) supporting extension to zHPF multitrack operations requires at a minimum:

- z/OS V1.12 with PTFs.
- z/OS V1.11 with PTFs.
- z/OS V1.10 with PTFs.

FICON Express8 (CHPID type FCP) for support of SCSI devices requires at a minimum:

- z/VM V5.4 with PTFs.
- z/VSE V4.1.
- Linux on System z distributions:
  - Novell SUSE SLES 10 and SLES 11.
  - Red Hat RHEL 5.

z/OS discovery and autoconfiguration (zDAC) for FICON Express8 and FICON Express4 channels (CHPID type FC) requires at a minimum:

- z/OS V1.12 with PTFs.

Up to 32 HiperSockets (CHPID type IQD) requires at a minimum:

- z/OS V1.12 with PTFs.
- z/OS V1.11 with PTFs.
- z/OS V1.10 with PTFs.
- z/VM V5.4 with PTFs.
- z/VSE V4.1.
- Linux on System z distributions:
  - Novell SUSE SLES 10 and SLES 11.
  - Red Hat RHEL 5.

HiperSockets network traffic analyzer (HS NTA) on IBM zEnterprise 196 and System z10 requires at a minimum:

- z/VM V5.4 with PTFs for guest exploitation.
- Linux on System z distributions:
  - Novell SUSE SLES 11 SP1.

IBM is working with its Linux distribution partners to include support in future Linux on System z distribution releases.

Note: OSA-Express3 GbE and 1000BASE-T contain two ports per PCIe adapter. The ports "share" one channel path identifer (CHPID). There may be two or four ports per feature, depending upon feature number. OSA-Express3 10 GbE SR and LR contain one port per PCIe adapter. There are two ports per feature.

CHPID type	Applicable features	Purpose/Traffic
OSC	1000BASE-T	OSA-Integrated Console Controller (OSA-ICC) Supports TN3270E, non-SNA DFT to IPL CPCs & LPs.
OSD	All	Queue Direct Input/Output (QDIO) architecture; TCP/IP traffic when Layer 3 (uses IP address) and Protocol-independent when Layer 2 (uses MAC address).
OSE	1000BASE-T	Non-QDIO; For SNA/APPN/HPR traffic and TCP/IP passthru traffic.
OSM	1000BASE-T	OSA-Express for Unified Resource Manager. Connectivity to intranode management network (INMN) from z196 to Unified Resource Manager functions.
OSN	GbE 1000BASE-T	OSA-Express for NCP; Appears to OS as a device supporting channel data link control (CDLC) protocol. Enables Network Control Program (NCP) channel-related functions such as loading and dumping to NCP. Provides LP-to-LP connectivity OS to IBM Communication Controller for Linux (CCL).
OSX	10 GbE	OSA-Express for zBX. Provides connectivity and access control to the intraensemble data network (IEDN) from z196 to Unified Resource Manager functions.

OSA-Express3 GbE LX (#3362) and GbE SX (#3363 and #3373) requires at minimum:

CHPID type OSD with exploitation of all four ports:

- z/OS V1.10.
- z/OS V1.9 (1) with PTFs.

- z/OS V1.8 (2) with PTFs.
- z/VM V5.4 with PTFs.
- z/VSE V4.1 with PTFs.
- z/TPF V1.1 PUT 4 with PTFs.
- Linux on System z distributions:
  - Novell SUSE SLES 10 SP2 and SLES 11.
  - Red Hat RHEL 5.2.

CHPID types OSD without maximum port exploitation (one port per PCIe adapter is available for use; two ports per feature):

- z/OS V1.7 (3).
- z/VM V5.4.
- z/VSE V4.1.
- z/TPF V1.1.
- Linux on System z distributions:
  - Novell SUSE SLES 10 and SLES 11.
  - Red Hat RHEL 5.

CHPID type OSN supporting OSA-Express for NCP (does not use ports; all communication is LPAR-to-LPAR):

- z/OS V1.9 (1).
- z/OS V1.8 (2).
- z/OS V1.7 (3).
- z/VM V5.4.
- z/VSE V4.1.
- z/TPF V1.1 PUT 4 with APARs.
- Linux on System z distributions:
  - Novell SUSE SLES 10 and SLES 11.
  - Red Hat RHEL 5.

OSA-Express3 1000BASE-T (#3367 and #3369) requires at minimum:

CHPID type OSC supporting TN3270E and non-SNA DFT:

- z/OS V1.8 (2).
- z/OS V1.7 (3).
- z/VM V5.4.
- z/VSE V4.1.

CHPID type OSD with exploitation of all four ports:

- z/OS V1.10.
- z/OS V1.9 (1) with PTFs.
- z/OS V1.8 (2) with PTFs.
- z/VM V5.4 with PTFs.
- z/VSE V4.1 with PTFs.
- z/TPF V1.1 PUT 4 with APARs.
- Linux on System z distributions - for four ports per feature (#3367):
  - Novell SUSE SLES 10 SP2 and SLES 11.
  - Red Hat RHEL 5.2.
- Linux on System z distributions - for two ports per feature (#3369):

  - Novell SUSE SLES 10 and SLES 11.
  - Red Hat RHEL 5.

CHPID type OSD without maximum port exploitation (one port per PCIe adapter is available for use; two ports per feature):

- z/OS V1.7 (3).
- z/VM V5.4.
- z/VSE V4.1.
- z/TPF V1.1.
- Linux on System z distributions:
  - Novell SUSE SLES 10 and SLES 11.
  - Red Hat RHEL 5.

CHPID type OSE supporting 4 or 2 ports per feature:

- z/OS V1.8 (2).
- z/VM V5.4.
- z/VSE V4.1.

CHPID type OSM for intranode management network:

- z/OS V1.12 with PTFs.
- z/OS V1.11 with PTFs.
- z/OS V1.10 with PTFs.
- z/VM V6.1 with PTFs.
- z/VM V5.4 with PTFs to define, modify, and delete OSM CHPID types when z/VM is the controlling LPAR for dynamic I/O.
- IBM is working with its Linux distribution partners to include support in future Linux on System z distribution releases.

CHPID type OSN supporting OSA-Express for NCP:

Note: CHPID type OSN does not use ports. All communication is LPAR-to-LPAR.

- z/OS V1.7 (3).
- z/VM V5.4.
- z/VSE V4.1.
- z/TPF V1.1.
- Linux on System z distributions:
  - Novell SUSE SLES 10 and SLES 11.
  - Red Hat RHEL 5.

OSA-Express3 10 GbE LR (#3370) and 10 GbE SR (#3371) require at a minimum:

CHPID type OSD:

- z/OS V1.7 (3).
- z/VM V5.4.
- z/VSE V4.1.
- z/TPF V1.1.
- Linux on System z distributions:
  - Novell SUSE SLES 10 and SLES 11.
  - Red Hat RHEL 5.

CHPID type OSX for intraensemble data network:

- z/OS V1.12 with PTFs.
- z/OS V1.11 with PTFs.
- z/OS V1.10 with PTFs.
- z/VM V6.1 with PTFs.
- z/VM V5.4 with PTFs to define, modify, and delete OSX CHPID types when z/VM is the controlling LPAR for dynamic I/O.
- IBM is working with its Linux distribution partners to include support in future Linux on System z distribution releases.

Display OSAINFO for OSA-Express3 CHPID types OSD, OSM (exclusive to IBM zEnterprise 196), and OSX (exclusive to IBM zEnterprise 196) on z196 and z10 requires at a minimum:

- z/OS V1.12 with PTFs.

Inbound workload queuing (IWQ) for OSA-Express3 CHPID types OSD and OSX (exclusive to IBM zEnterprise 196) on z196 and z10 requires at a minimum:

- z/OS V1.12 with PTFs.
- z/VM V5.4 with PTFs for guest exploitation.

12x InfiniBand and 1x InfiniBand coupling links require at a minimum:

- z/OS V1.10 with PTFs.
- z/OS V1.9 (1) with PTFs.
- z/OS V1.8 (2) with PTFs.
- z/OS V1.7 (3) with PTFs.
- z/VM V5.4 to define, modify, and delete an InfiniBand coupling link, CHPID type CIB, when z/VM is the controlling LPAR for dynamic I/O.

Coupling Facility Control Code Level 17

Exploiting the new functions of Coupling Facility Control Code Level 17, including support for up to 2047 Coupling Facility structures, requires at a minimum:

- z/OS V1.12 with PTFs.
- z/OS V1.11 with PTFs.
- z/OS V1.10 with PTFs.
- z/VM V5.4 for guest virtual coupling.

Static power save mode requires at a minimum:

- z/OS V1.12 with PTFs.
- z/OS V1.11 with PTFs.
- z/OS V1.10 with PTFs.
- z/VM V6.1 with PTFs.
- z/VM V5.4 with PTFs.

Planning information

Customer responsibilities

Information on customer responsibilities for site preparation can be found in the Library section of Resource Link at

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

Installability

The average installation time for a z196 is approximately 22 installer hours. This does not include planning hours. This assumes the Pre-Installation Configuration Service, a full System Assurance Product Review, and implementation of the cable services have been performed. See your IBM representative for details on these services.

Security, auditability, and control

The z196 uses the security and auditability features and functions of host hardware, host software, and application software.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a Web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent™ is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM . Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, visit

http://www.ibm.com/support/electronic

Terms and conditions

IBM Global Financing

Yes

Warranty period

One year

Warranty service

The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact

your local IBM representative or your reseller for country- and location-specific information.

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

The following service is available as warranty for your machine type.

- 24 hours per day, 7 days a week, same day response

Warranty service upgrades

The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information.

IBM On-Site Service: IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

The following service is provided.

- 24 hours per day, 7 days a week, same day response

Usage plan machine

No

IBM hourly service rate classification

Three

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Field-installable features

Yes

Model conversions

Yes

Machine installation

Installation is performed by IBM . IBM will install the machine in accordance with the IBM installation procedures for the machine. In the United States, contact IBM at 1-800-IBM-SERV (426-7378).

Graduated program license charges apply

No

Licensed internal code

IBM Licensed Internal Code (LIC) is licensed for use by a customer on a specific machine, designated by serial number, under the terms and conditions of the IBM License Agreement for Machine Code, to enable a specific machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement at

http://www-947.ibm.com/systems/support/machine_warranties/machine_code.html

or by contacting your IBM representative.

For machine type-model 2817-M15, 2817-M32, 2817-M49, 2817-M66, and 2817-M80, Elliptical Curve Cryptography (ECC) technology is included with the IBM zEnterprise 196 cryptography features. This technology is delivered through the machine's Licensed Internal Code, and requires license terms in addition to the standard IBM License Agreement for Machine Code (LMC) referenced above. These additional terms are delivered through the LMC's Addendum for Elliptical Curve Cryptography. This ECC Addendum is delivered with the machine along with the LMC when a cryptography feature is included in the IBM zEnterprise 196 order, or when a cryptography feature is carried forward as part of an MES order into IBM zEnterprise 196 and is available for review by contacting an IBM representative.

Educational allowance

A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

Pricing

For additional information and current prices, contact your local IBM representative.

Products

Description	Mach type	Mod	Feat	EW **	MMMC Fe	Init/ indicat	MES
IBM zEnterprise 196	2817	M15			X		
		M32			X		
		M49			X		
		M66			X		
		M80			X		
Month indicator			0660	**			Both
Day indicator			0661	**			Both
Hour indicator			0662	**			Both
Minute indicator			0663	**			Both
MTU 1 - D			0001	**			MES
MTU 100 - D			0002	**			MES
MTU 1 - V			0003	**			MES
MTU 100 - V			0004	**			MES
GTU 1 - D			0005	**			MES
GTU 100 - D			0006	**			MES
GTU 1 - V			0007	**			MES
GTU 100 - V			0008	**			MES
Ethernet switch *			0070	**			Both
HMC w/Dual EN			0090	**			Both
HMC w/Dual EN			0091	**			Both
I/O Cage ISC-D Airflow			0113	**			Both
I/O Cage Full Card Airflow			0114	**			Both
1 CPE Capacity Unit			0116	**			Both
100 CPE Capacity Unit			0117	**			Both
10000 CPE Capacity Unit			0118	**			Both
1 CPE Capacity Unit-IFL			0119	**			Both
100 CPE Capacity Unit-IFL			0120	**			Both
1 CPE Capacity Unit-ICF			0121	**			Both
100 CPE Capacity Unit-ICF			0122	**			Both
1 CPE Capacity Unit-zAAP			0123	**			Both
100 CPE Capacity Unit-zAAP			0124	**			Both
1 CPE Capacity Unit-zIIP			0125	**			Both
100 CPE Capacity Unit-zIIP			0126	**			Both
1 CPE Capacity Unit-SAP			0127	**			Both
100 CPE Capacity Unit-SAP			0128	**			Both
CPC -Air			0158	**			Both

CPC -Water	0159	**	Both
HCA2-C Fanout	0162	**	Both
HCA2-O fanout for 12x IFB	0163	**	Both
Fanout Airflow	0165	**	Both
HCA2-O LR fanout for 1x IFB	0168	**	Both
ISC-Mother Card	0217	**	Both
ISC-Daughter Card	0218	**	Both
ISC-3 link on F/C 0218	0219	**	Both
Manage Firmware Suite	0019	**	Both
Automate Firmware Suite	0020	**	Both
Ensemble membership	0025	**	Both
Manage FW ISAOPT	0039	**	Both
Manage FW Pwr Blade	0041	**	Both
Automate FW ISAOPT	0043	**	Both
Automate FW Pwr Blade	0045	**	Both
Automate FW IFL	0052	**	Both
IFB-MP Daughter Card	0326	**	Both
STI-A8 Mother Card	0327	**	Both
STI-A4 Mother Card	0328	**	Both
TKE workstation	0841	**	Both
TKE 7.0 LIC	0860	**	Both
Crypto Express3	0864	**	Both
TKE addl smart cards	0884	**	Both
TKE Smart Card Reader	0885	**	Both
UID Label for DoD	0998	**	Both
STP Enablement	1021	**	Both
EMEA Special Operations	1022	**	Both
16 GB Mem DIMM(5/feat)-A	1616	**	Both
16 GB Mem DIMM(5/feat)-W	1617	**	Both
32 GB Mem DIMM(5/feat)-A	1632	**	Both
32 GB Mem DIMM(5/feat)-W	1633	**	Both
4 GB Mem DIMM(5/feat)-A	1640	**	Both
4 GB Mem DIMM(5/feat)-W	1641	**	Both
LICCC Ship Via Net Ind	1750	**	MES
Preplanned memory	1996	**	Both
16GB Memory Capacity Incr	1901	**	Both
16GB Ftr Converted memory	1902	**	MES
Line Cord Plan Ahead	2000	**	Both
16-Port ESCON Card	2323	**	Both
ESCON Channel port	2324	**	Both
32 GB Memory	2425	**	Both
64 GB Memory	2427	**	Both
96 GB Memory	2429	**	Both
128 GB Memory	2431	**	Both
160 GB Memory	2433	**	Both
192 GB Memory	2435	**	Both
224 GB Memory	2437	**	Both
256 GB Memory	2439	**	Both
320 GB Memory	2441	**	Both
384 GB Memory	2443	**	Both
448 GB Memory	2445	**	Both
512 GB Memory	2447	**	Both
608 GB Memory	2449	**	Both
704 GB Memory	2451	**	Both
US English	2924	**	Init
France	2928	**	Init
German	2929	**	Init
Spanish - Non Spain	2930	**	Init
Spain	2931	**	Init
Italian	2932	**	Init
Canadian French	2935	**	Init
Portuguese	2978	**	Init
Brazilian Portuguese	2979	**	Init
UK English	2980	**	Init
Norwegian	2983	**	Init
Sweden Finland	2987	**	Init
Netherlands	2988	**	Init
Belgian French	2989	**	Init
Denmark	2993	**	Init
Swiss French, German	2997	**	Init

Balanced Power Plan Ahead	3003	**	Both
BPR Pair Air Model	3004	**	Both
BPD Pair Air Model	3005	**	Both
BPR Pair Water Model	3006	**	Both
BPD Pair Water Model	3007	**	Both
Internal Battery IBF-ED	3212	**	Both
FICON Express8 10KM LX	3325	**	Both
FICON Express8 SX	3326	**	Both
OSA-Express3 GbE LX	3362	**	Both
OSA-Express3 GbE SX	3363	**	Both
OSA-Express3 1000BASET-EN	3367	**	Both
OSA-Express3 10 GbE LR	3370	**	Both
OSA-Express3 10 GbE SR	3371	**	Both
Fill and Drain Kit	3377	**	Both
Universal Lift Tool/Ladder	3759	**	Both
CPACF Enablement	3863	**	Both
I/O Drawer-Air	4000	**	Both
I/O Cage-Air	4002	**	Both
I/O Drawer-Water	4004	**	Both
I/O Cage-Water	4005	**	Both
A Frame w/o Cargo-Water	4017	**	Both
A Frame w Cargo-Water	4018	**	Both
Luxembourg-Belgium ordered	5560	**	Init
Iceland-Ordered in Denmark	5561	**	Init
China-Ordered in Hong Kong	5562	**	Init
Flat panel display	6096	**	Both
Power Sequence Controller	6501	**	Both
Additional CBU Test	6805	**	Both
CBU Records Ordered	6818	**	Both
FQC Bracket/Mount HW-A	7900	**	Both
MT-RJ 6 ft harness-A	7902	**	Both
MT-RJ 8.5 ft harness-A	7903	**	Both
MT-RJ 5 ft harness-A	7904	**	Both
MT-RJ 3.5 ft harness-A	7905	**	Both
LC Dup 6 ft harness-A	7906	**	Both
LC Dup 8.5 ft harness-A	7908	**	Both
FQC Bracket/Mount HW-W	7910	**	Both
MT-RJ 6 ft harness-W	7912	**	Both
MT-RJ 8.5 ft harness-W	7913	**	Both
MT-RJ 5 ft harness-W	7914	**	Both
MT-RJ 3.5 ft harness-W	7915	**	Both
LC Dup 6.6 ft harness-W	7916	**	Both
LC Dup 8.5 ft harness-W	7918	**	Both
(NOT TAIWAN) Top exit I/O cabling (NOT TAIWAN)	7942	**	Both
Side covers	7949	**	Both
3-in-1 Bolt Down Kit-A	8008	**	Both
3-in-1 Bolt Down Kit-W	8009	**	Both
14ft 380-520V DC line cord	8963	**	Both
14ft 200V 3ph cord	8993	**	Both
14ft 480V 3ph line cord	8983	**	Both
Multi Order Ship Flag	9000	**	Both
Multi Order Rec Only-NB	9001	**	Both
Multi Order Rec Only-MES	9002	**	MES
RPO Action Flag	9003	**	MES
Downgraded PUs Per Request	9004	**	Both
On/Off CoD Act IFL Day	9888	**	MES
On/Off CoD Act ICF Day	9889	**	MES
On/Off CoD Act zAAP Day	9893	**	MES
On/Off COD authorization	9896	**	Both
On/Off CoD Act Cap CP Day	9897	**	MES
Perm upgr authorization	9898	**	Both
CIU Activation (Flag)	9899	**	MES

On Line CoD Buying (Flag)	9900	**		Both
On/Off CoD Act zIIP Day	9908	**		MES
On/Off CoD Act SAP Day	9909	**		MES
CBU authorization	9910	**		Both
CPE authorization	9912	**		Both
OPO sales authorization	9913	**		Both
1 MSU day	9917	**		MES
100 MSU days	9918	**		MES
10000 MSU days	9919	**		MES
1 IFL day	9920	**		MES
100 IFL days	9921	**		MES
1 ICF day	9922	**		MES
100 ICF days	9923	**		MES
1 zIIP day	9924	**		MES
100 zIIP days	9925	**		MES
1 zAAP day	9926	**		MES
100 zAAP days	9927	**		MES
1 SAP day	9928	**		MES
100 SAP days	9929	**		MES
Site Tool Kit	9968	**		Both
Weight Distribution Kit	9970	**		Both
Height Reduce Ship	9975	**		Both
Height Reduce for Return	9976	**		MES
CP4	1877	**		Both
CP5	1878	**		Both
CP6	1879	**		Both
CP7	1880	**		Both
IFL	1881	**	X	Both
ICF	1882	**	X	Both
SAP (optional)	1883	**		Both
zAAP	1884	**	X	Both
zIIP	1885	**	X	Both
Unassigned IFL	1886	**		Both
Total CBU Years Ordered	6817	**		Both
Single CBU CP-Year	6820	**		Both
25 CBU CP-Year	6821	**		Both
Single CBU IFL-Year	6822	**		Both
25 CBU IFL-Year	6823	**		Both
Single CBU ICF-Year	6824	**		Both
25 CBU ICF-Year	6825	**		Both
Single CBU zAAP-Year	6826	**		Both
25 CBU zAAP-Year	6827	**		Both
Single CBU zIIP-Year	6828	**		Both
25 CBU zIIP-Year	6829	**		Both
Single CBU SAP-Year	6830	**		Both
25 CBU SAP-Year	6831	**		Both
CBU Replenishment	6832	**		MES
Capacity for Planned Event	6833	**		Both
OPO Sales Flag	6835	**		Both
OPO Sales Flag Alteration	6836	**		MES
Feature Converted CBU CP	6837	**		MES
Feature Converted CBU IFL	6838	**		MES
Feature Converted CBU ICF	6839	**		MES
Feature Converted CBU zAAP	6840	**		MES
Feature Converted CBU zIIP	6841	**		MES
Feature Converted CBU SAP	6842	**		MES
1-Way Processor CP4	1751	**	X	Both
2-Way Processor CP4	1752	**	X	Both
3-Way Processor CP4	1753	**	X	Both
4-Way Processor CP4	1754	**	X	Both
5-Way Processor CP4	1755	**	X	Both
6-Way Processor CP4	1756	**	X	Both
7-Way Processor CP4	1757	**	X	Both
8-Way Processor CP4	1758	**	X	Both
9-Way Processor CP4	1759	**	X	Both
10-Way Processor CP4	1760	**	X	Both
11-Way Processor CP4	1761	**	X	Both
12-Way Processor CP4	1762	**	X	Both
13-Way Processor CP4	1763	**	X	Both
14-Way Processor CP4	1764	**	X	Both
15-Way Processor CP4	1765	**	X	Both
1-Way Processor CP5	1766	**	X	Both

2-Way Processor CP5	1767	**	X	Both
3-Way Processor CP5	1768	**	X	Both
4-Way Processor CP5	1769	**	X	Both
5-Way Processor CP5	1770	**	X	Both
6-Way Processor CP5	1771	**	X	Both
7-Way Processor CP5	1772	**	X	Both
8-Way Processor CP5	1773	**	X	Both
9-Way Processor CP5	1774	**	X	Both
10-Way Processor CP5	1775	**	X	Both
11-Way Processor CP5	1776	**	X	Both
12-Way Processor CP5	1777	**	X	Both
13-Way Processor CP5	1778	**	X	Both
14-Way Processor CP5	1779	**	X	Both
15-Way Processor CP5	1780	**	X	Both
1-Way Processor CP6	1781	**	X	Both
2-Way Processor CP6	1782	**	X	Both
3-Way Processor CP6	1783	**	X	Both
4-Way Processor CP6	1784	**	X	Both
5-Way Processor CP6	1785	**	X	Both
6-Way Processor CP6	1786	**	X	Both
7-Way Processor CP6	1787	**	X	Both
8-Way Processor CP6	1788	**	X	Both
9-Way Processor CP6	1789	**	X	Both
10-Way Processor CP6	1790	**	X	Both
11-Way Processor CP6	1791	**	X	Both
12-Way Processor CP6	1792	**	X	Both
13-Way Processor CP6	1793	**	X	Both
14-Way Processor CP6	1794	**	X	Both
15-Way Processor CP6	1795	**	X	Both
0-Way Processor CP7	1796	**	X	Both
1-Way Processor CP7	1797	**	X	Both
2-Way Processor CP7	1798	**	X	Both
3-Way Processor CP7	1799	**	X	Both
4-Way Processor CP7	1800	**	X	Both
5-Way Processor CP7	1801	**	X	Both
6-Way Processor CP7	1802	**	X	Both
7-Way Processor CP7	1803	**	X	Both
8-Way Processor CP7	1804	**	X	Both
9-Way Processor CP7	1805	**	X	Both
10-Way Processor CP7	1806	**	X	Both
11-Way Processor CP7	1807	**	X	Both
12-Way Processor CP7	1808	**	X	Both
13-Way Processor CP7	1809	**	X	Both
14-Way Processor CP7	1810	**	X	Both
15-Way Processor CP7	1811	**	X	Both
401 Capacity Marker	7202	**		Both
402 Capacity Marker	7203	**		Both
403 Capacity Marker	7204	**		Both
404 Capacity Marker	7205	**		Both
405 Capacity Marker	7206	**		Both
406 Capacity Marker	7207	**		Both
407 Capacity Marker	7208	**		Both
408 Capacity Marker	7209	**		Both
409 Capacity Marker	7210	**		Both
410 Capacity Marker	7211	**		Both
411 Capacity Marker	7212	**		Both
412 Capacity Marker	7213	**		Both
413 Capacity Marker	7214	**		Both
414 Capacity Marker	7215	**		Both
415 Capacity Marker	7216	**		Both
501 Capacity Marker	7217	**		Both
502 Capacity Marker	7218	**		Both
503 Capacity Marker	7219	**		Both
504 Capacity Marker	7220	**		Both
505 Capacity Marker	7221	**		Both
506 Capacity Marker	7222	**		Both
507 Capacity Marker	7223	**		Both
508 Capacity Marker	7224	**		Both
509 Capacity Marker	7225	**		Both
510 Capacity Marker	7226	**		Both
511 Capacity Marker	7227	**		Both
512 Capacity Marker	7228	**		Both
513 Capacity Marker	7229	**		Both

514 Capacity Marker		7230	**		Both
515 Capacity Marker		7231	**		Both
601 Capacity Marker		7232	**		Both
602 Capacity Marker		7233	**		Both
603 Capacity Marker		7234	**		Both
604 Capacity Marker		7235	**		Both
605 Capacity Marker		7236	**		Both
606 Capacity Marker		7237	**		Both
607 Capacity Marker		7238	**		Both
608 Capacity Marker		7239	**		Both
609 Capacity Marker		7240	**		Both
610 Capacity Marker		7241	**		Both
611 Capacity Marker		7242	**		Both
612 Capacity Marker		7243	**		Both
613 Capacity Marker		7244	**		Both
614 Capacity Marker		7245	**		Both
615 Capacity Marker		7246	**		Both
700 Capacity Marker		7247	**		Both
701 Capacity Marker		7248	**		Both
702 Capacity Marker		7249	**		Both
703 Capacity Marker		7250	**		Both
704 Capacity Marker		7251	**		Both
705 Capacity Marker		7252	**		Both
706 Capacity Marker		7253	**		Both
707 Capacity Marker		7254	**		Both
708 Capacity Marker		7255	**		Both
709 Capacity Marker		7256	**		Both
710 Capacity Marker		7257	**		Both
711 Capacity Marker		7258	**		Both
712 Capacity Marker		7259	**		Both
713 Capacity Marker		7260	**		Both
714 Capacity Marker		7261	**		Both
715 Capacity Marker		7262	**		Both
IBM zEnterprise 196 2817	M15				
Model M15 - Air Cooled		1125	**	X	Both
Model M15 - Water Cooled		1130	**	X	Both
A Frame w/o Cargo-Air		4015	**		Both
A Frame w Cargo-Air		4016	**		Both
IBM zEnterprise 196 2817	M32				
Model M32 - Air Cooled		1126	**	X	Both
Model M32 - Water Cooled		1131	**	X	Both
IBM zEnterprise 196 2817	M49				
Model M49 - Air Cooled		1127	**	X	Both
Model M49 - Water Cooled		1132	**	X	Both
IBM zEnterprise 196 2817	M66				
Model M66 - Air Cooled		1128	**	X	Both
Model M66 - Water Cooled		1133	**	X	Both
IBM zEnterprise 196 2817	M80				
Model M80 - Air Cooled		1129	**	X	Both
Model M80 - Water Cooled		1134	**	X	Both
IBM zEnterprise 196 2817	M32				
	M49				
	M66				
	M80				
800 GB Memory		2453	**		Both
896 GB Memory		2455	**		Both
1008 GB Memory		2457	**		Both
1136 GB Memory		2459	**		Both
1264 GB Memory		2461	**		Both
1392 GB Memory		2463	**		Both
1520 GB Memory		2465	**		Both
A Fr multinode w/o Cargo-A		4019	**		Both
A Fr multinode w Cargo-A		4020	**		Both
16-Way Processor CP7		1812	**	X	Both
17-Way Processor CP7		1813	**	X	Both
18-Way Processor CP7		1814	**	X	Both

19-Way Processor CP7		1815	**	X	Both
20-Way Processor CP7		1816	**	X	Both
21-Way Processor CP7		1817	**	X	Both
22-Way Processor CP7		1818	**	X	Both
23-Way Processor CP7		1819	**	X	Both
24-Way Processor CP7		1820	**	X	Both
25-Way Processor CP7		1821	**	X	Both
26-Way Processor CP7		1822	**	X	Both
27-Way Processor CP7		1823	**	X	Both
28-Way Processor CP7		1824	**	X	Both
29-Way Processor CP7		1825	**	X	Both
30-Way Processor CP7		1826	**	X	Both
31-Way Processor CP7		1827	**	X	Both
32-Way Processor CP7		1828	**	X	Both
716 Capacity Marker		7263	**		Both
717 Capacity Marker		7264	**		Both
718 Capacity Marker		7265	**		Both
719 Capacity Marker		7266	**		Both
720 Capacity Marker		7267	**		Both
721 Capacity Marker		7268	**		Both
722 Capacity Marker		7269	**		Both
723 Capacity Marker		7270	**		Both
724 Capacity Marker		7271	**		Both
725 Capacity Marker		7272	**		Both
726 Capacity Marker		7273	**		Both
727 Capacity Marker		7274	**		Both
728 Capacity Marker		7275	**		Both
729 Capacity Marker		7276	**		Both
730 Capacity Marker		7277	**		Both
731 Capacity Marker		7278	**		Both
732 Capacity Marker		7279	**		Both
IBM zEnterprise 196 2817	M49 M66 M80				
1776 GB Memory		2467	**		Both
2032 GB Memory		2469	**		Both
2288 GB Memory		2471	**		Both
33-Way Processor CP7		1829	**	X	Both
34-Way Processor CP7		1830	**	X	Both
35-Way Processor CP7		1831	**	X	Both
36-Way Processor CP7		1832	**	X	Both
37-Way Processor CP7		1833	**	X	Both
38-Way Processor CP7		1834	**	X	Both
39-Way Processor CP7		1835	**	X	Both
40-Way Processor CP7		1836	**	X	Both
41-Way Processor CP7		1837	**	X	Both
42-Way Processor CP7		1838	**	X	Both
43-Way Processor CP7		1839	**	X	Both
44-Way Processor CP7		1840	**	X	Both
45-Way Processor CP7		1841	**	X	Both
46-Way Processor CP7		1842	**	X	Both
47-Way Processor CP7		1843	**	X	Both
48-Way Processor CP7		1844	**	X	Both
49-Way Processor CP7		1845	**	X	Both
733 Capacity Marker		7280	**		Both
734 Capacity Marker		7281	**		Both
735 Capacity Marker		7282	**		Both
736 Capacity Marker		7283	**		Both
737 Capacity Marker		7284	**		Both
738 Capacity Marker		7285	**		Both
739 Capacity Marker		7286	**		Both
740 Capacity Marker		7287	**		Both
741 Capacity Marker		7288	**		Both
742 Capacity Marker		7289	**		Both
743 Capacity Marker		7290	**		Both
744 Capacity Marker		7291	**		Both
745 Capacity Marker		7292	**		Both
746 Capacity Marker		7293	**		Both
747 Capacity Marker		7294	**		Both
748 Capacity Marker		7295	**		Both
749 Capacity Marker		7296	**		Both

IBM zEnterprise 196 2817	M66				
	M80				
2544 GB Memory		2473	**		Both
2800 GB Memory		2475	**		Both
3056 GB Memory		2477	**		Both
50-Way Processor CP7		1846	**	X	Both
51-Way Processor CP7		1847	**	X	Both
52-Way Processor CP7		1848	**	X	Both
53-Way Processor CP7		1849	**	X	Both
54-Way Processor CP7		1850	**	X	Both
55-Way Processor CP7		1851	**	X	Both
56-Way Processor CP7		1852	**	X	Both
57-Way Processor CP7		1853	**	X	Both
58-Way Processor CP7		1854	**	X	Both
59-Way Processor CP7		1855	**	X	Both
60-Way Processor CP7		1856	**	X	Both
61-Way Processor CP7		1857	**	X	Both
62-Way Processor CP7		1858	**	X	Both
63-Way Processor CP7		1859	**	X	Both
64-Way Processor CP7		1860	**	X	Both
65-Way Processor CP7		1861	**	X	Both
66-Way Processor CP7		1862	**	X	Both
750 Capacity Marker		7297	**		Both
751 Capacity Marker		7298	**		Both
752 Capacity Marker		7299	**		Both
753 Capacity Marker		7300	**		Both
754 Capacity Marker		7301	**		Both
755 Capacity Marker		7302	**		Both
756 Capacity Marker		7303	**		Both
757 Capacity Marker		7304	**		Both
758 Capacity Marker		7305	**		Both
759 Capacity Marker		7306	**		Both
760 Capacity Marker		7307	**		Both
761 Capacity Marker		7308	**		Both
762 Capacity Marker		7309	**		Both
763 Capacity Marker		7310	**		Both
764 Capacity Marker		7311	**		Both
765 Capacity Marker		7312	**		Both
766 Capacity Marker		7313	**		Both
IBM zEnterprise 196 2817	M80				
67-Way Processor CP7		1863	**	X	Both
68-Way Processor CP7		1864	**	X	Both
69-Way Processor CP7		1865	**	X	Both
70-Way Processor CP7		1866	**	X	Both
71-Way Processor CP7		1867	**	X	Both
72-Way Processor CP7		1868	**	X	Both
73-Way Processor CP7		1869	**	X	Both
74-Way Processor CP7		1870	**	X	Both
75-Way Processor CP7		1871	**	X	Both
76-Way Processor CP7		1872	**	X	Both
77-Way Processor CP7		1873	**	X	Both
78-Way Processor CP7		1874	**	X	Both
79-Way Processor CP7		1875	**	X	Both
80-Way Processor CP7		1876	**	X	Both
767 Capacity Marker		7314	**		Both
768 Capacity Marker		7315	**		Both
769 Capacity Marker		7316	**		Both
770 Capacity Marker		7317	**		Both
771 Capacity Marker		7318	**		Both
772 Capacity Marker		7319	**		Both
773 Capacity Marker		7320	**		Both
774 Capacity Marker		7321	**		Both
775 Capacity Marker		7322	**		Both
776 Capacity Marker		7323	**		Both
777 Capacity Marker		7324	**		Both
778 Capacity Marker		7325	**		Both
779 Capacity Marker		7326	**		Both
780 Capacity Marker		7327	**		Both
System z10 EC 2097	E12				
	E26				
	E40				
	E56				

		E64		
HMC w/Dual EN		0091	**	Both
ISAOPT Enablement		0251	**	Both
TKE workstation		0841	**	Both
TKE 7.0 LIC		0860	**	Both
System z10 BC	2098	E10		
HMC w/Dual EN		0091	**	Both
ISAOPT Enablement		0251	**	Both
TKE workstation		0841	**	Both
TKE 7.0 LIC		0860	**	Both

* Ethernet switch (#0070) is not available in the following countries: Belize, Brazil, Egypt, Haiti, Moldavia, Nicaragua, Oman, Qatar, and Venezuela. For alternatives, refer to the Ethernet LAN switch support section of *Installation Manual - Physical Planning* (IMPP), offering ID GC28-6897.

On IBM zEnterprise 196 we will continue to deliver a significant level of price performance and investment protection. We will allow carry forward of speciality engines and memory, with a charge to carry forward these assets. See your IBM sales representative for details.

The following features are not orderable on the IBM zEnterprise 196 models. If they are installed at the time of an upgrade to the z196 they may be retained.

Description	Feat	**	EW MMMC Fe indicator	Init/ MES
HMC	0084	**		MES
SE-EN Switch (former HUB)	0089	**		MES
FICON Express4 10KM LX	3321	**		MES
FICON Express4 SX	3322	**		MES
FICON Express4 4KM LX	3324	**		MES
OSA-Express2 GbE LX	3364	**		MES
OSA-Express2 GbE SX	3365	**		MES
OSA-Express2 1000BASET-EN	3366	**		MES
17 inch panel display	6094	**		MES
21 inch panel display	6095	**		MES
6ft 250V Line Cord, Chi	8992	**		MES
6ft 480V 30A Line Cord, Chi	8994	**		MES

Notes:

1. Memory DIMMs do NOT physically carry forward.
2. Support Elements do NOT carry forward
3. FICON Express, features 2319 and 2320, are NOT supported on z196.
4. FICON Express2, features 3319 and 3320, are NOT supported on z196.
5. Crypto Express2, feature 0863, is NOT supported on z196.
6. OSA-Express2 10 GbE LR, feature 3368, is NOT supported on z196.

For ServiceElect (ESA) maintenance service charges, contact IBM Global Services at 888-IBM-4343 (426-4343).

Model conversions

Model From	To	
S08	M15	(*)
S08	M32	(*)
S08	M49	(*)
S08	M66	(*)
S08	M80	(*)
S18	M15	(*)
S18	M32	(*)
S18	M49	(*)
S18	M66	(*)

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 S18     M80    (*)
 S28     M15    (*)
 S28     M32    (*)
 S28     M49    (*)
 S28     M66    (*)
 S28     M80    (*)
 S38     M15    (*)
 S38     M32    (*)
 S38     M49    (*)
 S38     M66    (*)
 S38     M80    (*)
 S54     M15    (*)
 S54     M32    (*)
 S54     M49    (*)
 S54     M66    (*)
 S54     M80    (*)

 E12     M15    (*)
 E12     M32    (*)
 E12     M49    (*)
 E12     M66    (*)
 E12     M80    (*)
 E26     M15    (*)
 E26     M32    (*)
 E26     M49    (*)
 E26     M66    (*)
 E26     M80    (*)
 E40     M15    (*)
 E40     M32    (*)
 E40     M49    (*)
 E40     M66    (*)
 E40     M80    (*)
 E56     M15    (*)
 E56     M32    (*)
 E56     M49    (*)
 E56     M66    (*)
 E56     M80    (*)
 E64     M15    (*)
 E64     M32    (*)
 E64     M49    (*)
 E64     M66    (*)
 E64     M80    (*)

 M15     M32    (*)
 M15     M49    (*)
 M15     M66    (*)
 M15     M80    (*)
 M32     M49    (*)
 M32     M66    (*)
 M32     M80    (*)
 M49     M66    (*)
 M49     M80    (*)
 M66     M80    (*)

* Parts removed or replaced become the property of IBM and must
  be returned.
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Feature conversions

Contact your IBM representative for feature conversion prices.

IBM Global Financing

IBM Global Financing offers competitive financing to credit-qualified customers of hardware, software, and services, from both IBM and other manufacturers or vendors.

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Corrections

(Corrected on June 20, 2013)
Feature names were revised.

(Corrected on November 30, 2010)
Administrative feature codes were added.

(Corrected on August 5, 2010)
Under "Planned availability date," a description was revised. Under "Pricing," information for feature 9001 was corrected.