IBM enhances the IBM \textit{server} zSeries 990 family of servers

Overview

Forty years ago today, IBM began a revolution with the introduction of the \textit{System/360}. Over the years, IBM’s mainframes have continued to burst with innovations but with a focus on evolving, allowing you to grow, and also helping to protect your investments. The evolution continues to this day. The Mainframe Charter, which was announced in August 2003, provides the current framework on which the IBM \textit{server} zSeries\textregistered 990 (z990) is based. Today’s z990 announcement is representative of the intention to continue the mainframe evolution within the Mainframe Charter with new innovations that include virtualization technology, the zSeries Application Assist Processor (zAAP), the OSA-Express Integrated Console Controller (OSA-ICC), and the expansion to four Logical Channel Subsystems (LCSSs) with the resulting support of up to 1024 ESCON\textsuperscript{TM} channels.

Further, the proliferation of servers over the past several years has tended to create a large investment in applications on older technology, increased complexity in IT management and operations, decreased overall efficiency of resources, and generated the need for larger data centers. Added to this complexity is the need for critical business solutions to support business pressures on demand. This requires an on demand operating environment that is capable of being supportive, adaptive, and responsive to on demand business objectives, and one that couples overall Infrastructure Simplification of diverse critical business applications with the values of leading mainframe technology.

The IBM z990 is designed to help enable solutions to respond to these business pressures by:

- Leveraging the current application portfolio with Linux and z/OS\textsuperscript{®}.
- Simplifying the operations and management of the diverse business applications by consolidating both Linux and mainframe applications onto the same platform.
- Increasing the overall utilization of your IT resources by sharing these resources among your business applications.
- Decreasing the sprawl of server proliferation by minimizing the required number of servers.
- Supporting on demand business requirements by adapting to the business with the required platform resources.

With today’s enhanced capabilities on the z990 for Java\textsuperscript{™} applications, Logical Channel Subsystems, On/Off CoD, Parallel Sysplex\textsuperscript{®}, security, ESCON, FICON\textsuperscript{™}, OSA-Express, z/OS, z/VM\textsuperscript{®}, and Console support, the z990 now can allow for easier migration and consolidation of your applications onto a smaller number of z990 servers.

Key Prerequisites

- Refer to the Software requirements and \textbf{Hardware requirements} sections of this announcement.

At a Glance

This z990 announcement provides:

- zSeries Application Assist Processor (zAAP) on the z990
- Four Logical Channel Subsystems — up to 1024 ESCON channels
- Spanning of external channels — FICON Express, Integrated Cluster Bus (ICB), InterSystem Channel-3 (ISC-3), and OSA-Express
- OSA-Express Integrated Console Controller (OSA-ICC)
- On/Off CoD support for Internal Coupling Facilities (ICF) and zAAPs
- Up to 48 ISC-3 links in peer mode
- Coupling Facility Control Code (CFCC) Enhanced Patch Apply and CFCC level 13
- Security enhancements
- Improvement in FICON Express performance

This announcement is provided for your information only. For additional information, contact your IBM representative.
Planned availability dates

The following features and functions are planned to be available on May 28, 2004:

- Support for 48 ISC-3 links in peer mode
- Four Logical Channel Subsystems
- External spanned channel support
- OSA-Express Integrated Console Controller (OSA-ICC)
- Customer-Initiated Upgrade enhancement
- Fibre Channel Protocol (FCP) concurrent patch
- Concurrent Processor Unit conversions
- Operational Key Support TKE Code 4.1 (#0852)
- On/Off CoD for ICF (#9889)
- CFCC enhanced patch apply and CFCC level 13

The following features and functions are planned to be available on June 30, 2004:

- zSeries Application Assist Processor (#0520)
- On/Off CoD — zSeries Application Assist Processor (#9893)

The following features are planned to be available in September 30, 2004:

- New OSA-Express Gigabit Ethernet LX (#1364) for z990
- New OSA-Express Gigabit Ethernet SX (#1365) for z990

Expanding the new channel subsystem to four LCSSs

Now supporting four Logical Channel Subsystems: A new system structure was introduced on z990 in May 2003, supporting a scalable channel subsystem with two Logical Channel Subsystems. Now, the scalability is being further expanded. You may now define four LCSSs on a single z990, continuing to facilitate "horizontal" growth.

The channel subsystem structure now offers four LCSSs with the following characteristics:

- Each LCSS can have up to 256 CHPIDs defined.
- Each LCSS can be configured with one to 15 Logical Partitions (LPARs). The total system may support up to 30 LPARs.

Note: There continues to be no change to the operating system maximums. One operating system image continues to support up to a maximum of 256 Channel Path Identifiers (CHPIDs).


Refer to the Software requirements section of this announcement for further information. Under certain circumstances, earlier releases of an operating system may be supported. Refer to z/OS Migration (GA22-7499) for more details. An update to this publication, discussing more than two LCSSs, is planned to be available in the z/OS V1.6 timeframe.

Spanned channel support

Transparent sharing of internal and external channels across LCSSs: When Logical Channel Subsystems (LCSSs) were introduced on z990, transparent sharing of internal channels was introduced — sharing of HiperSockets and Internal Coupling Channels (ICs) between separate LCSSs. Now on z990, support for sharing of external channels is being added. FICON Express, ICB-2, ICB-3, ICB-4, ISC-3, and OSA-Express features are now capable of being configured as Multiple Image Facility (MIF) spanning channels, which may allow sharing of channel resources across Logical Partitions (LPARs).

Spanned channels can be shared among LPARs across LCSSs. FICON Express, HiperSockets, ICs, ICB-2, ICB-3, ICB-4, ISC-3, and OSA-Express can be configured to multiple channel subsystems and are designed to be transparently shared by any or all of the configured LPARs without regard to the LCSS to which the LPAR is configured.

The following may be spanned:

<table>
<thead>
<tr>
<th>Feature</th>
<th>CHPID type</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiperSockets</td>
<td>IQD</td>
</tr>
<tr>
<td>IC</td>
<td>ICP</td>
</tr>
<tr>
<td>FICON Express</td>
<td>FC, FCP</td>
</tr>
<tr>
<td>ICB-2 (z990 only)</td>
<td>CBS, Coupling Sender</td>
</tr>
<tr>
<td>ICB-3</td>
<td>CBP, Peer</td>
</tr>
<tr>
<td>ICB-4</td>
<td>CBP, Peer</td>
</tr>
<tr>
<td>ISC-3</td>
<td>CF, Coupling Sender, Compatibility mode</td>
</tr>
<tr>
<td>ISC-3</td>
<td>CFP, Peer</td>
</tr>
<tr>
<td>OSA-Express</td>
<td>OSC, OSD, OSE</td>
</tr>
</tbody>
</table>

Note: While the PCICA and PCIXCC features do not have CHPID types and are not identified as spanned channels, all LPARs in all LCSSs have access to the PCICA feature, up to 30 LPARs per feature. All LPARs in all LCSSs have access to the PCIXCC feature, up to 16 LPARs per feature.

For the minimum software requirements for all of the spanned channel types identified, refer to the Software requirements section of this announcement. Under certain circumstances earlier releases of the z/OS operating system are supported. Refer to the publication z/OS Migration (GA22-7499) for more details. An update to this publication, discussing the external spanned channel types, is planned to be available in the z/OS V1.6 timeframe.

The addition of FICON Express, ICBs, ISC-3, and OSA-Express to the line up of channel types that can be

**IBM eServer® zSeries Application Assist Processor**

The new zSeries Application Assist Processor (zAAP) (#0520), planned to be available on the zSeries 990 (z990) and zSeries 890 (z890) servers, is an attractively priced specialized processor unit that provides an economical Java execution environment for customers who desire the traditional Qualities of Service and the integration advantages of the zSeries platform.

When configured with general purpose processors within Logical Partitions (LPARs) running z/OS, zAAPs may help increase general purpose processor productivity and may contribute to lowering the overall cost of computing for z/OS Java technology-based applications. zAAPs are designed to operate asynchronously with the general purpose processor to execute Java programming under control of the IBM Java Virtual Machine (JVM). This can help reduce the demands and capacity requirements on general purpose processor which may then be available for reallocation to other zSeries workloads.

The IBM JVM processing cycles can be executed on the configured zAAPs with no anticipated modifications to the Java applications. Execution of the JVM processing cycles on a zAAP is a function of the Software Developer’s Kit (SDK) 1.4.1 for zSeries, z/OS V1.6, and Processor Resource/System Manager™ (PR/SM™).

The amount of general purpose processor savings will vary based on the amount of Java application code executed by zAAPs. This is dependent upon the amount of Java cycles used by the relevant applications and on the zAAP execution mode selected by the customer.

Execution of the Java applications on zAAPs (#0520), within the same z/OS SMP LPAR as their associated database subsystems, can also help simplify the server infrastructures and improve operational efficiencies. For example, use of zAAPs could reduce the number of TCP/IP stacks, firewalls, and physical interconnections (and their associated processing latencies) that might otherwise be required when the application servers and their database servers are deployed on separate physical server platforms.

IBM does not impose software charges on zAAP capacity. Additional IBM software charges will apply when additional CP capacity is used.

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

Refer to the Limitations section of this announcement for the number of zAAPs that may be activated by model and the Software requirements section of this announcement for further information.

### Support for up to 24 CPs in a single LPAR

z/OS V1.6 and z/VM V5.1 plan to support up to 24 CPs in a single LPAR on the z990. In conjunction with z/OS V1.6, the maximum number of combined zAAPs and CPs supported in a single LPAR is planned to be 24.


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**OSA-Express SNMP update**

The Simple Network Management Protocol (SNMP) is designed to allow network managers to monitor network devices and their functions, and identify problems in a TCP/IP environment. A separate standard, Management Information Base (MIB), defines the set of variables that SNMP servers maintain. The OSA-Express features support SNMP.

OSA-Express Direct SNMP subagent support and the OSA-Express Direct SNMP subagent MIB were first introduced in April 2002 for the QDIO mode only (CHPID type OSD). Prior to the introduction of the OSA-Express Direct SNMP subagent, OSA-Express management data was only available with the z/OS Communications Server TCP/IP subagent which required Open Systems Adapter/Support Facility (OSA/SF) to obtain the data.

With the release of the OSA-Express Direct SNMP subagent, OSA/SF was no longer required to manage SNMP data for OSA-Express when configured in QDIO mode (CHPID type OSD). With the introduction of Direct SNMP subagent support for LCS (see below), Direct SNMP subagent support has been expanded to include TCP/IP when configuring a LAN Channel Station (LCS) connection when in non-QDIO mode (CHPID type OSE).

**Traps and Set now supported:** IBM is introducing, today, enhanced support for the OSA-Express Direct SNMP subagent to include Traps and Set, in addition to the previously released Get and GetNext support. Support for Traps and Set helps network managers to seamlessly integrate the zSeries OSA-Express features with the overall SNMP management strategy.

**Trap** is designed to allow the SNMP manager to asynchronously receive an alert when one or more conditions are met, thus enabling a central source access to all information relating to the network connections. Direct SNMP users may configure the manager to send a Trap notification when the status of an OSA-Express port has changed.

**Set** support allows an SNMP manager to change a value identified by an Object Identifier (OID) in the OSA-Express Management Information Base (MIB). The initial object made settable in this implementation is the ability to set Traps on/off. Setting Traps “off” can be helpful if excessive Traps are being reported at the SNMP console.

**Trap and Set support** applies to all of the OSA-Express features supported on z890 and z990 when configured in QDIO mode (CHPID type OSD). Refer to the Software requirements section of this announcement for further information.

**OSA-Express Direct SNMP subagent support for LCS:** With this announcement IBM is introducing expanded support for Direct Simple Network Management Protocol (SNMP) to now include TCP/IP when configuring a LAN Channel Station (LCS) connection. This applies to the non-QDIO mode (CHPID type OSE) only when carrying TCP/IP traffic.

This support applies to all of the OSA-Express features supported on z890 and z990 and at availability will be exclusive in z/OS to z/OS V1.6 (planned availability — September 2004). Direct SNMP for LCS when configured in non-QDIO mode is intended to support the same SNMP requests and alerts offered in QDIO mode —Get, GetNext, Trap, Set.

In the past, Direct SNMP subagent support was exclusive to the QDIO mode (CHPID type OSD). Refer to the
Software requirements section of this announcement for further information.

**Performance data reflecting OSA-Express utilization:** In May 2003, IBM announced a usability enhancement via the Direct SNMP subagent to return performance data, in individual objects, for each image reflecting OSA-Express utilization without the need to “decode” a larger object that previously contained all of the information. The information returned includes the percentage of time the microprocessor was utilized to transfer data, as well as the number of inbound and outbound packets.

This support applies to all of the OSA-Express features supported on z800, z900, z890, and z990 when configured in QDIO mode (CHPID type OSD). Refer to the Software requirements section of this announcement for further information.

Summarizing the Direct SNMP subagent support offered for the OSA-Express features which has been made available via zSeries Licensed Internal Code (LIC) updates:

- **Get and GetNext** requests.
  - Applies to all of the OSA-Express features supported on z800, z900, z890, and z990 when configured in QDIO mode (CHPID type OSD).

- **dot3StatsTable.**

  Ethernet data for dot3StatsTable was first introduced in May 2003, and applies to the SNMP EtherLike Management Information Base (MIB) module in RFC 2665 which provides statistics for Ethernet interfaces. These statistics can assist in the analysis of network traffic congestion.
  - OSA/SF is no longer a prerequisite for this function.
  - Applies to all of the Ethernet features supported on z800, z900, z890, and z990 when configured in QDIO mode (CHPID type OSD).

- **Performance data** reflecting OSA-Express utilization was first introduced in May 2003.
  - Applies to all of the OSA-Express features supported on z800, z900, z890, and z990 when configured in QDIO mode (CHPID type OSD).

- **Traps and Set** is introduced in this announcement.
  - Applies to all of the OSA-Express features supported on z890 and z990 when configured in QDIO mode (CHPID type OSD).

- **Direct SNMP support for LCS.** introduced in this announcement.
  - Applies to all of the OSA-Express features supported on z890 and z990 when configured in non-QDIO mode (CHPID type OSE) supporting TCP/IP applications only and the same SNMP requests and alerts offered in QDIO mode — Get, GetNext, Trap, Set.
  - Applies exclusively to the z/OS V1.6 environment (planned to be available September 2004).

For more information on SNMP support as well as the applicable features and modes of operation, refer to the Open Systems Adapter-Express Customer’s Guide and Reference (SA22-7935 for z990 and z890, SA22-7476 for z800 and z900). Refer also to the Software requirements section of this announcement.

The May 2004 z990 Licensed Internal Code includes support for the following:

- Get and GetNext
- dot3StatsTable
- New Gigabit Ethernet features
- New 1000BASE-T Ethernet feature
- Four Logical Channel Subsystems (LCSSs)
- Updated performance table with more detailed information
- Traps and Set
- Direct SNMP for LCS when configured in non-QDIO mode

**Note:** Direct SNMP for LCS when configured in non-QDIO mode is planned to be available in the z/OS V1.6 timeframe.

The OSA-Express Direct SNMP subagent MIB information can be found on Resource Link™

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

If you subscribe to the document OSA-Express Direct SNMP subagent MIB module, you will receive e-mail notification of document changes.

**Enhancements to OSA-Express**

**OSA-Express Integrated Console Controller:** Today, IBM is introducing a new function for the Open Systems Adapter-Express 1000BASE-T Ethernet feature and a new Channel Path Identifier (CHPID) type, OSC. The new Open Systems Adapter-Express Integrated Console Controller (OSA-ICC) function supports TN3270E (RFC 2355) and non-SNA DFT 3270 emulation. Now, 3270 emulation for console session connections is integrated in the zSeries 990 via a port on the OSA-Express 1000BASE-T Ethernet feature. This can help eliminate the requirement for external console controllers (2074, 3174), helping to reduce cost and complexity. Each port can support up to 120 console session connections. OSA-Express 1000BASE-T Ethernet (CHPID types OSC, OSD, OSE) can be defined as a spanned channel and can be shared among LPARs within and across LCSSs.

OSA-ICC support is exclusive to z890 and z990. It is available only with the OSA-Express 1000BASE-T Ethernet feature. OSA-ICC can be configured on a port-by-port basis. A port on the 1000BASE-T Ethernet feature can be configured as CHPID type OSC, OSE, or OSE.

Refer to IBM @server zSeries 990 and 890 Open Systems Adapter-Express Integrated Console Controller User’s Guide (SA22-7990) for installation and setup assistance. Refer to the Software requirements section of this announcement for further information.

**Introducing new OSA-Express GbE features on z900:** New OSA-Express Gigabit Ethernet (GbE) features are being introduced on z900 to replace the currently available OSA-Express GbE features. OSA-Express Gigabit Ethernet SX feature #1364 replaces #2364. OSA-Express Gigabit Ethernet SX feature #1365 replaces #2365. The functions of these new OSA-Express Gigabit Ethernet features are expected to be equal to the functions currently available on z900. Refer to the z900 Sales Manual for details on these features.

These new GbE features have a new connector type, LC Duplex, replacing the current SC Duplex connector. This
conforms to the fiber optic connectors currently in use for the ISC-3 and FICON Express features on z900.

Features 1364 and 1365 are planned to become available September 30, 2004. When #1364 and #1365 become available, features 2364 and 2365 are intended to no longer be orderable. It is expected that there will be no unique software dependencies for the new OSA-Express Gigabit Ethernet features on z900.

**OSA-Express Token Ring outlook**

The demand for Token Ring in mainframe environments continues to decline. A migration from a Token Ring to an Ethernet environment should be a recommended part of all long-term LAN planning.

**Once again, increasing ESCON connectivity**

**Doubling, again, ESCON channel connectivity:** With the introduction of two Logical Channel Subsystems (LCSSs), it was possible to define up to a maximum of 512 ESCON CHPIDs on your z990, up to a maximum of 35 ESCON features.

With the introduction of four LCSSs, you may now define up to a maximum of 1,024 ESCON CHPIDs on your z990, up to a maximum of 69 ESCON features. The Model A08 supports a maximum of 720 ESCON CHPIDs, up to a maximum of 48 ESCON features. The maximum number of configurable CHPIDs is 256 per LCSS and per operating system image.

The high density 16-port Enterprise Systems Connection (ESCON) feature continues to have up to 15 active channels. One is always reserved as a spare in the event of a failure of one of the other channels. When four channels are ordered, two 16-port ESCON features are installed and two channels are activated on each feature. After the first pair, ESCON features are installed in increments of one. ESCON channels continue to be ordered in increments of four.

**ESCON supports five operating system environments:** Enterprise Systems Connection (ESCON) is currently supported by OS/390 and z/OS as well as z/VM, VSE/ESA™, TPF, and Linux on zSeries. Refer to the Software requirements section of this announcement for further information.

**FICON and FCP Enhancements**

**FICON Express spanned channels:** FICON Express (CHPID types FC and FCP) can be configured to Multiple Channel Subsystems and are designed to be transparently shared by any or all configured LPARs without regard to the LCSS to which the LPAR is configured. Refer to the Software requirements section of this announcement for further information.

**FICON natively supports five operating system environments:** Fibre Connection (FICON) is supported natively (CHPID type FC) by OS/390 and z/OS, as well as z/VM, VSE/ESA™, TPF, and Linux on zSeries. Refer to the Software requirements section of this announcement for further information.

**FICON Express performance improvement:** Relative to the FICON Express performance documented in the white paper **FICON and FICON Express Channel Performance Version 2.0**, dated November 2003, a customer may see an increase of up to 15% in the maximum of 4K I/O operations per second. This improvement is based on laboratory measurements. The actual I/O rate a customer may see will vary with factors such as the I/O configuration used and the level of the channel code installed. This performance improvement was achieved with FICON Express feature numbers 2319 (LX) and 2320 (SX) on the z990 using the May 2004 level of Licensed Internal Code with measurements averaged over four channels.

**FCP concurrent patch:** FICON, when configured as CHPID type FCP, is designed to support concurrent patch allowing application of new Licensed Internal Code (LIC) without requiring a configuration off/on. This is currently a zSeries exclusive FCP availability feature, available on z890 and z990 with FICON Express features 2319 and 2320. This concurrent patch capability requires the zSeries May 2004 level of LIC Code for z890 and z990. Users should note that when the LIC supporting the imbedded Fibre Channel kernel code is being updated, FICON may require a configuration off/on.

**Adding to the family of Directors supported by FICON:**

The FICON Express features now support attachment to the IBM M12 Director (2109-M12). This support became available October 14, 2003. A no-charge upgrade, Enterprise Operating System 4.1.2, is required for the IBM M12 Director.

The IBM M12 Director supports attachment of FICON Express channels on z800, z890, z900, and z990 via native FICON (CHPID type FC) and Fibre Channel Protocol (CHPID type FCP) supporting attachment to SCSI disks in Linux environments.

The FICON Express channels on the z800, z900, z990, and z990 continue to support attachment to McDATA Intrepid 6000 Series Directors and the CNT FC/9000 Directors.

For more information, refer to the IBM I/O Connectivity Web site

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

**Coupling Facility update**

**Coupling Facility Control Code (CFCC) level 13 for z990 and z990:** CFCC level 13, a new level, is now available for the z990 and z890. This level can provide Parallel Sysplex availability and performance enhancements.

**Coupling Facility Control Code (CFCC) enhanced patch apply:** Today, the CFCC patch apply process is designed to eliminate the need for a power on reset (POR) of the z990 to apply a “disruptive” CFCC patch. This enhancement is intended to provide you with the ability to:

- Selectively apply the new patch to one of possibly several CFs running on a z990. For example, if you have a CF that supports a test Parallel Sysplex and a CF that supports a production Parallel Sysplex on the same z990, you now have the ability to apply a “disruptive” patch to only the test CF without affecting the production CF. After you have completed testing of the patch, it can be applied to the production CF as identified in the example.

- Continue to run other LPARs on the z990 where a “disruptive” CFCC patch will be applied without being impacted by the application of the “disruptive” CFCC patch.

This enhancement does not change the characteristics of a “concurrent” CFCC patch, but can significantly enhance the availability characteristics of a “disruptive” CFCC patch by making it much less disruptive.
Previously, small enhancements or “fixes” to the CFCC were usually distributed as a “concurrent” patch that could be applied while the CF was running. Occasionally, a CFCC patch was “disruptive.” When such a “disruptive” change needed to be applied to a CF, it required a POR of the server where the CF was running. This was especially disruptive for those enterprises that had chosen to use internal CFs, because a POR of the server affects the CF where the change was to be applied and all other LPARs running on the same server. Further, if an enterprise was using multiple internal CFs on the same server (to support both a test and production configurations, for example), there was no way to selectively apply the “disruptive” patch to just one of the CFs — once applied, all the CFs on the server had the change. Consequently, the application of the “disruptive” CFCC patch was very disruptive from an operations and availability perspective.

**Additional CFCC enhancements:** CFCC level 13 provides additional changes that can affect different software environments that run within a Parallel Sysplex. For example, DB2® data sharing is expected to see a performance improvement, especially for castout processing against large DB2 group buffer pool structures.

**Increasing Coupling Link connectivity**

A 50% increase in ISC-3 link physical connectivity: To continue to provide “horizontal” growth opportunities for Parallel Sysplex solutions, zSeries 990 is increasing the number of InterSystem Channel-3 (ISC-3) links. z990 now supports 48 ISC-3 links in peer mode, 12 features (4 links per feature), versus the 32 ISC-3 links (eight features) in peer mode offered previously on z990. The maximum of 32 links in compatibility mode remains.

The ISC-3 feature is a member of the family of Coupling Link options available on z990. ISC-3 continues to support a link data rate of 2 Gigabits per second (Gbps) and carries traffic over 9 micron single mode fiber optic cables.

The family of Coupling Link options available on z990 is as follows:

**Coupling Link options summary**

<table>
<thead>
<tr>
<th>Link type</th>
<th>Name</th>
<th>Communication use</th>
<th>Maximum links</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC</td>
<td>Internal Coupling channel</td>
<td>Internal between CFs and z/OS LPARs</td>
<td>32</td>
</tr>
<tr>
<td>ICB-2</td>
<td>Integrated Cluster Bus-2</td>
<td>Server-to-server z990 to G5/G6 servers</td>
<td>8</td>
</tr>
<tr>
<td>ICB-3</td>
<td>Integrated Cluster Bus-3</td>
<td>Server-to-server z990 to z800, z900</td>
<td>16</td>
</tr>
<tr>
<td>ICB-4</td>
<td>Integrated Cluster Bus-4</td>
<td>Server-to-server z990 to z800, z900</td>
<td>16</td>
</tr>
<tr>
<td>ISC-3</td>
<td>InterSystem Channel-3</td>
<td>Server-to-server</td>
<td>48</td>
</tr>
</tbody>
</table>

- A maximum of 48 ISC-3s can be defined in peer mode (operating at a link data rate of 2 Gbps) and a maximum of 32 ISC-3s can be defined in compatibility mode (operating at 1 Gbps, instead of 2 Gbps).

- The maximum number of Coupling Links combined (ICs, ICB-2s, ICB-3s, ICB-4s, and active ISC-3 links) cannot exceed 64 per server.

- An ISC-3 feature on a z990 can be connected to another zSeries server in peer mode (CFP CHPID type) operating at 2 Gbps or to a HiPerLink (ISC-2) on a G5/G6 in compatibility mode (CHPID type CFS/CFR — sender/receiver) operating at 1 Gbps.

Refer to the Sales Manual for a complete description of all of the Coupling Link options. For the maximum unreported distances and unique cabling requirements, refer to the Sales Manual for details.

**Cryptography enhancements**

The CP Assist for Cryptographic function (#3863) is a prerequisite when ordering the PCICA and PCIXCC features and utilizing any of the functions/enhancements identified in this announcement.

**PCIXCC support for double length DUKPT:** Derived Unique Key Per Transaction (DUKPT) is a key management method that allows you to write applications that implement the DUKPT algorithm as defined by the ANSI X9.24 standard, which can provide added security for point of sale transactions. At introduction IBM supported single length DUKPT on the zSeries 990. Now, IBM is introducing support for double length DUKPT on the zSeries 990. This support applies only to the PCIXCC feature and to z980 and z990. This support is exclusive to the OS/390 V2.10 and z/OS environments and is part of the ICSF Web deliverable z990 and z890 Enhancements to Cryptographic Support. Refer to the Software requirements section of this announcement for further information.

**PCIXCC support for Europay Mastercard Visa (EMV) 2000 Standard:** Europay Mastercard and Visa support allows you to write applications that comply with the EMV 2000 standard, which is used for financial transactions among heterogeneous hardware and software. Support for the EMV 2000 standard applies only to the PCIXCC feature and to z980 and z990. This support is exclusive to the OS/390 V2.10 and z/OS environments and is part of the ICSF Web deliverable z990 and z890 Enhancements to Cryptographic Support. Refer to the Software requirements section of this announcement for further information.

**PCICA and PCIXCC support for PKD service enhancement:** The Public Key Decrypt (PKD) service has been upgraded to support a Zero-Pad option for clear RSA private keys. With this support, PKD can be used as an accelerator for raw RSA private operations, including the use of CRT format keys. This enhancement applies to z980 and z990, to the OS/390 V2.10 and z/OS environments, and is part of the ICSF Web deliverable z990 and z890 Enhancements to Cryptographic Support. Refer to the Software requirements section of this announcement for further information.

**PCICA and PCIXCC support for PKE service enhancement:** The Public Key Encrypt (PKE) service has been enhanced to support the Mod_Raised_to_Power (MRP) function. The MRP function can be used to offload the compute-intensive portion of the Diffie-Hellman protocol for both the PCICA and PCIXCC features to help improve performance and allow more efficient use of CP resources. This enhancement applies to z890 and z990. It is exclusive to the OS/390 V2.10 and z/OS 1.2 and later environments with the application of the ICSF Web deliverable z990 and z890 Enhancements to Cryptographic Support. Refer to the Software requirements section of this announcement for further information.
requirements section of this announcement for further information.

**TKE 4.1 code level for secure operational key entry:** The Trusted Key Entry (TKE) 4.1 code is now capable of providing a security-rich local and remote method of providing operational key entry along with master key entry that was previously announced. This support applies to the Cryptographic Coprocessor features and is exclusive to z890 and z990.


**z/VM guest support for the PCIXCC feature:** z/VM V5.1 provides dedicated-queue support for secure key and clear key cryptographic functions for z/OS guests and shared-queue and dedicated-queue support for clear key cryptographic functions for Linux guests, with up to 256 dedicated queues, using the PCIXCC feature.


Linux on zSeries support for the PCIXCC feature was delivered as an Open Source contribution in January 2004, via

http://www10.software.ibm.com/developerworks/opensource/linux390


Refer to the Software requirements section of this announcement for further information. Refer to the Sales Manual for a complete description of the PCIXCC feature.

**Dynamic add/delete of a Logical Partition name**

The ability to add meaningful Logical Partition (LPAR) names to the configuration without a Power-On Reset is being introduced. Prior to this support extra LPARs were defined by adding reserved names in the Input/Output Configuration Data Set (IOCDS), but one may not have been able to predict what might be meaningful names in advance.

Dynamic add/delete of an LPAR name allows reserved partition “slots” to be created in an IOCDS in the form of extra Logical Channel Subsystem, Multiple Image Facility (MIF) image ID pairs. These extra Logical Channel Subsystem MIF image ID pairs (CSSID/MIFID) can be later assigned an LPAR name for use (or later removed) via dynamic I/O commands using the Hardware Configuration Definition (HCD). The IOCDS still must have the extra I/O slots defined in advance since many structures are built based upon these major I/O control blocks in the Hardware System Area (HSA). This support is exclusive to z890 and z990 and z/OS V1.6 (planned to be available September 2004).

**Geographically Dispersed Parallel Sysplex™ (GDPS™) enhancements**

Geographically Dispersed Parallel Sysplex (GDPS), an industry-leading e-business continuity solution, is a multiple site solution that is designed to provide the capability to manage the remote copy configuration and storage subsystems, automate Parallel Sysplex operational tasks, and perform failure recovery from a single point of control, thereby helping to improve application availability. GDPS supports both the synchronous Peer-to-Peer Remote Copy (PPRC) as well as the asynchronous Extended Remote Copy (XRC) forms of remote copy. Depending on the form of remote copy, the solution is referred to as GDPS/PPRC or GDPS/XRC. GDPS/PPRC and GDPS/XRC have been enhanced to include new functions.

**GDPS/PPRC HyperSwap™ function:** The GDPS/PPRC HyperSwap function is designed to broaden the continuous availability attributes of GDPS/PPRC by extending the Parallel Sysplex redundancy to disk subsystems.

The Planned HyperSwap function can provide the ability to:

- Transparently switch all primary PPRC disk subsystems with the secondary PPRC disk subsystems for a planned reconfiguration
- Perform disk configuration maintenance and planned site maintenance without requiring any applications to be quiesced.

The Planned HyperSwap function became available in December 2002.

The Unplanned HyperSwap function contains additional function designed to transparently switch to use secondary PPRC disk subsystems in the event of unplanned outages of the primary PPRC disk subsystems or a failure of the site containing the Primary PPRC disk subsystems.

The Unplanned HyperSwap function can allow:

- Production systems to remain active during a disk subsystem failure. Disk subsystem failures will no longer constitute a single point of failure for an entire Parallel Sysplex.
- Production servers to remain active during a failure of the site containing the primary PPRC disk subsystems if applications are cloned and exploiting data sharing across the two sites. Even though the workload in the second site will need to be restarted, an improvement in the Recovery Time Objective (RTO) will be accomplished.

The Unplanned HyperSwap function became available in February 2004.

**GDPS/PPRC management for open systems Logical Unit Numbers (LUNs):** GDPS/PPRC technology has been extended to manage a heterogeneous environment of z/OS and open systems data. If installations share their disk subsystems between the z/OS and open systems platforms, GDPS/PPRC, running in a z/OS system, can manage the PPRC status of devices that belong to the other platforms and are not even defined to the z/OS platform. GDPS/PPRC is also designed to provide data consistency across both z/OS and open systems data.

GDPS/PPRC management of open systems LUNs became available in February 2004.

**GDPS supports PPRC over Fibre Channel links:** In 2003, IBM TotalStorage® Enterprise Storage Server™ (ESS) announced support of PPRC over Fibre Channel for the ESS Model 800. Refer to Product Announcement letter ZG03-0614 dated October 14, 2003.

This support is designed to provide improved throughput compared to ESCON, and a reduction in cross-site connectivity (two PPRC Fibre Channel links per ESS are considered sufficient for most customer workloads). One
of the potential benefits of this support is the ability for customers to increase the distance between sites while maintaining acceptable performance.

GDPS/PPRC support for PPRC over Fibre Channel became available in February 2004.

**GDPS support of FlashCopy® v2 helps to eliminate the LSS constraint:** In 2003, IBM TotalStorage Enterprise Storage Server (ESS) announced support of FlashCopy v2. Refer to Product Announcement letter ZG03-0338 dated May 13, 2003. Prior to this announcement, both source and target volumes had to reside on the same logical subsystem (LSS) within the disk subsystem. Since this constraint has been removed with FlashCopy v2, GDPS will now allow a FlashCopy from a source in one LSS to a target in a different LSS within the same disk subsystem. This new flexibility can help simplify administration and capacity planning for FlashCopy.

GDPS/PPRC support for FlashCopy v2 became available in February 2004.

**GDPS/PPRC and cross-site Parallel Sysplex distance extended up to 100 km:** On October 31, 2003, IBM delivered, via a Request for Price Quote (RPQ), the capability to configure GDPS/PPRC or a multi-site Parallel Sysplex up to a distance of up to 100 kilometers (62 miles) between two sites. This extended distance can potentially decrease the risk that the same disaster will affect both sites, thus permitting enterprises to recover production applications at another site.

Support has been extended up to a distance of up to 100 km from the current capability of 50 km (31 miles) for:

- External Time Reference (ETR) links: An ETR link on a zSeries or S/390® server provides attachment to the Sysplex Timer®.
- InterSystem Channel-3 (ISC-3) links operating in peer mode, supported on all zSeries servers, connect z/OS and OS/390 systems to Coupling Facilities in a Parallel Sysplex Environment.

The extended distance support for ETR and ISC-3 links is now consistent with other cross-site link technologies that currently support up to 100 km between two sites (such as FICON, Peer-to-Peer Remote Copy (PPRC), and Peer-to-Peer Virtual Tape Server (PPVTS)). It should be noted that the maximum fiber optic cable distance between a pair of Sysplex Timers in an Expanded Availability configuration remains at 40 km (25 miles). Therefore, to achieve the extended distance of up to 100 km between sites, one of the options to be considered is locating one of the Sysplex Timers in an intermediary site that is less than 40 km from one of the two sites. Other potential options can be evaluated when the RPQ request is submitted to IBM for review.

**Coordinated near continuous availability and disaster recovery for Linux guests:** GDPS plans to exploit the new z/VM HyperSwap function to provide a coordinated near continuous availability and disaster recovery solution for z/OS and Linux guests running under z/VM. z/VM 5.1 plans to provide a new HyperSwap function, so that the virtual devices associated with one real disk can be swapped transparently to another. HyperSwap can be used to switch to secondary disk storage subsystems mirrored by PPRC. This solution may be especially valuable for customers who share data and storage subsystems between z/OS and Linux on zSeries — for example, a SAP application server running on Linux on zSeries and a SAP DB server running on z/OS. HyperSwap can also be helpful in data migration scenarios to allow applications to migrate to new disk volumes without requiring them to be quiesced.

GDPS/PPRC will provide the reconfiguration capabilities for the Linux on zSeries systems and data in the same manner it does for z/OS systems and data. To support planned and unplanned outages, GDPS is designed to provide the following recovery actions:

- In-place re-IPL of failing operating system images
- Site takeover/failover of a complete production site
- Coordinated planned and unplanned HyperSwap of disk subsystems, transparent to the operating system images and applications using the disks

This innovative near continuous availability and disaster recovery solution requires IBM Tivoli® System Automation for Linux, and z/VM V5.1 in addition to the other GDPS/PPRC prerequisites.

**Performance enhancements for GDPS/PPRC and GDPS/XRC configurations:** Concurrent activation of Capacity Backup Upgrade (CBU) can now be performed in parallel across multiple servers, which can help result in an improved RTO. This improvement can apply to both the GDPS/PPRC and GDPS/XRC configurations.

In a GDPS/XRC configuration, it is often necessary to have multiple System Data Movers (SDMs). The number of SDMs is based on many factors, such as the number of volumes being copied and the I/O rate. Functions are now capable of being executed in parallel across multiple SDMs, thus helping to improve scalability for a coupled SDM configuration.

Analysis has shown that PPRC commands issued by GDPS will generate a large number of Write to Operator messages (WTOs) that may cause WTO buffer shortages and temporarily adversely impact system performance. The Message Flooding Automation function (MFA) is expected to substantially reduce the WTO message traffic that may cause WTO buffer shortages and temporarily adversely impact system performance. The Message Flooding Automation function is expected to substantially reduce the WTO message traffic and help improve system performance by suppressing redundant WTOs.


These GDPS enhancements are applicable to z800, z900, z890, and z990. For a complete list of other supported hardware platforms and software prerequisites, refer to the GDPS executive summary white paper, available at http://www.ibm.com/server/eserver/zseries/psp

**Customer Initiated Upgrade enhancement**

With the May 2004 Licensed Internal Code release, the z990 and z890 now support MES upgrades of zSeries Application Assist Processor processors using Customer Initiated Upgrade (CIU), and temporary Internal Coupling Facility (ICF) activation using On/Off Capacity on Demand. Temporary capacity may now be activated on systems with Capacity Backup Upgrade (CBU) enablement installed.

When your business needs additional capacity quickly, Customer Initiated Upgrade (CIU) with the Express option can now deliver it.
Permanent upgrades: Orders (MESs) of Processor Units (PUs), including the zSeries Application Assist Processors, and memory for IBM eServer zSeries systems that can be delivered by Licensed Internal Code, Control Code (LIC CC) are eligible for CIU delivery.

Temporary capacity

IBM eServer On/Off Capacity on Demand: When your business needs short-term additional capacity, On/Off CoD is designed to deliver it. On/Off CoD is designed to temporarily turn on Central Processors (CPs), Integrated Facilities for Linux (IFLs), Internal Coupling Facilities (ICFs), and/or zSeries Application Assist Processors (zAAPs) that are available within the current model. This capability can now coexist with Capacity Backup Upgrade (CBU) enablement. On/Off CoD is delivered through the function of Customer Initiated Upgrade (CIU). To participate in this offering, you must have installed CIU Enablement (#9898) and On/Off CoD Enablement (#9896). Subsequently, you may concurrently install temporary capacity by ordering On/Off CoD Active CP (#9897) up to the number of current CPs (#0716), On/Off CoD Active IFL (#9888) up to the number of current IFLs (#0516), and On/Off CoD Active ICF (#9889) up to the number of current ICFs (#0518). You may similarly concurrently install temporary capacity by ordering On/Off CoD Active zAAP (#9893) up to the number of current zAAPs (#0520), with the restriction that the total number of On/Off CoD Active zAAPs (#9893) plus zAAPs (#0520) may not exceed the number of On/Off CoD Active CPs (#9897) plus the number of CPs (#0716) plus the number of unassigned CPs (#1716). In addition, the number of OccoD Active zAAPs (#9893) may not exceed the current number of zAAPs (#0520) that are permanently purchased. All temporary hardware capacity will be billed on a 24-hour basis until the temporary capacity is removed. Each month your bill will be calculated for the sum of all orders installed within the prior month. Monitoring will occur through the server call home facility and a bill will be generated if the hardware capacity has been enabled for any portion of a calendar month. You will continue to be billed for use of temporary capacity until you return the server to the original state. After concurrently returning to the original state, you may choose to activate a new On/Off CoD upgrade which can be different from the previous upgrade. When you dispose of the server, or decide that you want to disable future temporary upgrades, you are required to remove the enabled feature, On/Off CoD Enablement (#9896).

IBM eServer On/Off Capacity on Demand from IBM Global Financing: Let IBM Global Financing, a leading provider of IT financing, assist in your acquisition of IBM leading-edge technology.

Through Total Solution Financing we provide a single source that allow you to consolidate your solution, including hardware, software, and services. You have an innovative and tailored solution that helps make acquiring your IBM eServer fast, easy, and affordable.

Through our Total Solution Financing offering we can provide financing for your on demand needs. Match your investment to your usage with competitive financing for your fixed and variable costs for On/Off Capacity on Demand.

Concurrent Processor Unit conversions

The z990 now supports concurrent conversion of different Processor Unit (PU) types. This capability is extended to Central Processor (CPs), Integrated Facility for Linux (IFLs), and Internal Coupling Facility (ICFs). This capability provides flexibility in configuring a z990 to meet the changing business environments. For example, a z990 Model A08 configured with eight CPs could be reconfigured to seven CPs and one IFL by ordering the appropriate PU conversion. This order will generate a new LIC CC which can be installed concurrently in two steps. First, the one CP is removed from the z990 conversion. Second, the newly available PU is activated as an IFL. This assumes that one CP remains active during the conversion of other processor units.

Extended Translation Facility

The Extended Translation Facility adds 10 new instructions to the zSeries instruction set. These new instructions may enhance performance for data conversion operations done supporting data encoded in Unicode, improving the ability to efficiently support applications enabled for Unicode and/or Globalization. The instructions add hardware support for conversions to and from the various Universal Character Set (UCS) Transformation Formats (UTF) encodings used to support Unicode.

These formats for encoding data are used in a number of important technologies emerging in the Web Services, Grid, and on demand environments, such as XML and SOAP, as well as being supported in DB2 for data storage. The initial programming support for the new instructions is intended to be provided in High Level Assembler.

Refer to the Software requirements section of this announcement for further information.

zSeries Software Pricing MSUs

The IBM zSeries Software pricing MSUs for the z990 as updated on August 22, 2003, can be located at the following Web site


This IBM zSeries Software Pricing Exhibits Web site contains information extracted from IBM customer agreements/contracts. Certain mainframe hardware information is required to determine software charges for zSeries and S/390 capacity-based software products. This information includes the capacity-based customer software charging data common in all geographies for IBM and our customers. The information includes vendor, machine model, WLC, PSLC, MSU, and other data related to capacity-based software charging.

Fiber optic cabling

Fiber optic cables, cable planning, labeling, and installation are all customer responsibilities for new installations and upgrades. Fiber optic conversion kits and Mode Conditioning Patch (MCP) cables are not orderable as features on z990.

To serve the cabling needs of zSeries customers, IBM Networking Services has fiber optic cabling services designed to match your requirements.

IBM Networking Integration and Deployment Services for zSeries fiber cabling and for enterprise fiber cabling help to ensure IBM has a comprehensive set of services for all customers, from product level to enterprise level — services geared for today and tomorrow. These services take into consideration the requirements for all of the protocols and media types supported on zSeries (for example, ESCON, FICON Express, Coupling Links, OSA-Express), whether the focus is the data center,
Storage Area Network, Local Area Network (LAN), or end-to-end enterprise.

Contact your IBM representative or your IBM Business Partner for information about this offering.

Additional information

All offers are subject to availability. IBM reserves the right to alter product offerings and specifications at any time without notice. IBM is not responsible for photographic or typographic errors.

IBM makes no representation or warranty regarding third-party products or services.

Product Positioning

The IBM z990 is the latest high-end member of the zSeries family. The z990 design represented a major change in the direction of the zSeries platform in comparison to the z900/z800 family with the implementation of the superscalar microprocessor. The superscalar microprocessor is designed to provide improvements in the performance of new workloads as well as maintaining excellent performance for traditional workloads. By providing increases in resources, up to triple the capacity of the z900 Model 216, up to four times the number of CHPIIDs, up to twice the number of LPARs, and up to four times the number of HiperSockets, and increasing the number of FICON channels by 25% when properly configured, this server can help provide you with the ability to improve application performance, increase the number of users supported, support more transactions, increase scalability, and consolidate workloads beyond what is available on other zSeries servers.

Statement of general direction

Token Ring on HMC, SE, TKE workstation, IBM 2074: The z980 and z990 will be the last zSeries servers to offer Token Ring adapter features on the Hardware Management Consoles (HMCs), Support Element (SEs), and Trusted Key Entry (TKE) workstations. The IBM 2074 Model 3 Console Support Controller will be the last controller to offer Token Ring adapter features.

IBM zSeries is making these statements to allow enterprises sufficient opportunity to prepare for a migration to Ethernet environments.

Hardware Management Consoles (HMCs): Beginning with the next zSeries server, after the IBM @server zSeries 890 and 990, all new HMCs on all currently marketed zSeries servers are intended to become closed platforms. They will support only the HMC application and not the installation of other applications such as the IBM ESCON Director and the IBM Sysplex Timer console applications.

When available, the next-generation HMC is expected to communicate only with G5 Servers, and above (Multiprise® 3000, G5/G6, z800, z900, z890, z990).

TCP/IP is intended to be the only communications protocol supported.

OSA-Express Layer 2 Support: IBM intends to extend its network virtualization capabilities with updates to OSA-Express, Virtual Switch, and guest LANs. When updated, these facilities will be designed to operate in Layer 2 mode (referring to Layer 2 of the Open Systems Interface [OSI] reference model). This is planned to allow destination and target nodes to be referenced by their Media Access Control (MAC) addresses rather than by Internet Protocol (IP) addresses, which is intended to enable protocol-independent network connectivity. Layer 2 support is intended to apply to an OSA-Express feature when configured in QDIO mode (CHPID type OSD). Layer 2 support is expected to be applicable, initially, to the z/VM and Linux on zSeries environments.

ISC-3s in compatibility mode: IBM intends z890 and z990 to be the last family of zSeries servers to support:
- Attachment of ISC-3 links to HiPerLinks (ISC-2) on G5/G6 servers
- Compatibility mode (CHPID types CFS and CFR) definitions for ISC-3 links

Greater than 24 CPs: IBM intends to support greater than 24 CPs, or combined CPs and zAAPs, in a single LPAR in the future on the appropriate releases of z/OS and z/VM in combination with designated zSeries servers.

Greater than 30 LPARs: On May 13, 2003, IBM made the following statements of direction regarding the z990 and z/OS:
- IBM intends to support up to 60 LPARs on the z990.
- IBM intends to provide support for up to 60 LPARs running z/OS on a single z990 effective with z/OS V1.6.
- IBM intends for z/VM V4.4 or later to provide support for up to 60 Logical Partitions (LPARs) with corresponding support on a z990 or future server.

On October 31, 2003, IBM increased the number of LPARs supported on the IBM @server zSeries 990 from 15 to 30. Based on additional evaluation of requirements, IBM now intends to support greater than 30 LPARs on a future zSeries server.

This new SOD represents a modification to IBM’s previously expressed direction “...to support up to 60 LPARs on z990...” which no longer represents IBM’s intent. When support for greater than 30 LPARs is made available on a future zSeries server, it is IBM’s intention to have support included in z/OS 1.6 and later, and z/VM 4.4 and later.

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

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