IBM zSeries 900 Processor Update

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Session T01

Harv Emery
demeryh@us.ibm.com
Washington Systems Center
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z900 - 2000 and 2001 Announcements

- 64-bit z/Architecture with tri-modal addressing
- 25 General Purpose models and Coupling Facility Model
- Up to 16-way (20 PUs), up to 64 GB memory

- Enhanced Parallel Sysplex
  - ISC-3, ICB-3, IC-3 Peer Mode Links
  - Intelligent Resource Director (IRD)
  - System Managed CF Structure Duplexing

- Enhanced Security
  - Cryptographic Coprocessors
  - PCICCC
  - PCICA

- Enhanced I/O and Connectivity
  - FICON Express
  - FICON CTC
  - OSA-Express
  - HiperSockets

- Availability Enhancements
  - Capacity Upgrade on Demand (CUoD)
  - Concurrent memory upgrade
  - Concurrent I/O Upgrade/Repair
  - Capacity Backup (CBU) Upgrade with Concurrent Downgrade
z900 Design Improvements

- 64-bit z/Architecture™ Implemented
  - 64/31/24-bit Addressing
  - 64-bit General Purpose Registers
  - Arithmetic and logical operations
  - I/O and channel subsystem
  - PR/SM™, SIE, QDIO, Crypto...

- Enhanced branch prediction

- Compression engine in hardware

- Improved decimal performance

- Improved IEEE Floating Point

- Improved storage organization
  - 512 kB L1 cache split - I/D (instructions/data)
  - 32 MB L2 Cache (16 MB 10x Models)
  - Doubled processor storage capability
  - Increased storage bandwidth

- Improved I/O subsystem
  - 24 STIs, 24 GB/sec bandwidth
  - CHPID mapping
  - IRD I/O priority queuing
  - IRD managed channels

- Improved PR/SM hypervisor
  - Defined capacity for IBM WLC
  - IRD weight management
2002 - What's New with z900?

- 16 New z900 Models (2C1 - 216)
  - Approximately 20% more performance
  - Double digit price performance improvement

- Networking Enhancements
  - OSA-Express Enhancements

- I/O Enhancements
  - FICON Express - 2 Gbit links
  - FICON Cascaded Directors (GA January 31, 2003)
    - Two director cascade
  - FCP for Linux (LA June 15, 2002)
    - Full Fabric Support

- Parallel Sysplex Enhancements
  - CFCC Level 12
    - 64-bit, 48 tasks
    - Structure duplexing
  - Message Time Ordering

- Availability
  - Customer Initiated Upgrade (CIU)

- Linux Security Enhancements
  - IFL support of PCICA

- New "Stealth Black" HMC, TKE
z900 Models 101 - 216 Relative Performance

12 PU MCM: 9 CPs + 2 SAPs
+ 1 Spare, 2 x 8 MB L2 cache,
2 Memory Cards, 1.3 ns.

20 PU MCM: 16 CPs + 3 SAPs
+ 1 Spare, 2 x 16 MB L2 cache,
4 Memory Cards, 1.09 ns.
**z900 Capacity Models 1C1 - 2C9**

**20 PU MCM:** 16 CPs + 3 SAPs + 1 Spare, 2 x 16 MB L2 cache, 4 Memory Cards

1.3 ns

1.09 ns
# z900 MSUs per Hour (for pricing)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20 PU</td>
<td>20 PU</td>
<td>12 PU</td>
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<tr>
<td><strong>Model</strong></td>
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<td>115</td>
</tr>
<tr>
<td>216</td>
<td>535</td>
<td>116</td>
</tr>
</tbody>
</table>

Caution: Don't use MSUs or MIPs for capacity planning.
**zSeries**

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**z900 20-PU MultiChip Module (MCM)**

- **CMOS Technology**
  - 1xx - CMOS 8S - copper
  - 2xx - CMOS 8SE - copper

- **35 Chips**
  - 30 chips CMOS 8SE or 8S

- **MCM Packaging**
  - 127.5 mm x 127.5 mm
  - Over 2.5 billion transistors
  - 20 Processor Units (PUs)
    - 17.9 mm x 9.9 mm
    - 47 million transistors
    - L1 cache/CP
      - 256 KB I-cache
      - 256 KB D-cache
    - 1.3 (1xx) and 1.09 ns (2xx) Cycle Time
  - 8 System Data (SD) cache chips
    - L2 cache
      - 234 million transistors
      - 4 MB/chip
      - 2 x 16 MB/cluster per MCM
  - 2 Storage Control (SC) chips
  - 4 Memory Bus Adapter (MBA) chips
  - 1 Clock (CLK) chip
  - 101 Glass Ceramic and 6 Thin Film layers
    - 1 km of wire

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**Technology Excellence**

World's Densest Logic Package
## Processor Options z900

<table>
<thead>
<tr>
<th>Options</th>
<th>PUs</th>
<th>CPs</th>
<th>SAPs</th>
<th>IFLs*/ICFs*</th>
<th>Spare PUs*</th>
<th>CUoD*/CIU*/CBU* Engines Available</th>
</tr>
</thead>
</table>
| 100     | 12  | 0   | 2    | 0           | 1 - 9* (ICFs) | 9                                | 8
| 101     | 12  | 1   | 2    | 3           | 8          | 9                                | 8
| 102     | 12  | 2   | 2    | 3           | 7          | 8                                | 7
| 103     | 12  | 3   | 2    | 3           | 6          | 7                                | 6
| 104     | 12  | 4   | 2    | 3           | 5          | 6                                | 5
| 104     | 12  | 5   | 2    | 3           | 4          | 5                                | 4
| 106     | 12  | 6   | 2    | 3           | 3          | 4                                | 3
| 107     | 12  | 7   | 2    | 2           | 2          | 3                                | 2
| 108     | 12  | 8   | 2    | 1           | 1          | 2                                | 1
| 109     | 12  | 9   | 2    | 0           | 1          | 1                                | 0
| 1C1/2C1 | 20  | 1   | 3    | 5           | 15         | 16                               | 15
| 1C2/2C2 | 20  | 2   | 3    | 5           | 14         | 15                               | 14
| 1C3/2C3 | 20  | 3   | 3    | 5           | 13         | 14                               | 13
| 1C4/2C4 | 20  | 4   | 3    | 5           | 12         | 13                               | 12
| 1C5/2C5 | 20  | 5   | 3    | 5           | 11         | 12                               | 11
| 1C6/2C6 | 20  | 6   | 3    | 5           | 10         | 11                               | 10
| 1C7/2C7 | 20  | 7   | 3    | 5           | 9          | 10                               | 9
| 1C8/2C8 | 20  | 8   | 3    | 5           | 8          | 9                                | 8
| 1C9/2C9 | 20  | 9   | 3    | 5           | 7          | 8                                | 7
| 110/210 | 20  | 10  | 3    | 5           | 6          | 7                                | 6
| 111/211 | 20  | 11  | 3    | 5           | 5          | 6                                | 5
| 112/212 | 20  | 12  | 3    | 4           | 4          | 5                                | 4
| 113/213 | 20  | 13  | 3    | 3           | 3          | 4                                | 3
| 114/214 | 20  | 14  | 3    | 2           | 2          | 3                                | 2
| 115/215 | 20  | 15  | 3    | 1           | 1          | 2                                | 1
| 116/216 | 20  | 16  | 3    | 0           | 0          | 1                                | 0

* Note: Indicates maximum number. Sum of CPs, SAPs, ICFs, IFLs and spare PUs always equals total PUs.

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T01:10
**z900 Concurrent Memory Upgrade**

- ### Concurrent Memory Upgrade
  - LIC CC nondisruptive memory activation up to size supported by currently installed cards
  - Add to OS/390 or z/OS partition using Dynamic Storage Reconfiguration 2 (DSR/2)

- ### Prerequisites
  - z900 Server, LPAR mode
  - Must have spare memory capacity on installed cards, otherwise disruptive
  - Must redefine additional memory to partition as "Reserved Storage"

- **Note:** No CBU for memory

---

**Memory Card Size and Number of Cards**

<table>
<thead>
<tr>
<th>Total Storage (GB)</th>
<th>Models 100-109</th>
<th>Models 110-116</th>
<th>Models 1C1-1C9</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4 GB x 2</td>
<td>Not Offered</td>
<td>Not Offered</td>
</tr>
<tr>
<td>6</td>
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</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8 GB x 2</td>
<td>4 GB x 4</td>
<td>4 GB x 4</td>
</tr>
<tr>
<td>12</td>
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<tr>
<td>16</td>
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<td></td>
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<tr>
<td>18</td>
<td>16 GB x 2</td>
<td>8 GB x 4</td>
<td>8 GB x 4</td>
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<tr>
<td>20</td>
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<tr>
<td>32</td>
<td></td>
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<tr>
<td>40</td>
<td>Not Offered</td>
<td>16 GB x 4</td>
<td>16 GB x 4</td>
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<tr>
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<tr>
<td>64</td>
<td></td>
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</table>

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zSeries CBU, CUoD and CIU Summary

- **CUoD - Capacity Upgrade on Demand**
  - Standard machine function (not ordered, no feature number)
  - Nondisruptive addition of CPs (model upgrade), ICF/IFL, and z900 memory
    - Addition of CPs to z800 subuni or subdyadic models changes CP capacity. Requires z/OS or OS/390 IPL.
  - Exploited by CBU, CIU and IBM ordered/installed MES upgrades
  - No support for downgrade RPQs - always disruptive

- **CBU - Capacity Backup**
  - Nondisruptive temporary addition of CPs ONLY in an emergency situation
  - CBU contract required to order CBU features and CBU LIC CC
  - Customer (or IBM) activates upgrade for test or temporary emergency
  - Nondisruptive downgrade required after test or recovery completed

- **CIU - Customer Initiated Upgrade (New!)**
  - Customer capability to order and install upgrades
  - CIU feature ordered to initiate contract and administrative setup
  - Customer orders and installs upgrade via Resource Link and RSF
  - Permanent upgrades only
  - No support for downgrade RPQs
zSeries Capacity Backup

- **Who Needs It?**
  - Customers who have a requirement for robust Disaster Recovery

- **What Is It?**
  - Temporary, nondisruptive addition of one or more CPs
    - Memory, ICFs, IFLs, and channels not included
  - Must plan ahead for memory and connectivity requirements
  - Contract between IBM and customer
  - Needs "spare" PUs and pre-positioned CBU configuration

- **Nondisruptive temporary upgrade or test process**
  - Execute CBU from HMC
  - Configure CP(s) online to partition
    - Predefine as "Reserved" CP(s)

- **Nondisruptive downgrade process**
  - Required after recovery or test completed
  - Follow procedures to quiesce workload
  - Configure CBU CP(s) off-line
  - Execute downgrade from HMC
zSeries CIU

- **Order CIU, Setup Process**
  - Qualification and pricing
  - ID Authorization

- **Customer Order**
  - Configure on Resource Link
  - CPs, ICFs, IFLs, Memory
  - Secondary Approval (Option)
  - Resource Link communicates with Remote Support Facility (RSF) to stage order and prepare download

- **Customer Install**
  - Customer notified order ready
  - Access Support Element (SE) via Hardware Management Console (HMC)
  - "Perform Model Upgrade"
  - Code obtained from RSF and installed on Target machine
Example of a z900 CIU Order

**41552 (TESTBED3)**

- **Customer number:** 8497001
- **Machine type:** 2064
- **Machine serial:** 41552
- **Machine name:** TESTBED3

<table>
<thead>
<tr>
<th>Current Configuration</th>
<th>Ordered Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model: 1C6</td>
<td>1C8</td>
</tr>
<tr>
<td>ICF: 1</td>
<td>3</td>
</tr>
<tr>
<td>Linux: 0</td>
<td>0</td>
</tr>
<tr>
<td>SAP: 3</td>
<td>3</td>
</tr>
<tr>
<td>Memory: 16</td>
<td>16</td>
</tr>
<tr>
<td>CBU: N/A</td>
<td></td>
</tr>
</tbody>
</table>

- A pre-negotiated price agreement exists for this machine.

**Order History:**

- **Order number:** LD57HTWS
- **Order status:** New order
- **Date status updated:** 02/19/2002 05:17:56 PM
z900 I/O Frames and Cages

- **zSeries nI/O Cages**
  - Up to 256 CHPIDs available (no blocked CHPIDs)
  - A and/or Z-Frame
  - 7 times the I/O bandwidth of G5/6 I/O cage
  - Slots for 28 new technology I/O cards
    - Up to 15 ESCON channels per card
    - Two Native FICON, FICON Bridge, or FCP channels per FICON/FICON Express card
    - Up to 4 double-speed coupling links per card
    - Two OSA-Express ports per card
    - Two PCI CC/CA engines per card
    - All hot plug, hot repair, hot swap
  - Up to 256 channels in one cage

- **Compatibility cI/O Cages**
  - New build or MES from G5/6
  - Z-Frame only
  - Investment protection
    - Parallel channel cards
    - OSA-2 FDDI
    - ESCON 4 port channel cards (MES only)

- **B-Frame**
  - Optional Internal Battery Feature
  - Local Uninterrupted Power Source
  - General Purpose Models: 3.5 to 20 minutes

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**Channel CHPID Assignment**
- Any port any CHPID
- All 256 CHPIDs available (no blocked CHPIDs)
- CHPID Availability Mapping Tool
New "Stealth Black" HMC, TKE, and Monitors

HMC Feature #0074 includes DVD RAM, TR, Ethernet
Not available: WAC and 3270 Card
Monitors: #6092 and #6093

Old HMCs OK - z800 or z900:
HMC #0073 + #0047 DVD
HMC #0061 + #0047 DVD

SE/Alt SE must have identical configuration:
FC 0062 - TR on SE
FC 0063 - Ethernet on SE

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z900 20-PU Logical Structure

35 logic chips in total on a 20-PU MCM
zSeries Security

- **Cryptographic Hardware**
  - Cryptographic Coprocessor(s) Facility (CCF)
  - PCI Cryptographic Coprocessors (PCICC)
  - PCI Cryptographic Accelerator (PCICA)

- **Enables End-to-End Security**
  - Tamper proof CCF and PCICC (FIPS 140-1 Level 4)
  - Traditional TDES Encryption/Decryption
  - Digital Signature function
  - Secure Sockets Layer (SSL)
  - User Defined Extensions (on PCICC)

- **z/OS ICSF**
  - Manages cryptographic hardware facilities
  - Routes requests for crypto services

- **Performance**
  - Up to 19 times over software for RSA Digital Signatures Generate
  - Up to 7000 SSL handshakes/sec on z900 Model 216
    (1300 SSL handshakes/sec on z800 Model 004)

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*Industrial strength security with excellent performance for e-business applications*
**zSeries PCI Cryptographic Accelerator Card**

- **Dual PCI Cryptographic Accelerator Card**
  - Up to 6 features, 12 processors, total
  - Total of PCI CA and PCI CC features limited to 8
  - Provides increased SSL throughput and price performance (> 50%)
  - High performance asymmetric encryption (Public Key) accelerator
  - Up to 2,100 SSL handshakes/sec per feature
  - Up to 7000 SSL handshakes/sec on z900 Model 216
    (1300 SSL handshakes/sec on z800 Model 004)
  - Limit is based on CP capacity, not PCICA
  - Linux support on CP or IFL (New!)
    - Via PKCS #11 API
    - IFL support fulfills 10/01 SOD
Dual PCI Cryptographic Coprocessor Feature - 0861

- Up to 8 features, 16 processors total
- High performance
- Flexible - TDES, SSL, etc.
- Tamperproof (FIPS 140-1 Level 4)
- Encryption of Transactions
- Network Encryption
- Support of TDES and SSL
- User Defined Extensions (UDX)
  - Customize to user requirements
  - Deploy new standard functions rapidly
  - Enable migration from IBM 4753 channel attached crypto units
**z900 Connectivity**

**Network Connectivity**

- **Value based on**
  - Up to 24 media speed ports for end-user connectivity
  - 12 OSA-Express Adapters
  - Any combination of
    - Gigabit Ethernet
    - Fast Ethernet
    - ATM 155 Mbps
    - Token-Ring 4/16/100 Mbps
  - HiperSockets
    - Network within server

**Storage Network Connectivity**

- FICON Cascaded Directors
- FCP full fabric switch support

**Parallel Sysplex Connectivity**

- Advanced zSeries connections
  - ISC-2
  - ICB-2
  - ICB-3
  - IC-3

**Channel Connectivity**

- FCP Channels
- Native FICON
- FICON Bridge
- ESCON
- Parallel

**Very large end-to-end bandwidth**
zSeries Network Connectivity

- **Open System Adapter (OSA) Express Card**
  - Gigabit Ethernet
  - Fast Ethernet
  - 155 ATM
  - Token-Ring (4/16/100 Mbit)
  - Up to 24 ports on 12 cards
  - Faster, more cost effective than channel attached control units

- **HiperSockets**
  - High speed "partition to partition" TCP/IP communications
  - No external network dependency
  - No hardware or cables required
  - Internal to server
  - Up to four internal networks
  - Faster, secure, no cost option

- **OSA-2 FDDI (z900 only)**

- **Statements of Direction**
  - No ATM support beyond z800 and z900
  - No FDDI support beyond z900
zSeries

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z900 OSA-Express Features

- Up to 12 cards (features), 24 channels per system
  - z900 new I/O cage only
  - Two ports per card, One CHPID per port
  - Feature conversion on G5/6 upgrade to z900

- Token-Ring (4/16/100 Mbps) - 2367
  - 4/16/100 Mbps auto negotiation
  - QDIO (TCP/IP), non-QDIO (SNA/APPN/HPR and TCP/IP)
  - Replaces OSA-2 TR

- Fast Ethernet - 2366
  - 10/100 Mbps auto negotiation
  - QDIO (TCP/IP), non-QDIO (SNA/APPN/HPR and TCP/IP)

- 155 ATM - 2362, 2363 (SOD - No future support)
  - SM (single mode) or MM (multimode) Fiber card
  - QDIO (TCP/IP), non-QDIO (SNA/APPN/HPR and TCP/IP)

- Gigabit Ethernet - 2364, 2365
  - LX (long wavelength) or SX (short wavelength)
  - LX with MCP - multimode fiber at reduced distances
  - QDIO (TCP/IP) - (use Enterprise Extender or TN3270 for SNA access over TCP/IP)
OSA-Express enhancements for QDIO mode

- Multiple secondary router settings
- IPv6 support on Gigabit and Fast Ethernet for z/OS V1.4 and Linux
  - Positions zSeries for explosive growth in IP device attachments
  - Minimizes need for Private Address spaces (Network Address Translation - NAT) to manage addressing limits
- Full Virtual LAN (VLAN) support for Linux
  - Separates a common physical network into a number of Logical LANs
  - Can reduce network overhead and traffic
  - Provides more secure isolation when multiple stacks share OSA-Express
- Simple Network Management Protocol (SNMP) for z/OS V1.4 and Linux
  - Onboard SNMP subagent and MIB minimizes management dependencies
    - Eliminates OSA/SF to manage SNMP data for OSA-Express
    - Operating systems have direct access to OSA-Express MIB
  - "GET" function retrieves real-time data
- Address Resolution Protocol (ARP) cache management
  - Linux: Query ARP table (IPv4)
  - Linux and z/OS V1.4: Purge APR table (IPv4)
  - Improved problem diagnosis and resolution for Linux and z/OS environments
- Broadcast support for z/OS V1.4, Linux and z/VM™
  - QDIO adapters can support e-mail, print/file server applications using broadcast
**FICON Express Characteristics**
- 2 channels per feature
- Up to 96 channels, 32 per zSeries I/O Cage
- 2 or 1 Gigabit autonegotiated, full duplex
- LC Duplex Connector (Reduced size, same as ISC-3)
- Data Bus - 64 bits wide, 66 MHz
- Channel Processor - 333 MHz

**FICON Express LX - 2319**
- 9 micron single mode fiber
  - Unrepeated Distance - 10 km
    (20 km RPQ at 1 Gbit, 12 km at 2 Gbit)
- Multimode fiber with mode conditioning patch cable
  - Unrepeated Distance at 1 Gbit - 550 meters
  - Distance at 2 Gbit - NOT SUPPORTED

**FICON Express SX - 2320**
- 50 micron multimode fiber
  - Unrepeated Distance at 1 Gbit - 500 meters
  - Unrepeated Distance at 2 Gbit - 300 meters
- 62.5 micron multimode fiber (ESCON standard fiber)
  - Unrepeated Distance at 1 Gbit - 250 meters
  - Unrepeated Distance at 2 Gbit - 120 meters

**Original zSeries FICON - 1 Gigabit ONLY**
- Features: LX - 2315 and SX - 2318
- Supported, no longer orderable
- Larger SC Duplex Connectors
- Bus - 32 bits wide, 33 MHz
- Distance restrictions - Same as Express at 1 Gbit
FICON Express - Breaking the Barrier

I/O Operations per second*

- zSeries FICON Express
- FICON z900
- S/390 FICON
- FC G5/G6
- ESCON

Effective Bandwidth MBytes and Gbits / sec **

- FICON Express 2Gbps
- FICON Express 1Gbps
- zSeries FICON
- ESCON

FICON Express Channel Card = Feature Code 2319 LX, and 2320 SX
* Channel 100% utilized, 4K block sizes, FC = Native, 1 or 2 GBit
** Using highly sequential 6x 27k block size, mixed reads and writes

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**FICON Cascaded Directors (1/31/2003 GA)**

- **Channel to CU:** two directors with dynamic switching support in both

- **Improved cross site connectivity**
  - Less fiber cabling required
  - More configuration flexibility

**Requirements**
- zSeries - Driver 3G + MCLs
- Single vendor, high integrity fabric
- z/OS V1.4, V1.3 + PTFs
Configuring zSeries FICON and FICON Express

- **FICON Bridge - FCV (1 Gbit only)**
  - Exploit FICON channel with existing ESCON control units
  - FICON, FICON Express - LX ONLY!

- **Direct Attachment - FC**

- **FICON Switched - FC**
  - McDATA ED-5000 (IBM 2032-001)
  - Directors listed below

- **FICON Switched, Cascaded - FC**
  - High integrity fabric features required
  - McDATA ED-6064 and ED-6140 IBM 2042-064 and -140
  - INRANGE FC/9000-001, -128, -256 IBM 2042-001, -128, and -256

- **Linux Open Fibre Channel Fabric - FCP**
  - SCSI on Fibre Channel
  - Homogeneous, single vendor fabric
  - Fibre channel switch support
    - Ficon Directors listed above
    - Plan carefully for protocol intermix especially with FICON Cascade
    - IBM/Brocade Switches (FCP only)
  - FCP to SCSI Bridge
  - FCP to FC-AL Bridge
FICON Express - 2 Gbit Links

- **Direct Attachment**
  - IBM Enterprise Storage Server 800

- **Switched and Cascaded Connectivity**
  - Director upgrades may be needed
  - McDATA ED-6064 and ED-6140
  - IBM 2042-064 and -140
  - INRANGE FC/9000-001, -128, -256
  - IBM 2042-001, -128, and -256

- **DWDM and Optical Amplifiers**
  - Cisco ONS 15540 ESP (LX, SX) and optical amplifier (LX, SX)
  - Nortel Optera Metro 5200* and 5300E* and optical amplifier
  - IBM 2029 Fiber Saver*

*2 Gbit support expected: LX - 4Q02, SX - 2H03

- **Transparent auto-negotiation between ports establishes link speed**

- **Compared to 1 Gbit, 2 Gbit links**
  - Improve performance and/or effective bandwidth
  - Allow channel consolidation
  - With cascade, reduce fiber required between sites including GDPS
**zSeries FCP Attachment Options for Linux**

**LA Program - Web form on Resource Link**

**FCP support for limited availability program**

- **FCP Full Fabric Connectivity**
  - Homogeneous, single vendor fabric
  - Fibre channel directors
    - INRANGE FC/9000 (IBM 2042)
    - McDATA ED-6064, -6140, -5000 (IBM 2032-064, -140, -001)
    - IBM 2109-F16/F08/S16/S08 (Brocade 3800/3200/2800/2400)
  - IBM/Brocade Fibre channel switches
  - Devices
    - Enterprise Storage Server

- **FCP to SCSI Bridge**
  - FCP-to-SCSI Bridges (via switch)
    - IBM 2108-G07 SAN Data Gateway
  - FCP-to-FC-AL bridge (via switch)
    - McDATA ES-1000 Loop Switch (IBM ES-2031-L00)

**Initially, no direct attachment to device or bridge**

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**ESCON CTC connectivity** requires a pair of ESCON channels, one defined CTC and one defined CNC. The CTC defined channel is dedicated, no CNC function for I/O. max. 120 LCUs, max. 512 CTC unit addresses per channel.

**FCTC connectivity** requires at least one FICON channel that supports FCTC CU function. If both support, location of FCTC CU is negotiated.

FICON FCTC CU function is provided with FICON FC definition on z900 at 10/01 LIC or later or on z800.

FICON FC channel on G5/6 or z900 at earlier LIC can connect to FICON FCTC CU if partner CEC supports it.

FICON FC channel supporting FCTC CU function also supports FC channel function for other I/O

max. 255 LCUs max. 16K CTC unit addresses per channel
New technology, high-density package
- 16-port channel card (Up to 15 active, at least one spare)
- Active ports - LIC controlled
- ESCON channel increment - 4 channels
- ESCON cards added in pairs as needed for availability
- Only 18 cards needed for 256 channels

New, smaller MT-RJ connector
- 62.5 micron multimode fiber
- Conversion kit needed to connect to existing ESCON duplex fiber optic cabling infrastructure
- Wiring harness available (Fiber Quick Connect)
**zSeries Sysplex**

- **Peer Mode Links (zSeries to zSeries only)**
  - ISC-3 configured as CFP - 2 Gbit LX
  - ICB-3 configured as CBP - 1 GByte copper
  - Internal IC-3 configured as ICP

- **Compatibility Links (zSeries to 9672 G3 - G6)**
  - ISC-3 configured as CFS, CFR - 1 Gbit LX
  - ICB-2 configured as CBS, CBR (z900 to G5/6)

- **Coupling Facility Models**
  - Upgradeable to server models with CPs
  - z900 Model 100 (1 - 9 ICFs, 5 - 32 GB)
    - Links: Up to 42 ISC-3 (RPQ 8P2248), 16 ICB-3, 16 ICB-2, 64 total external
  - z800 Model 0CF (1 - 4 ICFs, 8 - 32 GB)
    - Links: Up to 24 ISC-3, 6 ICB-3, 26 total external

- **zSeries Server with Internal CF**
  - Standard sysplex timer ports
  - Peer and Receiver - Dynamic I/O Definition
  - z900 (1- 15 ICFs, 5 - 64 GB, 32 external links)
  - z800 (1 - 3 ICFs, 8 - 32 GB, 26 external links)
    - ICFs on subunis run at full uniprocessor speed

- **All - CFCC Level 12 (New!)**
  - 64-bit - large structures in control store
  - 48 internal tasks
  - System managed structure duplexing
IBM Coupling Facility Control Code

World’s Leading and Unrivaled Coupling Technology

Level 0
Initial CF
HW and Functions
- Dynamic Alter
- CICS TSQ
- System Logger

Level 1
- Dynamic ICF Dispatch
- ICF Support

Level 2
- Structure Enhancements
  (255/Structure & 1023 Structure/CF)
- VSAM RLS
Level 2
- Systems Management

Level 3
- IMS Shared Message Queue Base

Level 4 - G1 Last Level
- DB2 Availability
- Dynamic CF Dispatching
- ICF Support

Level 5 - G2 Last Level
- DB2 CACHE Duplexing
- Dynamic ICF Expansion

Level 6
- CF Resource Mgmt
  - IC Channel
  - ICB
  - TPF support

Level 7 (3/99)
- Level 1
  - List KEY and List cursor Enhancements

Level 8 (6/99)
- G3/4 Last Level
  - Dynamic ICF Expansion into shared ICFs Structure rebuild

Level 9 (6/00)
- Level 1
  - Continuous Operations
- MQSeries V2.2
  - Multi-system Enclaves IRD Support

Level 10 (10/01)
- Dynamic I/O Peer and Receiver Structure Changes Sender in CF
- z900 GA
  - G5/6 Dr 26
- z900 Dr 3C
- z800 GA
  - z900 Dr 3G

Level 11 (4Q/02)
- Level 1
  - Register Name List and Batch Unlock
- Structure Changes

Level 12 (3/02)
- Level 1
  - Cache Vector index Comparison Enhancement

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System Managed
CF Structure Duplexing

Requirements:
- Sysplex Images -
  - z/OS v1.2 & up
  - APAR OW41617
- Coupling Facilities -
  - ICF or standalone
  - zSeries with CFCC Level 12
  - S/390 G5/6 with CFCC Level 11
  - CF - CF link connectivity

Considerations
- Not all structures supported
- Overhead to duplex
- Storage required to duplex
- See Announcement 102-181 (06/02)

Robust, standard recovery capability
- Ease of use for middleware and ISVs
- Eliminates rebuild delay
- Reduces need for standalone CF
Message Time Ordering - Fast CF Connection to Sysplex Timer

z900 New 2xx Model with ICF and non-Parallel Sysplex LPARs

- New Requirement Timer Attachment

- Required z/OS and OS/390 New Function APAR - OW53831
IBM Fiber Cabling Services for zSeries

- Introduced with z800 and a new alternative for z900
  - A scalable solution - 24 different standard solution packages
  - Fiber optic connectivity expertise deploying a proven methodology
  - Personalized services to effectively plan and install the fiber optic cabling needed for your zSeries with the future in mind

- Addressing the requirements of
  - The Data Center
  - Open Systems Environment
  - Storage Area Network (SAN)

- Incorporating
  - Current fiber optic cabling, connectors, transceivers
  - New industry-standard Small Form Factor (SFF) connectors and transceivers

- With
  - A contracted service for your small, medium, or large enterprise
  - Analysis of the current fiber optic cabling and the zSeries configuration
  - Options customized for your system environment including jumper cables and specialty cables

A flexible, cost-effective, tailored cabling solution
zSeries Summary

- **64-bit architecture**
  - Improved price/performance
  - Interoperability with other 64-bit platforms
  - Exploits large real memory
  - Enhances application support

- **Flexible Performance**
  - Performance
    - Uni-Processor improvements
    - 16-way (4-way on z800) SMP
    - Up to 15 (4 on z800) Linux (IFL) engines
    - More ERP and/or group users
    - Higher throughput for Web-based e-business transactions

- **I/O Connectivity**
  - Significant connectivity improvements and configuration flexibility
    - Up to 96 (32 on z800) 2 Gbit/sec FICON or FCP channels
    - FICON Cascaded Directors
    - OSA-Express
    - HiperSockets

- **Nondisruptive Growth**
  - Dynamic and nondisruptive addition of capacity
    - CP, ICF, IFL, I/O, Memory (z900)
    - CBU upgrades and downgrades
    - Customer Initiated Upgrades (CIU)