



International Technical Support Organization

System z HW Update

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IBM System z Hw Update

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IBM System z family

IBM eServer zSeries 990 – z990 (2084)




- Announced 5/03 – first zSeries Superscalar Server
- 4 models – Up to 32-way
- Specialty Engines
 - CP, IFL, ICF, zAAP
- On Demand Capabilities
 - CJoD, CIU, CBU, On/Off CoD
- Memory – up to 256 GB
- Channels
 - Four LCSSs
 - Up to 1024 ESCON channels
 - Up to 240 FICON Express2 channels
 - Token-Ring, GbE, 1000BASE-T Ethernet
 - Coupling Links
- Crypto Express2
- Parallel Sysplex clustering
- HyperSockets™ – up to 16
- Up to 30 logical partitions
- Operating Systems
 - z/OS, z/VM, VSE/ESA™, z/VSE, TPF, z/TPF, Linux on zSeries

IBM eServer zSeries 890 – z890 (2086)



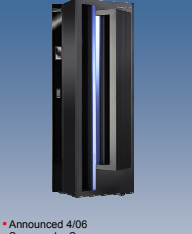
- Announced 4/04 – zSeries Superscalar Server for mid range
- 1 model – Up to 4-way
- 28 capacity settings
- Specialty Engines
 - CP, IFL, ICF, zAAP
- On Demand Capabilities
 - CJoD, CIU, CBU, On/Off CoD
- Memory – up to 32 GB
- Channel
 - Two LCSSs
 - Up to 420 ESCON channels
 - Up to 80 FICON Express2 channels
 - Networking Adapters (OSA)
 - Coupling Links
- Cryptographic Coprocessors
- Parallel Sysplex clustering
- HyperSockets – up to 16
- Up to 30 partitions
- Operating Systems
 - z/OS, z/OS.e, z/VM, VSE/ESA, z/VSE, TPF, z/TPF, Linux on zSeries

IBM System z9 EC – z9 EC (2094)







- Announced 7/05
- Superscalar Server
- 5 models – Up to 54-way
- Granular Offerings for 8 CP engines and below
- Specialty Engines
 - CP, IFL, ICF, zAAP, zIIP
- On Demand Capabilities
 - CJoD, CIU, CBU, On/Off CoD
- Memory – up to 512 GB
- Channels
 - Four LCSSs
 - Multiple Subchannel Sets
 - MIDAW facility
 - 63.75 subchannels
 - Up to 1024 ESCON channels
 - Up to 336 FICON channels
 - Enhanced FICON Express4 Gbps
 - 10 GbE, GbE, 1000BASE-T
 - Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex clustering
- HyperSockets – up to 16
- Up to 60 partitions
- Enhanced Availability
- Operating Systems
 - z/OS, z/VM, z/VSE, TPF, z/TPF, Linux on System z


IBM System z9 BC – z9 BC (2096)



- Announced 4/06
- Superscalar Server
- 2 models – 7 configurable PUs
- Extreme Granularity
- Specialty Engines
 - CP, IFL, ICF, zAAP, zIIP
- On Demand Capabilities
 - CJoD, CIU, CBU, On/Off CoD
- Memory – up to 64 GB
- Channels
 - Two LCSSs
 - Multiple Subchannel Sets
 - MIDAW facility
 - 63.75 subchannels
 - Up to 420 ESCON channels
 - Up to 112 FICON channels
 - Enhanced FICON Express4 Gbps
 - 10 GbE, GbE, 1000BASE-T
 - Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex clustering
- HyperSockets – up to 16
- Up to 30 partitions
- Enhanced Availability
- Operating Systems
 - z/OS, z/OS.e, z/VM, z/VSE, TPF, z/TPF, Linux on System z

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<p>IBM System z9 EC – z9 EC (2094)</p>  <ul style="list-style-type: none"> Announced 7/05 Superscalar Server 5 models – Up to 54-way Granular Offerings for 8 CP engines and below Specialty Engines <ul style="list-style-type: none"> CP, IFL, ICF, zAAP, zIIP On Demand Capabilities <ul style="list-style-type: none"> CUoD, CIU, CBU, On/Off CoD Memory – up to 512 GB Channels <ul style="list-style-type: none"> Four LCSSs Multiple Subchannel Sets MIDAW facility 63.75 subchannels Up to 1024 ESCON channels Up to 336 FICON channels Enhanced FICON Express4 Gbps 10 GbE, GbE, 1000BASE-T Coupling Links Configurable Crypto Express2 Parallel Sysplex clustering HiperSockets – up to 16 Up to 60 partitions Enhanced Availability Operating Systems <ul style="list-style-type: none"> z/OS, z/VM, z/VSE, TPF, z/TPF, Linux on System z 	<p>IBM System z9 BC – z9 BC (2096)</p>  <ul style="list-style-type: none"> Announced 4/06 Superscalar Server 2 models – 7 configurable PUs Extreme Granularity Specialty Engines <ul style="list-style-type: none"> CP, IFL, ICF, zAAP, zIIP On Demand Capabilities <ul style="list-style-type: none"> CUoD, CIU, CBU, On/Off CoD Memory – up to 64 GB Channels <ul style="list-style-type: none"> Two LCSSs Multiple Subchannel Sets MIDAW facility 63.75 subchannels Up to 420 ESCON channels Up to 112 FICON channels Enhanced FICON Express4 Gbps 10 GbE, GbE, 1000BASE-T Coupling Links Configurable Crypto Express2 Parallel Sysplex clustering HiperSockets – up to 16 Up to 30 partitions Enhanced Availability Operating Systems <ul style="list-style-type: none"> z/OS, z/OS.e, z/VM, z/VSE, TPF, z/TPF, Linux on System z 	<p>z9 EC/BC Announcements – 5/07</p> <ul style="list-style-type: none"> LPAR Group Capacity Limit Hardware Decimal Floating Point CFCC Level 15 System-Initiated CHPID Reconfiguration Channel PD enhancement OSA Network Traffic Analyzer Multiple IPL path retry <ul style="list-style-type: none"> ESCON and FICON Power estimation tool SAD – Power Monitoring z9 BC CBU Enhancement z9 BC Single Processor Crypto Express2 z9 BC 2 port FICON Express4 SX z9 Capacity on Demand enhancements HMC and SE <ul style="list-style-type: none"> LDAP user authentication Load from HMC CD-ROM / DVD HTTPS Proxy support TCPIP APIs support Driver 67 Upgrade via EDM 	
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<h2>System z9 LPAR Group Capacity Limit</h2>			
<ul style="list-style-type: none"> Adds capability to define a z/OS LPAR as a member of a group of LPARs <ul style="list-style-type: none"> Group can cross sysplex boundaries Group can include LPARs not participating in a sysplex Adds capability to specify capacity of the group of LPARs in MSUs per hour <ul style="list-style-type: none"> Synergy with LPAR defined capacity PR/SM™ and WLM work together to help: <ul style="list-style-type: none"> Enforce the capacity defined for the group Enforce the capacity optionally defined for each individual LPAR May provide better control of CP resource consumed for WLC pricing Exclusive to System z9 Requires at a minimum: <ul style="list-style-type: none"> z/OS or z/OS.e Version 1 Release 8 (1.8) 			
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System z9 LPAR Group Capacity Limit (group)

Customize/Delete Activation Profiles List : SCZP101

Selecionar	Profile Name	Type	Profile Description
<input type="radio"/>	A1A	Image	Image A1A Image profile.
<input type="radio"/>	A1D	Image	Image A1D Image profile.
<input type="radio"/>	A1E	Image	Image A1E Image profile.
<input type="radio"/>	A1F	Image	Image A1F Image profile.
<input type="radio"/>	A21	Image	Image A21 Image Profile.
<input type="radio"/>	A22	Image	Image A22 Image profile.
<input type="radio"/>	A23	Image	Image A23 Image profile.
<input type="radio"/>	A24	Image	Image A24 Image profile.
<input type="radio"/>	A25	Image	Image A25 Image profile.
<input type="radio"/>	A26	Image	Image A26 Image profile.
<input type="radio"/>	A27	Image	Image A27 Image profile.
<input type="radio"/>	A28	Image	Image A28 Image profile.
<input type="radio"/>	A2B	Image	Image A2B Image profile.
<input type="radio"/>	A2C	Image	Image A2C Image profile.
<input type="radio"/>	A2D	Image	Image A2D Image profile.
<input type="radio"/>	A2E	Image	Image A2E Image profile.
<input type="radio"/>	A2F	Image	Image A2F Image profile.
<input type="radio"/>	DEFAULT	Image	This is the default Image profile.
<input type="radio"/>	DEFAULT	Group	This is the default Group profile.
<input type="radio"/>	GROUP1	Group	Test lpar management group.

Customize Group Profiles: SCZP101 : GROUP1 : Group

Group name :

Group description :

Group capacity :

LPAR group capacity limit

- ✓ group some LPARs and give them an additional group limit
- ✓ the sum of the LPARs' utilization in that group will not exceed the group limit
- ✓ requires at least z/OS 1.8

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System z9 LPAR Group Capacity Limit (LPAR)

Customize Activation Profiles: SCZP101 : TESTE1 : A11 : Processor

Group Name:

Logical Processor Assignments

Dedicated processors

Select Processor Type	Initial	Reserved
<input checked="" type="checkbox"/> Central processors (CPs)	<input type="text" value="2"/>	<input type="text" value="2"/>
<input checked="" type="checkbox"/> Integrated facilities for applications (IFAs)	<input type="text" value="2"/>	<input type="text" value="0"/>
<input checked="" type="checkbox"/> System z9 integrated information processors (zIIPs)	<input type="text" value="2"/>	<input type="text" value="0"/>

Not Dedicated Processor Details for:

CPs IFAs zIIPs

CPs

CP Details

Initial processing weight: 1 to 999 Initial capping

Enable workload manager

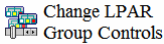
Minimum processing weight:

Maximum processing weight:


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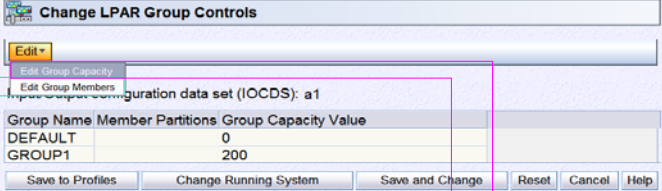
Change LPAR Group Controls

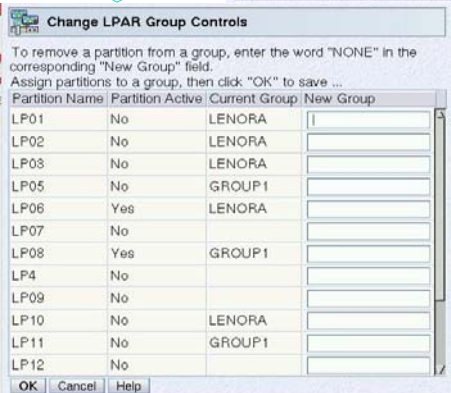


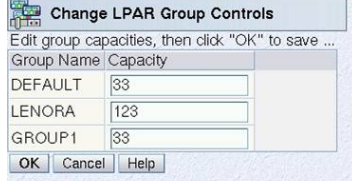
Change LPAR Group Controls




Change LPAR Group Controls







- Capability to define a z/OS® LPAR as a member of a group of LPARs
- Capability to specify capacity of the group of LPARs in MSUs per hour
 - All LPARs in the group have to be at z/OS 1.8 and higher
- PR/SM™ and WLM work together to
 - enforce the capacity defined for the group
 - enforce the capacity optional defined for each individual LPAR

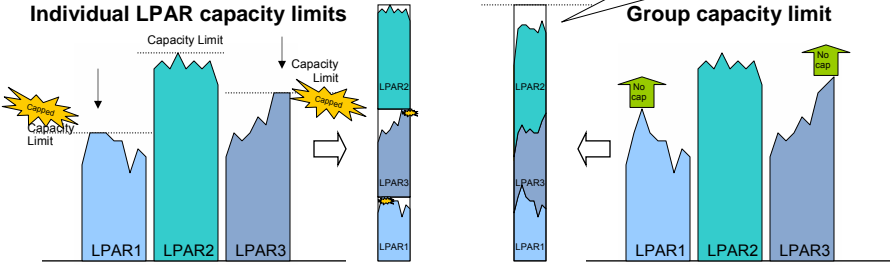

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Enhanced sysplex management

- The ability to define a Group Capacity Limit for not only a single logical partition (LPAR), but for a group of LPARs as well
 - System z to manage the group of LPARs in such a way that the sum of the LPAR capacity limits will not be exceeded.
 - Capacity limits based on four-hour rolling average
 - Available on System z9 EC and z9 BC only
 - Available with z/OS 1.8 and higher




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Hardware Decimal Floating Point facility


- Provides a new z/Architecture® Hardware Decimal Floating Point facility providing 4, 8, and 16 byte data formats, an encoded decimal (base 10) representation for data, instructions for performing decimal floating point computations, and an instruction which performs data conversions to and from the decimal floating point representation.
- Exclusive to System z9 EC and BC
 - No emulation or simulation support is provided for earlier machines.
- Requires at a minimum:
 - z/OS or z/OS.e 1.6 with PTF UA26136
 - z/VM 5.2 for guest support
 - IBM High Level Assembler V1.4 or higher plus applicable service for PTF PK18170
- Additional Information
 - <http://www.research.ibm.com/journal/rd/511/duale.html>


Coupling Facility Control Code Level 15

- All CFs in the configuration have to be at CFCC level 15 to get benefit
 - Requires EDM to GA3 driver (drv 67)
- Increasing the number of supported CF tasks from 48 to 112
- Designed to provide a basis for future* CF enhancements when CFs are at CFCC level 15
- Exclusive to System z9
- Requires at a minimum:
 - z/OS or z/OS.e 1.6 with APAR OA17055 for function and APAR OA17070 for RMF™ support
 - z/VM V5.1 for z/OS guests requiring virtual coupling facility support
 - Exploitation of future* enhancements will require z/OS 1.9 (Planned)

Note: When migrating CF levels, lock, list and cache structure sizes may need to be increased to support the new function. This adjustment can impact the system when it allocates structures or copies structures from one coupling facility to another at different CF levels. The coupling facility structure sizer tool is designed to size structures for you, and takes into account the amount of space needed for the current CFCC levels.

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<h3>CFCC 15 – Expected increase in structure sizes</h3> <ul style="list-style-type: none"> ▪ Approximately 4M growth (64K maximum data entry size) <ul style="list-style-type: none"> – XCF Signalling – WLM IRD, Enclaves – Logger (CICS, SA, IMS, OPERLOG, LOGREC, RRS, HealthChecker, WAS, APPC, IMS CQS, other logstreams) – IMS EMH, CQS shared message queue – MQ shared queues application and administrative – VTAM MNPS (multi-node persistent sessions) – TCP/IP sysplex wide security associations – BatchPipes ▪ Approximately 2M growth (32K maximum data entry size) <ul style="list-style-type: none"> – DB2 GBPs (w/32K page size) – VSAM RLS cache – IMS cache (various types) – variable – CICS temp store, shared data tables ▪ Approximately 1M growth (16K or less maximum data entry size) <ul style="list-style-type: none"> – DB2 GBPs (w/4K, 8K, 16K pagesize), SCA – VTAM GR (ISTGENERIC) – RACF cache – Enhanced Catalog Sharing (ECS) cache – HSM common recall queue – CICS named counter – IMS VSO - variable – JES2 checkpoint – TCP/IP sysplex ports ▪ Approximately 0.5M growth (no data in structure) <ul style="list-style-type: none"> – All lock structures (GRS STAR ISGLOCK, IMS IRLM, DB2 IRLM, VSAM RLS IGWLOCK00, others) 		
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<h3>System-Initiated CHPID Reconfiguration</h3> <ul style="list-style-type: none"> ▪ CHPID reconfiguration deals with the problem where multiple I/O paths need to be configured offline for service actions ▪ SE (R/V component) requests a configure off or on of all the CSS.CHPIDs associated with a particular chid <ul style="list-style-type: none"> – Normally, in a repair action, the operator has to take the channel offline using the operating systems, configuring off all of the associated CSS.CHPIDs in all partitions ▪ MVS™ handles the SE request by configuring all CSS.CHPIDs with the exception of the last path to a device. <ul style="list-style-type: none"> – The operator is required to do this last configure off action manually. – PCI Crypto PCHIDs will not be configured off or on by this process ▪ Requires at a minimum: <ul style="list-style-type: none"> – Z/OS V1.9 – V1.6, V1.7, or V1.8 plus PTF ▪ Messages IOS288A and IOS289I report initiation and completion 		
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System-Initiated CHPID Reconfiguration

- Related IOS messages

IOS288A SYSTEM-INITIATED {ONLINE|OFFLINE} RECONFIGURATION IS IN PROGRESS FOR THE FOLLOWING CHPIDS:
CC,CC-CC,CC,CC-CC ... CC

IOS289I SYSTEM-INITIATED {ONLINE|OFFLINE} RECONFIGURATION HAS COMPLETED. RECONFIGURATION WAS SUCCESSFUL FOR THE FOLLOWING CHPIDS:
CC,CC-CC,CC,CC-CC ...
RECONFIGURATION FAILED FOR THE FOLLOWING CHPIDS:
CC,CC-CC,CC,CC-CC ...

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Channel PD

The screenshot shows the Channel PD software interface. A grid of CHPID status is visible, with columns labeled from 001E to 017D. Each cell contains a status indicator (e.g., 'Online', 'Loss of signal') and a small icon. A 'Channel Problem Determination' dialog box is open, allowing the user to select a search method (by device number, unit address, or subchannel number) and choose an analysis option (analyze serial link status, display message buffer status, or fabric login status). A context menu is also visible over the grid, listing various operations like 'Channel Problem Determination', 'Hardware Messages', and 'Configure On/Off'.

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Channel PD

- Analyze Control Unit Header panel, under Channel Problem Determination task now displays additional information

Analyze Control Unit Header

CSS ID	0	CU-hdr no	0088	Sw busy mask	00000000
Subchnl set	0	CU type	10	Ded alleg mask	00000000
Absolute address	0000000078388A00			CU busy mask	00000000
Subch no	119E	Unit address	00	Shared busy mask	00000000
Device No	8000	MIF image ID	1	Init incomp	00001111

Note: If data is not available or the path is not valid, then those table entries will be blank.

Path	CHPID	Link	CUADD	Node Type	Node Status	Flag / Parm	Type / Model	MFG Plant	Seq. Number	Tag
0	80	..08..	00	Device	Valid	00200100	002105-800 IBM	13	000000022513	0004
1	84	..10..	00	Device	Valid	00200100	002105-800 IBM	13	000000022513	0084
2	83	..0C..	00	Device	Valid	00200100	002105-800 IBM	13	000000022513	0028
3	87	..14..	00	Device	Valid	00200100	002105-800 IBM	13	000000022513	00A8
4										
5										
6										
7										

OK Refresh Cancel

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OSA-Express2 Network Traffic Analyzer

- Designed to provide a new diagnostic trace facility, allowing OSA packet trace records to be sent directly to the z/OS operating system
- With the existing z/OS tools to format, edit and process trace records, allows administrators to
 - monitor network traffic
 - Diagnose / solve network problems
 - May increase availability by reducing the level of effort required for network problem determination
- Exclusive to System z9 and to OSA-Express2 features
 - Gigabit Ethernet LX and SX
 - 1000BASE-T Ethernet
 - when configured as CHPID type OSD (QDIO).
- Requires at a minimum:
 - **z/OS or z/OS.e 1.8**
 - **z/VM 5.1 for guest support**

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OSA-Express2 NTA background

- Strategic network interface for Ethernet connectivity
- Configuration in z/OS Communications Server
 - TRLE definition
 - MPCIPA DEVICE statement and IPAQENET LINK statement for IPv4
 - IPAQENET6 INTERFACE statement for IPv6
- Functions provided for an OSI Layer 3 application
 - ARP offload
 - VLAN
 - Checksum offload
 - TCP segmentation offload
 - By moving these functions to the OSA Hw, the Communications Server reduces the CPU load on the main processors
- The OSA can be shared by multiple stacks, LPARs and CSSs
 - In addition, multiple instances of the Communication Server in one LPAR or in multiple LPARs can share an OSA

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OSA Problem determination

- Diagnosing OSA-Express QDIO problems can be very difficult
 - TCP/IP stack
 - CTRACE and/or packet trace
 - VTAM
 - VIT
 - OSA Trace
 - hardware trace – SE initiated
 - Network trace
 - sniffer trace
- Often it is not clear where the problem is and which trace(s) to collect
- Offloaded functions and shared OSAs can complicate the diagnosis

The diagram illustrates the OSA-Express (OSA-E) architecture. At the top, a yellow circle represents the OSA-E hardware, which is connected to a LAN and a Router. Below the OSA-E, three z/OS environments are shown: z/OS (containing VTAM and TCP/IP), z/VM (containing Stack B), and z/Link (containing Stack C). Various trace points are indicated: 'sniffer trace' at the LAN interface, 'hardware trace' at the OSA-E hardware, 'CTRACE' and 'packet trace' at the VTAM/TCP/IP interface, and 'VIT' at the VTAM component.

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Solution - NTA

- Improve serviceability with an OSA-Express Network Traffic Analyzer (OSAENTA) function
 - NTA trace
- Supported on OSA-Express2 GA3 (in QDIO mode) on z9
 - Refer to the 2094DEVICE Preventive Service Planning (PSP) and the 2096DEVICE Preventive Service Planr (PSP) buckets for the level of the OSA-Express2 LIC
- Allows z/OS Comm Server to collect Ethernet data frames from OSA
 - Not a sniffer trace (but similar in some aspects)
 - No promiscuous mode
- Minimizes the need to collect and coordinate multiple traces for diagnosis
- Minimizes the need for traces from the OSA Hardware Management Console (HMC)

The diagram illustrates the NTA solution architecture. At the top, a yellow circle represents the LAN, containing a green diamond labeled 'OSA-E'. A green diamond labeled 'Router' is connected to the LAN. Below the LAN, three grey boxes represent 'Stack A', 'Stack B', and 'Stack C'. Arrows labeled 'z/OS' point from each stack to the OSA-E. A red label 'NTA trace' is positioned near Stack A. The entire setup is enclosed in a large white circle.

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NTA – Trace data collection

- Data collection is controlled by z/OS Comm Server
- New OSAENTA command
 - Define trace filters and parameters
 - OSA sends trace records to the z/OS stack
- Save and format the data using existing Ctrace facilities
- Collected by OSA
 - Ability to see:
 - ARP packets
 - MAC headers (including VLAN tags)
 - Packets to/from other stacks shared by the OSA (which could be z/VM or z/Linux)
 - SNA packets
 - Plus:
 - the OSAENTA facility captures the Ethernet header which is not available with the current PKTTRACE command
 - The Ethernet header includes the MAC addresses, the VLAN tag, and the other 802.3 fields
 - Packets for other protocols not currently seen by the z/OS IP Communications Server such as ARP and SNA packets can be captured
 - Packets sent and received from other devices shared by the OSA. These include IP stacks in the same LPAR, in other LPARs running z/VM, z/Linux and z/OS. This includes other z/OS images with different releases of z/OS

The diagram is identical to the one in the previous slide, showing the OSA-E connected to the LAN, Router, and three z/OS stacks (A, B, C).

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NTA - Notes on trace data collection

- This example shows **Stack A** using the OSA for IPv4/IPv6 data and also for NTA tracing
 - This configuration requires at least two data devices in the TRLE
 - Stack A activates the OSA for IPv4 and IPv6. This causes z/OS CS to allocate one data device which is shared for IPv4 and IPv6 data
 - Stack A also activates the OSA for NTA tracing. This causes z/OS CS to allocate another data device which is used exclusively for NTA

- This example shows **Stack A** using OSA for the purposes of NTA tracing. This allows one stack to perform the NTA function for other stacks which share the OSA.
 - This configuration requires only one data device in the TRLE
 - Stack A does not activate the OSA for IPv4 or IPv6
 - Stack A does activate the OSA for NTA tracing. This causes z/OS CS to allocate a data device which is used exclusively for NTA

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NTA - Notes on trace data collection

- This example shows a stack which is using the OSA for IPv4/IPv6 data and also for NTA tracing
 - This configuration requires at least two data devices in the TRLE
 - Stack A activates the OSA for IPv4 and IPv6. This causes z/OS CS to allocate one data device which is shared for IPv4 and IPv6 data
 - Stack A also activates the OSA for NTA tracing. This causes z/OS CS to allocate another data device which is used exclusively for NTA

- This example shows a stack which only activates the OSA for the purposes of NTA tracing. This allows one stack to perform the NTA function for other stacks which share the OSA.
 - This configuration requires only one data device in the TRLE
 - Stack A does not activate the OSA for IPv4 or IPv6
 - Stack A does activate the OSA for NTA tracing. This causes z/OS CS to allocate a data device which is used exclusively for NTA

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Steps to enable NTA on the HMC

- Set in the SE under ACSADMIN userid (SOO from HMC)
- This function is only valid on OSD chipids
 - trace all LAN traffic which is visible to external physical OSA ports associated with a given OSA CHPID
 - Activation SE panels shown below

OSA-Express NTA SE Controls


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Multiple path IPL retry


- Multipath IPL retry is designed to help eliminate manual problem determination when IPL'ing
 - Today, the failing CHPID has to be manually de-configured
 - If an error occurs, an alternate path is automatically selected
 - Applicable to ESCON (CHPID type CNC) and FICON channels (FC)
 - z/OS on System z9 provides support for this enhancement
- System requires at a minimum:
 - z/OS V1.7
 - z/OS V1.6 with PTFs
- Channel errors are reported and logged the same way as in the past


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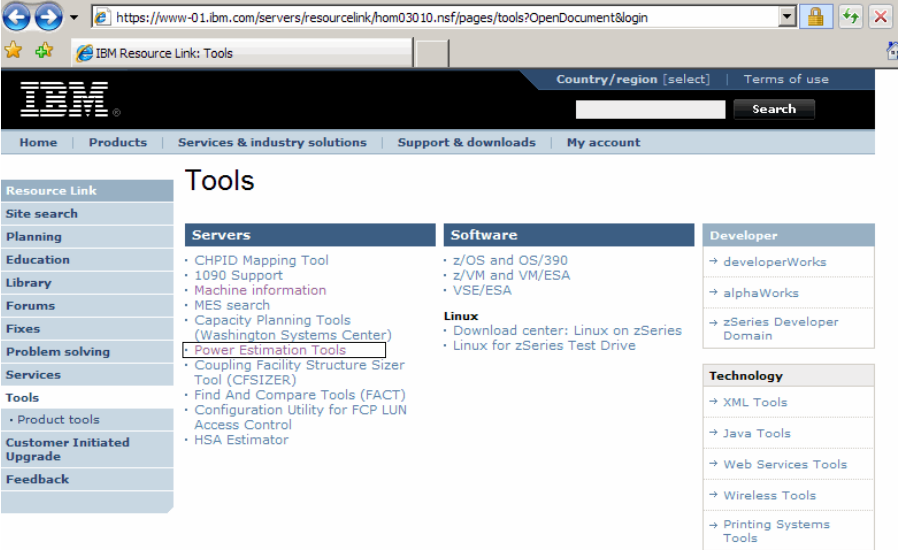
System z9 Power Planning and Monitoring

- Power Estimation Tool
 - Resource Link™ Web site tool designed to estimate power consumption of a specific System z9 machine configuration
 - Required Input: Model, Input Voltage, memory size, number of STI-MP cards, and quantity of each type of I/O feature card.
 - Designed to be more accurate than estimates provided in existing physical planning documentation
- System Activity Display (SAD) Power Monitor
 - Additional function for SAD on the HMC
 - Designed to display Watts and BTUs per hour of power consumption
 - Designed to display cooling air input temperature
- Exclusive to System z9
- Designed to help verify power consumption for currently installed System z9 servers and to help power and cooling planning for new System z9 servers or for upgrades to currently installed System z9 servers.


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Power Estimation Tool



The screenshot shows a web browser window with the URL <https://www-01.ibm.com/servers/resourcelink/hom03010.nsf/pages/tools?OpenDocument&login>. The page features a navigation menu with categories like Home, Products, Services & industry solutions, Support & downloads, and My account. A 'Tools' section is displayed with sub-categories: Servers, Software, Developer, and Technology. The 'Servers' category is expanded, listing various tools, with 'Power Estimation Tools' highlighted. The 'Software' category lists tools for z/OS, z/VM, and VSE/ESA. The 'Developer' category includes developerWorks, alphaWorks, and zSeries Developer Domain. The 'Technology' category includes XML Tools, Java Tools, Web Services Tools, Wireless Tools, and Printing Systems Tools.

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Power Estimation Tool

Configuration

Model: S54

Voltage group: 208 to 240V group

Line voltage: 208

Room temp: <28C

CEC data

Card Name	FC	Quantity	Max
#active processors		62	62
#4 gig memory cards	1504	0	32
#8 gig memory cards	1508	0	32
#16 gig memory cards	1516	32	32
MBA fan out card	0160	32	32
IB coupling card	0167	0	

Cargo Cages

Card Name	FC	Quantity	Max
Power Sequence Controller	6501	0	6
STI-MP Daughter Card	0325	24	24
ISC-daughter card	0218	8	24
16 port ESCON	2323	10	69
ESCON Channel port	2324	128	256
FICON Express LX	2319	0	60

FICON Express SX	2320	0	60
OSA-Express 1000base-T EN	1366	2	24
OSA-Express Fast Ethernet	2366	0	24
OSA-Express GbE LX	1364	0	24
OSA-Express GbE SX	1365	0	24
OSA-Express GbE LX	2364	0	24
OSA-Express GbE SX	2365	0	24
OSA-Express2 10GbE LR	3368	0	24
FICON Express4 10KM LX	3321	30	84
FICON Express4 SX	3322	0	84
FICON Express4 4KM LX	3324	0	84
FICON Express2 2G LX	3319	0	84
FICON Express2 2G SX	3320	0	84
OSA-Express2 GbE LX	3364	0	24
OSA-Express2 GbE SX	3365	4	24
OSA Express2 1000base-T	3366	2	24
Crypto Express2	0863	4	8

Results

System total heat load: 54403 BTU/hr

Utility input power: 15954 W

Calculate Clear Small Config Large Config

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System Activity Display - Power Monitoring

http://9.60.74.28:8080 - P066YFIN: System Activity P066YFIN: PROCESSOR - Mozilla Firefox: IBM Edition

Total System power consumption: 4.7 kW (KVA), 16037 BTU/hr
Air input temperature: 26.2 °C, 79.2 °F

Component	Usage (%)
CEPXL	(50%)
SAPALL	(47%)
IPL	(50%)
IPL 4	(50%)
IPL 7	(50%)
IPL 8	(50%)
IPL 9	(50%)
SAP 0	(81%)
SAP 1	(68%)
SAP 7	(92%)
SAP B	(53%)

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z9 BC – CBU Enhancement

Model R07

J01						
I01						
H01						
G01						
F01	F02					
E01	E02					
D01	D02	D03				
C01	C02	C03				
B01	B02	B03				
A01	A02	A03				
1-way	2-way	3-way				
CP	@	@	@	@	@	@

Model S07

Z01	Z02	Z03	Z04			
Y01	Y02	Y03	Y04			
X01	X02	X03	X04			
W01	W02	W03	W04			
V01	V02	V03	V04			
U01	U02	U03	U04			
T01	T02	T03	T04			
S01	S02	S03	S04			
R01	R02	R03	R04			
Q02	Q03	Q04				
P02	P03	P04				
O02	O03	O04				
N02	N03	N04				
M03	M04					
L03	L04					
K04						
1-way	2-way	3-way	4-way			
#	@	@	@	@	@	@

R07 CBU to S07

S07 – z9 EC

RULES:

- R07 configuration rules for I/O slots/Channels/LPARs remain
- Number of active specialty engines may not be decreased
- Number of active CPs may not be decreased
- CP capacity may not be decreased
- One CBU CP feature required at base speed for each target CP added
- One CBU CP feature required at a different speed for every target CP

= CP or IFL or ICF
@ = Any Specialty Engines. zAAPs and zIIPs have T & Cs

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z9 Capacity on Demand enhancements

- Allow one or more On/Off CoD LICCC records to be stored on the Support Element in an inactivated state.
- These multiple records may have different processing capacity, or there could be one or more records with the exact same processing capacity. (eg.: specialties adds)
 - quicker capability to activate temporary capacity
 - billing begins at activation
 - similar to Customer Initiated Upgrade (CIU) LIC-CC record
 - no new operating system support required
- A new option **View On/Off CoD feature information** on the the Perform Model Conversion panel, when selected, will display the staged orders (Order Number, LICCC resources, and Description) with options:
 - Update List
 - Update description
 - Activate
 - Delete

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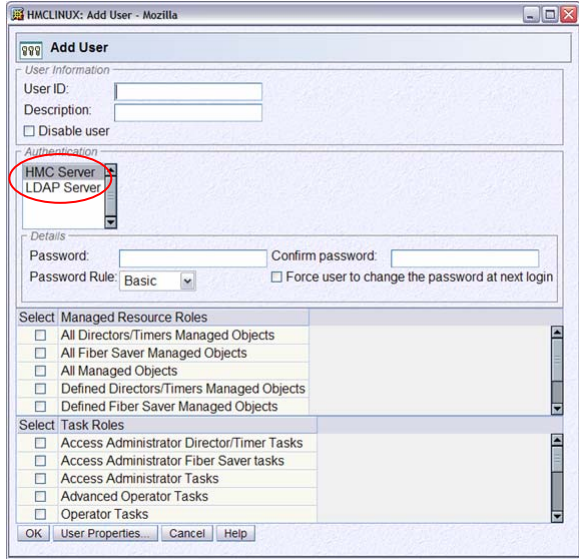
HMC Logon LDAP Authentication

- Provides optional Lightweight Directory Access Protocol (LDAP) support for HMC USERID logon and password authentication
 - HMC USERID settings and roles will still be defined on the HMC
 - USERIDs continue to reside on the HMC
 - LDAP “bind mode” support delegates password authentication to a designated customer LDAP server
 - SSL and non-SSL connection support between the HMC and the LDAP server
- Designed to improve management and audit functions for HMC USERIDs and passwords
 - Authentication is on a per user basis
 - User1 can have LDAP Authentication while User2 can have Local Server authentication
 - Requires a suitable LDAP Server with LAN connectivity to the HMC
- Transparent to operating systems supported on System z9

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HMC LDAP Setup Sample – 1

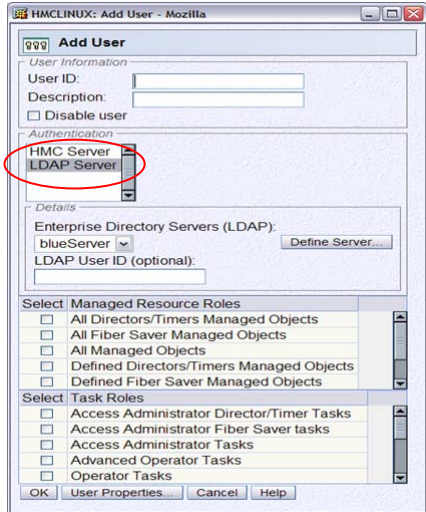


This panel illustrates what an administrator will see when they are creating a new user and selecting the HMC to handle the userid and password authentication

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HMC LDAP Setup Sample – 2



This panel illustrates what an administrator will see when they are creating a new user and selecting a defined LDAP Server to handle the userid and password authentication

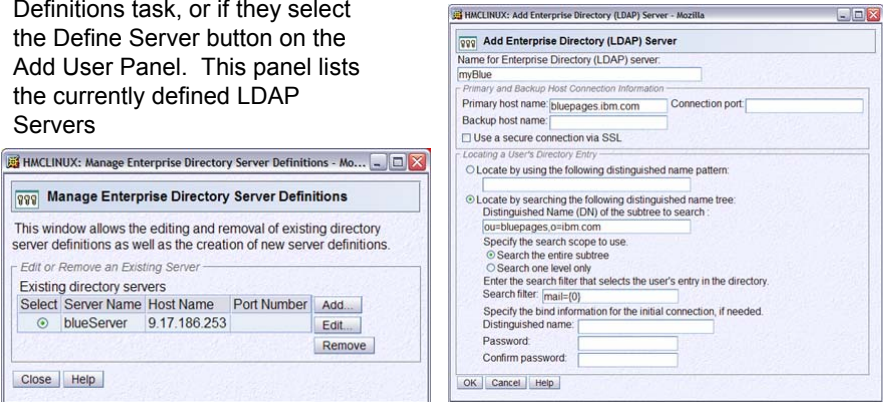
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HMC LDAP Setup Sample – 3

This is the panel that an administrator will see when they either select the Manage Enterprise Directory Server Definitions task, or if they select the Define Server button on the Add User Panel. This panel lists the currently defined LDAP Servers

This is the panel which allows the administrator to create or modify an LDAP Enterprise Directory Server definition



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HMC Load From CD / DVD / Server via FTP

The screenshot displays the HMC interface with the 'Load from CD-ROM, DVD, or Server' dialog box open. The dialog box contains the following fields and options:

- Hardware Management Console CD-ROM / DVD
- FTP Source
- Host computer:
- User ID:
- Password:
- Account (optional):
- File location (optional):

Buttons: OK, Cancel, Help

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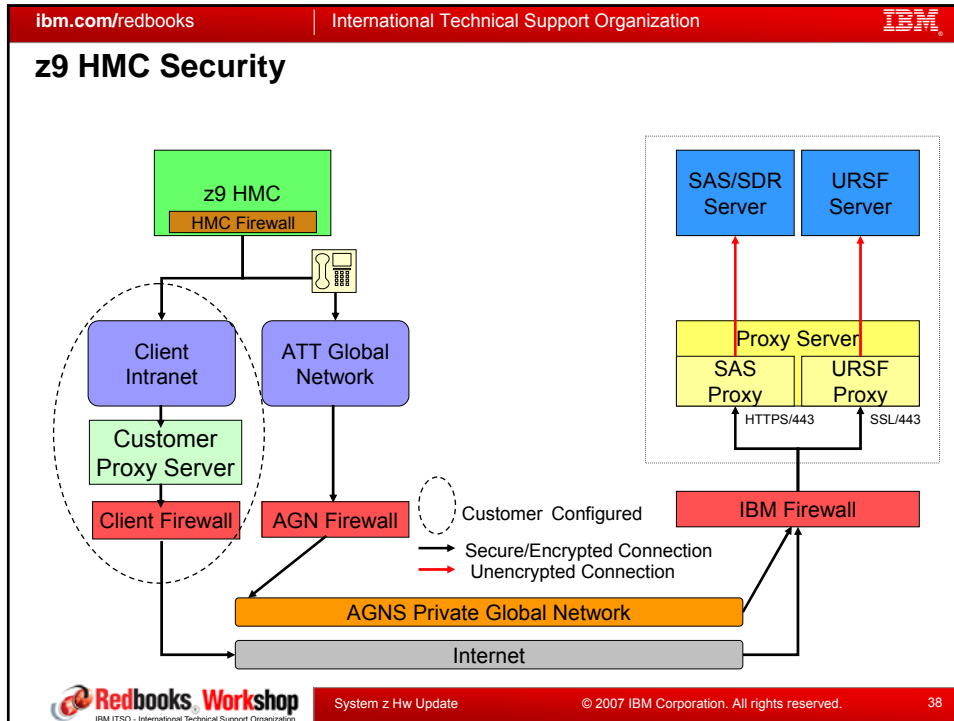
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Other HMC and SE Enhancements

- HTTPS Customer Proxy Server
 - For network connected HMCs
 - RSF can now optionally pass through a customer-supplied HTTPS proxy system
 - HMC provided Secure Sockets Layer (SSL) connections to IBM via phone or a network based (Internet) connections
- Optional z9 TCP/IP APIs (Application Programming Interface)
 - Allows remote management of the System z9 H/W
 - Simple Network Management Protocol (SNMP) APIs
 - Previous releases have supported User Datagram Protocol (UDP) only. This release supports both UDP and TCP/IP
 - [System z Application Program Interfaces - SB10-7030-09.pdf](#) (also available on the HMC views under books)
- Tree style user interface for the z9 Support Element
 - The tree-style GUI, previously available only on the HMC, is now optionally available on the SE

All the items above require HMC and SE at Driver 67

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z9 HMC Security – Internet connection help (1 of 4)

Customize Outbound Connectivity

Enable local system as a call-home server

Local Modem | **Internet** | External Time Source

Allow an existing Internet connection for service
 Note: Review help information to determine if any additional firewall configuration is necessary.

Proxy for Internet Access


Use SSL proxy
 Address: 10.2.100.14 Port: 5000

Authenticate with the SSL proxy
 User: B666372
 Password: [masked]
 Confirm password: [masked]

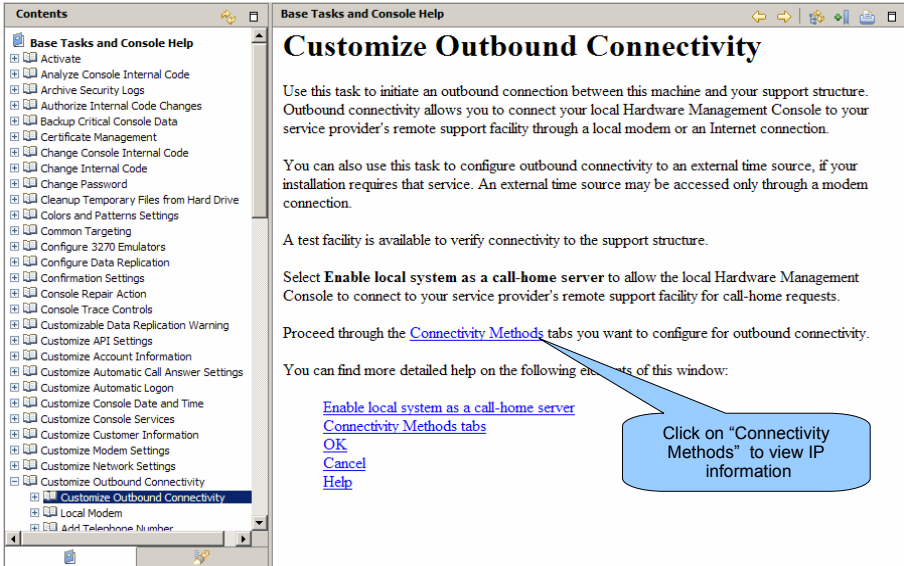
Test...

OK Cancel Help

Select the "Help" button on this panel to view Internet connectivity information

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z9 HMC Security – Internet connection help (2 of 4)



Contents

- Base Tasks and Console Help
 - Activate
 - Analyze Console Internal Code
 - Archive Security Logs
 - Authorize Internal Code Changes
 - Backup Critical Console Data
 - Certificate Management
 - Change Console Internal Code
 - Change Internal Code
 - Change Password
 - Cleanup Temporary Files from Hard Drive
 - Colors and Patterns Settings
 - Common Targeting
 - Configure 3270 Emulators
 - Configure Data Replication
 - Confirmation Settings
 - Console Repair Action
 - Console Trace Controls
 - Customizable Data Replication Warning
 - Customize API Settings
 - Customize Account Information
 - Customize Automatic Call Answer Settings
 - Customize Automatic Logon
 - Customize Console Date and Time
 - Customize Console Services
 - Customize Customer Information
 - Customize Modem Settings
 - Customize Network Settings
 - Customize Outbound Connectivity
 - Local Modem
 - Add Telephone Number

Base Tasks and Console Help

Customize Outbound Connectivity

Use this task to initiate an outbound connection between this machine and your support structure. Outbound connectivity allows you to connect your local Hardware Management Console to your service provider's remote support facility through a local modem or an Internet connection.

You can also use this task to configure outbound connectivity to an external time source, if your installation requires that service. An external time source may be accessed only through a modem connection.

A test facility is available to verify connectivity to the support structure.


Select **Enable local system as a call-home server** to allow the local Hardware Management Console to connect to your service provider's remote support facility for call-home requests.


Proceed through the [Connectivity Methods](#) tabs you want to configure for outbound connectivity.

You can find more detailed help on the following elements of this window:

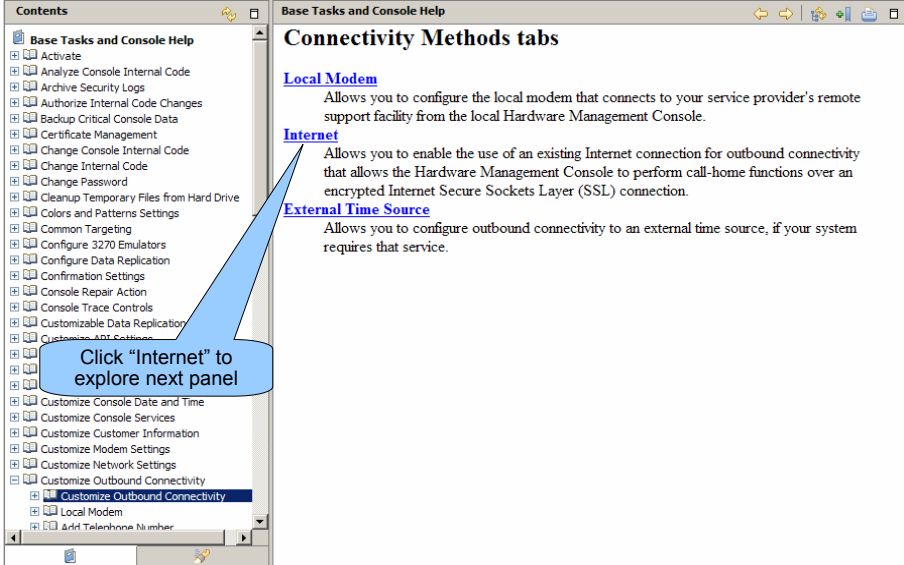
- [Enable local system as a call-home server](#)
- [Connectivity Methods tabs](#)
- [OK](#)
- [Cancel](#)
- [Help](#)

Click on "Connectivity Methods" to view IP information

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z9 HMC Security – Internet connection help (3 of 4)



Contents

- Base Tasks and Console Help
 - Activate
 - Analyze Console Internal Code
 - Archive Security Logs
 - Authorize Internal Code Changes
 - Backup Critical Console Data
 - Certificate Management
 - Change Console Internal Code
 - Change Internal Code
 - Change Password
 - Cleanup Temporary Files from Hard Drive
 - Colors and Patterns Settings
 - Common Targeting
 - Configure 3270 Emulators
 - Configure Data Replication
 - Confirmation Settings
 - Console Repair Action
 - Console Trace Controls
 - Customizable Data Replication
 - Customize API Settings
 - Customize Account Information
 - Customize Automatic Call Answer Settings
 - Customize Automatic Logon
 - Customize Console Date and Time
 - Customize Console Services
 - Customize Customer Information
 - Customize Modem Settings
 - Customize Network Settings
 - Customize Outbound Connectivity
 - Local Modem
 - Add Telephone Number

Base Tasks and Console Help


Connectivity Methods tabs

[Local Modem](#)
Allows you to configure the local modem that connects to your service provider's remote support facility from the local Hardware Management Console.

[Internet](#)
Allows you to enable the use of an existing Internet connection for outbound connectivity that allows the Hardware Management Console to perform call-home functions over an encrypted Internet Secure Sockets Layer (SSL) connection.

[External Time Source](#)
Allows you to configure outbound connectivity to an external time source, if your system requires that service.

Click "Internet" to explore next panel

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z9 HMC Security – Internet connection help (4 of 4)

Contents

- Base Tasks and Console Help
 - Activate
 - Certificate Management
 - Change Console Internal Code
 - Change Internal Code
 - Change Password
 - Cleanup Temporary Files from Hard Drive
 - Colors and Patterns Settings
 - Common Targeting
 - Configure 3270 Emulators
 - Configure Data Replication
 - Confirmation Settings
 - Console Repair Action
 - Console Trace Controls
 - Customizable Data Replication Warning
 - Customize API Settings
 - Customize Account Information
 - Customize Automatic Call Answer Settings
 - Customize Automatic Logon
 - Customize Console Date and Time
 - Customize Console Services
 - Customize Customer Information
 - Customize Modem Settings
 - Customize Network Settings
 - Customize Outbound Connectivity
 - Customize Outbound Connectivity
 - Local Modem
 - Add Telephone Number
 - Edit Telephone Number

Internet

Use this window to enable the use of an existing Internet connection for outbound connectivity that allows the Hardware Management Console to perform call-home functions over an encrypted Internet SSL connection.

This connection makes use of an SSL TCP/IP socket that flows over the Hardware Management Console's default gateway to the internet. In order for the Hardware Management Console to successfully use the Internet, the following items must be properly configured in the [Customize Network Settings](#) task:

- The Hardware Management Console must have a Local Area Network (LAN) adapter that is connected to a network with Internet access.
- The LAN adapter must be configured with a default gateway that provides access to the Internet.
- If a firewall is in place between the Hardware Management Console and the Internet, it must allow outgoing TCP/IP connections on port 443 from the Hardware Management Console to each of the following IP addresses:
 - 129.42.160.48 and 207.25.252.200 (IBM Service to System Authentication Server (SAS))
 - 129.42.160.49 and 207.25.252.204 (allow Hardware Management Console access to IBM Service for North or South America)
 - 129.42.160.50 and 207.25.252.205 (allow Hardware Management Console access to IBM Service for all other regions)

Note: You only need to specify the IP addresses necessary to setup access to SAS and those appropriate for your region.

You can find more detailed help on the following elements of this window:

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System z9 EC and zSeries RAS Overview

	Z900	z990	z9 EC
Microcode Driver Updates	6 Hr Scheduled outage	6 Hr Scheduled outage	Concurrent*
Book Replacement**	Not Applicable	Scheduled Outage	Concurrent
Memory Replacement	Scheduled Outage	Scheduled Outage	Concurrent (Book Offline)
ECC on Memory Control Circuitry (EX: SMI)	Unscheduled Outage	Unscheduled Outage	Transparent
Memory Bus Adapter (MBA) Replacement	Scheduled Outage. Lose connectivity to I/O Domain	Scheduled Outage. Lose connectivity to I/O Domain	Concurrent. Connectivity to I/O Domain remains
STI Failure	As for MBA	As for MBA	As for MBA
Oscillator Failure	Unscheduled Outage	Unscheduled Outage	Transparent
Processor Upgrades	Concurrent	Concurrent	Concurrent
Physical Memory Upgrades	Scheduled Outage	Scheduled Outage	Concurrent (Book Offline)
I/O Upgrades	Concurrent	Concurrent	Concurrent
Spare PUs	1 System	2 / Book	2 / System


*In select circumstances
**Customer pre-planning required, may require acquisition of additional hardware resources


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Avoidable Outages


- **Avoiding additional PORs**
 - MES – Model Upgrade / Add memory
 - Exploit Enhanced Book Availability
 - Flexible Memory and High Availability Configurations
 - LIC Driver Change
 - Plan to exploit Enhanced Driver Maintenance
 - HCD add a Channel SubSystem
 - Predefine with extra partitions
 - Plan to exploit dynamic I/O
 - HCD change MAXDEV (maximum devices) in an CSS
 - Take the MAXDEV default for Subchannel set 0
 - Define Subchannel set 1 at maximum size
 - HCD add an LPAR or move one to a different CSS
 - Define "*" reserved partitions (z/OS 1.6)
 - Define extra, named partitions and do not activate
 - Change I/O definition
 - Use z/OS dynamic I/O support (z/VM)
- **Avoiding LPAR Deactivation/Activation**
 - Change number of CPs, ICFs, IFLs, zIIPs or zAAPs
 - Define "Reserved" CPs, ICFs, IFLs, zIIPs or zAAPs
 - Change partition memory
 - Define "Reserved" memory element(s)
 - Change partition crypto-coprocessor access
 - Predefine candidate crypto-coprocessor access

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LIC Change Planning Recommendations

- **Driver (machine Licensed Internal Code – LIC = microcode) levels**
 - No charge, ordered as an ECA by IBM Service
 - Current HMC driver is applicable to z990 and newer and is required to control z Systems at drivers 63/67
 - Old driver fixes (MCLs) support - *at least* 6 months after newer driver announce
- **Driver and service recommendations – Stay current**
- **Subscribe Machine Serial in Resource Link**
- **Plan MCL apply at least every 2 months (3 months max)**
 - [Plan to exploit Enhanced Driver Maintenance when changing Driver](#)
- **Before a Driver or major LIC MCL change is made:**
 - Apply/test OS maintenance listed in PSP as required to exploit
 - Review documentation from [Resource Link](#) under:
 - Driver "Purpose and Description" from "Library"
 - Driver "Exception Letter" from "Fixes"
 - "EC/MCL Report" from "Machine Information" under "Tools"
 - Update operational procedures as required


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z9 Enhanced Driver Maintenance

- Ability to concurrently install and activate a new driver(*)
 - Can eliminate common planned outage
 - Select window of opportunity within code maintenance stream
 - Like some concurrent patches, may need to vary off/on certain devices
- Concurrently move from one point on major driver N, to a point on major driver N+1
 - Cannot move any-to-any, must move from a specific "from" patch bundle to a specific "to" patch bundle (Sync Points)
 - A limited number of specific crossover bundles will be defined for a driver
- Concurrent crossover from driver N to driver N+1, to driver N+2 must be done serially; no composite moves
- No concurrent back-off possible
- Disruptive driver upgrades are permitted at any time

(*) Requires proper configuration and planning for exploitation

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Questions ?

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Backup Foils


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z9 - 2094 Processor

CSS-0		CSS-1		CSS-2		CSS-3																
CSS.ID (0)		CSS.ID (1)		CSS.ID (2)		CSS.ID (3)																
Up to 15 Logical Partitions		Up to 15 Logical Partitions		Up to 15 Logical Partitions		Up to 15 Logical Partitions																
LP 1	LP 2	LP 3	LP 8	LP A	LP B	LP C	LP D	LP E	LP F	LP J	LP K	LP L	LP P	LP S	LP T	LP U	LP Z					
1	2	3	7	8	1	2	3	4	5	6	8	C	4	5	6	8	9	C	1	2	3	6
0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3
1	2	3	8	8	1	2	3	4	5	6	8	C	4	5	6	8	9	C	1	2	3	6
CSS-0 Subchannels		CSS-1 Subchannels		CSS-2 Subchannels		CSS-3 Subchannels																
SS-0 SS-1		SS-0 SS-1		SS-0 SS-1		SS-0 SS-1																
Not Specified		Not Specified		Not Specified		Not Specified																
Up to 256 CHPIDs		Up to 256 CHPIDs		Up to 256 CHPIDs		Up to 256 CHPIDs																

- The z9 supports 1 to 4 Channel Subsystems (CSS)
 - Each CSS has its own CSS.ID
 - Up to 15 Logical Partitions for a CSS with 60 LPARs maximum for the z9
 - This includes the new place holder logical partitions (*)
 - Each activated logical partition has:
 - LP NAME - MIF.ID - PARTITION.ID
 - Place holder partitions (*) cannot be z9 activated
 - Each CSS has its own set of SS0 subchannels and optional SS1 subchannels for its Logical Partitions
 - Each logical partition only uses I/O (Subchannels/Devices) defined to its host CSS
- Up to a maximum of 256 CHPIDs per CSS
- Up to 1024 channels in total for a z9

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CSS-0		CSS-1		CSS-2		CSS-3																
CSS.ID (0)		CSS.ID (1)		CSS.ID (2)		CSS.ID (3)																
Up to 15 Logical Partitions		Up to 15 Logical Partitions		Up to 15 Logical Partitions		Up to 15 Logical Partitions																
LP 1	LP 2	LP 3	LP 8	LP A	LP B	LP C	LP D	LP E	LP F	LP J	LP K	LP L	LP P	LP S	LP T	LP U	LP Z					
1	2	3	7	8	1	2	3	4	5	6	8	C	4	5	6	8	9	C	1	2	3	6
0	0	0	0	0	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	
1	2	3	8	8	1	2	3	4	5	6	8	C	4	5	6	8	9	C	1	2	3	6
CSS-0 Subchannels		CSS-1 Subchannels		CSS-2 Subchannels		CSS-3 Subchannels																
SS-0 SS-1		SS-0 SS-1		SS-0 SS-1		SS-0 SS-1																
Not Specified		Not Specified		Not Specified		Not Specified																
Up to 256 CHPIDs		Up to 256 CHPIDs		Up to 256 CHPIDs		Up to 256 CHPIDs																

ESCON DEDICATED
CHPID 30
PCHID 106

ESCON RECONFIGURABLE
CHPID 40
PCHID 384


FICON SPANNED
CHPID 60
PCHID 180

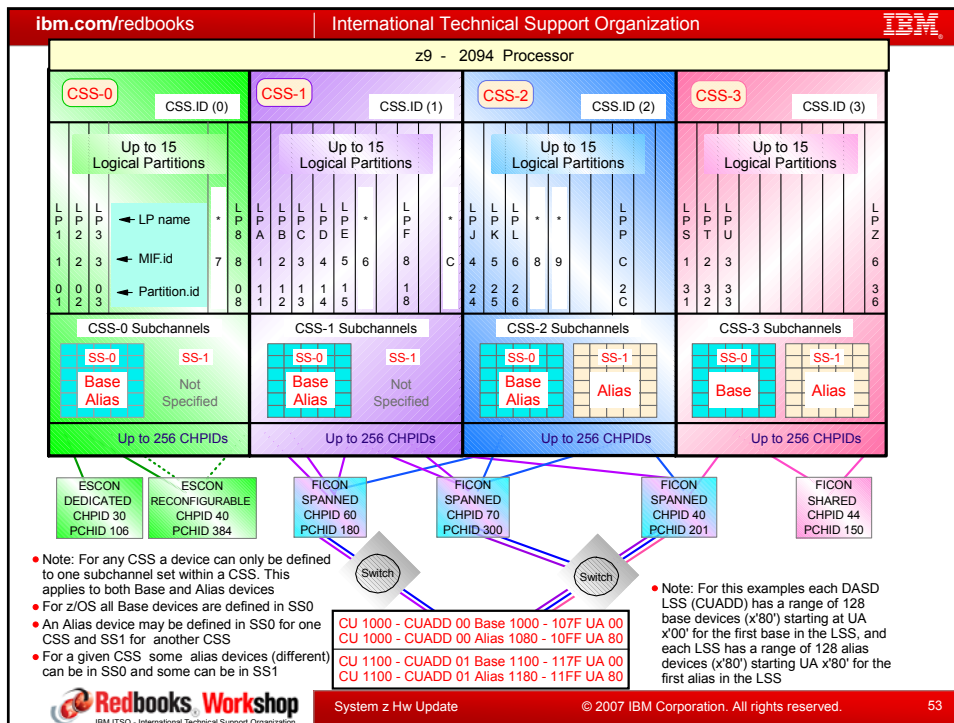
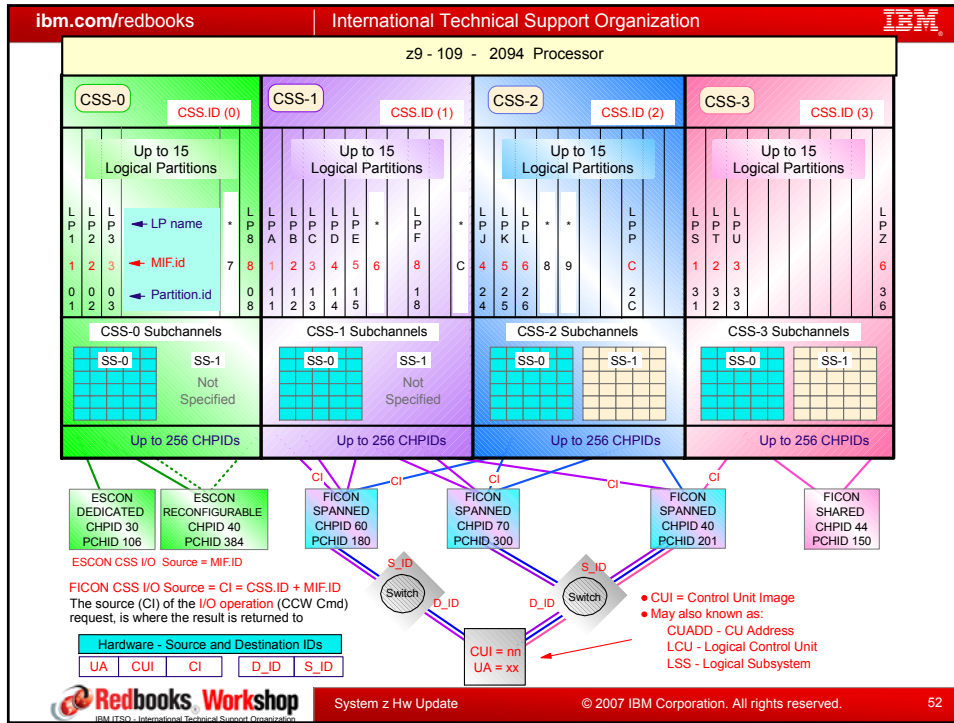
FICON SPANNED
CHPID 70
PCHID 300

FICON SPANNED
CHPID 40
PCHID 201

FICON SHARED
CHPID 44
PCHID 150

- Dedicated - Can only be accessed by one LP in the z9
- Reconfigurable - Accessed by one LP in the CSS, can be configured Offline to the LP, and then Online to another LP in the same CSS
- Shared - Can be accessed (be online) by one or more accessing LPs at the same time, all LPs must be in the same CSS
- Spanned - Can be accessed (be online) by one or more accessing LPs at the same time, the LPs can be in different CSSs
- Note - 1. Duplication of CHPID numbers in the same CSS (LCSS) is not allowed
- Note - 2. Place holder logical partitions (*) cannot be specified in a CHPID Access or Candidate list
- Note - 3. CHPID 40 in CSS 0 and CHPID 40 in CSS 1/2/3 are not the same channel, they have different PCHIDs - 384 and 201
- Note - 4. CHPID 70 in CSS 1 and CSS 2, are a the same channel, it is a spanned channel, with one PCHID value of 300

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Configuration definition flexibility

- CSS System Hardware
 - Memory
 - 2.7GB eSTIs
 - SAP's reside in all Books
 - MBAs, 16 per book and pluggable
 - I/O cards (also contain multiplexers)
 - STI Multiplexers with Dynamic I/O Bus
 - Increased Bus speeds, up to 2GB per I/O card
- MBAs
 - The MBAs are external to the book and plug into the front of the book. Each MBA Fanout card connects two STI cables which gives a total of 16 eSTIs per book.
 - 2 STIs per MBA Fanout Card.
 - ONLY the number of MBA Fanout Cards required by the I/O configuration are plugged.

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Redundant I/O interconnectivity (RII)

- **Dynamic I/O Bus**
 - The alternate path becomes active in the event of a failure or service action that causes one STI to be come unavailable
 - This could be an STI cable, MBA or Book failure or service action on these components
 - The new mother card that holds the two STI cards has only passive components and provides the link between the two STI cards
- **Redundant I/O Interconnect**
 - The 2094 is designed to allow a single book, in a multibook server, to be concurrently removed and reinstalled during an upgrade or repair action while continuing to provide connectivity to I/O resources using a second path from a different book.


NOTE: This does not provide an alternate path for failure or replacement of an eSTI card (daughter or mother)


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CSS Software/Hardware Enhancements

- LCSS
 - Channel Sub-System has been designed to expand the I/O subsystem architecture
 - Up to 4 CSS on 2094 (2 for 2096)
 - similar to z990 (2084): multiple Logical Channel Subsystem concept.
 - CSS Attributes per Channel Subsystem:
 - Up to 256 CHPIDs per CSS: 1024 Channels maximum for z9 EC, 420 on z9 BC
 - 60 Logical partitions for z9 EC (2094), 30 for z9 BC(2096): 15 per CSS.
 - Spanned Logical Channels (IC- 3, iQDIO)
 - Spanned Hardware Channels (not ESCON)
 - up to 2 Subchannel sets per LCSS
 - 63.75K Subchannels for the first Subchannel Set and (64K- 1) for the 2nd

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Coupling Links

- There is no coupling connectivity to any 967x available since only peer mode is supported.
- ICB's: Integrated Cluster Bus (ICB-4 and ICB-3)
 - direct attach to the Processor Book on Systems z9™/2084/2086
 - or via STI-3 cards in the Cargo cages to 2064/2066.
 - Peer ICB function at 2GB/s - up to 10 meters
 - eSTI slots on the book have PCHID assignments when used as ICB-4
 - ICB-3 uses STI-3 Card and runs at 1GB/s
- On IBM System z9™, only the following Coupling Links (ICB) are supported:

Cage	Book slot	MBA Fanout Connectors	PCHIDs	BOOK
	LG01	D1-J00,J01	000-001	3
	LG01	D2-J00,J01	002-003	3
	LG01	D3-J00,J01	004-005	3
A19 Front	LG01	~	~	3
	LG01	D8-J00,J01	00E-00F	3
	~	~	~	~
	LG06	D1-D8-J00,J01	010-01F	0
	LG10	D1-D8-J00,J01	020-02F	1
	LG15	D1-D8-J00,J01	030-03F	2

ICB (Speed)	Feature Code	Source	Destination
ICB-3 (1 GB)	0993	STI-3	206x
ICB-4 (2.0 GB)	3393	Processor Book/MBA	2084/2086/IBM System z9™

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Coupling Links

- **ISC-3 Channel Card**
 - Peer mode support (CHPID type CFP) on Systems z
 - Fiber link distances using WDM
 - **Compatibility mode CFS/CFR is not supported on System z9.**
 - Operates at 2 gigabits/sec
 - Up to 10 Kilometers (unrepeated)
 - The 1Gb ISC card (RPQ) offers greater distance - 20Km
 - **Qualified DWDM distance specifications**
 - Latest references available in Redbooks:
 - IBM System z9 Technical Guide SG24-7124-C
 - IBM System z9 Connectivity HB SG24-5444-0
 - IOCDs definition: Chpid Type = **CFP**
 - Dedicated/Reconfigurable/Shared/Spanned

Protocol	Data transfer rate	Max. repeated distance
ESCON	200 Mbps	100 km ^a
CLO	8 Mbps	40 km ^a
ETR	8 Mbps	100 km ^a
FICON (1 Gbps) ^c	1,062 Gbps	100 km
FICON (2 Gbps) (4 Gbps)	2,125 Gbps	100 km
Fibre Channel FC100 (1 Gbps)	1,062 Gbps	100 km
Fibre Channel FC200 (2 Gbps)	2,125 Gbps	100 km
ISC / ISC-2	1,062 Gbps	40 km
ISC-3 compatibility mode	1,062 Gbps	40 km
ISC-3 peer mode	2,125 Gbps	100 km ^a
ISC-3 peer mode (1 Gbps) ^d	1,062 Gbps	40 km

a. Requires RPO 8P2263 zSeries Extended Distance (8P2262 for S/390).
 b. Effective channel data rate of an ESCON channel is affected by distance.
 c. Including FICON Bridge card.
 d. Requires RPO 8P2197. This RPO provides an ISC-3 Daughter Card which clocks at 1 Gbps in peer mode.

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Coupling Links

- **Internal Coupling (IC) link:**
 - The IC is a linkless connection (implemented in Licensed Internal Code) and so does not require any hardware or cabling.
 - These IC channel types are mapped to **VCHIDs** at POR time, defined in the IOCDs, but do not have a PCHID statement.
 - The **PCHID** range of addresses assigned at POR is **700-7F0**
 - IOCDs definition: Chpid Type = **ICP**
 - can be Dedicated/Reconfigurable/Shared/Spanned
 - The ICP channel path must be connected to another **ICP** channel path by specifying the **CPATH** keyword in the CHPID statement for every **ICP** channel path.

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OSA Express2

- **Integrated Console Controller – OSC:**
 - Console Controller for z890, z990 and z9 can replace 2074s where access to multiple hardware platforms is not required
 - NIP (IPL) and MCS Consoles for multiple LPARs
 - Supports Ethernet- attached TN3270E emulated sessions
 - Exclusive to OSA-Express 1000BASE-T Ethernet
 - (FC 1366 and FC 3366)
 - RJ45 Ethernet LAN attachment
 - New CHPID type OSC required
 - One or Both ports can be configured for ICC
 - Up to 120 console sessions per port
 - CHPID type OSC can be defined as spanned
- **Communications Controller Linux (CCL) – OSN:**
 - Communication Controller for Linux on zSeries (CCL) allows to run the Network Control Program (NCP) on a zSeries machine running Linux operating system.
 - CCL has been developed to assist customers migrate from existing 3745 Hardware

OSA Modes of Operations		
Mode	Chpid	Description
OSA-ICC	OSC	3270 data streams
QDIO	OSD	Protocol-independent when Layer 2
Non-QDIO	OSE	TCP/IP and/or SNA/APPN/HPR traffic
OSA-CDLC	OSN	Channel Data Link Control for Linux NCP

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