



Checklist for a Successful Migration to z990, z890 and zAAP

z890 and z990 Software Considerations

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Topics (as they relate to software)

- **High level description z990/z890**
- **High level description zAAP**
- **High level description cryptography**
- **Checklist**
- **Systems Assurance**

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Introducing the z990 and z890 “breaking the barriers”

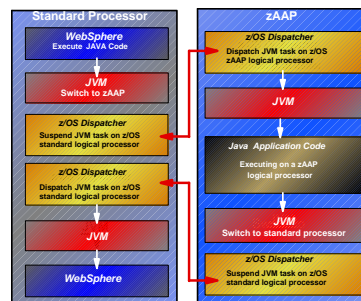
- **Multiple Logical Channel Subsystems (LCSSs)**
- **Up to 30 LPARs**
- **z/Architecture**
 - 64-bit and 31-bit support
- **z990**
 - GA1, GA2, GA3, GA4
- **z890**
 - GA1, GA2



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Introducing zAAP

- **New zSeries Application Assist Processor (zAAP)**
 - Specialty assist processor dedicated exclusively to execution of Java workloads under z/OS
 - Used by workloads with Java cycles – no changes to applications
 - WebSphere 5.1
 - CICS 2,3
 - IMS V7, V8, V9
 - DB2 V7, V8
 - IBM JVM, parts of LE runtime, and z/OS Supervisor are needed to support JVM execution of zAAPs



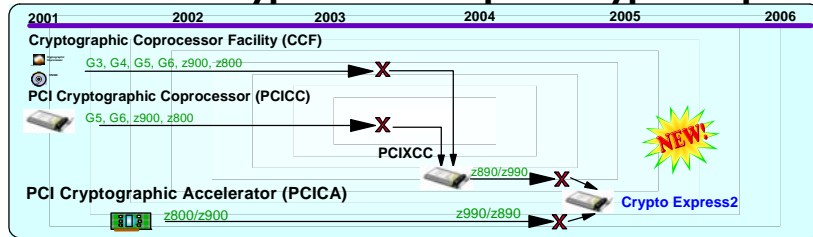
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Introducing zAAP

- **zAAP Prerequisites**
 - z/OS or z/OS.e 1.6
 - IBM SDK for z/OS Java 2 Technology Edition, V1.4 with PTF for APAR PQ86689
- **zAAPs must be jointly configured with general purpose processors within the z/OS LPARs**
- **zAAPs cannot be IPLed**

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z890/z990 Crypto Roadmap to Crypto Express2




- z990/890 includes **NO** standard cryptographic function
- **CP Assist for Cryptographic Function (message security assist) Feature #3863**
 - Allows access to crypto functions from any CP (Limited to CP0 and CPI on z900)
 - Supports limited clear key processing **running on the CP** – Compute intensive!
 - **NOT equivalent to CCF on older machines in function or offload**
- **PCIXCC Feature** – Supports “Secure key” cryptographic processing
- **PCICA Feature** – Supports “Public key” SSL cryptographic processing
- **Crypto Express2** – Combines function and performance of PCICA and PCICC
- **Migration to z990 when CCF, PCICC or PCICA is in use on an older machine usually requires Crypto Express2, PCIXCC and/or PCICA on z890/990.**

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z990 Crypto – October 2004

Hardware / z/OS Crypto Support	G5/G6	z800/z900	z990 GA1	z990-GA2/GA3	z890-GA2 z990-GA4
Hardware	CCF PCICC	CCF PCICC PCICA	PCICA CPACF	PCIXCC PCICA CPACF	Crypto Express2 CPACF
Crypto Function	Clear key and Secure crypto	Clear key and Secure crypto	Clear key only	Clear key and Secure crypto	Clear key and Secure crypto
OS Support	OS/390 R10, z/OS 1.1+	CCF/PCICC: OS/390 R10, z/OS 1.1+ PCICA: z/OS 1.2+	z/OS 1.3 and 1.4	OS/390 2.10 and z/OS 1.2 to 1.6 Web deliverable	z/OS 1.3 to 1.6 Web deliverable

- CP Crypto Assist for Cryptographic Functions (CP Assist)
 - High performance clear key DES and SHA-1 engine in every CP
 - Some DES, TDES applications may also require PCIXCC or Crypto Express2
- Crypto Express2 (3rd Generation Crypto) 
 - I/O Cage (STI) installable feature
 - Designed to add security-rich functions that previously required PCIXCC or PCICA
 - Designed provide the high performance SSL support that previously required PCICA

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Additional z990/z890 cryptographic support documents

- TechDocs site: www.ibm.com/support/techdocs
Search terms: **z990 AND cryptographic**

WP100345 Secure Key or Clear Key: Application Migration & Crypto Hardware on z990

PRS698 Crypto for VTAM® and TCP/IP Applications on the z990 Platform


FLASH10234 Can You Use Crypto for VTAM and TCP/IP Applications on the z990 Platform?

TD101100 zSeries 990 Hardware Cryptography Considerations

WP100245 Understanding the Crypto Hardware Available for zSeries and S/390

FLASH10236 z/OS & OS/390 Software Requirements for the z990

- Redbooks site: www.redbooks.ibm.com
Search terms: **z990 AND cryptographic**

SG24-7070 IBM zSeries 990 (z990) Cryptography Implementation 

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CHECKLIST

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✓ Documentation: Where is it and what is available

- **Resource Link is essential site for z990/z890 migrations**
 - Requires an ID and password
 - register at www.ibm.com/servers/resourcelink
 - All hardware documentation is located through this Web site
 - Purpose and Description documents
 - HIPER Alerts
 - Installation planning documents
 - Libraries for zSeries, Enterprise Servers, IBM eServer pSeries, G5, G6, Multiprise® 3000, IBM TotalStorage®, 2105 Enterprise Storage Server®, 2029 Fibre Saver, 2074 Control Unit, 9032 Model 5 Director, 9037 Model 2 Sysplex Timer®
- **WSC Flashes & Technical Papers @ www.ibm.com/support/techdocs**
 - FlashI0236, FlashI0270, FlashI0271, FlashI0185, TD101238, WPI00345

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✓ Understand software considerations for the z990 and z890

- This is not your normal hardware upgrade
- z/OS 1.1 is not allowed to run on a z990/z890, nor can it exist in the same sysplex with a z990/z890
- More than PTF service is required
 - Compatibility code for selected releases
 - Exploitation code for z/OS 1.4 and all future releases
- Parallel Sysplex considerations
- Cryptographic considerations

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✓ Compatibility Code

- Compatibility code required for **OS/390 2.10***, **z/OS 1.2***, **z/OS 1.3**
 - Restricted to LCSS0, unless running under z/VM
 - Restricted to LPAR IDs ≤ 15 (x'F')
 - Restricted to 15 active LPARs
 - Does not include full cryptographic support

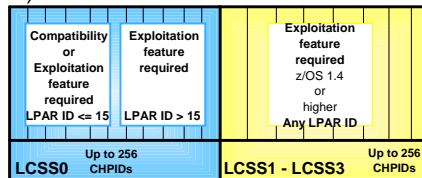
Compatibility level of z/OS or OS/390 can only run in LPARs with ID $\leq 15^*$	Compatibility level of z/OS or OS/390 can only run as z/VM guest**
LCSS0 Up to 256 CHPIDs	LCSS1- LCSS3 Up to 256 CHPIDs

- **Separate Web download**
 - <http://www.ibm.com/servers/eserver/zseries/zos/downloads>
 - Look for: **z990/z890 compatibility for selected releases**
 - Or, hot link off z/OS home page
- **Works with all z990/z890 levels of microcode**
- **Can be installed on non-z990/z890 servers** * Service support withdrawn

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✓ Exploitation Code

- **Exploitation code required for z/OS 1.4 and higher**
 - Separately orderable feature for z/OS 1.4 through December 2006
 - Includes z890/z990 compatibility code
 - Integrated in z/OS and z/OS.e 1.5 and higher
 - Does not include full support for PCIXCC or Crypto Express2
 - Provides support to exploit new hardware features in z990/z890
 - Running in LCSS0 - LCSS3 (z890 only has 2 LCSS)
 - Running in LPAR with ID > 15 (x'F')
 - 30 active logical partitions
 - Dynamic I/O changes in multiple LCSSs
 - Uses Extended Channel Measurement Block (ECMB)
 - new control block



- **Works with all z990/z890 levels of microcode**
- **Can be installed on non-z990/z890 servers**

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✓ Understand HCD requirements

- **New HCD FMID (HCD7708) ships with compatibility support**
 - Same FMID shipped in exploitation support for z/OS 1.4
 - FMID has not changed in z/OS and z/OS.e releases 1.5, 1.6
 - Must use this level of HCD/IOCP for definition of z990 or z890
 - Additional PTF service in hardware and software PSP buckets
- **Needs to be installed on non-z990/z890 systems in the same JESplex if HCD batch jobs route to that system**

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✓ Understand HSA requirements

- **The HSA size varies according to:**
 - Size and complexity of the system I/O configuration
 - Whether or not dynamic I/O configuration is enabled
 - Whether or not concurrent code changes are authorized
- **Define the maximum number of devices that you expect to use now and in the future**
 - changing MAXDEV in an LCSS requires a POR
- **The HCD default for maximum number of devices is 63K**
 - Ensure the value selected is large enough to accommodate all devices to be added until the next planned outage, but the larger the value is, the more HSA memory will be used

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✓ Understand ICKDSF requirements

- **ICKDSF Release 17 required on z990/z890 servers**
 - Ships in compatibility for selected releases and exploitation support feature for z/OS 1.4
 - Integrated in z/OS and z/OS.e 1.5 and higher releases
- **ICKDSF Release 17 required on all other servers sharing DASD with z990/z890**
 - Includes z/VM systems
- **Format of CPU id information changed**
 - Prior ICKDSF releases do not recognize the new format
 - Cannot properly determine if another ICKDSF is running against the same volume on another system

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✓ Pull PSP buckets

- **Pull hardware PSP buckets**
 - 2084DEVICE (z990)
 - Includes driver 55 and CFCC level I3
 - 2086DEVICE (z890)
 - Includes driver 55 and CFCC level I3

- **Pull software PSP buckets for compatibility and exploitation FMIDs**
 - Additional HIPER PTFs

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✓ Pull PSP buckets...

Upgrade	Subset	Description	Upgrade	Subset	Description
2084DEVICE	2084/zOS	z/OS for z990	2084DEVICE	2084VSE/ESA	VSE/ESA for z990
2084DEVICE	2084Z/VM	z/VM for z990	2086DEVICE	2086VSE/ESA	VSE/ESA for z890
2086DEVICE	2086/zOS	z/OS for z890	2086DEVICE	2086Z/VM	z/VM for z890
ZOSV1R5	BCP ICSF770A ICSF770B	ICSF - Secure ICSF - Enhanced Function	ZOSV1R6	BCP ICSF770A ICSF770B	ICSF - Secure ICSF - Enhanced Function
ZOSV1R4	HCD7708 HCM1510 OSA7708 ICSF7708 ICSF770A ICSF770B BCP7717 BCP77K7	HCD HCM OSA/SF ICSF (PCICA) ICSF - Secure ICSF - Enhanced Function BCP Exploitation BCP Japanese	ICKDSF017	EDU1N01 FDU1H07 FDU1H08 FDU1H09 CMS0H14 FDS1H03 FDS1HCD VDS21NM	ICKDSF R17 Base SMF SMF English Japanese ICKDSF VM V1R17 ICKDSF Standalone ICKDSF Standalone CD-ROM ICKDSF VSE

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✓ Understand Parallel Sysplex considerations

- **Compatibility code is required on non-z990/z890 images participating in a sysplex when:**
 - z990 or z890 coupling facility LPAR ID > 15 (x'F')
 - Cannot assign LPAR ID >15 to CF LPARs until compatibility software rolled out across all images in the sysplex
 - Operating system image LPAR ID > 15 (x'F')
- **z/OS or z/OS.e 1.1 cannot participate in a sysplex if at least one member (operating system) or ICF images resides on a z990/z890**
- **Any OS/390 2.10 image on a G2, G3, G4 or equivalent processor cannot participate in a sysplex with a z990/z890 server**
 - Upgrade processor first, or remove that system from the sysplex

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✓ Contact ISVs

- **Inquire about z990/z890 hardware support**
 - For each install
 - For new drivers
- **Specifically ask about ECMB support**
 - Pull WSC Flash I0270
 - Bypass available if vendor is not ready
 - Bypass not available in z/OS 1.7 or future releases
- **Non-IBM hardware vendors**

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✓ Understand Bimodal Migration Accommodation

- **Used to IPL z/OS in 31-bit**
 - To be used as a fallback when 64-bit is an issue
- **Not available for z/OS 1.5 or future releases**
 - Only available for z/OS releases 1.2, 1.3 and 1.4

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✓ z/Architecture (64-bit) Migration

- **z/OS 1.6 on a zSeries requires IPL in 64-bit**
 - Default, does not support 31-bit for IPL
 - Applications can run in 31-bit
- **Migration checklist available**
 - WSC Flash I0185 @ <http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/FLASHI0185>

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✓ Understand Cryptographic requirements

- **Compatibility nor z/OS I.4 Exploitation support feature provide full cryptographic support**

Operating System	Level Shipped in Base	Level Required for Clear Key Support	Level for Secure Key Support	Level Required for Enhanced Secure Key Support	Level Required For 64-bit addressing caller support
OS/390 2.10	HCR7703	HCR770A ¹	HCR770A ¹	HCR770B ⁴	N/A
z/OS 1.2	HCR7704	HCR770A ¹	HCR770A ¹	HCR770B ⁴	N/A
z/OS 1.3 or z/OS.e 1.3	HCR7706	HCR770B ² or HCR770A ¹	HCR770A ¹	HCR770B ⁴	N/A
z/OS 1.4 or z/OS.e 1.4	HCR7706 or HCR7708 ⁶	HCR770B ³	HCR770A ¹	HCR770B ⁴	N/A
z/OS 1.5 or z/OS.e 1.5	HCR7708	HCR7708	HCR770A ¹	HCR770B ⁴	N/A
z/OS 1.6 or z/OS.e 1.6	HCR770A	HCR770A	HCR770A ¹	HCR770B ⁴	HCR7720 ⁵

1. HCR770A is shipped in the z990 Cryptographic Support web deliverable.
2. HCR7708 is shipped in the z990 Cryptographic CP Assist Support for z/OS 1.3 web deliverable
3. HCR7708 is shipped in both the z/OS 1.4 z990 Compatibility Feature & Exploitation feature
4. HCR770B is shipped in the z990 & z890 Enhancements to Cryptographic Support web deliverable
5. HCR7720 is shipped in the ICSF 64-bit Virtual Support for z/OS & z/OS.e VIR6 web deliverable – planned for December 2004
6. HCR7708 is shipped in the z/OS VIR4 z990 Exploitation Support Feature

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z990: z/OS and OS/390 Cryptographic Support

- **Cryptographic Support Web deliverables (downloads)**

www.ibm.com/servers/eserver/zseries/zos/downloads

- “z990 Cryptographic Support” – GA2 (No longer available)
- “z990 and z890 Enhancements to Cryptographic Support” – GA3 (May 28, 2004)
- “ICSF 64-bit Virtual Support for z/OS VIR6 and z/OS.e VIR6 – Planned December 17, 2004

- **Function**

- Designed to enable both clear key and secure key cryptography
- Unpriced Web deliverable allows a z990 server to support CP Assist for Cryptographic Function, PCICA, PCIXCC and Crypto Express2 hardware cryptography features
- Supports:
 - z/OS 1.2 or z/OS.e 1.3 (z890 only) and later and, formerly, OS/390 2.10
 - TKE 4.2 LIC (FC0853) – Supports smart card reader (**z890/990 GA4 – October 2004**)
 - TKE 4.1 LIC (FC0852) – Supports operational key entry (**z990 GA3 – May 2004**)
 - TKE 4.0 LIC (FC0851) – Carry forward from z900
- Reference “ICSF Systems Programmer's Guide”, SA22-7520-06 or later
www.ibm.com/servers/eserver/zseries/zos/bkserv/r4pdf/crypto.html
- z/OS 1.4 level publications support all earlier releases

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Crypto functions no longer supported on z990/z890

- **APIs for these obsolete functions supported on some older S/390 and zSeries processors have been removed**
 - DSA signatures and key generation
 - ANSI x9.17 services (offset and notarization) and associated key types
 - Ciphertext_translate (CSNBCTT)
 - German Bank Pool - Pin Offset
 - CSFUDK API
 - Replaced by the newer API CSNBDBG in OS/390 ICSF Release 10
 - CDMF (40-bit encryption)
 - 56 bit DES typically used instead
- **These z/OS 1.4/1.5 publications provide full details on removed functions**
www.ibm.com/servers/eserver/zseries/zos/bkserv/r4pdf/crypto.html
 - *ICSF Administrator's Guide*, SA22-7521-05 or later
 - *ICSF Overview*, SA22-7519-04 or later
 - *ICSF System Programmer's Guide*, SA22-7520-05 or later
 - *ICSF Application Programmer's Guide*, SA22-7522-04 or later

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PCIXCC and Crypto Express2 considerations for installation

- **Install “z990 and z890 Enhancements to Cryptographic Support”**
- **Single PKA MK (ASYM-MK) on PCIXCC consideration**
 - Users of CCF systems where the SMK value is not equal to the KMMK value should change the PKA master key values to be the same, and re-encipher their PKDS on a machine with PCICC prior to z990 migration
- **CICS wait list, CSFWTL01, may require update**
- **Pass Phrase Init changed to initialize PKDS and support PCIXCC**
- **New options data set keyword, CKTAUTH**
- **CKDS can't be initialized on z990 if sharing with a CCF system**
- **CSFEUTIL for automated electronic delivery is not required on z990**
- **LPAR crypto setup allows the same domain to be assigned to different LPARs for different PCIXCC features (LPAR ID no longer used)**
- **Some obsolete cryptographic APIs have been removed**
- **Many supported cryptographic APIs have been changed**
- **New cryptographic APIs have been added**
- **Updated z/OS 1.4/1.5 ICSF references are also applicable to OS/390 2.10 and z/OS 1.2 and 1.3 with “z990 Cryptographic Support” or “z990 and z890 Enhancements to Cryptographic Support”.**

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✓ Understand zAAP requirements

- **z/OS 1.6 and SDK 1.4 w/PTF**
- **Only Java work directed to zAAPs by z/OS 1.6**
- **z990/z890 and future zSeries servers only**
- **No IBM software charges on zAAP capacity**
- **New estimation process to determine # zAAPs**
 - Download and install the instrumented JVM and estimation tool
 - Update the JVM option files to use instrumented JVM
 - Review WSC White Paper WPI0043 I
 - <http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WPI0043I>
- **May order zAAPs up to the number of permanently purchased CPs**
 - Number of zAAPs ordered may not exceed the limit of available engines in the machine model (initial and reserved)
- **RMF PTF available for z/OS 1.6**
 - RMF support described in APAR OA0573I

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✓ Understand zAAP processing

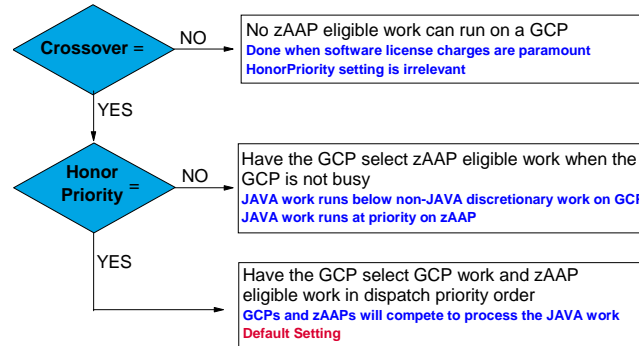
- **zAAPs can only help execute Java applications and application servers using the IBM JVM**
 - zAAPs can only execute JAVA instructions
- **No anticipated application changes**
- **WebSphere 5.1 and SDK 4.1 + PTF for APAR PQ86689 must be used for WebSphere-based Java workloads**
- **Understand IFACROSSOVER=YES|NO and IFAHONORPRIORITY=YES|NO**
 - Specified in IEAOPTxx PARMLIB member
 - IFACROSSOVER=YES is the default
- **A zAAP takes on the same characteristics as the LPAR the zAAP is assigned to**
 - Dedicated or shared

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✓ Setting zAAP options

- **Set new PARMLIB options**

- IFACROSSOVER = YES | NO
- IFAHONORPRIORITY = YES | NO



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Systems Assurance

- **z990 and z890 require a systems assurance**
 - Performed by IBM
 - Customer participation highly recommended
 - Ensures a successful hardware/software installation and migration

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Time for



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