IBM zEnterprise System is a first-of-a-kind workload-optimized multi-platform technology offering. The zEnterprise servers are the z196 and z114. The IBM zEnterprise 196 (z196) and z114 have a central processor complex (CPC), the IBM zEnterprise Unified Resource Manager, and built-in support for the IBM zEnterprise BladeCenter Extension (zBX) Model 002. The IBM zEnterprise is designed with improved scalability, performance, security, resiliency, availability, and virtualization. The z196 Model M80 provides up to 1.6 times the total system capacity of the z10 EC Model E64, and all z196 models provide up to twice the available memory of the z10 EC. The zBX deliver an integrated hardware platform spanning System z mainframe and POWER7 technologies. The IBM zEnterprise Unified Resource Manager, delivered with the z196 and z114, is designed to deliver end-to-end virtualization and management along with the ability to optimize technology deployment according to individual workload requirements.

Software Support

All supported releases can run on the new servers and enhancements in SMP/E V3.5 and higher integrate the identification, verification, acquisition, and installation of required PTFs into standard SMP/E processing.

All supported z/OS releases can participate in a sysplex with a CF or operating system image on a z196 or z114 server. Not all System z196 or z114 functions are available in every z/OS release. Other than the minimum support, there is no requirement to install either software or hardware first to exploit a specific function.

The software support for the z196 and z114 servers, similar to the IBM System z10 EC and z10 BC servers, differs by z/OS release level, and is provided by a combination of FMIDs and PTFs. The specific PTFs needed to be installed will depend on the z/OS release. In addition, exploitation of certain functions, specifically some cryptographic functions, requires the installation of an FMID. These FMIDs are downloadable Web Deliverables, which are unpriced and can be downloaded at: http://www.ibm.com/eserver/zseries/zos/downloads.

The following z/OS releases are supported on the z196 and z114:

- z/OS 1.13 + PTFs
- z/OS 1.12 + PTFs
- z/OS 1.11 + PTFs
- z/OS 1.10 + PTFs AND the z/OS 1.10 Lifecycle Extended Service (5656-A01). The Lifecycle Extension must be in place before a customer may obtain required PTFs for the z114 and z196. There are no exceptions.

- z/OS 1.9 + PTFs AND the z/OS 1.9 Lifecycle Extended Service (5646-A01). The Lifecycle Extension must be in place before a customer may obtain required PTFs for the z114 and z196. There are no exceptions.
  - Toleration only

- z/OS 1.8 with:
  - the z/OS 1.8 Lifecycle Extended Service (5638-A01) - This expired September 30, 2011. Contact GTS for qualifications for a contract. Contract must be in place to obtain required PTFs for the z114 or z196. There are no exceptions.
  - Toleration only
  - the IBM zIPP Support for z/OS and z/OS.e V1R6/R7 Web deliverable plus PTFs (the zIIP web download is required for HiperDispatch. A zIPP engine is not required).

Notes:

1. z/OS releases no longer service supported are not supported on a z196 or z114 server, with the exception of those offering a Lifecycle Extension.
2. The functional capabilities increase with z/OS releases. That is, z/OS V1.13 has more capabilities than z/OS V1.11. For a list of z/OS releases and the functions supported for those releases, review table 1 under z/OS Support for z196 by Release and z/OS Support for z114 by Release.

Red Alert
A Red Alert was issued on October 28, 2011 for a problem which may lead to a system or sysplex wide outage. (https://www14.software.ibm.com/webapp/set2/sas/f/redAlerts/home.html)

Configurations as noted below who choose to dynamically HCD activate which generates a new control unit accessing the coupling facility may lead to the problem. Please see APAR OA37264 which is applicable to z/OS 1.10, 1.11, 1.12 and 1.13 releases for more details.

Problem: A dynamic activate to add a coupling facility control unit configured with greater than 64 subchannels using HCD z196 GA2 and z114 support (OA32576) may lead to system or sysplex outage when the z/OS images reside on z196 GA2 or z114. z/OS images on a z196 or z114 at Driver 93G connected to a coupling facility on a z196 or z114 at Driver 93G using 3 or more infiniband links defined with 32 subchannels per CHPID will exceed 64 subchannels to the CF and may experience the problem described by XES APAR OA37264. The default for IFB links changed from 7 to 32 subchannels per CHPID with HCD APAR OA32576 installed for greater than 7 subchannel support

Recommended Actions:
For installations migrating to z196 GA2 (DR93) level machine or z114, please take one of the following actions:

A. At I/O definition time, do not take the default in HCD of 32 subchannels for IFB links introduced in OA32576. Explicitly specify 7 subchannels per CHPID before proceeding with dynamic activation.
B. Only define and configure online 2 CF links with 32 subchannels for each coupling facility control unit. Note: 32 subchannels per CHPID will be set by default.
C. Apply ++APAR for OA37264 to all z/OS images before exploiting the use of 32 subchannels per CHPID when 3 or more CHPIDs are defined for a CF control unit.

For installations currently configured with greater than 64 subchannels to the CF, please consider all of the following actions:

A. Do not perform a dynamic activate to add a CF control unit to z/OS images to use more than 64 coupling facility subchannels per CF control unit.
B. If a dynamic activate was performed which created a new CF control unit, do not attempt to bring online more than 64 subchannels (2 CHPIDs). Note: If the z/OS image has been IPLd since the dynamic activate was done the system can successfully exploit the greater than 64 subchannel support.
C. Roll ++APAR OA37264 ASAP if greater than 64 subchannel support is needed.
If 64 or fewer coupling facility subchannels are currently defined to each coupling facility control unit, no action is required.

Preventive Service Planning (PSP) Bucket Information
It is imperative all the appropriate Preventive Service Planning (PSP) buckets are obtained. In addition to the hardware PSP buckets, the software PSP buckets must also be obtained. IBM recommends using SMP/E 3.5 or higher to identify missing service; or ServiceLink to acquire PSP bucket service. (See SMP/E 3.5 below)

Note: the “Enhanced PSP Tool” is no longer available.

To assist in determining the recommended service (identified in these PSP buckets) installed on your system, use the SMP/E REPORT MISSINGFIX command in conjunction with the FIXCAT type of HOLDDATA, as follows:

- Acquire and RECEIVE the latest HOLDDATA onto your z/OS system(s). Use your normal service acquisition portals or download the two (2) year HOLDDATA directly from http://service.software.ibm.com/holddata/390holddata.html. Ensure you select “FULL” from the Download NOW column (last 730 days) to receive the FIXCAT HOLDDATA, as the other files do not contain FIXCAT HOLDDATA.

- Run the SMP/E REPORT MISSINGFIX command on your z/OS systems and specify one or more of the following Fix Categories (FIXCAT):
  - IBM.Device.Server.z196-2817
  - IBM.Device.Server.z196-2817.ParallelSysplexInfiniBandCoupling
  - IBM.Device.Server.z196-2817.zHighPerformanceFICON
  - IBM.Device.Server.z196-2817.UnifiedResourceManager
  - IBM.Device.Server.z114-2818
  - IBM.Device.Server.z114-2818.ParallelSysplexInfiniBandCoupling
  - IBM.Device.Server.z114-2818.zHighPerformanceFICON
  - IBM.Device.Server.zBX-2458
  - IBM.Device.Server.zBX-2458.ISAOPT

The report will identify any missing coexistence and fallback PTFs for that system. For complete information about the REPORT MISSINGFIX command, see SMP/E Commands book.

- Periodically, acquire the latest HOLDDATA and rerun the REPORT MISSINGFIX command to find out if there are any new PTFs recommended for the z196 or z114 server.

- If the PSP buckets were reviewed some time ago, review them again to ensure any newly identified z/OS service has been installed

SMP/E 3.5 or SMP/E 3.6 provides the function which greatly simplifies the identification, verification, acquisition, and installation tasks for service documented in PSP buckets by processing a new kind of HOLDDATA associating PTFs to fix categories. Each ++HOLD statement identifies an APAR and its resolving PTF needed to provide support for the fix category. The new FIXCAT HOLDDATA is now being delivered with existing ERROR HOLDDATA. Fix categories have been defined for hardware devices, new software FMIDs, and selected hardware and software functions.

When SMP/E V3.5 or V3.6 processes FIXCAT ++HOLD statements (during RECEIVE processing) the resolving PTF identified on the ++HOLD statement is assigned an SMP/E SOURCEID matching the fix category on that statement. This enables specifying fix categories as part of the SOURCEID operand on APPLY, ACCEPT, and LIST commands. Many customers fall into one of two camps when it comes to acquiring and installing service:
1. You choose to RECEIVE all available applicable PTFs and filter which PTFs get installed using parameters on the APPLY command; or
2. You only acquire PTFs you need when you want to install them.

No matter which approach you use, SMP/E V3.5 or V3.6 can simplify your task.

In the first scenario, you have all available PTFs applicable to your environment already RECEIVED. To install all the PTFs needed for minimal support of a z196 or z114 server, you could use something like the following command. You don't have to access the PSP bucket, nor download any extra files.

APPLY CHECK GROUPEXTEND BYPASS(HOLDSYS)
SOURCEID(IBM.Device.Server.z196-2817).

To include all support for the z196 or z114 optional functions, then the SOURCEID operand could either list all fix categories of interest, or use wildcarding to have SMP/E determine all applicable fix categories. This latter approach would automatically express interest in future z196 or z114 functions (should new fix categories be created). Specifying IBM.Device.Server.z196-2817*, or IBM.Device.Server.z196*, or just *2817* all result in similar results: an interest in the minimal support for z196 as well as exploitation of all optional functions. Furthermore, if you wanted the minimal support for either a z196 you could include the fix category in the SOURCEID parameter. In these examples the asterisk ("*" represents 0-n characters, while the percent sign ("%") (not shown) represents a single character. Based on the structured names of the fix categories for hardware support, you can use SOURCEIDs with wildcarding to ensure PTFs for multiple generations of servers are installed.

In the second scenario, you don't know if you have RECEIVED all the PTFs needed since you only obtain PTFs right before installing them. You need to first obtain the latest HOLDDATA using your favorite method. (Example: RECEIVE ORDER(CONTENT(HOLDDATA))...). Then you can use the new REPORT MISSINGFIX command to identify PTFs missing from your system. For example:

SET BDY(GLOBAL).
REPORT MISSINGFIX ZONES(ZOSR11T)
FIXCAT(IBM.Device.Server.z196-2817).

Example: RECEIVE ORDER(CONTENT(HOLDDATA))...).

The REPORT MISSINGFIX command checks your GLOBAL zone for FIXCAT HOLDDATA matching the FIXCAT values specified on the command. The command then compares the APARs identified in that FIXCAT HOLDDATA with the PTFs installed in the specified zones, and produces a report to identify any APARs not resolved. In other words, it reports which PTFs (fixes) are missing for the specified fix categories. Furthermore, the command produces a customized job used to obtain any PTFs not already RECEIVED via the RECEIVE ORDER command, and install any missing service via the APPLY CHECK command. Please note the FIXCAT operand on the REPORT MISSINGFIX command can list multiple fix categories, as well as using the same wildcarding techniques described above for the SOURCEID operand. Because both of these techniques are simple and integrated into basic SMP/E commands, use them periodically to ensure the latest PTFs specified in the hardware PSP bucket are installed (since PSP buckets can be updated daily). SMP/E V3.5 or V3.6 also provides an Explorer function which helps in identifying new fix categories which may be of interest. Go to this URL for a description of all the fix categories:

http://www-03.ibm.com/systems/z/os/zos/smpe/fixcategory.html
## PSP Bucket Reference Table

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<td>ICSF</td>
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### Third Channel Subset:
The z196 extends the amount of addressable storage capacity to help facilitate storage growth with the introduction of a third subchannel set - an additional 64K subchannels - to help complement other functions such as "large" or extended address volumes (EAV) and HyperPAV. This may also help facilitate consistent device address definitions, simplifying addressing schemes for congruous devices. The first subchannel set (SS0) allows definitions of any type of device (such as bases, aliases, secondaries, and devices not implementing the concept of associated aliases or secondaries). The second and third subchannel sets (SS1 and SS2) can now be used for disk alias devices (both primary and secondary devices) and/or Metro Mirror secondary devices only. The third subchannel set supports ESCON, FICON and zHPF protocols.

### Display OSAINFO:
The z196, z114 (and z10 server) introduces the capability for the operating system to directly query and display the current OSA configuration information (similar to OSA/SF). z/OS exploits this new OSA capability by introducing a new TCP/IP operator command called Display OSAINFO. Display OSAINFO allows the operator to monitor and verify the current OSA configuration,
which can help improve the overall management, serviceability, and usability of OSA-Express3. The Display OSAINFO requires OSA-Express3 CHPID types OSD, OSM, and OSX, and z/OS V1.12.

**CPU Measurement Facility architecture:** The CPU Measurement Facility is a hardware facility which consists of counters and samples. The facility provides a means to collect run-time data for software performance tuning with low overhead. The detailed architecture information for this facility can be found in the System z196 or z114 Library in Resource Link.

**Power Savings Mode:** There is a new SMFPRMxx PARMLIB option, MAXEVENTRECS, which allows governing the number of event interval records to be collected when the processor capacity changes. The default is zero. The default must be adjusted to collect extra records between intervals when the processor capacity changes. There is a new parameter to the Modify HIS command to override the default action when a CPU speed change is detected within the HIS (Hardware Instrumentation Services) component.

**Inbound Workload Queuing (IWQ):** z/OS V1.12 on z196 servers (and z10 server) is designed to provide improved networking performance with OSA-Express3 in QDIO mode with inbound workload queuing (IWQ). IWQ creates multiple input queues and allows OSA to differentiate workloads "off the wire" and then assign work to specific input queues to z/OS. With each input queue representing a unique type of workload, each having unique service and processing requirements, the IWQ function allows z/OS to use appropriate processing resources for each input queue. This approach allows multiple concurrent z/OS processing threads to process each unique input queue, avoiding traditional resource contention. In a heavily mixed workload environment, this "off the wire" network traffic separation provided by OSA-Express3 IWQ reduces the conventional z/OS processing required to identify and separate unique workloads, which is expected to result in improved overall system performance and scalability.

This function is exclusive to OSA-Express3 CHPID types OSD and OSX. There are some Communication Server configuration settings required to enable multiple inbound data queues. Specify INBPERF DYNAMIC WORKLOADQ on the IPAQENET or IPAQENET6 INTERFACE statement, if necessary, to enable inbound workload queuing for a specific QDIO interface. The QDIO interfaces for IPv4 which are defined by using the DEVICE, LINK, and HOME statements, must be converted first to use an IPAQENET INTERFACE statement.

Example:
```
INTERFACE QDIO4101L
DEFINE IPAQENET
INBPERF DYNAMIC workloadq
IPADDR 172.16.1.1/24
PORTNAME QDIO4101
PRIROUTER or VMAC
SOURCEVIPAINTERFACE VIPA4811L
```

**Note:** This function is supported only for interfaces which are configured to use a virtual MAC (VMAC) address.

**System z Discovery and AutoConfiguration (zDAC):** A new IBM System z Discovery and AutoConfiguration (zDAC) function, available with z/OS V1.12 on zEnterprise 196 and z114 servers, can help simplify the configuration of new and changed disk and tape I/O devices. zDAC can save time by discovering new and changed fabric-attached devices, and suggesting configurations aligned with best practices for availability and with the I/O policies you set. For example, with zDAC, building an updated I/O configuration can take as little as a few minutes. zDAC is designed to perform discovery for a single system or for all the systems in a sysplex. These capabilities are integrated with HCD and z/OS Hardware Configuration Manager (HCM). When new controllers are added to an I/O configuration or changes are made to existing controllers, the system is designed to discover them, and propose configuration changes based on a policy defined in the Hardware Configuration Dialog (HCD). This policy can include preferences for availability and bandwidth including parallel access volume (PAV), HyperPAV, DCM specifications, and preferred control unit and device number ranges.
zDAC does not alter your existing configuration until you have accepted or modified the proposed changes.

zDAC applies to all FICON features supported on z196 when configured as CHPID type FC and is supported by z/OS. zDAC is exploited by the IBM System Storage DS8700 which is designed to improve discovery performance. zDAC is supported by all FICON-attached IBM Storage tape and disk control units.

Migration Considerations
Because the z196 has, as its basis, the technology used on the z10 family of servers, there are only a few additional steps required to migrate from a z10 EC or BC server to the z196 server. Not all System z196 functions are available in every z/OS release. Some functions have exploitation or migration considerations. Many functions are enabled or disabled, based on the presence or absence of the required hardware and software. Other than the minimum support, there is no requirement to first install either software or hardware to exploit a specific function. The delta (from a z10 EC) support for a System z196 server is delivered by software PTFs. Exploitation of some cryptographic functions on the System z196 (and earlier) servers is provided via a web deliverable (FMID). Depending on the cryptographic support provided, and the z/OS release running, you may need to download and install a different ICSF Web deliverable.

Migration from an older server (z9, z890, z990, z900, z800 or earlier) requires performing the migration steps associated with the "skipped" servers, however it does not mean those intervening servers must be installed, only the migration considerations must be satisfied.

Also, refer to the z/OS Migration to the IBM zEnterprise System Version 1 Releases 11, 10, 9, 8 and 7 (pdf version) for more information. http://publibz.boulder.ibm.com/zoslib/pdf/e0z2g120.pdf

Plan for the Fixed HSA on z196 and z114 Servers: On a z196 and z114, (like z10 servers), preplanning requirements are minimized by offering a fixed HSA and introduction of the ability to seamlessly include such events as creation of LPARs, inclusion of logical subsystems, changing logical processor definitions in an LPAR, and introduction of cryptography into an LPAR. This fixed HSA is designed to improve availability by avoiding outages. It also minimizes the preplanning requirements. The z196 has a fixed 16GB Hardware System Area (HSA) which is managed separately from customer memory and the z114 has a fixed HSA of 8GB which is managed separately from customer memory.

SCRT: If Workload License Charging (WLC) is implemented the SCRT level must be upgraded to process z196 SMF data. SCRT V18.2.10 or higher provides support for the z196 server. If you collect SMF data on a System z196 server which will be processed by SCRT, you must minimally use SCRT V18.2.10 to generate the SCRT reports. If you do not need to process SMF data from a z196 server, you are not required to download or use SCRT. SCRT levels are available from the SCRT website at: http://ibm.com/zseries/swprice/scrt

New zArchitecture Instructions
In support of the z196 server there are new machine instructions. The new machine instructions (mnemonics) may collide with (be identical to) the names of Assembler macro instructions you use. In the event of such collisions, the Assembler’s default opcode table (UNI) will treat specification of these names as instructions when APAR PK97799 is installed, probably causing Assembler error messages and possibly causing generation of incorrect object code. If you write programs in Assembler Language, compare the names of Assembler macro instructions used to the new machine instructions (documented in the Principles of Operation SA22-7832-06) to identify any such conflicts.
or collisions which would occur. Identical names will cause Assembler errors or the generation of incorrect object code when you assemble your programs.

Also, an “as is” tool can be used to assist in identifying any conflicts. Available with this document on the Techdocs web site.

If a conflict is identified, take one of these actions:

- Change the name of your macro instruction.
- Specify PARM='…OPTABLE(YOP)…' (or some other earlier opcode table).
- Specify a separate ASMAOPT file containing assembler options such as in the previous method (this method requires no changes to source code or JCL).
- Add as the first statement of your source program: *PROCESS OPTABLE(YOP)
- Specify the PROFILE option either in JCL or the ASMAOPT file, and the specified or default member of the SYSLIB data set is copied into the front of the source program.
- If you must use both a new instruction and a macro with the same name in an assembly, you can use the following technique (where XXX is a sample mnemonic):

```plaintext
* Assume the default OPTABLE(UNI) is in effect
   XXX      a,b    new instruction
   PUSH    ACONTROL         save current optable definition
   ACONTROL OPTABLE(YOP)  switch optable dynamically
   XXX      r,s,t    macro invocation
   POP      ACONTROL   restore previous definition
   XXX    c,d    new instruction
```

HiperDispatch

The existing HIPERDISPATCH=YES|NO parameter in IEAOPTxx member of parmlib, and on the SET OPT=xx command to control whether HiperDispatch is enabled or disabled for the system. It can be changed dynamically. A Health Check (SUP_HIPERDISPATCH) is provided to verify that HiperDispatch is enabled on a z r z196 server. The Health Check is shipped inactive and should be activated when running on a z10 or z196 server. Note. Hiperdispatch default is YES in z/OS 1.13.

A WLM goal adjustment may be required when using this function. Review and update your WLM policies as necessary. You may need to turn off and on HiperDispatch while adjusting your WLM goals.

HiperDispatch Exploitation

This function is enhanced to exploit the z196 architecture and now allows 3 physical CPs from same chip to form affinity node. A z10 uses HiperDispatch book cache support and 4 physical CPs from same book.

To realize the benefits of HiperDispatch, z/OS has been changed to force HIPERDISPATCH=YES for LPARs with greater than 64 CPUs. On LPARs with greater than 64 CPUs defined on z196 with IEAOPTxx specifying HIPERDISPATCH=NO during IPL (or SET OPT=xx after IPL), the system will now generate a message but continue to run with HIPERDISPATCH=YES. The new message is: IRA865I HIPERDISPATCH=YES FORCED DUE TO GREATER THAN 64 LPS DEFINED

On LPARs in which HIPERDISPATCH=NO is specified with less than 64 CPUs, you can dynamically add more CPUs and continue to run in HIPERDISPATCH=NO. However, you may see a new message: ISN012E HIPERDISPATCH MUST BE ENABLED TO CONFIGURE CPU IDS GREATER THAN 3F ONLINE
Any attempt to configure CPUs greater than 64 CPUs online in HIPERDISPATCH=NO will be rejected with message: IEE241I CPU(x) NOT RECONFIGURED ONLINE - REQUIRES HIPERDISPATCH ENABLED

When a dynamic change to an LPAR with greater than 64 CPUs is changed to HIPERDISPATCH=YES, it cannot go back to HIPERDISPATCH=NO. It will be treated as if it was IPLed with HIPERDISPATCH=YES, once HIPERDISPATCH=YES is activated.

To assist in warning when you are getting close to 64 CPUs and running with HIPERDISPATCH=NO a new Health Check, SUP_HiperDispatchCPUConfig, has been added. The check always succeeds for LPAR in HIPERDISPATCH=YES (all CPU configurations supported). When an LPAR is running with HIPERDISPATCH=NO, the Health Check raises an exception when the number of CPUs is "close" to forcing the LPAR to IPL with HIPERDISPATCH=YES. The CPUSLEFTB4NEEDHD parameter indicates the minimum number of CPUs which can be installed and activated on an LPAR running in HIPERDISPATCH=NO. When CPUSLEFTB4NEEDHD=0, the check always succeeds. The default is 8, with values 0-63 accepted. The system re-drives the check when the HIPERDISPATCH state changes or CPU(s) are dynamically added. Possible Health Checker messages:

- IEEAVEH080I CPU configuration supported with HiperDispatch curstate
- IEEAVEH081E CPU configuration supported with HiperDispatch disabled. numcpus more CPU(s) can be added with HiperDispatch disabled.

Notes:
1. Ensure all HiperDispatch PTFs are installed prior to enabling. HiperDispatch PTFs are documented in the z10 EC and z10 BC PSP buckets.
2. It is highly recommended to continuously monitor for HiperDispatch PTFs and install them.

z/OS XL C/C++ Exploitation of z196 Machine Instructions (z/OS V1R12 and higher)
The ARCHITECTURE C/C++ compiler option selects the minimum level of machine architecture on which your program can run. Certain features provided by the compiler require a minimum architecture level. ARCH(9) exploits instructions available on z196 servers. For more information, refer to the ARCHITECTURE compiler option in z/OS XL C/C++ User's Guide. The TUNE compiler option allows the optimization of an application for specific machine architecture. The TUNE level has to be at the ARCH level, at a minimum. If the TUNE level is lower than the specified ARCH level, the compiler forces TUNE to match the ARCH level, or uses the default TUNE level, whichever is greater. For more information about the ARCHITECTURE and TUNE compiler options refer to z/OS XL C/C++ User's Guide.

Once programs exploit the ARCH(9) or TUNE(9) options, those programs can only run on a System z196 server, or an operation exception will occur. This is a consideration for programs running on different server levels (System z10 and z9 servers) during development, test, and production, as well as during fallback or disaster recovery.

Sysplex
z/OS on z900, z800, z990, or z890 servers cannot participate in a Sysplex with a z196 or z114 server.

z196 and z114 servers are only supported in a parallel sysplex with other z196 and z114 servers, z10 EC, z10 BC, z9 EC and z9 BC servers. If you are running z/OS on z900, z800, z990, or z890 servers, then you cannot add a z196 or z114 server to that sysplex. That is, you will not be able to perform rolling IPLs to introduce a z196 or z114 server if you have any of the earlier (pre-System z) servers either as z/OS images or coupling facility images in the sysplex. The earlier servers in the sysplex must be upgraded to System z9 or later to have z196 or z114 supported in the sysplex. If you have any z/OS images or coupling facility images on an earlier server, and you intend to introduce a
z/OS Positioning Software for zEnterprise (z196 and z114) Servers

z196 or z114 into that sysplex, you must migrate those images to a System z9 (or later) server prior to introducing the z196 or z114 server.

When changing coupling facility control code (CFCC) levels, the coupling facility structure sizes might change. System z196 and z114 servers initially ship with CFCC Level 17. If, as part of your migration to a System z196 or z114 server, you change CFCC levels (either by placing a coupling facility on the System z196 or z114 server or by moving the coupling facility to another supported server, (at a higher CFCC level), you may require larger structure sizes than previously. If your CFCC levels are identical, structure sizes are not expected to change when you migrate from a previous server to a System z196 or z114 server. Use the CFSIZER tool (http://www-03.ibm.com/systems/z/cfsizer/) to determine appropriate structure sizes.

Note: The PTFs supporting CFCC 17 have coexistence (or Sysplex preconditioning) PTFs requiring installation throughout the Sysplex prior to implementing CFCC 17.

Server Time Protocol - time synchronization for Parallel Sysplex

The z196 does not support connection to an External Time Reference (ETR). The z196 and z114 servers cannot be connected to a Sysplex Timer (9037-002). The Server Time Protocol (STP) feature is the follow-on to the Sysplex Timer. STP is designed to allow multiple servers and coupling facilities to maintain time synchronization with each other without requiring a Sysplex Timer. STP is a hardware feature of the z196, z114, z10 EC, z10 BC, z9 EC, z9 BC, z990, and z890 servers. To implement STP, see the STP Web site and the publications and other resources listed there. The STP Web site is at http://www.ibm.com/systems/z/psos/stp.html. Although the z196 or z114 does not support attachment to a Sysplex Timer, it can participate in a Mixed-CTN having either a z10 or z9 server synchronized to the Sysplex Timer. This maintains the capability for enterprises to concurrently migrate from an existing External Time Reference (ETR) to a Mixed-CTN and from a Mixed-CTN to an STP-only CTN.

Customers must migrate to STP prior to migrating to a z196.

Customers may run the SMP/E REPORT MISSINGFIX command on their z/OS systems and specify the FIXCAT category for IBM.Device.Server.z196-2817.ServerTimeProtocol (z196) or IBM.Device.Server.z114-2818.ServerTimeProtocol (z114) to obtain required service.

Migrate from ICB-4 to InfiniBand coupling links: The Integrated Cluster Bus 4 (ICB-4) Coupling Links are not supported on a z196 or z114 CPC. The 12x InfiniBand coupling links are designed to replace Integrated Cluster Bus 4 (ICB-4) and to complement 1x InfiniBand and ISC-3 on a z196 server. InfiniBand coupling can provide significantly improved service times compared to ISC-3s for distances up to 150 meters (12x InfiniBand). You can read about InfiniBand coupling links in the IBM System z Connectivity Handbook (SG24-5444).

Customers may run the SMP/E REPORT MISSINGFIX command on their z/OS systems and specify the FIXCAT category for IBM.Device.Server.z196-2817.ParallelSysplexInfiniBandCoupling to obtain required service.

Cryptography

The only z196 or z114 requirement is to have installed the level of ICSF which provides the functions required in your application environment.

UDX

A UDX is custom code installed in the secure hardware of the Crypto Express card. It allows customers to implement their own unique code within the tamper resistant hardware. On System z, the UDX code is always developed based on customer specs by IBM (either the Crypto Competence...
Center in Denmark or IBM Global Services in the US) and delivered to the customer for installation inside the Crypto Card. There is also a key management software package, called DKMS, from the Crypto Competence Center which may require a UDX depending, on the customer environment.

Because UDX interfaces directly with the Crypto card and with ICSF (the z/OS component providing the software interface to the crypto hardware), the UDX must be rebuilt anytime either a new crypto hardware device is installed or the version of ICSF changes. If a customer will be migrating from one hardware device to another (for example, from a CEX2 on a z10 to a CEX3 on a z196) or upgrading the version of ICSF on their new machine, the UDX will need to be rebuilt. You can check for the existence of a UDX in the UDX Status column on the Crypto Configuration panel on the HMC.

In most cases, the contract with the Services organization covers rebuilding for new hardware and software platforms, so it is simply a matter of contacting the appropriate organization to have the UDX updated and tested, however you should build time into the install schedule for getting the updated UDX's from IBM. Additionally, if the customer's support contract for the UDX has lapsed, there may be additional time required to get the paperwork in place.

**TKE**

If the customer plans to use a TKE workstation, insure it is the proper feature and LIC level to support a 2817.

If a customer wants to use a TKE for securely loading keys on the z196, they must use a supported TKE workstation (FC0841) for attachment to the 2817.

To exploit new cryptography enhancements (such as those announced in GA2), the new TKE LIC 7.1 LIC and specific operating system releases and service are required. With the 2817 or the z10, new Protected keys are available. If using a secure key as the source for a protected key, a Crypto Express3 is required.

The description of APAR OA29839 is no longer correct. Now supported are FMIDs HCR7740, HCR7750 and HCR7751 as well as HCR7770 and HCR7780 with TKE V7.

TKE V7 can manage the host cryptographic adapters on a z9, but the z9 server only supports CEX2s. You can't install a CEX3 on a z9 server. **Note:** TKE V6 is not supported on the z196.

**TKE Migration Considerations:**

- **z10 with CEX2 and TKE V5.x running HCR7740 or earlier:**
  1. Upgrade ICSF to at least HCR7750 plus the CEX3 toleration APARs, and preferably HCR7780 which supports the z196
  2. Install TKE V6 or TKE V7 on the z10
  3. Move to the z196, with TKE V7 (With the Migration Wizard support on TKE V6, the migration from TKE V6 to TKE V7 should be significantly easier.)

- **z10 with CEX2 and TKE V5.x running HCR7750 or later**
  1. Install the CEX3 toleration APARs
  2. Install TKE V6 or TKE V7 on the z10
  3. Move to the z196, with TKE V7 (With the Migration Wizard support on TKE V6, the migration from TKE V6 to TKE V7 should be significantly easier.)

If the customer already has CEX3s installed on their z10, the steps would be similar.

**Additional Cryptographic Exploitation Support**

*Cryptographic Support for z/OS V1.11 through z/OS V1.13* is available. *(FMID HCR7790)* To obtain this Web deliverable, visit: [http://www.ibm.com/systems/z/os/zos/downloads/](http://www.ibm.com/systems/z/os/zos/downloads/) This download provides
support for new encryption functions in the IBM zEnterprise 114 and the enhanced (GA2) level of the IBM System z196. This includes support for ANSI TR-31, X9.8 PIN Security, PKA RSA OAEP w/SHA 256, ECC Support Phase 2, Dynamic RSA MK, AES Key Type Support, 4096 RSA FP, Dynamic CKDS Administration.

A FIXCAT category for this level of ICSF is available for identifying fixes allowing prior levels of ICSF to coexist with, and fallback from, the Cryptographic Support for z/OS V1.11-V1.13 web deliverable (FMID HCR7790). Category: IBM.Coexistence.ICSF.z/OS_V1R11-V1R13-HCR7790

See Table 2 for the ICSF FMID shipped with the base operating system and level of cryptographic support.

Review the following WSC technical documents on Crypto at [www.ibm.com/support/techdocs](http://www.ibm.com/support/techdocs):

- **TD103782** z/OS: ICSF Version and FMID Cross Reference
- **WP100810** A Synopsis of System z Crypto Hardware
- **TD105523** REXX EXECs to Query the z/OS ICSF/Crypto Environment
- **PRS4216** CFSTINF – Display the names of ICSF key stores
### Table 1: z/OS Support for z196 and z114 by Release

<table>
<thead>
<tr>
<th>Release</th>
<th>z196 PSP Bucket – 2817DEVICE 2817/ZOS and z114 PSP Bucket – 2818DEVICE 2818/ZOS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Base Support</strong></td>
</tr>
<tr>
<td></td>
<td>OSA Express (GIO and SRB)</td>
</tr>
<tr>
<td></td>
<td>z/OS V1.8 1</td>
</tr>
<tr>
<td></td>
<td>z/OS V1.9 1</td>
</tr>
<tr>
<td></td>
<td>z/OS V1.10</td>
</tr>
<tr>
<td></td>
<td>z/OS V1.11</td>
</tr>
<tr>
<td></td>
<td>z/OS V1.12</td>
</tr>
<tr>
<td></td>
<td>z/OS V1.13</td>
</tr>
</tbody>
</table>

1 – The Lifecycle Extension for z/OS V1.8 or z/OS V1.9 is required for support
2 – The IBM Lifecycle Extension for z/OS V1.10 will be required after 9/30/2011 for support
3 – Does not include XL C/C++ support for ARCH(9) and TUNE(9) Options
4 – A Crypto Web Deliverable is NOT required, but toleration PTF is needed even if a web deliverable is installed. Support differs depending on the Crypto Web Deliverable installed
5 – Function available on z196 only
6 – Crypto Exploitation differs based on the Crypto Web Deliverable installed
7 – Statement of Direction. All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice
B – FMID in Base product W – FMIDs shipped in a Web Deliverable P – PTFs are required, P1 – Support differs by release, P2 - PTF required for toleration
N – Not Supported

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z/OS Positioning Software for zEnterprise (z196 and z114) Server

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

10/31/2011
## Table 2: z/OS Crypto Support

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Level Shipped in Base Product</th>
<th>Level Required for Secure Clear Key or Enhanced Secure Key Support and 64 bit addressing caller support</th>
<th>Level Required for AES, PRNG, and SHA-256 and CBC-in exploitation</th>
<th>Level Required for Remote Key Loading for AHMs and POSs</th>
<th>Level Required for CPACF Support</th>
<th>Level Required for SHA-384 and SHA-512 Support</th>
<th>Crypto Express3, Crypto Express3 1P, and Protected Key CPACF</th>
<th>X9.8 Pin, 64 Bit 128/192/256 Bit AES and SHA-256, SHA-256 (FIPS), SHA-384, SHA-512, and SHA-512 (FIPS), Support for PKA RSA and RSA-OAEP with SHA-256 algorithm, and Additional ECC Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS V1.8&lt;sup&gt;1&lt;/sup&gt;</td>
<td>HCR7731</td>
<td>Integrated in z/OS base level</td>
<td>Integrated in z/OS base level</td>
<td>HCR7750</td>
<td>HCR7750</td>
<td>HCR7751</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>z/OS V1.9&lt;sup&gt;1&lt;/sup&gt;</td>
<td>HCR7740</td>
<td>Integrated in z/OS base level</td>
<td>Integrated in z/OS base level</td>
<td>HCR7750</td>
<td>HCR7750</td>
<td>HCR7751</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>z/OS V1.10&lt;sup&gt;1&lt;/sup&gt;</td>
<td>HCR7750</td>
<td>Integrated in z/OS base level</td>
<td>Integrated in z/OS base level</td>
<td>HCR7751</td>
<td>HCR7770</td>
<td>HCR7780</td>
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<td>z/OS V1.11</td>
<td>HCR7751</td>
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<tr>
<td>z/OS V1.12</td>
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<tr>
<td>z/OS V1.13</td>
<td>HCR7780</td>
<td>Integrated in z/OS base level</td>
<td>Integrated in z/OS base level</td>
<td>HCR7790</td>
<td></td>
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</tr>
</tbody>
</table>

<sup>1</sup> The IBM Lifecycle Extension for z/OS is required for support after general support is withdrawn
## Additional Documentation

<table>
<thead>
<tr>
<th>Title</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>IBM zEnterprise System z196 Technical Introduction (Redbook)</td>
<td>SG24-7832</td>
</tr>
<tr>
<td>IBM zEnterprise System z196 Technical Guide (Redbook)</td>
<td>SG24-7833</td>
</tr>
<tr>
<td>IBM System z Connectivity Handbook (Redbook)</td>
<td>SG24-5444</td>
</tr>
<tr>
<td>IBM zEnterprise System: Smart Infrastructure for Today’s Heterogeneous Business Applications (RedPaper)</td>
<td>REDP-4645</td>
</tr>
<tr>
<td>Using System z As the Foundation for Your Information Management Architecture (RedPaper)</td>
<td>REDP-4606</td>
</tr>
<tr>
<td>Multiple Subchannel Sets: An Implementation View (Red Paper)</td>
<td>REDP-4387</td>
</tr>
<tr>
<td>Server Time Protocol Planning Guide (Redbook)</td>
<td>SG24-7280</td>
</tr>
<tr>
<td>Server Time Protocol Implementation Guide (Redbook)</td>
<td>SG24-7281</td>
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<tr>
<td>Server Time Protocol Recovery Guide (Redbook)</td>
<td>SG24-7380</td>
</tr>
<tr>
<td>IBM zEnterprise 114 Technical Guide</td>
<td>SG24-7954</td>
</tr>
<tr>
<td>IBM zEnterprise Unified Resource Manager</td>
<td>SG24-7921</td>
</tr>
</tbody>
</table>
Software Checklist

__ Identify Server migrating from:
1. MP2000 – MP3000
2. G2 – G6
3. z800 or z900
4. z890 or z990
5. z9 EC or z9 BC
6. z10 EC or z10 BC

__ Identify z/OS release
1. z/OS 1.8 – requires z/OS 1.8 Lifecycle Extended Service (5638-A01) to obtain toleration PTFs and for defect support. This expires on September 30, 2011.
2. z/OS 1.9 – requires z/OS 1.9 Lifecycle Extended Service (5646-A01) to obtain toleration PTFs and for defect support.
3. z/OS 1.10 - requires z/OS 1.10 Lifecycle Extended Service (5694-A01) for defect support after September 30, 2011.
4. z/OS 1.11, z/OS 1.12 or z/OS 1.13

__ Identify cryptographic requirements
   __ Web download (if applicable)

__ Identify zIIP and zAAP requirements
   __ Install all zIIP service based on function exploiting

__ Pull Hardware PSP buckets

__ Pull Software PSP buckets

__ Identify exploitation functions

__ Identify service requirements

__ Identify CFCC level
   __ Run CFSIZER (if applicable)

__ Order PTF service

__ Install PTF service

__ Review new mnemonics introduced

__ Implement STP (or a Mixed-CTN) timing network

__ Migrate from ICB-4 to InfiniBand coupling links

__ Pull WSC Documents
   __ FLASH10236 (if applicable – pre z990 and z890 Server)
   __ FLASH10477
   __ WP101229

__ Schedule Systems Assurance Review