

z/OS Positioning Software for z10 EC and z10 BC Servers

The latest generation of IBM System z servers, the IBM System z10 Enterprise Class (z10 EC) and IBM System z10 Business Class (z10 BC) is designed to meet your business needs. These servers are a marriage of evolution and revolution, building on the inherent strengths of the System z platform, delivering new technologies and virtualization designed to offer improvements in price / performance for key workloads as well as enabling a new range of hybrid solutions. The z10 further extends System z's leadership in key capabilities with the delivery of expanded scalability for growth and large-scale consolidation, availability to help reduce risk and improve flexibility to respond to changing business requirements, and improved security. The z10 is at the core of the enhanced System z platform designed to deliver technologies businesses need today along with a foundation to drive future business growth. The good news is all supported z/OS releases can run on a z10 server. Similarly, all supported z/OS and z/OS.e releases can participate in a sysplex with a Coupling facility or operating system image on a z10 server. The even better news is most customers are well positioned to use the new server.

The System z10 servers have as its basis the technology used for the z9 family of servers. This means if already running on, or are positioned to run on, a z9 server has less software to install than if migrating from a prior generation server. Therefore, anyone running z/OS 1.8 or higher is well positioned to run on a z10 server. It is important to note a direct migration to a System z10 server without upgrading to intermediate servers is valid (that is, you don't have to upgrade to a z9 prior to upgrading to a z10 server). However, ensure all migration considerations are satisfied for the servers "skipped". The "skipped" migration actions are documented in the *z/OS Migration* book and WSC Flashes 10236 and FLASH 10477 at www.ibm.com/support/techdocs

Software Support

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

All supported z/OS and z/OS.e releases can participate in a sysplex with a CF or operating system image on a z10 server. Not all System z10 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 z10 server, like the IBM z9 EC and z9 BC, differs by z/OS release level and is provided by a combination of FMIDs and PTFs. The specific PTFs needing installation will depend on the z/OS release. In addition, exploitation of certain functions, specifically some cryptographic functions and HiperDispatch (on z/OS 1.7), requires the installation of FMIDs. These FMIDs are downloadable Web Deliverables. These Web deliverables are unpriced and can be downloaded at:
<http://www.ibm.com/eserver/zseries/zos/downloads>.

The following z/OS releases are supported on the z10 EC and BC:

- z/OS 1.7 with:

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1. 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).
 2. the z/OS 1.7 Lifecycle Extended Service (5637-A01)
- z/OS 1.8 + PTFs and the z/OS 1.8 Lifecycle Extended Service (5638-A01).
 - z/OS 1.9 + PTFs
 - z/OS 1.10 + PTFs
 - z/OS 1.11 + PTFs

Notes:

1. z/OS.e cannot run on a z10 EC server.
2. z/OS and z/OS.e releases no longer service supported are not supported on a z10 server (z/OS V1R1 - V1R8)
3. **z/OS V1.4 and z/OS V1.5 will not IPL on a z10 Server.**
4. The functional capabilities increase with z/OS releases. That is, z/OS V1.9 has more capabilities than z/OS V1.7, and z/OS V1.9 exploits more functions than z/OS 1.7. For a list of z/OS releases and the functions supported for those releases, review table 1 under [z/OS Support for z10 EC and BC by Release](#).
5. **Support for z/OS 1.7 and z/OS 1.8 is only provided when the z/OS Lifecycle Extended Service is purchased. The Lifecycle Extended Service does not include z/OS.e releases.**

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 the "Enhanced PSP Tool" to identify missing service; or ServiceLink to acquire PSP bucket service.**

If generations of servers are skipped during the migration to the System z10 server, then go to the PSP Buckets for those generations to ensure all the software requirements are installed prior to IPLing z/OS on the System z10. (Upgrade: 2094DEVICE, subset 2094/ZOS if you are not already on a z9 EC or z9 BC server, and Upgrade 2084DEVICE, subset 2084/ZOS if you are not already on a z990 or z890). If you install one or more web deliverables, then you also need to review the software PSP bucket identified in the program directory that comes with each of those web deliverables.

If the PSP buckets were reviewed some time ago, there might have been additions since then, so ensure any newly identified z/OS service has been installed. To assist in determining whether the recommended service is installed on your system, which is identified in these PSP buckets, use AMP/E 3.5 FIXCAT category, the ServiceLink's PSP Service Extraction tool or the Enhanced PSP Tool (http://techsupport.services.ibm.com/390/psp_main.html). Please note in z/OS V1.10 or SMP/E V3.5 there are enhancements to integrate the verification and installation of service for new hardware in well known SMP/E functions.

For example, if migrating from a 31-bit-only processor (e.g., 9672 Rx6) to a System z10 EC, then refer to the z900/z800 PSP Bucket (either 2064DEVICE or 2066DEVICE) for the

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minimum z/OS requirements to operate in a 64-bit environment, then refer to the z990/z890 PSP Bucket (either 2084DEVICE or 2086DEVICE) for required software support at that level, then refer to the z9 PSP Bucket (2094DEVICE or 2096DEVICE) and finally refer to the z10 EC PSP Bucket (2097DEVICE) for the unique z10 EC requirements.

Note: If migrating from an old driver level on a z900, z800, z990, z890, or z9 server to System z10, then refer to the PSP Bucket for the appropriate server to ensure the highest level software support required for the server is installed.

The hardware buckets (2097DEVICE and 2098DEVICE) are structured to separate the minimum support required from support needed to exploit specific functions. To simplify finding the appropriate PSP Buckets and then identifying which PTFs listed in the PSP bucket need to be installed on your system, you can use the Technical Help Database for Mainframe Preventive Service Planning Buckets (<http://www14.software.ibm.com/webapp/set2/psp/srchBroker>) and the **Enhanced PSP Tool**. The web site provides a search capability, as well as pull down lists for types of PSP Buckets. The types currently supported include Processors, z/OS, and Functions. So you can simply select the processor you are preparing for and click 'Go'. zAAPs and zIIPs are defined as Functions, so identifying PTFs needed to use (exploit) these functions is just as easy. Just scroll down to the 'Find the bucket by Type, Category, and Release' heading, select 'Function' for the Type field, select either 'ZAAP' or 'ZIIP' for the Category field, and click Go.

Using the **Enhanced PSP Tool** will simplify the identification of required service for your specific environment. The tool output presents 'extract files'. 'Extract' files are simply structured lists used to identify every PTF from the PSP bucket, for every applicable z/OS release. This output can then be processed by the Enhanced PSP Tool (ePSPT) compare program (also downloadable from the same web site). The compare program will compare the structured list ('extract' file) to an SMP/E target zone, and identify any uninstalled service (filtering out service for releases that you don't have installed). It even will identify if any service has to be RECEIVED. Then use SMP/E's RECEIVE ORDER function (or your favorite service acquisition tool) to obtain the missing service. If desired, you can concatenate several extract files as input to the compare program. For example, you could concatenate the extract files for z990, z9 EC, ICSF, and zIIP; and then compare them to you z/OS V1.9 system to identify ALL PTFs needed for your upgrade in one fell swoop.

SMP/E 3.5 (also part of z/OS V1.10 - which became available September 26, 2008 - Announcement letter 208-269) provides new 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. Specifically, for the z10 platform the following fix categories have been defined:

z10 EC

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- IBM.Device.Server.z10-EC-2097 (defines minimum support required)
- IBM.Device.Server.z10-EC-2097.CapacityProvisioning
- IBM.Device.Server.z10-EC-2097.DecimalFloatingPoint
- IBM.Device.Server.z10-EC-2097.MIDAW
- IBM.Device.Server.z10-EC-2097.ParallelSysplexInfiniBandCoupling
- IBM.Device.Server.z10-EC-2097.ServerTimeProtocol
- IBM.Device.Server.z10-EC-2097.zAAP
- IBM.Device.Server.z10-EC-2097.zIIP

z10 BC

- IBM.Device.Server.z10-BC-2098 (defines minimum support required)
- IBM.Device.Server.z10-BC-2098.CapacityProvisioning
- IBM.Device.Server.z10-BC-2098.DecimalFloatingPoint
- IBM.Device.Server.z10-BC-2098.MIDAW
- IBM.Device.Server.z10-BC-2098.ParallelSysplexInfiniBandCoupling
- IBM.Device.Server.z10-BC-2098.ServerTimeProtocol
- IBM.Device.Server.z10-BC-2098.zAAP
- IBM.Device.Server.z10-BC-2098.zIIP

Additional fix categories may be added in the future.

When SMP/E V3.5 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 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 z10 EC 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.z10-EC-2097) .
```

If you wanted to include all support for the z10 EC optional functions, then the SOURCEID operand could either list all fix categories that you are interested in, or use wildcarding to have SMP/E determine all applicable fix categories. This latter approach would automatically express interest in future z10 functions (should new fix categories be created). Specifying IBM.Device.Server.z10-EC-2097*, or IBM.Device.Server.z10-EC*, or just *2097* all result in similar results: an interest in the minimal support for z10 EC as well as exploitation of all optional functions. Furthermore, if you wanted the minimal support for either a z10 EC or z10 BC you could include both categories in the SOURCEID parameter or specify IBM.Device.Server.z10-%C-209%. In these examples the asterisk (*) represents 0-n characters, while the percent sign (%) represents a single character. Based on the structured names of the fix categories for hardware support, you can use SOURCEIDs with wildcarding to ensure that PTFs for multiple generations of servers are installed.

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In the second scenario, you don't know if you have RECEIVED all the PTFs needed since you only obtain PTFs right before you want to install them. You need to first obtain the latest HOLDDATA using your favorite method (mine is 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(ZOSR8T)
FIXCAT(IBM.Device.z10-EC-2097) .
```

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, you can use them periodically to ensure you have the latest PTFs specified in the hardware PSP bucket installed (since PSP buckets can be updated daily). SMP/E V3.5 also provides an Explorer function which helps in identifying new fix categories which may be of interest.

PSP Bucket Reference Table		
Upgrade	Subset	Description
2097DEVICE	2097/ZOS 2097/ZVM 2097/ZVSE	z10 Enterprise Class
2098DEVICE	2098/ZOS 2098/ZVM 2098/ZVSE	z10 Business Class
2094DEVICE	2094/ZOS 2094Z/VM 2094VSE/ESA	z9 Enterprise Class
2096DEVICE	2096/ZOS 2096Z/VM 2096VSE/ESA	Z9 Business Class
2084DEVICE	2084/ZOS 2084Z/VM 2084VSE/ESA 2084/ZOS/1	z990
ZOSV1R10	BCP ICSF7750	(includes zIIP)
ZOSV1R9	BCP ICSF7750 ICSF7731 ICSF7740	(Includes zIIP) ICSF
ZOSV1R8	BCP ICSF7750 ICSF7731	(includes zIIP) ICSF
ZOSV1R7	BCP ICSF7730 ICSF7731 BCPZIIP	ICSF zIIP

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Migration Considerations

Because the z10 has, as its basis, the technology used on the z9 family of servers, there are only a few additional steps required to migrate from a z9 EC or BC server to the z10 BC or z10 EC. Not all System z10 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 z9 EC) support for a System z10 EC server, excluding cryptographic support and HiperDispatch support for z/OS V1.7, is delivered by software PTFs. Exploitation of some cryptographic functions on the System z10 EC (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. HiperDispatch on z/OS 1.7 requires the IBM zIIP Support for z/OS and z/OS.e V1R6/R7 web download.

Migration from an older server (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.

z/OS 1.7 or higher HCD or HCM will Assist in the Subchannel Set Definitions. If a z/OS V1.6 system is used to define the z10 EC or BC server, all subchannel sets must be defined or the VALIDATE will fail.

Plan for the Fixed HSA Enhancement on z10 Servers. On a z10 EC, a new 16 GB fixed Hardware System Area (HSA) which is managed separately from customer memory. This fixed HSA is designed to improve availability by avoiding outages. It also minimizes the preplanning requirements. On a z10 BC, a new 8 GB fixed HSA is managed separately from customer memory.

Plan for the Changes in Hardware Memory Granularity on a z10 Server. The minimum hardware memory granularity for LPAR assignment to central storage elements (initial and reserved) and for z/OS memory reconfiguration changes on z10 server. On z9, z990 and z890 it was 64 MB, on z10 EC it is 256 MB, and on a z10 BC it is 128 MB. Addressability is also increased to 8 TB on a z10 EC. See *PR/SM Planning* for more information. Any customer set up to do central memory reconfiguration with z/OS may have to change their RSU setting in IEASYSxx (in PARMLIB). You can specify RSU as number, a percentage of all storage, or in MB (or GB or TB). The *z/OS MVS Initialization and Tuning Reference* manual states while number values from 1-9999 are supported, it is recommended to use either the megabyte or gigabyte or terabyte format. If you currently specify RSU as a number, for example RSU=10, on a z9 it would result in 640 MB assuming a partition with largest element of 32 GB or less of central; however on z10 EC with the same size central, it would result in 2,560 MB. If you specify RSU in MB or GB, you will probably have less of an impact, but you need to understand the values will be rounded to a multiple of 256 MB instead of 64 MB or 128 MB.

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If **Workload License Charging (WLC)** is implemented the SCRT level must be upgraded to process z10 EC SMF data. SCRT V14.2.9 (Version 14 Release 2 Modification Level 9) or higher provides support for the z10 EC server. If you collect SMF data on a System z10 EC server which will be processed by SCRT, you must minimally use SCRT V14.2.9 to generate the SCRT reports. If you do not need to process SMF data from a z10 EC 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/>

z10 BC server requires minimally SCRT level 16.1.0 and is available from the SCRT website at: <http://ibm.com/zseries/swprice/scrt/>

New zArchitecture Instructions

In support of the z10 EC and z10 BC servers, the High Level Assembler introduced new mnemonics for the new machine instructions. The new 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, 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 following installation of the enabling PTF for APAR PK58463.

For convenience, here is the list.

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

Mnemonic	Format	OpCode	Instruction Name
ASI	SIY	EB6A	ADD IMMEDIATE (32←8)
AGSI	SIY	EB7A	ADD IMMEDIATE (64←8)
ALSI	SIY	EB6E	ADD LOGICAL WITH SIGNED IMMEDIATE (32←8)
ALGSI	SIY	EB7E	ADD LOGICAL WITH SIGNED IMMEDIATE (64←8)
CRB	RRS	ECF6	COMPARE AND BRANCH (32)
CGRB	RRS	ECE4	COMPARE AND BRANCH (64)
CRJ	RIE	EC76	COMPARE AND BRANCH RELATIVE (32)
CGRJ	RIE	EC64	COMPARE AND BRANCH RELATIVE (64)
CRT	RRF	B972	COMPARE AND TRAP (32)
CGRT	RRF	B960	COMPARE AND TRAP (64)
CGH	RXY	E334	COMPARE HALFWORD (64←16)
CHHSI	SIL	E554	COMPARE HALFWORD IMMEDIATE (16←16)
CHSI	SIL	E55C	COMPARE HALFWORD IMMEDIATE (32←16)
CGHSI	SIL	E558	COMPARE HALFWORD IMMEDIATE (64←16)
CHRL	RIL	C65	COMPARE HALFWORD RELATIVE LONG (32←8)
CGHRL	RIL	C64	COMPARE HALFWORD RELATIVE LONG (64←16)
CIB	RIS	ECFE	COMPARE IMMEDIATE AND BRANCH (32←8)

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CGIB	RIS	ECFC	COMPARE IMMEDIATE AND BRANCH (64←8)
CIJ	RIE	EC7E	COMPARE IMMEDIATE AND BRANCH RELATIVE (32←8)
CGIJ	RIE	EC7C	COMPARE IMMEDIATE AND BRANCH RELATIVE (64←8)
CIT	RIE	EC72	COMPARE IMMEDIATE AND TRAP (32←16)
CGIT	RIE	EC70	COMPARE IMMEDIATE AND TRAP (64←16)
CLRB	RRS	ECF7	COMPARE LOGICAL AND BRANCH (32)
CLGRB	RRS	ECE5	COMPARE LOGICAL AND BRANCH (64)
CLRJ	RIE	EC77	COMPARE LOGICAL AND BRANCH RELATIVE (32)
CLGRJ	RIE	EC65	COMPARE LOGICAL AND BRANCH RELATIVE (64)
CLRT	RRF	B973	COMPARE LOGICAL AND TRAP (32)
CLGRT	RRF	B961	COMPARE LOGICAL AND TRAP (64)
CLHHSI	SIL	E555	COMPARE LOGICAL IMMEDIATE (16←16)
CLFHSI	SIL	E55D	COMPARE LOGICAL IMMEDIATE (32←16)
CLGHSI	SIL	E559	COMPARE LOGICAL IMMEDIATE (64←16)
CLIB	RIS	ECFF	COMPARE LOGICAL IMMEDIATE AND BRANCH (32←8)
CLGIB	RIS	ECFD	COMPARE LOGICAL IMMEDIATE AND BRANCH (64←8)
CLIJ	RIE	EC7F	COMPARE LOGICAL IMMEDIATE AND BRANCH RELATIVE (32←8)
CLGIJ	RIE	EC7D	COMPARE LOGICAL IMMEDIATE AND BRANCH RELATIVE (64←8)
CLFIT	RIE	EC73	COMPARE LOGICAL IMMEDIATE AND TRAP (32←16)
CLGIT	RIE	EC71	COMPARE LOGICAL IMMEDIATE AND TRAP (64←16)
CLRL	RIL	C6F	COMPARE LOGICAL RELATIVE LONG (32)
CLHRL	RIL	C67	COMPARE LOGICAL RELATIVE LONG (32←16)
CLGRL	RIL	C6A	COMPARE LOGICAL RELATIVE LONG (64)
CLGHRL	RIL	C66	COMPARE LOGICAL RELATIVE LONG (64←16)
CLGFRL	RIL	C6E	COMPARE LOGICAL RELATIVE LONG (64←32)
CRL	RIL	C6D	COMPARE RELATIVE LONG (32)
CGRL	RIL	C68	COMPARE RELATIVE LONG (64)
CGFRL	RIL	C6C	COMPARE RELATIVE LONG (64←32)
ECAG	RSY	EB4C	EXTRACT CACHE ATTRIBUTE
EXRL	RIL	C60	EXECUTE RELATIVE LONG
LAEY	RXY	E375	LOAD ADDRESS EXTENDED
LTGF	RXY	E332	LOAD AND TEST (64←32)
LHRL	RIL	C45	LOAD HALFWORD RELATIVE LONG (32←16)
LGHRL	RIL	C44	LOAD HALFWORD RELATIVE LONG (64←16)
LLHRL	RIL	C42	LOAD LOGICAL HALFWORD RELATIVE LONG (32←16)
LLGHRL	RIL	C46	LOAD LOGICAL HALFWORD RELATIVE LONG (64←16)
LLGFRL	RIL	C4E	LOAD LOGICAL RELATIVE LONG (64←32)
LRL	RIL	C4D	LOAD RELATIVE LONG (32)
LGRL	RIL	C48	LOAD RELATIVE LONG (64)
LGFRL	RIL	C4C	LOAD RELATIVE LONG (64←32)
MVCOS	SSF	C80	MOVE WITH OPTIONAL SPECIFICATIONS
MVHHI	SIL	E544	MOVE (16←16)
MVHI`	SIL	E54C	MOVE (32←16)
MVGHI	SIL	E548	MOVE (64←16)
MFY	RXY	E35C	MULTIPLY
MHY	RXY	E37C	MULTIPLY HALFWORD
MSFI	RIL	C21	MULTIPLY SINGLE IMMEDIATE
MSGFI	RIL	C20	MULTIPLY SINGLE IMMEDIATE
PFDF	RXY	E336	PREFETCH DATA

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PFDRL	RIL	C62	PREFETCH DATA RELATIVE LONG
PFMF	RRE	B9AF	PERFORM FRAME MANAGEMENT FUNCTION
PTF	RRE	B9A2	PERFORM TOPOLOGY FUNCTION
RNSBG	RIE	EC54	ROTATE THEN AND SELECTED BITS
RXSBG	RIE	EC57	ROTATE THEN EXCLUSIVE OR SELECTED BITS
RISBG	RIE	EC55	ROTATE THEN INSERT SELECTED BITS
ROSBG	RIE	EC56	ROTATE THEN OR SELECTED BITS
STHRL	RIL	C47	STORE HALFWORD RELATIVE LONG
STRL	RIL	C4F	STORE RELATIVE LONG (32)
STGRL	RIL	C4B	STORE RELATIVE LONG (64)

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):

* 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

System z10: Obsolete Instructions Removed

Five obsolete instructions present on System z9 were removed on System z10. These instructions have Hexadecimal Operation Codes: E503, E504, E505, E506, E507. Continued use of these instructions on a System z10 will result in Operation Exception - OC1 ABEND in software. The removed instructions were originally introduced as part of the *"IBM System/370: Assists for MVS"* to provide various assist and lock manipulation functions. These five were carried forward to System z9. The former *"MVS Assist"* instruction Op Code E502 was recycled years ago for the z/Architecture 64-bit Store Real Address (STRAG) instruction. Other *"MVS Assist"* instructions have been gone from hardware for many years. The removed instructions have not been used in any IBM software product for many years. The removed instructions have never been part of z/Architecture as documented in Reference: *z/Architecture Principles of Operations, SA22-7832*.

HiperDispatch

There is a new HIPERDISPATCH=YES|NO parameter in the IEAOPTxx member of PARMLIB to control whether HiperDispatch is enabled or disabled for the system. It can be

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changed dynamically via the SET OPT=xx command. The default is HiperDispatch is disabled on z/OS V1.7 through V1.11. A Health Check is provided to verify HiperDispatch is enabled on a z10 system. The Health Check is shipped active, but only will detect an exception when z/OS is running on a z10 system and HIPERDISPATCH is set to NO. WLM goal adjustment may be required when using this function. Review and update WLM policies as necessary.

Refer to white paper WP101229 to understand the benefits of HiperDispatch available via Techdocs web site. (www.ibm.com/support/techdocs). IBM recommends enabling HiperDispatch after all the required PTFs, and if applicable the zIIP web deliverable, are installed.

Notes:

1. Ensure all HiperDispatch PTFs are installed prior to enabling. HiperDispatch PTFs are documented in the z10 EC and z10 BC PSP buckets. **There is no functional PSP for HiperDispatch.**
2. It is highly recommended to continuously monitor for HiperDispatch PTFs and install them.

z/OS XL C/C++ Exploitation of z10 EC and z10 BC Machine Instructions

The ARCHITECTURE C/C++ compiler option selects the minimum level of machine architecture on which programs will run. Certain features provided by the compiler require a minimum architecture level. ARCH(8) exploits instructions available on System z10 servers. For more information, refer to the ARCHITECTURE compiler option in *z/OS XL C/C++ User's Guide*. The TUNE compiler option allows for the optimization of the application for specific machine architecture within the constraints imposed by the ARCHITECTURE option. The TUNE level must not be lower than the setting in the ARCHITECTURE option. For more information, refer to the TUNE compiler option in *z/OS XL C/C++ User's Guide*. z/OS V1.9 is the minimum release required to use this function.

Once programs exploit the ARCH(8) or TUNE(8) options, those programs can only run on System z10 servers, or an operation exception will occur. This is a consideration for programs running on different server levels (System z9 and zSeries) during development, test, and production, as well as during fallback or disaster recovery.

Notes:

1. **ARCH(7) is the minimal level required to exploit the Decimal Floating Point support.** The resultant program objects can execute on z9 EC and z9 BC servers, as well as on the new z10 EC servers. Also note on z9 servers, the ability to use the hardware decimal floating point facilities is dependent on the MCL level of the server.
2. ARCH(8) is provided with z/OS V1.9. Instructions are provided on the web (<http://www.ibm.com/software/awdtools/czos/>) enabling z/OS V1.8 to use ARCH(7) or ARCH(8) to exploit decimal floating point, as well as use ARCH(8)/TUNE(8) on z/OS V1.8 to generate code to use instructions only available on a z10 EC service and optimize the code for a z10 EC server.
3. **z/OS V1.8 XL C/C++ does not support Decimal Floating Point Math, although it does support a smaller subset of ARCH(7).**

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Large Page (1MB) Support

Large page support is exclusive to z10 servers and to z/OS V1.9 (and higher). In order to use large pages requires the running of z/OS V1.9 (or higher), with the appropriate PTFs, in a 'native' z10 LPAR. The support is not enabled if you are running without the software support, or running on prior generations of servers, or when running as a z/OS guest under z/VM). Furthermore, to exploit Large Page frames a new parameter in the IEASYSxx member of PARMLIB (LFAREA=xx%|xxxxxxM|xxxxxxG) needs to be specified. This parameter cannot be changed dynamically.

High Performance FICON (zHPF)

There is a new ZHPF=YES/NO parameter in IECIOSxx member of Parmlib and on the SETIOS command to control whether zHPF is enabled or disabled. The default is set to no (ZHPF=NO). On z10 servers if all the CHPIDs defined to a set of devices support zHPF and the control unit supports ZHPF protocols, then the z/OS Media Manager component will automatically use the system architecture (Transport CCW) for communication with the device. Note zHPF protocols will not be used unless all the CHPIDs and control unit ports for the device support the new protocols.

Support is also added for the D IOS,ZHPF command. If D IOS,ZHPF is issued on a server which does not support zHPF, then IOS630I is issued to indicate zHPF is not supported by the server. Otherwise, message IOS630I is used indicating whether zHPF is enabled or disabled. If the zHPF parameter is specified in IECIOSxx or specified on a SETIOS command, then the parameter value is checked to see whether it is YES or NO. If not, message IOS085I xx,rrrr card, ZHPF FACILITY NOT SUPPORTED BY PROCESSOR is issued.

The command D M=DEV is changed to display whether zHPF is enabled for the device.

```
D M=DEV(410)

IEE174I 11.00.11 DISPLAY M 258
DEVICE 0410 STATUS=ONLINE
CHP                A0    A1    A2    A3
DEST LINK ADDRESS  A0    A1    A2    A3
PATH ONLINE       Y     Y     Y     Y
CHP PHYSICALLY ONLINE Y   Y   Y   Y
PATH OPERATIONAL  Y     Y     Y     Y
MANAGED           N     N     N     N
CU NUMBER         0400 0400 0400 0400
MAXIMUM MANAGED CHPID(S) ALLOWED: 0
DESTINATION CU LOGICAL ADDRESS = 04
SCP CU ND        =
002107.000.IBM.TC.02069A00FF04.00FF
SCP TOKEN NED    =
002107.000.IBM.TC.02069A00FF04.0400
SCP DEVICE NED   =
002107.000.IBM.TC.02069A00FF04.0410
FUNCTIONS ENABLED = MIDAW, ZHPF
```

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```
D M=CHP(A0)

IEE174I 19.38.27 DISPLAY M 343
CHPID A0: TYPE=1A, DESC=FICON POINT TO POINT, ONLINE
DEVICE STATUS FOR CHANNEL PATH A0
      0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
0041 +  +  +  +  +  +  +  +  AL AL AL AL AL AL AL AL
0071 +  +  +  +  +  +  +  +  UL UL UL UL .  .  .  .
0072 +  +  +  +  .  UL .  .  UL .  .  UL .  .  UL .
0073 +  +  UL .  UL .  UL .  UL .  UL .  UL .  UL .
1071 .  .  .  .  .  .  .  .  UL UL UL UL UL UL UL UL
SWITCH DEVICE NUMBER = B000
DEFINED ENTRY SWITCH - LOGICAL SWITCH ID = 20
ATTACHED ND = 006064.001.MCD.01.000000010C17
PHYSICAL CHANNEL ID = 01D3
FACILITIES SUPPORTED = ZHPF
```

Sysplex

z/OS on a z900 or z800 cannot participate in a sysplex with a z10 server. If you have any z/OS images or coupling facilities on a z900 or z800, and you intend to introduce a z10 server into that sysplex, you must migrate those images to z990 or z890 (or higher) prior to introducing the z10 server.

When you change coupling facility control code (CFCC) levels, your coupling facility structure sizes might change. System z10 servers initially ship with CFCC Level 16. If, as part of your migration to a System z10 server, you change CFCC levels (either by placing a coupling facility on the System z10 server or by moving the coupling facility to a z9 EC or BC 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 z10 server. Use the CFSIZER tool (<http://www-03.ibm.com/systems/z/cfsizer/>) to determine appropriate structure sizes.

Cryptography

The only z10 requirement is to have installed the level of ICSF which provides the functions required in your application environment.

Additional Cryptographic Exploitation Support

Effective November 20, 2009, Cryptographic Support for z/OS V1.9 through z/OS V1.11 is available. (FMID HCR7770) To obtain this Web deliverable, visit:

<http://www.ibm.com/systems/z/os/zos/downloads/> This Web deliverable supports z/OS V1.9 through z/OS V1.11 and provides support for new encryption functions in the IBM System z10 EC and BC. This support includes new support for the new Cryptographic

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Express3 Coprocessor (CEX3C) and new Protected Key CPACF Support. Additional software support includes enhanced PKCS#11 support and ECC Support.

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 z10 Library in Resource Link.

z/OS 1.11

FMID HCR7751 is integrated in the z/OS 1.11 base.

z/OS 1.10

FMID HCR7750 is integrated in the z/OS 1.10 base.

z/OS 1.8 and z/OS 1.9

The Cryptographic Support for z/OS V1R7-V1R9 and z/OS.e V1R7-V1R8 Web Deliverable (FMID HCR7750) must be installed (as well as the PTFs identified in the program directory provided with the Web deliverable and the PTFs recommended in the appropriate ICSF PSP bucket) to provide the API support for the new crypto hardware functions on the z10:

- Advanced Encryption Standard (AES) for 192- and 256-bit keys
- SHA-384 and -512 bit message digests
- ISO Format 3 PIN blocks
- RSA keys up to 4096 bits
- Random Number Generate Long
- Enhanced TKE Auditing

z/OS 1.7

If Crypto Express2 compatibility support is required when a Crypto Express2 PCI-X adapter is configured as an accelerator on the z10 EC, you must minimally have the PTFs listed in the PSP bucket installed.

To use APIs to access the crypto hardware support for AES-128, Pseudo Random Number Generate (PRNG) and/or SHA-256, introduced with the z9 CP Assist for Cryptographic Function (CPACF), or to exploit the Crypto Express2 as an accelerator on the z10 EC, you must minimally have installed the Cryptographic Support for z/OS V1R6/R7 and z/OS.e V1R6/R7 Web download (no longer available), the Enhancements to Cryptographic Support for z/OS and z/OS V1R6/R7 Web deliverable (no longer available), or the Cryptographic Support for z/OS V1R7-V1R9 and z/OS.e V1R7-V1R8 Web deliverable. You should also install the PTFs identified in the program directory provided with the Web deliverable and the PTFs recommended in the appropriate ICSF PSP bucket.

If support for Remote Key Loading for ATMs and point of sale devices is required, and/or implementation of ISO 16609 CBC Mode TDES MAC is required you must install the Enhancements to Cryptographic Support for z/OS V1R6/7 and z/OS.e V1R6/7 Web Deliverable (no longer available), or Cryptographic Support for z/OS V1R7-V1R9 and z/OS.e V1R7-V1R8 Web deliverable. You should also install the PTFs

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identified in the program directory provided with the Web deliverable and the PTFs recommended in the appropriate ICSF PSP bucket.

To use APIs to access the crypto hardware support for AES-192 and AES-256 bit keys or SHA-384 and SHA-512 message digests which are introduced on the CP Assist for Cryptographic Function on the z10, or to use ISO Format 3 PIN blocks, RSA keys up to 4096 bits, Random Number Generator Long, or enhanced TKE Auditing, then the Cryptographic Support for z/OS V1R7-V1R9 and z/OS.e V1R7-V1R8 Web Deliverable must be installed. You should also install the PTFs identified in the program directory provided with the Web deliverable and the PTFs recommended in the appropriate ICSF PSP bucket.

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

- TD103782** z/OS: ICSF Version and FMID Cross Reference

- WP100810** A Synopsis of System z Crypto Hardware

- FLASH10620** Cryptographic Support for z/OS V1.9 through z/OS V1.11 Web deliverable now available.

- PRS3472** ICSF HCR7751 and the October, 2008 Crypto Announcements

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Table 1: z/OS Support for z10 EC or z10 BC by Release

Release	z/OS Support for z10 EC or z10 BC																													
	Included in Base z/OS Support											Explicit z/OS Support																		
	z10 EC GA1 Support	OSA-Express3 10 GBE	OSA-Express3 4-port OSA-I-CC	65535 MP Factors	z10 mnemonic support	Crypto Tolerant ¹	HiperDispatch	Large Memory > 128GB (1 TB) ²	C/C++ ARCH(8) and TUNE(8)	Greater than 54 CPs (64) ³	Dynam. Add Logical CPs	PSIFB Coupling Links	Usage Report Program	Decimal Floating Point ⁴	High Performance FICON	CF Level 16	Crypto Exploitation ⁵	Layer 3 VMAC Support	Service Aids Support for Large Dumps	CPU Measurement Facility	OSA-Express3 Double Port Density	WVPN prediction tool	Large Page Support	Capacity Provisioning	HiperSockets Multiple Write Facility	STP Enhancements	Throughput improvements with Protected Key CPACF	OSA Interrupt Optimization or Optimized Latency Mode (OLM)	OSA QDIO data connection Isolation	New XL C/C++ Compiler Options
z/OS 1.7 ⁶	P	B	B	P	P	W P	N	N	N	N	P	P	P	P	P	W	N	N	N	N	N	N	N	N	N	N	N	N	N	
z/OS 1.7 ⁶ w/ZIIP	P	B	B	P	P	W P	W P	N	N	N	P	P	P	P	P	W	N	N	N	N	N	N	N	N	N	N	N	N	N	
z/OS 1.8 ⁶	P	B	B	P	P	B P	P	B P	W	N	N	P	P	W P	P	P	P	P	P	P	P	N	N	N	N	N	N	N	N	
z/OS 1.9	P	B	B	B	P	B P	B P	B P	B P	B	N	B P	P	B P	P	P	W	B	P	P	P	P	B P	B P	P	WP	N	N	N	
z/OS 1.10	B P	B	B	B	B	B P	B P	B P	B P	B	B	B P	P	B P	P	P	W	B	B	P	B	P	B P	B P	B	P	N	WP	N	N
z/OS 1.11	B P	B	B	B	B	B P	B	B	B	B	B	B	B	B	B	W	B	B	B	B	B	B	B	B	B	B	B	WP	P	P

1 – New cryptographic toleration required for GA3 (Y4)
 2 - Up to 1 Terabyte on a z10 EC, and up to 248 GB on a z10 BC
 3 – Only on a z10 EC
 4 – Decimal Floating Point Support differs by release
 5. Crypto Exploitation differs by release and web deliverable installed
 6. The IBM Lifecycle Extension for z/OS is required after Sept. 2009

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Legend

B - FMID in Base product (assumes service identified in z9 EC PSP bucket is installed)

W - FMIDs shipped in web deliverable

P - PTFs required

N - Not supported

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Table 2: z/OS Crypto Support

Operating System	Level Shipped in Base Product	Level Required for Secure or Clear Key or Enhanced Secure Key Support	Level Required for 64-bit addressing caller support	Level Required for AES, PRNG, and SHA-256 and CEX2n exploitation	Level required for Remote Key Loading for ATMs and POSs	Level Required for 4096-RSA keys, ISO-3 PIN Support	Level Required for CPACF support for SHA-384 and SHA-512 Support	Level Required for 13- thru 19-digit Personal Account Numbers, ICSF Query Algorithms, and Key Token Policy support
z/OS 1.7 ¹ or z/OS.e 1.7	HCR7720	Integrated in z/OS base level	Integrated in z/OS base level	HCR7730	HCR7731	HCR7750	HCR7750	HCR7751
z/OS 1.8 ¹ or z/OS.e 1.8	HCR7731	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	HCR7750	HCR7750	HCR7751
z/OS 1.9	HCR7740	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	HCR7750	HCR7750	HCR7751
z/OS 1.10	HCR7750	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	HCR7751
z/OS 1.11	HCR7751	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level	Integrated in z/OS base level

z/OS 1.7 requires Lifecycle Extended Service (5637-A01)

z/OS 1.8 requires Lifecycle Extended Service (5638-A01)

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[Additional Documentation](#)

IBM System z10 Enterprise Class Technical Guide (Redbook)	SG24-7516
IBM System z10 Enterprise Class Configuration Setup (Redbook)	SG24-7571
IBM System z Connectivity Handbook (Redbook)	SG24-5444
IBM System z10 Enterprise Class Technical Introduction (Redbook)	SG24-7515
IBM System z10 Enterprise Class Capacity on Demand (Redbook)	SG24-7504
Getting Started with Infiniband on System z10 and System z9 (Redbook)	SG24-7539
Multiple Subchannel Sets: An Implementation View (Red Paper)	REDP-4387
Server Time Protocol Planning Guide (Redbook)	SG24-7280
Server Time Protocol Implementation Guide (Redbook)	SG24-7281
System z Connectivity Handbook (Redbook)	SG24-5444
HiperSockets (Redbook)	SG24-6816
System z Cryptographic Services and z/OS PKI Services (Redbook)	SG24-7470
IBM System z10 Business Class Technical Overview (Redbook)	SG24-7632
IBM System z10 Capacity on Demand (Redbook)	SG24-7504

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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

- Identify z/OS release
 1. z/OS 1.7 - requires z/OS 1.7 Lifecycle Extended Service (5637-A01)
 2. z/OS 1.8
 3. z/OS 1.9
 4. z/OS 1.10
- Identify cryptographic requirements
 - Web download (if applicable)

- Identify zIIP and zAAP requirements
 - Web download for zIIP for z/OS 1.7 (Required for HiperDispatch)
 - Install all zIIP service based on function exploiting

- Pull Hardware PSP buckets

- Pull Software PSP buckets

- Pull Functional PSP buckets as required
 - ZAAP, zIIP, STP, DECFP, CAPPROV, etc.

- Identify exploitation functions

- Identify service requirements

- Identify CFCC level

- Order PTF service

- Install PTF service

- Install Web downloads, if applicable

- Pull WSC Documents
 - FLASH10236 (if applicable - pre z990 and z890 Server)
 - FLASH10185 (if applicable - 64-bit Migration)
 - FLASH10477
 - WP101229