z/OS

Migration to the IBM System z10

Version 1 Releases 9, 8, and 7

SA23-2242-00

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Note
Before using this information and the product it supports, be sure to read the general information under “Notices” on page 11.

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This edition applies to version 1 releases 9, 8, and 7 of z/OS (5694-A01).

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Contents

About this document

This document provides software migration information for those who are using z/OS® V1R9, V1R8, or V1R7 and intend to migrate from their current server to an IBM® System z10™ server.

Who should read this document

This document is intended for the same type of person who uses the *z/OS Migration* document (GA22-7499).

Related information

For z/OS V1R9, V1R8, or V1R7 migration information *not* related to the System z10 server, see the *z/OS Migration* document for the appropriate release. (The migration information related to the System z10 server is in the document you are reading.)

For information about System z10 servers, see the documents in the System z10 library on Resource Link™ (http://www.ibm.com/servers/resourcelink).

Migrating to a System z10 server

Description: The IBM System z10 server is a follow-on to the IBM System z9™ servers (z9 EC [formerly z9-109] and z9 BC) and IBM eServer™ zSeries® servers (z990, z890, z900, and z800). The System z10 server is a marriage of evolution and revolution, building on the inherent strengths of the System z™ platform and delivering new technologies that offer dramatic improvements in price and performance for key new workloads as well as enabling a new range of hybrid solutions. The System z10 server further extends System z leadership in key capabilities with the delivery of expanded scalability for growth and large scale consolidation, availability to reduce risk and improve flexibility to respond to changing business requirements, and improved security. The System z10 server is at the core of the enhanced System z platform that delivers technologies that businesses need today along with a foundation to drive future business growth.

The specific System z10 functions exploited by z/OS depend on the z/OS release. See Table 1.

Table 1. System z10 functions exploited by z/OS V1R7, z/OS V1R8, and z/OS V1R9

New System z10 functions that you can exploit	**R7**	**R8**	**R9**
Basic z/OS support	X	X	X
FICON® Express4 (CHPID type FC)	X	X	X
OSA-Express2 Gigabit Ethernet, 1000BASE-T Ethernet, and OSA-Express2 10 Gigabit Ethernet	X	X	X
OSA-Express3 10 Gigabit Ethernet	X	X	X
InfiniBand Coupling Links	X	X	X
65535 MP Factors	X	X	X
Decimal Floating Point Math Support	X (in HLASM support only)	X (only if instructions at http://www.ibm.com/software/awdtools/czos/ are followed for using the R9 XL C/C++ compiler on an R8 system)	X
CP Assist for Cryptographic Functions (CPACF)	X (with any of the following Web deliverables installed: Cryptographic Support for z/OS V1R6/R7 and z/OS.e V1R6/R7 [no longer available], Enhancements to Cryptographic Support for z/OS and z/OS.e V1R6/R7 [no longer available], or Cryptographic Support for z/OS V1R7-V1R9 and z/OS.e V1R7-V1R8)	X	X

Table 1. System z10 functions exploited by z/OS V1R7, z/OS V1R8, and z/OS V1R9 (continued)

New System z10 functions that you can exploit	**R7**	**R8**	**R9**
Enhancements to CP Assist for Cryptographic Functions (CPACF) (Crypto Advanced Encryption Standard (AES) for 256-bit keys, and SHA-384 and 512 bit for message digest support)	X (only with the Cryptographic Support for z/OS V1R7-R9 Web deliverable, ICSF FMID HCR7750, installed)	X (only with the Cryptographic Support for z/OS V1R7-R9 Web deliverable, ICSF FMID HCR7750, installed)	X (only with the Cryptographic Support for z/OS V1R7-R9 Web deliverable, ICSF FMID HCR7750, installed)
Configurable Crypto Express2	X (with either of the following Web deliverables installed: Enhancements to Cryptographic Support for z/OS and z/OS.e V1R6/R7 [no longer available], or Cryptographic Support for z/OS V1R7-V1R9 and z/OS.e V1R7-V1R8)	X	X
Support for RSA keys up to 4096 bits in length	X (only with the Cryptographic Support for z/OS V1R7-R9 Web deliverable, ICSF FMID HCR7750, installed)	X (only with the Cryptographic Support for z/OS V1R7-R9 Web deliverable, ICSF FMID HCR7750, installed)	X (only with the Cryptographic Support for z/OS V1R7-R9 Web deliverable, ICSF FMID HCR7750, installed)
Key management for remote loading of ATM and Point of Sale (POS) keys	X (with either of the following Web deliverables installed: Enhancements to Cryptographic Support for z/OS and z/OS.e V1R6/R7 [no longer available], or Cryptographic Support for z/OS V1R7-V1R9 and z/OS.e V1R7-V1R8)	X	X
Improved Key Exchange with non-CCA Cryptographic Systems	X	X	X
Dynamically Add Crypto to Logical Partition	X	X	X
HiperDispatch	X (only with the z/OS V1R7 zIIP Web deliverable installed; a zIIP specialty processor is not required)	X	X
>128 GB Support		X	X
>54 CPs for a single LPAR			X
Capacity Provisioning			X
Large Page (1 MB) Support			X
HiperSockets™ Multiple Write Facility			X

Table 1. System z10 functions exploited by z/OS V1R7, z/OS V1R8, and z/OS V1R9 (continued)

New System z10 functions that you can exploit	R7	R8	R9
zIIP-assisted z/OS Global Mirror (XRC)			X
ARCH(8), TUNE(8)		X (only if instructions at http://www.ibm.com/software/awdtools/czos/ are followed for using the R9 XL C/C++ compiler on an R8 system)	X

Element or feature:	Multiple.
When change was introduced:	The System z10 server, which first shipped in February 2008.
Applies to migration from:	z/OS V1R9, z/OS V1R8, and z/OS V1R7.
Timing:	Before installing a System z10 server.
Is the migration action required?	Yes, if you want to run z/OS on a System z10 server.
Target system hardware requirements:	A System z10 server.
Target system software requirements:	See the appropriate PSP buckets for required Web deliverables and PTFs for specific functions, as described in “Recommended migration steps” on page 8.
Other system (coexistence or fallback) requirements:	See the appropriate PSP buckets for required PTFs for specific functions, as described in “Recommended migration steps” on page 8.
Restrictions:	None.
System impacts:	None.

Steps to take: Follow the recommendations and considerations, adhere to the restrictions, and perform the tasks described in the topics below.

General recommendations and considerations

As you plan your migration to a System z10 server, consider the following:

1. **Relatively few migration actions are new when coming from a System z9 server.** Migration to a System z10 server has, as its basis, a migration to a z9 EC or z9 BC. This means that if you are migrating to a System z10 server from a z9 EC or z9 BC (and have performed the migration actions associated with the z9 EC or z9 BC), you have fewer migration actions than if you were migrating from a server prior to the z9 EC or z9 BC and have not yet performed the migration actions associated with the z9 EC or z9 BC. There are, in fact, very few new migration actions to perform on z/OS for a System z10 server if you have already migrated to a z9 EC or z9 BC. It is important to note that you can migrate directly to a System z10 server without installing the intermediate (prior to z9 EC and z9 BC) servers, but you still need to ensure that any migration considerations are satisfied for the servers that you “skipped”. You can read about z9 EC and z9 BC migration actions in the following places:
   - For z/OS V1R9, the topic “Migrate to a System z9 server” in *z/OS V1R9 Migration*, GA22-7499.

- For z/OS V1R8, the topic “Migrate to a System z9 server” in *z/OS V1R8 Migration*, GA22-7499.
- For z/OS V1R7, the document *Migration to the IBM System z9*, SA23-1348. You can obtain this document at the Migration and Installation section of the z/OS Web site: http://www.ibm.com/eserver/zseries/zos/installation/.

2. **Support is delivered by service (and FMID Web deliverables for ICSF and z/OS V1R7 HiperDispatch).** The delta (from a z9 EC or z9 BC) support for a System z10 server, excluding cryptographic support, is delivered by service (PTFs). The cryptographic support for the System z10 servers continues to be FMIDs, many of which are still available in Web deliverables. Different ICSF Web deliverables, providing different levels of support, are available for different releases of z/OS.
3. **Larger coupling facility structure sizes might be necessary.** When you change coupling facility control code (CFCC) levels, your coupling facility structure sizes might change. System z10 servers initially ship with CFCC Level 15. 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 z9 BC at a later CFCC level), you might have larger structure sizes than you did 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.
4. **Use the same software level throughout a sysplex.** Having members of a sysplex at the same software level (other than during brief migration periods) is good software management policy.
5. **Migrate hardware and software at different times.** To minimize the amount of change (and therefore risk) that you experience at one time, do not migrate your software release level at the same time that you migrate your hardware.

Restrictions

Restrictions associated with the System z10 server are:

1. **Functional limitations:** Not all System z10 functions are available in every z/OS release. See Table 1 on page 1 for a list of the System z10 functions available in each z/OS release. Some functions have exploitation or migration considerations (see below). Many functions are enabled or disabled, based on the presence or absence of the required hardware and software. If you wish to position to exploit any new System z10 functions, the software and hardware may be installed in either order. That is, there is no requirement to install either software or hardware first to exploit a specific function.
2. **System z10 in a sysplex:**
   - The z9 EC and z9 BC are the last servers to support active participation in the same Parallel Sysplex® with z900, z800, and earlier servers. If you are running z/OS on a z900 or z800, you cannot add a System z10 server to that sysplex. That is, you will not be able to perform rolling IPLs to introduce a System z10 server if you have any z900 or z800 images (either as z/OS images or coupling facilities) in the sysplex. Any z900 or z800 servers in the sysplex have to be upgraded to a z990, z890, or later server to have a System z10 server supported in the sysplex. If you have any z/OS images or coupling facilities on a z900 or z800, and you intend to introduce a System z10 server into that sysplex, you must migrate those images to z990 or z890 (or later) prior to introducing the System z10 server.
   - The Integrated Cluster Bus (ICB) connector on the System z10 server is different than on previous servers, requiring new links and connectors to be

installed on previous servers in order to connect them to a System z10 server by ICB. This is a hardware-only migration action.

Actions you can take before you order a System z10 server

You can perform the following migration actions before you order or install your System z10 server:

1. **Review the sysplex configuration in which the System z10 server will participate.** In particular, if you have any existing z900 or z800 z/OS images or coupling facilities in the sysplex, move these z/OS images or coupling facilities to later servers (such as z990 or z890 or later). This action is necessitated by the restriction that a System z10 server cannot participate with a z900 or z800 in a sysplex.
2. **Install new links and connectors on earlier servers.** This action is necessitated because the ICB connector on the System z10 server is different than on previous servers.
3. **Review restrictions and coexistence requirements for earlier servers.** Because the z9 EC and z9 BC support is the basis for the System z10 server support, the restrictions and coexistence requirements for the z9 EC and z9 BC also apply to the System z10 server. For instance, Large Page (1 MB) Support is not supported by z/OS when z/OS runs as a guest under z/VM® on a System z10 server. Review the restrictions and coexistence requirements that were introduced for the z9 EC, if you have not already done so, and take any necessary actions. You can find the z9 EC restrictions and coexistence requirements in the following places:
   - For z/OS V1R9, the topic “Migrate to a System z9 server” in *z/OS V1R9 Migration*, GA22-7499.
   - For z/OS V1R8, the topic “Migrate to a System z9 server” in *z/OS V1R8 Migration*, GA22-7499.
   - For z/OS V1R7, the document *Migration to the IBM System z9*, SA23-1348. You can obtain this document at the Migration and Installation section of the z/OS Web site: http://www.ibm.com/eserver/zseries/zos/installation/.
4. **Install the necessary z/OS service, as indicated in PSP buckets.** The appropriate PSP buckets are listed in “Recommended migration steps” on page 8 and are dependent on the z/OS release you will run on the System z10 server and on the hardware support you already have installed. If you reviewed the PSP buckets some time ago, there might have been additions since then, so ensure that any newly identified z/OS service has been installed. To assist you in determining whether you have the recommended service installed on your system, which is identified in these PSP buckets, you can use the Enhanced PSP Tool (http://www14.software.ibm.com/webapp/set2/psp/srchBroker) or ServiceLink’s PSP Service Extraction tool.
5. **Run CFSizer.** If you are moving your coupling facilities and the coupling facility structures will be on later CFCC levels than they were previously, run the Coupling Facility Structure Sizer (CFSizer) tool to find out if you have to increase coupling facility structure sizes. System z10 servers initially ship with CFCC Level 15. Prepare to make the necessary changes as indicated by the tool. You can find the CFSizer tool at http://www.ibm.com/eserver/zseries/cfsizer.
6. **Plan for the System z10 fixed HSA enhancement.** With System z10 servers, planning requirements are minimized by the availability of 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. For more information about this enhancement, see the System z10 Redbooks®.

7. **Decide on the steps you will take for your migration to a System z10 server.** As a guide, see “Recommended migration steps” on page 8. Be aware of the following:
   - You should review the cryptographic support you currently have installed versus the support required for the functions you plan to use on the System z10 server. Several cryptographic support Web deliverables have been made available for various z/OS releases. The Web deliverables listed in “Recommended migration steps” on page 8 are the minimum Web deliverable level for the function specified. When a subsequent cryptographic Web deliverable is available for a particular z/OS level, the previous one is withdrawn. The newer cryptographic Web deliverable, however, includes the previous function (when applicable) for that particular z/OS level. Note that you can use the newer cryptographic Web deliverables on servers prior to the System z10 server (that is, on System z9 and zSeries servers).

     The level of cryptographic support integrated in z/OS V1R7 is ICSF FMID HCR7720, the level of cryptographic support integrated in z/OS V1R8 is ICSF FMID HCR7731, and the level of cryptographic support integrated in z/OS V1R9 is ICSF FMID HCR7740. The Web deliverable *Cryptographic Support for z/OS V1R7-R9* contains ICSF FMID HCR7750.

     Where ICSF FMID HCR7750 is installed, the following coexistence support is needed on other systems to allow sharing of the ICSF PKDS:
     - PTF UA37971 (APAR OA21807) for FMID HCR7740
     - PTF UA37970 (APAR OA21807) for FMID HCR7731
     - PTF UA37969 (APAR OA21807) for FMID HCR7730
     - PTF UA37968 (APAR OA21807) for FMID HCR7720
   - You can migrate to z/OS V1R9, V1R8, or V1R7 before or after you migrate to a System z10 server.
8. **Upgrade your SCRT level if you want to process System z10 SMF data.** SCRT V14.2.9 (Version 14 Release 2 Modification Level 9) provides support for the System z10 server. If you collect SMF data on a System z10 server and the data will be processed by the SCRT, you must minimally use SCRT V14.2.9 to generate your SCRT reports. If you do not need to process SMF data from a System z10 server, you are not required to download or use SCRT V14.2.9; you may continue to use SCRT V14.1.0 or V14.2.0 until the next version upgrade of the SCRT. SCRT V14.2.9 is available from the SCRT Web site at http://www.ibm.com/eserver/zseries/swprice/scrt/.
9. **Review the new mnemonics introduced for the System z10.** The new mnemonics might collide with (be identical to) the names of assembler macro instructions you use or provide. In the event of such collisions, the HLASM default opcode table (UNI) will treat specification of these names as instructions when the PTF for APAR PK58463 is installed. This will probably cause assembler error messages and possibly cause generation of incorrect object code.

   If you write programs in assembler language, you should compare the list provided in *z/Architecture Principles of Operation* to the names of assembler macro instructions you use or provide, to identify any such conflicts or collisions that would occur following installation of the PTF for HLASM APAR PK58463.

   If a conflict is identified, take one of the following 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 as in the previous method. This method requires no changes to source code or JCL.

- Add *PROCESS OPTABLE(YOP) as the first statement of your source program.
- Specify the PROFILE option in either JCL or the ASMAOPT file, and the specified or default member of the SYSLIB data set is copied into the beginning 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 that 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
```

For more information about the HLASM opcode table, see *HLASM Programmer's Guide*.

Actions you can take after you order a System z10 server

After you order but before you install your System z10 server, do the following:

1. **Use the CHPID Mapping Tool.** As you might have done with your z9 EC or z9 BC, use the CHPID Mapping Tool to map logical CHPIDs to physical channels (PCHIDs) and create input to HCD/IOCP for your System z10 server. The tool is a workstation-based Java™ application available from the Resource Link Web site (http://www.ibm.com/servers/resourcelink). For more information about this tool, refer to the Web site.
2. **Make note of central storage granularity on the System z10 and possibly change your reconfiguration storage unit (RSU) value.** The central storage granularity on System z10 servers is different than on previous servers. On System z10 servers it is 256 MB. On z9 EC, z9 BC, z990, and z890 servers it is 64 MB. Multiples and ranges of the supported storage granularity are:
   - System z10 central storage granularity:
     - 256 MB — up to 128 GB of central storage
     - 512 MB — above 128 GB up to 256 GB (requires at least z/OS V1R8)
     - 1 GB — above 256 GB up to 512 GB
     - 2 GB — above 512 GB up to 1 TB (largest possible central element)
   - System z9 central storage granularity:
     - 64 MB — up to 32 GB
     - 128 MB — above 32 GB up to 64 GB
     - 256 MB — above 64 GB up to 128 GB
     - The same as the System z10 server above 128 GB

   A specification of RSU=10 on a System z9 server, for example, specifies 640 MB of central storage for storage reconfiguration, assuming a partition with the largest element of 32 GB or less of central storage. But on a System z10 server, the same specification results in 2560 MB of central storage for storage reconfiguration. For more information about central storage granularity and RSU values, see *PR/SM Planning Guide*.

Recommended migration steps

This topic suggests the steps for migrating your same z/OS release level from your current server to a System z10 server. The steps are based on the assumption that you want to minimize the amount of change (and therefore risk) and the amount of work required to perform the migration.

Your current z/OS release is V1R7, V1R8, or V1R9, so follow these steps:

1. Install the service in the following PSP buckets:
   - The z10 EC PSP bucket: upgrade 2097DEVICE, subset 2097/ZOS
   - The z9 EC PSP bucket: upgrade 2094DEVICE, subset 2094/ZOS (if not already on a z9 EC or z9 BC)
   - The z990 PSP bucket: upgrade 2084DEVICE, subset 2084/ZOS (if not already on a z990 or z890)
2. Install the Web deliverable *Cryptographic Support for z/OS V1R7-V1R9 and z/OS.e V1R7-V1R8* (ICSF FMID HCR7750) or its follow-on, as well as the service in the software PSP bucket identified in the program directory that comes with the Web deliverable, if you require any of the functions provided in Table 1 on page 1.
3. Upgrade your hardware to a System z10 server. If you are migrating from a z990 or z890 server, you must also satisfy z9 EC and z9 BC migration considerations. You can read about them in the following places:
   - For z/OS V1R9, the topic “Migrate to a System z9 server” in *z/OS V1R9 Migration*, GA22-7499.
   - For z/OS V1R8, the topic “Migrate to a System z9 server” in *z/OS V1R8 Migration*, GA22-7499.
   - For z/OS V1R7, the document *Migration to the IBM System z9*, SA23-1348. You can obtain this document at the Migration and Installation section of the z/OS Web site: http://www.ibm.com/eserver/zseries/zos/installation/.

Tip for locating the correct service: To simplify finding the appropriate PSP bucket and 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 (EPSPT). The Web site provides a search capability as well as pull down lists for types of PSP buckets. The types 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) those 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**.

You are presented with PSP buckets and “extract” files (the Web site lets you limit the searches to one or the other, but defaults to both). “Extract” files are simply structured lists that identify every PTF from the PSP bucket, for every applicable z/OS release. They can be processed by the EPSPT compare program (also downloadable from that same Web site). The compare program compares the structured list (“extract” file) to an SMP/E target zone and identifies any uninstalled service (filtering out service for releases that you do not have installed). It even identifies whether any service has to be RECEIVEd. You can 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.

Migration and exploitation considerations for System z10 functions

- *InfiniBand Coupling:* Each system can use (or not use) InfiniBand coupling links independently of what other systems are using, and can use the links in conjunction with other link types. InfiniBand Coupling connectivity can only be performed with other systems that also support InfiniBand Coupling (which are z9 EC and z9 BC coupling facility images).
- *HiperDispatch:* A new HIPERDISPATCH=YES|NO parameter in parmlib member IEAOPT*xx*, and on the SET OPT=*xx* command, controls whether HiperDispatch is enabled or disabled for the system. The value can be changed dynamically. HiperDispatch defaults to disabled on z/OS V1R7 through V1R9. Thus, by default, your environment is not changed from a HiperDispatch perspective when migrating from a pre-System z10 server to a System z10 server. Once migration has completed, you can exploit the HiperDispatch function of the System z10 server. Because HiperDispatch improves the performance of a System z10 system, a new health check (SUP_HIPERDISPATCH) was added to verify that HiperDispatch is enabled. The new health check is only added on System z10 systems. WLM goal adjustment might be required when using this function. Review and update your WLM policies as necessary. You might need to turn off and on HiperDispatch while adjusting your WLM goals.
- *Capacity Provisioning:* Connectivity to the managed systems is by TCP/IP. The function requires the CIM server to be active. For more information about exploiting this enhancement, see *z/OS MVS Capacity Provisioning User's Guide*.
- *Large Page (1 MB) Support:* Large page support is not enabled without the software support. Page frames will be allocated at the current 4 K size without the large page support. There is a new LFAREA=xx%|xxxxxxM|xxxxxxG parameter in parmlib member IEASYS*xx*. This parameter cannot be changed dynamically.
- *C/C++ ARCH(8) and TUNE(8) options:* The ARCHITECTURE option of the XL C/C++ compiler selects the minimum level of machine architecture on which your 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 you to optimize your application for a 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*. You must have at least the z/OS V1R9 XL C/C++ compiler to use this function. Information about how to copy the z/OS V1R9 XL C/C++ compiler to a z/OS V1R8 system is provided at http://www.ibm.com/software/awdtools/czos/.

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

  Note: ARCH(7) is the minimum level required to exploit Decimal Floating Point Math support. The resulting program objects can run on z9 EC and z9 BC servers (depending on the MLC installed) as well as on System z10 servers.
- *ICSF HCR7750 PKDS change:* With the Web deliverable *Cryptographic Support for z/OS V1R7-V1R9 and z/OS.e V1R7-V1R8* (ICSF FMID HCR7750), the LRECL of the PKA key data set (PKDS) has increased. See "ICSF: Increase the size of your PKDS" in *z/OS V1R9 Migration*, GA22-7499.

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