

Driver 51 Customer Exception Letter
Level 00o - 31 January 2024

IBM z16 (MT 3931 and MT 3932)



Edition notice

This edition, SC28-7033-00o, applies to IBM z16 processors, Driver 51. This edition replaces SC28-7033-00 and all letter levels (00a through 00n) that were published previously.

There might be a newer version of this document in a PDF file available on **IBM Documentation**. Go to <https://www.ibm.com/docs/en/systems-hardware>, select **IBM Z** or **IBM LinuxONE**, then select your configuration, and click **Library Overview** on the navigation bar.

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Contents

About this Customer Exception letter.....	5
Acquiring the latest version.....	5
How to provide feedback to IBM.....	5
Code considerations.....	7
April 2023 announce delivery.....	7
November 2023 announce delivery.....	7
Sysplex and STP connectivity information.....	7
Recommended coupling facility control code levels.....	7
Minimum levels to support z14/z15 HMC/HMA updates to Driver 51.....	8
Minimum firmware levels for MT 3931.....	8
Minimum firmware levels for MT 3932.....	9
Crypto UDX code considerations.....	9
CFCC Level 25 Coupling Facility.....	9
Channel information.....	11
FICON directors and network switches - minimum levels of code support required for IBM z16 connectivity.....	11
Restrictions.....	13
LinuxONE Emperor 4 restriction - Cannot use OSA-Express OSE CHPID type with Linux.....	13
LinuxONE Emperor 4 restriction - A maximum of 100 Linux guests can share a single OSA card.....	13
Linux Secure Boot restriction with either Bundle S08b or new SLES 15 SP3 or SP4 Releases.....	13
Linux Secure Boot restriction with Bundle S18 for SLES, RHEL, and Ubuntu.....	13
Recently removed restrictions.....	17
DPM FICON Channel-to-Channel (FCTC).....	17
Remote Dynamic I/O Capabilities for z16 CPCs hosting Linux and z/TPF images.....	17
z/OS Validated Boot function.....	17
Secure Boot customer-defined certificate usage.....	17
Concurrent Drawer Repair (CDR).....	17
Dynamically deleting a coupling CHPID (ICP, CS5, or CL5) that has been assigned PCHID/VCHID 500, has the potential to cause an image or sysplex outage.....	17
Configured as an STP Primary (PTS) or Backup (BTS) Time Server.....	17
Dynamic operations affecting CL5 coupling channel types.....	17
N-Mode Power STP imminent disruption signal.....	17
Secure execution.....	18
Remote Code Load (RCL) for IBM Z Firmware is not recommended at this time.....	18
HMC/SOO Remote Browser Access Restriction using Mozilla Firefox browser.....	18
Exceptions.....	19
Trademarks.....	21

About this Customer Exception letter

This exception letter is used by a customer and needs to be reviewed in its entirety. It includes information that pertains to the driver, such as:

- Functional exceptions
- Code restrictions
- General information
- Specific customer information

Acquiring the latest version

The latest version of this letter is available in portable document formation (PDF) on **IBM Documentation**. Go to <https://www.ibm.com/docs/en/systems-hardware>, select **IBM Z®** or **IBM LinuxONE**, then select your configuration, and click **Library Overview** on the navigation bar.

How to provide feedback to IBM

We welcome any feedback that you have, including comments on the clarity, accuracy, or completeness of the information.

For additional information use the following link that corresponds to your configuration:

Configuration	Link
IBM® z16™ Model A02	How to send feedback to IBM
IBM z16 Rack Mount Bundle	How to send feedback to IBM
IBM LinuxONE Rockhopper 4 Model LA2	How to send feedback to IBM
IBM LinuxONE Rockhopper 4 Rack Mount Bundle	How to send feedback to IBM

Code considerations

April 2023 announce delivery

The April 2023 announce delivery includes the following:

- Quantum-safe encryption for the Coupling Facility Control Code (CFCC) firmware.
Available with the release of Bundle S19b, released May 17th, 2023.
- A new HMC Environmental Dashboard and accompanying HMC Web Service API provide access to power management data. Power reporting is now available by logical partition (LPAR) within this new HMC Environmental Dashboard.
Available with the release of Bundle S19b released May 17th, 2023.
- Validated Boot for z/OS®. With IBM z16 and accompanying z/OS V2.5 operating system support, IBM is providing basic support for performing a validated boot (IPL) of z/OS.
Available with the release of Bundle S19b, released May 17th, 2023.
- Linux® Secure Boot for ECKD DASD. Support in IBM z16 extends existing Linux Secure Boot capabilities to ECKD devices and allows client-provided validation certificates provided through the SE/HMC to be used for validation purposes during Linux Secure Boot.
Available with the release of Bundle S19b, released May 17th, 2023.
- HMC Mobile Application enhanced functions.
Available with the release of Bundle S19b, released May 17th, 2023.

November 2023 announce delivery

The November 2023 announce delivery includes the following:

- Remote Dynamic I/O Capabilities for z16 CPCs hosting Linux and z/TPF images.
- Support for FICON® Channel-to-Channel (FCTC) Definitions in DPM mode.
- OSA Automation Toggling with OS Toleration.

Sysplex and STP connectivity information

IBM z16™ machines will continue to follow IBM (n-2) "statement of support" for Parallel Sysplex® server hardware based on connectivity over coupling links or STP timing-only links. IBM z16 STP is only supported for the following IBM Z servers:

- z15® (8562) at Driver 41
- z15 (8561) at Driver 41
- z14 Model ZR1 (3907) at Driver 36
- z14 (3906) at Driver 36

Recommended coupling facility control code levels

The following MCL and CFCC levels are recommended when coupling with an **IBM z16 (MT 3931)**. Product Engineering (PE) always recommends the highest available MCL level for best performance and availability.

- z14 (3906 and 3907)
 - CFCC Product Release 23 - Service level 00.21

This can be identified by the Activation of the following MCL:

- Driver 36 Bundle S64, released August 2021
- z15 (8561 and 8562)
 - CFCC Product Release 24 - Service level 00.29

This can be identified by the activation of the following MCL:

- Driver 41 Bundle S48, released August 2021
- IBM z16 (3931)
 - CFCC Product Release 25 - Service level 02.43

This can be identified by the activation of the following MCL:

- Driver 51 Bundle S05, released July 2022

The following MCL and CFCC levels are recommended when coupling with an **IBM z16 (MT 3932)**. Product Engineering (PE) always recommends the highest available MCL Bundle level for best performance and availability.

- z14 (3906 and 3907)

- CFCC Product Release 23 - Service level 00.22

This can be identified by the activation of the following MCL Bundle:

- Driver 36 Bundle S77, released September 2022

- z15 (8561 and 8562)

- CFCC Product Release 24 - Service level 00.30

This can be identified by the activation of the following MCL Bundle:

- Driver 41 Bundle S55, released January 2022

- IBM z16 (3931 and 3932)

- CFCC Product Release 25 - Service level 02.51.2

This can be identified by the activation of the following MCL Bundle:

- Driver 51 Bundle S18, released April 2023

Minimum levels to support z14/z15 HMC/HMA updates to Driver 51

Before loading Driver 51 onto any HMC or HMA system, ensure the following firmware levels are activated.

z14 HMC, Driver 36 – Bundle H60, released 06 May 2022

z14 TKE, Driver 36 – Bundle T36, released 06 May 2022

Note: Any z14 HMC/TKE at Driver 32 must be updated to Driver 36 before going to IBM z16 Driver 51.

z15 HMC, Driver 41 – Bundle H44, released 13 May 2022

z15 HMA, Driver 41 – requires CPC Bundle S60, released 23 March 2022

z15 TKE, Driver 41 – Bundle T29, released 13 May 2022

Minimum firmware levels for MT 3931

The Minimum Ship Level (MSL) firmware for May 2022 shipments is defined as Bundle S04.

Additional firmware updates were released after shipments that include important stability and serviceability improvements.

Product Engineering recommends that the latest firmware level be loaded at system installation.

Minimum firmware levels for MT 3932

The Minimum Ship Level (MSL) firmware for May 2023 shipments is defined as Bundle S18.

Additional firmware updates were released after shipments that include important stability and serviceability improvements.

Product Engineering recommends that the latest firmware level be loaded at system installation.

Crypto UDX code considerations

A Crypto UDX (User Defined Extensions) is custom code that is 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 IBM Z, the UDX code is always developed based on customer specifications by IBM (either the Crypto Competence Center in Denmark or IBM Global Services in the United States) and delivered to the customer for installation inside the Crypto card. There is also a key management software package, DKMS, from the Crypto Competence Center that might require a UDX depending, on the customer environment.

Since a UDX interfaces directly with the card and with ICSF (the z/OS component that provides a software interface to the crypto hardware), anytime either a new crypto hardware device is installed or the version of ICSF changes, or specific versions of the crypto code changes, the UDX must be rebuilt. If a customer will be migrating from one hardware device to another (for example, from a Crypto Express6S or Crypto Express7S adapter to a Crypto Express8S in an IBM z16) or upgrading the version of ICSF on their new machine, or migrating to a new driver or MCL with new crypto code, the UDX might need to be rebuilt. The UDX rebuild might delay production workload usage.

In most cases, the contract with the service organization covers rebuilding for new hardware and software platforms. Contact the appropriate organization to have the UDX updated and tested. However, you should allow time in the installation schedule for getting the updated UDXs from IBM. Additionally, if the customer's support contract for the UDX has lapsed, there can be extra time that is required to get the paperwork in place.

CFCC Level 25 Coupling Facility

The CFCC image requires a minimum of 1024 MB of central storage to activate. You may also define additional storage to accommodate the shared structures and dump space used by software subsystems using the coupling facility.

It is recommended to use the CFSizer tool, available at <http://www.ibm.com/systems/support/z/cfsizer>. You can also refer to the *Processor Resource/Systems Manager™ Planning Guide*, SB10-7178.

Level 25 coupling facility (CFLEVEL=25) provides the following enhancements:

- CFCC change to dynamic dispatching. DYNDISP=THIN is the only option.
- Cache residency time metrics for directory/data entries.
- Cache retry buffer support for IFCC retry idempotency.
- Lock record data reserved entries for structure full recovery.
- CF performance and scalability improvements through CF dispatcher changes.
- CF Cache and Lock structure resiliency improvements.
- Coupling link short-reach protocol efficiency improvements.
- CF image scalability improvements.

Note: Dedicated engines continue to be recommended for the best coupling facility performance.

Channel information

FICON directors and network switches - minimum levels of code support required for IBM z16 connectivity

IBM Z periodically performs connectivity and interoperability testing of FICON and FCP switches and directors to ensure that products adhere to the Fibre Connection (FICON) architecture and Fibre Channel Protocol (FCP) architecture.

This information can be found by navigating within the following website:

<http://www.ibm.com/servers/resourcelink>

1. Click **Sign in**.
2. Specify a valid user ID and password.
3. From the navigation pane, click **Library**.
4. Locate **Hardware products for servers** heading.
5. Select "Switches and directors qualified for IBM Z FICON and FCP channels" link.

It is important you contact your director and/or switch supplier to determine the minimum level of microcode that is needed when you connect to an IBM z16.

Restrictions

See the following restrictions.

LinuxONE Emperor 4 restriction - Cannot use OSA-Express OSE CHPID type with Linux

LinuxONE Emperor 4 restriction - A maximum of 100 Linux guests can share a single OSA card

Linux Secure Boot restriction with either Bundle S08b or new SLES 15 SP3 or SP4 Releases

SUSE recently made a change to the public key used for Secure Boot/IPL to address a vulnerability: <https://www.suse.com/support/kb/doc/?id=000020668>

The SUSE releases/kernels built with the new public key are:

- SLES-15-SP3 : kernel-default-5.3.18 - 150300.59.71.2.s390x.rpm or higher
- SLES-15-SP4 : kernel-default-5.14.21 - 150400.24.11.1.s390x.rpm or higher

Impact

Secure Boot/IPL will fail if there is a mismatch with the platform key and the public key. The net result is that IBM z16 can support only one platform key at a time. This creates a firm co-requisite between IBM z16 and SUSE distribution levels. There are two conditions of concern:

- The new platform key that is contained in Bundle S08b only supports Secure Boot/IPL on the new levels of SUSE. When Bundle S08b is installed, the IBM z16 no longer supports the Secure Boot/IPL on earlier levels of SUSE.
- If the IBM z16 does not have Bundle S08b installed and the customer updates to the newest SUSE distribution, then the Secure Boot feature is not be supported. Driver 51C, Bundle S08b can be identified with the installation of MCL004 in the P30744 EC Stream.

Workaround/Actions

- Disable Secure Boot/IPL, on the older levels of SUSE, before installing Bundle S08b. Then, perform migrations to the newer SUSE levels before re-enabling Secure Boot.
- Bundle S08b should not be installed, if you are using the Secure Boot capability on an older SUSE distribution.
- Coordinated roll - If you are using Secure Boot, combine the installation of Bundle S08b and update to the newer levels of SUSE distribution.

Linux Secure Boot restriction with Bundle S18 for SLES, RHEL, and Ubuntu

Linux Secure Boot Restriction with IBM LinuxONE Emperor 4, IBM LinuxONE Rockhopper 4, or IBM z16 D51C Bundle S18.

D51C Bundle S18 introduces a firmware change that requires a corresponding update to the Linux release/kernel if Linux Secure Boot is to continue to function. Updates are required for SUSE, Red Hat (RHEL), and Canonical (Ubuntu). D51C Bundle S18 was released on April 26, 2023.

The following lists the minimum levels of components for distributions that are required to perform Secure Boot with Linux on Z from FCP-attached disks and NVMe devices on an Emperor 4, Rockhopper 4, or IBM z16 with D51C Bundle S18.

<i>Table 1. SUSE Linux Enterprise Server:</i>		
Distro	Kernel	s390-tools
SLES 15 SP3	kernel-default-5.3.18-150300.59.115.2	s390-tools-2.15.1-150300.8.32.1
SLES 15 SP4	kernel-default-5.14.21-150400.24.55.3	s390-tools-2.19.0-150400.7.18.5

<i>Table 2. Red Hat Enterprise Linux:</i>		
Distro	Kernel	s390utils
RHEL 8.4	kernel-4.18.0-305.82.1.el8_4	s390utils-2.15.1-5.el8_4.6
RHEL 8.6	kernel-4.18.0-372.46.1.el8_6	s390utils-2.19.0-1.el8_6.3
RHEL 8.7	kernel-4.18.0-425.13.1.el8_7	s390utils-2.22.0-2.el8_7.1
RHEL 9.0	kernel-5.14.0-70.49.1.el9_0	s390utils-2.19.0-2.el9_0.4
RHEL 9.1	kernel-5.14.0-162.22.2.el9_1	s390utils-2.22.0-2.el9_1.1

<i>Table 3. Canonical:</i>		
Distro	Kernel	s390-tools
Ubuntu 20.04	ubuntu-5.4.0-136.153	2.12.0-0ubuntu3.7
Ubuntu 22.04	ubuntu-5.15.0-57.63	2.20.0-0ubuntu3.2
Ubuntu 22.10	ubuntu-5.19.0-28.29	2.23.0-0ubuntu1.1
Ubuntu 23.04	ubuntu-6.2.0-21.21	2.26.0-0ubuntu1

For SUSE Linux distribution levels

There is a firm Co-Requisite between the IBM zSystems® server or IBM LinuxONE server Bundle level and the SUSE Linux distribution levels in [Table 1 on page 14](#) for Linux Secure Boot to continue to function.

For Red Hat distribution levels

There is a firm Pre-Requisite that those distributions must be updated to the minimum levels shown in [Table 2 on page 14](#) for Linux Secure Boot to continue to function properly when the IBM zSystems server or IBM LinuxONE server Bundle level is updated to D51C Bundle S18.

For Canonical distribution levels

There is a firm Pre-Requisite that those distributions must be updated to the minimum levels shown in [Table 3 on page 14](#) for Linux Secure Boot to continue to function properly when the IBM zSystems server or IBM LinuxONE server Bundle level is updated to D51C Bundle S18.

Impact statement

Secure Boot/IPL will fail, if the firm co-requisite or prerequisite between the IBM zSystems server or IBM LinuxONE Bundle level and the Linux distribution levels are not met. The Firmware change can be identified with the installation of MCL P30744.008 in Driver 51C Bundle S18 for Emperor 4, Rockhopper 4, or IBM z16.

Recommended action

If your machine is not using Linux Secure Boot, no further action is needed.

If your machine is using Linux Secure Boot, then consider the following actions.

1. Disable Secure Boot/IPL on the older levels of the Linux distribution, before installing D51C Bundle S18. Then perform migrations to the newer Linux distribution levels, before re-enabling Secure Boot.
2. Do not install D51C bundle S18 if you are exploiting the Secure Boot capability on older Linux distributions before the Linux distributions' levels are updated to the minimum levels listed in [Table 1 on page 14](#), [Table 2 on page 14](#), and [Table 3 on page 14](#).
3. Perform a coordinated roll: if you are exploiting Secure Boot, combine the installation of D51C Bundle S18 and the update to the newer levels of the Linux distributions.

Recently removed restrictions

DPM FICON Channel-to-Channel (FCTC)

With Bundle S28, this restriction is lifted.

Remote Dynamic I/O Capabilities for z16 CPCs hosting Linux and z/TPF images

With Bundle S27, this restriction is lifted.

z/OS Validated Boot function

With Bundle S22, this restriction is lifted.

Secure Boot customer-defined certificate usage

With Bundle S22, this restriction is lifted.

Concurrent Drawer Repair (CDR)

With Bundle S08, this restriction is lifted.

Dynamically deleting a coupling CHPID (ICP, CS5, or CL5) that has been assigned PCHID/VCHID 500, has the potential to cause an image or sysplex outage

With Bundle S07, this restriction has been lifted.

Configured as an STP Primary (PTS) or Backup (BTS) Time Server

Bundle S05 allows the IBM z16 server to be used as a Primary Time Server (PTS) or Backup Time Server (BTS).

Note: Bundle S05 enables support for External Time Source connections to the Oscillator card. The External Time Source (ETS) attachment interface has been redesigned with IBM z16, 3931, and requires a dedicated Ethernet cable attached directly to the Oscillator cards. If you are planning for IBM z16, 3931, CPC's to be configured as the Primary Time Server (PTS) or Backup Time Server (BTS) in an STP network, customers need to provide two more Ethernet connections at the CPC, to support External Time Source (ETS). Refer to the *3931 Installation Manual*, GC28-7017, or the *3931 Installation Manual for Physical Planning*, GC28-7015, for additional information on these cables.

Dynamic operations affecting CL5 coupling channel types

With Bundle S05, restriction on performing dynamic changes affecting CL5 coupling channel types has generally been lifted.

N-Mode Power STP imminent disruption signal

With Bundle S05, this function is now fully functional.

Secure execution

Secure Execution feature can now be configured and is fully supported.

Remote Code Load (RCL) for IBM Z Firmware is not recommended at this time

Remote Code Load is now fully available, starting from Bundles S05a/H05.

HMC/SOO Remote Browser Access Restriction using Mozilla Firefox browser

Starting from Bundle H05 level, Mozilla Firefox browser can be used with domain names configuration for HMC Single Object Operation (SOO) remote operation.

Exceptions

- █ None.

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SC28-7033-00

