Western Digital.

Release Notes

Ultrastar® Data102

Firmware 4008-020
Regulatory Model H4102-J
Document D018-000700-000
Revision 01
May 2023

Table of Contents

Revision History

Date	Revision	Comment
May 2023	01	Initial release

Notices

Western Digital Technologies, Inc. or its affiliates' (collectively “Western Digital”) general policy does not recommend the use of its products in life support applications wherein a failure or malfunction of the product may directly threaten life or injury. Per Western Digital Terms and Conditions of Sale, the user of Western Digital products in life support applications assumes all risk of such use and indemnifies Western Digital against all damages.

This document is for information use only and is subject to change without prior notice. Western Digital assumes no responsibility for any errors that may appear in this document, nor for incidental or consequential damages resulting from the furnishing, performance or use of this material.

Absent a written agreement signed by Western Digital or its authorized representative to the contrary, Western Digital explicitly disclaims any express and implied warranties and indemnities of any kind that may, or could, be associated with this document and related material, and any user of this document or related material agrees to such disclaimer as a precondition to receipt and usage hereof.

Each user of this document or any product referred to herein expressly waives all guaranties and warranties of any kind associated with this document any related materials or such product, whether expressed or implied, including without limitation, any implied warranty of merchantability or fitness for a particular purpose or non-infringement. Each user of this document or any product referred to herein also expressly agrees Western Digital shall not be liable for any incidental, punitive, indirect, special, or consequential damages, including without limitation physical injury or death, property damage, lost data, loss of profits or costs of procurement of substitute goods, technology, or services, arising out of or related to this document, any related materials or any product referred to herein, regardless of whether such damages are based on tort, warranty, contract, or any other legal theory, even if advised of the possibility of such damages.

This document and its contents, including diagrams, schematics, methodology, work product, and intellectual property rights described in, associated with, or implied by this document, are the sole and exclusive property of Western Digital. No intellectual property license, express or implied, is granted by Western Digital associated with the document recipient's receipt, access and/or use of this document or the products referred to herein; Western Digital retains all rights hereto.

Western Digital, the Western Digital design, the Western Digital logo, and Ultrastar are registered trademarks or trademarks of Western Digital Corporation or its affiliates in the US and/or other countries. Oracle is a registered trademark of Oracle and/or its affiliates. Broadcom is among the trademarks of Broadcom. Linux® is the registered trademark of Linus Torvalds in the U.S. and other countries. All other marks are the property of their respective owners. Product specifications subject to change without notice. Pictures shown may vary from actual products. Not all products are available in all regions of the world.

Western Digital
5601 Great Oaks Parkway
San Jose, CA 95119

Points of Contact

For further assistance with a Western Digital product, contact Western Digital Datacenter Platforms technical support. Please be prepared to provide the following information, as applicable: part number (P/N), serial number (S/N), product name and/or model number, software version, and a brief description of the issue.

Email:
support@hgst.com

Website:
https://portal.wdc.com/Support/s/

UK Import Representation Contact

Western Digital UK Limited
PO Box 471
Leatherhead KT22 2LU
UK

Telephone: +44 1372 366000

EU Import Representation Contact

Western Digital EU Limited
PO Box 13379
Swords, Co
Dublin, Ireland

Firmware Release Notes

This document contains information relevant to the current release of in-band and out-of-band firmware and the current revision of product hardware.

In This Chapter:

1.1 About the Release

This section provides information about the latest firmware version for Ultrastar Data102.

Release Summary

The following tables provide a summary of the firmware and related hardware for this release.

Table 2: Transition Firmware Details

Category	Value
Current Version	4T16-015
Transition Image Bundle	HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_4T16-015_3.1.12.tar.gz
MD5 Checksum	5523f9a6a913949a348f6f01ba556c93

Table 3: Final Firmware Details

Category	Value
Current Release	4008-020
Previous Release	3010-007
Image Bundle	HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_4008-020_4.0.31.tar.gz
MD5 Checksum	cd54f472621c63786b244bea6cd4833a

Table 4: Test Firmware Details

Category	Value
Test Image Bundle	HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_400T-020_T4.0.31.tar.gz
MD5 Checksum	1779415cc893b43d8aa9f1ba34870054

Note: The test bundle is for download testing purposes only (available upon request from Support).

Table 5: Hardware Details

Category	Value
Platform	Ultrastar Data102
Tested OSs	• Microsoft® Windows 2022 • CentOS/RedHat® Enterprise Linux (RHEL) 8.6 and 9 • Ubuntu® Server 22.04 • Debian GNU/Linux 11

Category	Value
Tested HBAs	Broadcom SAS 9300, 9400, and 9500 Host Bus Adapters
OOBM FW Version	4.0.31
FPGA Firmware Version	**Baseboard 60:** 1.3.0 **Baseboard 42:** 56.0.0 (86.0.0 decimal)

Note: High-capacity drives are supported with 2053-003 or later (16TB & 18TB drives) SEP firmware versions.

File List

The following table provides a list of files for this release and the purpose of each file.

File	Description
HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_4T16-015_3.1.12.tar.gz	4M -> 16M Transition Bundle
HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_16T4-015_4.0.10.tar.gz	16M -> 4M Transition Bundle
HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_4008-020_4.0.31.tar.gz	FW Bundle

1.2 Known Issues

This section lists the known issues for the current release of firmware.

Table 7: Known Issues

Ref. ID	Title	Description
RMMM-2724	IOM reset and HBA reset test hung on IOM-B, in both test configs	Believed to be a HBA/host side issue
RMMM-2715	"TLB exception" crash after code loading 4008-014 build (from earlier 4008 build)	Very low probability of seeing this in the field

1.3 Fixed Issues

This section lists the issues fixed with the current release of firmware.

Table 8: Fixed Issues

Ref. ID	Title/Description/Notes	Fixed In Version
MMFW-258	Gospower Platinum and Titanium support	4008-020
MMFW-298	Mismatch PSU detection and reporting	4008-020
MMFW-316	Degraded SAS Link Retry	4008-020
MMFW-319	Port RMMM-2440 Modify MPS2853 configuration fix from MT	4008-020
MMFW-325	MPS2853 DLL initial boot state event	4008-020
MMFW-352	Port RMMM-2024 slot toggle fix from MT	4008-020
RMMM-2627	Remove swapspace from OOBM	4.0.31 OOBM
RMMM-2717	`PSU B fault` message coming continuously on console logs with Gospower Platinum/Titanium PSU	4008-020
RMMM-2720	Index 0 Phy resetting automatically while resetting any other 3 Phys in a host port	4008-020
RMMM-2721	Mismatch reset count between Individual resets and Global resets	4008-020
RMMM-2723	PSU status changing from Critical to OK and OK to Critical in events with mismatched PSU's	4008-020

1.4 Third-Party Vendor Notes

This section lists issues and notifications related to third-party components and their firmware.

Identification Number	Title	Description
N/A	**Broadcom 9400 with Windows Server 2016 may cause the system to crash if the patch level is not up to date**	The system must be at or beyond the patch level indicated in customer advisory before installing a Broadcom Retpoline enabled driver to avoid a system crash. The drivers for the system Phase 13 or MR 7.12 Windows drivers must not be installed until the operating system has been patched. If the required patch level has not been applied, the system may crash and be unrecoverable.
N/A	**Broadcom IT HBA – Setting Task Management Reset Type**	Using ScrutinyCLI (version 32 or later), changing the Task Management Reset Type on the HBA(s) from `Target Reset` to `I_T Nexus Reset` will increase the responsiveness of the topology during the event of a cable pull, IOM/ESM reset, or drive pull. See https://support-en.westerndigital.com/app/answers/detail/a_id/32058/kw/broadcom for more details.

1.5 Enclosure Firmware Upgrade and Downgrade

This section provides information on actions that should be taken before starting a firmware upgrade or downgrade on the Ultrastar Data102 .

Devices (<dev>)

In order to initiate a firmware upgrade on the enclosure, a target must be identified. Linux targets are referred to as sg (SCSI Generic) devices and appear as <dev> in the Linux Firmware Upgrade procedure.

Users should install all of the required downloads before beginning the firmware upgrade process.

Required Downloads:

- **SG3 Utils**: download version 1.47 from the SG3 Utils website at: http://sg.danny.cz/sg/sg3_utils.html

1.5.1 Firmware Upgrade and Downgrade Version Information

This section provides details related to upgrade and downgrade versions. The upgrade tables detail the supported "Upgrade from Version" and the "Upgrade to Version" configurations. The downgrade tables detail the supported "Downgrade from Version" and the "Downgrade to Version" configurations.

Attention: If you have a system that needs to be upgraded from a firmware version older than 2040-015, contact Western Digital support at: support@hgst.com.

Table 10: Firmware Upgrade Version Information

Upgrade from Version	Upgrade to Version
2040-015_2.3.8	4008-020_4.0.31
2053-003_2.4.27	4008-020_4.0.31
3010-007_3.1.11	4008-020_4.0.31

Table 11: Firmware Downgrade Version Information

Downgrade from Version	Downgrade to Version
4008-020_4.0.31	2040-015_2.3.8
4008-020_4.0.31	2053-003_2.4.27
4008-020_4.0.31	3010-007_3.1.11

1.5.2 Upgrading Enclosure Firmware—Linux OS

Warning: Ensure that no IO is running to the drives in the enclosure. Upgrading is an offline event, and the drives will be disabled during this process.

Step 1: Connect the Ultrastar Data102 to a standard SAS HBA or a RAID SAS HBA hosted on the Linux Server that presents the Enclosure Services Processor to the Linux operating system. The Enclosure Services Processor in the Ultrastar Data102 will be referred to as an IOM.

Step 2: Issue the **sg_scan -i** command to verify that the enclosure has been found by the server.

```
# sg_scan -i | grep -i 4102 -B 1
<dev>: scsi8 channel=0 id=50 lun=0
    HGST  H4102-J  2020 [rmb=0 cmdq=1 pqual=0 pdev=0xd]
<dev>: scsi8 channel=0 id=204 lun=0
    HGST  H4102-J  2020 [rmb=0 cmdq=1 pqual=0 pdev=0xd]
```

Note: If the Ultrastar Data102 is connected to an HBA that does not present the Enclosure Services Processor to the host for management purposes, Western Digital recommends attaching the Ultrastar Data102 to a host that does expose the Enclosure Services Processor so that the upgrade may be performed.

Step 3: Download the Firmware Update script and the 4008-020 Firmware bundle. If the current firmware is 4xxx-0xx or later, then also download the Transition code bundle - "HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_4T16-015_3.1.12.tar.gz" from the support portal: https://portal.wdc.com/Support/s/.

Step 4: Collect logs using wddcs tool.

```
wddcs getlog all
```

Note: Results will be in /tmp/wddcs_<hostname>_<timestamp>.tgz

Step 5: Check the current expander firmware and the OOBM versions.

```
wddcs <device> rcli "show enc"
wddcs <version>
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates

Device: <device>

Enclosure Information (IOM A)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146

Device: <device>

Enclosure Information (IOM B)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146
```

Step 6 : The versions listed in the WDDCS Tool output should be earlier versions of firmware than what is in the upgrade firmware bundle. If the SEP version is pre-4xxx-0xx then the Transition bundle will be needed by the Update script.

Attention: Upgrades from firmware versions prior to 2040 are not supported. Any enclosure that contains a firmware version previous to 2040 must be upgraded before completing the upgrade to 4008-020.

Step 7 : Perform the upgrade on the enclosure.

Note: Only one enclosure may be upgraded at a time.

a. Initiate the upgrade by issuing the following command:

```
./Ultrastar_Data60_102_FWUpdate -f HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_<FW Version>.tar.gz
```

```
Ultrastar_Data60_102_FWUpdate v1.0.0
Copyright (c) 2022-2023 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2023_1_12_8_50_23.txt
Target File = HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_<FW
 Version>.tar.gz
Target Directory = <path to firmware files>


Identified below FW Upgradable Enclosure connected to Host
_____________________________________________________________
Index        Enc Address          SEP              OOBM
1.        USCSJ04217EA0001     <FW Version>  <OOBM Version>
_____________________________________________________________

4T16 Transition image is required
FW Update status for IOMB = [0x0]
Current FW Version = 2053-003
Target FW Version 4T16-015
Starting FW update with file HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_4T16-015_3.1.12.tar.gz on handle /dev/sg1
FW Download is completed Successfully
FW Update is completed for 4T16-015, reset command is sent, sleep for 10
 minutes.
Verify New FW  4T16-015 for Enclosure ID: USCSJ04217EA0001
FW Update completed Successfully for Version 4T16-015
Current FW Version = 4T16-015
Target FW Version 4008-020
Starting FW update with file HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_4008-020_4.0.31.tar.gz on handle /dev/sg1
FW Download is completed Successfully
```

Note: <FW Version> represents the latest version of firmware or the **Target FW Version**.

Attention: The firmware upgrade will take approximately one hour to complete.

Step 8 : Use the WDDCS Tool to verify that the SEP and OOBM firmware has been upgraded to the preferred version of firmware and is running on all expanders.

```
# wddcs rcli "show enc"
wddcs v2.0.6.0
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates

Device: <device>

Enclosure Information (IOM A)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146

Device: <device>

    Enclosure Information (IOM B)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146
```

Step 9 : Verify the firmware and OOBM information lists the version of the upgraded firmware.

Result: The enclosure firmware has now been upgraded.

1.5.3 Upgrading Enclosure Firmware—Windows OS

Warning: Ensure that no IO is running to the drives in the enclosure. Upgrading is an offline event, and the drives will be disabled during this process.

Step 1: Connect the Ultrastar Data102 to a standard SAS HBA or a RAID SAS HBA hosted on the Windows Server that presents the Enclosure Services Processor to the operating system. The Enclosure Services Processor in the Ultrastar Data102 will be referred to as an IOM.

Step 2: Log on to the Windows server and launch a command prompt.

Step 3: Input the **sg_scan -s** command to find the IOM devices to ensure that they can be accessed.

Note: If the Ultrastar Data102 is connected to an HBA that does not present the Enclosure Services Processor to the host for management purposes, Western Digital recommends attaching the Ultrastar Data102 to a host that does expose the Enclosure Services Processor so that the upgrade may be performed.

Step 4: To determine which IOM is which, use the **<dev>** string with the sg_ses command.

Step 5: Download the Firmware Update script and the 4008-020 Firmware bundle. If the current firmware is 4xxx-0xx or later, then also download the Transition code bundle - "HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_4T16-015_3.1.12.tar.gz" from the support portal: https://portal.wdc.com/Support/s/.

Step 6: Collect logs using wddcs tool.

```
wddcs getlog all
```

Note: Results will be in /tmp/wddcs_<hostname>_<timestamp>.tgz

Step 7: Use the WDDCS Tool to verify that the expander firmware and the OOBM version.

```
wddcs <device> rcli "show enc"
wddcs <version>
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates

Device: <device>

Enclosure Information (IOM A)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
```

```
        SERIAL : THCLS00719EG0090
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146

Device: <device>

Enclosure Information (IOM B)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146
```

Step 8: The versions listed in the WDDCS Tool output should be an earlier version of firmware than the upgrade firmware bundle.

Attention: Upgrades to firmware versions prior to 2040 are not supported. Any enclosure that contains a firmware version previous to 2040 must be upgraded before completing the upgrade to 4008-020.

Step 9: Perform the upgrade on the enclosure.

Note: Only one enclosure may be upgraded at a time.

a. Initiate the upgrade by issuing the following command:

```
./Ultrastar_Data60_102_FWUpdate -f HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_<FW Version>.tar.gz.
```

```
Ultrastar_Data60_102_FWUpdate v1.0.0
Copyright (c) 2022-2023 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2023_1_12_8_50_23.txt
Target File = HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_<FW
 Version>.tar.gz
Target Directory = <path to firmware files>
```

```
Identified below FW Upgradable Enclosure connected to Host
_____________________________________________________________________
Index        Enc Address          SEP               OOBM
1.        USCSJ04217EA0001     <FW Version>  <OOBM Version>
_____________________________________________________________________

4T16 Transition image is required
FW Update status for IOMB = [0x0]
Current FW Version = 2053-003
Target FW Version 4T16-015
Starting FW update with file fw_files/HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_4T16-015_3.1.12.tar.gz on handle /dev/sg1
FW Download is completed Successfully
FW Update is completed for 4T16-015, reset command is sent, sleep for 10
 minutes.
Verify New FW  4T16-015 for Enclosure ID: USCSJ04217EA0001
FW Update completed Successfully for Version 4T16-015
Current FW Version = 4T16-015
Target FW Version 4008-020
Starting FW update with file fw_files/HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_4008-020_4.0.31.tar.gz on handle /dev/sg1
FW Download is completed Successfully
```

Note: <FW Version> represents the latest version of firmware or the **Target FW Version**.

Attention: The firmware upgrade will take approximately one hour to complete.

Step 10 : Use the WDDCS Tool to verify that the SEP and OOBM firmware has been upgraded to the preferred version of firmware and is running on all expanders.

```
# wddcs rcli "show enc"
wddcs v2.0.6.0
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates

Device: <device>

Enclosure Information (IOM A)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
```

```
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146

Device: <device>

    Enclosure Information (IOM B)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146
```

Step 11: Verify the firmware and OOBM information lists the version of the upgraded firmware.

Result: The enclosure firmware has now been upgraded.

1.5.4 Downgrading Enclosure Firmware—Linux OS

The following procedure provides instructions for downgrading the enclosure's current version of firmware using a Linux host.

Warning: Ensure that no IO is running to the drives in the enclosure. Downgrading is an offline event, and the drives will be disabled during this process.

Step 1: Connect the Ultrastar Data102 to a standard SAS HBA or a RAID SAS HBA hosted on the Linux Server that presents the Enclosure Services Processor to the Linux operating system. The Enclosure Services Processor in the Ultrastar Data102 will be referred to as an IOM.

Attention: The drives will be inaccessible while the transition image is active.

Step 2: Download the Firmware Update script and the desired Firmware downgrade bundle. If the current firmware is later than 4xxx-0xx, and the desired firmware is pre-4xxx-0xx, then also download the Transition code bundle - "HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_16T4-015_4.0.10.tar.gz" from the support portal: https://portal.wdc.com/Support/s/.

Step 3: Issue the **sg_scan -i** command to verify that the enclosure has been found by the server.

```
# sg_scan -i | grep -i 4102 -B 1
<dev>: scsi8 channel=0 id=50 lun=0
    HGST   H4102-J   4008 [rmb=0 cmdq=1 pqual=0 pdev=0xd]
<dev>: scsi8 channel=0 id=204 lun=0
    HGST   H4102-J   4008 [rmb=0 cmdq=1 pqual=0 pdev=0xd]
```

Note: If the Ultrastar Data102 is connected to an HBA that does not present the Enclosure Services Processor to the host for management purposes, Western Digital recommends attaching the Ultrastar Data102 to a host that does expose the Enclosure Services Processor so that the upgrade may be performed.

Step 4: Use the WDDCS Tool to verify that the expander firmware and the OOBM version.

```
wddcs <device> rcli "show enc"
wddcs <version>
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates

Device: <device>

Enclosure Information (IOM A)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146

Device: <device>

Enclosure Information (IOM B)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
```

```
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146
```

Step 5 : The versions listed in the WDDCS Tool output should be later versions of firmware than what is in the downgrade firmware bundle. If the current SEP version is 4xxx-0xx or later and the target firmware is pre-4xxx-0xx, then the 16T4 Transition bundle will be needed by the Update script.

Attention: Downgrades to firmware versions prior to 2053-003 are not supported.

Step 6 : Perform the downgrade on the enclosure.

Note: One enclosure may be downgraded at a time.

a. Initiate the downgrade by issuing the following command:

```
./Ultrastar_Data60_102_FWUpdate -f HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_<FW Version>.tar.gz.
```

```
Ultrastar_Data60_102_FWUpdate v1.0.0
Copyright (c) 2022-2023 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2023_1_12_8_50_23.txt
Target File = HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_<FW
 Version>.tar.gz
Target Directory = <path to firmware files>


Identified below FW Upgradable Enclosure connected to Host
_____________________________________________________________
Index        Enc Address          SEP              OOBM
1.        USCSJ04217EA0001     <FW Version>  <OOBM Version>
_____________________________________________________________

16T4 Transition image is required
FW Update status for IOMB = [0x0]
Current FW Version = 4008-020
Target FW Version 16T4-015
Starting FW update with file fw_files/HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_16T4-015_4.0.10.tar.gz on handle /dev/sg1
FW Download is completed Successfully
FW Update is completed for 16T4-015, reset command is sent, sleep for 10
 minutes.
Verify New FW  16T4-015 for Enclosure ID: USCSJ04217EA0001
FW Update completed Successfully for Version 16T4-015
Current FW Version = 16T4-015
Target FW Version 3010-007
```

```
Starting FW update with file fw_files/HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_3010-007_3.1.11.tar.gz on handle /dev/sg1
FW Download is completed Successfully
FW Update is completed for 3010-007, reset command is sent, sleep for 10
 minutes.
Verify New FW  3010-007 for Enclosure ID: USCSJ04217EA0001
FW Update completed Successfully for Version 3010-007
FW Update is completed for all the files, Successful Exit!
```

Attention: The firmware downgrade will take approximately one hour to complete.

Step 7 : Use the WDDCS Tool to verify that the SEP and OOBM firmware has been downgraded to the preferred version of firmware and is running on all expanders.

```
# wddcs rcli "show enc"
wddcs v2.0.6.0
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates

Device: <device>

Enclosure Information (IOM A)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146

Device: <device>

    Enclosure Information (IOM B)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
```

```
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146
```

Step 8: Verify the firmware and OOBM information lists the version of the downgraded firmware.

Result: The enclosure firmware has now been downgraded.

1.5.5 Downgrading Enclosure Firmware—Windows OS

The following procedure provides instructions for downgrading the enclosure current version of firmware using a Windows host.

Warning: Ensure that no IO is running to the drives in the enclosure. Downgrading is an offline event, and the drives will be disabled during this process.

Step 1: Make sure that **sg3_utils** is installed on the enclosure and that the **MPIO** software is configured and enabled on the host to be able to handle an online upgrade.

Step 2: Connect the Ultrastar Data102 to a standard SAS HBA or a RAID SAS HBA hosted on the Windows Server that presents the Enclosure Services Processor to the operating system. The Enclosure Services Processor in the Ultrastar Data102 will be referred to as an IOM.

Note: To perform an online firmware upgrade, the Ultrastar Data102 must be configured with redundant data paths, meaning both IOMs must have a SAS Port populated and connected to the host server.

SAS Configurations: The server host must be configured with multi-pathing software that can handle the nature of the firmware upgrade. i.e. Once firmware is downloaded to the IOMs, each IOM will reset and boot the new code in a staggered fashion such that the host always has at least one path to the drives to service I/O.

SATA Configurations: A SATA configuration should not be considered for an online upgrade due to the single path nature of the topology.

Step 3: Log on to the Windows server and launch a command prompt.

Step 4: Input the **sg_scan -s** command to find the IOM devices to ensure that they can be accessed.

Note: If the Ultrastar Data102 is connected to an HBA that does not present the Enclosure Services Processor to the host for management purposes, Western Digital recommends attaching the Ultrastar Data102 to a host that does expose the Enclosure Services Processor so that the upgrade may be performed.

Step 5: To determine which IOM is which, use the **<dev>** string with the sg_ses command.

Step 6: Use the WDDCS Tool to verify that the expander firmware and the OOBM version.

```
wddcs <device> rcli "show enc"
wddcs <version>
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates

Device: <device>

Enclosure Information (IOM A)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146

Device: <device>

Enclosure Information (IOM B)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : xxxx-xxx
        FW(SEC1) : xxxx-xxx
        FW(SEC2) : xxxx-xxx
        FW(OOBM) : x.x.x
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146
```

Step 7: The versions listed in the WDDCS Tool output should be a later version of firmware than the downgrade firmware bundle is.

Attention: Downgrades to firmware versions prior to 2053-003 are not supported.

Step 8 : Perform the downgrade on the enclosure.

Note: One enclosure may be downgraded at a time.

a. Initiate the downgrade by issuing the following command:

```
./Ultrastar_Data60_102_FWUpdate -f HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_<FW Version>.tar.gz.
```

```
Ultrastar_Data60_102_FWUpdate v1.0.0
Copyright (c) 2022-2023 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2023_1_12_8_50_23.txt
Target File = HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_<FW
 Version>.tar.gz
Target Directory = <path to firmware files>


Identified below FW Upgradable Enclosure connected to Host
_____________________________________________________________
Index        Enc Address          SEP              OOBM
1.        USCSJ04217EA0001     <FW Version>  <OOBM Version>
_____________________________________________________________

16T4 Transition image is required
FW Update status for IOMB = [0x0]
Current FW Version = 4008-020
Target FW Version 16T4-015
Starting FW update with file fw_files/HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_16T4-015_4.0.10.tar.gz on handle /dev/sg1
FW Download is completed Successfully
FW Update is completed for 16T4-015, reset command is sent, sleep for 10
 minutes.
Verify New FW  16T4-015 for Enclosure ID: USCSJ04217EA0001
FW Update completed Successfully for Version 16T4-015
Current FW Version = 16T4-015
Target FW Version 3010-007
Starting FW update with file fw_files/HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_3010-007_3.1.11.tar.gz on handle /dev/sg1
FW Download is completed Successfully
FW Update is completed for 3010-007, reset command is sent, sleep for 10
 minutes.
Verify New FW  3010-007 for Enclosure ID: USCSJ04217EA0001
FW Update completed Successfully for Version 3010-007
FW Update is completed for all the files, Successful Exit!
```

Attention: The firmware downgrade will take approximately one hour to complete.

Step 9 : Use the WDDCS Tool to verify that the SEP and OOBM firmware has been downgraded to the preferred version of firmware and is running on all expanders.

```
# wddcs rcli "show enc"
wddcs v2.0.6.0
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates

Device: <device>

Enclosure Information (IOM A)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146

Device: <device>

    Enclosure Information (IOM B)
    ENCL CONFIG : 4U60
    PARTNUM : 1ES1049-A5
    SERIAL : USWSJ01119EZ002C
    IOM A
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG005E
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1E:B1
        IP ADDR : xx.xxx.xxx.214
    IOM B
        PARTNUM : 1EB1049-A2
        SERIAL : THCLS00719EG0090
        FW(PRI) : <version>
        FW(SEC1) : <version>
        FW(SEC2) : <version>
        FW(OOBM) : <version>
        MAC : 00:0C:CA:08:1D:E8
        IP ADDR : xx.xxx.xxx.146
```

Step 10 : Verify the firmware and OOBM information lists the version of the downgraded firmware.

Result: The enclosure firmware has now been downgraded.

1.6 Firmware Auto-Sync

Introduced with firmware version 3000-058, Auto-Sync is a feature that automatically detects a mismatch of SEP and OOBM firmware between an enclosure's two IOMs and initiates an upgrade or downgrade to synchronize the firmware versions. This feature is designed to reduce the time required to update firmware after replacing one or both IOMs and can be utilized to achieve different outcomes depending on the user's needs. The following sections define use cases of this feature, requirements for its operation, and procedures for enabling and disabling it.

Single IOM Replacement

After removing one IOM from a powered-up enclosure, or booting an enclosure with only a single IOM, the firmware on the installed IOM (if v3 or higher) will become dominant. If a second IOM with different firmware is then installed, the enclosure will detect the mismatch and either upgrade or downgrade the firmware on the second IOM to match the first.

Dual IOM Replacement

After booting an enclosure with two installed IOMs, the highest version of IOM firmware will become dominant. The firmware on the other IOM will be upgraded to match.

Feature Requirements

- The dominant IOM must be running SEP firmware version 3xxx or higher and OOBM firmware 3.x.x or higher. This firmware bundle is collectively referred to as "v3".
- The non-dominant IOM must be running SEP firmware version 2020 or higher.
- The enclosure must have the Auto-Sync VPD bit enabled.
- To enable and disable the Auto-Sync VPD bit, the host must have the sg3_utils package installed: http://sg.danny.cz/sg/sg3_utils.html.

Restrictions

- Auto-Sync will not be operational when a manual firmware upgrade is in progress.
- Manual firmware upgrade will not be available when an Auto-Sync firmware upgrade is in progress.

1.6.1 Enabling Auto-Sync

Step 1: Follow the instructions in the Enclosure Firmware Upgrade and Downgrade *(page 6)* section to download the v3 firmware bundle to the dominant IOM and activate it.

Step 2: From a host command line, use the `sg_modes` utility to verify that the enclosure's Auto-Sync VPD bit is currently **disabled** (00, bold in the following example):

```
sg_modes <dev> --page=0x20 --llbaa
    HGST  H4102-J  3010   peripheral_type: enclosure services device [0xd]
Mode parameter header from MODE SENSE(10):
  Mode data length=24, medium type=0x00, specific param=0x00, longlba=0
  Block descriptor length=0
>> page_code: 0x20, page_control: current
 00     a0 0e 01 00 00 00 00 00  00 00 00 00 00 00 00 00
```

Step 3: Use the `sg_wr_mode` utility to **enable** the enclosure's Auto-Sync VPD bit:

```
sg_wr_mode <dev> --dbd -s --page=0x20 --
contents=a0,0e,01,00,00,00,00,00,00,00,00,00,00,00,08,00 --
mask=00,00,00,00,00,00,00,00,00,00,00,00,00,00,08,00
```

Step 4: Use the `sg_modes` utility to verify that the enclosure's Auto-Sync VPD bit is now **enabled** (08, bold in the following example):

```
sg_modes <dev> --page=0x20 --llbaa
    HGST  H4102-J  3010   peripheral_type: enclosure services device [0xd]
Mode parameter header from MODE SENSE(10):
  Mode data length=24, medium type=0x00, specific param=0x00, longlba=0
  Block descriptor length=0
>> page_code: 0x20, page_control: current
 00     a0 0e 01 00 00 00 00 00  00 00 00 00 00 00 08 00
```

1.6.2 Checking Auto-Sync Status

Note: Depending on the user's system and configuration, it may take several minutes for the enclosure to detect a mismatch in firmware between its two IOMs, and several additional minutes for the synchronization to complete, before the upgraded/downgraded IOM reboots.

Step 1: To check the status of the Auto-Sync process, use the `sg_ses` utility to query the Download Microcode Status Diagnostic page for the IOM being upgraded/downgraded:

```
sg_ses <dev> --page=0xe
```

If the enclosure hasn't yet detected the mismatch, the `status` will indicate the following:

```
HGST  H4102-J  <FW Version>
Download microcode status diagnostic page:
  number of secondary subenclosures: 0
  generation code: 0x0
   subenclosure identifier: 0 [primary]
     download microcode status: No download microcode operation in progress
 [0x0]
     download microcode additional status: 0x0
     download microcode maximum size: 1703914 bytes
     download microcode expected buffer id: 0x0
     download microcode expected buffer id offset: 0
```

When the mismatch is detected and the syncing has begun, the `expected buffer id offset` value will grow, and the `status` will alternate between the following:

```
download microcode status: Updating storage with deferred microcode [0x3]
```

```
download microcode status: Download in progress, awaiting more [0x1]
```

When the sync is complete, the status will indicate:

```
download microcode status: Complete, no error, start after hard reset or
 power cycle [0x11]
```

Step 2: After the firmware has been syncronized, the upgraded/downgraded IOM will reboot.

1.6.3 Disabling Auto-Sync

Step 1: From a host command line, use the `sg_modes` utility to verify that the enclosure's Auto-Sync VPD bit is currently **enabled** (08, bold in the following example):

```
sg_modes <dev> --page=0x20 --llbaa
    HGST  H4102-J  3010   peripheral_type: enclosure services device [0xd]
Mode parameter header from MODE SENSE(10):
  Mode data length=24, medium type=0x00, specific param=0x00, longlba=0
  Block descriptor length=0
>> page_code: 0x20, page_control: current
 00     a0 0e 01 00 00 00 00 00  00 00 00 00 00 00 08 00
```

Step 2: Use the `sg_wr_mode` utility to **disable** the enclosure's Auto-Sync VPD bit:

```
sg_wr_mode <dev> --dbd -s --page=0x20 --
contents=a0,0e,01,00,00,00,00,00,00,00,00,00,00,00,00,00 --
mask=00,00,00,00,00,00,00,00,00,00,00,00,00,00,08,00
```

Step 3: Use the `sg_modes` utility to verify that the enclosure's Auto-Sync VPD bit is now **disabled** (00, bold in the following example):

```
sg_modes <dev> --page=0x20 --llbaa
    HGST  H4102-J  3010   peripheral_type: enclosure services device [0xd]
Mode parameter header from MODE SENSE(10):
  Mode data length=24, medium type=0x00, specific param=0x00, longlba=0
  Block descriptor length=0
>> page_code: 0x20, page_control: current
 00     a0 0e 01 00 00 00 00 00  00 00 00 00 00 00 00 00
```

1.7 Enhanced Logging

The following table details the events that have been added to logging for the v4000 firmware release.

Event	Behavior	Description
OOBM_COMN_STATUS	Event data : Param1 will be set to 1 On SEP successfully establishing connection with OOBM	Connection will be validated every 50 sec
OOBM_COMN_STATUS	Event data : Param1 will be set to 0 On SEP losing connection with OOBM	Connection will be validated every 50 sec
INTERCONNECT_PHY_LOG	Event data : No parameters will have data to denote that link between IOMs is not alive	Communication failure on interconnect between IOMs and the link is not alive.
INTERCONNECT_PHY_LOG	Event data : Param1 denotes that one of the phy of the interconnect is bad, Param2 gives phy ID that is not working	Communication failure on interconnect an one of the phy in the interconnect is not working.
I2C_COMN_STATUS	Event Data: Param1 tells about status of i2c communication, Param2 tells that it's a i2c vpd read command	I2C communication failure, i2c VPD read failed with status given in parameter 1
I2C_COMN_STATUS	Event Data: Param1 tells about status of i2c communication, Param2 tells that it's a i2c vpd write command	I2C communication failure, i2c VPD write failed with status given in parameter 1
DEV_ACC_FAILURE	Event Data: Param1 tells about instance that SEP failure to get an update.	Device update failure, Param1 will give details of the devices instance.

1.8 OOBM Log Syncing

This section provides information about OOBM log synching enhancements introduced with the v4000 firmware release.

Overview

The OOBM has been enhanced to synchronize SEP logs between IOMs to help diagnosis of IOM faults when one IOM has become inoperable. The self and partner logs IOM logs are captured in parallel. At any given point in time, both IOM logs from either IOM can be retrieved.

The following logs are synced between IOMs:

- SEP Console Logs
- SEP Event Logs
- SEP Crash Logs

Syncing Process

When an IOM is booting, it checks for the compatibility of firmware versions for Log Syncing in both IOMs. If both IOMs support the log sync capability, then Log Initialization messages are exchanged between the IOMs so that the current state of the Log Syncing will be notified to the partner IOM.

After the Log Syncing state in both IOMs is known, the Log Syncing process begins for all the three logs (event logs, console logs, and crash logs). Log Syncing processes in the firmware will continuously look for changes in the log files; if there is a new addition of logs, changes will be synced with the partner IOM.

1.8.1 Extracting OOBM Logs

This task provides instructions for extracting the OOBM logs from both IOMs using the WDDCS Tool.

Step 1: Use the WDDCS Tool's `show` command to determine the SEP handle(s) of the IOM, and to verify that the vM400 firmware is running.

```
# wddcs show
wddcs v2.1.0.0
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates

Device: /dev/sg4
    product : H4102-J
    serial  : USWSJ02320EA0007-B
    firmware: M400-019
    name    : Ultrastar Data102

Device: /dev/sg5
    product : H4102-J
    serial  : USWSJ02320EA0007-B
    firmware: M400-019
    name    : Ultrastar Data102
```

Step 2: Use the `iom` command to confirm which IOM the SEP handle(s) refer to.

```
# wddcs iom
wddcs v2.1.0.0
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates
```

```
Device: /dev/sg4
Dual IOM operation
IOM B

Device: /dev/sg5
Dual IOM operation
IOM B
```

Step 3 : Use one of the IOM's SEP handles with the `getlog vendor` command to capture vendor-specific log information. One of the log files created with this command will be an archive file named `bundlelog_sg<#>.tgz`.

```
# wddcs /dev/sg4 getlog vendor
wddcs v2.1.0.0
Copyright (c) 2019-2021 Western Digital Corporation or its affiliates

Creating files for: /dev/sg4
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/ses/
page_EAh_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/ses/
page_EDh_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/ses/
page_17h_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
consolelog_exp_0_sg4.bin
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
consolelog_exp_1_sg4.bin
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
consolelog_exp_2_sg4.bin
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
crashlog_exp_0_sg4.bin
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
crashlog_exp_1_sg4.bin
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
crashlog_exp_2_sg4.bin
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
eventlog_exp_0_sg4.bin
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
eventlog_exp_1_sg4.bin
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
eventlog_exp_2_sg4.bin
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/
jbodlogs/bundlelog_sg4.tgz
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
i2c_scan_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_gpio_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_enc_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_dual_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_hosts_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_phys_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec1_show_phys_sg4.txt
```

```
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec2_show_phys_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_ac_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_le_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_sensor_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_drives_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_drives_high_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_drives_low_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_thermon_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_ses_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
phyinfo_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
phyinfo_buffer_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec1_phyinfo_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec1_phyinfo_buffer_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec2_phyinfo_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec2_phyinfo_buffer_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
debug_dump_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
zonecfg_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec1_debug_dump_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec2_debug_dump_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
err_cnts_0-47_read_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec1_err_cnts_0-60_read_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec2_err_cnts_0-60_read_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_threads_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec1_show_threads_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec2_show_threads_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
qinfo_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec1_qinfo_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec2_qinfo_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
status_sas_phy_sg4.txt
```

```
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec1_status_sas_phy_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
sec2_status_sas_phy_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_cable_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_vpd_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
show_autosync_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
i2c_read_fpga_port1_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
i2c_read_fpga_port2_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
i2c_read_fpga_port3_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
i2c_read_fpga_port4_sg4.txt
*File saved: /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
gpio_sg4.txt
```

Step 4: Navigate to the `jbodlogs/` directory and verify that `bundlelog_sg<#>.tgz` is present.

```
# cd /tmp/wddcs_<hostname>_<datestamp>_<timestamp>/jbodlogs/
```

```
# ls
bundlelog_sg4.tgz           eventlog_exp_1_sg4.bin       qinfo_sg4.txt
                sec2_err_cnts_0-60_read_sg4.txt  show_drives_high_sg4.txt
 show_ses_sg4.txt
consolelog_exp_0_sg4.bin    eventlog_exp_2_sg4.bin
 sec1_debug_dump_sg4.txt          sec2_phyinfo_buffer_sg4.txt
 show_drives_low_sg4.txt   show_thermon_sg4.txt
consolelog_exp_1_sg4.bin    gpio_sg4.txt
 sec1_err_cnts_0-60_read_sg4.txt  sec2_phyinfo_sg4.txt
 show_drives_sg4.txt       show_threads_sg4.txt
consolelog_exp_2_sg4.bin    i2c_read_fpga_port1_sg4.txt
 sec1_phyinfo_buffer_sg4.txt      sec2_qinfo_sg4.txt
 show_dual_sg4.txt         show_vpd_sg4.txt
crashlog_exp_0_sg4.bin      i2c_read_fpga_port2_sg4.txt  sec1_phyinfo_sg4.txt
             sec2_show_phys_sg4.txt           show_enc_sg4.txt
 status_sas_phy_sg4.txt
crashlog_exp_1_sg4.bin      i2c_read_fpga_port3_sg4.txt  sec1_qinfo_sg4.txt
               sec2_show_threads_sg4.txt        show_gpio_sg4.txt
 zonecfg_sg4.txt
crashlog_exp_2_sg4.bin      i2c_read_fpga_port4_sg4.txt
 sec1_show_phys_sg4.txt           sec2_status_sas_phy_sg4.txt
 show_hosts_sg4.txt
debug_dump_sg4.txt          i2c_scan_sg4.txt
 sec1_show_threads_sg4.txt        show_ac_sg4.txt
 show_le_sg4.txt
err_cnts_0-47_read_sg4.txt  phyinfo_buffer_sg4.txt
 sec1_status_sas_phy_sg4.txt      show_autosync_sg4.txt
 show_phys_sg4.txt
eventlog_exp_0_sg4.bin      phyinfo_sg4.txt
 sec2_debug_dump_sg4.txt          show_cable_sg4.txt
 show_sensor_sg4.txt
```

Step 5 : Unpack the tgz file. There will be a `partner/` and `self/` directory. The `partner/` directory will contain the console and expander directories and event logs for the opposite IOM. The `self/` directory will contain the console, expander, and OOBM directories for the local IOM.

```
# tar xvfz bundlelog_sg4.tgz
partner/sep_console_log/console_log_exp
partner/sep_console_log/console_log_exp0.4
partner/sep_console_log/console_log_exp1
partner/sep_console_log/console_log_exp0.2
partner/sep_console_log/console_log_exp0
partner/sep_console_log/console_log_exp0.1
partner/sep_console_log/console_log_exp2
partner/sep_console_log/console_log_exp0.3
partner/sep_console_log/console_log_exp0.5
partner/sep_event_log/event_log_exp2
partner/sep_event_log/event_log_exp1
partner/sep_event_log/event_log_exp0
self/sep_console_log/console_log_exp1
self/sep_console_log/console_log_exp0
self/sep_console_log/console_log_exp2
self/OOBM_logs/log_sync.log.1
self/OOBM_logs/discover.log
self/OOBM_logs/sep_interface.log.3
self/OOBM_logs/sep_interface.log.2
self/OOBM_logs/sep_interface.log.1
self/OOBM_logs/log_sync.log.2
self/OOBM_logs/sesdb.sqlite3
self/OOBM_logs/sep_interface.log.4
self/OOBM_logs/datamgr.log
self/OOBM_logs/messages
self/OOBM_logs/messages.0
self/OOBM_logs/ipmi.log
self/OOBM_logs/sep_interface.log
self/OOBM_logs/log_sync.log
self/sep_event_log/event_log_exp2
self/sep_event_log/event_log_exp1
self/sep_event_log/event_log_exp0
```

Result: The OOBM logs have now been extracted.

Hardware Release Notes

In This Chapter:

2.1 About the Release

This section provides information regarding the release of the latest hardware release revision for Ultrastar Data102 .

Table 13: Release Summary

Release Version	1ES0300-0341 Rev. 01