



Western Digital

User Guide

Firmware Update CLI for Ultrastar[®] Data60
& Ultrastar Data102

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Revision History

Date	Revision	Comment
August 2024	01	Initial release for software version 1.0

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Western Digital
5601 Great Oaks Parkway
San Jose, CA 95119

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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.

Website:

<https://portal.wdc.com/s/>

Email:

enterprisesupport@wdc.com

UK Import Representation Contact

PO Box 471
Leatherhead KT22 2LU
UK

Telephone: +44 1372 366000

EU Import Representation Contact

BP 80006
92135 Issy les Moulineaux, France



Overview

The topics in this chapter provide an overview of the Firmware Update CLI application, including its purpose, prerequisites, and instructions for downloading and installing it.

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1.1 Overview

The Firmware Update CLI version 1.0 is an in-band, command-line software utility for updating SEP and OOBM enclosure firmware — or drive firmware for installed drives — on the following Western Digital platforms.

- Ultrastar Data60
- Ultrastar Data102

1.2 Prerequisites

This section lists the prerequisites for proper function of the Firmware Update CLI utility.

Operating Systems

Table 2: Supported Operating Systems for Firmware Update CLI

Linux®	Windows
Debian 12.5	Window Server® 2022
Oracle® Linux 7.9	
Red Hat Enterprise Linux® (RHEL) 9.3	
Ubuntu® Server 22.04	

Third-Party Software

The following third-party software must be installed on the host server running the Firmware Update CLI.

Table 3: Required 3rd-Party Software for Firmware Update CLI

Linux	Windows
N/A	sg3_utils version 1.45

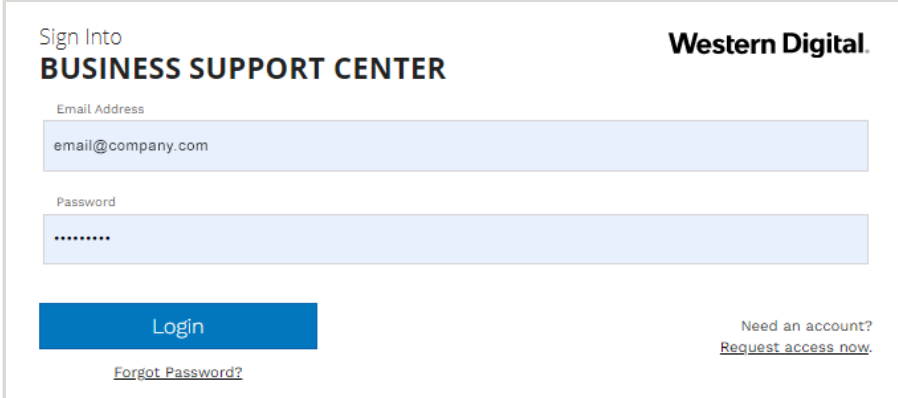
1.3 Downloading the Firmware Update CLI

This procedure provides instructions for downloading the Firmware Update CLI utility from the Western Digital Business Support Center.

Step 1: Open a web browser and navigate to: <https://portal.wdc.com/s/>.

The login page for the **Western Digital Business Support Center** will be displayed:

Figure 1: Western Digital Business Support Center Login Page

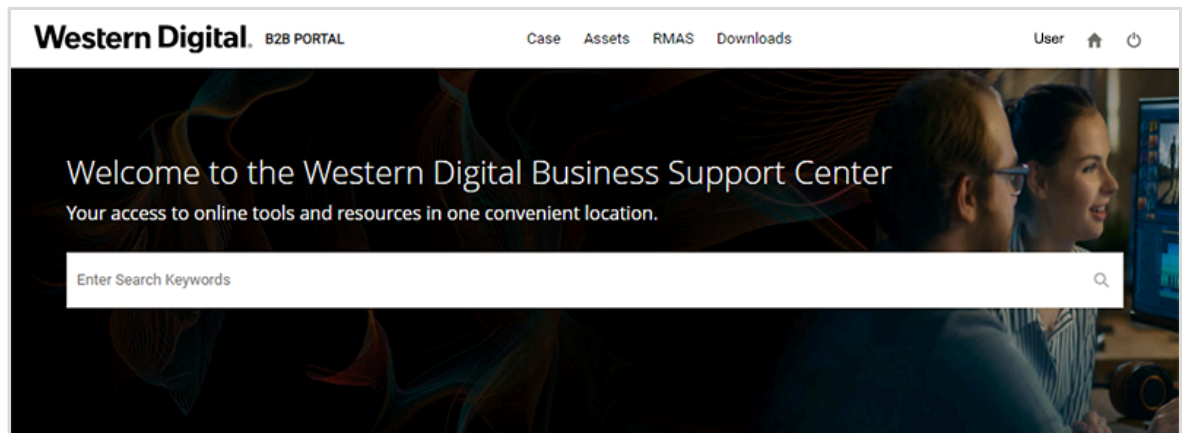


The screenshot shows the login page for the Western Digital Business Support Center. At the top left, it says "Sign Into BUSINESS SUPPORT CENTER" and at the top right is the "Western Digital." logo. Below the header, there are two input fields: "Email Address" with the placeholder text "email@company.com" and "Password" with a masked password ".....". A blue "Login" button is positioned below the password field. To the right of the button, there is a link that says "Need an account? Request access now." and a link below the button that says "Forgot Password?".

Step 2: Enter a valid email address and password into the **Email Address** and **Password** fields. Then click the **Login** button.

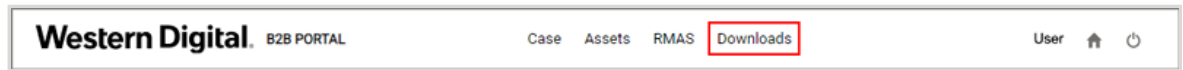
The **Western Digital B2B Portal** page will be displayed:

Figure 2: Western Digital B2B Portal



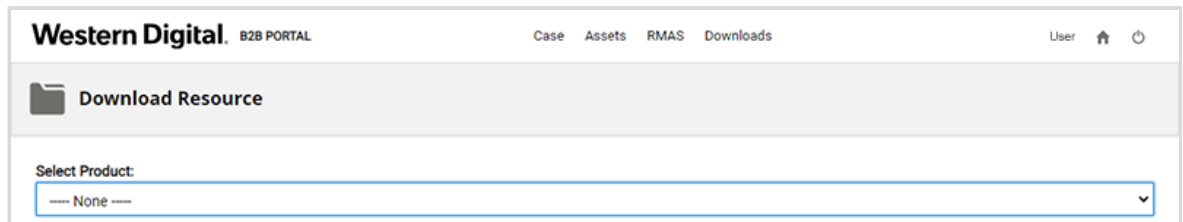
Step 3: Click **Downloads** at the top of the page.

Figure 3: Downloads Link



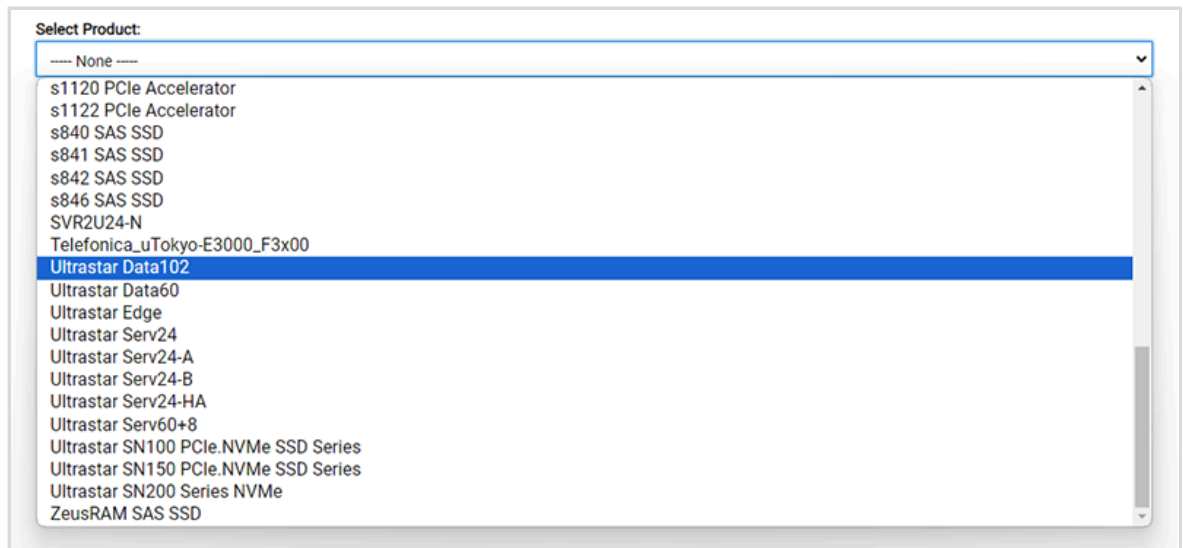
The **Download Resource** page will be displayed:

Figure 4: Download Resource Page



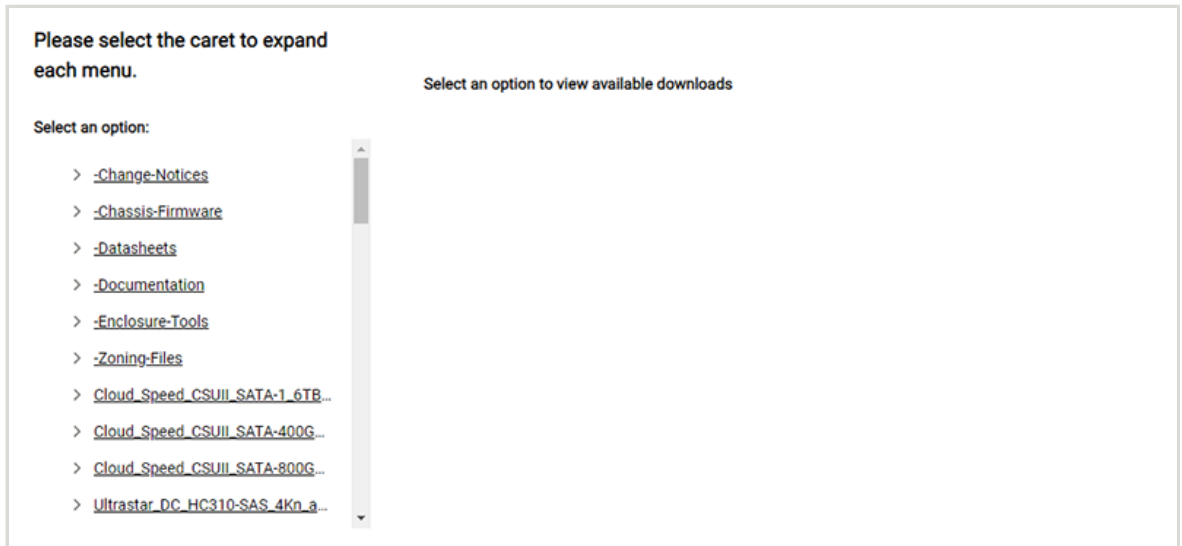
Step 4: Use the **Select Product** drop-down list to select your platform (Ultrastar Data60 or Ultrastar Data102).

Figure 5: Select Your Platform



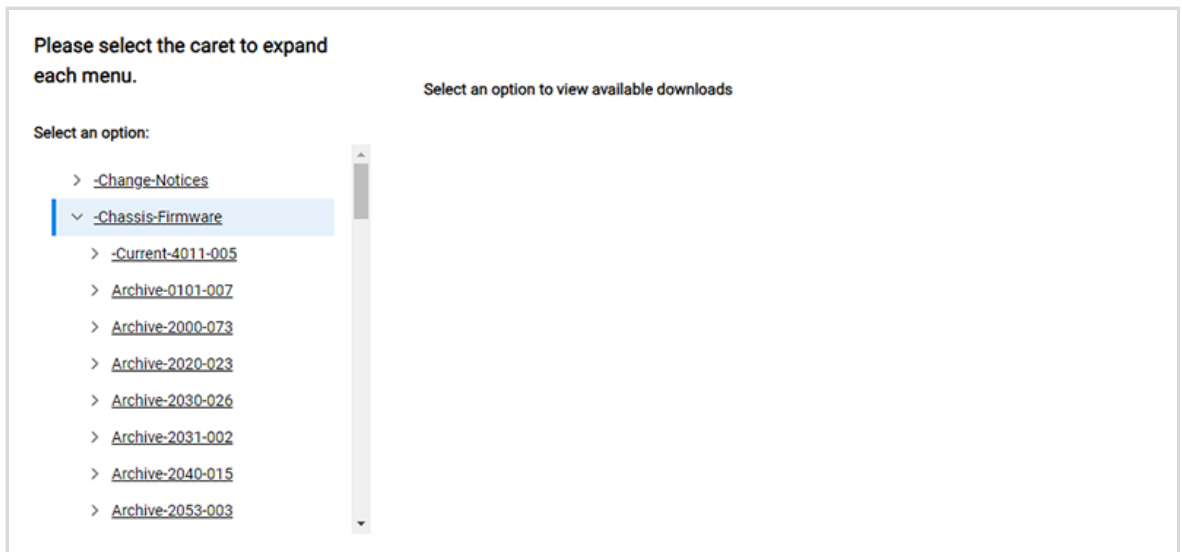
The downloadable resources for that product will be displayed:

Figure 6: Download Resources



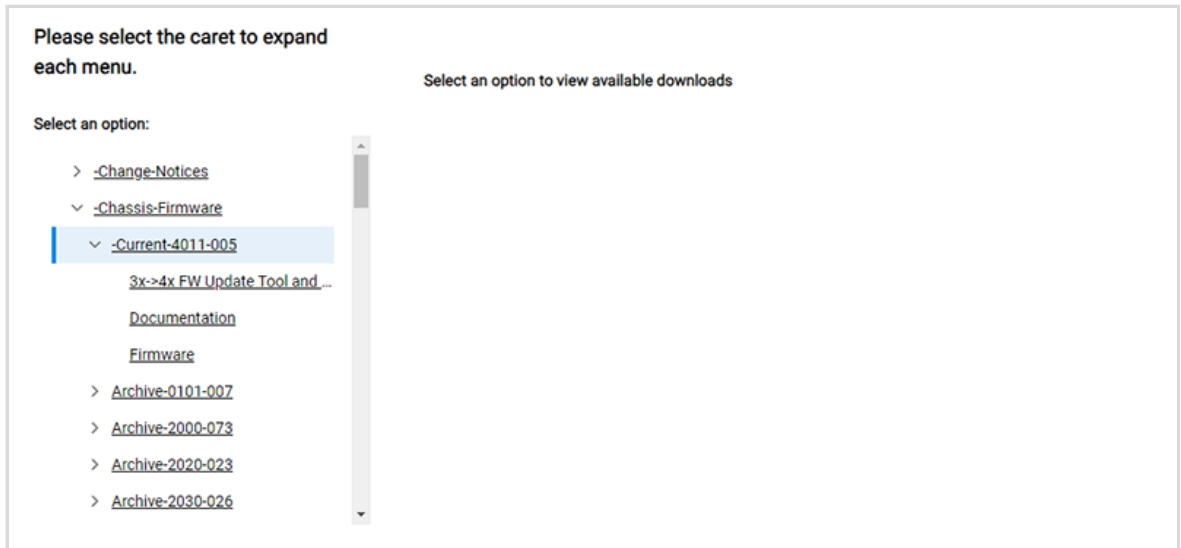
Step 5: Under **Select an option**, click the caret symbol to expand the **Chassis Firmware** menu.

Figure 7: Select the Chassis Firmware



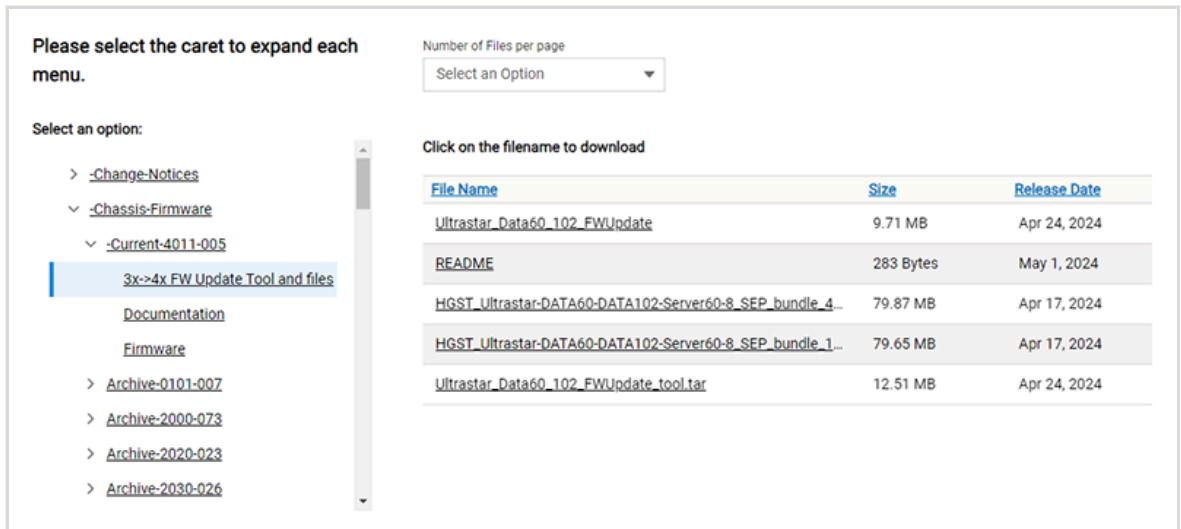
Step 6: Click the caret symbol to expand the **Current** version menu.

Figure 8: Select the Current Version



Step 7: Click to select the **3x->4x FW Update Tool and files** option.

Figure 9: Select the Firmware Update Tool



Step 8: From the file options on the right, click to select the **Ultrastar_Data60_102_FWUpdate** utility. The software bundle will download to the host.

Result: The Firmware Update CLI application has now been downloaded from the Western Digital Business Support Center.

What to do next: Proceed to [Installing the Firmware Update CLI \(page 7\)](#).

1.4 Installing the Firmware Update CLI

The Firmware Update CLI is a portable application; it does not require installation to perform its functions.

Step 1: To use the application, simply extract/unzip the downloaded software bundle to any location on the file system of the host OS. The application can then be launched from that path.

Result: The Firmware Update CLI application is now ready for use.



Firmware Update CLI Commands

The topics in this section provide information and instructions for using the Firmware Update CLI commands.

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2.1 General Notes

This section lists notes that apply to all Firmware Update CLI commands.



Note: The Firmware Update CLI utility can be launched from the directory where the software bundle was extracted/unzipped. Before use, navigate (change directory) to that directory.



Note: Commands can be run from Linux or Windows operating systems. The Linux syntax is presented throughout this document. For Windows, include `.exe` after the utility name:

Linux:

```
# ./Ultrastar_Data60_102_FWUpdate <option>
```

Windows:

```
C:/> Ultrastar_Data60_102_FWUpdate.exe <option>
```

2.2 help

The --help or -? option is used to print usage information about the Firmware Update CLI utility.

Command Syntax & Output Examples

```
# ./Ultrastar_Data60_102_FWUpdate --help

Ultrastar_Data60_102_FWUpdate v1.0.7
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_16_22_19_29.txt

-----
Usage:      Ultrastar_Data60_102_FWUpdate <--iom | --drive> [--model <drive model
number>] [--file <FW Bundle file>]

Note:
-i, --iom:
    Perform Enclosure/IOM related operations.

    --OR--

-d, --drive:
    Perform drive related operations.

-l, --list:
    Lists the details of the enclosures or drives (based on the options specified)
    connected to the host.
    If list option is not specified, the tool will perform firmware update based on the
    information provided using other arguments.

-m, --model < model number of the drive > (Applicable only for drive related
operations. Optional for listing drives.)
    Selects only those drives which belongs to the given model number.

-f, --file <FW Bundle file with/without path>
    Enter FW Bundle File.
    Providing full path is optional. If path is not provided then script will search for
    FW Bundle in Current Working Directory.
    Ex. Ultrastar_Data60_102_FWUpdate -f /root/fw_bundle/HGST_Ultrastar-DATA60-DATA102-
    Server60-8_SEP_bundle_2044-006_2.4.7.tar.gz

[-e, --eid < Enclosure SAS Address > ]
    This option is usefull to choose Enclosure to update in case of multiple enclosure is
    connected on same host.
    Not mandatory for single Enclosure system
    Enclosure SAS Address is part of ses page 7 and can be retrived using below command.
    sg_ses <IOM Handle> -p 7 |grep "Element type: Enclosure, subenclosure id:" -A2 |
    grep ENCLOSURE | awk -F, '{print $3}'

-o, --force
    FW Update to proceed forcefully. Force FW Update will be applicable on below
    exceptions.
    1. All Expanders are not on same version.
    2. SEP-OOBM are not on released sync version.
```

```
-?, --help  
  Display tool usage help.
```

2.3 iom

The `--iom/-i` option is used to perform enclosure/IOM related operations.



Note: The `--iom/-i` option is intended to be used along with other options. See [list \(page 14\)](#), [file \(page 17\)](#), [force \(page 21\)](#), or [Firmware Update Using a Configuration File \(page 22\)](#) for usage examples. Unless used in conjunction with a configuration file or other options, the `--iom/-i` option will produce the following error.

```
Ultrastar_Data60_102_FWUpdate v1.0.7
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_16_22_45_20.txt

Error: IOM firmware file information missing! Please provide the input as command
line argument or in config file.
```

2.4 drive

The `--drive/-d` option is used to perform drive related operations.



Note: The `--drive/-d` option is intended to be used along with other options. See [list \(page 14\)](#), [file \(page 17\)](#), or [Firmware Update Using a Configuration File \(page 22\)](#) for usage examples. Unless used in conjunction with a configuration file or other options, the `--drive/-d` option will produce the following error.

```
Ultrastar_Data60_102_FWUpdate v1.0.7
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Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_16_22_45_20.txt

Error: Drive firmware file information missing! Please provide the input as command
line argument or in config file.

-----
```

2.5 list

The `--list/-l` option is used to list the details of the enclosure(s) or drive(s) connected to the host.



Note: This option requires the addition of the `--iom/-i` or `--drive/-d` option to specify whether to list the enclosure or drive details.

Command Syntax & Output Examples

List Enclosure Details:

1. Use the `--iom/-i` and `--list/-l` options.

```
# ./Ultrastar_Data60_102_FWUpdate --iom --list

Ultrastar_Data60_102_FWUpdate v1.0.7
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_22_14_52_59.txt

Connected Enclosure(s):
```

Index	Enc Address	SEP	OOBM
1.	USWSJ00220EZ000A	4011-005	4.0.111

List Drive Details:

1. Use the `--drive/-d` and `--list/-l` options.

```
# ./Ultrastar_Data60_102_FWUpdate --drive --list

Ultrastar_Data60_102_FWUpdate v1.0.7
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_22_14_55_10.txt

DUT Device          Port Capacity State          BootDevice Serial Number
Model Number      Firmware Lnk Spd Cap/Cur
-----
0  /dev/nvme-fabrics NVMe 11.9 MB unretrievable No          Serial
Model          Firmware unretrievable/unretrievable
2  /dev/sdaj          SAS 10.0 TB Good          No          VCG1MY2M
WUS721010AL5204 C920 Gen4,Gen4/Gen4,Gen4
3  /dev/sdak          SAS 12.0 TB Good          No          8DG3WUVD
HUH721212AL5200 A640 Gen4,Gen4/Gen4,Gen4
4  /dev/sdal          SAS 10.0 TB Good          No          VCG1PX2N
WUS721010AL5204 C920 Gen4,Gen4/Gen4,Gen4
5  /dev/sdam          SAS 10.0 TB Good          No          VCG1NTDM
WUS721010AL5204 C920 Gen4,Gen4/Gen4,Gen4
6  /dev/sdan          SAS 10.0 TB Good          No          7GJJ44EK
HUH721010AL4200 A92C Gen4,Gen4/Gen4,Gen4
7  /dev/sdao          SAS 10.0 TB Good          No          7JGV4LYG
HUH721010AL4200 A92C Gen4,Gen4/Gen4,Gen4
```

8	/dev/sdap	SAS	10.0 TB	Good	No	7JGPMU2G
	HUH721010AL4200	A92C	Gen4,Gen4/Gen4,Gen4			
9	/dev/sdaq	SAS	10.0 TB	Good	No	VCG16VNN
	WUS721010AL5204	C920	Gen4,Gen4/Gen4,Gen4			
10	/dev/sdar	SAS	10.0 TB	Good	No	VCG1LD3N
	WUS721010AL5204	C920	Gen4,Gen4/Gen4,Gen4			

2.6 model

The `--model/-m` option is used to perform drive related operations.



Note: The `--model/-m` option is intended to be used along with other options. See [list \(page 14\)](#) or [file \(page 17\)](#) for usage examples. If used on its own, the `--model/-m` option will produce the following error.

```
Ultrastar_Data60_102_FWUpdate v1.0.7
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_22_17_9_53.txt

./Ultrastar_Data60_102_FWUpdate: option requires an argument -- 'm'

-----
```

2.7 file

The `--file/-f` option is used to update firmware on the enclosure(s) or drive(s) connected to the host.



Note: This option requires the addition of the `--iom/-i` or `--drive/-d` option to specify whether to update the enclosure or drive firmware.



Note: If the firmware file is located in the same directory as the Firmware Update CLI utility, there is no need to specify the path to the file, only the firmware filename itself. If the firmware file is not located in the same directory as the Firmware Update CLI utility, specify the full path to the firmware file on the host.

Command Syntax & Output Examples

Update Firmware on a Single Enclosure:

1. Use the `--iom/-i` option and the `--file/-f` option, along with the firmware filename.

```
# ./Ultrastar_Data60_102_FWUpdate --iom --file <path/firmware_filename>
```

```
Ultrastar_Data60_102_FWUpdate v1.0.7
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_23_5_50_26.txt
Target File = HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_4011-005_4.0.111.tar.gz

Identified below FW Upgradable Enclosure connected to Host
```

Index	Enc Address	SEP	OOBM
1.	USWSJ00220EZ000A	4011-005	4.0.111

```
FW Update status for IOMA = [0x0]
FW Update status for IOBM = [0x0]
Current FW Version = 4011-005
Target FW Version 4011-005
Starting FW update with file HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_4011-005_4.0.111.tar.gz on handle /dev/sg2
FW Download is completed Successfully
FW Update is completed for 4011-005, reset command is sent, sleep for 10 minutes.
Verify New FW 4011-005 for Enclosure ID: USWSJ00220EZ000A
FW Update completed Successfully for Enclosure ID: USWSJ00220EZ000A for Version
4011-005
FW Update is completed for all the files. Successful Exit!
Status Code : 0
```

Update Firmware on a Single Enclosure in a Multi-Enclosure Setup:

1. Use the `--iom/-i` and `--list/-l` options to list the enclosure(s) connected to the host, and note the SAS address of the enclosure(s) you want to update.

```
# ./Ultrastar_Data60_102_FWUpdate --iom --list
```

```

Ultrastar_Data60_102_FWUpdate v1.0.7
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates

```

```
Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_22_14_52_59.txt
```

```
Connected Enclosure(s):
```

Index	Enc Address	SEP	OOBM
1.	USWSJ00220EZ000A	4011-005	4.0.111
2.	USWSJ00220EZ000B	4011-005	4.0.111

- Use the `--iom/-i` option, the `--eid/-e` option along with the enclosure SAS address from step 1 (page 18), and the `--file/-f` option along with the firmware filename.

```
# ./Ultrastar_Data60_102_FWUpdate --iom --eid USWSJ00220EZ000A --file <path/firmware_filename>
```

```

Ultrastar_Data60_102_FWUpdate v1.0.7
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates

```

```
Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_23_6_17_45.txt
```

```
Target File = HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_4011-005_4.0.111.tar.gz
```

```
Identified below FW Upgradable Enclosure connected to Host
```

Index	Enc Address	SEP	OOBM
1.	USWSJ00220EZ000A	4011-005	4.0.111

```
FW Update status for IOMA = [0x0]
```

```
FW Update status for IOMB = [0x0]
```

```
Current FW Version = 4011-005
```

```
Target FW Version 4011-005
```

```
Starting FW update with file HGST_Ultrastar-DATA60-DATA102-Server60-8_SEP_bundle_4011-005_4.0.111.tar.gz on handle /dev/sg2
```

```
FW Download is completed Successfully
```

```
FW Update is completed for 4011-005, reset command is sent, sleep for 10 minutes.
```

```
Verify New FW 4011-005 for Enclosure ID: USWSJ00220EZ000A
```

```
FW Update completed Successfully for Enclosure ID: USWSJ00220EZ000A for Version 4011-005
```

```
FW Update is completed for all the files. Successful Exit!
```

```
Status Code : 0
```

Update Drive Firmware:

- Use the `--drive/-d` and `--list/-l` options to list the drive(s) connected to the host, and note the model number of the drive(s) you want to update:

```
# ./Ultrastar_Data60_102_FWUpdate --drive --list
```

```

Ultrastar_Data60_102_FWUpdate v1.0.7
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates

```

```
Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_22_14_55_10.txt
```

DUT	Device	Port	Capacity	State	BootDevice	Serial Number
Model	Number	Firmware	Lnk Spd Cap/Cur			
0	/dev/nvme-fabrics	NVMe	11.9 MB	unretrievable	No	Serial
Model		Firmware	unretrievable/unretrievable			
2	/dev/sdaj	SAS	10.0 TB	Good	No	VCG1MY2M
	WUS721010AL5204	C920	Gen4,Gen4/Gen4,Gen4			
3	/dev/sdak	SAS	12.0 TB	Good	No	8DG3WUVD
	HUH721212AL5200	A640	Gen4,Gen4/Gen4,Gen4			
4	/dev/sdal	SAS	10.0 TB	Good	No	VCG1PX2N
	WUS721010AL5204	C920	Gen4,Gen4/Gen4,Gen4			
5	/dev/sdam	SAS	10.0 TB	Good	No	VCG1NTDM
	WUS721010AL5204	C920	Gen4,Gen4/Gen4,Gen4			
6	/dev/sdan	SAS	10.0 TB	Good	No	7GJJ44EK
	HUH721010AL4200	A92C	Gen4,Gen4/Gen4,Gen4			
7	/dev/sdao	SAS	10.0 TB	Good	No	7JGV4LYG
	HUH721010AL4200	A92C	Gen4,Gen4/Gen4,Gen4			
8	/dev/sdap	SAS	10.0 TB	Good	No	7JGPMU2G
	HUH721010AL4200	A92C	Gen4,Gen4/Gen4,Gen4			
9	/dev/sdaq	SAS	10.0 TB	Good	No	VCG16VNN
	WUS721010AL5204	C920	Gen4,Gen4/Gen4,Gen4			
10	/dev/sdar	SAS	10.0 TB	Good	No	VCG1LD3N
	WUS721010AL5204	C920	Gen4,Gen4/Gen4,Gen4			

- Use the `--drive/-d` option, the `--model/-m` option along with the drive model number from step 1 (page 18), and the `--file/-f` option along with the firmware filename.

```
# ./Ultrastar_Data60_102_FWUpdate --drive --model WUS721010AL5204 --file <path/  
drive_FW>
```

```
Ultrastar_Data60_102_FWUpdate v1.0.7  
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates  
  
Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_23_7_57_55.txt  
  
Device      Serial Number  FW File      Update Status  
-----  
/dev/sdaj   VCG1MY2M      VXGSC980.bin Download was successful.  
/dev/sdal   VCG1PX2N      VXGSC980.bin Download was successful.  
/dev/sdam   VCG1NTDM      VXGSC980.bin Download was successful.  
/dev/sdaq   VCG16VNN      VXGSC980.bin Download was successful.  
/dev/sdar   VCG1LD3N      VXGSC980.bin Download was successful.  
  
Drive firmware update successful.  
Status Code : 0
```


2.8 eid

The `--eid/-e` option is used to specify a specific enclosure ID in the event of a multi-enclosure setup.



Note: The `--eid/-e` option is intended to be used along with other options. See [file \(page 17\)](#) for a usage example. If used on its own, the `--eid/-e` option will produce the following error.

```
Ultrastar_Data60_102_FWUpdate v1.0.7
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Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_22_17_9_53.txt

./Ultrastar_Data60_102_FWUpdate: option requires an argument -- 'e'

-----
```

2.9 force

The `--force/-o` option is used to force a firmware update in the event of the following conditions:

- The expanders in IOMs A & B are not on the same firmware version
- The SEP & OOBM are not using compatible firmware versions (i.e. released bundle)

Command Syntax & Output Examples



Note: This option requires the addition of the `--iom/-i` and `--file/-f` options to specify an enclosure firmware update and the firmware filename.



Note: If the firmware file is located in the same directory as the Firmware Update CLI utility, there is no need to specify the path to the file, only the firmware filename itself. If the firmware file is not located in the same directory as the Firmware Update CLI utility, specify the full path to the firmware file on the host.

1. Use the `--iom/-i` option, the `--force/-o` option, and the `--file/-f` option along with the firmware filename.

```
# ./Ultrastar_Data60_102_FWUpdate --iom --force --file <path/firmware_filename>
```

```
Ultrastar_Data60_102_FWUpdate v1.0.7
Copyright (c) 2022-2024 Western Digital Corporation or its affiliates

Logfile = Ultrastar_Data60_102_FWUpdate_2024_7_22_7_12_5.txt
Target File = HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_4011-005_4.0.111.tar.gz
Force Update is Enabled, Will try to perform FW Update

Identified below FW Upgradable Enclosure connected to Host
```

Index	Enc Address	SEP	OOBM
1.	USWSJ00220EZ000A	4011-005	NA

```
FW Update status for IOMA = [0x0]
FW Update status for IOMB = [0x0]
Current FW Version = 4011-005
Target FW Version 4011-005
Starting FW update with file HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_4011-005_4.0.111.tar.gz on handle /dev/sg2
FW Download is completed Successfully
FW Update is completed for 4011-005, reset command is sent, sleep for 10 minutes.
Verify New FW 4011-005 for Enclosure ID: USWSJ00220EZ000A
FW Update completed Successfully for Enclosure ID: USWSJ00220EZ000A for Version
4011-005
FW Update is completed for all the files. Successful Exit!
Status Code : 0
```

2.10 Firmware Update Using a Configuration File

For scenarios where multiple systems require the same enclosure and/or drive firmware update, the Firmware Update CLI includes a firmware directory (for storing firmware) and a configuration file, which references this directory. Using these features reduces the number of command options required for each update.

The Firmware Directory

The Firmware Update CLI software bundle includes a firmware directory with the following structure:

```
firmwares/  
|__ drive_firmware  
|   |__ <drive firmware file>  
|__ iom_firmware  
|   |__ <IOM firmware file>
```

To use the directory:

- Place a drive firmware file in the `firmwares/drive_firmware` directory
- Place an enclosure firmware file in the `firmwares/iom_firmware` directory

The Configuration File

The Firmware Update CLI software bundle includes a `config` file that references the files in the firmware directory using a `key:value` format:

```
#IOM  
IOM_FW :  
ENC_ID :  
  
#Drive  
DRIVE_FW :  
DRIVE_MODEL :
```

To use the configuration file, add the following values:

- For the `IOM_FW` : value, add the relative path to the enclosure firmware file
- For the `ENC_ID` : value, add the SAS address of a particular enclosure, if needed
- For the `DRIVE_FW` : value, add the relative path to the drive firmware file
- For the `DRIVE_MODEL` : value, add the model number of the drives to be updated

The following is an example of a filled-in configuration file:

```
#IOM  
IOM_FW : firmwares/iom_firmware/HGST_Ultrastar-DATA60-DATA102-  
Server60-8_SEP_bundle_4011-005_4.0.111.tar.gz  
ENC_ID :  
  
#Drive  
DRIVE_FW : firmwares/drive_firmware/VXGSC980.bin  
DRIVE_MODEL : WUS721010AL5204
```

Updating Enclosure Firmware

1. Place the enclosure firmware file in the `firmwares/iom_firmware/` directory.
2. Add the relative path to the configuration file.
3. If needed, specify the SAS address of the enclosure in the configuration file.
4. Update the enclosure firmware using the `--iom/-i` option:

```
# ./Ultrastar_Data60_102_FWUpdate --iom
```

Updating Drive Firmware

1. Place the drive firmware file in the `firmwares/drive_firmware/` directory.
2. Add the relative path to the configuration file.
3. Specify the drive model to be updated.
4. Update drive firmware using the `--drive/-d` option:

```
# ./Ultrastar_Data60_102_FWUpdate --drive
```