User Guide

Storage Executive Command Line Interface

Introduction

This guide describes how to use Micron's Storage Executive command line interface (CLI) to monitor, manage, and configure Micron solid state drives (SSDs).

The CLI provides a list of commands for configuration and management, including:

- View all drives installed in a system and see current drive status and capacity, temperature, firmware version, and driver information.
- View SMART attributes and data/error logs.
- Run SMART self-tests.
- Update firmware.
- Retrieve debug data.
- Configure drive settings including interrupt coalescing, over-provisioning, and Flex Capacity levels.
- Remove all data from a drive, by performing a sanitize drive, sanitize crypto scramble, physical security ID(PSID) revert, or secure erase operation.
- Run the STANDBY IMMEDIATE command.
- Prepare an NVMe drive for safe removal from a system.
- Manage the namespace on an NVMe drive.

For instructions on installing Storage Executive or using the Storage Executive graphical user interface, see the *Storage Executive User Guide.*

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About the CLI

The Storage Executive command line interface (CLI) provides a list of commands for managing and monitoring supported Micron and Crucial SSDs in a local system. The CLI is intended for system administrators and can be used to automate Storage Executive operations.

Supported OS

OS	Variant
Windows Desktop OS	Windows 11 (64-bit) Windows 10 (64-bit)
Windows Server OS	Windows Server 2016 Windows Server 2019 Windows Server 2022
Linux	Cent OS 7.x and later Ubuntu 18.00 LTS and later RHEL 7.x and later SUSE 12 and later Fedora 14 and later Debian 11 and later Rocky Linux 9.0 and later

Supported Driver

Driver	Description
Micron Windows NVMe	For all supported versions of Windows, supports all Storage Executive features
Inbox Microsoft Windows 10 and Windows 11 NVMe	supports all Storage Executive features except: -Configure Power Management feature for an NVMe drive -Perform format namespace operation
IRSTe /IRST	In Windows, supports Storage Executive features
Linux Inbox NVMe driver	For all supported versions of Linux, supports all Storage Executive features

Note: For Crucial Storage Executive (CSE), Linux OS and Linux Drivers are not supported.

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Supported SSDs

SSD	Model Number	
Micron NVMe™	9500 9400 9300 Series 9200 Series 9100 Series 7500PRO, 7500MAX 7450 Series 7400 Series 7300 Series 7100 Series 6500ION 6400ZNS 6500ZNS	2200 2100AI, 2100AT 2210 2300 2400 2450 2500 2550 3400 3460 3500 P7 4150
Micron SATA	5400 5300 Series 5210 5200 Series 5100 Series 1100 1300 M500	M500DC M500IT M510 M510DC M550 M600 P400m
Crucial SATA	MX-series BX-series M-series	
Crucial NVMe	PX Series PXP	
Crucial USB Portable	X6 Series, X8 Series, X9 Series, X10 Series.	

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RAID Controller Support

RAID Controller	Details
Avago Mega RAID, Microchip Smart RAID, Smart HBA, Smart Array Controllers	Drives connected to Mega RAID controllers appear with the following device name:mraidX:Y Where X indicates the ID of the Mega RAID controller and Y indicates the ID of the drive behind the controller.
Adaptec	Drives connected to Adaptec controllers appear with the following device name:sgX Where X indicates the ID of the Adaptec controller
Intel VMD	Intel® RST VMD Managed Controller (09AB) Which are supported only for Intel® 11th Generation platforms or newer Supported Micron SSD Models: 2200,2210,2300,2400,2450,2550,3400,7400 Series,9400
Dell BOSS Controller Card	Drives connected to Dell BOSS controllers appear with the following device name:dellboss:X:<device-name> Where X indicates the ID of the Dell BOSS controller

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Running the CLI

To run the CLI, execute the following in a command prompt:

Windows: **msecli.exe**

Linux: **msecli**

Obtaining Help

To obtain CLI usage information, enter the following in the command prompt:

Usage: **msecli -?**

Fig: msecli main options

```
C:\Users\Administrator\Desktop\Latest_SE_Tools>msecli.exe -?
USAGE:
msecli <Main Option> -?

    Provides the detailed usage information for the specified main option

NOTE: All options may not be supported by all drives

Single Letter Options:
  -L  Lists the basic information for all drives available in the system
  -S  Lists the SMART values for the supported parameters for the micron drives
  -M  To manage the micron drives
  -X  Performs various format operations on given Micron drive
  -C  Displays the command output data from a specified data
  -D  Displays the Driver and Host Information for the given <device-name>
  -F  Manages the firmware update/Boot partition for Micron drives
  -h  Displays the help usage for the micron drives with respective to the drive type
  -P  Collects debug data from the system for each micron drive
  -V  Displays the Micron Storage Executive current Version
  -U  Performs firmware update with the firmware folder for the specified SATA/SAS/NVME drive
  -J  Performs Format Unit operation on a specified SAS device
  -N  To manage the namespaces on a Micron NVME device
  -T  Updates the UBI image in the specified Micron PCIe drive
  -Z  Prepares the specified Micron PCIe drive for removal

admin-passthru
        Submit an arbitrary admin command, return results
set-feature
        Set a feature ang show the resulting value
supported-cap-config-log
        List the supported capacity configuration descriptors
endurance-group-list
        List Endurance Group Identifiers

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C:\Users\Administrator\Desktop\Latest_SE_Tools>
```


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Common Command Options

The CLI provides the following options for all commands:

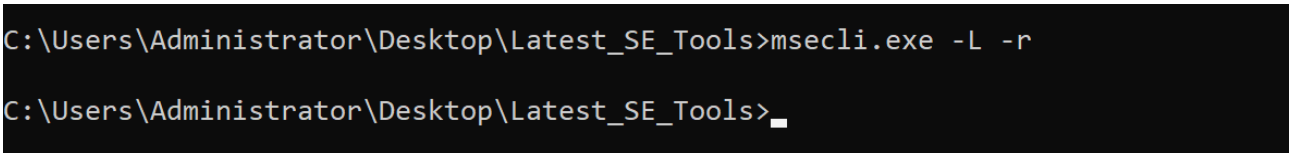
Option	Description
-r	Runs the CLI in silent mode.
-n	Retrieves specified information for the given device name.
-s	Saves the output of the command to the specified file.

Using Silent Mode

In silent mode, the CLI does not display output on the screen and does not request user input, if any, during its operation. If a command requires user confirmation, the default input value (yes) is used for those commands.

To run the CLI in silent mode, enter the following in the command prompt:
Usage: **msecli -L -r**

Fig: CLI in Silent mode



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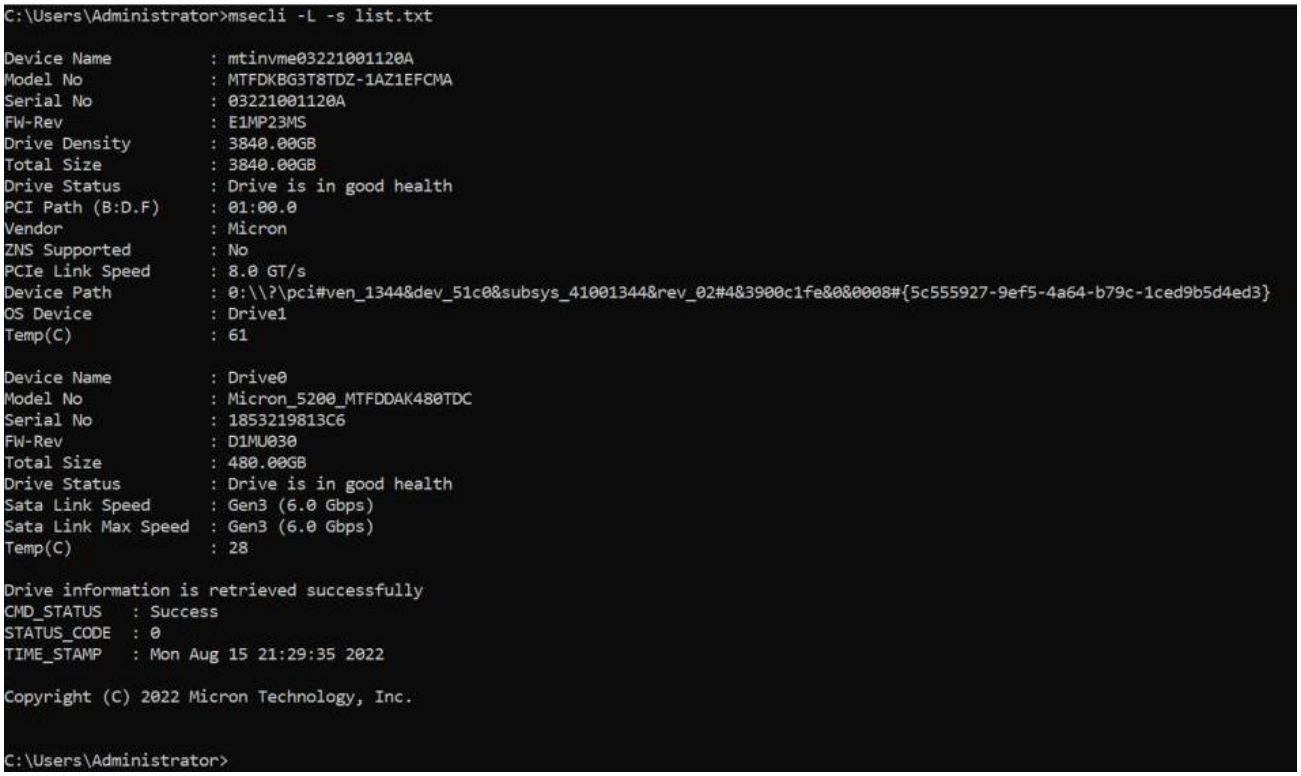
Saving the Command Output

The output of every command issued in the CLI can be saved as a .txt file. This file is created in the location from which the command is executed (Storage Executive installation folder by default) unless an absolute path is given.

1. At the command prompt, run the command for which output will be saved.
2. Enter the following in the command prompt: **msecli -L -s <output file name>**
3. Replace <output file name> with the name for the saved file. The command prompt displays the content of the saved file.

Fig: Displaying Saved Output



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Displaying CLI Usage

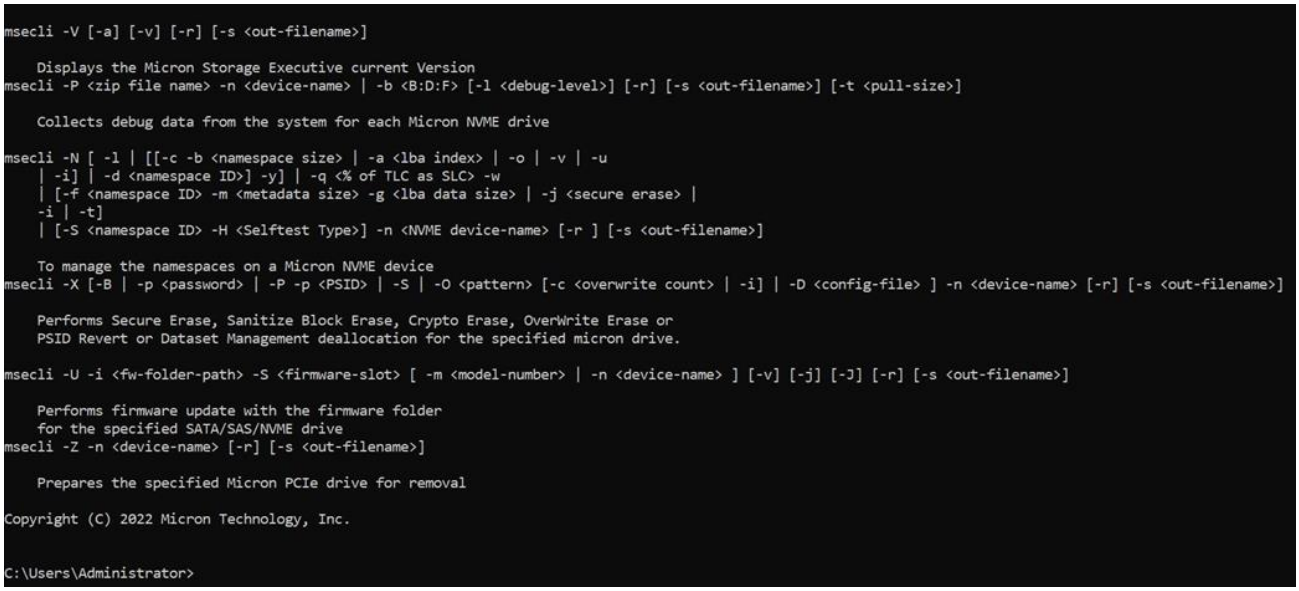
Storage Executive supports many commands to manage Micron SSDs. Some commands are common to all Micron SSDs while others are specific to a certain type of SSD; for example, NVMe (7400 series, 9400 series, etc.) or SATA (M500, M510, M550, BX500, P-Series SSD etc.).

To determine the commands available for a specific SSD or type of SSD, issue the following commands in this section.

Displaying NVMe SSD Commands

Enter the following at the command prompt: **msecli -h -t**

Fig: NVMe SSD Commands



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Displaying SATA SSD Commands

Enter the following at the command prompt: **msecli -h -c**

Fig: SATA SSD Commands

```
C:\Users\Administrator>msecli -h -c
USAGE:
msecli -L [-d|-j <json-file>|-J] [-n <device-name>]  [-r ] [-s <out-filename>]

    Lists the basic information for all drives available in the system
msecli -S [-i] [-V] [-l <log-type[0 | 1 | 2 | 3 | 6 | 7]>] [-p [-j <json-file>] [-J]] [-w <test-span1,test-span2,...,test-span5>] [-t <Self-test type[0 | 1 | 2 | 3 | 4 | 5]
>] [-g <gpl-log-address>] [-n <device-name>] [-r] [-s <out-filename>] [-b <bin-file-name>]

    Lists the SMART values for the supported parameters for the micron drives
    available in the system
msecli -M [-l <state-value> | -o <Max Address> ] -n <device-name> [-r] [-s <out-filename>]

    To manage client drives.

msecli -X [-B | -p <password> |-P -p <PSID> | -S] -n <device-name> [-r] [-s <out-filename>]

    Performs Secure Erase, Sanitize Block Erase, Crypto Scramble, OverWrite Erase or
    PSID Revert for the specified client drive

msecli -D [ -n <device-name> [-r] [-s <out-filename>] ] [ -L -s <segment> -b <bus> -d <device> -f <function> -l <lane> -t <num_time_steps> -v <num_voltage_steps> ]

    Displays the Driver and Host Information for the given <device-name>
msecli -C [[-Z] -i [-a <namespace id>] | -b | -f <feature-code> -c <sector-count> -l <lba> ] -n <device-name> [-r] [-s <out-filename>]

    Displays the specified ATA command output data or to issue the
    StandByImmediate or identify device commands to the specified drive.

msecli -V [-a] [-v] [-r] [-s <out-filename>]

    Displays the Micron Storage Executive current Version
msecli -P <zip file name> -n <device-name> [-l <debug-level>] [-r] [-s <out-filename>]

    Collects debug data from the system for each client drive

msecli -F [[ -U <fw-img-file> | -A] [-l] -n <device-name>] [-r] [-s <out-filename>]

    Manages the firmware update/Boot partition for Micron drives
msecli -U -i <fw-folder-path> [ -m <model-number> | -n <device-name>] [-v] [-J] [-r] [-s <out-filename>]

    Performs firmware update with the firmware folder
    Client drive
```


```
msecli -V [-a] [-v] [-r] [-s <out-filename>]

    Displays the Micron Storage Executive current Version
msecli -P <zip file name> -n <device-name> [-l <debug-level>] [-r] [-s <out-filename>]

    Collects debug data from the system for each client drive

msecli -F [[ -U <fw-img-file> | -A] [-l] -n <device-name>] [-r] [-s <out-filename>]

    Manages the firmware update/Boot partition for Micron drives
msecli -U -i <fw-folder-path> [ -m <model-number> | -n <device-name>] [-v] [-J] [-r] [-s <out-filename>]

    Performs firmware update with the firmware folder
    Client drive
```


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```
C:\Users\Administrator>
```


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Displaying Commands for a Specific SSD

Enter the following at the command prompt: **msecli -h -n <device-name>**

Fig: Specific SSD Commands

```
C:\Users\Administrator>msecli -h -n drive0
USAGE:
msecli -L [-d|-j <json-file>|-J] [-n <device-name>]  [-r ] [-s <out-filename>]

    Lists the basic information for all drives available in the system
msecli -S [-i] [-V] [-l <log-type[0 | 1 | 2 | 3 | 6 | 7]>] [-p [-j <json-file>] [-J]] [-w <test-span1,test-span2,...,test-span5>] [-t <Self-test type[0 | 1 | 2 | 3 | 4 | 5]
>] [-g <gpl-log-address>] [-n <device-name>] [-r] [-s <out-filename>] [-b <bin-file-name>]

    Lists the SMART values for the supported parameters for the micron drives
    available in the system
msecli -M [-l <state-value> | -o <Max Address> ] -n <device-name> [-r] [-s <out-filename>]

    To manage client drives.

msecli -X [-B | -p <password> |-P -p <PSID> | -S] -n <device-name> [-r] [-s <out-filename>]

    Performs Secure Erase, Sanitize Block Erase, Crypto Scramble, OverWrite Erase or
    PSID Revert for the specified client drive

msecli -D [ -n <device-name> [-r] [-s <out-filename>] ] [ -L -s <segment> -b <bus> -d <device> -f <function> -l <lane> -t <num_time_steps> -v <num_voltage_steps> ]

    Displays the Driver and Host Information for the given <device-name>
msecli -C [[-Z] -i [-a <namespace id>] | -b | -f <feature-code> -c <sector-count> -l <lba> ] -n <device-name> [-r] [-s <out-filename>]

    Displays the specified ATA command output data or to issue the
    StandByImmediate or identify device commands to the specified drive.

msecli -V [-a] [-v] [-r] [-s <out-filename>]

    Displays the Micron Storage Executive current Version
msecli -P <zip file name> -n <device-name> [-l <debug-level>] [-r] [-s <out-filename>]

    Collects debug data from the system for each client drive

msecli -F [[ -U <fw-img-file> | -A] [-l] -n <device-name>] [-r] [-s <out-filename>]

    Manages the firmware update/Boot partition for Micron drives
msecli -U -i <fw-folder-path> [ -m <model-number> | -n <device-name>] [-v] [-J] [-r] [-s <out-filename>]

    Performs firmware update with the firmware folder
    Client drive
```


```
msecli -F [[ -U <fw-img-file> | -A] [-l] -n <device-name>] [-r] [-s <out-filename>]

    Manages the firmware update/Boot partition for Micron drives
msecli -U -i <fw-folder-path> [ -m <model-number> | -n <device-name>] [-v] [-J] [-r] [-s <out-filename>]

    Performs firmware update with the firmware folder
    Client drive
```


```
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C:\Users\Administrator>
```


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Displaying Drive Information

This section describes how to view:

Basic and detailed drive information for all drives in a system or a specific drive

- Driver information
- ATA Identify Device data for a drive
- Firmware slot information (NVMe drives only)
- PCIe information (NVMe drives only)

Displaying Basic Information for All Drives in a System

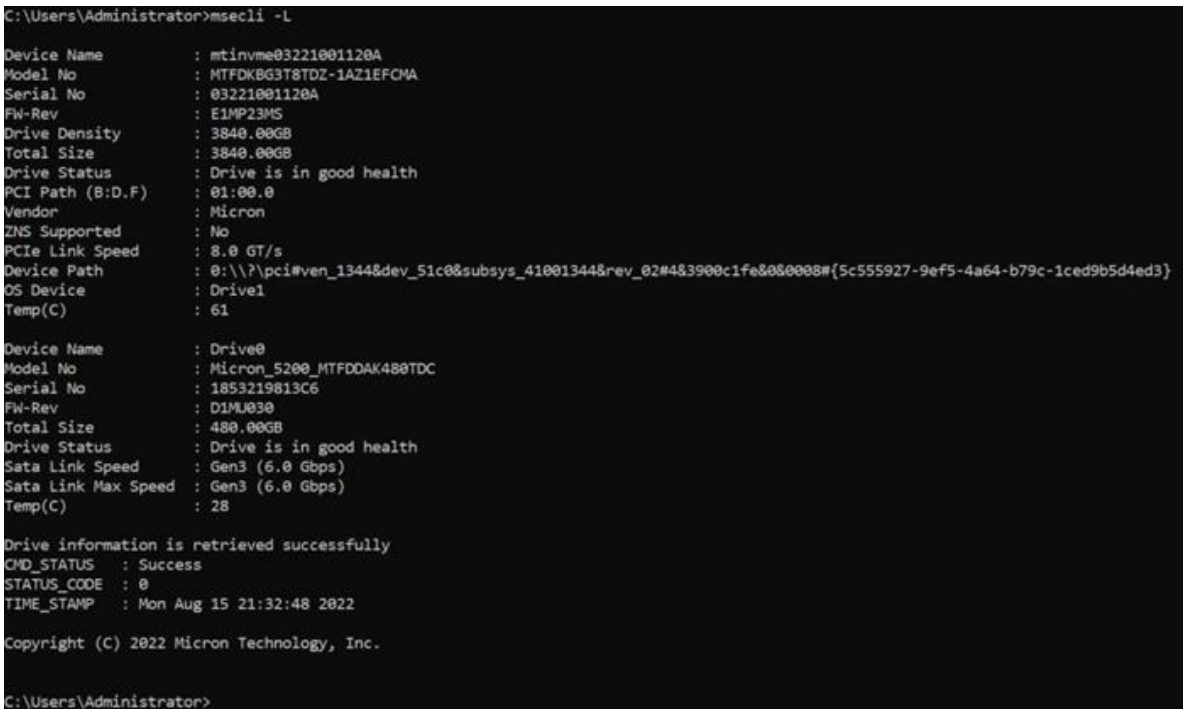
Use the following instructions to view basic information for all drives in a host system, including the drive's device name, model number, serial number, capacity, and status of each drive. All measurements for storage are displayed in gigabytes (GB). The drive's de- vice name is necessary to issue subsequent commands to a drive.

Note: An error message displays if no drives are connected to the host system. PCI path is displayed in hexadecimal value.

Usage: **msecli -L [-d|-P|-i|-j <json-file>|-J|-f <feature-id>] [-n <device-name>] [-h] [-r] [-s <out-filename>]**

1. Enter the following at the command prompt: **msecli -L**
2. The CLI displays information about all drives in the host system.

Fig: Details for all Drives in the Host System



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Displaying Basic Information for a Specific Drive

Use the following instructions to view basic information for a specific drive, including the model number, serial number, capacity, and drive status.

Usage: **msecli -L [-d|-P|-i|-j <json-file>|-J|-f <feature-id>] [-n <device-name>] [-h] [-r] [-s <out-filename>]**

1. Enter the following at the command prompt: **msecli -L -n <device-name>**
2. Replace <device-name> with the drive's device name.
3. The CLI displays information about the specified drive.

Fig: Details for a Specific Drive

Displaying Detailed Drive Information

Use the following instructions to view detailed information about all available drives in the host system, including:

- Device name
- Total (available) size
- Drive status
- SMART enabled status
- Estimated life remaining
- TCG status
- Power limit status
- Native max LBA details
- Interrupt coalescing value (NVMe drives)
- Write buffer status (NVMe drives)

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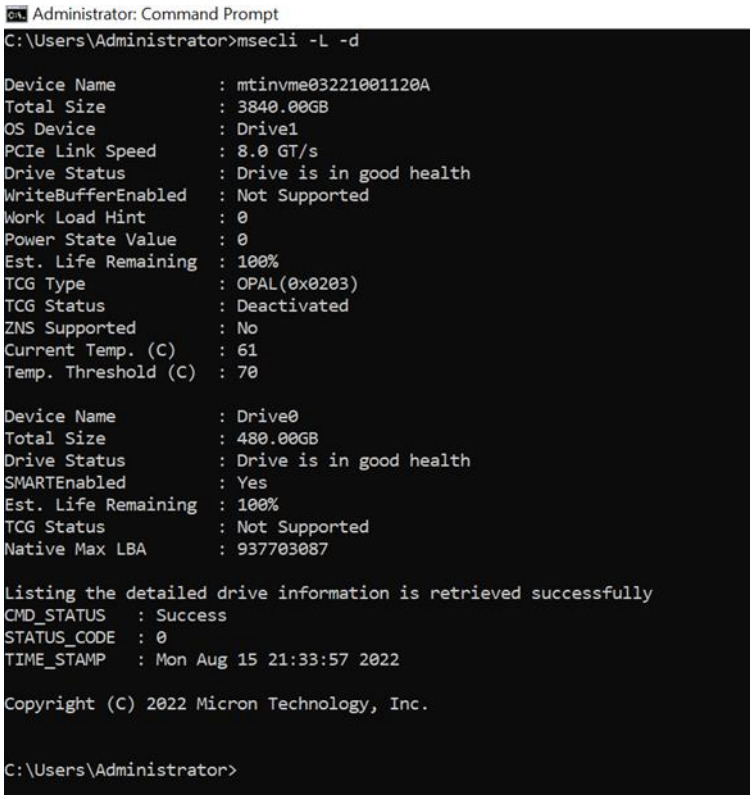
Usage: **msecli -L [-d|-P|-i|-j <json-file>|-J|-f <feature-id>] [-n <device-name>] [-h] [-r] [-s <out-filename>]**

1. Enter the following at the command prompt: **msecli -L -d**
2. The CLI displays detailed information about all drives in the host system.

Fig: Detailed Drive Information



Displaying Driver Information

Use the following instructions to display information about the driver, host operating system, and host name for a specific drive.

Usage: **msecli -D [-n <device-name> [-r] [-s <out-filename>]] [-L -s -b <bus> -d <device> -f <function> - l <lane> -t <num_time_steps> -v <num_voltage_steps>]**

1. Enter the following at the command prompt: **msecli -D -n <device-name>**
2. Replace <device-name> with the drive's name.
3. The CLI displays driver information for the specified drive.

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Fig: Driver Information

```
C:\Users\Administrator>msecli -D -n mtinvme03221001120A
Host Name       : DESKTOP-IEAVPPB
Driver Version  : 2.1.19.0
Driver Name     : Micron NVMe Storage Controller
OS Name         : Windows 10 Pro (build 19042), 64-bit

Device Name  : mtinvme03221001120A
Driver information is retrieved successfully
CMD_STATUS   : Success
STATUS_CODE  : 0
TIME_STAMP   : Mon Aug 15 21:34:43 2022

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C:\Users\Administrator>
```

Display Identify Device Data

Identify device data can be saved to a text file or output to the screen. It is recommended to save the data to a text file using the -s option to ensure all parsed identify data can be read.

Usage: **msecli -C [-i [-a <namespace id>] | -b | -f <feature-code> -c <sector-count> -l <lba>] -n <device-name> [-r] [- s <out-filename>]**

1. Enter the following at the command prompt: **msecli –C -i -n <device-name>**
2. When finished, the data outputs to the console or specified file.

Fig: Display ATA Identify Device Data

```
C:\Users\Administrator>msecli -C -i -n mtinvme03221001120A -s output.txt

Device Name  : mtinvme03221001120A
Parsed IDD data is saved successfully in the specified file
CMD_STATUS   : Success
STATUS_CODE  : 0
TIME_STAMP   : Mon Aug 15 21:35:42 2022

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C:\Users\Administrator>
```


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Fig: Display NVMe Controller Data

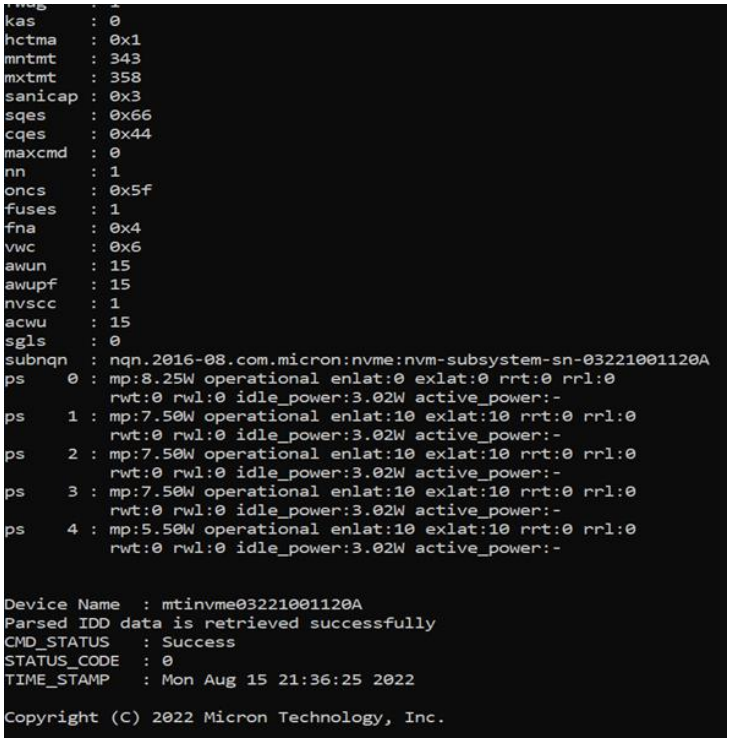
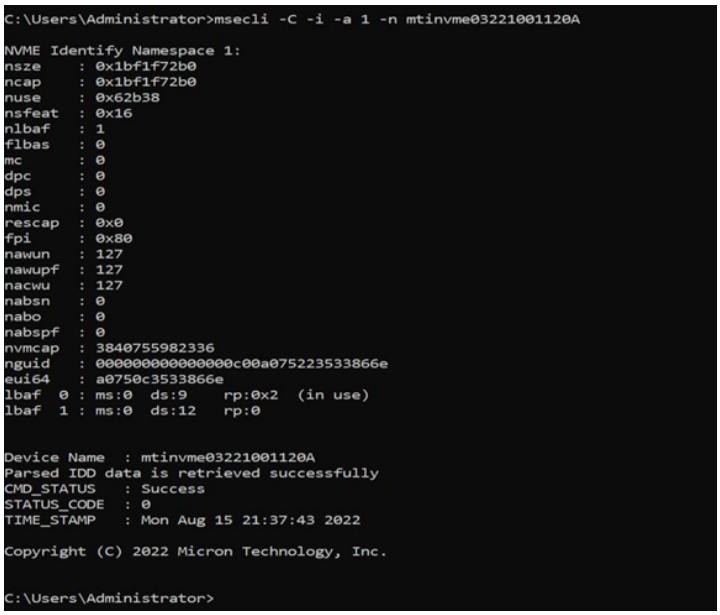


Fig: Display NVMe Namespace IDD Data



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Displaying Firmware Slot Information (NVMe Drives Only)

Use the following command to display firmware slot information for an NVMe drive.

Usage: **msecli -L [-d|-P|-i|-j <json-file>|-J] [-n <device-name>] [-r] [-s <out-filename>]**

1. Enter the following at the command prompt: **msecli -L -i -n < device-name>**
2. The CLI displays firmware slot information about the specified drive.

Fig: Firmware Slot Information for an NVMe Drive

```
C:\Users\Administrator>msecli -L -i -n mtinvme03221001120A

Device Name   : mtinvme03221001120A
Active Slot   : 2
Slot 1        : E1MP23MS (Read-Only)
Slot 2        : E1MP23MS (Read-Write)
Slot 3        : E1MP23MS (Read-Write)

Device Name   : mtinvme03221001120A
Firmware slot information retrieved successfully
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Mon Aug 15 21:38:25 2022

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C:\Users\Administrator>
```

Displaying PCIe Information (NVMe Drives Only)

Use the following instructions to display PCIe information for an NVMe drive, including:

- Device name
- Vendor ID
- Device ID
- Revision ID
- Supported PCIe link speeds
- Maximum PCIe link width
- Current PCIe link speed
- Negotiated PCIe link width
- PCI location (path) of the PCIe controller (PCI bus slot info)
- Subsystem vendor ID
- Subsystem ID
- Class code

Usage: **msecli -L [-d|-P|-i|-j <json-file>|-J] [-n <device-name>] [-r] [-s <out-filename>]**

1. Enter the following at the command prompt: **msecli -L -P**
2. The CLI displays information for each available NVMe drive.

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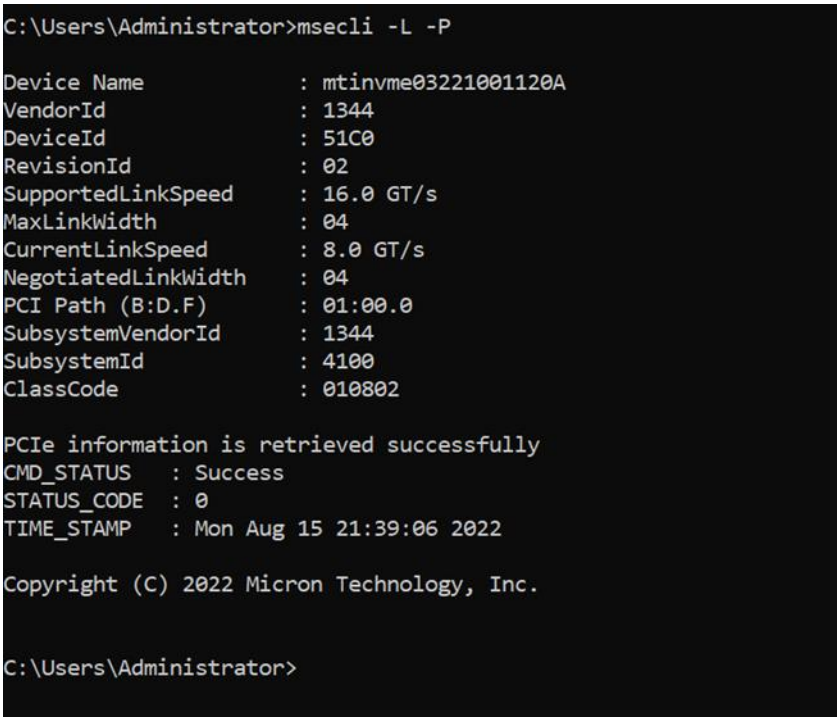
Fig: Displaying PCIe information (NVMe Drives Only)



Displaying HMB information (NVMe Drives Only)

Host Memory Buffer (HMB) is a low-level shared memory interface that can enable high- performance applications such as small payload control loops and large random-access buffers.

Use the following information for displaying HMB information from drive.

Usage: **msecli -L -h -n <drive-name>**

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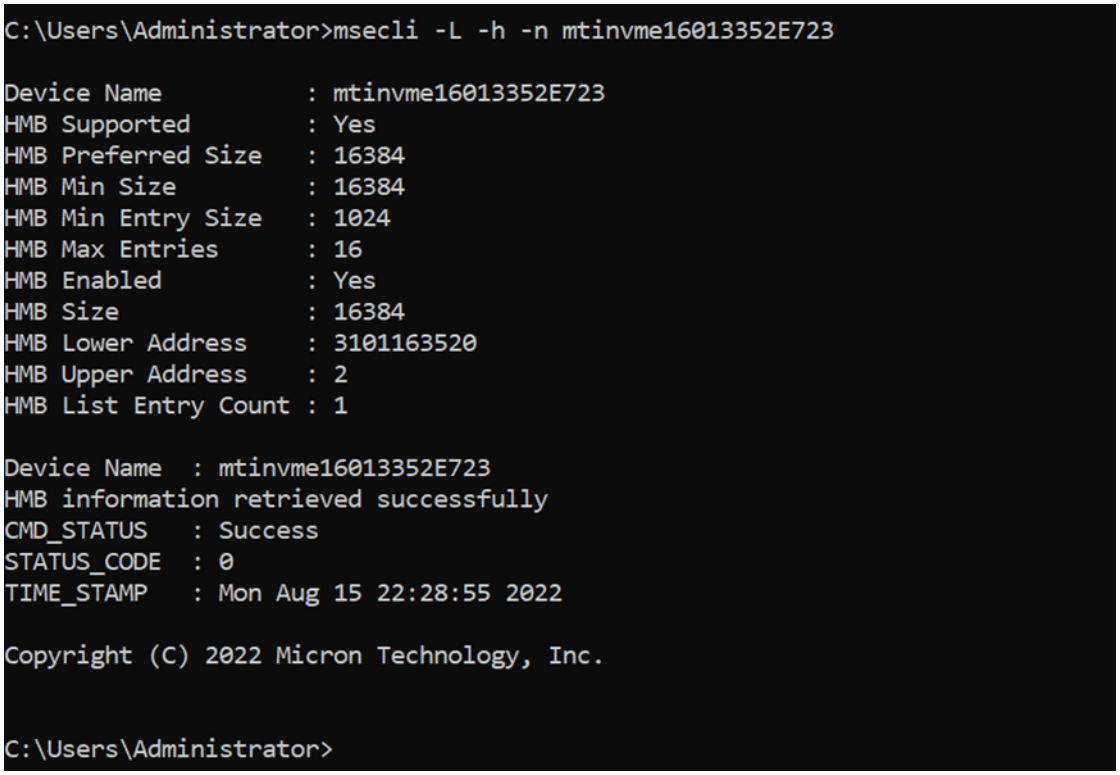
Fig: HMB Information



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Displaying SMART Data and Error Logs

Self-Monitoring, Analysis, and Reporting Technology (SMART) is a monitoring frame- work used to detect and report various indicators of consistency and anticipate failures. SMART must be enabled on a drive to display data and logs for the drive.

This section describes how to:

- Display SMART data
- Display SMART error and self-test logs

Displaying SMART Data

Use the following instructions to display a list of SMART attributes supported by each drive in the system. The CLI displays details for each attribute, including the value, threshold, and status.

For a list of SMART attributes and attribute IDs, see Appendix A. SMART Attributes and Drive Statistics.

1. To display SMART data for a specific drive: **msecli -S -n <device-name>**
2. To display SMART data for all drives: msecli -S

In below figure, the **Temp. Throttle Threshold in C** value is the temperature at which the firmware starts to throttle write performance to keep the drive within the operating temperature range. The **Temp. Shutdown Threshold in C** value is the temperature at which the firmware shuts down I/O traffic to prevent the drive's com- ponents from operating out of the specified range.

Usage: **msecli -S [-i] [-V] [-l <log-type[0 | 1 | 2 | 3 | 6 | 7]>] [-p [-j <json-file>] [-J]] [-t <Self-test type[0 | 1 | 2 | 3 | 4 | 5]>] [-g <gpl-log-address>] [-n <device-name>] [-r] [-s <out-filename>] [-b <bin-file-name>]**

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Fig: SMART Attributes

```
C:\Users\Administrator>msecli -S -n Drive0

Device Name  : Drive0

 ID  Attribute Name               Attribute Data Units

 1   Raw Read Error Rate          0           Errors/Page

 5   Retired NAND Blocks          0           NAND Blocks

 9   Power On Hours Count         13191       Hours

 12  Power Cycle Count            734         Cycles

 170 Reserved block count         0           Blocks

 171 Program Fail Count           0           NAND Page Program Failures

 172 Erase Fail Count             0           NAND Block Erase Failures

 173 Average Block-Erase Count    10          Erases

 174 Unexpected Power Loss Count  562         Unexpected Power Loss events

 180 Unused reserved block count  4118        Blocks

 183 SATA Interface Downshift     2           Downshifts

 184 Error Correction Count       0           Correction Events

 187 Reported Uncorrectable Errors 0          ECC Correction Failures

 188 Command Timeouts             7195        Outstanding Commands Since
                                              Last Reset

 194 Enclosure Temperature        28          Current Temperature (C)

                                  37          Highest Lifetime Temperature (C)

 195 Cumulative Corrected ECC     0           Corrected ECC

 197 Current Pending Sector Count  0           512 Byte Sectors

 198 SMART Off-line Scan           0           Errors

     Uncorrectable Errors

 199 Ultra-DMA CRC Error Count     0           Errors

 202 Percentage Lifetime Used      0           % Lifetime Used

 206 Write Error Rate              0           Program Fails/MB

 210 RAIN Successful Recovery      0           TUs successfully recovered by

     Page Count                                RAIN

 211 Integrity Scan Complete Count 5           Count

 212 Integrity Scan Folding        0           Count

     Completed Count

 246 Cumulative Host Write         12993123475 512 Byte Sectors

     Sector Count

 247 Host Program Page Count       406052262   NAND Page

 248 FTL Program Page Count        33669914    NAND Page


Device Name  : Drive0
SMART attributes are retrieved successfully
CMD_STATUS   : Success
STATUS_CODE  : 0
TIME_STAMP   : Mon Aug 15 21:42:04 2022

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C:\Users\Administrator>
```


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Displaying SMART Logs

Use the following instructions to display available SMART logs. Analyzing these logs helps to identify errors in a drive.

Use the optional **-b <output-binary>** flag to save log data in a binary file.

Note: This feature is not supported by NVMe and SAS drives.

The following SMART logs can be generated:

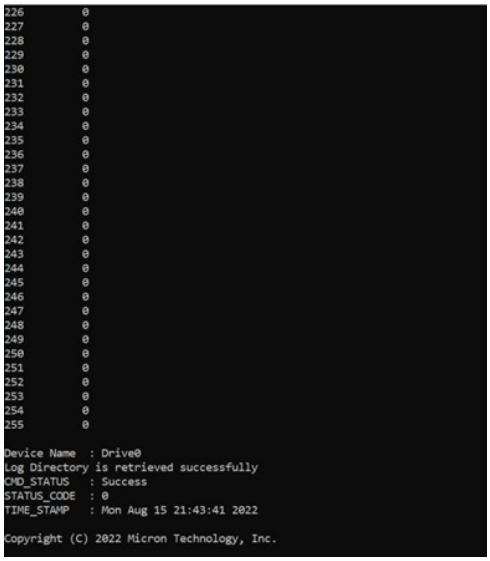
- **SMART error log directory (log type 0):** Displays the number of log pages.
- **SMART summary error log (log type 1):** Displays a summary of SMART log errors.
- **SMART comprehensive error log (log type 2):** Provides logging for 28-bit addressing only. It includes uncorrectable errors, ID Not Found errors for which the LBA request was valid, server errors, and write fault errors. This log does not include errors attributed to the receipt of faulty commands.
- **SMART extended error log (log type 3):** Provides logging for 28-bit and 48-bit entries. It includes uncorrectable errors, ID Not Found errors for which the LBA request was valid, server errors, and write fault errors. This log does not include errors attributed to the receipt of faulty commands.
- **SMART self-test log (log type 6):** Displays the results of the SMART self-test for 28-bit addressing only.
- **Extended SMART self-test log (log type 7):** Displays the results of the SMART self-test for 48-bit and 28- bit addressing.

Usage: **msecli -S [-l <log-type[0 | 1 | 2 | 3 | 6 | 7]>] [-n <device-name>] [-r] [-s <out-file-name>] [- b<output-binary>]**

Displaying a SMART Error Log Directory (SATA)

1. Enter the following at the command prompt: **msecli -S -l 0 -n <device-name>**
2. The SMART error log directory displays.

Fig: SMART Error Log Directory



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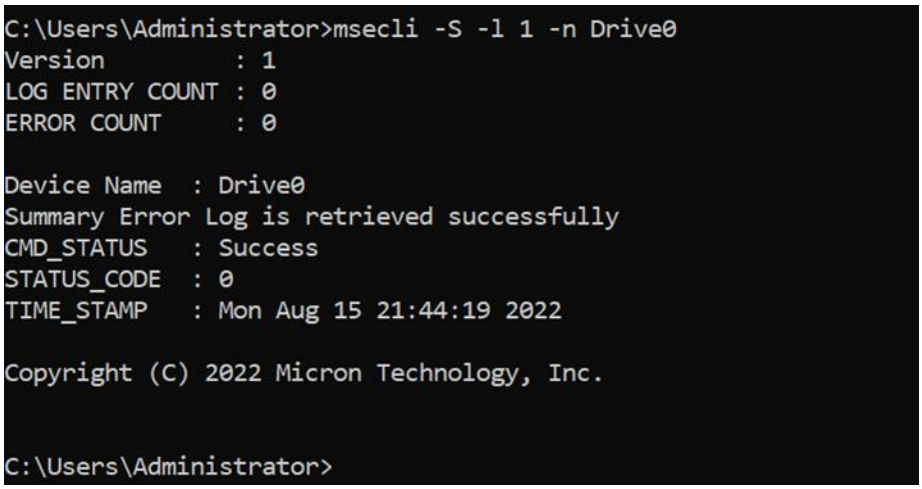
Displaying a SMART Summary Error Log (SATA)

1. Enter the following at the command prompt: **msecli -S -l 1 -n <device-name>**
2. The SMART summary error log displays.

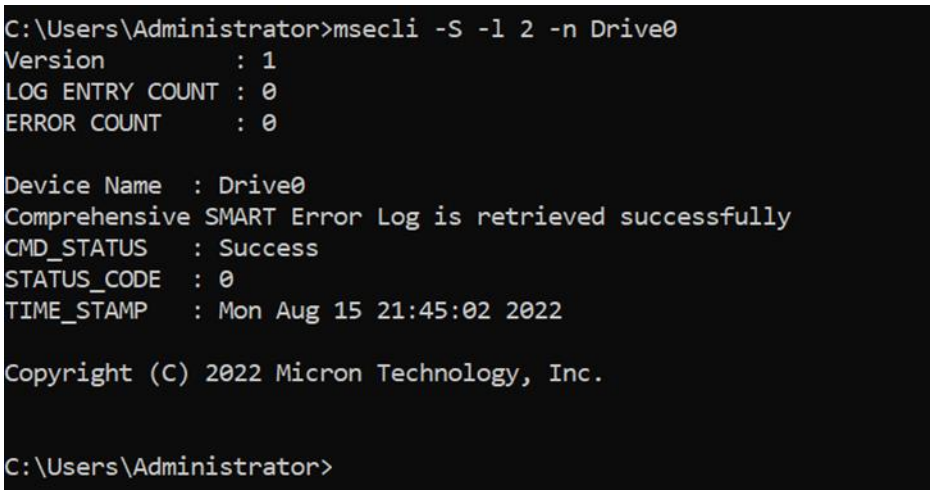
Fig: SMART Summary Error Log



Displaying a SMART Comprehensive Error Log (SATA)

1. Enter the following at the command prompt: **msecli -S -l 2 -n <device-name**
2. The SMART comprehensive error log displays.

Fig: SMART Comprehensive Error Log



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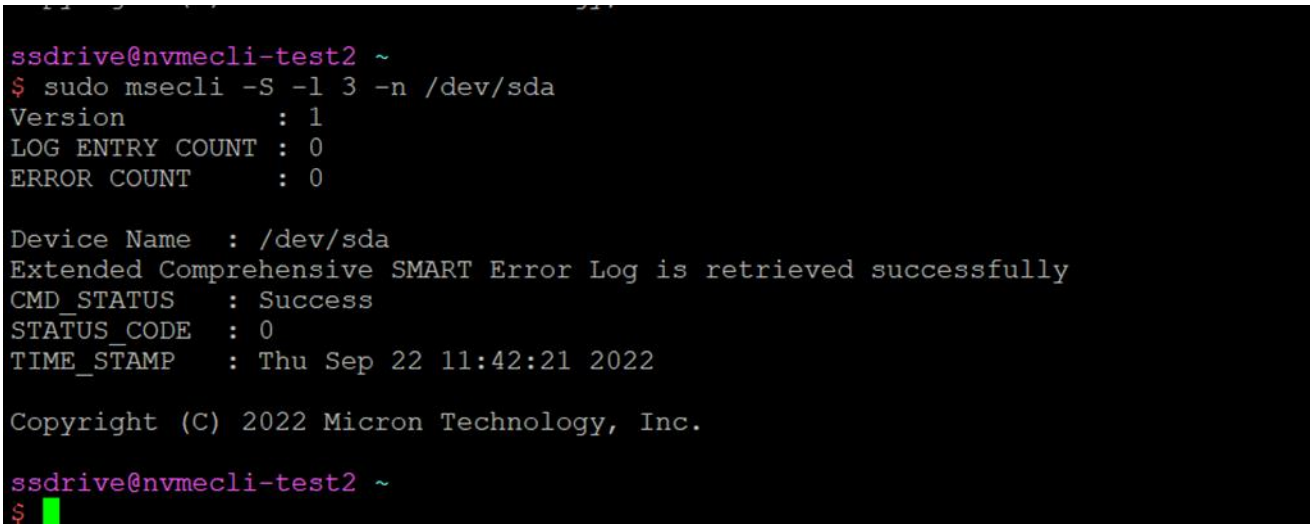
Displaying a SMART Extended Error Log (SATA)

1. Enter the following at the command prompt: **msecli -S -l 3 -n <device-name>**
2. The SMART extended error log displays.

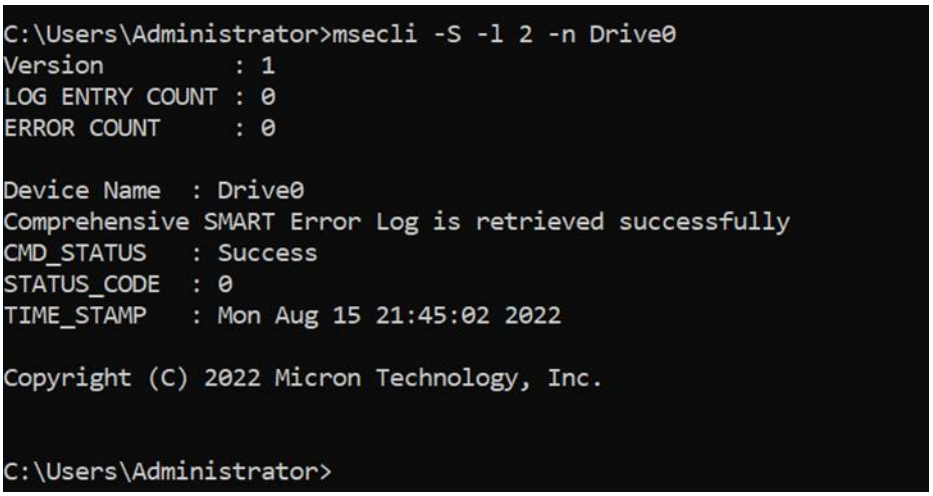
Fig: SMART Extended Error Log



Displaying a SMART Self-Test Log (SATA)

1. Enter the following at the command prompt: **msecli -S -l 6 -n <device-name>**
2. The SMART self-test log displays.

Fig: SMART Self-Test Log



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Displaying a SMART Extended Self-Test Log (SATA)

1. Enter the following at the command prompt: **msecli -S -l 7 -n <device-name>**
2. The SMART extended self-test log displays.

Fig: SMART Extended Self-Test Log

```
C:\Users\Administrator>msecli -S -l 7 -n Drive0
Version         : 1
LOG ENTRY COUNT : 13
FAILING LBA Timestamp (UTC) LBA        Status     CHECKPOINT
0           6774            255        0          48
0           6895            255        0          48
0           6995            255        0          16
0           7086            255        0          48
0           7156            255        0          48
0           7250            255        0          48
0           7277            255        0          48
0           7321            255        0          48
0           7422            255        0          48
0           7486            255        0          48
0           7606            255        0          48
0           7776            255        0          49
0           7937            255        0          48
0           5943            255        0          48
0           6038            255        0          48
0           6084            255        0          16
0           6317            255        0          49
0           6581            255        0          48
0           6609            255        0          48

Device Name   : Drive0
Extended SMART Self-Test Log is retrieved successfully
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Mon Aug 15 21:46:42 2022

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C:\Users\Administrator>
```

Displaying General Purpose Log (GPL) Data

Use the following command to display GPL page data.

Reading log page 0 displays the GPL directory with a count of available pages for each log address. Use the optional **-b <output-binary>** to save the log data in a binary file.

Usage: **msecli -S -g <GPL Log Address> -n <device-name> [-b <output-binary] [-r] [-s <out-filename>]**

1. Enter the following at the command prompt: **msecli -g 0 -n <device-name>**
2. Replace 0 with the desire log and device name with the target device.

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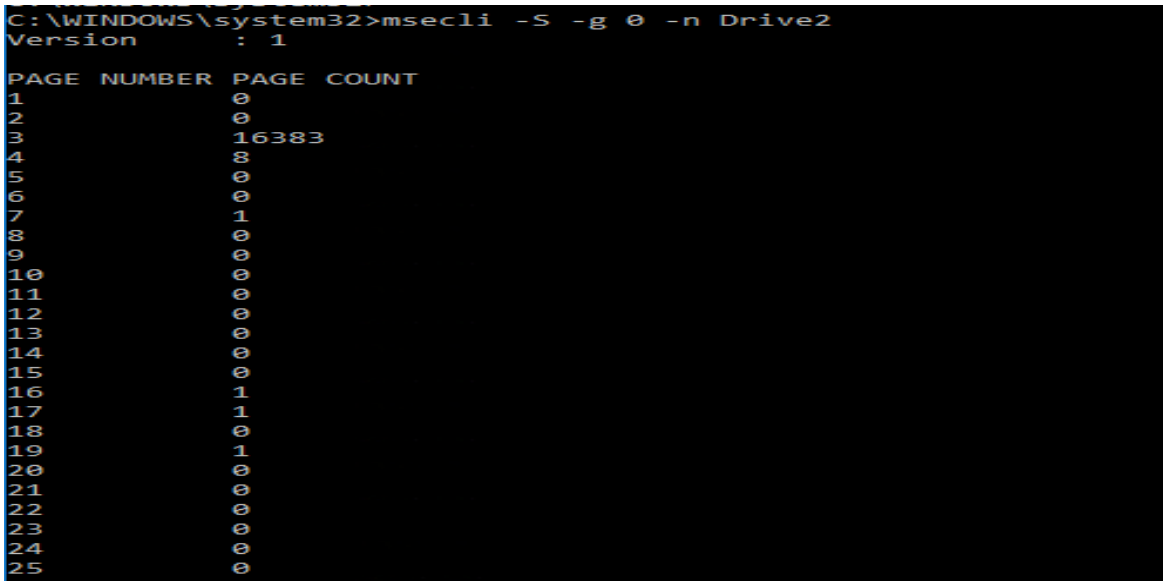
3. For log 0, the GPL directory is displayed. For all others, the raw data is displayed.

Fig: GPL Data



SMART Self Tests (SATA)

Use the following instructions to run SMART self-tests on a specific drive. The supported tests (Short, Extended, Conveyance Self-Test) can be run in either offline or captive mode.

Note: With SAS drives, only Self-Test types 1 and 2 are supported.

Usage: **msecli -S -t <self-test-type> -n <device-name>**

Where self-test type is an integer

- 0 = Short Self-Test offline mode
- 1 = Extended Self-Test offline mode
- 2 = Conveyance Self-Test offline mode
- 3 = Short Self-Test captive mode
- 4 = Extended Self-Test captive mode
- 5= Conveyance Self-test captive mode

1. Enter the following at the command prompt: **msecli -S -t <self-test type> -n <device-name>**
2. Enter Y when prompted.
3. The self-test can take up to an hour depending on the test being run (Extended Self-Test is the longest). A message appears when the test is complete.

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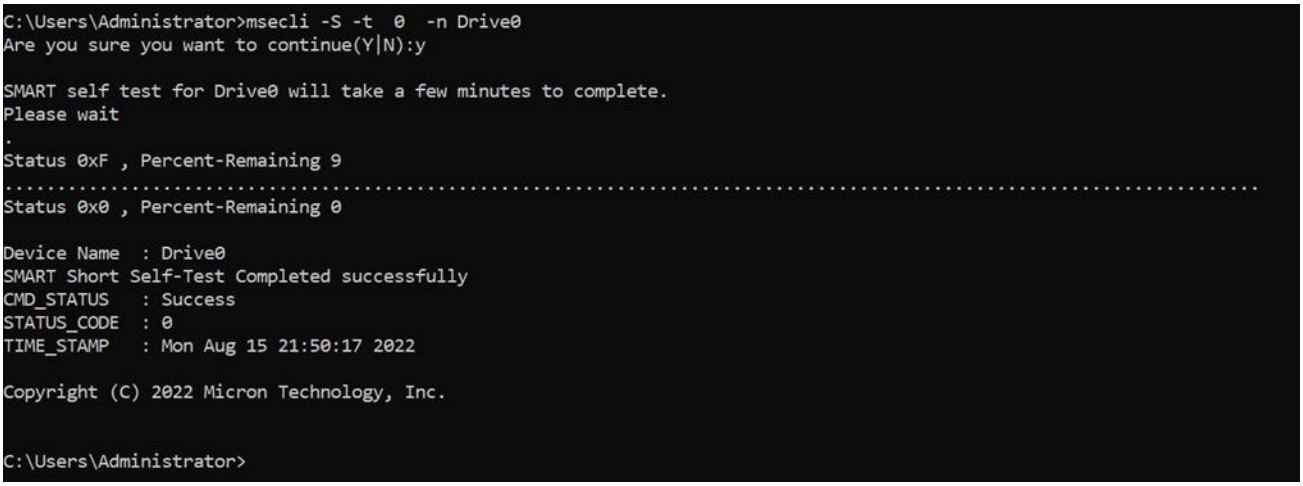
Fig: SMART Self-Test



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Updating Firmware

This section explains how to check for and perform a firmware update on supported drives.

Checking the Firmware Version

Usage: **msecli -F**

1. Enter the following at the command prompt: **msecli -F**
2. The currently installed firmware version displays.

Fig: Firmware Version

```
C:\Users\Administrator>msecli -F
Device Name                FW-Rev
mtinvme03221001120A        E1MP23MS
Drive0                     D1MU030

Firmware version retrieved successfully
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Mon Aug 15 21:50:49 2022

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C:\Users\Administrator>
```

Updating Firmware

Usage: **msecli -U -i <fw-folder-path> -S <firmware-slot> [-m <model-number> | -n <device-name>] [-v] [- j] [-J] [-r] [-s <out-filename>]**

Note: Specify **-m <model-number>** instead of **-n <device-name>** to upgrade the firmware on all drives of the same model type. For NVMe drives, specify the firmware slot using the **-S** sub-option.

1. Enter the following at the command prompt: **msecli -U -i <fw-folder-path> -n <device-name>**. Replace <fw-folder-path> with the firmware folder for the drive.
2. Confirm the operation when prompted.
3. Press Enter to continue.
4. On Windows systems, a message indicates the progress and shows successful when complete. The system will boot into Windows again automatically.
5. On Linux systems, a message appears when the upgrade is successful.

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Fig: Firmware Update Successful

```
C:\Users\Administrator\Desktop\Fleetwood4\56-fleet>msecli -F
Device Name           FW-Rev
Drive0                M3CR043
Drive1                M6CR052

Firmware version retrieved successfully
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Fri Jul 15 19:39:58 2022

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C:\Users\Administrator\Desktop\Fleetwood4\56-fleet>msecli -U -i M6CR056 -n Drive1
This will update the BX504 drive in the system
Are you sure you want to continue(Y|N):Y

Updating firmware on drive Drive1 (Serial No. 2033E4A93701)
.................
Device Name   : Drive1
Firmware Update on Drive1 Succeeded!
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Fri Jul 15 19:40:26 2022

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C:\Users\Administrator\Desktop\Fleetwood4\56-fleet>msecli -F
Device Name           FW-Rev
Drive0                M3CR043
Drive1                M6CR056

Firmware version retrieved successfully
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Fri Jul 15 19:40:35 2022
```

Fig: Firmware Update Successful

```
C:\Users\Administrator\Desktop\Fleetwood4\56-fleet>msecli -F
Device Name           FW-Rev
Drive0                M3CR043
Drive1                M6CR052

Firmware version retrieved successfully
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Fri Jul 15 19:41:50 2022

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C:\Users\Administrator\Desktop\Fleetwood4\56-fleet>msecli -U -i M6CR056 -m BX500
This will update all the BX500 drives in the system
Are you sure you want to continue(Y|N):Y

Updating firmware on drive Drive1 (Serial No. 2033E4A93701)
.................
Device Name   : Drive1
Firmware Update on Drive1 Succeeded!
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Fri Jul 15 19:42:21 2022

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C:\Users\Administrator\Desktop\Fleetwood4\56-fleet>
```


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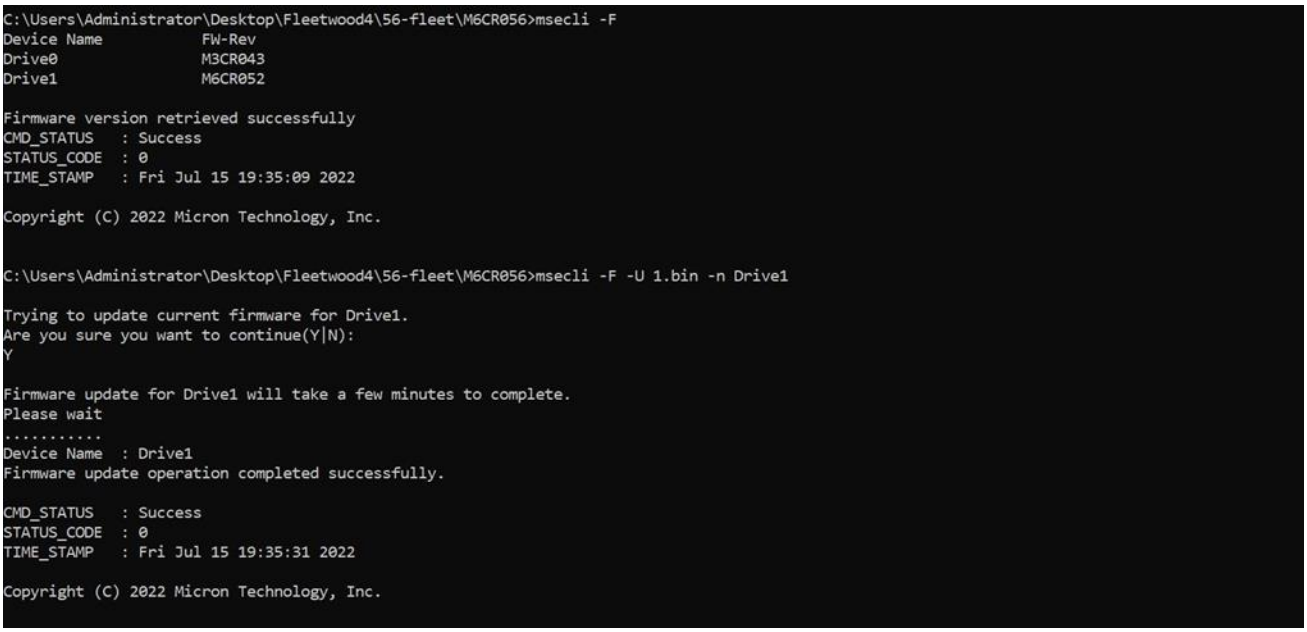
Downloading a Single Firmware Image

This option downloads a raw firmware binary image to the specified Micron drive. The optional **-S <fw-slot>** can be used to specify a firmware slot on an NVMe drive. If -S is not specified for an NVMe drive, the slot will be chosen automatically.

Usage: **msecli -F [-U <fw-image-file> | -S <fw-slot> | -A] [-l] [-m <fw select>] -n <device-name> [-r] [-s <out- filename>]**

1. Enter the command: **msecli -F -U <firmware binary im- age> -n <device-name>**
2. Confirm the operation when prompted.
3. A message indicates the firmware image update is in progress. When finished, a message indicates the operation was successful.

Fig: Firmware Update



Downloading and Activating Later

Usage: **msecli -F -U E1MU23HQ _release.ubi -C 0 -n <Device Name> -S 2** (Command to do a 'Firmware Activate Later' (-C))

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Fig: Download Firmware for Later Use

```
root@ssdrive-desktop:/home/ssdrive/Desktop# sudo ./msecli -F -U allBinary.bin -C 0 -n /dev/nvme0 -S 2

Trying to update current firmware for /dev/nvme0.
Are you sure you want to continue(Y|N):y

Firmware update for /dev/nvme0 will take a few minutes to complete.
Please wait
.
Device Name   : /dev/nvme0
Firmware update operation completed successfully.

CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Wed Aug 17 08:02:13 2022

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root@ssdrive-desktop:/home/ssdrive/Desktop#
```

Selective Image Download (9200 Series Only)

The 9200 series firmware binaries have multiple firmware components that occasionally need to be updated individually. The following command lets you update specific components from the given firmware binary. The valid component options are: ALL, EEP and OOB.

Usage: **msecli -F -U <firmware_binary> -m <component> -n <device-name>**

1. Enter the command in the command prompt: **msecli -F -U <firmware_binary> -m [ALL|EEP|OOB] -n <device-name>**
2. The specified firmware component will be updated.

Fig: Selective Image Download

```
c:\Users\Administrator\Desktop>msecli -F -U allBinary.tar -m ALL -n mtinvme17217879382

Firmware update for mtinvme17217879382 will take a few minutes to complete.
Please wait
.......................
Device Name   : mtinvme17217879382
Firmware update operation completed successfully.
Restart the server for the downloaded microcode to take effect.

CMD_STATUS    : Success
STATUS_CODE   : 0

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c:\Users\Administrator\Desktop>_
```


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Retrieving Debug Data

Debug data from the device and operating system is provided to help debug any potential issues. If using VMware, debug data is saved as a .tar file. Otherwise, debug data is saved as a .zip file.

The optional **-l <debug-level>** flag can be used to specify the level of collected debug data. By default, the All level is selected and both OS and drive data are collected. OS data includes information about the operation system environment in which the drive is running. Drive data collected includes various SMART, GPL and vendor-specific logs.

Valid options for **-l <debug-level>** are: ALL, OS, Telemetry and CTRL.

Usage: **msecli -P <zip file name> -n <device-name> | -b <B:D:F> [-l <debug-level>] [-r] [-s <out-filename>] [-t <pull-size>]**

1. Enter the following in the command prompt: **msecli –P <.zip or .tar file name> -n<device-name>**
2. Replace <.zip or .tar file name> with the debug data file and <device-name> with the drive's device name. If a file path is not specified, the .zip or .tar file is saved to the current directory.
3. A message appears when the operations complete.

Fig: Zip File Created Successfully

```
C:\Windows\System32>msecli -P Debug.zip -n mtinvme2205E603F90F
Not all debug data can be collected using Microsoft NVMe driver.
Use Micron NVMe Driver to gather maximum amount of debug data.
Collecting debug data, DO NOT cancel msinfo32 window as it is collecting OS information.....
Zip file is created on the specified location
Device Name   : mtinvme2205e603f90f
Debug data has been retrieved successfully
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Mon Sep 19 11:33:00 2022

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C:\Windows\System32>
```


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Erasing a Drive

This section explains how to remove all data from a drive by performing a sanitize erase, sanitize crypto scramble, PSID revert, or secure erase operation.

Performing a Sanitize Drive (Block Erase) Operation

The sanitize drive (block erase) operation is supported on all drives except for encrypted drives (those with TCG-enabled/password-protected). These drives must use the PSID revert operation to remove data. See Performing a PSID Revert.

This operation:

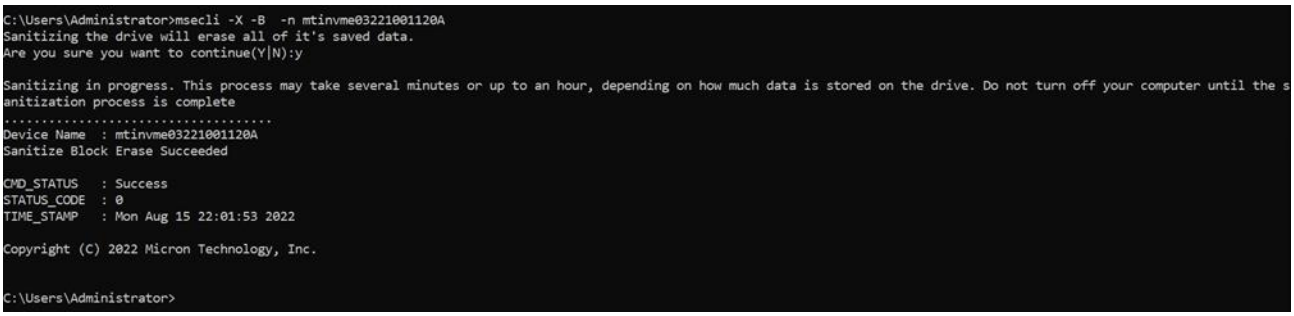
- Cannot be performed on mounted drives. Unmount the drive before proceeding.
- Cannot be performed on Windows systems in which the system partition is encrypted with Bit locker.
- Will not complete on systems in IDE mode. Change to AHCI mode and then proceed with the operation.
- Cannot be performed on drives connected behind a RAID controller.

CAUTION: This operation completely removes all data from a drive. If possible, back up important data before performing the operation.

Usage: **msecli -X -B -n <device-name> [-r] [-s <out-filename>]**

1. Enter the following at the command prompt: **msecli -X -B -n <device-name>**
2. Confirm the operation when prompted.
3. Press Enter to continue.
4. A message indicates the operation is in progress. When finished, a message indicates the operation was successful.

Fig: Sanitize Drive Successful



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Performing a Sanitize Crypto Scramble Operation

This operation is not supported on encrypted drives (those with TCG-enabled/pass- word-protected) and the BX100, BX200 and P400m drives. Encrypted drives must use the PSID revert operation to remove data. BX100, BX200 and P400m drives must use the Sanitize Block Erase operation to remove data.

This operation:

- Cannot be performed on mounted drives. Unmount the drive before proceeding.
- Cannot be performed on Windows systems in which the system partition is encrypted with Bit locker.
- Will not complete on systems in IDE mode. Change to AHCI mode and then proceed with the operation.
- Cannot be performed on drives connected behind a RAID controller.

CAUTION: This operation completely removes all data from the drive. If possible, back up important data before performing the operation.

Usage: **msecli -X -S -n <device-name> [-r] [-s <out-filename>]**

1. Enter the following at the command prompt: **msecli -X -S -n <device-name>**
2. Confirm the operation when prompted.
3. Press Enter to continue.
4. A message indicates the operation is in progress. Another appears when the operation is successful.

Fig: Sanitize Crypto Scramble Successful

```
C:\Users\Administrator>msecli -X -S  -n mtinvme03221001120A
Performing crypto scramble operation will render all user data unreadable.
Are you sure you want to continue(Y|N):y

Crypto scramble is in progress. This process will take a few moments.
..........
Device Name  : mtinvme03221001120A
Crypto Scramble operation completed successfully.

CMD_STATUS   : Success
STATUS_CODE  : 0
TIME_STAMP   : Mon Aug 15 22:02:32 2022

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C:\Users\Administrator>
```

Performing a PSID Revert

This operation is supported on encrypted drives only.
The PSID revert operation removes all data from an encrypted drive (one with TCG enabled/password-protected). It can also be used if you have an encrypted drive for which you have lost the authentication code to return the drive to its factory default state.

TCG is automatically enabled on drives that are initialized in systems running Windows 8 or later, or it can be enabled with third-party software utilities. For more in- formation on TCG, refer to http://www.trustedcomputinggroup.org/.

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This operation cannot be performed on mounted drives. Unmount the drive before proceeding.

Usage: **msecli -X -P -p <PSID-value> -n <device-name> [-r] [-s <output-filename>]**

1. Enter the following at the command prompt: **msecli -X -P -p <PSID-value> -n <device-name>**
2. Replace <PSID-value> with the drive's PSID value. This value can be found on the drive's front label.
3. Confirm the operation when prompted.
4. Press Enter to continue.
5. A message indicates the operation was successful.

Fig: PSID Revert Successful Performing a Secure Erase (SATA)

```
C:\Users\Administrator>msecli -X -P -p CAB23E3E5B845AD64C358F339B47950A -n mtinvme03221001120A
PSID Revert will permanently erase ALL user data! Please backup all data from the drive before proceeding!
Are you sure you want to continue(Y|N):y
PSID Revert will take a few seconds to complete.
...
Device Name  : mtinvme03221001120a
PSID Revert completed successfully
CMD_STATUS   : Success
STATUS_CODE  : 0
TIME_STAMP   : Mon Aug 15 22:04:21 2022

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C:\Users\Administrator>
```

Performing a Secure Erase (SATA)

CAUTION: This operation completely removes all data from a drive. If possible, back up important data before performing the operation.

This operation cannot be performed on mounted drives. Unmount the drive before proceeding.
This command is not supported by drives in a security frozen state. For drives in this state, use the Sanitize Drive operation to remove user data.

Usage: **msecli -X -p <password> -n <device-name> [-r] [-s <output-filename>]**

1. Enter the following at the command prompt: **msecli -X -p <password> -n <device- name>**
2. Replace <password> with ffff and <device-name> with the drive's name.
3. Confirm the operation when prompted.
4. Press Enter to continue.
5. A message indicates the operation is in progress. When finished, a message indicates the operation was successful.

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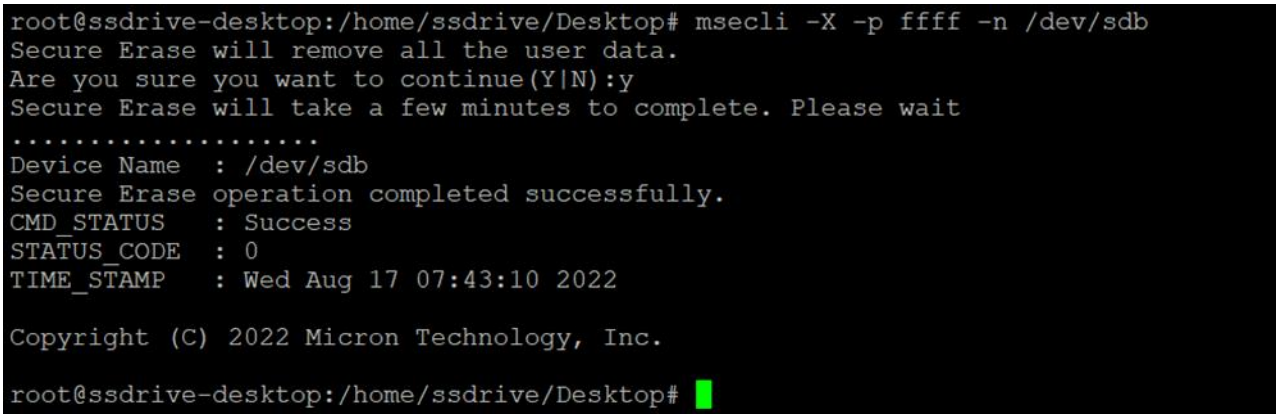
Fig: Secure Erase Successful



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Running the STANDBY IMMEDIATE Command (SATA)

This command places the specified drive-in standby mode. This is useful when preparing a drive for removal from a system or prior to shut down. The drive will remain capable of processing commands, but performance may be slower than if the drive were in an idle state.

Usage: **msecli -C [-i [-a <namespace id>] | -b | -f <feature-code> -c <sector-count> -l <lba>] -n <device-name> [- r] [-s <out-filename>]**

1. Enter the command prompt: **msecli -C -b -n <device-name>**
2. Replace <device-name> with the drive's name.
3. Enter Y when the warning message appears.
4. A message indicates the operation was successful.

Fig: STANDBY IMMEDIATE Command

```
C:\Users\Administrator>msecli -C -b -n drive0
Warning: The STANDBY IMMEDIATE command causes the device to enter the Standby mode.
In Standby mode the device is capable of processing commands but the device may take longer time to complete commands than in the Idle mode.
Are you sure you want to continue(Y|N):y

Device Name  : Drive0
StandByImmediate command completed successfully
CMD_STATUS   : Success
STATUS_CODE  : 0
TIME_STAMP   : Mon Aug 15 22:05:28 2022

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C:\Users\Administrator>
```


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Fixed capacity configuration Management

To set the capacity config ID for Fixed capacity configuration use below command. Supported for 4150 Drive.

Usage: **msecli -M -I <Capacity Config ID> -n <dev-name>**

Pull and parse PCIE Eyechart info from the nvme drives

To trigger and parse(-c) PCIe Eye chart sample run use below command. Supported only for Raptor, Raven, and Condor Drives.

Usage: **msecli -M -E [-c] [-J] -s <filename>**

PLN Feature

Enable/Disable PLN Feature

To enable/disable PLN feature (for 2400 device only) use below command.

Usage: **msecli -M -K <value> -n <device-name>**

Use value:

- 0 - To disable PLN.
- 1 - To enable PLN.

Save PLN feature across Power cycle

To save the PLN feature across Power cycle, use the below command. Applicable for 2400 device only.

Usage: **msecli -M -K <value> -X -n <device-name>**

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Configuring Drive Over-Provisioning

Over-provisioning reduces the accessible capacity of a drive while allocating more capacity for performing background tasks. The CLI provides two methods of changing over-provisioning capacity: specify the max number of LBAs or set desired drive capacity in GB (whole GB only).

Warning: Over-provisioning erases all data on the drive. Back up all required data before performing this operation.

Supported Drives
NVMe: 7400, 7450, 9300, 9400, 7300, 2100, 7500 (only if drive supports namespace management)
SATA: 5200, 5300, 5400

Usage: **msecli -M [-k <value> | -l <state-value> | -u <value> | -i <value> | -w <state-value> | -p <state-value> | -P <state- value> | -o <Max Address> | -O <size in GB>] -n <de- vice-name> [-r] [-s <out-filename>]**

1. Enter the following at the command prompt to set the maximum number of LBAs: **msecli –M –o <Max Address> -n <device-name>.** If specifying max address, replace <Max Address> with the new max addressable LBA, not to exceed the default for the drive.
2. The default max LBA can be determined using the command: **msecli -L -d -n <device name>** Or enter the following at the command prompt to set desired drive capacity in GB: **msecli -M -O <Capacity in GB> -n <device-name>**
3. Enter Y to proceed with the operation.
4. A message indicates the operation was successful.
5. Power cycle the system for the settings to take effect.

Fig: Changing Over-Provisioning Capacity via Max Address

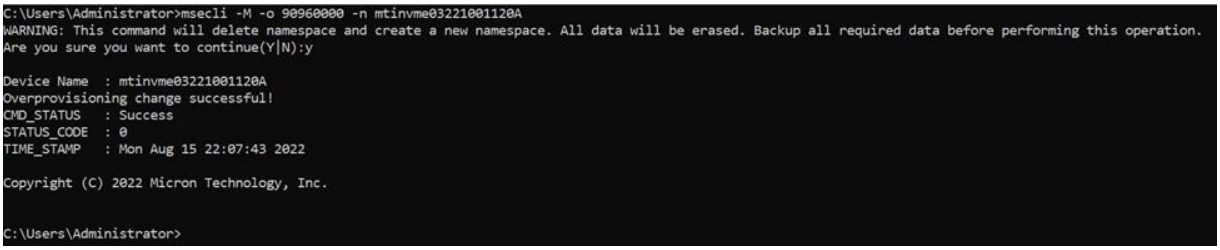
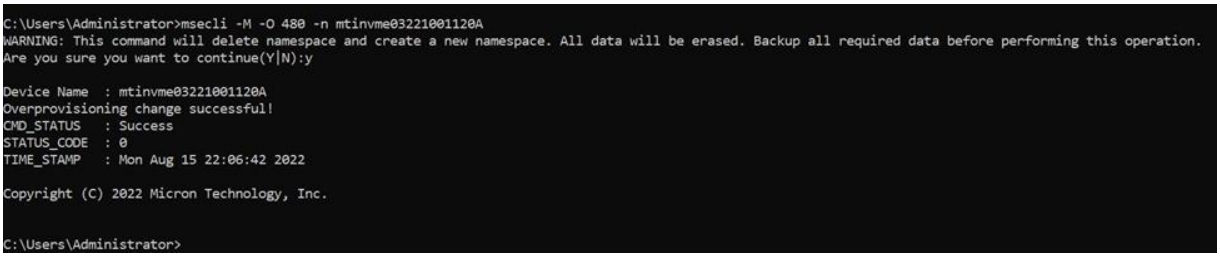


Fig: Changing Over-Provisioning via Drive Capacity



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Managing Drive Physical Capacity

This section describes how to manage the physical capacity of a 2100AI or 2100AT drive. Physical capacity management (PCM) is also known as SLC namespaces or enhanced partitions.

Usage: **msecli -M [-k <value> | -l <state-value> | -u <value> | -i <value> | -w <state-value> | -p <state-value>| -P <state- value> | -b <% of TLC as SLC> | -L | -o <Max Address> | -O <size in GB>] -n <device-name> [-r] [-s <out filename>]**

***-b** <% of TLC as SLC>*

Sub option of '-M'. Sets percentage of TLC as SLC on 2100AI and 2100AT. Valid inputs are 10, 20, 30, 40, 50, 100.

***-L** Sub option of '-M'*

Sets lock for physical configuration command on 2100AI and 2100AT.

Fig: Allocating SLC Namespace Capacity (30% of Total Capacity)

```
C:\Users\Administrator\Desktop>msecli -M -b 30 -n mtinvme194524F3C2F2

Device Name  : mtinvme194524F3C2F2

Successfully created SLC physical capacity!

CMD_STATUS   : Success
STATUS_CODE  : 0
TIME_STAMP   : Wed Aug 17 21:57:57 2022

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C:\Users\Administrator\Desktop>
```


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Configuring Interrupt Coalescing (NVMe Drives Only)

Interrupt coalescing is the process of taking successive command completion events and coalescing them into a single interrupt. When a high queue depth is used on an NVMe drive, this coalescing leads to fewer system interrupts, lower CPU utilization, and higher IOPS. For lower queue depth I/O activity, coalescing can increase latency.
Changing this value increases or decreases the internal timeout length, enabling I/Os to be completed with a single interrupt.

For NVMe drives, valid data values must be in the following hexadecimal format:
Bits 15:8 - Aggregation Time
Bits 7:0 - Aggregation Threshold

Usage: **msecli -M [-k <value> | -l <state-value> | -u <value> | -i <value> | -w <state-value> | | -p <state-value> | -P <state-value> | -o <Max Address> | -O <size in GB>] -n <de- vice-name> [-r] [-s <out-filename>]**

1. Enter the following at the command prompt: **msecli –M –i <coalescing value> -n <device-name>**
2. Replace <coalescing value> with the new interrupt coalescing value and <device- name> with the name of the drive.
3. Confirm the operation when prompted.
4. Press Enter to continue.
5. A message indicates the operation was successful.

Fig: Interrupt Coalescing Value Changed Successfully

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Preparing to Remove a Drive (NVMe Drives Only)

This section describes how to prepare an NVMe drive to be safely removed from a system.

During the removal process, any cached data is automatically flushed to the drive and the driver unregisters the drive from the kernel. The drive can then be safely removed from the system. Users do not have permission to read, write, or monitor the drive after it is logically removed from system.

Note: Because of kernel limitations, these instructions are supported on RHEL 6.x, SLES, and Windows platforms only. The instructions are not supported on RHEL 5.x platforms.

CAUTION: Do not perform a remove command when an I/O operation is in progress. Doing so will cause the remaining I/O to fail without any indication.

This operation cannot be performed on mounted drives. Unmount the drive before proceeding.

Usage: **msecli -Z -n <drive-id> [-r] [-s <out-filename>]**

1. Enter the following at the command prompt: **msecli -Z -n <device-name>**
2. Replace <device-name> with the name of the drive.
3. A message indicates the drive was shut down successfully and has been prepared for removal. The drive can now be physically removed from the system.

Fig: Drive Shut Down Successfully

```
C:\Users\Administrator\Desktop>msecli -Z -n mtinvme190720DC5B18
Ensure that there are no I/O operations on the drive before proceeding with removing the drive(Y/N):y

Device Name   : mtinvme190720DC5B18
Prepare To Remove drive operation succeeded
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Wed Aug 17 22:07:45 2022

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C:\Users\Administrator\Desktop>
```


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Namespace Management (NVMe Drives Only)

This section explains the options for managing the namespace on an NVMe drive.

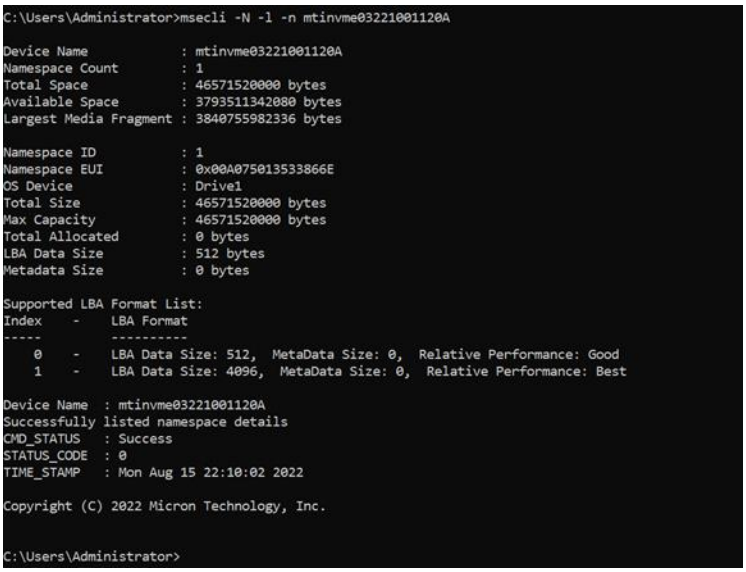
Displaying Namespace Details

The following option displays details about the namespace on an NVMe drive, including the Namespace ID which is used for namespace-specific operations.

Usage: **msecli -N [-l | [[-c -b <namespace size> | -a <lba index> | -o | -v | -u| -i] | - d <namespace ID>] -e <ieee EUI> -y] | -q <% of TLC as SLC> | [-f <namespace ID> -m <metadata size> -g <lba data size> | -j <secure erase> | -i | -t] | [-S namespace ID> -H <Selftest Type>] -n <NVME device-name>**

1. Enter the following command at the command prompt: **msecli -N -l -n <device-name>**
2. Namespace details for the specified NVMe drive appear.

Fig: Display Namespace Details Command



Displaying LBA Formats for a Namespace

NVMe namespaces can support several different LBA formats (512 bytes vs. 4096 byte). The following command displays the supported LBA formats for a given namespace.

Usage: **msecli -N [-l | [[-c -b <namespace size> | -a <lba index> | -o | -v | -u| -i] | - d <namespace ID>] -e <ieee EUI> -y] |-q <% of TLC as SLC> | [-f <namespace ID> -m <metadata size> -g <lba data size> | -j <secure erase> | -i | -t] | [-S <namespace ID> -H <Selftest Type>] -n <NVME device-name>**

1. Enter the following at the command prompt: **msecli -N -f <namespace-ID> -n <device-name>**

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2. LBA formats for the specified namespace appear.

Fig: Display LBA Formats for a Namespace

```
C:\Users\Administrator>msecli -N -f 1 -n mtinvme03221001120A

This device only supports the following LBA/Metadata pairs:

LBA Data Size: 512,  MetaData Size: 0
LBA Data Size: 4096,  MetaData Size: 0

Device Name   : mtinvme03221001120A
Successfully listed supported namespace formats
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Mon Aug 15 22:10:48 2022

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C:\Users\Administrator>
```

Changing LBA Format on a Namespace

The following command changes the LBA format of a specified namespace. This can be used to change the LBA or metadata size of the namespace.

WARNING: This command causes all data on the namespace to be erased. Backup any data before proceeding. If you want to perform a secure erase as part of the format, see the Secure Erase Namespace section below.

Make sure to offline/unmount the name- space OS device before attempting this operation.

Usage: **msecli -N [-l | [[-c -b <namespace size> | -a <lba index> | -o | -v | -u| -i] | -d <namespace ID>] -e <ieee EUI> -y] | -q <% of TLC as SLC> | [-f <namespace ID> -m <metadata size> -g <lba data size> | -j <secure erase> | -i | -t] | [-S <namespace ID> -H <Selftest Type>] -n <NVME device-name>**

1. Enter the following at the command prompt: **msecli -N -f <namespace-ID> -m<metadata size> -g <LBA size> -n <device-name>**
2. When prompted, enter Y to proceed with the format.
3. The operation begins and may take up to a few minutes to complete.
4. After the operation completes, the namespace format is changed.

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Fig: Changing LBA Formats on a Namespace

```
C:\Users\Administrator>msecli -N -f 1 -m 0 -g 4096 -n mtinvme03221001120A
Formatting the namespace will erase all data stored on that namespace.
Are you sure you want to continue(Y|N):y
Formatting the namespace may take a while to complete.
..
Device Name   : mtinvme03221001120A
Successfully formatted namespace
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Mon Aug 15 22:11:35 2022

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C:\Users\Administrator>
```

Create SLC/TLC Namespace

This section describes how to create an SLC/TLC namespace on a 2100AI or 2100AT drive.

Usage: **msecli -N -c -y -n <device-name>**

***-y** Optional sub option of -c*

This option creates a namespace command to specify SLC mode instead of the default TLC mode for 2100AI/AT drives.

***-q** <% of TLC as SLC>*

Sub option of -N. This option is used to perform multiple operations, including NVME format, detach NS, delete NS, PCM (Physical Capacity Management), PCM Lock, Create SLC NS, Attach SLC NS.

Allocate and create SLC namespace using the following namespace management command (50% of total capacity).

Fig: SLC Namespace Command

```
C:\Users\Administrator\Desktop>msecli -N -q 50 -n mtinvme194524F3C2F2
Creating SLC namespaces will erase all data stored on the namespaces.
Are you sure you want to continue(Y|N):y
.
Device Name   : mtinvme194524F3C2F2
Successfully created namespace. Please reboot or restart driver for new namespace to become available.
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Wed Aug 17 21:59:31 2022

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C:\Users\Administrator\Desktop>
```


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Fig: Creating SLC Namespace in Already Allocated SLC Space

```
C:\Users\Administrator\Desktop>msecli -N -c -y -n mtinvme194524F3C2F2

Device Name   : mtinvme194524F3C2F2
Successfully created namespace. Please reboot or restart driver for new namespace to become available.
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Wed Aug 17 22:00:48 2022

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C:\Users\Administrator\Desktop>
```

Secure Erase Namespace

The section above covers changing the LBA format on a given namespace, which causes user data to be erased. This same command can be used to perform a secure erase or cryptographic erase (where supported) on the namespace. You do not need to change LBA format to perform a secure erase, simply set the metadata and LBA size to the current settings.

WARNING: A secure erase operation removes all user data on the namespace. Backup data before proceeding. Make sure to offline/unmount the namespace OS device before attempting this operation.

Usage: **msecli -N -f <namespace-ID> -m <metadata size> -g <LBA size> -j [1 (Secure Erase) | 2 (Cryptographic Erase)] -n <device-name>**

1. Enter the following at the command prompt: **msecli -N -f <namespace-ID> -m <metadata size> -g <LBA size> -j[1 | 2] -n <device-name>**
2. When prompted, enter Y to proceed with the secure erase operation.
3. The operation begins and may take up to a few minutes to complete.

Fig: Secure Erase Namespace

```
C:\Users\Administrator>msecli -N -f 1 -m 0 -g 4096 -n mtinvme03221001120A -j 1
Formatting the namespace will erase all data stored on that namespace.
Are you sure you want to continue(Y|N):y
Formatting the namespace may take a while to complete.
..
Device Name   : mtinvme03221001120A
Successfully formatted namespace
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Mon Aug 15 22:13:08 2022

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C:\Users\Administrator>
```


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Create Namespace using specified Endurance Group ID for Nvme Drives

Usage: **msecli -N -c -b <block-size> -z <Endurance Group ID> -n Drive**

Fig: Namespace Creation Using Endurance Group ID

```
root@SSDHSWRWB1803:/home/ssdrive# msecli -N -c -b 4096000 -z 0x10 -n /dev/nvme0

Device Name  : /dev/nvme0
Successfully created namespace. Please reboot or restart driver for new namespace to become available.
CMD_STATUS   : Success
STATUS_CODE  : 0
TIME_STAMP   : Mon Sep 25 19:28:56 2023

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root@SSDHSWRWB1803:/home/ssdrive#
```


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SMART Self-test (NVMe Drives only)

This section explains how to perform SMART self-tests on NVMe Controller/selected Namespace/All Namespaces.

Usage: **msecli -N -S<namespace-ID> -H <test Type> -n <device-name>**

Namespace ID to run self-test as follows:
0x0 - Run Self-test only on controller
0x1 - 0xFFFFFFFE - Run Self-test on a specified Namespace
0xFFFFFFFF - Run Self-test on all active Namespaces

There are three different types of Self tests are supported, and they can be specified as mentioned below:
Self-test type 0 - Short Self-Test
Self-test type 1 - Extended Self-Test
Self-test type 6 - Vendor Specific Test

Fig: Drive Self-test

```
C:\Windows\System32>msecli -N -S 0 -H 0 -n mtinvme2205E603F90F
Are you sure you want to continue(Y|N):y

Short self test for mtinvme2205E603F90F will take a few minutes to complete.
To abort the test at any time hit q and Enter key.Please wait
Percent Complete: 100%


Device Name   : mtinvme2205e603f90f
Short Self-Test Completed successfully
CMD_STATUS    : Success
STATUS_CODE   : 0
TIME_STAMP    : Mon Sep 19 11:36:52 2022

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C:\Windows\System32>
```


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Dataset Management (NVMe Drives Only)

The Dataset Management command is used by the host to deallocate or trim a section of data. Deallocating or trimming unnecessary data helps in increasing the write throughput of the drive. It also helps in decreasing write amplification through efficient garbage collection from increased free space of the drive.

Deallocating or Trimming Unnecessary Data

The following option executes a dataset management command for de-allocating unused blocks that may be used to optimize performance and reliability. The input configuration file contains the LBA ranges to be de-allocated on an NVMe drive.

Usage: **msecli -X -D < config-file > -n <device-name>**

1. Enter the following at the command prompt: **msecli -X -D < config-file > -n <device-name>**
2. Press Enter to continue.
3. A message indicates the operation was successful.

Example of a typical config-file:

<start>
use '#' to add comment
StartLBA:LBACount
A maximum of 256 ranges allowed
Range1 0x123:0x10
Range2 0x456:0x1234
Range3 0xFFFFF:0x12345
<end>

Fig: Deallocating Command Successful

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Boot Partitions (NVMe Drives Only)

Boot Partitions provide an optional area of NVM storage that may be read without the host initializing queues or enabling the controller. The simplified interface to access Boot Partitions may be used for platform initialization code (e.g., a bootloader that is executed from host ROM) to boot to a pre-OS environment (e.g., UEFI) instead of storing the image on another storage medium (e.g., SPI flash).
An NVMe controller that supports Boot Partitions has two Boot Partitions of equal size using Boot Partition identifiers 0 and 1.

Boot Partition Loading and Activation

The following option updates the boot partition on an NVMe drive.

Usage: **msecli -F -B <boot-img-file> -S <bp-slot> -n <device-name>**

1. Enter the following at the command prompt: **msecli -F -B <boot-img-file> -S <bp-slot> -n <device-name>**
2. Replace < boot-img-file > with a bootable binary image file name, <bp-slot> with 0 or, 1 and <device-name> with the name of the drive.
3. Confirm the operation when prompted.
4. Press Enter to continue.
5. A message indicates that the boot image update is in progress. When finished, a message indicates the operation was successful.

Fig: Boot Partition Update Successful

```
[root@localhost mse]# ./msecli -F -B ./testA.bin -S 0 -n /dev/nvme1

Trying to update boot partition image for /dev/nvme1.
Are you sure you want to continue(Y|N):y

Boot Partition update for /dev/nvme1 will take a few minutes to complete.
Please wait
.............................
Device Name   : /dev/nvme1
Boot image update operation completed successfully.

CMD_STATUS    : Success
STATUS_CODE   : 0

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[root@localhost mse]#
```


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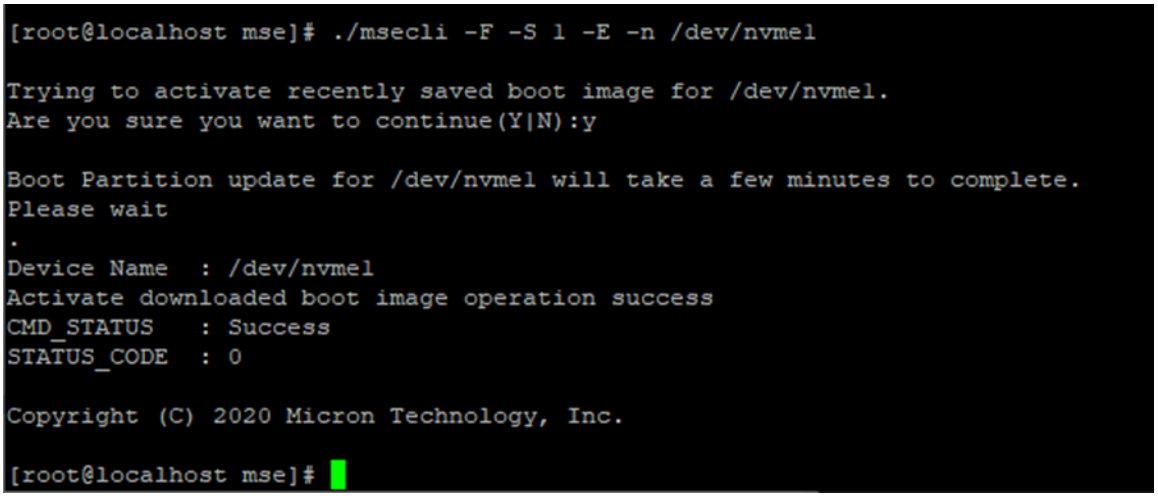
Boot Partition Activation:

The following option activates a boot partition between two existing boot partitions 0 and 1 on an NVMe drive.

Usage: **msecli -F -S <bp-slot> -E -n <device-name>**

1. Enter the following at the command prompt: **msecli -F -S <bp-slot> -E -n <device-name>**
2. Replace <bp-slot> with 0 or, 1 and <device-name> with the name of the drive.
3. Confirm the operation when prompted.
4. Press Enter to continue.
5. A message indicates the operation was successful.

Fig: Boot Partition Activation Successful



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Manage RPMB feature of a drive

The Replay Protected Memory Block (RPMB) provides a means for the system to store data to a specific memory area in an authenticated and replay protected manner. This is provided by first programming authentication key information to the controller that is used as a shared secret.

Authentication key programming

This command can be used to program the Authentication Key for the selected RPMB target.
CAUTION: This action is irreversible.

Usage: **msecli -M -R -t <RPMB-target> -k <key> -n <device-name>**

1. Enter the following at the command prompt: msecli -M -R -t <RPMB-target> -k <key> -n <device-name>
2. Confirm the operation when prompted.
3. Press Enter to continue.
4. A message indicates the operation was successful.

Fig: Programming Authentication Key

```
C:\Windows\system32>msecli -M -R -t 0 -k AAAABBBBCCCCDDDDEEEEFFFFGGGGHHHH -n mtinvmeAA000000000000000019
This operation is ir-reversable.
Are you sure you want to continue(Y|N):y
Authentication Key program Successful.

Device Name   : mtinvmeAA000000000000000019
CMD_STATUS    : Success
STATUS_CODE   : 0

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C:\Windows\system32>
```

Authenticated Data Write

This command can be used to securely write data to RPMB target.
CAUTION: this action is irreversible.

Usage: **msecli -M -R -t <RPMB-target> -d WRITE -a <RPMB-address> -f <input-file> -n <device-name> -k<key>**

1. Enter the following at the command prompt: **msecli -M -R -t <RPMB-target> -d WRITE -a <RPMB- address> -f<input-file> -n <device-name> -k <key>**
2. Press Enter to continue.
3. A message indicates the operation was successful

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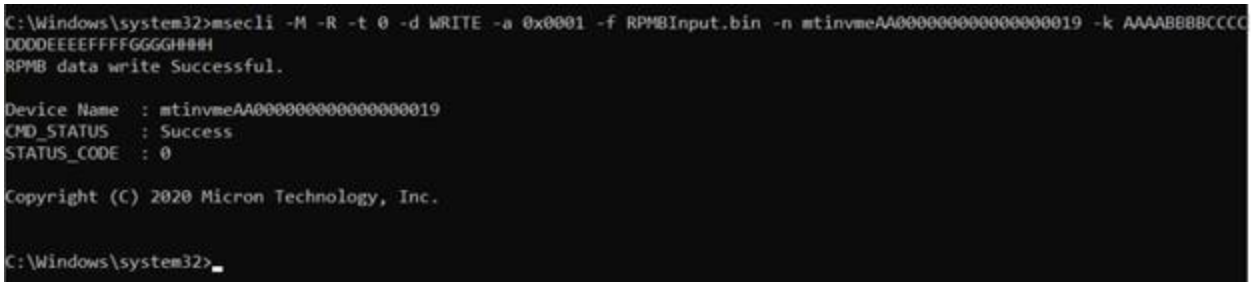
Fig: Writing Authenticated Data to RPMB



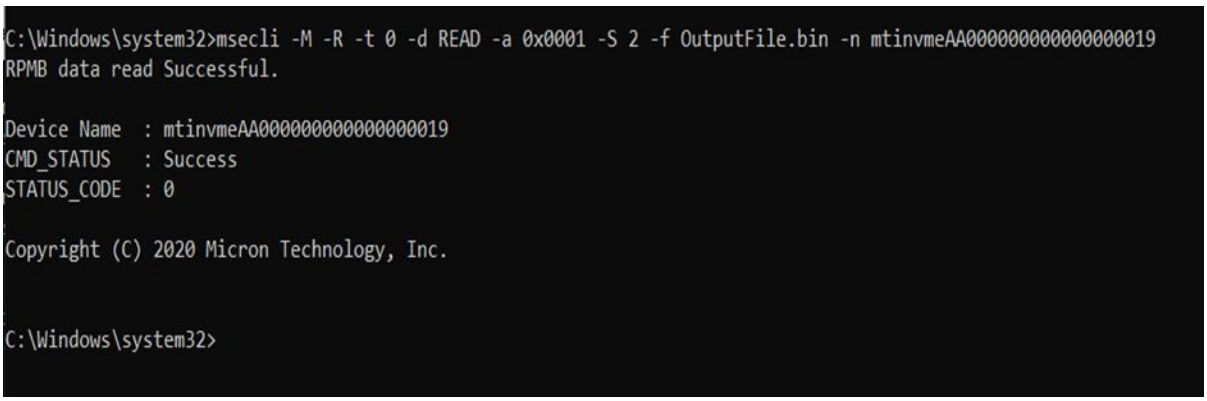
Authenticated Data Read

This command can be used to read data from the RPMB target.

Usage: **msecli -M -R -t <RPMB-target> -d READ -a <RPMB-address> -S <sector-count> -f <input-file> - n<device- name> -k <key>**

1. Enter the following at the command prompt: **msecli -M -R -t <RPMB-target> -d READ -a <RPMB- address> -S<sector-count> -f <input-file> -n <device-name> -k <key>**
2. Press Enter to continue.
3. A message indicates the operation was successful.

Fig: Reading Authenticated Data from RPMB



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Managing Boot Partitions

Enable Boot Partition Protection

Usage: **msecli -M -R -P <device-name> -k <key>**

1. Enter the following at the command prompt: **msecli -M -R -P -n <device-name> -k <key>**
2. Confirm the operation when prompted.
3. Press Enter to continue.
4. A message indicates the operation was successful.

Fig: Enabling Boot Partition Protecting

```
C:\Windows\system32>msecli -M -R -P -n mtinvmeAA000000000000000019 -k AAAABBBBCCCCDDDDEEEEFFFFGGGGHHHH
This operation is ir-reversable.
Are you sure you want to continue(Y|N):y
Boot Partition Protection has been Enabled.

Device Name  : mtinvmeAA000000000000000019
CMD_STATUS   : Success
STATUS_CODE  : 0

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C:\Windows\system32>
```


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Lock/Unlock Boot Partition

This command can be used to lock or unlock a specified boot partition.

Usage: **msecli -M -R -b <boot-partition-id> -l <lock-unlock> <device-name> -k <key> <lock- unlock>** specify 0 for Unlock, 1 for Lock.

1. Enter the following at the command prompt: **msecli -M -R -b <boot- partition-id> -l <lock-unlock> <device-name> -k <key>**
2. Press Enter to continue.
3. A message indicates the operation was successful.

Fig: Locking/Unlocking of Boot Partition

```
C:\Windows\system32>msecli -M -R -b 0 -l 1 -n mtinvmeAA000000000000000019 -k AAAABBBBCCCCDDDDEEEEFFFFGGGGHHHH
Boot Partition operation successful.

Device Name   : mtinvmeAA000000000000000019
CMD_STATUS    : Success
STATUS_CODE   : 0

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C:\Windows\system32>
```


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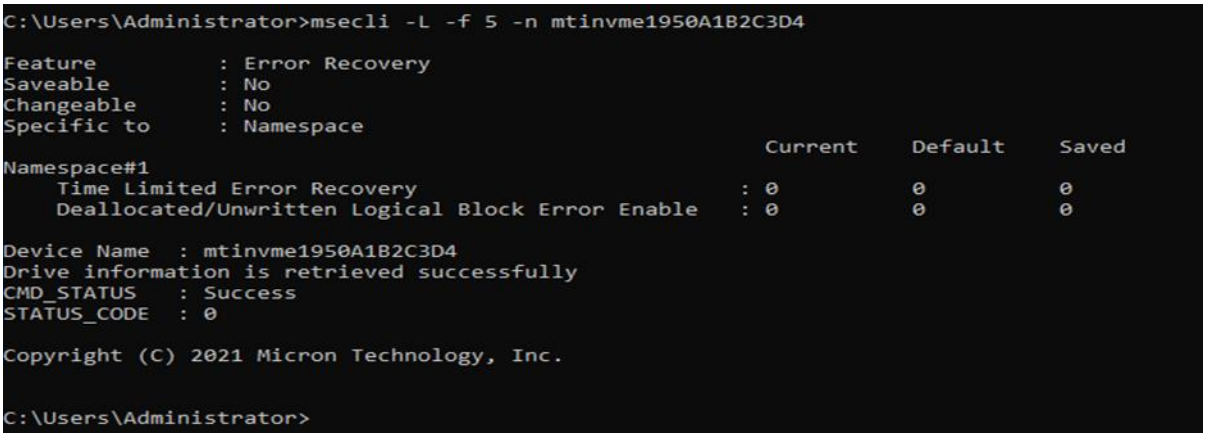
Displaying Get_feature information

This is to display the feature details, supported by the drive, as defined in the NVMe specification. Under this section, currently, Storage Executive CLI supports displaying get_feature details for eleven features.

The features IDs starting from 1 to 12 are supported except feature ID 9. This feature is supported both in Windows and Linux.

Usage: **msecli -L -f <feature_id> -n <device-name>**

Fig: Get Feature



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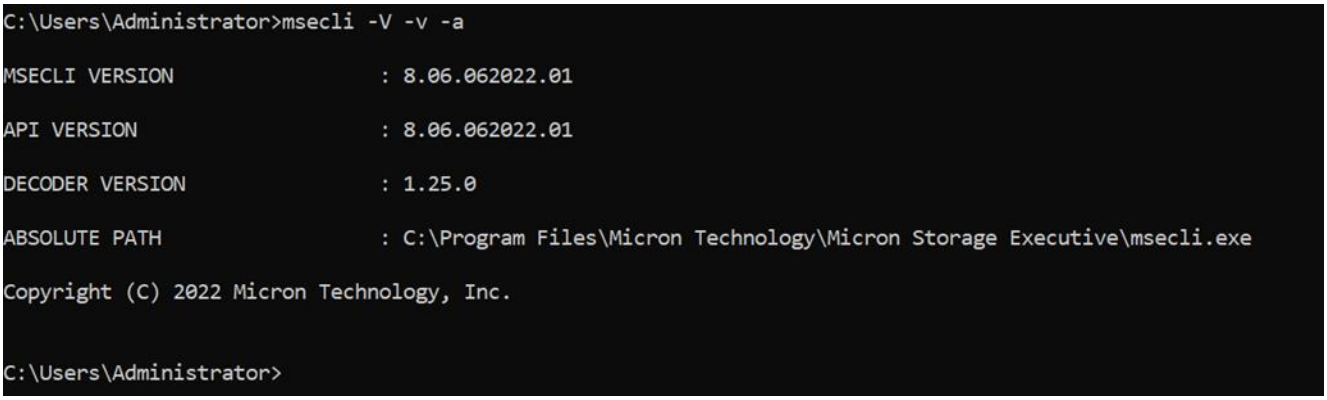
Displaying Storage Executive, API, and CLI Versions

Use the following instructions to display the installed version of Storage Executive, the API, and the CLI.

Usage: **msecli -V [-a] [-v] [-r] [-s <out-filename>]**

Fig: Storage Executive, API, and CLI Versions



General Instructions

Please do not use multiple instances of Storage Executive simultaneously.

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SMART Attributes and Drive Statistics

This section lists standard SMART attributes, attribute IDs, and drive statistics supported by drive interface. For a customer-specific list of SMART attribute details, contact your Micron customer representative.

SATA Drives

Table 1: SMART IDs and Attributes—SATA Drives

ID	SMART Attribute Name
1	Raw Read Error Rate
5	Retired NAND Blocks
9	Power On Hours Count
12	Power Cycle Count
171	Program Fail Count
172	Erase Fail Count
173	Average Block-Erase Count
174	Unexpected Power Loss Count
180	Unused Reserved Block Count
183	SATA Interface Downshift
184	Error Correction Count
187	Reported Uncorrectable Errors
194	Enclosure Temperature
196	Reallocation Event Count
197	Current Pending Sector Count
198	SMART Off-Line Scan Uncorrectable Errors
199	Ultra-DMA CRC Error Count
202	Percentage Lifetime Used
206	Write Error Rate
210	RAIN Successful Recovery Page Count
246	Cumulative Host Write Sector Count
247	Host Program Page Count
248	FTL Program Page Count

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NVMe Drives

Table 2: Smart Attributes -NVMe Drives

Attribute Name	Attribute Data	Units
Critical Warning	0	No critical warning indicated
Device Temperature	66	Celsius
Available Spare Blocks	100	Percent
Available Spare Threshold	10	Percent
Percentage Lifetime Used	0	Percent
Data Units Read	0x038	1000-512byte Sectors
Data Units Written	0x01	1000-512byte Sectors
Host Read Commands	0x05FB	Completed
Host Write Commands	0x06	Completed
Controller Busy Time	0x00	Minutes
Power Cycle Count	0x017	Power Cycles
Power On Hours Count	0x0E0	Hours
Unsafe Shutdowns Count	0x011	Shutdowns
Media Error Counts	0x00	Occurrences
Error Info Log Entries	0x023f	Entries
Warning Temperature Time	0	Minutes
Critical Temperature Time	0	Minutes
Warning Temperature Threshold	70	Celsius
Critical Temperature Threshold	85	Celsius
Temperature Sensor 1	86	Celsius
Temperature Sensor 2	73	Celsius
Temperature Sensor 3	52	Celsius
Thermal Management Temp1 TC	0	Count
Thermal Management Temp2 TC	0	Count
Total Time Thermal Mngmt Temp1	0	Seconds
Total Time Thermal Mngmt Temp2	0	Seconds
Grown Bad Block Count	0	Count
Erase Fail Count	0	Count
Program Fail Counts	0x0	Count
Total Bytes Written	0x299db50000	Bytes
User Block Min Erase Count	1	Count
User Block Avg Erase Count	1	Count
User Block Max Erase Count	2	Count

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admin-passthru

Submit an arbitrary admin command, return results.

Usage: **msecli admin-passthru <drivepath> [--opcode=<opcode>] [--flags=<flags>] [--rsvd=<rsvd>] [--namespace-id=<nsid>] [--cdw2=<cdw2>] [--cdw3=<cdw3>] [--cdw10=<cdw10>] [--cdw11=<cdw11>] [--cdw12=<cdw12>] [--cdw13=<cdw13>] [--cdw14=<cdw14>] [--cdw15=<cdw15>] [--data-len=<data-len>] [--input-file=<file>] [[--read] | [--write]] [--model=<model>]**

set -feature

Set a feature and show the resulting value.

Usage: **msecli set-feature -fid <feature-id> -dw11 <DWORD11 feature specific data> -save <save bit 0/1> -n <device-name>**

supported-cap-config-log

List the supported capacity configuration descriptors.

Usage: **msecli supported-cap-config-log -n <device-name>**

endurance-group-list

List Endurance Group Identifiers.

Usage: **msecli endurance-group-list -n <device-name>**

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Revision History

Rev. P – 09/23
- Updated supporting drive models and OS.
- Added admin-passthru, set-feature, supported-cap-config-log, endurance-group-list.
- Added PLN Feature, PCIE Chart, Fixed capacity configuration management.
- Added Create Namespace using Specified Endurance Group ID.
- Aligned the document.

Rev. O – 12/22
- Updated supporting drive models.

Rev. N – 09/22
- OP Support information added.
- Realigned as per the new functionality.

Rev. M – 03/22
- Added support for 7450 Series, 3460 and 2400.
- Updated the usage of multiple commands.
- Removed SAS Drive SMART information.

Rev. L – 12/21
- Updated the supported SSD information.
- Updated/Corrected SATA and NVMe specific information.

Rev. K – 10/21
- Self-tests info addition for NVMe drives.
- Self-tests info modification for SATA drives.

Rev. J – 04/21
- Added Get_features section.
- Updated the supported SSD information.

Rev. I – 11/20
- Added HMB section in drive info display.
- Added dataset management section.
- Added Boot partition section.
- Added manage RPMB section.

Rev. H – 1/20
- Added 2100AI, 2100AT drives to supported drive list.
- Added Manage Drive Physical Capacity section.
- Added Create SLC Namespace section.

Rev. G – 10/19
- Added 7300, Crucial P-series, X8 Portable SSD drives to supported drive list.
- Updated various screen shots.

Rev. F – 7/19
- Added 2200, P1, 9300 Series, 1300 drives to supported drive list.
- Updated various screen shots and usage statements.

Rev. E – 3/19
- Updated Configuring Drive Over-Provisioning section.

Rev. D – 1/19
- Updated Formatting a Drive section (new screen shot).

Rev. C – 4/18
- Added support for 5210, 5200 Series.
- Added Displaying GPL Data section.
- Updated Displaying SMART Logs and Retrieving Debug Data sections.
- Added new firmware sections: Download and Activate Later and Selective Image Download.

Rev. B – 10/17
- Added support for 9200 Series.
- Updated Configuring Drive Over-Provisioning section.

Rev. A – 3/17
- Initial release.

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