Intel® Memory and Storage Tool (Intel® MAS) Graphic User Interface (GUI)

User Guide

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Revision History

Revision Number	Description	Date
009US	• Release for software version 2.3	December 2023
008US	• Release for software version 2.2	December 2022
007US	• Release for software version 2.1 • Added firmware updates for hybrid products • Updated Solidigm* links in installer, GUI, and CLI • Hid CLI properties when they are not applicable • Fixed IMAS GUI crash that occurred with certain Intel® Rapid Storage Technology (Intel® RST) RAID configurations	July 2022
006US	• Release for software version 2.0 • Intel® MAS now only supports SSDs based on Intel® Optane™ technology • User Interface updated with new look • Changes in document made related to above points	May 2022
005US	• Release for software version 1.9 • Updated Firmware Update button text	July 2021
004US	• Release for software version 1.6	February 2021
003US	• Release for software version 1.4 • Secure Erase limitation with win server 2016	November 2020
002US	• Release for software version 1.1 • Version updates • Updated User Interface (UI) screenshots	July 2020
001US	• Initial release for software version 1.0.5	April 2020

1 Introduction

1.1 About Intel® Memory and Storage Tool (Intel® MAS)

The Intel® MAS is available in two interface types: as a Command Line Interface (CLI) tool and a Graphical User Interface (GUI) tool. This document focuses on usage of the GUI interface version. The Intel® MAS is drive management software that enables you to view the following information for Intel® SSDs:

Note: In this document, references to Intel® SSDs are related to supported SSDs based on the Intel® Optane™ technology.

- Drive Health
- Estimated Life Remaining
- 2.2- Self-Monitoring and Reporting Technology (SMART) Attributes (also available for hard disk drives and non-Intel® SSDs)
- Drive Detail - Drive Details (also available for hard disk drives and non-Intel® SSDs)
- Optimizing your Intel® SSD - Optimizing your Intel® SSD using Trim functionality (a command that allows an operating system to inform an SSD which blocks of data are no longer considered in use and can be deleted)
- 4.1 and 4.2Quick Diagnostic Scan and Full Diagnostic Scan to test the read and write functionality of an Intel® SSD
- System Information – View your system information and hardware configuration, such as CPU, chipset, controller name and driver versions
- Checking for Firmware Updates – Checking for firmware updates on an Intel® SSD
- Performing a Secure Erase – Perform a secure erase on a secondary Intel® SSD

1.2 Viewing the Summary

The Summary view shows a list of all available devices installed in the system including Intel® SSDs, non- Intel® SSDs, and HDDs. A card for each drive will appear on the summary view.

Drives installed as cache devices using Intel® Rapid Storage Technology (Intel® RST)

If a drive is installed as a cache device using Intel® RST, the drive appears as a member drive of a parent volume.

Drives part of a RAID array using Intel® RST

If a drive is installed as part of a RAID array using Intel® RST, the drive appears as a member drive of a parent volume.

Note: RAID volumes and RAID volume members have limited functionality in the Intel® MAS.

Summary information of the selected device is displayed; the displayed Information varies depending on the selected device type, partitions, and manufacturer.

- Model Number
- Firmware Version
  - If you purchased your Intel® SSD from an OEM, your firmware version may have a different naming convention. The Intel® MAS tool does not support updating firmware on OEM drives, contact your local OEM representative or support site for latest firmware revisions.
- Serial Number
- Drive Capacity
  - The total usable capacity of an Intel® SSD may be less than the total physical capacity because a small portion of the capacity is used for Intel® SSD management and maintenance purposes.
- Drive Health
  - Good (green) - All Self-Monitoring and Reporting Technology (SMART) attributes are above their threshold levels.
  - Warning (orange - red) - One or more SMART attributes has moved beyond the threshold level and reached the final value. Intel recommends you back up all data and consider replacing the SSD.
  - Critical (red) – A SMART critical warning has been triggered or the drive has encountered a critical error related to drive degradation. Intel recommends you back up all data and consider replacing the SSD.
- Estimated Life Remaining
  - Endurance calculations are estimated and may vary. The estimation shown is based on the applied workload and is not accurate if the workload changes. Estimates are based on your usage to date and will not extend or reduce the SSD warranty period.
  - Estimated Life Remaining is reported for Intel® SSDs only with SMART enabled or with a SMART health log available.

To run a task on a drive, select a feature from the left menu.

- Section 1.2 - Viewing of the summary
- Chapter 5 - Updating Firewire
- Chapter 4 - Running Diagnostic Scans
- Chapter 6 - Performing a Secure Erase

- Chapter 8 - Performance Booster Feature
- Drive Details - Drive Details
- Section 2.2 - SMART Attributes

Click the Refresh button on the top panel to rescan for drives and refresh all information displayed in the Intel® MAS.

If an installed device does not appear on the home screen, see Troubleshooting - Drives.

2 Obtaining Drive, SMART, and System Information

Details features can be accessed to view

- Drive information
- SMART
- Export functionality to a file

2.1 Drive Details

The Identify view displays standard identification data for the selected drive. The information displayed is generated by an `ATA IDENTIFY DEVICE` or `NVMe* IDENTIFY` command (see 11.2), depending on the selected drive.

Use the drive selection drop down in the top-right corner of the screen to change drives.

To reissue the Identify command and display updated information for the selected drive, click the refresh icon.

To export the current data, click the export icon, select the output file type, and save the output.

2.2 SMART Attributes

The SMART Details screen shows (SMART) attributes and/or SMART Health Info attributes on the selected drive. Recommended actions (if any) appear next to each attribute.

Use the drive selection drop down in the top-right corner of the screen to change drives.

Each drive operates under a predefined set of SMART attributes and corresponding threshold values, of which the drive must not pass during normal operation[1]. Each attribute has a **raw** value (defined by the manufacturer) and a **normalized** value[1]. See 11.2 for the ATA specifications and NVMe* specifications for a complete description of each SMART attribute.

Scroll down to view the SMART attributes supported by the selected ATA or NVMe* drive.

Details shown for each SMART attribute include:

- **ID:** The hexadecimal name of the SMART attribute.
- **Description:** The name of the SMART attribute.
- **Raw:** The raw value assigned to the SMART attribute by the drive manufacturer.

- **Normalized[1]:** The value of an attribute adjusted to a scale spanning typical increments of 100 to 1, or 200 to 1.
- **Threshold[1]:** The lowest acceptable normalized value for the drive.
- **Action:** Identifies whether the system can use the drive for processing.

Descriptions of some SMART attributes are shown in the following table. These attributes vary depending on the Intel® SSD or other drive selected. Your SSD or drive may not support some of these attributes. For more details on each attribute, see 11.2.

Table 2.1 Attribute and Description (SATA)

ID	Attribute and Description (SATA)
03	**Spin Up Time** For Intel® SSDs, reports a fixed value of zero (0). The average time it takes the spindle to spin up. (Since an SSD has no moving parts, this attribute reports a fixed Raw value of zero (0) and a fixed Normalized value of 100.)
04	**Start/Stop Count** For Intel® SSDs, reports a fixed value of zero (0). This type of event is not an issue for SSDs. However, hard disk drives can experience only a finite number of these events, and therefore, must be tracked.
05	**Re-allocated Sector Count** The raw value shows the number of retired blocks since leaving the factory (grown defect count).
09	**Power-On Hours Count** The raw value reports the cumulative number of power-on hours over the life of the device. **Note:** The On/Off status of the Device Initiated Power Management (DIPM) feature affects the number of hours reported. • If DIPM is turned on, the recorded value does not include the time that the device is in a slumber state. • If DIPM is turned off, the recorded value must match the clock time, as all three device states are counted: active, idle, and slumber.
0C	**Power Cycle Count** The raw value reports the cumulative number of power-cycle events (power on/off cycles) over the life of the device.
AA	**Available Reserved Space** Reports the number of reserve blocks remaining. The normalized value begins at 100 (64h), which corresponds to 100 percent availability of the reserved space. The threshold value for this attribute is 10 percent availability.
AB	**Program Fail Count** The raw value shows total count of program fails. The normalized value, beginning at 100, shows the percent remaining of allowable program fails.
AC	**Erase Fail Count** The raw value shows total count of erase fail. The normalized value, beginning at 100, shows the percent remaining of allowable erase fails.
AE	**Unexpected Power Loss** Reports number of unclean shutdowns, cumulative over the life of the SSD. An "unclean shutdown" is the removal of power without STANDBY IMMEDIATE as the last command (regardless of PLI activity using capacitor power). Also known as "Power-off Retract Count" per magnetic-drive terminology.

ID	Attribute and Description (SATA)
B8	**End-to-End Error Detection Count** Reports number of errors encountered during Logical Block Address (LBA) tag checks within the SSD data path. The normalized value begins at 100 and decrements by 1 for each LBA tag mismatch detected. The threshold value is 90.
BB	**Uncorrectable Error Count** The raw value shows the count of errors that could not be recovered using Error Correction Code (ECC).
BE	**Temperature - Airflow (Case)** Reports the SSD case temperature in degree Celsius. The raw value is as follows: • Byte 0 = Current case temperature (°C) • Byte 2 = Recent minimum case temperature (°C) • Byte 3 = Recent maximum case temperature (°C) The normalized value is 100. Case temperature is calculated based on an offset from internal temperature sensor.
C0	**Unsafe Shutdown Count (Power-off Retract Count)** The raw value reports the cumulative number of unsafe (unclean) shutdown events over the life of the device. An unsafe shutdown occurs whenever the device is powered off without STANDBY IMMEDIATE being the last command.
C2	**Temperature - Device Internal** Reports internal temperature of the SSD. Temperature reading is the value direct from the internal sensor. The raw value is the current temperature. The normalized value is the results equation min (150-current temp, 100).
C7	**CRC Error Count** The total number of encountered SATA interface Cyclic Redundancy Check (CRC) errors.
E1	**Host Writes** The raw value reports the total number of sectors written by the host system. The raw value increases by 1 for every 65,536 sectors written by the host.
E2	**Timed Workload, Media Wear** Measures the wear seen by the SSD (since reset of the Timed Workload Timer, attribute E4), as a percentage of the maximum rated cycles.
E3	**Timed Workload, Host Read/Write Ratio** The percentage of I/O operations that are read operations (since reset of the Timed Workload Timer, attribute E4).
E4	**Timed Workload Timer** Measures the elapsed time (number of minutes) since starting this workload timer.
E8	**Available Reserved Space** Reports the number of reserve blocks remaining. The normalized value begins at 100 (64h), which corresponds to 100 percent availability of the reserved space. The threshold value for this attribute is 10 percent availability.
E9	**Media Wearout Indicator** Reports the number of cycles the NAND media has undergone. The normalized value declines linearly from 100 to 1 as the average erase cycle count increases from 0 to the maximum rated cycles. Once the normalized value reaches 1, the number will not decrease, although it is likely that significant additional wear can be put on the device.
F1	**Total LBAs Written** Counts sectors written by the host.

ID	Attribute and Description (SATA)
F2	**Total LBAs Read** Counts sectors read by the host.

Scroll down to view the SMART Health Info attributes supported by the selected NVMe* drive.

Details shown for each SMART Health Info attribute include:

- **ID:** The byte offset value of the SMART Health Info.
- **Description:** The name of the SMART Health Info.
- **Raw:** The raw value assigned to the SMART Health Info by the drive manufacturer.
- **Threshold[1]:** (If defined) The lowest acceptable normalized value for the drive.
- **Action:** Identifies whether the system can use the drive for processing.

Descriptions of some SMART Health Info attributes are shown in the following table. These attributes vary depending on the Intel® SSD or other drive selected. Your SSD or drive may not support some of these attributes. For more details on each attribute, see the NVMe* specification.

Table 2.2 Attribute and Description (NVMe*)

ID	Attribute and Description (NVMe*)
1	**Temperature** Reports overall Device current temperature in Kelvin.
3	**Available Spare** Contains a normalized percentage (0 to 100%) of the remaining spare capacity available. Starts from 100 and decrements.
4	**Available Spare Threshold** Threshold is set to 10%.
5	**Percentage Used Estimate** (Value allowed to exceed 100%) A value of 100 indicates that the estimated endurance of the device has been consumed but may not indicate a device failure. The value is allowed to exceed 100. Percentages greater than 254 must be represented as 255. This value must be updated once per power-on hour (when the controller is not in a sleep state).
32	**Data Units Read (in LBAs)** Contains the number of 512-byte data units the host has read from the controller; this value does not include metadata. This value is reported in thousands (for example, a value of 1 corresponds to 1000 units of 512 bytes read) and is rounded up. When the LBA size is a value other than 512 bytes, the controller must convert the amount of data read to 512-byte units.
48	**Data Units Write (in LBAs)** Contains the number of 512-byte data units the host has written to the controller; this value does not include metadata. This value is reported in thousands (i.e., a value of 1 corresponds to 1000 units of 512 bytes written) and is rounded up. When the LBA size is a value other than 512 bytes, the controller must convert the amount of data written to 512-byte units. For the NVM command set, logical blocks written as part of Write operations must be included in this value. Write Uncorrectable commands must not impact this value.

ID	Attribute and Description (NVMe*)
64	**Host Read Commands** Contains the number of read commands issued to the controller.
80	**Host Write Commands** Contains the number of write commands issued to the controller.
96	**Controller Busy Time (in minutes)** Contains the amount of time the controller is busy with I/O commands. The controller is busy when there is a command outstanding to an I/O Queue (specifically, a command was issued by way of an I/O Submission Queue Tail doorbell write and the corresponding completion queue entry has not been posted yet to the associated I/O Completion Queue). This value is reported in minutes.
112	**Power Cycles** Contains the number of power cycles
128	**Power On Hours** Contains the number of power-on hours. This does not include time that the controller was powered and in a low power state condition.
144	**Unsafe shutdowns** Contains the number of unsafe shutdowns. This count is incremented when a shutdown notification (CC.SHN) is not received prior to loss of power.
160	**Media Errors** Contains the number of occurrences where the controller detected an unrecovered data integrity error. Errors such as uncorrectable ECC, CRC checksum failure, or LBA tag mismatch are included in this field.
176	**Number of Error Information Log Entries** Contains the number of Error Information log entries over the life of the controller.
192	**Warning Composite Temperature Time** Contains the amount of time in minutes that the controller is operational, and the Composite Temperature is greater than or equal to the Warning Composite Temperature Threshold (WCTEMP) field and less than the Critical Composite Temperature Threshold (CCTEMP) field in the Identify Controller data structure.
196	**Critical Composite Temperature Time** Contains the amount of time in minutes that the controller is operational, and the Composite Temperature is greater the Critical Composite Temperature Threshold (CCTEMP) field in the Identify Controller data structure.
0	**Critical Warning** These bits if set, flag various warning sources. • Bit 0: Available Spare is below Threshold • Bit 1: Temperature has exceeded Threshold • Bit 2: Reliability is degraded due to excessive media or internal errors • Bit 3: Media is placed in Read- Only Mode • Bit 4: Volatile Memory Backup System has failed (e.g., enhanced power loss capacitor test failure) • Bits 5-7: Reserved Any of the critical warning can be tied to asynchronous event notification.

To reissue the SMART command and refresh the SMART information for the selected drive, click the refresh icon.

Note: Threshold and Normalized values not applicable to NVMe* drives unless defined in spec.

To export the current data, click the export icon, select the output file type, and save the output. See 2.1 and 2.2.

2.3 Windows System Information*

The Windows System Information* tool shows details about your computer's operating system and hardware configuration, such as CPU, chipset, and controller name and driver version.

This information can be useful for troubleshooting purposes.

To access this tool, select System Information under the System menu item.

See 2.1 and 2.2.

3 Optimizing your Intel® SSD

The Optimize Drives tool in Windows* helps an Intel® SSD retain its out-of-box performance by removing deleted data files from NAND flash management blocks on the SSD using trim functionality (a command that allows an operating system to identify and tell an SSD which blocks of data are no longer considered in use and can be deleted).

For example, when you delete a file on your system, the operating system marks the file for deletion but does not physically erase the file. Because an SSD does not know which files are deleted, the SSD continues to think all files contain valid data. This situation causes the SSD to continue managing deleted files in addition to valid data in the SSD.

By running Optimize Drives in Windows*, the SSD can clean up internal management space, thus eliminating the need to manage the deleted files.

To access this tool, select Optimizer under the System menu item.

Note: On supported Intel® SSDs there may be additional options to boost performance available in the Intel® MAS under the Performance Booster feature. See Troubleshooting for more information.

4 Running Diagnostic Scans

4.1 Quick Diagnostic Scan

Run the Quick Diagnostic scan to test the basic functionality of the selected Intel® SSD. The scan takes approximately three minutes to complete and performs two tests:

- Read Scan - checks 1.5 GB of the Intel® SSD for READ errors.
- Data Integrity Scan - creates 1 GB of random data, writes the data to unused areas of the Intel® SSD, and then compares it for data integrity.

Note: The Data Integrity Scan cannot be run on a Windows* 8, Windows* 8.1, Windows* 10 or Windows Server* 2012 Storage Space, nor on any individual SSD that is a member of a Storage Space.

The scan requires:

- A minimum of 5 GB of free space to run.
- A partitioned area to create and validate random data.

Note: Other Intel® MAS options (such as the home screen or SMART Details screen) may be accessed while the scan is running, but no other tests (such as Optimizer or Full Diagnostic Scan) may be started.

1. Click **Run**.
2. View the progress on the screen.
3. To stop the scan, click **Cancel**.

4.2 Full Diagnostic Scan

Run the Full Diagnostic scan to perform an overall health evaluation on the selected Intel® SSD.

The scan performs two tests:

- Read Scan - checks every Logical Block Address (LBA) for READ errors.
- Data Integrity Scan - uses free space to write random data and read it back to ensure data integrity.

Note: The Data Integrity Scan cannot be run on a Windows* 8, Windows* 8.1, Windows* 10 or Windows Server* 2012 Storage Space, nor on any individual SSD that is a member of a Storage Space.

The scan can take an hour or more to complete (depending on the amount of free space on the Intel® SSD). The test can run in the background.

The scan requires:

- A minimum of 5 GB of free space to run.
- A partitioned area to create and validate random data.

Note: Other Intel® MAS tool options (such as the home screen or SMART Details screen) may be accessed while the scan is running, but no other tests (such as Optimizer or Quick Diagnostic Scan) may be started.

1. Click **Run**.
2. View the progress on the screen.
3. To stop the scan, click Cancel.

Note: Diagnostic scans are intentionally disabled on Intel® Optane™ Memory devices when system acceleration is enabled. Running Diagnostic Scans.

5 Updating Firmware

5.1 Checking for Firmware Updates

If your Intel® SSD contains an older version of firmware than the version included with this release of the Intel® MAS, Firmware Updates will be available from the Summary card or within the Firmware Update view.

To manually check for a newer version:

Note: The firmware version of the Intel® SSD on the Summary card.

1. Select **Check for Updates** under the Settings menu bar to open the Intel Download Center to verify if there is a new version of the tool.
2. Confirm in the Release Notes or here for the latest firmware versions available for non-OEM Products.
3. Update the firmware following the instructions in the following section.

5.2 Using Firmware Update

The Firmware Update feature updates the selected Intel® SSD to the latest firmware included with this version of the Intel® MAS.

To update the firmware on an Intel® SSD:

1. Back up the Intel® SSD.
2. Perform a complete system backup on the Intel® SSD to make sure no data is lost during the firmware update process. Intel is not responsible for any data loss that might occur during or after a firmware update on an Intel® SSD.
3. Close all open applications except Intel® MAS.
4. When available, click **Firmware Update** to update an Intel® SSD with the firmware version included with this release of Intel® MAS. Minimize system use during this operation.
5. Reboot your system once the update is complete. See 5.1 and 10.2

6 Performing a Secure Erase

6.1 About Secure Erase

Secure Erase permanently deletes all data on an Intel® SSD. To run Secure Erase, the Intel® SSD must be installed as a secondary SSD in your system.

CAUTION: Secure Erase is an unrecoverable operation that permanently deletes all data on an Intel® SSD. Secure Erase eliminates not only the user data section of the SSD, but also the reserve data area, rendering data remnants virtually unrecoverable. Secure Erase is an addition to the existing format drive command available in computer operating systems. Once you run Secure Erase on an Intel® SSD, there is no possibility to recover data from the SSD.

- On Intel® SSDs supporting encryption, the encryption key used in randomizing data is re-generated after Secure Erase

See Secure Erase Requirements, 6.3, and See Error! Not a valid bookmark self-reference.

Running Secure Erase

6.2 Secure Erase Requirements

To run Secure Erase on an Intel® SSD:

- Back up any data onto another drive if you want to keep any of the data on the Intel® SSD.
- The SSD must be the secondary drive in the system. Secure Erase cannot be run from a bootable SSD or on an SSD with a partition.
- All partitions must be removed from the SSD.
- Back up any data onto another drive if you want to keep any of the data on the Intel® SSD.

See 6.3 and See Error! Not a valid bookmark self-reference.

Running Secure Erase

6.3 Deleting a Partition

These instructions describe how to delete a partition on an Intel® SSD in Microsoft Windows* in preparation for running Secure Erase on the SSD.

These steps logically delete a partition, which makes all data unavailable on the SSD. These steps can be performed while Intel® MAS is running.

1. In Windows*, right-click the Windows* Key and select **Disk Management**.

2. Select the Intel® SSD that contains the partition.
3. Locate the partition on the Intel® SSD (indicated by a drive letter).
4. Right-click on the partition and select **Delete Partition** or **Delete Volume**.
5. Confirm the deletion, if prompted.
6. Exit the Windows* Disk Management screen.
7. After deleting the partition, click **Refresh** on the Intel® MAS tool home screen.

See **Error! Not a valid bookmark self-reference.**

6.4 Running Secure Erase

Run Secure Erase to permanently delete all data on a secondary Intel® SSD installed in your system.

CAUTION: Secure Erase is an unrecoverable operation that permanently deletes all data on an Intel® SSD. Secure Erase eliminates not only the user data section of the SSD, but also the reserve data area, rendering data remnants virtually unrecoverable. Secure Erase is an addition to the existing format drive command available in computer operating systems. Once you run Secure Erase on an Intel® SSD, there is no possibility to recover data from the SSD.

1. Review the requirements on Secure Erase Requirements before running Secure Erase.
2. See 6.3 on the Intel® SSD to be erased.
3. From the left menu, select **Secure Erase**.
4. Click **Secure Erase**.

Secure Erase starts on the selected Intel® SSD. A progress bar shows the status of the operation. The process can take 1 to 2 minutes, depending on the capacity of the SSD.

CAUTION: Your system may appear to stop responding during this operation. Do not power off or disconnect power from your system during the operation, as this can damage the SSD.

5. When complete, follow Creating a Partition and format the SSD.
6. Click **Refresh** on the home screen to view the Intel® SSD.

See Secure Erase Requirements, 6.3, and See Error**! Not a valid bookmark self-reference.**

Running Secure Erase

6.5 Creating a Partition

These instructions describe how to create and format a partition on an Intel® SSD in Microsoft Windows*. These instructions can be helpful for preparing an SSD after performing a Secure Erase. For more information or instructions for other operating systems, see the documentation for your operating system.

1. Right-click the Windows* Key and select **Disk Management**.
2. Select the Intel® SSD on which you want to create a partition and click **New Simple Volume**.
3. Click **Next** when the New Simple Volume Wizard starts.
4. Enter the information for the partition (size of partition, drive letter).
5. Click **Next**.
6. Select an option to format the partition, and then click **Next**.
7. Click **Finish**.

7 LED Color Feature – Intel® Optane™ SSD 905P Series Only

7.1 Intel® Optane™ SSD 905P LED Color

This section describes how to check the change the LED color on Intel® Optane™ SSD 905P Series.

1. An LED Color drop down will be visible on the Summary card for Intel® Optane™ SSD 905P Series drives
2. Select the color desired.
3. Click Apply.

8 Performance Booster Feature

8.1 Intel® Solid State Hybrid Drive

Intel® Optane™ Memory H10/H20 with Solid State Storage drives are equipped with a cache architecture to boost performance. This feature will move and clear the contents of the available cache and boost the performance of the SSD. The following section describes how to run performance boost feature.

Select the device connected to your system

1. Select the Performance Booster feature from the left menu.
2. Click the “Run” button.
3. If user decides to cancel, the progress bar will show the percentage of cache that’s been cleared.
4. Once the entire cache is clear the progress bar must show 100 percent.

9 Intel® Optane™ Memory H10/H20 with Solid State Storage

9.1 Intel® Optane™ Memory H10/H20 with Solid State Storage

This hybrid SSD combines technologies of Intel® Optane™ memory and Intel® NAND Flash Memory technologies into a single M.2 2280-S3-M form factor. As such, the single M.2 device will initially enumerate as two distinct drives in the operating system. However, once enabled, the Intel® Optane™ memory accelerated volume will be shown as a single device.

Notes:

1. To enable acceleration with Intel® Optane™ Memory refer to the *Intel® Optane™ Memory Installation Guide*
2. If the Intel® RST driver is not installed, only the NAND portion of the drive will be enumerated (see the next bullet)
3. Intel® MAS intended usage for Intel® Optane™ Memory H is only when the device is connected to Intel® Optane™ Memory H supported platform. Intel® MAS does not supported for Intel® Optane™ Memory H on unsupported platform.

10 Troubleshooting

10.1 Troubleshooting - Drives

Drive does not appear on the home screen

If a drive installed in the system does not appear on the Summary view:

- Check power to the drive.
- For NVMe* drives, check that the drive is properly socketed in the CPU direct attached PCIe* slot.
- Click Refresh in the top toolbar.
- Reboot the system and restart the Intel® MAS.

If the problem persists, contact Intel.

SMART information does not appear for a selected drive

If the SMART Details option is not available for a selected drive, make sure SMART is enabled on the drive.

Drive Health or Estimated Life Remaining does not appear for a selected drive

Drive Health and Estimated Life Remaining information appears for Intel® SSDs only with SMART enabled.

10.2 Troubleshooting - Firmware Update

If you encounter an issue updating the firmware on an Intel® SSD or if the firmware update fails, use the Intel® Solid State Drive Firmware Update Tool located at:

Intel® SSD Firmware Update Tool

11 Additional Information

11.1 Related Publications

For more information on Intel Solid State Drives, go to:

Intel® Solid State Drive Technology

11.2 Reference Documents

Table 11.1 Reference Documents

Document	Document No./Location
ATA Specification	http://www.t13.org/
SATA Specification	http://www.sata-io.org
NVMe* Specification	http://www.nvmexpress.org