



USER GUIDE - PUBLIC

Solidigm™ Storage Tool - CLI

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SOLIDIGM™

Revision History

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1 Introduction

This guide describes usability of the Command Line Interface (CLI) of Solidigm™ Storage Tool (SST) and provides reference on using the tool to configure and retrieve data from supported products.

SST Summary:

- CLI based tool for interacting with Solidigm™ SSDs (formerly Intel®)
- Provides firmware updates to all non-OEM drives
- Supports Client and Datacenter drives
- Supports multiple Operating Systems: Windows, Linux and ESXi

1.1 Features

The SST provides a suite of capabilities for interacting with PCIe/SATA-based SSDs.

1.1.1 Feature Availability

Availability of features is dependent on various factors. These factors include, but are not limited to, the following:

- a. Product
- b. Product Type: Client, Datacenter
- c. Interface Type: ATA, NVMe (1.1, 1.2, 1.3, 1.4)
- d. Operating System Version/Support
- e. Driver: Intel NVMe driver, Windows Inbox NVMe driver, Intel® RST driver
- f. Configuration: RAID

1.1.2 Feature Summary

The functionality includes:

- Detecting drives attached on the system
- Parsing a drive's Identify Device information
- Parsing a drive's SMART (Self-Monitoring and Reporting Technology) information
- Resizing the SSD's usable storage capacity by changing its max LBA
- Option to retrieve output in text, JSON or xml format
- Updating SSD firmware:
 - Firmware binaries for updating the firmware are embedded in the tool.
 - When displaying drive information, the tool will indicate if a new firmware is available.
- Calculating drive life expectancy (Endurance Analyzer)
- Power Governor Mode (vendor unique). Three modes are supported:
 - 0: 25-watts for PCIe NVMe devices; 40W for PCIe NVMe x8 devices; Unconstrained for SATA devices.
 - 1: 20-watts for PCIe NVMe devices; 35W for PCIe NVMe x8 devices; Typical (7-watts) for SATA devices.
 - 2: 10-watts for PCIe NVMe devices; 25W for PCIe NVMe x8 devices; Low (5-watts) for SATA devices.
- Functionality to Enable/Disable Latency Tracking
- Functionality to Parse the read and write commands from Latency Tracking logs
- End of Life notification when 15% of spare is left

The following functionality and features apply to SATA drives only:

- Enabling and disabling Spread Spectrum Clocking (SSC)
- Issuing SCT Error Recover Control command
- Setting drive PHY Speed: 1.5Gbs, 3.0Gbs, and 6.0Gbs
- Setting PHY configurations:

- 0 (Default Enterprise Settings)
- 1 (Client Settings)
- 2 (Alternate Enterprise Settings)

Support for SCT Feature Control:

- Write cache state
- Write cache reordering state
- Temperature logging interval
- PLI Cap test time interval (vendor unique)
- Power Governor Burst power (vendor unique)
- Power Governor Average power (vendor unique)
- Parse ATA HDA Temp (SCT command)
- Parsing PHY Counters (ATA command)
- Reading ATA General Purpose Logs (GPL) (generic)
- ATA Standby Immediate
- ATA Drive Self-Test

The following functionality applies to PCIe NVMe drives only:

- Executing an NVMe Format command
- Parsing device log data
- Reading and setting temperature threshold
- Dumping NLOGS and Event Logs
- Reading and setting the SM Bus Address
- Namespace Management command support (NVMe 1.2 and later drives)

1.2 System Requirements

The SST is supported on the following:

- Operating systems on x64 Architecture:
 - Windows:
 - Windows Server 2012, 2012 R2, 2016, 2019, 2022
 - Windows 10, 11
 - Linux:
 - Red Hat Enterprise Linux (RHEL) 8.0, 8.2, 8.3, 8.4
 - CentOS 8.0, 8.2, 8.3, 8.4
 - SLES 12, 15
 - Ubuntu 16.04, 18.04, 20.04
 - ESXi:
 - ESXi 7.x
 - ESXi 8.0, 8.0.u1
- Available space of 400 MBs

NOTES:

- On Windows Server 2012/2008/R2 and Windows OS, administrator access is required. Open a command prompt as administrator and run the tool via the commands as described in this document. Disable UAC where applicable and run the tool in a command prompt.
- On Linux systems, the tool must be run with root privileges. This can be done through either `sudo` or `su` commands. If running as a non-root user, the tool will not be able to communicate with the drive. Only basic drive information will be displayed, and no drive functions will work. There are two Linux installers: one for 32-bit systems, and one for 64-bit systems.
- On ESXi systems, the tool only works on PCIe NVMe drives using the Intel ESXi NVMe driver. The user will need to set their ESXi host acceptance level to "CommunitySupported" in order to install the tool.

- On Windows Server 2012, the tool only works with Intel/Solidigm provided Windows driver. Click [here](#) for the latest drivers. The tool will not work with the in-box Windows NVMe driver found in server 2012 R2. The tool will return an error if this driver is used.
- Namespace limitations on RHEL/Centos 8.2: Kernel bug can cause deadlock on delete namespace in RHEL/CentOS 8.2
- Earlier OS Versions not listed in supported list are generally expected to work but are not actively validated and not officially supported

1.2.1 RAID Support

Supported:

- The Intel® RST RAID supports direct attached SSD SATA drives only.
- Drives attached to LSI MegaRAID adaptors
 - 64-bit OS support only
 - SATA drives
 - NVMe drives (limited functionality)
 - Support based on storelib 7.27 version from Broadcom

Not Supported:

- Drives behind HBAs

RAID Modes Supported:

- RAID 0
- RAID 1
- RAID 5
- VROC RAID

Other Modes Supported:

- AHCI

1.3 Document Conventions

Throughout this guide, the format of each command is documented in a gray colored text box.

- Items in [brackets] are optional.
- For options and targets, each possible value is separated by a bar, '|', meaning "or" and the default value is listed first.
- Items in (parenthesis) indicate a user supplied value.

For example, the following **set** command is interpreted as follows:

- The verb **set** can be followed by an optional modifier (help).
- The target **-ssd** is required followed by Index or Serial number of the drive to be targeted
- It also specifies a required property **Test** in which valid values are **Test1** or **Test2**.

```
sst set [-h|-help] -ssd [(Index|SerialNumber|PhysicalPath)] Test=(Test1|Test2)
```

1.4 Running the SST

Run the SST from either a Windows administrator command prompt or a Linux terminal window. The tool is run as a single command by supplying the command and parameters immediately following the SST executable.

```
sst show -ssd
```

1.5 Command Syntax

The command line syntax is case insensitive and is interpreted in English-only. It follows the Distributed Management Task Force (DMTF) Server Management (SM) Command Line Protocol (CLP), or DMTF SM-CLP standard with the

exception of the target portion of the command. Document number DSP0214 and can be found at <http://www.dmtf.org>.

Target specification in SM-CLP identifies CIM instances using CIM object paths. The modified syntax implemented utilizes key properties of the target without requiring a syntactically correct CIM object path. Generally, the form of a user request is:

```
sst <verb>[<options>][<targets>][<properties>]
```

A command has a single verb that represents the action to be taken. Following the verb can be one or more options that modify the action of the verb, overriding the default behavior with explicitly requested behavior.

Options generally have a short and long form (for example, `-a` | `-all`). One or more targets are normally required to indicate the object of the action. However, there are a few cases where a target is not required. Finally, zero or more properties defined as a key/value pair can be used to modify the target.

1.6 Targets

In general, if there is only one object of a specific target type, a target value is not accepted.

Unless otherwise specified, when there are multiple objects of a specific target type, not supplying a target value implies the command should operate on all targets of that type. This is the case for the `show device` command, which will display all devices if no target value is specified.

```
sst show -ssd
```

The same operation can be limited to a single object by supplying a specific target value.

```
sst show -ssd 1
```


2 Feature List

The following table list all features available in SST. Features are listed alphabetically. Command Syntax describes the command and command syntax needed to perform each feature. Commands can have different options and ways to specify target drive.

Further details for each command is provided in subsequent sections of this document.

2.1 Quick Command Syntax Guide for Features Table

Options	Description
<code>[-all -a]</code>	Shows all properties.
<code>[-display -d]</code>	Filters the returned properties by explicitly specifying a comma separated list of any of the properties defined in the Return Data section.
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvmlxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

Target	Description
<code>-ssd [(Index SerialNumber PhysicalPath Bootdrive)]</code>	Restricts output to specific SSD by supplying the device's Index or Serial Number or path or Bootdrive. BootDrive option available in Windows only.

2.2 Features

Feature	Description	Command Syntax	Example
Aggregation (Threshold/Time)	Set the Aggregation Threshold/Time	<pre>set [-help -h] [-output -o (text nvmlxml json)] -ssd (Index SerialNumber PhysicalPath) aggregationthreshold = (value)</pre> <pre>set [-help -h] [-output -o (text nvmlxml json)] -ssd (Index SerialNumber PhysicalPath) aggregationtime = (value)</pre>	<pre>sst set -ssd 1 aggregationthreshold = 128</pre> <pre>sst set -ssd 1 aggregationtime = 255</pre>
Assert Log	Read the Assert Log binary and save it to the given filename. NVME only	<pre>dump [-help -h] [-destination (path)] [-output -o (text nvmlxml json)] [-ssd [(Index SerialNumber PhysicalPath)]] -assertlog</pre>	<pre>sst dump -destination assertlog_binary.bin -ssd 1 - assertlog</pre>

Feature	Description	Command Syntax	Example
Bridge NLog	Read the Bridge NLog binary and save it to the given filename. Selected NVME only	dump [-help -h] [-destination (path)] [-output -o (text nvmlxml json)] [-ssd [(Index SerialNumber PhysicalPath)]] -bridgenlog	sst dump -destination apl_bridge_binary.bin -ssd 1 -bridgenlog
Delete	Delete all the data on the selected device. To by-pass the prompt, specify the -force option.	delete [-help -h] [-force -f] [-output -o (text nvmlxml json)] -ssd (Index SerialNumber PhysicalPath)	sst delete -ssd 1
DIPM	Disable/Enable drive's DIPM feature. ATA only	set [-help -h] [-output -o (text nvmlxml json)] -ssd (Index SerialNumber PhysicalPath) dipmenabled = ('true' 'false')	sst set -ssd 1 dipmenabled = false sst set -ssd 1 dipmenabled = true
Drive Index	Display information of selected drive by index.	show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvmlxml json)] -ssd [(Index SerialNumber PhysicalPath)]	sst show -ssd 1
Drive List	Display a list of attached drives to the screen.	show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvmlxml json)] -ssd [(Index SerialNumber PhysicalPath)]	sst show -ssd
Drive Path	Display information of selected drive by drive path.	show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvmlxml json)] -ssd [(Index SerialNumber PhysicalPath)]	sst show -ssd \\.\physicaldrive1
Drive Serial	Display information of selected drive by serial number.	show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvmlxml json)] -ssd [(Index SerialNumber PhysicalPath)]	sst show -ssd cvpo893749287gn
Drive Scan	Scan the drive for Data Integrity, Read Scans, or Logs.	start [-help -h] [-output -o (text nvmlxml json)] -scan [(dataintegrity readscan logs)] [-ssd [(Index SerialNumber PhysicalPath)]] [includeos = (true false)] [fullscan = (true false)] [path = (drive letter)] [directorypath = (file path)] [includesysteminfo = (true false)]	sst start -scan logs -ssd 1 [includeos = (true false)] [fullscan = (true false)] [path = (drive letter)] [directorypath = (file path)] [includesysteminfo = (true false)]

Feature	Description	Command Syntax	Example
DSSD PowerState	Show, set DSSD Power state	<pre>sst set [-help -h] [-output -o (text nvmmxml json)] -ssd (Index SerialNumber PhysicalPath) - DSSDPowerState DSSDPowerState = (Watts)</pre>	<pre>sst set -ssd 1 DSSDPowerState DSSDPowerState=20</pre>
		<pre>sst show [-help -h] [-output -o (text nvmmxml json)] -ssd (Index SerialNumber PhysicalPath) - DSSDPowerState [Select = ('current' 'default' 'saved' 'capabi lities')]</pre>	<pre>sst show -ssd 1 -DSSDPowerState Select=current</pre>
eDrive (Set)	Enable eDrive support on the device. Warning: once enabled, eDrive support cannot be disabled.	<pre>set [-help -h] [-force -f] [-o utput -o (text nvmmxml json)] -ssd (Index SerialNumber PhysicalPath) edrive supported = (true)</pre>	<pre>sst set -ssd 1 edrive supported = true</pre>
	Selected drives only		
Endurance Analyzer	Run the endurance analyzer calculation to determine drives life expectancy.	<pre>reset [-help -h] [-output -o (text nvmmxml json)] -ssd (Index SerialNumber PhysicalPath) endurance analyzer</pre>	<pre>sst reset -ssd 1 endurance analyzer</pre>
Error Injection	Inject panic error into an OCP enabled drive.	<pre>set [-help -h] [-output -o (text nvmmxml json)] -ssd (Index SerialNumber PhysicalPath) - error injection number of error injections = (value) error injection data structure entry = (tilde separated entry list)</pre>	<pre>sst set -ssd 1 -error injection number of error injections = 2 error injection data structure entry = 1 0 5 2~0 0 9 a5</pre>
Error Recovery Timer (Read/Write)	Set the selected drive's current error read and write recovery timers.	<pre>show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvmmxml json)] -ssd (Index SerialNumber PhysicalPath) set [-help -h] [-output -o (text nvmmxml json)] -ssd (Index SerialNumber PhysicalPath) write error recovery timer = (0-65535)</pre>	<pre>sst show -d read error recovery timer -ssd 1 sst show -d write error recovery timer -ssd 1 sst set -ssd 1 read error recovery timer = 2 sst set -ssd 1 write error recovery timer = 5</pre>
	ATA only		
Event Log	Read the Event Log binary and save it to the given filename.	<pre>dump [-help -h] [-destination (path)] [-output -o (text nvmmxml json)] [-ssd (Index SerialNumber PhysicalPath)] -eventlog</pre>	<pre>sst dump -destination eventlog_binary.bin -ssd 1 - eventlog</pre>

Feature	Description	Command Syntax	Example
Firmware Activate and Configuration	<p>Activate the firmware on the selected drive (NVMe only). Configure activation notification</p> <p>Performed after firmware update with source option</p> <p>NVMe only</p>	<pre>load [-help -h] [-force -f] [-source (path)] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - firmwareactivate [firmwareslot = ('1 2 3 4 5 6 7')] [commitaction = (2 3)] set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) firmwareactivationnoticesconfigurati on = ('true' 'false')</pre>	<pre>ssd load -ssd 1 - firmwareactivate firmwareslot = 1 commitaction = 2 ssd set -ssd 1 firmwareactivationnoticesconfig uration = true</pre>
Firmware Update (load)	<p>Update the firmware of the selected drive (if possible).</p>	<pre>load -instelssd (Index SerialNumber PhysicalPath) load [-help -h] [-force -f] [-source (path)] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) [firmwareslot = ('1 2 3 4 5 6 7')] [commitaction = (0 1 2 3)]</pre>	<pre>ssd load -ssd 1 ssd load -source firmwarebinaryfile.bin -ssd 1 firmwareslot = 1 commitaction = 0</pre>
Format	<p>NVMe Format the selected drive.</p> <p>NVMe only.</p> <p>See NVMeFormat</p>	<pre>see nvme format</pre>	
General Purpose Log (GPL)	<p>Read the general purpose log binary and save it to the given filename.</p> <p>ATA only</p>	<pre>dump [-help -h] [-destination (path)] [-output -o (text nvmxml json)] [-ssd [(Index SerialNumber PhysicalPath)]] -gpl (log address) [pagenum = [(page #)]] [sectorcount = [(sectors)]]</pre>	<pre>ssd dump -destination supportedgpl.bin -ssd 1 -gpl 0 pagenum = 0 sectorcount = 1</pre>
Get Feature	<p>Display the given NVMe feature ID data to the screen.</p>	<pre>show [-help -h] [-display -d (property1,...)] [-all -a] [- output -o (text nvmxml json)] - ssd [(Index SerialNumber PhysicalPat h)] -getfeature (feature id - hex)</pre>	<pre>ssd show -ssd 1 -getfeature 0x2 ssd show -ssd 1 -getfeature 0xa</pre>
HDA Temperature	<p>Display selected drive's HDA Temperature data.</p> <p>ATA only</p>	<pre>show [-help -h] [-output -o (text nvmxml json)] -ssd [(Index SerialNumber PhysicalPath)] -hdateperature</pre>	<pre>ssd show -ssd 1 -hdateperature</pre>
Health (sensor/warning)	<p>Show properties related to device health sensors.</p> <p>Enable Health Critical Warnings.</p>	<pre>show [-help -h] [-display -d (property1,...)] [-all -a] [- output -o (text nvmxml json)] [-ssd [(Index SerialNumber PhysicalPath)]] -sensor set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) smarthealthcriticalwarningsconfigura tion = (0-255)</pre>	<pre>ssd show -ssd 1 -sensor ssd set -ssd 1 - smarthealthcriticalwarningsconf iguration = 255</pre>

Feature	Description	Command Syntax	Example
Help	Display the help string and exit. All other arguments will be ignored.	help [-help -h] [-output -o (text nvmxml json)] [name = (name)] [verb = (verb)]	<pre>sst help name = help sst help verb = help</pre>
Identify	Show the device identify structures. Use the -nvmecontroller and -namespace targets to select specific identify structures for NVMe devices.	<pre>show [-help -h] [-output -o (text nvmxml json)] -identify [-namespace (integer 'attached' 'allocated')] [-nvmecontroller] [-ssd [(Index SerialNumber PhysicalPath)]]</pre>	<pre>sst show -ssd 1 -identify sst show -ssd 1 -identify -namespace 1 sst show -ssd 1 -namespace attached sst show -ssd 1 -namespace allocated</pre>
Latency Monitor	Set Latency Monitor values	<pre>set [-help -h] -source (path) [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) -LatencyMonitor</pre> <p>Set The Latency Monitor feature, add -source file and specify latency monitoring data structure entries in json format as below.</p> <p>Refer to OCP specification for value ranges and bitmasks</p> <pre>"LatencyMonitoringDataStructureEntry" { "ActiveBucketTimerThreshold" : 0, "ActiveThresholdA" : 0, "ActiveThresholdB" : 0, "ActiveThresholdC" : 0, "ActiveThresholdD" : 0, "ActiveLatencyConfiguration": 0x7777, "ActiveLatencyMinimumWindow" : 0, "DebugLogTriggerEnable" : 0x7777, "DiscardDebugLog" : 0, "LatencyMonitorFeatureEnable" : 1 }</pre>	<pre>sst set -source latencydata.json -ssd 1 -LatencyMonitor</pre>

Feature	Description	Command Syntax	Example
Latency Tracking	Display the Latency tracking status.	show [-help -h] [-output -o (text nvxml json)] -latencystatistics ('reads' 'writes') [-ssd [(Index SerialNumber PhysicalPath)]]	sst show -ssd 1 -latencystatistics sst show -ssd 1 -latencystatistics reads
	Enable or disable the device's Latency Tracking feature. Selected drives only	set [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) latencytrackingenabled = (true false)	sst show -ssd 1 -latencystatistics writes sst set -ssd 1 latencytrackingenabled=true
LED Activity	Display the selected drive's LED activity settings.	show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvxml json)] [-ssd [(Index SerialNumber PhysicalPath)]] -led set [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) -led [idlestate = (on off)] [durationbase = (25 50)] [formatonmultiplier = (0-15)] [formatoffmultiplier = (0-15)] [iooffmultiplier = (0-15)] [ioonmultiplier = (0-15)]	sst show -ssd 1 -led sst set -ssd 1 -led idlestate = on sst set -ssd 1 -led durationbase = 25
	Selected drives only		sst set -ssd 1 -led formatonmultiplier = 5 sst set -ssd 1 -led formatoffmultiplier = 5 sst set -ssd 1 -led ioonmultiplier = 5 sst set -ssd 1 -led iooffmultiplier = 5
License	Display the tool's software license.	version [-all -a] [-display -d (property1,...)] [-help -h] [-output -o (text nvxml json)]	sst version -d license
Max Address	Set the drive's maximum LBA value.	set [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) maximumlba = (numgb 1-100% lba 'native')	sst set -ssd 1 maximumlba = native sst set -ssd 1 maximumlba = 50gb sst set -ssd 1 maximumlba = 25%
	Caution: Resizes the drive		sst set -ssd 1 maximumlba = 4097151

Feature	Description	Command Syntax	Example
Namespace (Attach/Create Delete/Detach Notification)	Configure the specified namespace ID to the given controller ID. NVMe only	attach [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - namespace (namespace id) [- nvmecontroller (controller id integer)]	ssd attach -ssd 1 -namespace 1 -nvmecontroller 0
		create [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - namespace size = (blocks) [lbaformat = (0-numlbaformats)] [protectioninformation = (0 1)] [multipathcapabilities = (0 1)]	ssd create -ssd 1 -namespace size = 12345 lbaformat = 0 protectioninformation = 1 multipathcapabilities = 1
		delete [-help -h] [-force -f] [- output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - namespace (namespace id)	ssd delete -ssd 1 -namespace 1 ssd detach -ssd 1 -namespace 1
		detach [-help -h] [-force -f] [- output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - namespace (namespace id)	ssd set -ssd 1 namespaceattributenoticesconf iguration = true
		set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) namespaceattributenoticesconfigurati on = ('true' 'false')	
NCQ Support (Enable/Disable)	Set the NCQ bit in the identify block Limitation: ATA DC S3500 (WL_HD) & S3700 (TV) only command	set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - ncqsupport (enable disable)	ssd set -ssd 1 -ncqsupport enable ssd set -ssd 1 -ncqsupport disable
NLog	Read the NLog binary and save it to the given filename.	dump [-help -h] [-destination (path)] [-output -o (text nvmxml json)] [-ssd [(Index SerialNumber PhysicalPath)]] -nlog	ssd dump -destination nlog_binary.bin -ssd 1 -nlog
NVMe Controller (Show)	Show the devices list of controllers. Use the -namespace target to list controllers attached to that given namespace ID. NVMe only	show [-help -h] [-output -o (text nvmxml json)] [- ssd [(Index SerialNumber PhysicalPat h)]] [-namespace (namespace id)] - nvmecontroller	ssd show -ssd 1 -namespace 1 - nvmecontroller

Feature	Description	Command Syntax	Example
NVMe Get Feature	Show the attributes of the NVMe feature specified (denoted by feature id).	<pre>show [-help -h] [-display -d (property1,...)] [-all -a] [- output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - getfeature (feature id) [-namespace (namespace id)] [select = ('current' 'default' 'saved' 'capabi lities')]</pre>	<pre>ssd show -ssd 1 -getfeature 0x1</pre>
NVMe Format	Issue an NVMe format to the selected drive. To by-pass the prompt, specify the -force option. NVMe only See ConfigureSSDs-NVMeFormat section for details.	<pre>start [-help -h] [-force -f] [- output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - nvmeformat [-namespace (namespace id)] [lbaformat = (0-numlbaformats)] [secureerasesetting = (0 1 2)] [protectioninformation = (0 1)] [metadatasettings = (0 1)]</pre>	<pre>ssd start -ssd 1 -nvmeformat - namespace 1 secureerasesetting = 0</pre>
NVMe Log (Show)	Display the given NVMe log data to the screen or save log binary to file. NVMe only	<pre>show [-help -h] [-output -o (text nvmxml json)] [-ssd [(Index SerialNumber PhysicalPath)]] -nvmelog [('commandeffectslog' 'changednamespacelist' 'errorinfo' 'smarthealthinfo' 'firmwareslotinfo' 'temperaturestatistics' 'queuemetrics', 'performancebooster')]</pre>	<pre>ssd show -ssd 1 -nvmelog smarthealthinfo</pre>
NVMe Reset	Performs an NVMe reset on the targeted NVMe controller	<pre>reset [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - nvmecontroller</pre>	<pre>ssd reset -ssd 1 - nvmecontroller</pre>
NVMe Timestamp	Returns the current timestamp value for the targeted controller. Sets the timestamp value in the controller. Note: Units are in milliseconds.	<pre>showtimestamp: show [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - timestamp</pre> <pre>settimestamp: set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) - timestamp (value)</pre>	<pre>ssd show -ssd 1 -timestamp</pre> <pre>ssd set -ssd 1 -timestamp 0</pre>

Feature	Description	Command Syntax	Example
Performance	Show properties related to device performance metrics.	show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvmxml json)] [-ssd [(Index SerialNumber PhysicalPath)]] -performance	ssd show -ssd 1 -performance
Performance Booster	Boost performance of SSD by flushing cache. User can start, stop, or track progress of cache flushing feature. Selected drives only	start [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) -performancebooster stop [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) -performancebooster show [-help -h] [-output -o (text nvmxml json)] [-ssd [(Index SerialNumber PhysicalPath)]] -nvmelog [['commandeffectlogslog' 'changednamespacelist' 'errorinfo' 'smarthhealthinfo' 'firmwareslotinfo' 'temperaturestatistics' 'queuemetrics' 'performancebooster']]	sst start -ssd 1 -performancebooster sst stop -ssd 1 -performancebooster sst show -ssd 1 -performancebooster
Phy Speed Configuration	Display the PHY Counters data to the screen. Set the drive's PHY settings. Set the drive's negotiated Serial ATA signal speed. ATA only	show [-help -h] [-output -o (text nvmxml json)] -phycounters [-ssd [(Index SerialNumber PhysicalPath)]] set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) phyconfig = (0 1 2 3) set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) physpeed = (1.5 3 6)	sst show -phycounters -ssd 1 sst set -ssd 1 phyconfig = 1 sst set -ssd 1 physpeed = 1.5
Physical Sector Size	Display the selected drives physical sector size to the screen. ATA only Caution: Changes drive sector size	set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) physicalsectorsize = (512 4096)	ssd set -ssd physicalsectorsize = 512

Feature	Description	Command Syntax	Example
PLI Test Time Interval	Display the selected drive's PLI test time interval, and option flag. ATA only	<pre>show [-help -h] [-display -d (property1,...)] [-all -a] [- output -o (text nvxml json)] -ssd [(Index SerialNumber PhysicalPath)] set [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) plitesttimeinterval = (0-6)</pre>	<pre>sst show -d plitesttimeinterval -ssd 1 sst set -ssd 1 plitesttimeinterval = 2</pre>
PLP Check	Set PLP Interval and show PLP Check Value	<pre>sst set [help {}h] [{-}output - o (text nvxml json0)] [- ssd [index serialNumber PhysicalPath]] -PLPCheck PLPCheckInterval = (interval value) sst show [help {}h] [{-}output -o (text nvxml json0)] [- ssd [index serialNumber PhysicalPath]] -PLPCheck [Select = ('current' 'default' 'saved' 'capabilities')]</pre>	<pre>sst set -ssd 1 -PLPCheck PLPCheckInterval=20 sst show -ssd 1 -PLPCheck Select=current</pre>
Power Governor Average	Display the selected drive's power governor average power setting.	<pre>show [-help -h] [-display -d (property1,...)] [-all -a] [- output -o (text nvxml json)] -ssd [(Index SerialNumber PhysicalPath)]</pre>	<pre>sst show -d powergovernoraveragepower -ssd 1</pre>
Power Governor (Burst/Mode)	Display the selected drive's power governor burst power setting. Set the device's Power Governor Mode. Supports SATA and NVMe devices.	<pre>show [-help -h] [-display -d (property1,...)] [-all -a] [- output -o (text nvxml json)] -ssd [(Index SerialNumber PhysicalPath)] set [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) powergovernormode = (0 1 2)</pre>	<pre>sst show - d powergovernorburstpower -ssd 1 sst show -d powergovernormode - ssd 1</pre>
Psid Revert	Issue a PSID revert to an Opal activated device. Caution: Erases your password if forgotten. Data loss	<pre>start [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) - psidrevert (psid)</pre>	<pre>sst start -ssd 1 -psidrevert 987654321</pre>
Read System Snapshot	Read the system snapshot from the device and save it to a binary file.	<pre>dump [-help -h] [-destination (path)] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) - systemsnapshot</pre>	<pre>sst dump -ssd 1 -systemsnapshot</pre>

Feature	Description	Command Syntax	Example
Sanitize	Erase all accessible storage.	<pre>start [-help -h] [-force -f] [-output -o (text nvmlxml json)] -ssd (Index SerialNumber PhysicalPath) -sanitize [(block crypto overwrite exit_failure)] [nodeallocateaftersanitize = (true false)] [overwriteinvertpattern = (true false)] [overwritepasscount = (integer)] [allowunrestrictedexit = (true false)] [overwritepattern = (32-bit hex pattern)] [returnimmediately = (true false)]</pre>	<pre>ssd start -ssd 1 -sanitize</pre>
Secure Erase (ATA Secure Erase)	Secure Erase data on the selected drive. ATA only	<pre>start [-help -h] [-output -o (text nvmlxml json)] [-ssd (Index SerialNumber PhysicalPath)] -secureerase secureerase</pre>	<pre>ssd start -ssd 1 -secureerase</pre>
Self Test	Execute a drive self-test routine on the selected drive.	<pre>start [-help -h] [-output -o (text nvmlxml json)] -ssd (Index SerialNumber PhysicalPath) -selftest [('short' 'extended' 'conveyance')] ssd show [help -h] [-output -o (text nvmlxml json)] [-ssd [index serialNumber PhysicalPath]] -selftest</pre>	<pre>ssd start -ssd 1 -selftest short ssd show -ssd 1 -selftest</pre>
Smart	Display selected drive's SMART data to the screen.	<pre>show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvmlxml json)] -smart sst show -smart -ssd 1 [(id)] [-ssd [(Index SerialNumber PhysicalPath)]]</pre>	
SMBus Address	Display the selected drive's SM bus address. NVMe only Caution: May lock system if conflicting address set.	<pre>show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvmlxml json)] -ssd [(Index SerialNumber PhysicalPath)] set [-help -h] [-output -o (text nvmlxml json)] -ssd (Index SerialNumber PhysicalPath) smbusaddress = (address)</pre>	<pre>ssd show -d smbusaddress -ssd 1 ssd set -ssd 1 smbusaddress = 106</pre>

Feature	Description	Command Syntax	Example
Spread Spectrum Clocking (Disable/Enable)	Disable/Enable the drive's spread spectrum clocking feature. ATA only	set [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) sscenabled = ('true' 'false')	ssd set -ssd 1 sscenabled = false ssd set -ssd 1 sscenabled = true
Standby Immediate	Send an ATA Standby Immediate command to the selected drive. This will prepare the drive for a power cycle. ATA only	start [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) -standby	ssd start -ssd 1 -standby
Telemetry	Read the Telemetry Log binary and save it to the given filename. Configure log notification.	dump [-help -h] [-destination (path)] [-output -o (text nvxml json)] [-ssd ((Index SerialNumber PhysicalPath))] -telemetrylog set [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) telemetrylognoticesconfiguration = ('true' 'false')	ssd dump -destination telemetry_data.bin -ssd 1 -telemetrylog
Temperature Logging Interval	Display the selected drive's temperature logging interval time, and option flag. ATA only	show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvxml json)] -ssd ((Index SerialNumber PhysicalPath)) set [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) temperaturelogginginterval = (time)	ssd show -d temperaturelogginginterval -ssd 1 ssd set -ssd 1 temperaturelogginginterval = 2
Temp Threshold (Set)	Set the drives temperature threshold value. NVMe only Caution: If set incorrectly could overheat drive.	set [-help -h] [-output -o (text nvxml json)] -ssd (Index SerialNumber PhysicalPath) tempthreshold = (value)	ssd set -ssd 1 tempthreshold = 65

Feature	Description	Command Syntax	Example
Thermal Throttle	Display the Thermal Throttle status. Optional parameter is used to enable/disable thermal throttling.	<pre>show [-help -h] [-display -d (property1,...)] [-all -a] [- output -o (text nvmlxml json)] -ssd [(Index SerialNumber PhysicalPath)] set [-help -h] [-output -o (text nvmlxml json)] -ssd (Index SerialNumber PhysicalPath) thermalthrottleenabled = ('true' 'false')</pre>	<pre>sst show -d thermalthrottleenabled -ssd 2 sst set -ssd 2 thermalthrottleenabled = false</pre>
Trim	Trim the device. Specify what to trim by specifying the StartLBA and Count properties. WARNING: This command will make your data inaccessible!	<pre>start [-help -h] [-force -f] [- output -o (text nvmlxml json)] -ssd (Index SerialNumber PhysicalPath) - trim startlba = (integer) count = (integer)</pre>	<pre>sst start -ssd 1 -trim startlba = 0 count = 1024</pre>
UUID	Feature to show Universally Unique Identifier data	<pre>sst show [help -h] [-output -o (text nvmlxml json0)] [-ssd [index serialNumber PhysicalPath]] - identify uuidlist dump [-help -h] -destination (path) [-output -o (text nvmlxml json)] [- ssd (Index SerialNumber PhysicalPath)] - identify -uuidlist</pre>	<pre>sst show -ssd 1 -identify uuidlist sst dump -destination targetfile.bin -ssd 1 -identify uuidlist</pre>

Feature	Description	Command Syntax	Example
Workload Tracker		Set Workload data properties: set [-help -h] [-output -o (text nvmm1 json)] -ssd (Index SerialNumber PhysicalPath) WorkloadTrackerEnable = (value) [LogGroup = (value [0..6])] [SampleTime = (value)]	
		LogGroup Values (0-6): 0 = G0 Misalignment (default) 1 = CmdQ Stats 2 = Internal Only 3 = Random vs.Sequential Data 4 = Detailed Throttle Data 5 = Detailed Power Data 6 = Defrag status	sst set -ssd 1 WorkloadTrackerEnable = true LogGroup = 6 SampleTime=3
	Feature to track set of key workload data. Set Workload Tracker feature properties and threshold.	SampleTime Values (1-15): 0 = Default 1 = 1ms 2 = 5ms 3 = 10ms 4 = 50ms 6 = 500ms 7 = 1sec 8 = 5sec 9 = 10sec 10 = 30sec 11 = 1min 12 = 5min 13 = 10min 14 = 30min 15 = 1Hr	
	See: Workload Tracker Logs to get data NVMe Only Selected drives Only	Set Feature Threshold: set [-help -h] [-output -o (text nvmm1 json)] -ssd (Index SerialNumber PhysicalPath) WorkloadTrackerThreshold = (value in percentage)	sst set -ssd 1 WorkloadTrackerThreshold = 90
		Disable the Feature: set [-help -h] [-output -o (text nvmm1 json)] -ssd (Index SerialNumber PhysicalPath) WorkloadTrackerEnable = false	sst set -ssd 1 WorkloadTrackerEnable = false

Feature	Description	Command Syntax	Example
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Workload Tracker Log	Get Workload Feature logs	Get Log: show [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) -nvmelog WorkloadTrackerLog	ssd show -ssd 1 -nvmelog WorkloadTrackerLog
	Timed Log: Get time elapsed log in CSV format for specified time and interval	Get Timed Log: dump [-help -h] [-destination (path)] [-output -o (text nvmxml json)] [-ssd [(Index SerialNumber PhysicalPath)]] - WorkloadLogTime = (value in seconds) WorkloadLogInterval = (value in seconds)	ssd dump -destination WorkloadLog.csv -ssd 1 WorkloadLogTime=5 WorkloadLogInterval=2
	NVMe Only		
	Selected drives Only		

Write Cache (Disable/Enable Reordering State)	Display/Disable/Enable drive's write cache/cache reordering statefeature	show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvmxml json)] -ssd [(Index SerialNumber PhysicalPath)] set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) writecachestate = (1 2 3)	ssd show -d writecacheenabled -ssd 1 ssd set -ssd 1 writecachestate = 1
		set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) writecacheenabled = ('true' 'false')	ssd set -ssd 1 writecacheenabled = false ssd set -ssd 1 writecacheenabled = true
	ATA only	show [-help -h] [-display -d (property1,...)] [-all -a] [-output -o (text nvmxml json)] -ssd [(Index SerialNumber PhysicalPath)] set [-help -h] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) writecachereorderingstateenabled = ('true' 'false')	ssd show -d writecachereorderingstateenabled -ssd 1 ssd set -ssd 1 writecachereorderingstateenabled = true

Feature	Description	Command Syntax	Example
Write Same	<p>Issue SCT Write Same command to the selected drive. The start LBA, number of sectors, and data pattern must be specified. The tool will prompt prior to issuing the Write Same command.</p> <p>Caution: Overwrites sectors on drive with a HEX pattern.</p>	<pre>start [-help -h] [-force -f] [-output -o (text nvmxml json)] -ssd (Index SerialNumber PhysicalPath) -writesame [Count = (sectors)] [HexPattern = (0x00 - 0xFFFFFFFF)] [LBA = (0-Max LBA)]</pre>	<pre>sst start -ssd 1 -writesame Count = 5 LBA = 0 HexPattern = 0x0000ABAB</pre>

Notes on device target options:

- In Windows, device can be targeted with BootDrive option in addition to Index|SerialNumber|PhysicalPath
- PhysicalPath option may not work with some Linux distributions.

3 Feature Details

3.1 Show Device Information

This section provides different options to retrieve device related information.

3.1.1 Show Device List

Show information about one or more SSD devices.

Generally, this command is run as a first step to get list of devices attached and get device index.

3.1.1.1 Syntax

```
sst show [-help|-h] [-output|-o (text|nvmlxml|json)] -ssd
[(Index|SerialNumber|PhysicalPath)]
```

3.1.1.2 Options

Option	Description
[-display -d]	Filters the returned properties by explicitly specifying a comma separated list of any of the properties defined in the Return Data section.
[-help -h]	Displays help for the command.
[-output -o (text nvmlxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.1.1.3 Targets

Target	Description
-ssd [(Index SerialNumber PhysicalPath BootDrive)]	Restricts output to specific SSD by supplying the device's Index or Serial Number. By default, the command displays all SSDs. BootDrive option available in Windows only.

3.1.1.4 Properties

This command does not support any properties

3.1.1.5 Examples

Lists all the devices attached to the system. Basic/default properties are displayed for each device.

```
sst show -ssd
```

Lists basic default information for drive at index 0

```
sst show -ssd 0
```

3.1.1.6 Sample output

Default show output for -ssd target in default text format

```
>sst.exe show -ssd
- Intel SSD DC P3608 Series CVF85156007H400AGN-2 -

Bootloader : 8B1B0131 {
DevicePath : \\.\PHYSICALDRIVE1 {
DeviceStatus : Healthy {
Firmware : 8DV10171 {
FirmwareUpdateAvailable : The selected drive contains current firmware as of this tool
release. {
Index : 0 {
ModelNumber : INTEL SSDPECME400G4 {
ProductFamily : Intel SSD DC P3608 Series {
SerialNumber : CVF85156007H400AGN-2
```

Default show output for -ssd target in JSON format

```
>sst.exe show -o json -ssd
{
  "Intel SSD DC P3608 Series CVF85156007H400AGN-2":
  {
    "Bootloader":"8B1B0131",
    "DevicePath":"\\.\PHYSICALDRIVE1",
    "DeviceStatus":"Healthy",
    "Firmware":"8DV10171",
    "FirmwareUpdateAvailable":"The selected drive contains current firmware as of this
tool release.",
    "Index":0,
    "ModelNumber":"INTEL SSDPECME400G4",
    "ProductFamily":"Intel SSD DC P3608 Series",
    "SerialNumber":"CVF85156007H400AGN-2"
```

3.1.2 Show Device Data

Show detailed information about one or more SSD devices.

3.1.2.1 Syntax

```
sst show [-all|-a] [-display|-d] [-help|-h] [-output|-o (text|nvmlxml|json)] -ssd
[(Index|SerialNumber|PhysicalPath)]
```

3.1.2.2 Options

Option	Description
[-all -a]	Shows all properties.
[-display -d]	Filters the returned properties by explicitly specifying a comma separated list of any of the properties defined in the Return Data section.
[-help -h]	Displays help for the command.
[-output -o (text nvmlxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.1.2.3 Targets

Target	Description
-ssd [(Index SerialNumber PhysicalPath Bootdrive)]	<p>Restricts output to specific SSD by supplying the device's Index or Serial Number. By default, the command displays all SSDs.</p> <p>For Windows, Boot drive option can be used to target the boot drive.</p>

3.1.2.4 Properties

This command does not support any properties.

3.1.2.5 Return Data

By default, a table is displayed with the following default properties. Use the options to show more detail.

Property	Description
AccessibleMaxAddressSupported	(For ATA devices only) True if the devices support the accessible max address commands (Identify device Word 103 bit 8).
AggregationThreshold	(For NVMe devices only) Shows the minimum number of completion queue entries to aggregate per interrupt vector before signaling an interrupt to the host. This value is zero-based.
AggregationTime	(For NVMe devices only) Shows the recommended maximum time in 100 microsecond increments that a controller may delay an interrupt due to interrupt coalescing.
ArbitrationBurst	(For NVMe devices only) Shows the maximum number of commands that the controller may launch at one time. This value is specified in 2 ⁿ . A value of 7 indicates no limit.
AsynchronousEventConfiguration	(For NVMe devices only) Determines whether an asynchronous event notification is sent to the host for the corresponding Critical Warning specified in the SMART / Health Information Log.
Bootloader	(Default; For NVMe devices only, if present) Return the devices Bootloader Revision.
BusType	(Windows OS only) The bus type value determined by Windows.
ControllerDescription	(Currently in Windows OS only) Shows a description of the controller the device is attached to.
ControllerID	(Windows OS only) The ID value of the device controller found in the Windows OS registry.
ControllerIDEMode	Shows if the controller the device is attached to is in IDE mode. Returns either True or False.
ControllerManufacturer	(Currently in Windows OS only) The manufacturer of the controller that the device is attached to.
ControllerService	(Currently in Windows OS only) Displays the controller driver sys file that the attached device is connected to.
DigitalFenceSupported	(For ATA devices only) True if the device supports the Digital Fence feature.

Property	Description
DIPMEnabled	(For ATA devices only) True if the device has DIPM enabled (Identify device Word 79 bit 3).
DIPMSupported	(For ATA devices only) True if the device supports DIPM (Identify device Word 78 bit 3).
DevicePath	(Default) The OS path to the device (i.e. \\.\PhysicalDrive0).
DeviceStatus	(Default) Report the device's status. In the current implementation this will look at ErrorString and if it is empty it will report "Healthy" otherwise it will report the value of ErrorString.
DriverCommunicationError	(Default; if present) This reports if the tool detected a potential error with communicated with the driver the device is connected to. For example, the tool will detect an error if the Server 2012 R2* system is using the in-box NVMe driver from Microsoft*. SST does not support communication with that driver.
DriverDescription	Description of the controller driver that the device is attached to. Currently in Windows OS only.
DriverMajorVersion	Major version of the controller driver that the device is attached to. Currently in Windows OS only.
DriverManufacturer	Manufacturer of the controller driver that the device is attached to. Currently in Windows OS only.
DriverMinorVersion	Minor version of the controller driver that the device is attached to. Currently in Windows OS only.
EnduranceAnalyzer	The drives life expectancy in years. This utilizes the 0xE2, 0xE3 and 0xE4 SMART attributes. If these SMART attributes have a value of 0xFFFF then they are still in the reset state and a 60+ minute workload (per 240GB) has yet to run. If the media wear indicator is zero, then the workload has not induced enough wear to calculate an accurate life expectancy.
ErrorString	Shows a description of the error state of the drive. NOTE: The drive is not in an error state if the value is blank.
Firmware	(Default) Shows the firmware revision of the device.
FirmwareUpdateAvailable	(Default) Shows the firmware revision available for update. Firmware updates are carried within the tool as a "payload" binary for each supported drive. Tool reports 'Firmware is up to date as of this tool release' if the device's firmware is up to date.
HighPriorityWeightArbitration	(For NVMe devices only) Shows the number of commands that can be executed from the high priority services class in each arbitration round. This is a 0's based value.
IEEE1667Supported	(For ATA devices only) Shows if the IEEE1667 protocol is supported. Reports True or False.
Index	(Default) Shows the SSD device index, used for device selection.
SolidigmGen3SATA	True if the device is a Solidigm™ (formerly Intel®) SATA SSD.
SolidigmNVMe	True if the device is a Solidigm™ (formerly Intel®) NVMe SSD.
IOCompletionQueuesRequested	(For NVMe devices only) Shows the number of IO Completion Queues requested.

Property	Description
IOSubmissionQueuesRequested	(For NVMe devices only) Shows the number of IO Submission Queues requested.
LatencyTrackingEnabled	Shows if the latency tracking feature of the drive is enabled (True) or disabled (False).
LBAFormat	(For NVMe devices only) Shows the LBA Format that the drive is configured with. This has a possible value of 0 to 'NumLBAFormats'. Details of the different LBA formats can be found in Identify Namespace. This value can be changed by NVMe format.
LowPriorityWeightArbitration	(For NVMe devices only) Shows the number of commands that can be executed from the low priority services class in each arbitration round. This is a 0's based value.
MaximumLBA	Shows the devices maximum logical block address.
MediumPriorityWeightArbitration	(For NVMe devices only) Shows the number of commands that can be executed from the medium priority services class in each arbitration round. This is a 0's based value.
MetadataSetting	<p>(For NVMe devices only) Shows the device's Metadata setting. One of either:</p> <ul style="list-style-type: none"> 0: Metadata is transferred as part of a separate contiguous buffer. 1: Metadata is transferred as part of an extended data LBA. <p>This can be changed by issuing an NVMe format.</p>
ModelNumber	(Default) Shows the model number assigned to the device.
NamespaceId	(For NVMe devices only) Shows the value of the namespace ID of the device if it has one. The namespace must be allocated and attached.
NativeMaxLBA	Shows the devices native maximum logical block address set in manufacturing. This value cannot be changed. It represents the physical maximum number of LBAs for the device.
NumErrorLogPageEntries	(For NVMe devices only) Shows the number of Error Information log entries that are stored by the controller. This value is zero-based.
NumLBAFormats	(For NVMe devices only) Shows the number of different LBA Formats the device supports. This value is zero-based. For example, a value of 6 means there are 0 to 6 possible LBA Formats (7 total).
NVMeControllerID	(For NVMe devices only) The value of the NVMe controller ID found in the NVMe identify controller structure.
NVMePowerState	(For NVMe devices only) Shows the power state of the controller. Supported power states are described in the Identify Controller data structure. This is an NVMe Get Feature (feature ID=2)
NVME_1_0_Supported	(For NVMe devices only) True if the device supports the NVMe 1.0 command specification.
NVME_1_2_Supported	(For NVMe devices only) True if the device supports the NVMe 1.2 command specification.
PCILinkGenSpeed	(For NVMe devices only) The devices PCI Gen speed.
PCILinkWidth	(For NVMe devices only) The devices PCI link width. E.g. 4 or 8

Property	Description
PhyConfig	<p>(For ATA devices only) Shows the devices PHY Configuration. One of the following:</p> <ul style="list-style-type: none"> 0: Default enterprise settings 1: Client settings 2: Alternate enterprise settings
PhysicalSectorSize	<p>(For ATA devices only) Shows the physical sector size in bytes. One of either:</p> <ul style="list-style-type: none"> 512 4096
PhysicalSize	The physical size of the device in bytes. Value is in decimal format.
PhySpeed	<p>(For ATA devices only) Shows the maximum physical speed (in gigabits-per-second) of the device. One of the following:</p> <ul style="list-style-type: none"> 1.5 3 6
PLITestTimeInterval	<p>(For ATA devices only) Shows the PLI Test Time interval in minutes of the device. One of:</p> <ul style="list-style-type: none"> 0: 0 min, no immediate test. 1: 0 min, do immediate test. 2: 60 min, do immediate test. 3: 1440 min, do immediate test. 4: 4320 min, do immediate test. 5: 10080 min, do immediate test. 6: 20160 min, do immediate test.
PNPString	(Windows OS only) The devices PNP String from the Windows registry.
ProductProtocol	The devices protocol e.g. ATA or NVME.
PowerGovernorAveragePower	(For ATA devices only) Shows the device's power governor average power in milliwatts.
PowerGovernorBurstPower	(For ATA devices only) Shows the device's power governor burst power in milliwatts.
PowerGovernorMode	<ul style="list-style-type: none"> Shows the devices' Power Governor state. 0: 25-watts for PCIe NVMe devices; 40W for PCIe NVMe x8 devices; Unconstrained for SATA devices. 1: 20-watts for PCIe NVMe devices; 35W for PCIe NVMe x8 devices; Typical (7-watts) for SATA devices. 2: 10-watts for PCIe NVMe devices; 25W for PCIe NVMe x8 devices; Low (5-watts) for SATA devices.
ProductFamily	(Default) Shows the SSD Series name.
ProtectionInformation	<p>(For NVMe devices only) Shows the device's protection information type setting. One of:</p> <ul style="list-style-type: none"> 0: Protection information is not enabled. 1: Protection information type 1 is enabled. <p>This can be changed by issuing an NVMe format.</p>

Property	Description
ProtectionInformationLocation	<p>(For NVMe devices only) Shows the device's protection information location setting. One of:</p> <ul style="list-style-type: none"> 0: Protection information is transferred as the last 8 bytes of metadata. 1: Protection information is transferred as the first 8 bytes of metadata.
RAIDMember	Shows if the device is part of a RAID. Currently only support RST RAID drivers and LSI Mega RAID.
ReadErrorRecoveryTimer	(For ATA devices only) Shows the time limit for read error recovery. Time limit is in 100 millisecond units.
SanitizeBlockEraseSupported	(For ATA devices only) True if the device supports the Sanitize block erase command (Identify device Word 59 bit 15).
SanitizeCryptoScrambleSupported	(For ATA devices only) True if the device supports the Sanitize crypto scramble command (Identify device Word 59 bit 13).
SanitizeSupported	(For ATA devices only) True if the device supports the Sanitize feature (Identify device Word 59 bit 12).
SataGen1	(For ATA devices only) Shows if the device supports SATA Gen 1 speed. Reports True or False.
SataGen2	(For ATA devices only) Shows if the device supports SATA Gen 2 speed. Reports True or False.
SataGen3	(For ATA devices only) Shows if the device supports SATA Gen 3 speed. Reports True or False.
SataNegotiatedSpeed	<p>(For ATA devices only) Coded value indicating current negotiated SATA signal speed. One of:</p> <ul style="list-style-type: none"> 1: SATA Gen1 rate of 1.5 Gbps 2: SATA Gen2 rate of 3 Gbps 3: SATA Gen3 rate of 6 Gbps
SCSIPortNumber	(Windows OS only) The port number of the SCSI path used by Windows.
SectorSize	Shows the sector size in bytes.
SecurityEnabled	(For ATA devices only) Shows if the device is in security enabled state. Reports True or False.
SecurityFrozen	(For ATA devices only) Shows if the device is in security frozen state. Reports True or False.
SecurityLocked	(For ATA devices only) Shows if the device is security locked. Reports True or False.
SecuritySupported	(For ATA devices only) True if the devices supports ATA Security feature (Identify device Word 128 bit 0).
SerialNumber	(Default) Shows the serial number assigned to the device.
SMARTEnabled	Shows if SMART capabilities are enabled on the device. Reports True or False.
SMARTSelfTestSupported	(For ATA devices only) True if the device supports the drive self-test feature (Identify device Word 84 bit 1).
SMBusAddress	(For NVMe devices only) Shows the SM Bus address of the drive. Value of 255 means the SM Bus is disabled.

Property	Description
SSCEnabled	(For ATA devices only) Shows if the device has spread spectrum clocking enabled or not. Reports True or False.
StorageSpaceMember	Shows if the device is a Windows Storage Space member.
TemperatureLoggingInterval	(For ATA devices only) Shows the time interval for temperature logging.
TempThreshold	(For NVMe devices only) Shows the temperature threshold of the overall device. Units are in Celsius.
TimeLimitedErrorRecovery	(For NVMe devices only) Shows the limited retry timeout value in 100 millisecond units. This applies to I/O commands that indicate a time limit is required. A value of 0 indicates that there is no timeout.
TrimSupported	True if the device supports Trim feature.
VolatileWriteCacheEnabled	(For NVMe devices only) True if the volatile write cache is enabled.
WriteAtomicityDisableNormal	(For NVMe devices only) Shows the atomic write status. One of: <ul style="list-style-type: none"> 0: If cleared to '0', the atomic write unit for normal operation shall be honored by the controller. 1: The host specifies that the atomic write unit for normal operation is not required and the controller shall only honor the atomic write unit for power fail operations.
WriteCacheEnabled	(For ATA devices only) Shows if the device has write cache enabled. Reports True or False.
WriteCacheState	(For ATA devices only) Shows the device's write cache state. One of: <ul style="list-style-type: none"> 1: Write cache state is determined by ATA Set Features 2: Write cache is enabled. 3: Write cache is disabled.
WriteCacheSupported	(For ATA devices only) Shows if the device supports write cache capabilities. Reports True or False.
WriteErrorRecoveryTimer	(For ATA devices only) Shows the time limit for write error recovery in 100 millisecond units.
WriteCacheReorderingStateEnabled	(For ATA devices only) True if the write cache reordering state is enabled on the SATA device.

3.1.2.6 Examples

Lists basic properties for the SSD devices at index 1.

```
sst show -a -ssd 1
```

3.1.2.7 Sample Output

Default show output for –ssd target in default text format

```
>sst.exe show -ssd
- Intel SSD DC P3608 Series CVF85156007H400AGN-2 -

Bootloader : 8B1B0131 {
DevicePath : \\.\PHYSICALDRIVE1 {
DeviceStatus : Healthy {
Firmware : 8DV10171 {
FirmwareUpdateAvailable : The selected drive contains current firmware as of this tool
release. {
```



```
Index : 0 {
  ModelNumber : INTEL SSDPECME400G4 {
  ProductFamily : Intel SSD DC P3608 Series {
  SerialNumber : CVF85156007H400AGN-2
```

Default show output for `-ssd` target in JSON format

```
>sst.exe show -o json -ssd
{
  "Intel SSD DC P3608 Series CVF85156007H400AGN-2":
  {
    "Bootloader":"8B1B0131",
    "DevicePath":"\\\\.\\PHYSICALDRIVE1",
    "DeviceStatus":"Healthy",
    "Firmware":"8DV10171",
    "FirmwareUpdateAvailable":"The selected drive contains current firmware as of this
tool release.",
    "Index":0,
    "ModelNumber":"INTEL SSDPECME400G4",
    "ProductFamily":"Intel SSD DC P3608 Series",
    "SerialNumber":"CVF85156007H400AGN-2"
  }
}
```

3.1.3 Show Health Sensors

The `show -sensor` command shows the health sensor properties of one or more SSDs.

3.1.3.1 Syntax

```
sst show [-all|-a] [-display|-d] [-help|-h] [-output|-o (text|nvmlxml|json)] -sensor [-ssd
(Index|SerialNumber|PhysicalPath)]
```

3.1.3.2 Options

Option	Description
<code>[-all -a]</code>	Show all properties.
<code>[-display -d]</code>	Filters the returned properties by explicitly specifying a comma separated list of any of the properties defined in the Return Data section.
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvmlxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.1.3.3 Targets

Target	Description
<code>-sensor</code>	Displays the health related properties for device(s).
<code>[-ssd (Index SerialNumber PhysicalPath)]</code>	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number. The default is to display sensors for all manageable SSDs.

3.1.3.4 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software.

3.1.3.5 Return Data

The command displays the following properties for each sensor command option. This output could be filtered by specifying the Properties with the `-display` option. It can be further filtered by specifying the ID property.

Note: Some health sensor properties are not supported some devices.

Property	Description
AvailableSpare	(NVMe Devices Only). Percentage (0 to 100%) of the remaining spare capacity available.
AverageNandEraseCycles	Average number of NAND erase cycles for all blocks.
CrcErrorCount	Total number of interface (SATA or NVMe) CRC errors.
EndToEndErrorDetectionCount	Total number of end to end detected errors.
EnduranceAnalyzer	Reports the expected drive life in years.
EraseFailCount	Total number of raw erase fails.
ErrorInfoLogEntries	(NVMe Devices Only). Number of entries in the Error Info Log page over the life of the controller.
HighestLifetimeTemperature	(NVMe Devices Only). The highest lifetime temperature (in Celsius) of the device.
LowestLifetimeTemperature	(NVMe Devices Only). The lowest lifetime temperature (in Celsius) of the device.
MaxNandEraseCycles	Max number of NAND erase cycles for all blocks.
MediaErrors	(NVMe Devices Only). Number of times where the controller detected an unrecovered data integrity error.
MinNandEraseCycles	Min number of NAND erase cycles for all blocks.
PercentageUsed	Estimate of the percentage of life used of the device.
PowerCycles	(NVMe Devices Only). Number of power cycles.
PowerOnHours	Contains the number of power on hours of the device.
ProgramFailCount	Total number of raw program fails.
SpecifiedPCBMaxOperatingTemp	(NVMe Devices Only). Specified PCB maximum operating temperature in degrees C.
SpecifiedPCBMinOperatingTemp	(NVMe Devices Only). Specified PCB minimum operating temperature in degrees C.
Temperature	Total temperature of the device in degrees C
ThermalThrottleCount	The total number of times thermal throttle has been activated.
ThermalThrottleStatus	The amount that Thermal Throttle that is applied. A value of zero is no throttle. 100 is 100% throttling applied.
UnsafeShutdowns	Reports the number of unsafe shutdowns over the life of the device.

3.1.3.6 Examples

Default show output for `--sensor` target in default text format.

```
>sst.exe show --sensor
- Intel SSD DC P3608 Series CVF85156007H400AGN-2 -

AvailableSpare : 100
AverageNandEraseCycles : 1
CrcErrorCount : 0
DeviceStatus : Healthy
EndToEndErrorDetectionCount : 0
EnduranceAnalyzer : Media Workload Indicators have reset values. Run an hour or more
workload (per 240GB) prior to running the endurance analyzer.
EraseFailCount : 0
ErrorInfoLogEntries : 0x00
HighestLifetimeTemperature : 53
LowestLifetimeTemperature : 16
MaxNandEraseCycles : 3
MediaErrors : 0x00
MinNandEraseCycles : 0
PercentageUsed : 0
PowerCycles : 0x01F
PowerOnHours : 0x0667
ProgramFailCount : 0
SpecifiedPCBMaxOperatingTemp : 85
SpecifiedPCBMinOperatingTemp : 0
Temperature : 317
ThermalThrottleCount : 0
ThermalThrottleStatus : 0
UnsafeShutdowns : 0x05
```

Note: Specified the ID property to limit the output.

3.1.4 Show SMART

The `show --smart` command shows the SMART attributes for one or more SSDs.

3.1.4.1 Syntax

```
sst show [-all|-a] [-display|-d] [-help|-h] [-output|-o (text|nvmlxml|json)] --smart [(id)]
[-ssd (Index|SerialNumber|PhysicalPath)] IncludeNVMeSmartHealthLog=(true|false)
```

3.1.4.2 Options

Option	Description
<code>[-all -a]</code>	Show all properties.
<code>[-display -d]</code>	Filters the returned properties by explicitly specifying a comma separated list of any of the properties defined in the Return Data section.
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvmlxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.1.4.3 Targets

Target	Description
<code>-smart [(id)]</code>	Displays SMART attributes for device(s). Specific SMART attributes can be selected if (id) is given.
<code>[-ssd (Index SerialNumber PhysicalPath)]</code>	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number. The default is to display sensors for all manageable SSDs.

3.1.4.4 Properties

Property	Description
<code>IncludeNVMeSmartHealthLog=(true false)</code>	Determines whether to return NVMe SMART health log attributes in addition to standard SMART attributes. Default is false. Supported for NVMe only.

3.1.4.5 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software.

3.1.4.6 Return Data

The command displays the following properties for each SMART attribute. This output could be filtered by specifying the Properties with the `-display` option.

Note: Some optional properties are not supported on all device sensors and SMART Attributes F4/F5 are reported in Bytes.

Property	Description
Action	(Optional) Shows the Pass/Fail status based on the Pre-failure/advisory status bit.
Description	Shows a string representation of the ID token. The SMART Attribute ID token.
ID	Smart ID: 03, 04, 05, 0C, AA, B8, BB, C1, E2, E9, F2 Not all drives have the same SMART Id's
Normalized	Shows the normalized value of the SMART attribute.
Raw	Shows the raw value of the SMART Attribute. Value is in decimal.
Status	(Optional) Shows the status flags for the SMART attribute: <ul style="list-style-type: none"> • Bit 0 Pre-failure/advisory bit • Bit 1 Online data collection • Bit 2 Performance attribute • Bit 3 Error rate attribute • Bit 4 Event count attribute • Bit 5 Self-preserving attribute • Bits 6 – 15 Reserved
Threshold	(Optional) Shows the SMART Attributes threshold value.
Worst	(Optional) Shows the SMART attributes worst normalized value. Maintained for the life of the device.

3.1.4.7 Examples

Default show output for `-smart` target in default text format.

```
>sst.exe show -smart E9
- SMART Attributes CVLV119200C4300DGN -

- E9 -

Action : Pass
Description : Media Wearout Indicator
ID : E9
Normalized : 100
Raw : 0
Status : 50
Threshold : 0
Worst : 100
```

Note: Specified the ID property to limit the output.

Default show output for `-smart` target in JSON format.

```
>sst.exe show -o json -smart E9
{
  "SMART Attributes CVLV119200C4300DGN":
  {
    "E9":
    {
      "Action":"Pass",
      "Description":"Media Wearout Indicator",
      "ID":"E9",
      "Normalized":100,
      "Raw":0,
      "Status":50,
      "Threshold":0,
      "Worst":100
    }
  }
}
```

Note: Specified the ID property to limit the output I.

Show all the properties of the SMART E9 Attribute for the SSD at Index 1.

```
show -smart E9 -ssd 1
```

Shows only the raw value of the SMART E9 Attribute for all SSDs.

```
sst show -d raw -smart E9
```

3.1.5 Show Performance Metrics

The show –performance command shows the performance metrics for one or more SSDs.

3.1.5.1 Syntax

```
sst show [-all|-a] [-display|-d] [-help|-h] [-output|-o (text|nvmxml|json)] -performance [-ssd (Index|SerialNumber|PhysicalPath)]
```

3.1.5.2 Options

Option	Description
[-all -a]	Show all properties.
[-display -d]	Filters the returned properties by explicitly specifying a comma separated list of any of the properties defined in the Return Data section.
[-help -h]	Displays help for the command.
[-output -o (text nvmxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.1.5.3 Targets

Target	Description
-performance	Displays performance metrics for device(s).
[-ssd (Index SerialNumber PhysicalPath)]	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number. The default is to display sensors for all manageable SSDs.

3.1.5.4 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software.

3.1.5.5 Return Data

The command displays the following properties associated with performance metrics. This output could be filtered by specifying the Properties with the –display option.

Note: Some optional properties are not supported on some devices.

Property	Description
TotalLBAsRead	(ATA Devices only). Total number of sectors read by the Host.
TotalLBAsWritten	(ATA Devices only). Total number of sectors written by the Host.
ControllerBusyTime	(NVMe Devices only). Amount of time the controller is busy with I/O commands. Value is reported in minutes.
DataUnitsRead	(NVMe Devices only). The number of 512 byte data units the host has read from the device. Value is reported in units of 1000 (1 = 1000 units of 512 bytes).
DataUnitsWritten	(NVMe Devices only). The number of 512 byte data units the host has written to the device. Value is reported in units of 1000 (1 = 1000 units of 512 bytes).

Property	Description
HostReadCommands	(NVMe Devices only). The number of read commands completed by the controller.
HostWriteCommands	(NVMe Devices only). The number of write commands completed by the controller.

3.1.5.6 Examples

Default show output for –performance target in default text format.

```
>sst.exe show -performance
- Intel SSD DC P3608 Series CVF85156007H400AGN-2 -

ControllerBusyTime : 0x0
DataUnitsRead : 0x01F097
DataUnitsWritten : 0x0
HostReadCommands : 0x86A392
HostWriteCommands : 0x7772E3

- Intel SSD DC P3608 Series CVF85156007H400AGN-1 -

ControllerBusyTime : 0x0
DataUnitsRead : 0x10
DataUnitsWritten : 0x0
HostReadCommands : 0x777E07
HostWriteCommands : 0x7772E3
```

3.1.6 Show Device Identification Structures

The show –identify command shows the device identification structures for one or more SSDs.

3.1.6.1 Syntax

```
sst show [-help|-h] [-output|-o (text|nvmlxml|json)] [-ssd
(Index|SerialNumber|PhysicalPath)] -identify [-nvmecontroller] [-namespace
(id|'attached'|'allocated')]
```

3.1.6.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmlxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.1.6.3 Targets

Target	Description
-identify	Displays identification structures for SSDs.
[-ssd (Index SerialNumber PhysicalPath)]	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.

`[-nvmecontroller]`

(Optional) Specify it to parse the NVMe identify controller structure.

`[-namespace (id|'attached'|'allocated')]`

(Optional) Specify it to parse the NVMe namespace structure for the given namespace ID. If 'attached' is given, parse the list of attached NVMe namespaces. If 'allocated' is given, parse the list of allocated NVMe namespaces (these are created and may, or may not, be attached).

3.1.6.4 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software.

3.1.6.5 Return Data

This command will return human readable text of the specified Identify structure. Use the `--output` option to return the parsed data in different formats.

Note: Some identify structures are not supported on all devices.

3.1.6.6 Examples

Parse the ATA identify device structure. Only a snippet of the output is shown below:

```
>sst.exe show -identify
- ATA Identify Device CVLV119200C4300DGN -

- Word 0 -

General Configuration : 0040
Bit 15 - ATA Device Identifier : 0
Bit 14:8 - Retired : 00
Bit 7:6 - Obsolete : 1
Bit 5:3 - Retired : 0
Bit 2 - Response Incomplete : 0
Bit 1 - Retired : 0
Bit 0 - Reserved : 0

- Word 1 -

Obsolete : 3FFF

- Word 2 -

Specific Configuration : C837

- Word 3 -

Obsolete : 0010

- Word 4 -

Retired : 0000

- Word 5 -

Retired : 0000

- Word 6 -

Obsolete : 003F

- Word 7-8 -

Reserved : 00000000

- Word 9 -

Retired : 0000

- Word 10-19 -

Serial Number : CVLV119200C4300DGN
```

Display the NVMe controller identify structure in JSON format. Not all of the data is show below. Only supported on NVMe devices.

```
>sst.exe show -o json -identify -nvmecontroller
{
  "Identify Controller CVF85156007H400AGN-1":
  {
    "Byte 0-1":
    {
      "PCI Vendor ID (VID)":8086
    },
    "Byte 2-3":
    {
      "PCI Subsystem Vendor ID (SSVID)":8086
    },
    "Byte 4-23":
    {
      "Serial Number":"CVF85156007H400AGN-1"
    },
    "Byte 24-63":
    {
      "Model Number":"INTEL SSDPECME400G4"
    },
    "Byte 64-71":
    {
      "Firmware Revision":"8DV10171"
    },
  },
}
```

Display the list of Namespace ID's that have been created.

```
>sst.exe show -ssd 2 -identify -namespace allocated
- Allocated Namespace IDs CVEK5316004R800AGN -
Namespace ID : 1
Namespace ID : 2
```

3.1.7 Show NVMe Controller Information

The show `-nvmecontroller` command lists the NVMe controller IDs for one or more SSDs. Only supported on NVMe devices.

3.1.7.1 Syntax

```
sst show [-help|-h] [-output|-o (text|nvxml|json)] [-ssd
(Index|SerialNumber|PhysicalPath)] -nvmecontroller [-namespace (id)]
```

3.1.7.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvxml'.

3.1.7.3 Targets

Target	Description
-nvmecontroller	(Required) Will parse the list of all NVMe controllers of the device. You can change the behavior if -namespace target is given.
[-ssd (Index SerialNumber PhysicalPath)]	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.
[-namespace (id)]	(Optional) If given, with a valid namespace ID value, then the list of controllers attached to that given namespace ID is returned. The Tool will issue the NVMe identify command with CNS=0x12.

3.1.7.4 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

3.1.7.5 Return Data

This command will parse, and return human readable text. Use the --output option to return the parsed data in different formats.

3.1.7.6 Examples

Parsed list of NVMe controller ID's on all drives.

```
>sst.exe show -nvmecontroller
- BTWL238602AM800DGN -

Status : The selected drive does not support this feature.

- All Controllers CVEK5316004R800AGN -

Number of Controller Entries : 2
Controller ID : 0
Controller ID : 1
```

Parsed list of controllers that a given namespace ID is attached to.

```
>sst.exe show -namespace 1 -nvmecontroller -ssd 2
- Attached Controllers CVEK5316004R800AGN -

Number of Controller Entries : 1
Controller ID : 1
```

3.1.8 Show NVMe Log Information

The show --nvme log command parses NVMe Logs for one or more SSDs. Only supported on NVMe devices.

3.1.8.1 Syntax

```
sst show [-help|-h] [-output|-o (text|nvml|json)] [-ssd
[(Index|SerialNumber|PhysicalPath)]] -nvme log
```

```
[('commandeffectslog'|'changednamespacelist'|'errorinfo'|'smarthealthinfo'|'firmwareslotinfo'|'temperaturestatistics'|'queuemetrics'|'performancebooster'|'sanitizestatus'|'ocperrorrecovery'|'ocpsmartcloud')] [namespacepecific = (true|false)] [logspecificfield = (int)]
```

3.1.8.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvxml'.

3.1.8.3 Targets

Target	Description
<code>-nvmelog ('errorinfo' 'smarthealthinfo' 'firmwareslotinfo' 'temperaturestatistics' 'queuemetrics' 'performancebooster' 'sanitizestatus' 'ocperrorrecovery' 'ocpsmartcloud')</code>	<p>Parse the NVMe log structures. Valid input would be</p> <ul style="list-style-type: none"> ErrorInfo – Error Information Log SmartHealthInfo – SMART Health Information Log FirmwareSlotInfo – Firmware Slot Information Log TemperatureStatistics – Temperature Statistics Log QueueMetrics – Submission and completion queue metrics Performance booster (client only) – Show the contents of the performance booster log SanitizeStatus – Show the contents of the sanitize status log OCPErrrorRecovery – Show the contents of the error recovery log OCPSMARTCloud – Show the contents of the SMART cloud log Log ID Value – Specify an arbitrary integer value. SST will send the log page command, and either returned parsed data or raw binary data.
<code>[-ssd (Index SerialNumber PhysicalPath)]</code>	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.

3.1.8.4 Properties

Property	Description
NamespaceSpecific	<p>Determines whether log page is namespace specific or not Valid values are:</p> <ul style="list-style-type: none"> True False
LogSpecificField	<p>Specifies the log specific field (LSP) of the log page Valid values are:</p> <ul style="list-style-type: none"> Integer

3.1.8.5 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

To run this command option with Target 'QueueMetrics', the specified device must be an NVMe SSD and have firmware 8DV101F0 or newer firmware. With earlier firmware, SST will report command failure.

3.1.8.6 Return Data

This command will parse and return human readable text of the specified NVMe log. Use the `-output` option to return the parsed data in different formats.

3.1.8.7 Examples

Parsed output of the SMART and Health information log in text format

```
>sst.exe show -nvme log smarthealthinfo
- SMART and Health Information CVF85156007H400AGN-2 -

Available Spare Normalized percentage of the remaining spare capacity available : 100
Available Spare Threshold Percentage : 10
Available Spare Space has fallen below the threshold : False
Controller Busy Time : 0x0
Critical Warnings : 0
Data Units Read : 0x01F097
Data Units Written : 0x0
Host Read Commands : 0x86A392
Host Write Commands : 0x7772E3
Media Errors : 0x0
Number of Error Info Log Entries : 0x0
Percentage Used : 0
Power Cycles : 0x1F
Power On Hours : 0x0668
Media is in a read-only mode : False
Device reliability has degraded : False
Temperature - (Kelvin) : 318
Temperature has exceeded a critical threshold : False
Unsafe Shutdowns : 0x05
Volatile memory backup device has failed : False
```

Parsed output of the Temperature Statistics log in JSON format.

```
>sst.exe show -o json -nvme log temperaturestatistics
{
  "Temp Statistics CVF85156007H400AGN-2":
  {
    "Current Temperature":45,
    "Overtemp shutdown Flag for Last Drive Overheat":0,
    "Overtemp shutdown Flag for Life Drive Overheat":0,
    "Highest Temperature":53,
    "Lowest Temperature":16,
    "Maximum operating temperature":85,
    "Minimum operating temperature":0,
    "Estimated offset in Celsius":-5
  }
}
```

3.1.9 Show Phy Counters

The show -phycounters command parses the phy counter information for one or more SSDs. Only supported on SATA devices.

3.1.9.1 Syntax

```
sst show [-help|-h] [-output|-o (text|nvmxml|json)] -phycounters [-ssd (Index|SerialNumber|PhysicalPath)]
```

3.1.9.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.1.9.3 Targets

Target	Description
-phycounters	Displays the device Phy Counters. ATA only
[-ssd (Index SerialNumber PhysicalPath)]	(Optional) Restricts output to a specific SSD by supplying the SSD Index or Serial Number.

3.1.9.4 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be a SATA device.

3.1.9.5 Return Data

This command will parse and return human readable text of the PHY Counters structure. Use the -output option to return the parsed data in different formats.

3.1.9.6 Examples

Parsed output of the PHY Counters structure in text format. Not all counters are shown below.

```
>sst.exe show -phycounters
- PHY Counters CVLV119200C4300DGN -

- Counter ID 0x001 -

ID : 001
Description : Command failed and ICRC error bit set to one in Error register
Value : 0

- Counter ID 0x004 -

ID : 004
Description : R_ERRP response for Host-to-Device Data FIS
Value : 0
```

- Counter ID 0x007 -

ID : 007

Description : R_ERRP response for Host-to-Device non-Data FIS

Value : 0

- Counter ID 0x008 -

ID : 008

Description : Device-to-Host non-Data FIS retries

Value : 0

Parsed output of the PHY Counters in JSON output. Not all counters are shown below.

```
>sst.exe show -o json -phycounters
{
  "PHY Counters CVLV119200C4300DGN":
  {
    "Counter ID 0x001":
    {
      "ID":"001",
      "Description":"Command failed and ICRC error bit set to one in Error
register",
      "Value":0
    },
    "Counter ID 0x004":
    {
      "ID":"004",
      "Description":"R_ERRP response for Host-to-Device Data FIS",
      "Value":0
    },
    "Counter ID 0x007":
    {
      "ID":"007",
      "Description":"R_ERRP response for Host-to-Device non-Data FIS",
      "Value":0
    },
    "Counter ID 0x008":
    {
      "ID":"008",
      "Description":"Device-to-Host non-Data FIS retries",
      "Value":0
    },
    ...
  }
}
```

3.1.10 Show HDA Temperature

The show -hdtemperature command parses the HDA Temperature and temperature history information for one or more SSDs. Only supported on SATA devices.

3.1.10.1 Syntax

```
sst show [-help|-h] [-output|-o (text|nvmlxml|json)] -hdtemperature [-ssd
(Index|SerialNumber|PhysicalPath)]
```

3.1.10.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmlxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.1.10.3 Targets

Target	Description
-hdateperature	Displays HDA Temperature and history information.
[-ssd (Index SerialNumber PhysicalPath)]	Restricts output to a specific SSD by supplying the SSD Index or Serial Number.

3.1.10.4 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be a SATA device.

3.1.10.5 Return Data

This command will parse, and return human readable text of the HDA temperature and history structure. Use the – output option to return the parsed data in different formats.

3.1.10.6 Examples

Parsed output of the HDA Temperature structure in text format. Not all data is shown below.

```
>sst.exe show -hdateperature
- HDA Temperature BTWL238602AM800DGN -

Format Version : 2
Sampling period : 1
Interval : 1
Maximum recommended continuous operating temperature : 70
Maximum Temperature Limit : 70
Minimum recommended continuous operating temperature : 0
Minimum Temperature Limit : 0
Circular buffer size : 478
Last Updated Entry in the circular buffer : 372

- Temperatures -

Index 0 : Initial value or discontinuity in temperature recording.
Index 1 : 17
Index 2 : Initial value or discontinuity in temperature recording.
Index 3 : 13
Index 4 : 15
Index 5 : 15
Index 6 : 16
Index 7 : 16
Index 8 : 16
Index 9 : 17
Index 10 : 17
Index 11 : 17
Index 12 : 17
Index 13 : 18
Index 14 : 18
Index 15 : 18
Index 16 : 18
Index 17 : 18
Index 18 : 18
```

3.1.11 Show Read and Write Latency Statistics Tracking Information

The show -latencystatistics command parses the Latency Statistics Logs for one or more SSDs. The LatencyTrackingEnabled must be set to true in order to read the logs.

3.1.11.1 Syntax

```
sst show [-help|-h] [-output|-o (text|nvxml|json)] -latencystatistics ('reads'|'writes')
[-ssd (Index|SerialNumber|PhysicalPath)]
```

3.1.11.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvmlxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.1.11.3 Targets

Target	Description
<code>-latencystatistics (reads writes)</code>	Used to display latency statistics logs for read or write commands. In order to successfully read the logs the <code>LatencyTrackingEnabled</code> property must be set to True. See Modify Device
<code>[-ssd (Index SerialNumber PhysicalPath)]</code>	Restricts output to a specific SSD by supplying the SSD Index or Serial Number.

3.1.11.4 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software.

3.1.11.5 Return Data

This command will parse and return human readable text of the Latency Statistics Log structure. Use the `-output` option to return the parsed data in different formats.

3.1.11.6 Examples

Parsed output of the Latency Statistics log structure for read commands. Output is in text format. Not all data is shown below.

```
>sst.exe show -latencystatistics reads

- Latency Statistics For Read Commands CVF85156007H400AGN-1 -

Major Version : 3
Minor Version : 0
Group 1 Details : Range is 0-1ms. Step is 32us. Bucket size is 4 bytes. Total 32 buckets.
Group 2 Details : Range is 1-32ms. Step is 1ms. Bucket size is 4 bytes. Total 31 buckets.
Group 3 Details : Range is 32ms-1s. Step is 32ms. Bucket size is 4 bytes. Total 31 buckets.

- Group 1 Group 1 -

Bucket 1 : 0
Bucket 2 : 0
Bucket 3 : 0
Bucket 4 : 0
Bucket 5 : 0
Bucket 6 : 0
Bucket 7 : 0
Bucket 8 : 0
Bucket 9 : 0
Bucket 10 : 0
Bucket 11 : 0
Bucket 12 : 0
Bucket 13 : 0
Bucket 14 : 0
Bucket 15 : 0
Bucket 16 : 0
Bucket 17 : 0
Bucket 18 : 0
Bucket 19 : 0
Bucket 20 : 0
Bucket 21 : 0
Bucket 22 : 0
Bucket 23 : 0
Bucket 24 : 0
Bucket 25 : 0
Bucket 26 : 0
Bucket 27 : 0
Bucket 28 : 0
Bucket 29 : 0
Bucket 30 : 0
Bucket 31 : 0
Bucket 32 : 0

- Group 2 Group 2 -

Bucket 1 : 0
```

```
Bucket 2 : 0
Bucket 3 : 0
```

3.1.12 Show Parsed Persistent Event Log Data

The show -persistenteventlog command parses persistent event log data either from a binary file saved on the system or pulled directly from the drive.

3.1.12.1 Syntax

```
sst show [-help|-h] [-source (path)] [-destination (path)] [-output|-o (text|nvmxml|json)] [-ssd (Index|SerialNumber|PhysicalPath)] -persistenteventlog
```

3.1.12.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-source (path)]	If used, will parse a persistent event log binary file at this path. If this option is not used, data will instead be pulled from the drive and parsed immediately (if a persistent event log context is established).
[-destination (path)]	If used, will output the parsed persistent event log data to a text file at the specified path. If not used, the parsed data will be displayed to the user.
[-output -o (text nvmxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.1.12.3 Targets

Target	Description
-persistenteventlog	Used to parse persistent event log data.
[-ssd (Index SerialNumber PhysicalPath)]	Restricts output to a specific SSD by supplying the SSD Index or Serial Number.

3.1.12.4 Limitations

The persistent event log command must be supported by the drive. In order to pull the persistent event log data from the drive and parse it (by omitting the -source option) a persistent event log context must be established using the dump command, see [section 3.4.3](#).

3.1.12.5 Return Data

This command will parse and return human readable text of the persistent event log. Use the -output option to return the parsed data in different formats.

3.1.12.6 Examples

Parse a previously dumped persistent event log binary (see [section 3.4.3](#))

```
sst.exe show -source PEL_binary.bin -destination PEL_parsed.txt -persistenteventlog
```

Parse persistent event log data directly from a drive

```
sst.exe show -destination PEL_parsed.txt -ssd 1 -persistenteventlog
```

3.1.13 Show NVMe Get Feature Information

The show -getfeature command sends a get feature command with the specified feature id (FID) for SSDs. Only supported on NVMe devices.

3.1.13.1 Syntax

```
sst show [-help|-h] [-display|-d (Property1,...)] [-all|-a] [-output|-o  
(text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath) -getfeature (feature id) [-  
namespace (namespace id)] [Select = ('current'|'default'|'saved'|'capabilities')]
```

3.1.13.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.1.13.3 Targets

Target	Description
-getfeature (feature id)	<p>Specify the feature id (FID) of the NVMe get feature command Examples of valid input would be</p> <ul style="list-style-type: none"> • 0x1 - Arbitration • 0x2 - Power Management • 0x3 - LBA Range Type • 0x4 - Temp Threshold • 0x5 - Error Recovery • 0x6 - Volatile Write Cache • 0x7 - Number of Queues • 0x8 - Interrupt Coalescing • 0x9 - Interrupt Vector Config • 0xA - Write Atomicity • 0xB - Event Config
[-ssd (Index SerialNumber PhysicalPath)]	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.
-namespace (namespace Id)	Namespace target is optional. Must specify namespace ID if being used.

3.1.13.4 Properties

Below are the properties that can be modified.

Property	Description
Select	<p>Sets the select value Valid values are:</p> <ul style="list-style-type: none"> • Current • Default • Saved • Capabilities

3.1.13.5 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

The command is entirely dependent on valid feature id values. Different drive families will support different feature ids.

3.1.13.6 Return Data

This command will parse and return human readable text of the specified NVMe get feature. Use the --output option to return the parsed data in different formats.

3.1.13.7 Examples

Parsed output of get feature with FID=1

```
> sst show -ssd 0 -getfeature 1
- BTLJ723607AK2P0BGN -
```



```
ArbitrationBurst : 0
HighPriorityWeightArbitration : 0
LowPriorityWeightArbitration : 0
MediumPriorityWeightArbitration : 0
```

3.1.14 Show NVMe IEEE 16667 Silo Information

The show -IEEESilo command sends a get feature command with the specified feature id (FID) for SSDs. Used to show IEEE 16667 Silo information.

Only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

3.1.14.1 Syntax

```
sst show [-help|-h] [-output|-o (text|nvmexml|json)] -ssd (Index|SerialNumber|PhysicalPath)
-IEEESilo [Select = ('current'|'default'|'saved'|'capabilities')]
```

3.1.14.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmexml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmexml'.

3.1.14.3 Targets

Target	Description
-IEEESilo	Specifies that IEEE 16667 Silo information is requested. No input required.
[-ssd (Index SerialNumber PhysicalPath)]	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.

3.1.14.4 Properties

Below are the properties that can be modified.

Property	Description
Select	Sets the select value Valid values are: <ul style="list-style-type: none"> • Current • Default • Saved • Capabilities

3.1.14.5 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

This command is only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

3.1.14.6 Return Data

This command will parse and return human readable text of the specified NVMe get feature. Use the `-output` option to return the parsed data in different formats.

3.1.14.7 Examples

```
> sst show -ssd 0 -IEEESSilo
- BTLJ723607AK2P0BGN -
Silo : Currently Enabled
```

3.1.15 Show NVMe Read Only/Write Through Mode Information

The `show -ReadOnlyWriteThrough` command sends a get feature command with the specified feature id (FID) for SSDs. Used to show Read Only/Write Through mode information.

Only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

3.1.15.1 Syntax

```
sst show [-help|-h] [-output|-o (text|nvmxml|json)] -ssd
(Index|SerialNumber|PhysicalPath) -ReadOnlyWriteThrough [Select =
('current'|'default'|'saved'|'capabilities')]
```

3.1.15.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvmlxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.1.15.3 Targets

Target	Description
<code>-ReadOnlyWriteThrough</code>	Specifies that Read Only/Write Through Mode information is requested. No input required.
<code>[-ssd (Index SerialNumber PhysicalPath)]</code>	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.

3.1.15.4 Properties

Below are the properties that can be modified.

Property	Description
Select	Sets the select value Valid values are: <ul style="list-style-type: none"> • Current • Default • Saved • Capabilities

3.1.15.5 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

This command is only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

3.1.15.6 Return Data

This command will parse and return human readable text of the specified NVMe get feature. Use the `–output` option to return the parsed data in different formats.

3.1.15.7 Examples

```
> sst show -ssd 1 -ReadOnlyWriteThrough Select=Default
- BTLJ723607AK2P0BGN -
Mode : Read Only Mode (ROM) is the factory default
```

3.1.16 Show NVMe Error Injection Information

The show -ErrorInjection command sends a get feature command with the specified feature id (FID) for SSDs. Used to show error injection information.

Only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

3.1.16.1 Syntax

```
sst show [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
-ErrorInjection
```

3.1.16.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.1.16.3 Targets

Target	Description
-ErrorInjection	Specifies that Error Injection information is requested. No input required.
[-ssd (Index SerialNumber PhysicalPath)]	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.

3.1.16.4 Properties

No properties available for this feature

3.1.16.5 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

This command is only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

3.1.16.6 Return Data

This command will parse and return human readable text of the specified NVMe get feature. Use the -output option to return the parsed data in different formats.

3.1.16.7 Examples

```
> sst show -ssd 1 -errorinjection
- BTLJ723607AK2P0BGN -
- Error Injection Info Error Injection Info -
Number of Error Injections : 0
```

3.2 Configure SSDs

Configuring SSDs requires the CLI verbs Load (Firmware Update), Set (Modify Device), and Start (Execute Drive Function).

3.2.1 Firmware Update

Updates the firmware on the SSD. On the next reset, the firmware will become active.

SST show devices (sst.exe show -ssd) will indicate if there is firmware update available. Run the load command to update the firmware. Firmware update binaries are embedded in the tool. User doesn't have to provide firmware binary.

Note: Note: Systems configured with the SATA Controller set to IDE mode are not supported

3.2.1.1 Syntax

```
sst load [-force|-f] [-help|-h] [-output|-o (text|nvmlxml|json)] -ssd
(Index|SerialNumber|PhysicalPath)
```

3.2.1.2 Options

Option	Description
[-force -f]	Displays a prompt by default when invoking the Firmware Update command. Use this option to bypass the prompt.
[-help -h]	Displays help for the command.
[-output -o (text nvmlxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.2.1.3 Targets

Target	Description
-ssd (Index SerialNumber PhysicalPath)	Updates the firmware on the specified SSD. Firmware binaries are embedded into the tool. See the FirmwareUpdateAvailable property for firmware update eligibility.

3.2.1.4 Properties

This command does not support any properties.

3.2.1.5 Limitations

To run this command, you must have the appropriate host system privileges and the specified SSDs must be manageable by the host software.

3.2.1.6 Return Data

The CLI indicates the status of the firmware update operation.

3.2.1.6.1 Sample Output

```
>sst.exe load -ssd 0
WARNING! You have selected to update the drives firmware!
Proceed with the update? (Y|N): y
Updating firmware...The selected drive contains current firmware as of this tool release.

>sst.exe load -ssd 0
WARNING! You have selected to update the drives firmware!
Proceed with the update? (Y|N): n
Canceled.

>sst.exe load -f -ssd 0
Updating firmware...
The selected drive contains current firmware as of this tool release.

>sst.exe load -ssd 0
WARNING! You have selected to update the drives firmware!
Proceed with the update? (Y|N): y
Updating firmware...
Firmware update successful.
```

3.2.1.7 Examples

Updates the firmware on the device at index 1.

```
sst load -ssd 1
```

3.2.2 Firmware Update (with binary file)

This method is only to be used if firmware update binaries are available and update is not available in the tool.

Use this method with caution and at your own risk as drive may become unresponsive if invalid binary is loaded.

For NVMe drives, user can also choose the following options:

Commit Action to indicate when the firmware should be activated.

Firmware Slot the firmware should be loaded into if drive supports multiple slots.

3.2.2.1 Syntax

```
sst load -source firmwareBinaryFile.bin -ssd (Index|SerialNumber|PhysicalPath)
```

NVMe only:

```
sst load -source firmwareBinaryFile.bin -ssd (Index|SerialNumber|PhysicalPath)
[FirmwareSlot=(0,1..7)] CommitAction=(2,3)
```

3.2.2.2 Options

Option	Description
[-force -f]	Displays a prompt by default when invoking the Firmware Update command. Use this option to bypass the prompt.
[-help -h]	Displays help for the command.
[-output -o (text nvxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvxml'.

3.2.2.3 Targets

Target	Description
-ssd (Index SerialNumber PhysicalPath)	Updates the firmware on the specified SSD. Firmware binaries are embedded into the tool. See the FirmwareUpdateAvailable property for firmware update eligibility.
-source	Provide firmware binary for the update
[FirmwareSlot]	Slot number that should be updated
[CommitAction]	Numeric data indicating Commit option according to NVMe specification.

3.2.2.4 Properties

This command does not support any properties.

3.2.2.5 Limitations

To run this command, you must have the appropriate host system privileges and the specified SSDs must be manageable by the host software.

3.2.2.6 Return Data

The CLI indicates the status of the firmware update operation.

3.2.2.6.1 Sample Output

```
>sst.exe load -ssd 0
WARNING! You have selected to update the drives firmware!
Proceed with the update? (Y|N): y
Updating firmware...The selected drive contains current firmware as of this tool release.

>sst.exe load -ssd 0
WARNING! You have selected to update the drives firmware!
Proceed with the update? (Y|N): n
Canceled.

>sst.exe load -f -ssd 0
Updating firmware...
The selected drive contains current firmware as of this tool release.

>sst.exe load -ssd 0
WARNING! You have selected to update the drives firmware!
Proceed with the update? (Y|N): y
Updating firmware...
Firmware update successful.
```

3.2.2.7 Examples

Updates the firmware on the device at index 1.

```
sst load -ssd 1
```

3.2.3 Modify Device

Changes the configurable settings on an SSD.

Note: You can only change one setting at a time.

3.2.3.1 Syntax

```
sst set [-help|-h] [-output|-o (text|nvme|json)] -ssd (Index|SerialNumber|PhysicalPath) [...]
```

Property	Description
DIPMEnabled	<p>Enable or disable the SATA device's DIPM.</p> <p>Valid values are:</p> <ul style="list-style-type: none"> • True – enables DIPM • False – disables DIPM
EnduranceAnalyzer	<p>Resets the SMART attributes: E2, E3, and E4.</p> <p>The Valid value is reset. As a result, the reported raw value of these attributes will be 0xFFFF. Once the values have been reset, the device must go through a 60+ minute workload (per 240GB) for the attributes to trip.</p>
LatencyTrackingEnabled	<p>Enables or disables latency tracking feature. This must be enabled in order to successfully read the latency statistics logs (Show Read and Write Latency Statistics Tracking Information)</p> <p>Valid values are:</p> <ul style="list-style-type: none"> • True – enables latency tracking. • False – disables latency tracking.
MaximumLBA	<p>Sets the device's Maximum LBA value. This operation will overprovision the drive. The MaximumLBA can be specified in the following ways:</p> <ul style="list-style-type: none"> • xGB - Sets the devices maximum LBA such that the total capacity is the specified GB value. Value must be at least 1 and cannot exceed devices total native capacity. • X% - Sets the devices maximum LBA to the given percentage. Allowed values are 1-100%. 100% equals native maximum LBA. • LBA - Sets the devices maximum LBA value to the given LBA. Given value must be a decimal literal. The LBA value must be at least XYZ and it cannot exceed the native maximum LBA value. • "native" - Sets the devices maximum LBA value back to its native maximum.
PhyConfig	<p>(For ATA devices only) Changes the PHY configuration of the selected device. Valid values are:</p> <ul style="list-style-type: none"> • 0: Default enterprise settings. • 1: Client settings • 2: Alternate enterprise settings • 3: Server Settings
PhysicalSectorSize	<p>(For ATA devices only) Changes the devices physical sector size. Values are in byte units. Valid values are:</p> <ul style="list-style-type: none"> • 512 • 4096
PhySpeed	<p>(For ATA devices only) Changes the devices maximum allowed PHY Speed it is allowed to negotiate. Valid values are:</p> <ul style="list-style-type: none"> • 1.5: SATA Gen 1 speed of 1.5 Gbs • 3: SATA Gen 2 speed of 3 Gbs • 6: SATA Gen 3 speed of 6 Gbs

Property	Description
	Actual negotiated speed is also determined by the controller the device is attached to.
PLITestTimeInterval	<p>(For ATA devices only) Changes the devices PLI test time interval setting. Valid values are:</p> <ul style="list-style-type: none"> 0: 0 min, no immediate test 1: 0 min, do immediate test 2: 60 min, do immediate test 3: 1440 min, do immediate test 4: 4320 min, do immediate test 5: 10080 min, do immediate test 6: 20160 min, do immediate test
PowerGovernorMode	<p>Changes the devices power governor mode settings. Valid values are:</p> <ul style="list-style-type: none"> 0: 25-watts for PCIe NVMe devices; 40W for PCIe NVMe x8 devices; Unconstrained for SATA devices. 1: 20-watts for PCIe NVMe devices 35W for PCIe NVMe x8 devices; Typical (7-watts) for SATA devices. 2: 10-watts for PCIe NVMe devices; 25W for PCIe NVMe x8 devices; Low (5-watts) for SATA devices.
ReadErrorRecoveryTimer	<p>(For ATA devices only) Sets the devices error recovery timer for reads. Value is in 100-microsecond units (e.g., a value of 1 = 100 ms, 2 = 200 ms). Valid values are:</p> <ul style="list-style-type: none"> 0-65535
SMBusAddress	<p>(For NVMe devices only) Sets the devices SM Bus Address. Valid values are:</p> <ul style="list-style-type: none"> 1-255. A value of 255 will disable SM Bus
SSCEnabled	<p>(For ATA devices only) Toggles the devices spread spectrum clocking (SSC) feature on and off.</p> <ul style="list-style-type: none"> "True" - enable SSC "False" - disable SSC <p>Device must be power cycled after setting.</p>
TempLoggingInterval	<p>(For ATA devices only) Sets the devices temperature logging interval. Value is in seconds. Valid values are:</p> <ul style="list-style-type: none"> 0-65535
TempThreshold	<p>(For NVMe devices only) Sets the devices temperature threshold. Value is in degrees Celsius. Valid values are:</p> <ul style="list-style-type: none"> 0-75
WriteCacheEnabled	<p>Enable or disable the SATA device's Write Cache via ATA set features command.</p> <p>Valid values are:</p> <ul style="list-style-type: none"> True – enables Write Cache False – disables Write Cache
WriteCacheState	<p>(For ATA devices only) Sets the devices write cache state. Valid values are:</p> <ul style="list-style-type: none"> 1: Write cache state is determined by ATA Set Features 2: Write cache is enabled. 3: Write cache is disabled.
WriteCacheReorderingStateEnabled	<p>Enable or disable the SATA device's write cache reordering state.</p>

Property	Description
	Valid values are: <ul style="list-style-type: none"> True – enables write cache reordering state False – disables write cache reordering state
WriteErrorRecoveryTimer	(For ATA devices only) Set the devices error recovery timer for writes. Value is in 100-microsecond units (e.g., a value of 1 = 100 ms, 2 = 200 ms). Valid values are: <ul style="list-style-type: none"> 0-65535

3.2.3.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmlxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.2.3.3 Targets

Target	Description
-ssd (Index SerialNumber PhysicalPath)	Modifies the selected drive by supplying its Index or Serial Number value. An -ssd must be specified for this command.

3.2.3.4 Properties

Below are the properties that can be modified. One, and only one, property must be specified.

3.2.3.5 Limitations

To run this command, you must have the appropriate host system privileges and the specified SSD must be manageable by the host software.

3.2.3.6 Return Data

The CLI indicates the status of the operation.

3.2.3.6.1 Sample Output

```
Set WriteCacheState successful.
```

3.2.3.7 Examples

Disables the write cache state of the SSD at index 0 by setting its WriteCacheState to 3.

```
sst set -ssd 0 WriteCacheState=3
```

3.2.4 Execute Device Function

Use the start verb to execute a function on the selected device.

3.2.4.1 Syntax

```
start [-help|-h] [-force|-f] [-output|-o (text|nvml|json)] -ssd
(Index|SerialNumber|PhysicalPath) -selftest [(‘short’|‘extended’|‘conveyance’)]

start [-help|-h] [-force|-f] [-output|-o (text|nvml|json)] -ssd
(Index|SerialNumber|PhysicalPath) -nvmeformat [lbaformat=(0-numlbaformats)]
[secureerasesetting=(0|1|2)] [protectioninformation=(0|1)] [metadatasettings=(0|1)]

start [-help|-h] [-force|-f] [-output|-o (text|nvml|json)] -ssd
(Index|SerialNumber|PhysicalPath) -standby
```

3.2.4.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-force -f]	Displays a prompt by default when invoking NVMe Format functionality. Use this option to bypass the prompt.
[-output -o (text nvml json)]	Changes the format of the Return Data. Supported output options are: ‘text’ (Default), ‘json’, and ‘nvml’.

3.2.4.3 Targets

Target	Description
-ssd (Index SerialNumber PhysicalPath)	A specific SSD selected by supplying the SSD Index or Serial Number must be provided.
-selftest (‘short’ ‘extended’ ‘conveyance’)	Runs a device self-test on the selected ATA device. If no test is specified, a short test is executed.
-nvmeformat	Issues an NVMe format to the selected drive. See the properties below for details on how to configure the NVMe format. To by-pass the prompt, specify the –force option.
-standby	(ATA devices only) Put the selected device into standby power state. This prepares the drive for removal from the system.

3.2.4.4 Properties

Properties supported for the start verb are list below. Properties are specific to different targets.

The properties: LBAFormat, SecureEraseSetting, ProtectionInformation, and MetadataSettings are used with the – nvmeformat target.

The target that they correspond to is also listed in the Description.

Property	Description
LBAFormat	(-nvmeFormat) Sets a value that corresponds to one of the supported LBA Formats described in Identify Namespace. If not provided, the tool will use the current value of the selected SSD. Valid values are: <ul style="list-style-type: none"> 0-NumLBAFormats: See NumLBAFormats Property for max value.
SecureEraseSetting	(-nvmeFormat) Specifies the setting for Secure Erase. If not provided, the tool will use a value of 2. Valid values are: <ul style="list-style-type: none"> 0: No secure erase. 1: User data erase. 2: Crypto erase.
ProtectionInformation	(-nvmeFormat) Enables different protection information types. If not provided, the tool will use the current value of the selected SSD. Valid values are: <ul style="list-style-type: none"> 0: Protection information is not enabled. 1: Protection information type 1 is enabled.
MetadataSettings	(-nvmeFormat) Specifies how metadata is transferred. If not provided, the tool will use the current value of the selected SSD Valid values are: <ul style="list-style-type: none"> 0: Metadata is transferred as part of a separate contiguous buffer. 1: Metadata is transferred as part of an extended data LBA.

3.2.4.5 Limitations

To run this command, you must have the appropriate host system privileges and the specified SSD must be manageable by the host software.

3.2.4.6 Return Data

The CLI returns the status of the command.

3.2.4.7 Examples

Issues NVMe Format to the SSD at index 1 using the default values.

```
start -ssd 1 -nvmeformat
```

Issues NVMe Format to the SSD at index 1 and set the LBA Format to 3 and enable Type 1 protection information.

```
start -ssd 1 -nvmeformat lbaformat=3 protectioninformation=1
```

Issues an ATA Standby Immediate to the SSD at index 1. This will prepare the drive for power removal.

```
start -ssd 1 -standby
```

Issues an extended ATA DriveSelfTest to the SSD at index 1.

```
start -ssd 1 -selftest extended
```

3.2.5 Delete Device

Delete SSD will erase all the data on the drive. For SATA devices, this will issue an ATA Secure Erase if supported, or Sanitize erase if supported. For NVMe devices, this will issue an NVMe Format command with SecureEraseSetting = 2. The function will keep the drive's current configuration.

When invoked, the tool will prompt you to proceed with the delete. To bypass the prompt, use the `-force` option.

3.2.5.1 Syntax

```
delete [-help|-h] [-force|-f] [-output|-o (text|nvmxml|json)] -ssd  
(Index|SerialNumber|PhysicalPath)
```

3.2.5.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-force -f]</code>	The tool will display a prompt by default when invoking delete. Use this option to bypass the prompt. This option will also ignore partitions on the device.
<code>[-output -o (text nvmxml json)]</code>	Change the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.2.5.3 Targets

Target	Description
<code>-ssd (Index SerialNumber PhysicalPath)</code>	Delete the selected drive Device and erase all data.

3.2.5.4 Properties

This command does not support any properties.

3.2.5.5 Limitations

To successfully execute this command, the caller must have the appropriate privileges and the specified SSD must be manageable by the host software.

3.2.5.6 Return Data

The CLI will return status of the command.

3.2.5.7 Examples

Delete the device at index 1 and erase all user data.

```
delete -ssd 1
```

3.2.6 Secure Erase (ATA Secure Erase)

Perform Secure Erase on ATA drive.

When invoked, the tool will prompt you to proceed with the erase. To bypass the prompt, use the `-force` option.

3.2.6.1 Syntax

```
start [-help|-h] [-output|-o (text|nvmxml|json)] [-ssd (Index|SerialNumber|PhysicalPath)]
-secureerase
```

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-force -f]</code>	The tool will display a prompt by default when invoking delete. Use this option to bypass the prompt. This option will also ignore partitions on the device.
<code>[-output -o (text nvmxml json)]</code>	Change the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.2.6.2 Targets

Target	Description
<code>-ssd (Index SerialNumber PhysicalPath)</code>	Secure Erase the selected drive Device and erase all data.

3.2.6.3 Properties

This command does not support any properties.

3.2.6.4 Limitations

To successfully execute this command, the caller must have the appropriate privileges and the specified SSD must be manageable by the host software.

3.2.6.5 Return Data

The CLI will return status of the command.

3.2.6.6 Examples

Delete the device at index 1 and erase all user data.

```
start -ssd 1 -secureerase
```

3.2.7 NVMe Format

3.2.7.1 Syntax

```
start [-help|-h] [-force|-f] [-output|-o (text|nvmxml|json)] -ssd
(Index|SerialNumber|PhysicalPath) -nvmeformat [-namespace (namespace id)] [LBAFormat = (0-
NumLBAFormats)] [SecureEraseSetting = (0|1|2)] [ProtectionInformation = (0|1)]
[MetadataSettings = (0|1)]
```

3.2.7.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvmlxml json)]</code>	Change the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.
LBAFormat	<p>(-nvmeFormat) Sets a value that corresponds to one of the supported LBA Formats described in Identify Namespace. If not provided, the tool will use the current value of the selected SSD.</p> <p>Valid values are:</p> <p>0-NumLBAFormats: See NumLBAFormats Property for max value.</p>
SecureEraseSetting	<p>(-nvmeFormat) Specifies the setting for Secure Erase. If not provided, the tool will use a value of 2.</p> <p>Valid values are:</p> <ul style="list-style-type: none"> 0: No secure erase. 1: User data erase. <p>2: Crypto erase.</p>
ProtectionInformation	<p>(-nvmeFormat) Enables different protection information types. If not provided, the tool will use the current value of the selected SSD.</p> <p>Valid values are:</p> <ul style="list-style-type: none"> 0: Protection information is not enabled. <p>1: Protection information type 1 is enabled.</p>
MetadataSettings	<p>(-nvmeFormat) Specifies how metadata is transferred. If not provided, the tool will use the current value of the selected SSD</p> <p>Valid values are:</p> <ul style="list-style-type: none"> 0: Metadata is transferred as part of a separate contiguous buffer. <p>1: Metadata is transferred as part of an extended data LBA.</p>

3.2.7.3 Targets

Target	Description
<code>-ssd (Index SerialNumber PhysicalPath)</code>	(Required) A specific SSD selected by supplying the SSD Index or Serial Number must be provided.

3.2.8 Set NVMe Feature

The set `--setfeature` command sends a set feature command with the specified feature id (FID) for SSDs. Only supported on NVMe devices.

3.2.8.1 Syntax

```
sst set [-help|-h] [-output|-o (text|nvmlxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
-setfeature (feature id) [-namespace (namespace id)] dword11 = (32 bit hex) [dword12 = (32
bit hex)] [dword13 = (32 bit hex)]
```


3.2.8.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvmlxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.2.8.3 Targets

Target	Description
	Specify the feature id (FID) of the NVMe set feature command Examples of valid input would be <ul style="list-style-type: none"> • 0x1 - Arbitration • 0x2 - Power Management • 0x4 - Temp Threshold • 0x5 - Error Recovery • 0x6 - Volatile Write Cache • 0x7 - Number of Queues • 0x8 - Interrupt Coalescing • 0x9 - Interrupt Vector Config • 0xA - Write Atomicity • 0xB - Event Config
<code>-setfeature (feature id)</code>	
<code>[-ssd (Index SerialNumber PhysicalPath)]</code>	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.
<code>-namespace (namespace Id)</code>	Namespace target is optional. Must specify namespace ID if being used.

3.2.8.4 Properties

Below are the properties that can be modified.

Property	Description
DWORD11	32 bit command dword 11 structure value that is used to set the chosen feature value. See Set Features Command specification in NVMe 1.4 spec (section 5.21) for details.
DWORD12	32 bit command dword 12 structure value.
DWORD13	32 bit command dword 13 structure value.

3.2.8.5 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

The command is entirely dependent on valid feature id values. Different drive families will support different feature ids.

3.2.8.6 Return Data

This command will send and return the status of the NVMe set feature. There is usually a corresponding get feature command (see [get feature](#))

3.2.8.7 Examples

Parsed output of get feature with FID=1

```
> sst set -ssd 0 -setfeature 4 DWORD11=1
- NVMeFeatures BTLJ723607AK2P0BGN -
Status : Completed successfully.
```

3.2.9 Set NVMe IEEE 1667 Silo

The set -IEEEESilo command sends a set feature command with the specified feature id (FID) for SSDs. Used to set IEEE 16667 Silo information.

Only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

Syntax:

```
sst set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
-IEEEESilo Enable = ('true'|'false')Options
```

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.2.9.1 Targets

Target	Description
-IEEEESilo	Specifies that IEEE 16667 Silo is requested. No input required.
[-ssd (Index SerialNumber PhysicalPath)]	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.

3.2.9.2 Properties

Below are the properties that can be modified.

Property	Description
Enable	True to enable, false to disable.

3.2.9.3 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

This command is only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

3.2.9.4 Return Data

This command will send and return the status of the NVMe set IEEE 16667 Silo. See the following section for the corresponding get feature:

[Show IEEE 16667 Silo](#)

3.2.9.5 Examples

```
> sst set -ssd 1 -IEEESilo Enable=True
```

```
Set Enable successful. Completed successfully.
```

3.2.10 Set NVMe Read Only/Write Through Mode

The set `-ReadOnlyWriteThrough` command sends a set feature command with the specified feature id (FID) for SSDs. Used to set read only or write through mode as the desired device transition and end of life.

Only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

Syntax

```
sst set [-help|-h] [-output|-o (text|nvmlxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
-ReadOnlyWriteThrough Mode = (1|2)
```

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvmlxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.2.10.1 Targets

Target	Description
<code>-ReadOnlyWriteThrough</code>	Specifies that Read Only/Write Through mode is requested. No input required.
<code>[-ssd (Index SerialNumber PhysicalPath)]</code>	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.

3.2.10.2 Properties

Below are the properties that can be modified.

Property	Description
Mode	1 to transition to read only mode, 2 to transition to write through mode.

3.2.10.3 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

This command is only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

3.2.10.4 Return Data

This command will send and return the status of the NVMe set Read Only/Write Through mode. See the following section for the corresponding get feature:

[Show Read Only/Write Through](#)

3.2.10.5 Examples

```
> sst set -ssd 1 -readonlywritethrough mode=1
```

```
Set Mode successful. Completed successfully.
```

3.2.11 Set NVMe Error Injection

The set -ErrorInjection command sends a set feature command with the specified feature id (FID) for SSDs. Used to forcibly inject errors into the device.

Only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

Syntax

```
set [-help|-h] [-output|-o (text|nvmlxml|json)] -ssd (Index|SerialNumber|PhysicalPath) -errorinjection
```

```
[ErrorInjectionEntries = (tilde separated entry list)] [errorinjectionentryfile = (path to input file)]
```

ShowErrorInjection:

```
show [-help|-h] [-output|-o (text|nvmlxml|json)] -ssd (Index|SerialNumber|PhysicalPath) -errorinjection
```

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvxml'.

3.2.11.1 Targets

Target	Description
<code>-ErrorInjection</code>	Specifies that error injection set feature is requested. No input required.
<code>[-ssd (Index SerialNumber PhysicalPath)]</code>	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.

3.2.11.2 Properties

Below are the properties that can be modified.

Property	Description
	<p>A tilde separated list of error injection entries. See the Open Compute Project NVMe Cloud SSD Specification for more details.</p> <p>Note:</p> <p>Each entry shall be formatted in a specific way. Each item in the entry is separated by a period (.). The general format is as follows:</p> <ul style="list-style-type: none"> First item is the injection enable attribute (0 or 1) The second item is the single instance attribute (0 or 1) The third item is the error injection type (always interpreted as hex value) The fourth entry is a 27-byte hex value indicating the type specific data. A user doesn't have to specify all 27-bytes. If less than 27-bytes are specified, then 0's are prepended. <p>Example:</p> <p>ErrorInjectionEntries= 1.0.0x3.0x44~0.1.0x12.0x3D~1.1.0x3.0xA16E</p> <p>Note:</p> <p>ErrorInjectionEntries properties and ErrorInjectionEntryFile are mutually exclusive.</p>
ErrorInjectionEntryFile	<p>Specifies an XML file that contains the error injection info data. This option serves to streamline the injection formatting (which is cumbersome).</p> <p>Note:</p> <p>ErrorInjectionEntries properties and ErrorInjectionEntryFile are mutually exclusive.</p>

3.2.11.3 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

This command is only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

3.2.11.4 Return Data

This command will send and return the status of the NVMe set error injections. See the following section for the corresponding get feature:

[Show Error Injection](#)

3.2.11.5 Examples

```
> sst set -ssd 1 -errorinjection ErrorInjectionEntryFile=errorinjection.xml
```

Completed successfully.

```
> sst set -ssd 1 -errorinjection > C:\test\ >sst set -ssd 1 -errorinjection  
errorinjectionentries=1.0.0x3.0x44~0.1.0x12.0x3D~1.1.0x3.0xA16E
```

Completed successfully Completed successfully.

3.2.12 Clear PCIe Correctable

The set -PCIECorrectable command sends a set feature command with the specified feature id (FID) for SSDs. Used to clear the PCIe correctable counter.

Only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

Syntax:

```
sst set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
-PCIECorrectable ClearCounter = (true)
```

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.2.12.1 Targets

Target	Description
-PCIECorrectable	Specifies that clear PCIe correctable counter is requested. No input required.
[-ssd (Index SerialNumber PhysicalPath)]	(Optional) Restricts output to specific SSD by supplying the SSD Index or Serial Number.

3.2.12.2 Properties

Below are the properties that can be modified.

Property	Description
ClearCounter	Set to 'true' to clear the counter.

3.2.12.3 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software. The specified device must be an NVMe SSD.

This command is only supported on NVMe devices that support the NVMe Cloud SSD Specification from the Open Compute Project.

3.2.12.4 Return Data

This command will send and return the status of the NVMe clear PCIe correctable counter. Examples

```
> sst set -ssd 1 -PCIECorrectable ClearCounter=True
Set ClearCounter successful. Completed successfully.
```

3.2.13 Drive Scan

Scan the drive for Data Integrity, Read Scans, or Logs.

Note: Log scan output will be saved to the output/TIME_STAMP directory relative to the directory in which the command was run unless overridden by the DirectoryPath property.

3.2.13.1 Syntax

```
start [-help|-h] [-output|-o (text|nvmxml|json)] -scan [(DataIntegrity|ReadScan|Logs)] [-ssd [(Index|SerialNumber|PhysicalPath)]] [IncludeOS = (true|false)] [FullScan = (true|false)] [Path = (drive letter)] [DirectoryPath = (file path)] [IncludeSystemInfo = (true|false)]
```

3.2.13.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmxml json)]	Change the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.2.13.3 Targets

Target	Description
-ssd (Index SerialNumber PhysicalPath)	(Required) A specific SSD selected by supplying the SSD Index or Serial Number must be provided.
-scan [(DataIntegrity ReadScan Logs)]	(Required) Command to scan information on the drive. Options: DataIntegrity ReadScan Logs

3.2.13.4 Properties

Property	Description
[IncludeOS = (true false)]	(Optional) Scan OS partition and/or drive as part of scan.
[FullScan = (true false)]	(Optional) Should the command perform Full or Quick scan.
[Path = (drive letter)]	(Optional) Path to drive partition to scan. Only applicable for DataIntegrity
[DirectoryPath = (file path)]	(Optional) Specify path where drive and system logs should be saved Default is "output/" in current directory.
[IncludeSystemInfo = (true false)]	(Optional) Should system information be included in the scan.

3.2.13.5 Limitations

To successfully execute this command, the caller must have the appropriate privileges and the specified SSD must be manageable by the host software.

3.2.13.6 Return Data

This will return status of the command.

3.2.13.7 Examples

```
> - Scan Results -
```

```
- Intel SSD PHYF830403701P9DGN -
- StoreLogs -
Result : Completed successfully.
```

3.2.14 Read System Snapshot

Read the system snapshot from the device and save it to a binary file.

3.2.14.1 Syntax

```
Dump [-help|-h] [-destination (path)] [-output|-o (text|nvmxml|json)] -ssd
(Index|SerialNumber|PhysicalPath) -SystemSnapshot
```

3.2.14.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-destination (path)]	Specify an alternate destination and file name for the output file.
[-output -o (text nvmxml json)]	Change the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.2.14.3 Targets

Target	Description
-ssd (Index SerialNumber PhysicalPath)	(Required) A specific SSD selected by supplying the SSD Index or Serial Number must be provided.
-SystemSnapshot	(Required) Read the System Snapshot from the device.

3.2.14.4 Properties

No properties are applicable for this command.

3.2.14.5 Limitations

To successfully execute this command, the caller must have the appropriate privileges and the specified SSD must be manageable by the host software.

3.2.14.6 Return Data

This will return status of the command.

3.2.14.7 Examples

```
> sst dump -ssd 1 -systemsnapshot

SystemSnapshot_SerialNumber : Successfully written SystemSnapshot to
SystemSnapshot_SerialNumber.bin
```

Configure Namespaces

3.2.15 Create a Namespace

Create a namespace. Supported on NVMe 1.2+ devices. The NVMe controller of the device will determine the Namespace ID of the newly created namespace.

3.2.15.1 Syntax

```
create [-help|-h] [-output|-o (text|nvmlxml|json)] -namespace -ssd
(Index|SerialNumber|PhysicalPath) Size = (blocks) [LBAFormat = (0-NumLBAFormats)]
[ProtectionInformation = (0|1)] [MultiPathIoCapabilities = (0|1)]
```

3.2.15.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmlxml json)]	Change the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.2.15.3 Targets

Target	Description
-ssd (Index SerialNumber PhysicalPath)	A specific SSD selected by supplying the SSD Index or Serial Number must be provided.
-namespace	The -namespace target is required. It specifies that a namespace is to be created.

3.2.15.4 Properties

Properties	Description
Size = (blocks)	The size property is required. It specifies the size of the new namespace in terms of blocks.
[LBAFormat = (0-NumLBAFormats)]	The LBAFormat property is optional. By default an LBAFormat of 0 will be used. Valid options are 0 to Number of supported LBA Formats specified in the Identify Controller structure. See the NumLBAFormats from show -ssd. The main thing this value determines is the formatted sector size. NOTE: you cannot have different namespaces with different LBA sector sizes.
[ProtectionInformation = (0 1)]	The ProtectionInformation property is optional. By default a value of 0 will be used. 0 = protection information is disabled. 1 = protection information type 1 is used.
[MultiPathIoCapabilities = (0 1)]	The MultiPathIoCapabilities property is optional. By default a value of 1 will be used. 0 = Private namespace is created. 1 = shared namespace is created.

3.2.15.5 Limitations

To successfully execute this command, the caller must have the appropriate privileges and the specified SSD must be manageable by the host software.

3.2.15.6 Return Data

The CLI will return status of the command.

3.2.15.7 Examples

Create a given namespace with a size of 100000 blocks.

```
create -namespace -ssd 2 size=100000
- Intel SSD CVEK5316004R800AGN -
Status : create namespace successful.
```

Create a given namespace with a size of 100000 blocks, that is private and has protection type 1.

```
create -namespace -ssd 2 size=100000 MultiPathIoCapabilities=0 ProtectionInformation=1
- Intel SSD CVEK5316004R800AGN -
Status : create namespace successful.
```

3.2.16 Attach a Namespace

Attach a namespace. May specify an NVMe controller ID using the `-nvmecontrollerid` target. Supported on NVMe 1.2+ devices.

3.2.16.1 Syntax

```
attach [-help|-h] [-output|-o (text|nvmxml|json)] -namespace (id) -ssd
(Index|SerialNumber|PhysicalPath) [-nvmecontroller (controller ID integer)]
```

3.2.16.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvmxml json)]</code>	Change the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.2.16.3 Targets

Target	Description
<code>-ssd (Index SerialNumber PhysicalPath)</code>	A specific SSD selected by supplying the SSD Index or Serial Number must be provided.
<code>-namespace (id)</code>	The <code>-namespace</code> target is required and a valid namespace ID. It specifies that a namespace is to be attached.
<code>[-nvmecontroller (controller ID integer)]</code>	The <code>-nvmecontroller</code> target is optional. If used, a valid controller ID must be given. Used in the case of dual port drives in which a device may have more than one NVMe controller.

3.2.16.4 Properties

This command does not support any properties.

3.2.16.5 Limitations

To successfully execute this command, the caller must have the appropriate privileges and the specified SSD must be manageable by the host software.

3.2.16.6 Return Data

The CLI will return status of the command.

3.2.16.7 Examples

Attach namespace 1 on the device at index 2.

```
attach -namespace 1 -ssd 2
- Intel SSD CVEK5316004R800AGN -
Status : attach namespace successful.
```

3.2.17 Detach a Namespace

Detach a namespace. Supported on NVMe 1.2+ devices.

3.2.17.1 Syntax

```
detach [-help|-h] [-output|-o (text|nvmxml|json)] -namespace (id) -ssd
(Index|SerialNumber|PhysicalPath) [-nvmecontroller (controller ID integer)]
```

3.2.17.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmxml json)]	Change the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.2.17.3 Targets

Target	Description
-ssd (Index SerialNumber PhysicalPath)	(Required) A specific SSD selected by supplying the SSD Index or Serial Number must be provided.
-namespace (id)	(Required) The -namespace target is required and a valid namespace ID. It specifies that a namespace is to be detached.
[-nvmecontroller (controller ID integer)]	The -nvmecontroller target is optional. If used, a valid controller ID must be given. Used in the case of dual port drives in which a device may have more than one NVMe controller.

3.2.17.4 Properties

This command does not support any properties.

3.2.17.5 Limitations

To successfully execute this command, the caller must have the appropriate privileges and the specified SSD must be manageable by the host software.

3.2.17.6 Return Data

The CLI will return status of the command.

3.2.17.7 Examples

Detach namespace 1 on the device at index 2.

```
detach -namespace 1 -ssd 2
- Intel SSD CVEK5316004R800AGN -
Status : detach namespace successful.
```

3.2.18 Delete a Namespace

Delete a namespace. Supported on NVMe 1.2+ devices.

3.2.18.1 Syntax

```
delete [-help|-h] [-force|-f] [-output|-o (text|nvmxml|json)] -namespace (id) -ssd
(Index|SerialNumber|PhysicalPath)
```

3.2.18.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-force -f]</code>	The tool will display a prompt by default when invoking delete. Use this option to bypass the prompt. This option will also ignore partitions on the device.
<code>[-output -o (text nvmlxml json)]</code>	Change the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.2.18.3 Targets

Target	Description
<code>-ssd (Index SerialNumber PhysicalPath)</code>	(Required) A specific SSD selected by supplying the SSD Index or Serial Number must be provided.
<code>-namespace (id)</code>	The -namespace target is required and a valid namespace id must be provided. This selects which namespace to delete.

3.2.18.4 Properties

This command does not support any properties.

3.2.18.5 Limitations

To successfully execute this command, the caller must have the appropriate privileges and the specified SSD must be manageable by the host software.

3.2.18.6 Return Data

The CLI will return status of the command.

3.2.18.7 Examples

Delete namespace 1 on the device at index 2.

```
delete -namespace 1 -ssd 2

WARNING! You have selected to delete the namespace!
Proceed with the delete? (Y|N): y

- Intel SSD CVEK5316004R800AGN -

Status : delete namespace successful.
```

Use the -force option to bypass the prompt.

```
delete -f -namespace 1 -ssd 2

- Intel SSD CVEK5316004R800AGN -

Status : delete namespace successful.
```

3.3 Instrumentation Commands

3.3.1 Show Tool Configuration

Show tool configuration properties.

3.3.1.1 Syntax

```
sst show [-all|-a] [-display|-d] [-help|-h] [-output|-o (text|nvmxml|json)] -system
```

3.3.1.2 Options

Option	Description
[-all -a]	Show all properties.
[-display -d]	Filters the returned properties by explicitly specifying a comma separated list of any of the properties defined in the Return Data section.
[-help -h]	Displays help for the command.
[-output -o (text nvmxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.3.1.3 Targets

Target	Description
-system	Represents the host system. This target has no parameters.

3.3.1.4 Properties

This command option does not support any properties.

3.3.1.5 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software.

3.3.1.6 Return Data

The command displays the following Tool configuration properties. This output could be filtered by specifying the Properties with the `--display` option.

Property	Description
EnableLSIAAdapter	True or False. Whether or not the LSIAAdapter library is loaded. This affects LSI Mega RAID Controller Support. (Default value is False)
EnableLog	True or False. Whether or not to save the Tool's debug log file. (Default value is False)
LogFile	Filename of the Tool's debug log file. Only saved if EnableLog is true. Can contain full qualified file system path. Log location: Windows: c:\Program Files\Solidigm\SolidigmStorageTool\SolidigmSSDTDK.log Linux: /usr/bin/Solidigm/SSDTDK.log

3.3.1.7 Examples

Default show output for `--system` target in default text format.

```
>sst.exe show --system
- sst Config -
EnableLSIAAdapter: false
EnableLog: false
LogFile: C:\Program Files\Solidigm\Solidigm(TM) Storage Tool\\SolidigmTDKI.log
```

3.3.2 Modify Tool Configuration

Change the Tool's configurable settings on the host system. You can only change one setting at a time.

3.3.2.1 Syntax

```
sst set [-help|-h] [-output|-o (text|nvmxml|json)] --system [Property=]
```

3.3.2.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-output -o (text nvmxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.3.2.3 Targets

Target	Description
<code>-system</code>	Represents the host system. This target has no parameters.

3.3.2.4 Properties

One, and only one, property can be specified at a time.

Property	Description
EnableLSIAdapter	Enable or disable the loading of the LSI Adapter library. Supported values are "True" and "False".
EnableLog	Enable or disable the Tool from saving a debug log file. Supported values are "True" and "False"
LogFile	Specify the filename (and path if desired) of the Debug log file. Debug log is only saved if EnableLog=True and LogFile is a valid file name and path.

3.3.2.5 Limitations

To run this command option, the specified SSD(s) must be manageable by the host software.

3.3.2.6 Return Data

The CLI will indicate the status of the operation.

Sample Output:

```
Set EnableLog successful.
```

3.3.2.7 Examples

```
set -system EnableLog=True
```

Enable the tool's debug log file.

```
set -system LogFile=myNewLogFile.txt
```

Set the tool's debug log file. If no path is given the file will be saved in the working directory.

```
set -system EnableLSIAdapter=False
```

Disable the loading of the LSIAdapter library.

3.3.3 Dump Device Data

This command will read binary data from the device and save it to a file. This feature currently supports dumping:

- nLog
- Event Log
- Assert Log
- Telemetry Log

3.3.3.1 Syntax

```
dump[-help|-h] [-destination (filename)] [-output|-o (text|nvmxml|json)] [-ssd (Index|SerialNumber|PhysicalPath)] -nlog
```

```
dump[-help|-h] [-destination (filename)] [-output|-o (text|nvmxml|json)] [-ssd (Index|SerialNumber|PhysicalPath)] -eventlog
```

```
dump[-help|-h] [-destination (filename)] [-output|-o (text|nvmxml|json)] [-ssd
(Index|SerialNumber|PhysicalPath)] -assertlog

dump -destination <output binary> -ssd <index|serial|physicalpath> -telemetrylog

dump[-help|-h] [-destination (filename)] [-output|-o (text|nvmxml|json)] [-ssd
(Index|SerialNumber|PhysicalPath)] -persistenteventlog ('read'|'release') [NewContext =
[('true'|'false')]]
```

3.3.3.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-destination (filename)]	Specifies a filename to save the dump data to. If -destination option is not given, default filename is assigned based on target and drive serial number.
[-output -o (text nvmxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'. This option does not affect the output in the binary file.

3.3.3.3 Targets

Target	Description
-ssd (Index SerialNumber PhysicalPath)	Dump the selected data from the given SSD.
-nlog	Read the nlog binary data from the device and save it to binary file.
-eventlog	Read the event log binary data from the device and save it to binary file.
-assertlog	Read the Assert log binary data from the device and save it to binary file.
-telemetrylog	Read the telemetry log binary data from the device and save it to binary file
-persistenteventlog ('read' 'release')	Read the persistent event log binary data from the current context, create a new context, or release the current context

3.3.3.4 Properties

This command does not support any properties.

3.3.3.5 Limitations

To run this command, the specified SSD must be manageable by the host software.

Telemetry is only available on selected drives.

3.3.3.6 Return Data

Binary data is saved to default file destination or if -destination option is given, output will be saved to given filename. Status of reading the binary data from the selected device, and saving it to file, is returned.

3.3.3.7 Examples

Read the nlog binary from all attached SSDs. Save to default files.

```
> dump -nlog
Nlog_CVF85156007H400AGN-2 : Successfully written Nlog data to Nlog_CVF85156007H400AGN-2.bin
Nlog_CVF85156007H400AGN-1 : Successfully written Nlog data to Nlog_CVF85156007H400AGN-1.bin
Nlog_BTWL238602AM800DGN : Successfully written Nlog data to Nlog_BTWL238602AM800DGN.bin
```

Read 600 sectors the GPL at address 0xDF, Page Number 0 and save it to binary file: gpl.bin.

```
> dump -destination gpl.bin -ssd 1 -gpl 0xDF PageNum=0 SectorCount=600

GPL_BTWL238602A

M800DGN : Successfully written GPL data to gpl.bin
```

Extract Telemetry log to file telemetry_data.bin

```
sst.exe dump -destination telemetry_data.bin -ssd 1 -telemetrylog
```

Read Persistent event log data from the current context

```
sst.exe dump -destination PEL_data.bin -ssd 1 -persistenteventlog read
```

Establish a new persistent event log context and read from it

```
sst.exe dump -destination PEL_data.bin -ssd 1 -persistenteventlog read NewContext = true
```

Release the current persistent event log context (does not read or output any data)

```
sst.exe dump -destination PEL_data.bin -ssd 1 -persistenteventlog release
```

3.4 Support Commands

Support commands consist of Help and Version.

3.4.1 Help Command

Shows help for the supported commands.

3.4.1.1 Syntax

```
sst help [-help|-h] [-output|-o (text|nvmxml|json)] [Verb=(verb)] [Name=(command)]
```

3.4.1.2 Options

Option	Description
[-help -h]	Displays help for the command.
[-output -o (text nvmxml json)]	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmxml'.

3.4.1.3 Targets

This command does not support any targets.

3.4.1.4 Properties

Property	Default	Description
Verb	All Verbs	Filters help to a specific verb. One of: <ul style="list-style-type: none"> • delete • dump • help • load • set • show • start • version
Name	All commands	Filters help to a specific command by name.

3.4.1.5 Return Data

By default, the command displays an introduction to SST followed by a list of the supported commands. When the command list can be filtered to just one command, detailed information is displayed. When the command list includes more than one command, only the command name and synopsis are displayed.

3.4.1.5.1 Sample Output (Multiple Commands)

Note: Not all commands are displayed. This is just to view how the output appears.

```
>sst.exe help
Usage:  sst.exe <verb>[<options>][<targets>][<properties>]

Commands:

Help:
  help [-help|-h] [-output|-o (text|nvmlxml|json)] [Name = (name)] [verb = (verb)]

ssd:
  show [-help|-h] [-display|-d (Property1,...)] [-all|-a] [-output|-o
(text|nvmlxml|json)] -ssd [(Index|SerialNumber|PhysicalPath)]

EnduranceAnalyzer:
  reset [-help|-h] [-output|-o (text|nvmlxml|json)] -ssd (Index|SerialNumber|PhysicalPath
) EnduranceAnalyzer

PhyConfig:
  set [-help|-h] [-output|-o (text|nvmlxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
PhyConfig = (0|1|2|3)

PhysicalSectorSize:
  set [-help|-h] [-output|-o (text|nvmlxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
PhysicalSectorSize = (512|4096)
```

```
PLITestTimeInterval:
    set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
PLITestTimeInterval = (0-6)

PowerGovernorMode:
    set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
PowerGovernorMode = (0|1|2)

ReadErrorRecoveryTime:
    set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
ReadErrorRecoveryTimer = (value)

PhySpeed:
    set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
PhySpeed = (1.5|3|6)

SSCEnabled:
    set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
SSCEnabled = ('true'|'false')

TemperatureLoggingInterval:
    set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
TemperatureLoggingInterval = (time)

TempThreshold:
    set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
TempThreshold = (value)

WriteErrorRecoveryTime:
    set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
WriteErrorRecoveryTimer = (value)

WriteCacheState:
    set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
WriteCacheState = (1|2|3)

MaximumLBA:
    set [-help|-h] [-output|-o (text|nvmxml|json)] -ssd (Index|SerialNumber|PhysicalPath)
MaximumLBA = (numGB|1-100%|LBA|'native')

FirmwareUpdate:
    load [-help|-h] [-force|-f] [-output|-o (text|nvmxml|json)] -ssd
(Index|SerialNumber|PhysicalPath)

SMART:
    show [-help|-h] [-display|-d (Property1,...)] [-all|-a] [-output|-o
(text|nvmxml|json)] -smart [(id)] [-ssd

[(Index|SerialNumber|PhysicalPath)]]

Sensors:
    show [-help|-h] [-display|-d (Property1,...)] [-all|-a] [-output|-o
(text|nvmxml|json)] -sensor [-ssd
```

```

[(Index|SerialNumber|PhysicalPath)]

Performance:
  show [-help|-h] [-display|-d (Property1,...)] [-all|-a] [-output|-o
(text|nvmlxml|json)] -performance [-ssd

  [(Index|SerialNumber|PhysicalPath)]

NVMeLog:
  show [-help|-h] [-output|-o (text|nvmlxml|json)] [-ssd
[(Index|SerialNumber|PhysicalPath)] -nvmeLog

  [('ErrorInfo'|'SmartHealthInfo'|'FirmwareSlotInfo'|'TemperatureStatistics'))]

Delete:
  delete [-help|-h] [-force|-f] [-output|-o (text|nvmlxml|json)] -ssd
(Index|SerialNumber|PhysicalPath)

```

3.4.1.5.2 Sample Output (verb filter to multiple commands)

Specifying the verb property filters the list to only the commands starting with the specified verb.

```

sst.exe help verb=show
Usage:  sst.exe <verb>[<options>][<targets>][<properties>]

Commands:

ssd:
  show [-help|-h] [-display|-d (Property1,...)] [-all|-a] [-output|-o
(text|nvmlxml|json)] -ssd [(Index|SerialNumber|PhysicalPath)]

SMART:
  show [-help|-h] [-display|-d (Property1,...)] [-all|-a] [-output|-o
(text|nvmlxml|json)] -smart [(id)] [-ssd

  [(Index|SerialNumber|PhysicalPath)]

Sensors:
  show [-help|-h] [-display|-d (Property1,...)] [-all|-a] [-output|-o
(text|nvmlxml|json)] -sensor [-ssd

  [(Index|SerialNumber|PhysicalPath)]

Performance:
  show [-help|-h] [-display|-d (Property1,...)] [-all|-a] [-output|-o
(text|nvmlxml|json)] -performance [-ssd

  [(Index|SerialNumber|PhysicalPath)]

NVMeLog:
  show [-help|-h] [-output|-o (text|nvmlxml|json)] [-ssd
[(Index|SerialNumber|PhysicalPath)] -nvmeLog

  [('ErrorInfo'|'SmartHealthInfo'|'FirmwareSlotInfo'|'TemperatureStatistics'))]

```

```

IdentifyDevice:
    show [-help|-h] [-output|-o (text|nvmxml|json)] -identify [-namespace [(integer |
'attached' | 'allocated')]]

    [-nvmecontroller] [-ssd [(Index|SerialNumber|PhysicalPath)]]

LatencyStatistics:
    show [-help|-h] [-output|-o (text|nvmxml|json)] -latencystatistics ('reads'|'writes')
[-ssd [(Index|SerialNumber|PhysicalPath)]]

HDATemperature:
    show [-help|-h] [-output|-o (text|nvmxml|json)] -hdatemperature [-ssd
[(Index|SerialNumber|PhysicalPath)]]

PhyCounters:
    show [-help|-h] [-output|-o (text|nvmxml|json)] -phycounters [-ssd
[(Index|SerialNumber|PhysicalPath)]]

NVMeControllerList:
    show [-help|-h] [-output|-o (text|nvmxml|json)] [-namespace (namespace id)] -
nvmecontroller [-ssd

    [(Index|SerialNumber|PhysicalPath)]]

System:
    show [-help|-h] [-display|-d (Property1,...)] [-all|-a] [-output|-o
(text|nvmxml|json)] -system

```

3.4.1.5.3 Sample Output (single command)

Specifying the Name property filters the list to a specific command and detailed information is returned.

```

sst.exe help Name=Firmware
Name: FirmwareUpdate

Description:
    Update the device's firmware. See the device's FirmwareUpdateAvailable property for
any eligible updates. To by-pass the prompt specify the -force option.

Synopsis:
    load [-help|-h] [-force|-f] [-output|-o (text|nvmxml|json)] -ssd
(Index|SerialNumber|PhysicalPath)

Verb:
    load

Options:
    [-help|-h] -- Display help for the command.

    [-force|-f] -- Force the operation

    [-output|-o (text|nvmxml|json)] -- Change the output format. One of "text", "nvmxml"
or "json".

```


Targets:

-ssd (Index|SerialNumber|PhysicalPath) -- Device index or serial number is required.

Properties:

3.4.1.6 Examples

Lists all supported commands.

```
sst help
```

Lists all commands where the verb is set.

```
sst help verb=show
```

Lists the detailed help for the given Name WriteCacheState.

```
sst help Name=WriteCacheState
```

3.4.2 Version Command

Shows the SST's version and End-User License.

3.4.2.1 Syntax

```
sst version [-help|-h] [-display|-d] [-all|-a] [-output|-o (text|nvmxml|json)]
```

3.4.2.2 Options

Option	Description
<code>[-help -h]</code>	Displays help for the command.
<code>[-display -d]</code>	Filters the returned properties by explicitly specifying a comma separated list of any of the properties defined in the Return Data section.
<code>[-output -o (text nvmlxml json)]</code>	Changes the format of the Return Data. Supported output options are: 'text' (Default), 'json', and 'nvmlxml'.

3.4.2.3 Targets

This command does not support any targets.

3.4.2.4 Properties

This command does not support any properties.

3.4.2.5 Return Data

By default, the command returns the SST's version information. With the `--display` option, it shows the License property.

Property	Description
License	Shows the End-User License for the SST.

3.4.2.5.1 Sample Output

Default output in text.

```
> sst.exe version
- Version Information -

Name: Solidigm(R) Storage Tool
Version: 3.0.0
Description: Interact and configure SSDs.
```

Default output in JSON.

```
> sst.exe version -o json
{
  "Version Information":
  {
    "Name": "Solidigm(R) Storage Tool",
    "Version": "3.0.0",
    "Description": "Interact and configure SSDs."
  }
}
```

3.4.2.6 Examples

Display the available version information for the SST.

```
version
```

Display the End-User License for the SST software components.

```
version -d license
```

3.5 Debug

3.5.1 Tool Debug File

The SST saves to a debug file that contains detailed information on the tool execution. This file is very useful for the Tool Developers when having to debug issues. Whenever requesting assistance from the Tools team on a potential issue with the tool this file will be requested. See [Show Tool Configuration](#) and [Modify Tool Configuration](#) for more information on enabling the debug log.

§

4 Response Codes

The following table lists all the possible error and status codes that are returned from the SST. The first column lists the numeric value of the error/status code returned by the tool. In Windows, to display the numeric return value, type the following at the command prompt after running the tool:

```
>echo %errorlevel%
```

Code	Description
0	Completed successfully.
1	Failed to load the TDK Interface library.
2	An error occurred with interacting with the TDK Interface Library.
3	An error was returned from the TDK Interface when executing the given CLI functionality.
4	Encountered a read file error.
5	Encountered a write file error.
6	Invalid Boolean values were given.
7	Invalid property given.
8	Invalid CLI argument given.

§

5 Examples

5.1 Display Tool Help

Use **help** command line option to display the help table.

```
sst.exe help
```

5.2 Display Tool License

Use the **version** command with the license property to display the End-User license agreement for SST.

```
sst.exe version -d license
```

5.3 Display Drives

Use the **show** command to display a list of drives on the system.

```
sst.exe show -ssd
```

5.4 Bypass Prompts (force)

Use the force option to bypass the warning prompts associated with **load** and **start** commands.

5.5 Debug Log Files

The tool generates a detailed log of the tool's functionality that you can use for debugging purposes and send out for further analysis of tool issues. See [Debug](#) section.

5.6 Display Drive Info

Use the **show** command's **-ssd** option to select which drive to execute functions on and provides a simple summary of each drive found. Use the **show** command's **-a -ssd 1** option to display a verbose output of all the information the tool can get on that particular drive.

```
sst.exe show -a -ssd 1
```

5.7 Identify Device

Use the **show** verb along with the **-identify** target to read and parse identify information. See [Show Device Identification Structures](#) for details.

Note: Identify device contains a large amount of data and the console window may not be large enough to display it in a readable format.

```
sst.exe show -identify -ssd 1  
sst.exe show -identify -ssd 1 -nvmecontroller
```

5.8 Sensor or SMART Data

Use the **-sensor** command to read and parse the Health Sensors. Use the **-smart** command to read and parse the SMART attribute information of the selected drive.

Show all the sensor information for all SSDs

```
sst.exe show -sensor
```

Show all the SMART properties for the SSD at index 1.

```
sst.exe show -smart -ssd 1
```

5.9 Delete

Use the **Delete** command to erase all the data on the drive.

```
sst.exe delete -ssd 1
```

You will be prompted unless using the **-force** option.

```
WARNING: You have selected to delete the drive!  
Proceed with the delete? (Y/N)
```

To bypass the warning prompts, use the **-force** option.

```
sst.exe delete -f -ssd 1
```

5.10 Change Maximum LBA

Use the **MaximumLBA** property to change the drive's maximum storage capacity up to the native capacity of the drive (that is, **MAX LBA**).

Note: Always run the **delete** command before altering the **Maximum LBA** of a drive. After modifying the maximum LBA, you must perform a complete power shutdown to properly reflect the changes.

The **MaximumLBA** property has four options:

The **native** option resets the drive back to its native Max LBA, or 100% of the drive.

```
sst.exe set -ssd 1 MaximumLBA=native
```

The **LBA** option specifies the drive's max LBA with a specific number. The number entered must be a decimal literal.

This example sets the drive's Max LBA to 55555:

```
sst.exe set -ssd 1 MaximumLBA=55555
```

The **x%** percent changes the drive's size based on a percentage of native max. Values of 1-100 are valid, where a value of 100 is equivalent to using the **native** option.

```
sst.exe set -ssd 1 MaximumLBA=80%
```

The **xGB** capacity option sets the drive to a specific capacity in gigabytes. This will result in an error if the given number of gigabytes is less than 1 or is greater than the drive's max capacity.

```
sst.exe set -ssd 1 MaximumLBA=80GB
```

5.11 Update Firmware

Firmware Update is achieved through the load command verb and is used to update the firmware of the selected drive:

```
sst.exe load -ssd 1
```

The SST handles both updates using Windows process or Linux process.

Full Windows Process: The tool handles both updates automatically. For example:

```
sst.exe show -ssd 1
- Ssd Index 1 -
Bootloader: 8B1B012E
DevicePath: \\.\PHYSICALDRIVE1
DeviceStatus: Healthy
Firmware: 8DV10131
FirmwareUpdateAvailable: Firmware=8DV10151 Bootloader=8B1B012F
Index: 1
ProductFamily: Intel SSD DC P3700 Series
ModelNumber: INTEL SSDPEDMD800G4
SerialNumber: CVFT4174002A800CGN

sst.exe load -ssd 1
WARNING! You have selected to update the drives firmware!
Proceed with the update? (Y|N): y
Updating firmware...
Firmware update successful. Please reboot the system.

sst.exe show -ssd 1
- Ssd Index 1 -
Bootloader: 8B1B012F
DevicePath: \\.\PHYSICALDRIVE1
DeviceStatus: Healthy
Firmware: 8DV10151
FirmwareUpdateAvailable: Firmware is up to date as of this tool release.
Index: 1
ProductFamily: Intel SSD DC P3700 Series
ModelNumber: INTEL SSDPEDMD800G4
SerialNumber: CVFT4174002A800CGN
```

Linux Process: User must call the "load" function twice with a system shutdown and reboot in between.

First update:

```
sst show -ssd
- Ssd Index 0 -
Bootloader: 8B1B012E
DevicePath: /dev/nvme0n1
DeviceStatus: Healthy
Firmware: 8DV10131
FirmwareUpdateAvailable: Firmware=8DV10151
Index: 0
ProductFamily: Intel SSD DC P3700 Series
ModelNumber: INTEL SSDPEDMD800G4
SerialNumber: CVFT4174002A800CGN

[root@linuxul2br]# Sst load -ssd 0
WARNING! You have selected to update the drives firmware!
```

```
Proceed with the update? (Y|N): y
Updating firmware...
Firmware update successful. Please reboot the system.
[root@linuxul2br]#
```

The user then shuts down the system and reboots.

In the second update, the tool shows the next update to the BL12E and FW 131 combined package:

```
sst show -ssd
- Ssd Index 0 -
Bootloader: 8B1B012E
DevicePath: /dev/nvme0n1
DeviceStatus: Healthy
Firmware: 8DV10131
FirmwareUpdateAvailable: Firmware=8DV10151 Bootloader=8B1B012F
Index: 0
ProductFamily: Intel SSD DC P3700 Series
ModelNumber: INTEL SSDPEDMD800G4
SerialNumber: CVFT4174002A800CGN

[root@linuxul2br]# Sst load -ssd 0
WARNING! You have selected to update the drives firmware!
Proceed with the update? (Y|N): y
Updating firmware...
Firmware update successful. Please reboot the system.
[root@linuxul2br]#
```

The user shuts down the system and reboots.

```
sst show -ssd
- Ssd Index 0 -
Bootloader: 8B1B012F
DevicePath: /dev/nvme0n1
DeviceStatus: Healthy
Firmware: 8DV10151
FirmwareUpdateAvailable: Firmware is up to date as of this tool release
Index: 0
ProductFamily: Intel SSD DC P3700 Series
ModelNumber: INTEL SSDPEDMD800G4
SerialNumber: CVFT4174002A800CGN
```


5.12 Endurance Analyzer

Use the `enduranceanalyzer` property to calculate the life expectancy of the drive's media based on a user workload. Please note that this feature specifically measures the expected lifetime of the media, not the overall expected lifetime of the drive.

The steps are:

1. Reset SMART Attributes using the `reset` option.

```
sst.exe reset -ssd 2 enduranceanalyzer
```

2. Optionally, remove the SSD and install in test system.
3. Apply minimum 60-minute workload (per 240GB) to SSD.
4. Reinstall SSD in original system if needed. Compute endurance using the `show` command. You can also specify the `EnduranceAnalyzer` property specifically using the `-display (-d)` option.

```
sst.exe show -a -ssd 2
```

```
sst.exe show -d enduranceanalyzer -ssd 2
```

5. Read the Endurance Analyzer value which represents the life expectancy of the drive's media in years.

Note: Endurance analyzer measures **media wear only**. Using media wear, calculations are performed to determine the expected life of the drive media. Please do not use this feature as an overall indicator of drive life expectancy. Media is one component of many affecting drive lifespan.

5.13 Power Governor Mode

Use `PowerGovernorMode` to display and/or change the selected drive's power governor mode. The supported modes are:

- 0 – 25 watts for NVMe drives, unconstrained for ATA devices
- 1 – 20 watts for NVMe drives, Typical (7W) for ATA devices
- 2 – 10 watts for NVMe drives, Low (5W) for ATA devices

To view the current setting, use the **show** command and view the current setting. You can also specify the `PowerGovernorMode` property specifically using the `-display (-d)` option.

```
sst.exe show -a -ssd 1
```

```
sst.exe show -d powergovernormode -ssd 1
```

To explicitly set the power governor mode, provide one of the supported mode options.

```
sst.exe set -ssd 1 powergovernormode=0
```

5.14 JSON – Output

Supports output to all verbs.

Note: The parsed output from "dump" still goes to the file. The output to the screen is status/error text and that is what is affected by the --output option.

Example:

```
sst.exe show -o json -ssd
{
  "Ssd Index 0":
  {
    "DevicePath": "\\.\PHYSICALDRIVE0",
    "DeviceStatus": "Healthy",
    "Firmware": "D2010370",
    "FirmwareUpdateAvailable": "Firmware is up to date as of this tool release.",
    "Index": 0,
    "ProductFamily": "Intel SSD DC S3500 Series",
    "ModelNumber": "INTEL SSDSC2BB080G4",
    "SerialNumber": "BTWL2390005K080DGN"
  }
  "Ssd Index 1":
  {
    "DevicePath": "\\.\PHYSICALDRIVE01",
    "DeviceStatus": "Healthy",
    "Firmware": "5DV10270",
    "FirmwareUpdateAvailable": "Firmware is up to date as of this tool release.",
    "Index": 1,
    "ProductFamily": "Intel SSD DC S3700 Series",
    "ModelNumber": "INTEL SSDSC2BA400G3",
    "SerialNumber": "BTTV220600B5400HGN"
  }
  "Ssd Index 2":
  {
    "Bootloader": "8B1B012E",
    "DevicePath": "\\.\PHYSICALDRIVE02",
    "DeviceStatus": "Healthy",
    "Firmware": "8DV10131",
    "FirmwareUpdateAvailable": "Firmware is up to date as of this tool release.",
    "Index": 2,
    "ProductFamily": "Intel SSD DC P3600 Series",
    "ModelNumber": "INTEL SSDPEDME800G4D HDDL NVME 800GB",
    "SerialNumber": "CVFT4174002C800CGN"
  }
}
```

5.15 NVMLXML – Output

Supports output to all verbs.

Note: The parsed output from "dump" still goes to the file. The output to the screen is status/error text and that is what is affected by the --output option.

Example:

```
sst.exe show -o nvmlxml -ssd
<RootList>
<Ssd_Index_0>
  <DevicePath>\\\\.\\PHYSICALDRIVE0</DevicePath>
  <DeviceStatus>Healthy</DeviceStatus>
  <Firmware>D2010370</Firmware>
  <FirmwareUpdateAvailable>Firmware is up to date as of this tool
release.</FirmwareUpdateAvailable>
  <Index>0</Index>
  <ProductFamily>Intel SSD DC S3500 Series</ProductFamily>
  <ModelNumber>INTEL SSDSC2BB080G4</ModelNumber>
  <SerialNumber>BTWL2390005K080DGN</SerialNumber>
</Ssd_Index_0>

<Ssd_Index_1>
  <DevicePath>\\\\.\\PHYSICALDRIVE1</DevicePath>
  <DeviceStatus>Healthy</DeviceStatus>
  <Firmware>5DV10270</Firmware>
  <FirmwareUpdateAvailable>Firmware is up to date as of this tool
release.</FirmwareUpdateAvailable>
  <Index>1</Index>
  <ProductFamily>Intel SSD DC S3700 Series</ProductFamily>
  <ModelNumber>INTEL SSDSC2BA400G3</ModelNumber>
  <SerialNumber>BTTV220600B5400HGN</SerialNumber>
</Ssd_Index_1>
<Ssd_Index_2>
  <DevicePath>\\\\.\\PHYSICALDRIVE2</DevicePath>
  <DeviceStatus>Healthy</DeviceStatus>
  <Firmware>8DV10131</Firmware>
  <FirmwareUpdateAvailable>Firmware is up to date as of this tool
release.</FirmwareUpdateAvailable>
  <Index>2</Index>
  <ProductFamily>Intel SSD DC P3600 Series</ProductFamily>
  <ModelNumber>INTEL SSDPEDME800G4D HHHL NVME 800GB</ModelNumber>
  <SerialNumber>CVFT4174002C800CGN</SerialNumber>
</Ssd_Index_2>
</RootList>
```