Toshiba Global Commerce Solutions

System Management SSD Life Monitor

Toshiba SSD Life Monitor User's Guide

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Acronyms

SSD	Solid State Drive
SSDLM4L	SSD Life Monitor for Linux
POS	Point of Sale
SFCB	Small Footprint CIM Broker
CIM	Common Information Model
SATA	Serial ATA
NVMe	Non-Volatile Memory express

About this guide

The guide describes how to install and configure Toshiba SSD Life Monitor for Linux (SSDLM4L) 1.5.x on Linux systems.

Who should read this guide?

This guide is intended for personnel who installed and monitoring Solid State Disks on Toshiba Point of Sale Systems by using the CIM open standard interface.

Summary of changes

Version	Description	Release Date
1.3.x	**Initial User's Guide based on software version 1.3.0-1.0**	**22/07/2020**
1.4.x	**Updates based on software version 1.4**	**12/07/2021**
1.5.x	**Added support for Batman machine.**	**01/08/2023**

Chapter 1. Introduction

System Requirements

This section lists the SSDs hardware bus interfaces that SSDLM4L currently supports as well as the software requirements that SSDLM4L needs to run without problems.

Supported SSD Hardware Bus Interface

The following SSDs interfaces are supported on various POS Terminals:

- **SATA/SCSI**
- **NVMe**

Software Requirements

The SSDLM4L requires the following software environment:

Operating System	• Linux x64 (Kernel 4.4+)[1] Packages tested on GNU/Linux distributions[2]: **Ubuntu** (20.04, 22.04) and **SLE** (12 SP5, 15 SP3, 15 SP4)
Library/Package Dependency	• SFCB (Small Footprint CIM Broker)[3] https://sourceforge.net/p/sblim/code/

Table 1 - Software Requirements

[1] Best effort will be provided for no default version.

[2] Best effort will be provided for no tested GNU/Linux distributions.

[3] If the CIM broker is not installed on the system, SSDM4L package installation will fail with an alert message to installing it. It is strongly recommended to previously install the CIM Broker alongside a client to consume and test the information.

Chapter 2. Installing and Removing the SSD Life Monitor

This chapter describes the installation and removal of Toshiba POS SSD Life Monitor in Linux, using either the **rpm** or **dpkg** packages handler depending on the Linux distro is being used.

Installation of SFCB

It is important that SFCB (Small Foot CIM Broker) be already installed on the selected system before installing the SSDLM4L, but if SFCB is not yet installed, please follow the next steps to install it on your system:

1. On Ubuntu:

   ```
   $ sudo apt install sfcb
   ```

2. On SLE 12 / SLE 15:

   ```
   $ sudo dnf install [4]sblim-sfcb.x86_64
   ```

Installation and Removal Procedure

Installation of RPM Package

To install[5] the SSDLM4L **rpm** package: **toshiba-ssddrv-linux-x.y.z-r.r_x86_64.rpm**, where **x.y.z** is the version and **r.r** is the version release, follow the next steps:

1. Install the Toshiba SSD Life Monitor provider:

   ```
   $ sudo rpm -ivh toshiba-ssddrv-linux-x.y.z-r.r.x86_64.rpm
   ```

Removal of RPM Package

To uninstall **toshiba-ssddrv-linux.x86_64** package:

1. Remove the **toshiba-ssddrv-linux** package:

   ```
   $ sudo rpm -e toshiba-ssddrv-linux.x86_64
   ```

[4] rpm -Uvh is also supported but is required preinstall manually all of package 's dependencies

[5] **NOTE:** Please **uninstall** any previous SSDLM4L version in your system, it doesn't support **UPDATE** feature.

Installation of DEB Package

To install[6] the SSDLM4L **deb** package: **toshiba-ssddrv-linux-x.y.z-r.r_amd64.deb**, where **x.y.z** is the version and **r.r** is the version release, follow the next steps:

1. Install the SSD Life Monitor provider:

```
$ sudo dpkg -i toshiba-ssddrv-linux_x.y.z-r.r_amd64.deb
```

Removal of DEB Package

To uninstall **toshiba-ssddrv-linux-x.y.z-r.r_amd64.deb** package:

1. Remove the **toshiba-ssddrv-linux** package:

```
$ sudo dpkg remove --purge toshiba-ssddrv-linux
```

[6] **NOTE:** Please **uninstall** any previous SSDLM4L version in your system, it doesn't support **UPDATE** feature.

Chapter 3. Configuring the SSD Life Monitor Driver

SSD Life Monitor Configuration file

The Toshiba SSLM4L has configuration files that can be found in:

- /etc/ssddrv/ssddrv.ini
- /etc/ssddrv/log.conf

Containing the following entries:

Property	Description	Default Value
PollRate	Seconds at which the driver is polled to check the health of SSDs.	10
PercentUsedThreshold	Threshold for SSD %used over which an event is fired to registered client	90
SptLogAccess	Use 'SCSI Pass Thru' for ATA Log access	1
FileName	Log file location	*/var/log/ssddrv/ssddrv.log*
Level	Log verbosity level: Off **0** Error **1 -** Log only errors Information **2** - (default for production) Debug **3 -** Errors + detailed info Trace **4 -** Very detailed info	2
MaxLength	Maximum length of the log file. When full no more logging is recorded.	10MB

Table 2 - SSD Life Monitor config entries

Configuring SFCB Server

There are some basic changes that must be done on the configuration file ***/etc/sfcb/sfcb.cfg*** at the option '**providerDirs**:':

1. Add the following path at the end of the line if not present:

   - On Ubuntu
   `/usr/lib/x86_64-linux-gnu`

- On SLE 12 and SLE 15:

```
/usr/lib64/sfcb
```

2. Restart the SFCB daemon to update the new configurations:

   - On Ubuntu

   ```
   $ sudo systemctl restart sfcb
   ```

   - on SLE 12 and SLE 15

   ```
   $ sudo systemctl restart sblim-sfcb
   ```

3. To test the SFCB configuration you can install **sblim** test utilities in either client or local machine:

   - On Ubuntu

   ```
   $ sudo apt install sblim-wbemcli
   ```

   - On SLE 12 and SLE 15

   ```
   $ sudo dnf install sblim-wbemcli.x86_64
   ```

   - To test it

   ```
   $ wbemcli ec 'http://localhost:5988/root/cimv2'
   ```

Chapter 4: Supported CIM Information

SSD CIM operations

The following table describe both supported and unsupported CIM operations in *Toshiba SSD Life Monitor driver*:

CIM Operation	Supported
get class	No
get class definition	Yes
delete class	No
enumerate classes	Yes
enumerate class names	Yes
get instance	Yes
create instance	No
modify instance	No
delete instance	No
enumerate instances	Yes
enumerate instance names	Yes
enumerate association instances	No
enumerate association instance names	No
enumerate reference instances	No
enumerate reference instance names	No
get property	No
set property	No
call method	No
call method (return XML)	No
Exec query	Yes
CIM_ProcessIndication[7]	Yes

[7] Register clients is required

Table 3 – Supported CIM SSD operations

SSD'S properties Summary

The following properties are declared in the CIM SSD class:

Property	Description	Example
ClassVersion	Internal version control	1
DeviceID [KEY]	DriverModel + DriveSerialNumber + PhysicalDrive	SanDisk SD8SNAT128G1011___170728421415___sda
DriveModel	SSD's Model described internally by manufacturer	SanDisk SD8SNAT128G1011
DriveSerialNumber	Serial Number	170728421415
PhysicalDrive	Node device name identified by the Kernel under /dev/ directory	sda
DriveFirmwareVersion	Firmware version	20102P00
PoweredOnHours	Lifetime of driver when the electrical power is applied to device. A determined number of Power-On-Hour is provided by SSD manufactured	7234
PercentageUsed	1% means the drive is 100% healthy, while 100% means that 100% of the drive's lifetime is used up.	4
PercentageUsedSource	Defined by default in ATA log (used internally by SSD driver)	2
FailureImminent	Condition reached: **SSD Percentage Used** in S.M.A.R.T log is greater than **PercentageUsed** setting described in Chapter 3.	FALSE

Table 4 – CIM SSD class declaration[8]

[8] Looks inside in **/etc/ssddrv/SsdSchema.mof** for exactly properties data type definition

Chapter 5: Basic Configuration Test

CIM client applications should be able to send supported CIM Operations Request described in SSD CIM operations section.

Example of CIM client applications that you can use to test your configuration and successful Toshiba SSD Life Monitor Installation are:

- **wbemcat**: XML request/response for Linux/Windows client.
- **wbemcli**: Command Line Client to CIM.

The following command shows how to issue the CIM Enumerate Instances operation:

```
$ wbemcli ei 'http://localhost:5988/root/cimv2:RSS_SSDLifeMonitor'
```

Output:

```
localhost:5988/root/cimv2:RSS_SSDLifeMonitor.DeviceID=

"SanDisk SD8SNAT128G1011___170728421415___sda",

SystemCreationClassName="Computer System",

SystemName="Toshiba POS SSD Life Monitor Drivers",

CreationClassName="RSS_SSDLifeMonitor" Generation=,

ElementName=,

Description="Lifecycle information for Solid State Disk: SanDisk SD8SNAT128G1011 with
Serial Number 170728421415 on Linux Physical Drive sda",

Caption="SSD Life Monitor (SanDisk SD8SNAT128G1011___170728421415___sda)",

InstanceID=,

PrimaryStatus=,

OperatingStatus=,

DetailedStatus=,

CommunicationStatus=,

HealthState=,

Status=,

StatusDescriptions=,

OperationalStatus=,

Name=,

InstallDate=,

TransitioningToState=12,

AvailableRequestedStates=,
```

```
TimeOfLastStateChange=,
EnabledDefault=2,
RequestedState=12,
OtherEnabledState=,
EnabledState=5,
LocationIndicator=,
AllocationState=,
MaxQuiesceTime=,
AdditionalAvailability=,
IdentifyingDescriptions=,
TotalPowerOnHours=,
PowerOnHours=,
OtherIdentifyingInfo=,
ErrorCleared=,
ErrorDescription=,
LastErrorCode=,
StatusInfo=,
Availability=,
PowerManagementCapabilities=,
PowerManagementSupported=,
CreationClassName="RSS_SSDLifeMonitor",
SystemName="Toshiba POS SSD Life Monitor Drivers",
SystemCreationClassName="Computer System",
FailureImminent=FALSE,
PercentageUsedSource=2,
PercentageUsed=6,
PoweredOnHours=165,
DriveFirmwareVersion="Z2333000",
PhysicalDrive="sda",
DriveSerialNumber="170728421415",
DriveModel="SanDisk SD8SNAT128G1011",
DeviceID="SanDisk SD8SNAT128G1011___170728421415___sda",
ClassVersion="1"
```

For more details you can use the official Linux's manual and documentation.

Chapter 6: Solving Problems

SSD Life Monitor for Linux supports log's file level generation[9] its default setting is **`Level 2`** (minimal information) as is described in Chapter 3. All information regarding to SSDs device, S.M.A.R.T logs, request, statistics, status, so forth is contained in this file, the name and location of trace file is configured by the **FileName** entry in the **log.conf** file described in Chapter 3, by default with the value: **`/var/log/ssddrv/ssddrv.log`**.

```
2/07/2020 12:34:04.693 P[   11663] T[1a614700] Debug   SsdManager::initialise - Found fixed scsi disk
sda

22/07/2020 12:34:04.693 P[   11663] T[1a614700] Debug   ATA Major version = 000003f0

22/07/2020 12:34:04.693 P[   11663] T[1a614700] Debug   model: SanDisk SD8SNAT128G1011

22/07/2020 12:34:04.693 P[   11663] T[1a614700] Debug   serial no: 170728421415

22/07/2020 12:34:04.693 P[   11663] T[1a614700] Debug   fw rev: Z2333000

22/07/2020 12:34:04.693 P[   11663] T[1a614700] Debug   Rotation word: 0x0001

22/07/2020 12:34:04.693 P[   11663] T[1a614700] Debug   SSD Heuristics: ' SSD ' in model - No

22/07/2020 12:34:04.693 P[   11663] T[1a614700] Debug   Non-rotating SSD Yes

…
```

Table 5 - SSD output log file in trace level

The CIM broker in which SSD Life Monitor for Linux relies, has its private logging subsystem, please referred to **Table 2** of this guide to configure the trace level.

That information helps to trace issues presented in SSD Life Monitor for Linux Driver, also the Linux native logging subsystem: syslog would be useful, to get such traces please referred to Linux User Manual for the distribution that you are using.

README.txt and *SSDLM4L_Users_Guide.pdf* can be found in ***/usr/share/doc/toshiba-ssddrv-linux/*** after successful installation.

[9] Please **restart** the SFCB service to changes take effect in SSD's configuration file.

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