Device Statistics – Usage

T13 Technical Proposal – e06180r8

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[This document is a proposal for the T13 to describe the Device Statistics for the device to report. The device usage is the information for the device usage history such as the length of the use period. The statistics supported are optional, and only applicable to the applicable devices.]

A.5 Device Statistics (Log Address TBDh)

A.5.1 Overview

The optional Device Statistics log contains selected statistics about the device. This log shall be read-only, and shall only be accessed via the GPL feature set. This log is supported if there is a non-zero length for log address TBDh in the General Purpose Log Directory. The format of the data is defined in table TBD. If the Device Statistics log is supported, only the Structure Version field is required. Each statistic is composed of a 1-byte flag field and a value field. If the bit 7 of the flag field is set to one then the value field of that statistic is valid. Each statistic shall be a multiple of 8 bytes long. The number of log pages may be greater than one.

A.5.2 Device Usage Statistics (Page 4)

A.5.2.1 Overview

Device Statistics log page 4 contains device usage information about the device as described in table TBD.

The summary of this usage statistics is as followed:

a) Structure Version
b) Power-On Hours (Lifetime)
c) Spindle Motor Power-on Hours (Lifetime)
d) Head-Flying Hours (Lifetime)
e) Head Load Events (Lifetime)
f) Active/Idle Power Loss Events (Lifetime)
g) Total Write Data (Lifetime)
h) Number of Write Commands (Lifetime)
i) Total Read Data (Lifetime)
j) Number of Read Commands (Lifetime)

(Editor's note: Bit 63:56 will be a generic structure defined in the Statistics Overview document.)

Table TBD – Usage Statistics

Offset	Type	Content
0-7	QWord	Structure Version
		Bit **Meaning** 63:56 Reserved 55:48 Device Statistics Version Number = 0001h 47:16 Reserved 15:0 0004h
8-15	QWord	Power-On Hours (Lifetime)
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Power-On Hours (Lifetime)
16-23	QWord	Spindle Motor Power-on Hours (Lifetime)

Offset	Type	Content
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Spindle Motor Power-on Hours (Lifetime)
24-31	QWord	Head-Flying Hours (Lifetime)
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Head-Flying Hours (Lifetime)
32-39	QWord	Head Load Events (Lifetime)
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Head Load Events (Lifetime)
40-47	QWord	Active/Idle Power Loss Events (Lifetime)
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Active/Idle Power Loss Events (Lifetime)
48-55	QWord	Total Write Data (Lifetime)
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Total Write Data (Lifetime)
56-63	QWord	Number of Write Commands (Lifetime)
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Number of Write Commands (Lifetime)
64-71	QWord	Total Read Data (Lifetime)
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Total Read Data (Lifetime)
72-79	QWord	Number of Read Commands (Lifetime)
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Number of Read Commands (Lifetime)
80-511	Byte	Reserved

A.5.2.2 Structure Version

A.5.2.2.1 Description

Structure Version defines the version of the data structure arrangement for this statistics. The structure is defined by the T13 committee. When a new structure is defined the version number will be assigned.

Bit 56:48 is used for the revision number of the statistics structure. Bit 15:0 is used for the page number of the Log Page for this statistics.

A.5.2.2.2 Update Interval

Update interval is not applicable to the Structure Version field.

A.5.2.2.3 Measurement Unit

Measurement unit is not applicable to the Structure Version field.

A.5.2.2.4 Initialization

Structure Version shall be initialized to the corresponding number at the time of manufacture.

A.5.2.3 Power-On Hours (Lifetime)

A.5.2.3.1 Description

Power-On Hours (Lifetime) is a counter that records the amount of time that the device has been operational since the device was manufactured. The device is operational when it is in Active/Idle/Standby state. The Sleep state is not an operational state. The power-on hours is sampled and recorded to a volatile counter with a minimum resolution of one minute. This volatile counter is accumulated into a non-volatile location per the following update criteria. The reporting of power on hours is truncated to hour units. Power-On Hours (Lifetime) is incremented by one for each hour of operation.

A.5.2.3.2 Update Interval

Power-On Hours (Lifetime) is updated on the following events. When the device is operational the counter is updated and stored in a non-volatile location at a minimum interval of one hour.

A.5.2.3.3 Measurement Unit

Measurement Unit: Hour.

A.5.2.3.4 Initialization

Power-On Hours (Lifetime) shall be initialized to zero at the time of manufacture.

A.5.2.4 Spindle Motor Power-on Hours (Lifetime)

A.5.2.4.1 Description

Spindle Motor Power-on Hours (Lifetime) is a counter that records the amount of time that the spindle motor has been powered on since the device was manufactured. The spindle motor power on time is sampled and recorded to a volatile counter with a minimum resolution one minute. This volatile counter is accumulated into a non-volatile location per the following update criteria. The reporting of spindle motor

power on hours is truncated to hour units. Spindle Motor Power-on Hours (Lifetime) is incremented by one for each hour of spindle powered on.

A.5.2.4.2 Update Interval

Spindle Motor Power-on Hours (Lifetime) is updated on the following events. When the device is operational the counter is updated and stored in a non-volatile location at an interval of no greater that one hour

A.5.2.4.3 Measurement Unit

Measurement Unit: Hour.

A.5.2.4.4 Initialization

Spindle Motor Power-on Hours (Lifetime) shall be initialized to zero at the time of manufacture.

A.5.2.5 Head-Flying Hours (Lifetime)

A.5.2.5.1 Description

Head-Flying Hours (Lifetime) is a counter that records number of hours that the device head(s) is(are) flying over the surface of the media since the device was manufactured. The head-flying time is sampled and recorded to a volatile counter with a minimum resolution of one minute. This volatile counter is accumulated into a non-volatile location per the following update criteria. The reporting of the head-flying hours is truncated to hour units. Head-Flying Hours (Lifetime) is incremented by one for each hour of head(s) flying over the surface of media.

A.5.2.5.2 Update Interval

Head-Flying Hours (Lifetime) is updated on the following events. When the device is operational the counter is updated and stored in a non-volatile location at an interval of no greater that one hour

A.5.2.5.3 Measurement Unit

Measurement Unit: Hour.

A.5.2.5.4 Initialization

Head-Flying Hours (Lifetime) shall be initialized to zero at the time of manufacture.

A.5.2.6 Head Load Events (Lifetime)

A.5.2.6.1 Description

Head Load Events (Lifetime) is a counter that records the number of events that the device loads its head(s) over the surface of the media. If the device is a ramp load device the number of times that the head(s) is(are) loaded from the ramp to the media are counted. If the device is a contact start stop device the number of time that the head(s) move away from the landing zone are counted. Head Load Events (Lifetime) is incremented by one for each time the device loads its head(s) over the surface of the media.

A.5.2.6.2 Update Interval

Head Load Events (Lifetime) is updated on the following events. When the device is operational the counter is updated and stored in a non-volatile location at an interval of no greater that one hour

A.5.2.6.3 Measurement Unit

Measurement Unit: Event.

A.5.2.6.4 Initialization

Head Load Events (Lifetime) shall be initialized to zero at the time of manufacture.

A.5.2.7 Active/Idle Power Loss Events (Lifetime)

A.5.2.7.1 Description

Active/Idle Power Loss Events (Lifetime) is a counter that records number of power loss events that have occurred when the device was in Active or Idle state. Active/Idle Power Loss Events (Lifetime) is incremented by one each time the Active/Idle Power Loss Event is detected.

A.5.2.7.2 Update Interval

Active/Idle Power Loss Events (Lifetime) is updated on the following events. When the device is powered on, if it detects that an Active/Idle Power Loss Event has occurred, then the counter is incremented and stored in a non-volatile location.

a) Update on Timer: Yes, no greater than one hour interval
b) Update on entering Standby state: No
c) Update on entering Sleep state: No
d) Update on Device Statistics Page Read: No
e) Update on following power on: Yes

A.5.2.7.3 Measurement Unit

Measurement Unit: Event.

A.5.2.7.4 Initialization

Active/Idle Power Loss Events (Lifetime) shall be initialized to zero at the time of manufacture.

A.5.2.8 Total Write Data (Lifetime)

A.5.2.8.1 Description

Total Write Data (Lifetime) is a counter that records the total amount of logical data blocks transferred for write commands that complete successfully. Total Write Data (Lifetime) is incremented by one for each logical data block that was written successfully.

A.5.2.8.2 Update Interval

Total Write Data (Lifetime) is updated on the following events. When the device is operational the counter is updated and stored in a non-volatile location at an interval of no greater than one hour.

A.5.2.8.3 Measurement Unit

Measurement Unit: LBA Block.

A.5.2.8.4 Initialization

Total Write Data (Lifetime) shall be initialized to zero at the time of manufacture.

A.5.2.9 Number of Write Commands (Lifetime)

A.5.2.9.1 Description

Number of Write Commands (Lifetime) is a counter that records the number of write commands that complete successfully. Number of Write Commands (Lifetime) is incremented by one for each write command that is completed successfully.

A.5.2.9.2 Update Interval

Number of Write Commands (Lifetime) is updated on the following events. When the device is operational the counter is updated and stored in a non-volatile location at an interval of no greater that one hour.

A.5.2.9.3 Measurement Unit

Measurement Unit: Commands completed successfully.

A.5.2.9.4 Initialization

Number of Write Commands (Lifetime) shall be initialized to zero at the time of manufacture.

A.5.2.10 Total Read Data (Lifetime)

A.5.2.10.1 Description

Total Read Data (Lifetime) is a counter that records the total amount of logical data blocks transferred for read commands that complete successfully. Total Read Data (Lifetime) is incremented by one for each logical data block that was read successfully.

A.5.2.10.2 Update Interval

Total Read Data (Lifetime) is updated on the following events. When the device is operational the counter is updated and stored in a non-volatile location at an interval of no greater than one hour.

A.5.2.10.3 Measurement Unit

Measurement Unit: LBA Block.

A.5.2.10.4 Initialization

Total Read Data (Lifetime) shall be initialized to zero at the time of manufacture.

A.5.2.11 Number of Read Commands (Lifetime)

A.5.2.11.1 Description

Number of Read Commands (Lifetime) is a counter that records the number of read commands that complete successfully. Number of Read Commands (Lifetime) is incremented by one for each read command that is completed successfully.

A.5.2.11.2 Update Interval

Number of Read Commands (Lifetime) is updated on the following events. When the device is operational the counter is updated and stored in a non-volatile location at an interval of no greater that one hour.

A.5.2.11.3 Measurement Unit

Measurement Unit: Commands completed successfully.

A.5.2.11.4 Initialization

Number of Read Commands (Lifetime) shall be initialized to zero at the time of manufacture.