Device Statistics – Usage

T13 Technical Proposal – e06180r9~~e06180r8~~

By
Steve Livaccari, IBM, and
Joseph Chen, Samsung

2008-08-05~~Revision 8, 2008-06-23~~

~~[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 TBD)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.5.2A.5.1 Device Usage Statistics (Page TBD)4)

A.5.2.1A.5.1.1 Overview

Device Statistics log page TBD4 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) Device Power-on Hours;
c) Spindle Motor Power-on Hours;
d) Head Flying Hours;
e) Head Loaded Events;
f) Active/Idle Power Loss Events;
g) Total Write Logical Sectors;
h) Number of Write Commands;
i) Total Read Logical Sectors; and
1. Number of Read Commands.Structure Version
2. Power-On Hours (Lifetime)
3. Spindle Motor Power-on Hours (Lifetime)
4. Head-Flying Hours (Lifetime)
5. Head Load Events (Lifetime)
6. Active/Idle Power Loss Events (Lifetime)
7. Total Write Data (Lifetime)
8. Number of Write Commands (Lifetime)
9. Total Read Data (Lifetime)
10. 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** 63:5655:24 Device Statistics Flags, (See Table TBD)Reserved 23:1655:48 TBD, PageDevice Statistics Version Number = 0001h 15:047:16 Device Statistics Version Number = 0001hReserved 15:0 0004h
8-15	QWord	Device Power-onPower On Hours (Lifetime)

Offset	Type	Content
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Device Power-on~~Power-On~~ Hours ~~(Lifetime)~~
16-23	QWord	Spindle Motor Power-on Hours ~~(Lifetime)~~
		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 Loaded Events ~~(Lifetime)~~
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Head Loaded 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 Logical Sectors~~Data (Lifetime)~~
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Total Write Logical Sectors~~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 Logical Sectors~~Data (Lifetime)~~
		Bit **Meaning** 63:56 Device Statistics Flags, (See Table TBD) 55:32 Reserved 31:0 Total Read Logical Sectors~~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.5.2.2A.5.1.2 Structure Version

A.5.2.2.1A.5.1.2.1 Description

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

Bit 23:1656:48 is the page number of the Log Page. Bit 15:0 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.5.2.2.2A.5.1.2.2 Update Interval

NAUpdate interval is not applicable to the Structure Version field.

A.5.2.2.3A.5.1.2.3 Measurement Unit

NAMeasurement unit is not applicable to the Structure Version field.

A.5.2.2.4A.5.1.2.4 Initialization

Structure Version shall be setinitialized to 0001h.the corresponding number at the time of manufacture.

A.5.2.3A.5.1.3 Device Power-onPower-On Hours (Lifetime)

A.5.2.3.1A.5.1.3.1 Description

Device Power-onPower-On Hours statistics(Lifetime) is a valuecounter 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 locationcounter with a minimum resolution of one minute. This volatile valuecounter is accumulated into a non-volatile location per the following update criteria. The reporting of power on hours is truncated to hour units. This statisticsPower-On Hours (Lifetime) is incremented by one for each hour of operation.

A.5.2.3.2A.5.1.3.2 Update Interval

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

1.

A.5.2.3.3A.5.1.3.3 Measurement Unit

Unsigned value in hourMeasurement Unit: Hour.

A.5.2.3.4A.5.1.3.4 Initialization

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

~~A.5.2.4~~A.5.1.4 Spindle Motor Power-on Hours ~~(Lifetime)~~

~~A.5.2.4.1~~A.5.1.4.1 Description

Spindle Motor Power-on Hours statistics~~(Lifetime)~~ is a value~~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 value~~counter~~ with a minimum resolution one minute. This volatile value~~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. This statistics~~Spindle Motor Power-on Hours (Lifetime)~~ is incremented by one for each hour of spindle powered on.

~~A.5.2.4.2~~A.5.1.4.2 Update Interval

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

1.

~~A.5.2.4.3~~A.5.1.4.3 Measurement Unit

Unsigned value in hour~~Measurement Unit: Hour.~~

~~A.5.2.4.4~~A.5.1.4.4 Initialization

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

~~A.5.2.5~~A.5.1.5 Head~~-~~Flying Hours ~~(Lifetime)~~

~~A.5.2.5.1~~A.5.1.5.1 Description

Head~~-~~Flying Hours statistics~~(Lifetime)~~ is a value~~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 value~~counter~~ with a minimum resolution of one minute. This volatile value~~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. This statistics~~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~~A.5.1.5.2 Update Interval

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

1.

~~A.5.2.5.3~~A.5.1.5.3 Measurement Unit

~~A.5.2.5.4~~A.5.1.5.4 Unsigned value in hour~~Measurement Unit: Hour.~~Initialization

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

A.5.2.6A.5.1.6 Head Loaded Events (Lifetime)

A.5.2.6.1A.5.1.6.1 Description

Head Loaded Events statistics(Lifetime) is a valuecounter 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. This statisticsHead Load Events (Lifetime) is incremented by one for each time the device loads its head(s) over the surface of the media.

A.5.2.6.2A.5.1.6.2 Update Interval

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

1.

A.5.2.6.3A.5.1.6.3 Measurement Unit

A.5.2.6.4A.5.1.6.4 Unsigned value of eventMeasurement Unit: Event.Initialization

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

A.5.2.7A.5.1.7 Active/Idle Power Loss Events (Lifetime)

A.5.2.7.1A.5.1.7.1 Description

Active/Idle Power Loss Events statistics(Lifetime) is a valuecounter that records number of power loss events that have occurred when the device was in Active or Idle state.[SJL1] This statisticsActive/Idle Power Loss Events (Lifetime) is incremented by one each time the Active/Idle Power Loss Event is detected.

A.5.2.7.2A.5.1.7.2 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 this statisticsthe counter is incremented and stored in a non-volatile location at the next power-up.

1. Update on Timer: Yes, no greater than one hour interval
2. Update on entering Standby state: No
3. Update on entering Sleep state: No
4. Update on Device Statistics Page Read: No
5.1. Update on following power on: Yes

A.5.2.7.3A.5.1.7.3 Measurement Unit

A.5.2.7.4A.5.1.7.4 Unsigned value of eventMeasurement Unit: Event.Initialization

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

A.5.2.8A.5.1.8 Total Write Logical SectorsData (Lifetime)

A.5.2.8.1A.5.1.8.1 Description

Total Write Logical Sectors statisticsData (Lifetime) is a valuecounter that records the total amount of logical sectorsdata blocks transferred for write commands that complete successfully.

A.5.2.8.2A.5.1.8.2

A.5.2.8.3A.5.1.8.3

This statisticsTotal Write Data (Lifetime) is incremented by one for each logical data block that was written successfully.

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

A.5.2.8.4A.5.1.8.4 Measurement Unit

A.5.2.8.5A.5.1.8.5 Unsigned value of Logical SectorMeasurement Unit: LBA Block.Initialization

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

A.5.2.9A.5.1.9 Number of Write Commands (Lifetime)

A.5.2.9.1A.5.1.9.1 Description

Number of Write Commands statistics(Lifetime) is a valuecounter that records the number of write commands that complete successfully.

A.5.2.9.2 This statisticsNumber of Write Commands (Lifetime) is incremented by one for each write command that is completed successfully.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.

1.

A.5.2.9.3 Measurement Unit

A.5.2.9.4 Measurement Unit: Commands completed successfully.Initialization

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

~~A.5.2.10~~A.5.1.10 ~~Total Read Data (Lifetime)~~

~~A.5.2.10.1~~A.5.1.1.1 ~~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~~A.5.1.10.1 **Update Interval**

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

A.5.1.10.2 Measurement Unit

Unsigned value of event that command completed successfully

A.5.1.10.3 Initialization

This statistics shall be initialized to zero at the time of manufacture.

A.5.1.10.4 Total Read Logical Sectors~~Description~~

Total Read Logical Sectors statistics is a value that records the total amount of logical sectors transferred for read commands that complete successfully. This statistics is incremented by one for each logical data block that was read successfully.

A.5.1.10.5 Update Interval

When the device is operational this statistics~~counter~~ is updated and stored in a non-volatile location at an interval of no greater than one hour.

1.

~~A.5.2.10.3~~A.5.1.10.6 ~~Measurement Unit~~

~~A.5.2.10.4~~A.5.1.10.7 **Measurement Unit~~: LBA Block.Initialization~~**

Unsigned value of Logical Sector

A.5.1.10.8 Initialization

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

~~A.5.2.11~~A.5.1.11 **Number of Read Commands ~~(Lifetime)~~**

~~A.5.2.11.1~~A.5.1.11.1 **Description**

Number of Read Commands statistics~~(Lifetime)~~ is a value~~counter~~ that records the number of read commands that complete successfully.

~~A.5.2.11.2~~A.5.1.11.2 **This statistics~~Number of Read Commands (Lifetime)~~ is incremented by one for each read command that is completed successfully.~~Update Interval~~**

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

1.

~~A.5.2.11.3~~A.5.1.11.3 **Measurement Unit**

~~A.5.2.11.4~~A.5.1.11.4 **Unsigned value of event that command~~Measurement Unit: Commands~~ completed successfully~~.~~Initialization**

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