

Device Statistics – General Errors and Rotating Media Errors

T13 Technical Proposal – e06181r7

By
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[This document is a proposal for the T13 to describe the Device Statistics for the device to report. The device error is the information for the device history. The statistics supported are optional, and only applicable to the applicable devices.]

A.5.1 General Errors Statistics (Page TBD)

A.5.1.1 Overview

General Errors Statistics log page TBD contains error information about the device as described in table TBD.

The summary of this error statistics is as followed:

- a) Structure Version;
- b) Number of Reported Uncorrectable Errors;
- c) Number of Reported Device Errors that are not UNC Errors;
- d) Number of Commands Terminated by Resets; and
- e) Number of Power Loss Instance with Incomplete Write.

Table TBD – General Errors Statistics

Offset	Type	Content						
0-7	QWord	Structure Version						
		<table border="0"> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:24</td> <td>Reserved</td> </tr> <tr> <td>23:16</td> <td>TBDh, Page Number</td> </tr> <tr> <td>15:0</td> <td>Device Statistics Version Number = 0001h</td> </tr> </table>	Bit	Meaning	63:24	Reserved	23:16	TBDh, Page Number
Bit	Meaning							
63:24	Reserved							
23:16	TBDh, Page Number							
15:0	Device Statistics Version Number = 0001h							
8-15	QWord	Number of Reported Uncorrectable Errors						
		<table border="0"> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Number of Reported Uncorrectable Errors</td> </tr> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:32	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:32	Reserved							
31:0	Number of Reported Uncorrectable Errors							
16-24	QWord	Number of Reported Device Errors that are not UNC Errors						
		<table border="0"> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Number of Reported Device Errors that are not UNC Errors</td> </tr> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:32	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:32	Reserved							
31:0	Number of Reported Device Errors that are not UNC Errors							
25-32	QWord	Number of Commands Terminated by Resets						
		<table border="0"> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Number of Commands Terminated by Resets</td> </tr> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:32	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:32	Reserved							
31:0	Number of Commands Terminated by Resets							
33-40	QWord	Number of Power Loss Instance with Incomplete Write						
		<table border="0"> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Number of Power Loss Instance with Incomplete Write</td> </tr> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:32	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:32	Reserved							
31:0	Number of Power Loss Instance with Incomplete Write							
41-511	Byte	Reserved						

A.5.1.2 Structure Version

A.5.1.2.1 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 31:16 is used for the page number of the Log Page for this statistics. Bit 15:0 is used for the revision number of the statistics structure.

A.5.1.2.2 Update Interval

Update interval is not applicable to the Structure Version field.

A.5.1.2.3 Measurement Unit

Measurement unit is not applicable to the Structure Version field.

A.5.1.2.4 Initialization

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

A.5.1.3 Number of Reported Uncorrectable Errors

A.5.1.3.1 Description

Number of Reported Uncorrectable Errors statistics is a counter that records the number of errors that are reported as Uncorrectable (UNC) errors in the error response of a command. Uncorrectable errors occur during background activity are not counted. This statistics is incremented by one for each uncorrectable error status reported to the host.

A.5.1.3.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.1.3.3 Measurement Unit

Event

A.5.1.3.4 Initialization

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

A.5.1.4 Number of Reported Device Errors that are not UNC Errors

A.5.1.4.1 Description

Number of Reported Device Errors that are not UNC (Uncorrectable) Errors statistics is a counter that records the number of errors reported in the error response of a command that are of these types: CCTO, MED, APRRR, INCS, ILRER and Special Error for Request Sense. The UNC error is not counted in this statistics. This statistics is incremented by one for each event reported to the host.

A.5.1.4.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.1.4.3 Measurement Unit

Event

A.5.1.4.4 Initialization

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

A.5.1.5 Number of Commands Terminated by Resets

A.5.1.5.1 Description

Number of Commands Terminated by Resets statistics is a counter that records the number of events that command is terminated by a reset before it reports the command completion. The reset can be either Soft Reset, Device Reset if the device is ATAPI, or Hard Reset. This statistics is for the device to record number of reset events host has generated to terminate the command execution. This statistics is incremented by one for each event a command is terminated by reset.

A.5.1.5.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.1.5.3 Measurement Unit

Event

A.5.1.5.4 Initialization

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

A.5.1.6 Number of Power Loss Instances with Incomplete Write

A.5.1.6.1 Description

Number of Power Loss Instances with Incomplete Write statistics is a counter that records the number of events that the device has not complete its write operation due to power loss. The incomplete write event cannot be reported to the host at the time of event due to loss of power. This statistics is incremented by one for each event that a write is not completed due to power loss.

A.5.1.6.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.1.6.3 Measurement Unit

Event

A.5.1.6.4 Initialization

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

A.5.2 Rotating Media Errors Statistics (Page TBD)**A.5.2.1 Overview**

Rotating Media Errors Statistics log page TBD contains error information about the device as described in table TBD.

The summary of this error statistics is as followed:

- a) Number of Defective Logical Sectors;
- b) Number of Remaining Spare Logical Sectors;
- c) Number of Reallocation Candidate Logical Sectors;
- d) Number of Retry Revolutions;
- e) Number of Read Errors Requiring Multiple Revolutions;
- f) Number of Write Retries;
- g) Number of Seek Error; and
- h) Number of Mechanical Start Failures.

Table TBD – Rotating Media Errors Statistics

Offset	Type	Content						
0-7	QWord	Structure Version						
		<table> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:24</td> <td>Reserved</td> </tr> <tr> <td>23:16</td> <td>TBDh, Page Number</td> </tr> <tr> <td>15:0</td> <td>Device Statistics Version Number = 0001h</td> </tr> </table>	Bit	Meaning	63:24	Reserved	23:16	TBDh, Page Number
Bit	Meaning							
63:24	Reserved							
23:16	TBDh, Page Number							
15:0	Device Statistics Version Number = 0001h							
8-15	QWord	Number of Defective Logical Sectors						
		<table> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Number of Defective Logical Sectors</td> </tr> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:32	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:32	Reserved							
31:0	Number of Defective Logical Sectors							
16-23	QWord	Number of Remaining Spare Logical Sectors						
		<table> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Number of Remaining Spare Logical Sectors</td> </tr> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:32	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:32	Reserved							
31:0	Number of Remaining Spare Logical Sectors							
24-31	QWord	Number of Reallocation Candidate Logical Sectors						
		<table> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Number of Reallocation Candidate Logical Sectors</td> </tr> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:32	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:32	Reserved							
31:0	Number of Reallocation Candidate Logical Sectors							
48-55	QWord	Number of Retry Revolutions						
		<table> <tr> <td>Bit</td> <td>Meaning</td> </tr> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:48</td> <td>Reserved</td> </tr> <tr> <td>47:0</td> <td>Number of Retry Revolutions</td> </tr> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:48	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:48	Reserved							
47:0	Number of Retry Revolutions							

Offset	Type	Content						
56-63	QWord	Number of Read Errors Requiring Multiple Revolutions						
		<table> <thead> <tr> <th>Bit</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:48</td> <td>Reserved</td> </tr> <tr> <td>47:0</td> <td>Number of Read Errors Requiring Multiple Revolutions</td> </tr> </tbody> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:48	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:48	Reserved							
47:0	Number of Read Errors Requiring Multiple Revolutions							
64-71	QWord	Number of Write Retries						
		<table> <thead> <tr> <th>Bit</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Number of Write Retries</td> </tr> </tbody> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:32	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:32	Reserved							
31:0	Number of Write Retries							
72-79	QWord	Number of Seek Error						
		<table> <thead> <tr> <th>Bit</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Number of Seek Error</td> </tr> </tbody> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:32	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:32	Reserved							
31:0	Number of Seek Error							
80-87	QWord	Number of Mechanical Start Failures						
		<table> <thead> <tr> <th>Bit</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>63:56</td> <td>Device Statistics Flags, (See Table TBD)</td> </tr> <tr> <td>55:32</td> <td>Reserved</td> </tr> <tr> <td>31:0</td> <td>Number of Mechanical Start Failures</td> </tr> </tbody> </table>	Bit	Meaning	63:56	Device Statistics Flags, (See Table TBD)	55:32	Reserved
Bit	Meaning							
63:56	Device Statistics Flags, (See Table TBD)							
55:32	Reserved							
31:0	Number of Mechanical Start Failures							
104-511	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 31:16 is used for the page number of the Log Page for this statistics. Bit 15:0 is used for the revision number of the statistics structure.

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

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

A.5.2.3 Number of Defective Logical Sectors

A.5.2.3.1 Description

Number of Defective Logical Sectors statistics is a counter that records the number of logical sectors that has been reallocated due to media defects after the device is manufactured. This statistics is incremented by one for each logical sector reallocated.

A.5.2.3.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.3.3 Measurement Unit

Logical Sector

A.5.2.3.4 Initialization

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

A.5.2.4 Number of Remaining Spare Logical Sectors

A.5.2.4.1 Description

Number of Remaining Spare Logical Sectors statistics is a counter that records the number of logical sectors that are available for reallocation after the device is manufactured. This statistics is decremented by one for each logical sector reallocated.

A.5.2.4.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.4.3 Measurement Unit

Logical sector

A.5.2.4.4 Initialization

This statistics shall be initialized at the time of manufacture.

A.5.2.5 Number of Reallocation Candidate Sectors

A.5.2.5.1 Description

Number of Reallocation Candidate Sectors is a counter that records the number of logical sectors that are candidates for reallocation. Criteria for adding or removing sectors from the candidate list are vendor specific. This statistics is incremented by one for each logical sector candidate for reallocation. The counter shall be decremented by one when any one of the candidates is removed from the candidate sector list by methods such as reallocation or repair.

A.5.2.5.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.5.3 Measurement Unit

Logical sector

A.5.2.5.4 Initialization

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

A.5.2.6 Number of Retry Revolutions

A.5.2.6.1 Description

Number of Retry Revolutions statistics is a counter that records the number of extra revolutions due to retry. This statistic is only valid for rotational media. This statistics is incremented by one for each extra revolution takes to retry.

A.5.2.6.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.6.3 Measurement Unit

Revolution

A.5.2.6.4 Initialization

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

A.5.2.7 Number of Read Errors Requiring Multiple Revolutions

A.5.2.7.1 Description

Number of Read Errors Requiring Multiple Revolutions statistics is a counter that records the number of soft errors the device encountered during read operations. A soft error is defined as error that requires more than two revolutions to correctly read the data more than two times of read attempts. This counter is incremented by one for each sector that encounters a soft error.

A.5.2.7.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.7.3 Measurement Unit

Event

A.5.2.7.4 Initialization

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

A.5.2.8 Number of Write Retries

A.5.2.8.1 Description

Number of Write Retries statistics is a counter that records number of retries during write operation. This counter is incremented by one each time a retry is performed while writing a logical sector.

A.5.2.8.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.8.3 Measurement Unit

Event

A.5.2.8.4 Initialization

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

A.5.2.9 Number of Seek Error

A.5.2.9.1 Description

Number of Seek Error is a counter that records the number of seek errors detected since the device is manufactured. This statistics is incremented by one for each seek error event encountered

A.5.2.9.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.9.3 Measurement Unit

Event

A.5.2.9.4 Initialization

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

A.5.2.10 Number of Mechanical Start Failures

A.5.2.10.1 Description

Number of Mechanical Start Failures statistics is a counter that records the number of spin-up errors after the device is manufactured. The criteria for spin-up failure are vendor specific. This statistics is incremented by one for each spin-up failure event encountered.

A.5.2.10.2 Update Interval

When the device is operational the counter is updated and stored in a non-volatile location at a maximum interval of one hour.

A.5.2.10.3 Measurement Unit

Event

A.5.2.10.4 Initialization

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