

## Proposal for a Selective Self-test

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Current self-tests provides for a short self-test and an extended self-test. The short self-test does read scan of a small area of the media in a short time. The area of the media scanned is vendor specific. The extended self-test does read scan of the entire media. As the capacity of disk drives increases, the time to complete the extended self-test becomes exceedingly long. This proposal defines a Selective self-test that allows the read scan portion of the self-test to test areas of the media specified by the user. This allows the time to complete the self-test to be altered and allows those areas deemed critical by the user to be scanned.

Modifications to ATA/ATAPI-6 revision 3a:

**Table 51 – SMART EXECUTE OFF-LINE IMMEDIATE LBA Low register values**

Value	Description of subcommand to be executed
0	Execute SMART offline routine immediately in off-line mode
1	Execute SMART Short self-test routine immediately in off-line mode
2	Execute SMART Extended self-test routine immediately in off-line mode
3	Reserved
4	Execute SMART Selective self-test routine immediately in off-line mode
5-63	Reserved
64-126	Vendor specific
127	Abort off-line mode self-test routine
128	Reserved
129	Execute SMART Short self-test routine immediately in captive mode
130	Execute SMART Extended self-test routine immediately in captive mode
131	Reserved
132	Execute SMART Selective self-test routine immediately in captive mode
133-191	Reserved
192-255	Vendor specific

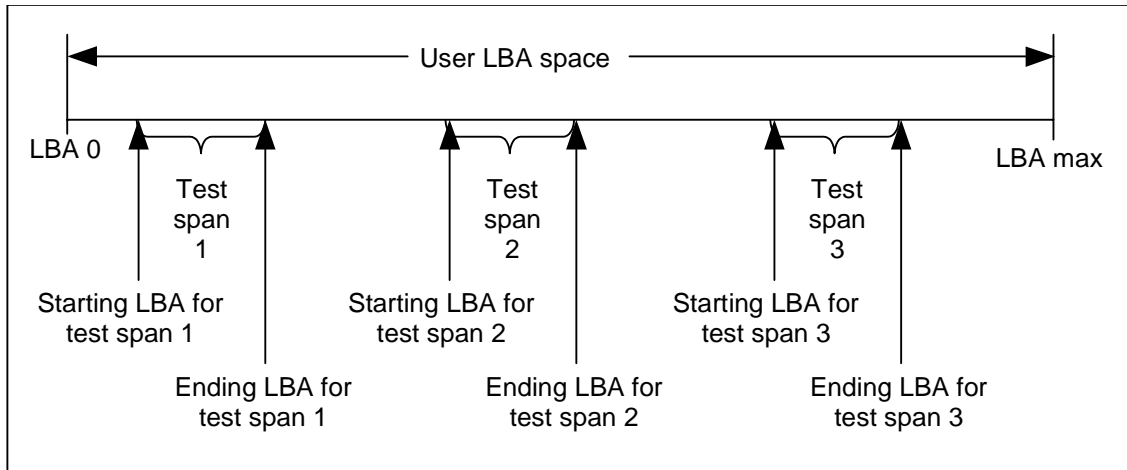
### 8.54.4.8.6 SMART Selective self-test routine

The SMART Selective self-test routine is an optional self-test routine. If the routine is implemented, all features of the routine shall be implemented. Support for the routine is indicated in off-line data collection capabilities (See 8.54.5.8.4).

When the value in the LBA Low register is 4 or 132, the Selective self-test routine shall be performed. This self-test routine shall include the initial tests performed by the Extended self-test routine plus a selectable read scan.

The user may choose to do read scan only on specific areas of the media. To do this, user shall set the test spans desired in the Selective self-test log and set the flags in the Feature flags field of the Selective self-test log to indicate do not perform off-line scan. In this case, the test spans defined shall be read scanned in their entirety. The Selective self-test log is updated as the self-test proceeds indicating test progress. When all specified test spans have been completed, the test is terminated and the appropriate self-test execution status is reported in the SMART READ DATA response depending on the occurrence of errors. Figure xx shows an example of a

Selective self-test definition with three test spans defined. In this example, the test terminates when all three test spans have been scanned.



**Figure xx – Selective self-test test span example**

After the scan of the selected spans described above, a user may wish to have the rest of media read scanned as an off-line scan. In this case, the user shall set the flag to enable off-line scan in addition to the other settings. If an error occurs during the scanning of the test spans, the error is reported in the self-test execution status in the SMART READ DATA response and the off-line scan is not executed. When the test spans defined have been scanned, the device shall then set the off-line scan pending and active flags in the Selective self-test log to one, the span under test to a value greater than five, the self-test execution status in the SMART READ DATA response to 00h, set a value of 03h in the off-line data collection status in the SMART READ DATA response and shall proceed to do an off-line read scan through all areas not included in the test spans. This off-line read scan shall be completed as rapidly as possible, no pauses between block reads, and any errors encountered shall not be reported to the host. Instead error locations may be logged for future reallocation. If the device is powered-down before the off-line scan is completed, the off-line scan shall resume when the device is again powered up. From power-up, the resumption of the scan shall be delayed the time indicated in the Selective self-test pending time field in the Selective self-test log. During this delay time the pending flag shall be set to one and the active flag shall be set to zero in the Selective self-test log. Once the time expires, the active flag shall be set to one, and the off-line scan shall resume. When the entire media has been scanned, the off-line scan shall terminate, both the pending and active flags shall be cleared to zero, and the off-line data collection status in the SMART READ DATA response shall be set to 02h indicating completion.

During execution of the Selective self-test, the self-test execution time byte in the Device SMART Data Structure may be updated but the accuracy may not be exact because of the nature of the test span segments. For this reason, the time to complete off-line testing and the self-test polling times are not valid. Progress through the test spans is indicated in the selective self-test log.

A hardware or software reset shall abort the Selective self-test except when the pending bit is set to one in the Selective self-test log (see 8.54.8.6.5). The receipt of a SMART EXECUTE OFF-LINE IMMEDIATE command with 0Fh, Abort off-line test routine, in the LBA Low register shall abort Selective self-test regardless of where the device is in the execution of the command. If a second self-test is issued while a selective self-test is in progress, the selective self-test is aborted and the newly requested self-test is executed.

### 8.54.5.8.1 Off-line collection status byte

**Table 53 – Off-line data collection status byte values**

Value	Description
00h or 80h	Off-line data collection activity was never started.
01h	Reserved
02h or 08h	Off-line data collection activity was completed without error.
03h	Off-line activity in progress.
04h or 84h	Off-line data collection activity was suspended by an interrupting command from the host.
05h or 85h	Off-line data collection activity was aborted by an interrupting command from the host.
06h or 86h	Off-line data collection activity was aborted by the device with a fatal error.
07h-3Fh	Reserved
40h-7Fh	Vendor specific
81h	Reserved
83h	Reserved
87h-BFh	Reserved
C0h-FFh	Vendor specific

### 8.54.5.8.2 Self-test execution status byte

**Table 54 – Self-test execution status values**

Value	Description
0	The previous self-test routine completed without error or no self-test has ever been run.
1	The self-test routine was aborted by the host.
2	The self-test routine was interrupted by the host with a hardware or software reset.
3	A fatal error or unknown test error occurred while the device was executing its self-test routine and the device was unable to complete the self-test.
4	The previous self-test completed having a test element that failed and the test element the failed is not known.
5	The previous self-test completed having the electrical element of the test failed.
6	The previous self-test completed having the servo (and/or seek) element of the test failed.
7	The previous self-test completed having the read element of the test failed.
8	The previous self-test completed having reached the maximum allowable execution time specified.
9-14	Reserved.
15	Self-test routine in progress.

### 8.54.5.8.4 Off-line data collection capabilities

Bit 5 (Reserved)

Bit 6 (Selective self-test implemented bit) – If this bit is cleared to zero, the device does not implement the Selective self-test routine. If this bit is set to one, the device implements the Selective self-test routine.

Bits 7 (Reserved).

## 8.6.4 SMART READ LOG

### 8.54.6.4 Inputs

**Table 55 – Log address definition**

Log address	Content	R/W
00h	Log directory	RO
01h	Summary SMART error log	RO
02h	Comprehensive SMART error log	RO
03h	Extended Comprehensive SMART error log	See note
04h-05h	Reserved	Reserved
06h	SMART self-test log	RO
07h	Extended self-test error log	See note
08h	Reserved	Reserved
09h	Selective self-test log	R/W
0Ah-1Fh	Reserved	Reserved
20h	Streaming performance log	See note
21h	Write stream error log	See note
22h	Read stream error log	See note
23h	Delayed sector log	See note
24h-7Fh	Reserved	Reserved
80h-9Fh	Host vendor specific	R/W
A0h-BFh	Device vendor specific	VS
C0h-FFh	Reserved	Reserved
Key – RO – Log is read only by the host. R/W – Log is read or written by the host. VS – Log is vendor specific thus read/write ability is vendor specific.		

#### 8.54.8.6.5 Selective self-test log

The Selective self-test log is a log that may be both written and read by the host. This log allows the host to select the parameters for the self-test and to monitor the progress of the self-test. Table nn defines the content of the Selective self-test log.

**Table nn – Selective self-test log**

Byte	Description	Read/write
0-1	Data structure revision number	R/W
2-9	Starting LBA for test span 1	R/W
10-17	Ending LBA for test span 1	R/W
18-25	Starting LBA for test span 2	R/W
26-33	Ending LBA for test span 2	R/W
34-41	Starting LBA for test span 3	R/W
42-49	Ending LBA for test span 3	R/W
50-57	Starting LBA for test span 4	R/W
58-65	Ending LBA for test span 4	R/W
66-73	Starting LBA for test span 5	R/W
74-81	Ending LBA for test span 5	R/W
82-337	Reserved	Reserved
338-491	Vendor specific	Vendor specific
492-499	Current LBA under test	Read
500-501	Current span under test	Read
502-503	Feature flags	R/W
504-507	Vendor specific	Vendor specific
508-509	Selective self-test pending time	R/W
510-511	Data structure checksum	R/W

**8.54.8.6.5.1 Data structure revision number**

The value of the data structure revision number filed shall be 01h. This value shall be written by the host and returned unmodified by the device.

**8.54.8.6.5.2 Test span definition**

The Selective self-test log provides for the definition of up to five test spans. The starting LBA for each test span is the LBA of the first sector tested in the test span and the ending LBA for each test span is the last LBA tested in the test span. If the starting and ending LBA values for a test span are both zero, a test span is not defined and not tested. These values shall be written by the host and returned unmodified by the device.

**8.54.8.6.5.3 Current LBA under test**

The Current LBA under test field shall be written with a value of zero by the host. As the self-test progresses, the device shall modify this value to contain the beginning LBA of the 65,536 sector block currently being tested. When the self-test including the off-line scan between test spans has been completed, a zero value is placed in this field.

**8.54.8.6.5.4 Current span under test**

The Current span under test field shall be written with a value of zero by the host. As the self-test progresses, the device shall modify this value to contain the test span number of the current span being tested. If an off-line scan between test spans is selected, a value greater than five is placed in this field during the off-line scan. When the self-test including the off-line scan between test spans has been completed, a zero value is placed in this field.

**8.54.8.6.5.5 Feature flags**

The Feature flags define the features of Selective self-test to be executed (see table mm).

**Table mm – Selective self-test feature flags**

<b>Bit</b>	<b>Description</b>
0	Vendor specific
1	When set to one, perform off-line scan after selective test.
2	Vendor specific
3	When set to one, off-line scan after selective test is pending.
4	When set to one, off-line scan after selective test is active.
5-15	Reserved.

Bit (1) shall be written by the host and returned unmodified by the device. Bits (4:3) shall be written as zeros by the host and the device shall modify them as the test progresses.

#### **8.54.8.6.5.6 Selective self-test pending time**

The selective self-test pending time is the time in minutes from power-on to the resumption of the off-line testing if the pending bit is set. At the expiration of this time, sets the active bit to one, and resumes the off-line scan that had begun before power-down.

#### **8.54.8.6.5.7 Data structure checksum**

The data structure checksum is defined in 8.54.6.8.2.4.