8.7 READ BUFFER command

8.7.1 READ BUFFER command overview

The READ BUFFER command is used with the write buffer command to determine the integrity of the target device's buffer memory and the physical interconnect that connects the target device and the initiator.

Table 22 — READ BUFFER command CDB fields

Field	Description or reference
OPERATION CODE	The SATL shall issue the ATA READ BUFFER command ~~(E4h)~~ to the attached ATA device.
MODE	8.7.2
BUFFER ID	Unspecified (see 3.4.3)
BUFFER OFFSET	Refers to the offset in the buffer to start reading data from. The BUFFER OFFSET should be less than the size of the buffer size, otherwise a CHECK CONDITION shall be sent back with sense key set to ILLEGAL REQUEST and additional sense code set to INVALID FIELD IN CDB.
ALLOCATION LENGTH	Refer to individual sections for the meaning of this term.
CONTROL	6.4

The logical sector buffer in a ATA device shall be used to emulate the READ BUFFER command, so the size of the buffer is limited to 512 bytes for data buffer and echo buffers.

8.7.2 MODE field

Table 23 describes modes supported. ~~Only data and data buffer descriptor shall be supported.~~

Table 23 — MODE field

Code	Translated ATA Opcode
02h (i.e., Data)	Translated to the ATA READ BUFFER command (see 8.7.3).
03h (i.e., Descriptor)	See 8.7.4.
All others	Unspecified (see 3.4.3)

8.7.3 Data Only mode (02h)

In this mode, data is read from the device's logical sector buffer and returned to the requestor. Note that logical sector buffer in the ATA device is being used to emulate the SCSI READ BUFFER command, so the maximum length of data that can be written is 512 bytes. Valid fields in the CDB, apart from the MODE field, are BUFFER ID, BUFFER OFFSET and ALLOCATION LENGTH. The BUFFER OFFSET shall be less than or equal to 512. The ALLOCATION LENGTH shall be less than or equal to 512. A write buffer command may sent to the same BUFFER ID before it is read.

8.7.4 Descriptor mode (03h)

Four bytes of information shall be returned to the requestor describing the requested buffer. These four bytes include the OFFSET BOUNDARY and the BUFFER CAPACITY. The BUFFER ID should be set to 0. For all other BUFFER ID's, all zeros shall be returned. ALLOCATION LENGTH should be set to 4.

Page: 56

Sequence number: 1
Author: SIERLGC[BMartin]
Subject: Highlight
Date: 6/24/2006 1:54:28 PM
Page 36, 8.7.3, second sentence
"can" s.b. "may"
DISCUSS FLAG
RESOLUTION: See Dell comment

Status
rlsheffi None 7/24/2006 12:55:13 PM

9.2.6 IP bit

If the SATL supports an IP bit value of one and the IP bit is set to one, the SATL shall process the command as follows:

a) If the attached ATA device supports the SCT LBA Segment Access (see SCT) command and the value of the INITIALIZATION PATTERN LENGTH field in the initialization pattern descriptor is four, and the value of the IP MODIFIER field in the initialization pattern descriptor is zero, then the SATL should issue an SCT LBA Segment Access command to the attached ATA device with the Function Code field set to 0001b (i.,e., Repeat Write Pattern), with the Start field and the Count field set to initialize the area of the media accessible by the application client, and with the Pattern field set to the value of the INITIALIZATION PATTERN field from the FORMAT command initialization pattern descriptor; and
b) if the SCT LBA Segment Access command is not used to write the initialization pattern, then the SATL shall write the specified pattern by issuing ATA write commands (see 3.1.18 and 9.1) to the attached ATA device.

If the IP bit is set to zero, then the SATL shall return GOOD status.

NOTE 7 The SATL should reverse the order of the bytes between the Pattern field in the SCT LBA Segment Access command and the value stored in the INITIALIZATION PATTERN field in the FORMAT command initialization pattern descriptor to adjust for the translation from little-endian to big-endian byte ordering.

9.3 READ commands overview

9.3.1 READ commands operation code translation

This subclause applies to the translation of ~~SCSI~~ READ(6), READ(10), READ(12), and READ(16) commands.

The SATL shall issue ATA read commands (see 3.1.15) in accordance with the constraints specified in 9.1 to cause the ATA device to transfer the logical blocks specified in the SCSI read command (see 3.1.64).

If the SATL returns an error other than an ILLEGAL REQUEST while processing the command the SATL may transfer a vendor-specific amount of data before terminating the command.

9.3.2 READ commands with FUA

If the SATL does not support FUA and the FUA bit is set to one, the SATL shall terminate the READ (10), READ (12) or READ (16) command with CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and the additional sense code set to INVALID FIELD IN CDB.

1 The SATL shall process a SCSI read command with the FUA bit set to one as follows depending on whether or not the attached ATA device supports NCQ:

a) If the attached device supports NCQ (i.e., bit-8 in word 77 of ATA IDENTIFY DEVICE data is set to one) the SATL shall issue a READ FPDMA QUEUED command (see SATA 2.5) with the FUA bit in the Device field set to one;
b) otherwise, the SATL shall,
   1) if the ATA device's write cache is enabled (see ATA/ATAPI-7), issue an ATA verify command (see 3.1.17); and,
   2) issue an ATA read command as specified in 9.3.1.

Page: 69

Sequence number: 1
Author: DELL[KMarks]
Subject: Highlight
Date: 2/6/2006 7:30:53 PM

T9.3.2 READ commands with FUA
2nd Paragraph, 1st Sentence

"The SATL shall process a SCSI read command with the FUA bit set to one as follows depending on whether or not the attached ATA device supports NCQ:"
to

"The SATL shall process a SCSI read command with the FUA bit set to one as follows:"

Status
rlsheffi None 7/24/2006 12:55:15 PM

3) If the HDA Temp field is equal to 80h the SATL shall set the MOST RECENT TEMPERATURE READING field to FFh; and
4) Otherwise the SATL shall set the MOST RECENT TEMPERATURE READING FIELD to the value in the HDA Temp field.

If the ATA device does not support the SCT Feature Set, then the SATL shall set the MOST RECENT TEMPERATURE READING field to FFh.

10.2.4 Self-Test Results log page

10.2.4.1 Self-Test Results log page overview

The Self-Test Results log page provides the results from the most recent self-tests. Table 73 shows the Self-Test Results log page header fields.

Table 73 — Self-Test Results log page fields

Field	Description or reference
PAGE CODE	Set to 10h. This field value is specific to the Self-Test Results log page.
PAGE LENGTH	See SPC-3

Translations of the fields for the Self-Test Results log parameters for the Self-Test Results log page are shown in Table 74.

Table 74 — Self-Test Results log parameters (part 1 of 2)

Field	Description or reference
PARAMETER CODE	Unspecified (see 3.4.3)
DU	Unspecified (see 3.4.3)
DS	Unspecified (see 3.4.3)
TSD	Unspecified (see 3.4.3)
ETC	Unspecified (see 3.4.3)
TMC	Shall be set to 00b.
LBIN	Unspecified (see 3.4.3)
LP	Unspecified (see 3.4.3)
PARAMETER LENGTH	Unspecified (see 3.4.3)
SELF-TEST CODE	Unspecified (see 3.4.3)
SELF-TEST RESULTS	The SATL shall read the ATA log data as defined in 10.2.4.2. If the SATL reads the ATA log data using the READ LOG EXT command specifying the Extended SMART self-test log, then the SATL shall set the SELF-TEST RESULTS field to the value in the Self-test Execution Status bits from the Content of the self-test execution status byte (i.e., byte n + 1 of the Extended Self-test log descriptor entry) (see ATA/ATAPI-7). If the SATL reads the ATA log data using the SMART READ LOG command specifying the SMART self-test log, then the SATL shall set the SELF-TEST RESULTS field to the value in the Content of the self-test execution status byte (i.e., byte n + 1 of the Self-test log descriptor entry) for the Self-test execution status bits.
SELF-TEST NUMBER	Unspecified (see 3.4.3)

Page: 94

Sequence number: 1
Author: DELL[KMarks]
Subject: Highlight
Date: 5/6/2006 3:56:30 PM

Table 74 — Self-Test Results log parameters (part 1 of 2)
Row: SELF TEST CODE

Why is this Unspecified? It appears to me that the first byte of the self-test descriptor entry is the ATA self test that failed. This maps back to the SCSI SELF-TEST CODE using the text in the SEND DIAGNOSTIC command translation, i.e. a one to one mapping...

DISCUSS: "Unspecified" is consistent with what was in proposal 05-245r4, "See SPC-3". What needs to change here?

Status
rlsheffi None 7/24/2006 12:55:14 PM

Table 74 — Self-Test Results log parameters (part 2 of 2)

Field	Description or reference
TIMESTAMP	The SATL shall read the ATA log data as defined in 10.2.4.2. If the SATL reads the ATA log data using the READ LOG EXT command specifying the Extended SMART self-test log, then the SATL shall set the TIMESTAMP field to the values in the Life timestamp (most significant byte) and Life timestamp (least significant byte) of the Extended Self-test log descriptor entry. If the SATL reads the ATA log data using the SMART READ LOG command specifying the SMART self-test log, then the SATL shall set the TIMESTAMP field to the values in the Life timestamp (most significant byte) and Life timestamp (least significant byte) of the Self-test log descriptor entry.
ADDRESS OF FIRST FAILURE	The SATL shall read the ATA log data as defined in 10.2.4.2. If the SATL reads the ATA log data using the READ LOG EXT command specifying the Extended SMART self-test log, then the SATL shall set the ADDRESS OF FIRST FAILURE field using the values in the Failing LBA (47:40), Failing LBA (39:32), Failing LBA (31:24), Failing LBA (23:16), Failing LBA (15:8), and Failing LBA (7:0) of the Extended Self-test log descriptor entry. If the SATL reads the ATA log data using the SMART READ LOG command specifying the SMART self-test log, then the SATL shall set the ADDRESS OF FIRST FAILURE field using the values in the Failing LBA (most significant byte), Failing LBA (next most significant byte), Failing LBA (next least significant byte), and Failing LBA (least significant byte) of the Self-test log descriptor entry.
SENSE KEY	10.2.4.3
ADDITIONAL SENSE CODE	10.2.4.3
ADDITIONAL SENSE CODE QUALIFIER	10.2.4.3

10.2.4.2 A method of determining ATA command selection for field translations

To translate the SELF-TEST RESULTS field, the TIMESTAMP field, the ADDRESS OF FIRST FAILURE field, the SENSE KEY field, the ADDITIONAL SENSE CODE field, and the ADDITIONAL SENSE CODE QUALIFIER field of Self-Test Results log parameters, the SATL shall:

1) Issue an IDENTIFY DEVICE command to the ATA device;
2) From the returned data the SATL shall determine if the ATA device supports the 48-bit Address feature set from bit 10 of word 83;
3) If the 48-bit Address feature set is supported the SATL shall issue a READ LOG EXT command with the Log address set to 07h (i.e., Extended SMART self-test log) to the ATA device; and
4) If the 48-bit Address feature set is not supported the SATL shall issue a SMART READ LOG command with the Log address set to 06h (i.e., SMART self-test log) to the ATA device.

10.2.4.3 Sense key and additional sense code

The SATL shall determine the sense key and additional sense code from the content of the self-test execution status byte returned from a READ LOG EXT command or SMART READ LOG command issued to the ATA

Page: 95

Sequence number: 1
Author: HPQ[WBellamy]
Subject: Highlight
Date: 5/6/2006 4:07:25 PM

Verbiage is strange here, i. e., "shall set" the xxx field using the values". Shouldn't this be "shall set the xxx field to the values of". I suggest for this field going back to proposal 05-245r4 for better verbiage or building another translation just for these LBA values for this "set / using" process.

DISCUSS: text from 05-245 is as follows:
"1) From the returned data from a READ LOG EXT command for the Extended SMART self-test log the SATL shall select the Failing LBA (47:40), Failing LBA (39:32), Failing LBA (31:24), Failing LBA (23:16), Failing LBA (15:8), and Failing LBA (7:0) of the Extended Self-test log descriptor entry to return to the application client for this field."

Do we need a table within a table to provide the byte-for-byte mapping?

Status
rlsheffi None 7/24/2006 12:55:14 PM

Sequence number: 2
Author: HPQ[WBellamy]
Subject: Highlight
Date: 5/6/2006 4:06:45 PM

Verbiage is strange here, i. e., "shall set" the xxx field using the values". Shouldn't this be "shall set the xxx field to the values of". I suggest for this field going back to proposal 05-245r4 for better verbiage or building another translation just for these LBA values for this "set / using" process.

DISCUSS: the text from 05-245r4 is,
“2) From the returned data from a SMART READ LOG command for the SMART self-test log the SATL shall select the Failing LBA (most significant byte), Failing LBA (next most significant byte), Failing LBA (next least significant byte), and Failing LBA (least significant byte) of the Self-test log descriptor entry to return to the application client for this field.”

Do we need a table within a table to provide the byte-for-byte mapping?

Status
rlsheffi None 7/24/2006 12:55:14 PM

10.3 Vital product data parameters

10.3.1 Vital product data parameters overview

Table 77 provides a summary of the VPD page translations defined in this standard.

Table 77 — Summary of SCSI / ATA VPD page mapping

SCSI VPD page	Reference
Supported VPD Pages (i.e., 00h)	10.3.2
Unit Serial Number (i.e., 80h)	10.3.3
Device Identification (i.e., 83h)	10.3.4
ATA Information VPD page (i.e., 89h)	10.3.5

10.3.2 Supported VPD pages VPD page

Table 78 shows the fields of the Supported VPD pages VPD page.

Table 78 — Supported VPD pages VPD page fields

Field	Description or reference
PERIPHERAL DEVICE TYPE	The PERIPHERAL QUALIFIER field and the PERIPHERAL DEVICE TYPE field shall be set as described in 8.1.2.
PERIPHERAL QUALIFIER	
PAGE CODE	The SATL shall set the field to 00h.
PAGE LENGTH	The SATL shall set this field to indicate the length of the supported VPD page list returned in number of bytes.
SUPPORTED VPD LIST	This list shall contain the page codes of the pages supported by the SATL in ascending order of page codes beginning with page code 00h.

10.3.3 Unit Serial Number VPD page

Table 79 defines the Unit Serial Number VPD page (see SPC-3) returned by a SATL for an ATA device.

Table 79 — Unit Serial Number VPD page for SAT

Bit\Byte	7	6	5	4	3	2	1	0
0	PERIPHERAL QUALIFIER			PERIPHERAL DEVICE TYPE				
1	PAGE CODE (80h)							
2	Reserved							
3	PAGE LENGTH (14h)							
4	PRODUCT SERIAL NUMBER							
23								

The PERIPHERAL QUALIFIER field and the PERIPHERAL DEVICE TYPE field shall be set as described in 8.1.2.

The PAGE CODE field shall be set to 80h.

The PAGE LENGTH field shall be set to 14h.

Page: 97

Sequence number: 1
Author: DELL[KMarks]
Subject: Note
Date: 5/6/2006 4:33:20 PM

Why are the VPD page translation formats different than all the other translations, i.e. shown in Bit/Byte Format, instead of the Field/Description or Reference format?

Change to match format except for the ATA Information VPD.
DISCUSS: is the SAT WG OK with changing the format?

Status
rlsheffi None 7/24/2006 12:55:14 PM

Table 88 — SIGNATURE field

Bit Byte	7	6	5	4	3	2	1	0
0	FIS TYPE (34h)							
1	Reserved	INTERRUPT	Reserved		PM PORT			
2	STATUS							
3	ERROR							
4	LBA LOW							
5	LBA MID							
6	LBA HIGH							
7	DEVICE							
8	LBA LOW EXP							
9	LBA MID EXP							
10	LBA HIGH EXP							
11	Reserved							
12	SECTOR COUNT							
13	SECTOR COUNT EXP							
14	Reserved							
19								

All fields within the SIGNATURE field are defined in ATA/ATAPI-7 V1 and ATA/ATAPI-7 V3.

Table 89 lists common signature values for fields within the SIGNATURE field.

Table 89 — Common signature values (informative)

Field	ATA device	ATAPI device
SECTOR COUNT	01h	01h
LBA LOW	01h	01h
LBA MID/BYTE COUNT LOW	00h	14h
LBA HIGH/BYTE COUNT HIGH	00h	EBh
DEVICE	00h	00h

The COMMAND CODE field contains the command code used to retrieve the data in the IDENTIFY DEVICE or IDENTIFY PACKET DEVICE DATA field (e.g., ECh for IDENTIFY DEVICE (i.e., the ATA device type) or A1h for IDENTIFY PACKET DEVICE (i.e., the ATAPI device type) or 00h for other device types).

The IDENTIFY DEVICE OR IDENTIFY PACKET DEVICE DATA field contains:

a) if the device is an ATA device, the IDENTIFY DEVICE data (see ATA/ATAPI-7 V1). If the IDENTIFY DEVICE command fails, 512 bytes each set to 00h;
b) if the device is an ATAPI device, the IDENTIFY PACKET DEVICE data (see ATA/ATAPI-7 V1). If the IDENTIFY PACKET DEVICE command fails, 512 bytes each set to 00h; or
c) if the device is any other device type, 512 bytes each set to 00h.

Page: 105

Sequence number: 1
Author: STX[GHoulder]
Subject: Highlight
Date: 5/7/2006 8:54:05 AM
PDF page 105
Table 89
For the device types listed, the signature is normative (not informative). For other device types, say 'unspecified'
DISCUSS: Remove table 89?

Status
rlsheffi None 7/24/2006 12:55:14 PM

Sequence number: 2
Author: IBM[GPenokie]
Subject: Comment on Text
Date: 5/7/2006 8:54:24 AM
table 89
The title should remove the << (informative) >> term. It has little or no meaning or value.
DISCUSS: Remove table 89?

Status
rlsheffi None 7/24/2006 12:55:15 PM

Sequence number: 3
Author: STX[GHoulder]
Subject: Highlight
Date: 5/7/2006 8:54:45 AM
PDF page 105
Table 89
The DEVICE register is not part of the signature (per ATA/ATAPI-7)
DISCUSS: Remove table 89?

Status
rlsheffi None 7/24/2006 12:55:15 PM

13 Translation for ATAPI devices

13.1 Overview

This subclause describes those elements of SCSI / ATA Translation that are specific to ATAPI devices.

13.2 Commands

13.2.1 INQUIRY command

13.2.1.1 INQUIRY command overview

For ATAPI devices, the SATL may support the ATA Information VPD page (see 13.2.1.3) to provide information about the SATL and provide the IDENTIFY PACKET DEVICE data from the ATAPI device.

If the SATL does not support the ATA Information VPD page, it shall pass through all INQUIRY commands and parameter data unaltered to the ATAPI device.

If the SATL supports the ATA Information VPD page, the SATL shall:

a) pass through INQUIRY commands requesting the standard INQUIRY data unaltered;
b) pass through INQUIRY commands requesting VPD pages other than the Supported VPD Pages VPD page and the ATA Information VPD page unaltered;
c) process INQUIRY commands requesting the Supported VPD Pages VPD page (see SPC-3) as described in 13.2.1.2; and
d) process INQUIRY commands requesting the ATA Information VPD page (see 10.3.5) as described in 13.2.1.3.

13.2.1.2 Supported VPD Pages VPD page

If the SATL supports the ATA Information VPD page, the SATL shall pass through an INQUIRY command requesting the Supported VPD Pages VPD page (see SPC-3) to the ATAPI device unaltered.

If the ATAPI device returns CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and the additional sense code set to INVALID FIELD IN CDB, and the field pointer in the sense data points to the EVPD bit or the PAGE CODE field, the SATL shall return GOOD status and return parameter data containing the Supported VPD Pages VPD page with only two supported VPD page codes:

a) 00h (i.e., Supported VPD Pages); and
b) 89h (i.e., ATA Information).

If the ATAPI device returns GOOD status, the SATL shall modify the parameter data containing the Supported VPD Pages VPD page returned by the ATAPI device to add 89h (i.e., the ATA Information VPD page) into the supported VPD page code list.

13.2.1.3 ATA Information VPD page

If the SATL supports the ATA Information VPD page (see 10.3.5) and it receives an INQUIRY command requesting the ATA Information VPD page, the SATL shall process the command (i.e., return parameter data and status) itself.and shall not pass through the INQUIRY command to the ATAPI device.

The SATL shall use the IDENTIFY PACKET DEVICE command (A1h) rather than the IDENTIFY DEVICE command (ECh) to retrieve information for the ATA Information VPD page from the attached ATAPI device.

Page: 120

Sequence number: 1
Author: STX[GHoulder]
Subject: Note
Date: 5/8/2006 6:45:04 PM
PDF page 120
That this is the final page is not easily determined.
Please either put in a section that says 'this is the end'
or make the page footer say 'page xxx of yyy' so that
it is easy to determine if some pages are missing.

DISCUSS

Status
rlsheffi None 7/24/2006 12:55:14 PM