

To: T10 Technical Committee  
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 Date: 9 December 2004  
 Subject: 04-218r7 SAT INQUIRY contents

### **Revision history**

Revision 0 (8 July 2004) First revision  
 Revision 1 (29 July 2004) Incorporated comments from July 2004 SAT WG.  
 Revision 2 (23 August 2004) Incorporated comments from 12 August 2004 SAT teleconference.  
 Revision 3 (25 August 2004) Removed port selector support. This includes removing the SAT protocol identifier, because a SAT would never return an identifier with ASSOCIATION=1 (target port) if it has no use for the relative target port identifier.  
 Revision 4 (10 September 2004) Incorporated comments from 26 August 2004 SAT WG meeting.  
 Revision 5 (29 October 2004) Incorporated comments from the September SAT WG meeting.  
 Revision 6 (30 November 2004) Incorporated comments from the November SAT WG meeting - for SATA devices lacking WWNs, changed the logical unit name from SCSI name string format (8h) to T10 vendor identification format (1h). Updated baseline text to sat-r01 and changed format of proposal to match (e.g., moved ATAPI material to a standalone section).  
 Revision 7 (9 December 2004) Incorporated comments from 2 Dec SAT teleconference.

### **Related documents**

T13/ata7v1r4b - ATA/ATAPI-7 volume 1 revision 4b  
 T13/ata8-acs-r1a - ATA/ATAPI-8 Command Set (ATA8-ACS) revision 1a  
 T10/sat-r01 - SCSI to ATA Translation (SAT) revision 1  
 T10/spc3r21 - SCSI Primary Commands - 3 revision 21

### **Overview**

1. It is difficult for the SATL to respond to a SCSI INQUIRY command and return VENDOR IDENTIFICATION (8 bytes), PRODUCT IDENTIFICATION (16 bytes), and PRODUCT REVISION LEVEL (4 bytes) field values based on ATA IDENTIFY DEVICE data.

The fields in ATA IDENTIFY DEVICE that are possibly related to those SCSI INQUIRY fields are SERIAL NUMBER (20 bytes), FIRMWARE REVISION (8 bytes), and MODEL NUMBER (40 bytes). These 68 bytes do not fit into the 30 bytes of ASCII strings available in standard INQUIRY data:

- a) There is no SERIAL NUMBER field in standard INQUIRY data (although it can be mapped into the Unit Serial Number VPD page as proposed in this proposal).
- b) The ATA FIRMWARE REVISION field (8 bytes) is twice as big as the SCSI PRODUCT REVISION LEVEL field (4 bytes).
- c) Although there is no VENDOR IDENTIFICATION field in ATA, the ATA model number often starts with a vendor name. There's no guarantee that it complies with a T10 vendor ID (8 bytes), though, which sometimes has to be abbreviated due to the 8 byte length.

Proposal: set the VENDOR IDENTIFICATION field to "ATA", the PRODUCT IDENTIFICATION field to the first part of the ATA model number, and the PRODUCT REVISION LEVEL field to 4 ASCII spaces. The full contents of the ATA fields are available through the ATA Identification VPD page (incorporated into sat-r01).

2. SCSI logical units are required to provide a logical unit name in the Device Identification VPD page (83h). If the ATA device returns a WWN, it should be used as the NAA format identifier. If the ATA device does not return a WWN, then the T10 vendor identification format should be used, with the VENDOR IDENTIFICATION field set to "ATA" and the VENDOR-SPECIFIC IDENTIFIER field set to the ATA model number and serial number.

3. ATAPI devices reply to SCSI INQUIRY commands themselves (delivered in ATA PACKET commands), so the SATL need not be involved in generating standard INQUIRY data for them. It should be allowed to provide the ATA Information VPD page (89h), though; this requires that it intercept the Supported VPD Pages VPD page and add page 89h to the list.

### **Suggested changes to SAT**

#### **8 SCSI Primary Commands (SPC) Mapping**

## 8.1 INQUIRY command (12h)

### 8.1.1 Command Summary

The SCSI INQUIRY command requests general information about a target or component LUN. The INQUIRY command and selected vital product data pages shall be emulated using information from the ATA IDENTIFY DEVCIE command, and other information as described in subsequent sub clauses. Table 5 describes the emulation of fields in the SCSI INQUIRY CDB.

**Table 1 — INQUIRY command CDB fields**

Field	SATType	Description or reference
OPERATION CODE (12h)	E	The SATL shall issue an IDENTIFY DEVICE command (ECh) to the attached ATA device. <sup>1</sup>
EVPD	E	<del>The SATL may set this bit to a one to request vital product data pages. The PAGE CODE indicates the page requested (see SPC-3). The SATL may set the EVPD bit to zero to request standard INQUIRY data (see 8.1.2.2).</del> <a href="#">The SATL shall implement this field as defined in SPC-3.</a>
PAGE CODE	E	The SATL <del>may support any of three pages (see 8.1.2):</del> a) <a href="#">shall support the</a> Supported VPD pages (00h); <sup>1</sup> b) <a href="#">may support the</a> Unit <del>serial number</del> <a href="#">Serial Number</a> VPD page (80h); <sup>1</sup> c) <a href="#">shall support the</a> Device Identification VPD page (83h); and d) <a href="#">shall support the</a> ATA <del>information</del> <a href="#">Information</a> VPD page (89h). <del>The SATL shall support the ATA information VPD page.</del>
ALLOCATION LENGTH	E	<del>The SATL shall return no more bytes of data than the number specified in this field, but any length fields in the returned data shall be consistent with the number of bytes that would have been returned if this field had specified at least as many bytes as required to transmit the information requested.</del> <a href="#">The SATL shall implement this field as defined in SPC-3.</a>
<del>GMBDT</del>	<del>U</del>	<del>This bit is obsolete. If the bit is set to one, the SATL shall return a CHECK CONDITION with SENSE KEY set to ILLEGAL REQUEST and the ADDITIONAL SENSE CODE set to INVALID FIELD IN CDB.</del>
CONTROL	I	(see 6.4)

The logical unit number identified with the I\_T\_L nexus should be set to zero. If the logical unit number of the request is not zero, the SATL device server may terminate the command with CHECK CONDITION STATUS with the ~~SENSE KEY~~ [sense key](#) set to ILLEGAL REQUEST and the ~~ADDITIONAL SENSE CODE~~ [additional sense code](#) set to LOGICAL UNIT NOT SUPPORTED.

### 8.1.2 Page codes

#### 8.1.2.1 Overview

~~The SATL shall support standard inquiry data and the following page codes:~~

- ~~a) 00h—Supported VPD pages;~~
- ~~b) 80h—Unit Serial Number page;~~
- ~~e) 89h—ATA Information VPD page.~~

#### 8.1.2 Standard INQUIRY data

[Table 2 describes the standard INQUIRY data field supported by the SATL.](#)

Editor's Note 1: general principle on INQUIRY fields: if it matters to SATL, describe specific requirements. If it doesn't matter to SATL, say "shall implement this field as defined in SPC-3." SATL can claim ownership of block-command specific fields like PROTECT but shouldn't comment on fields like 3PC, TPGS, ACC, etc.

Table 2 — Standard ~~Inquiry~~INQUIRY data fields (part 1 of 3)

Field	SATType	Description or reference
PERIPHERAL DEVICE TYPE	I	This <del>bit</del> field shall be set to 00h to indicate that <del>a</del> <u>the peripheral device is a</u> direct access <u>block</u> device <del>is connected</del> .
PERIPHERAL QUALIFIER <u>[make this 1st in list]</u>	I	This <del>bit</del> field shall be set to 00b to indicate that the <del>specified</del> peripheral device is currently <del>attached</del> <u>connected</u> to this logical unit.
RMB	I	The SATL shall set this bit to the value of bit 7 of <u>the</u> GENERAL CONFIGURATION field of <u>the</u> IDENTIFY DEVICE <del>information data</del> retrieved from the attached ATA device.
VERSION	E	<del>The SATL shall set this field to 03h to indicate that it supports SPC-3</del> <u>The VERSION field indicates the version of SPC to which the SATL complies (see SPC-3) (e.g., 05h for SPC-3).</u>
RESPONSE DATA FORMAT	I	The SATL shall set this field to 2h. <del>(A value of 2 indicates the format is as specified by SPC-3. Values other than 2 are obsolete).</del>
HISUP	U	<del>The SATL shall set this bit to 0 to indicate that this device does not support hierarchical addressing model. The SATL shall not support the hierarchical addressing model.</del> <u>The SATL shall implement this field as defined in SAM-3 and SPC-3.</u>
<del>NORMAL ACA-SUPPORT</del> <u>NORMACA</u>	U	The SATL shall set this bit to 0 to indicate the SATL does not support the NACA bit in the <del>control</del> <u>CONTROL</u> byte (see 6.4).
ADDITIONAL LENGTH	E	The SATL shall set this field to the length of the INQUIRY data that follows.
PROTECT	U	The SATL shall set this <del>field</del> <u>bit</u> to zero to indicate that the <u>peripheral</u> device does not support protection information.
3PC	U	<del>The SATL shall set this field to 0 to indicate the device does not support third-party commands.</del> <u>The SATL shall implement this field as defined in SPC-3.</u>
<del>ALUA</del> <u>TPGS</u>	U	<del>The SATL shall set this field to 0 to indicate the device does not support asymmetrical logical unit access.</del> <u>The SATL shall implement this field as defined in SPC-3.</u>
ACC	U	<del>The SATL shall set this field to 0 to indicate no access controls coordinator may be addressed through this logical unit.</del> <u>The SATL shall implement this field as defined in SPC-3.</u>
SCCS	U	<del>The SATL shall set this field to 0 to indicate the device does not contain an embedded storage array controller component.</del> <u>The SATL shall implement this field as defined in SPC-3.</u>
ADD <del>R</del> 16	U	<del>The SATL shall set this field to 0 to indicate the device does not support 16bit wide SCSI addresses.</del> <u>The SATL shall implement this field as defined in SPC-3.</u>

Table 2 — Standard ~~Inquiry~~ **INQUIRY** data fields (part 2 of 3)

Field	SATType	Description or reference
MCHNGR	U	The SATL shall set this field to 0 to indicate the <u>peripheral</u> device is not attached to a medium transport element.
MULTIP	U	<del>The SATL shall set this field to 0 to indicate the device does not contain multiple ports. (Is this too restrictive?)</del> The SATL shall implement this field as defined in SPC-3.
ENCSERV	U	<del>The SATL shall set this field to 0 to indicate that this device does not contain an embedded enclosure service component.</del> The SATL shall implement this field as defined in SPC-3.
BQUE	U	<del>Works in combination with the CMDQUE bit. The SATL shall set this field to 0 to indicate that this <u>peripheral</u> device does not support the basic task management model.</del> The SATL shall implement this field as defined in 6.2, SAM-3, and SPC-3.
CMDQUE	U	<del>The SATL shall set this bit to 1 if bit 8 of the SERIALATACAPABILITIES field in the Device Identify data is set and the SERIALATACAPABILITIES field represents a valid value. If set to 1 the device supports full task management model, specifically it supports command queuing. If this bit is 0, the <u>peripheral</u> device does not support command queuing.</del> The SATL shall implement this field as defined in 6.2, SAM-3, and SPC-3.
LINKED	U	The SATL shall set this field to 0 to indicate that this <u>peripheral</u> device does not support linked commands.
SU <del>Y</del> NC	U	<del>The SATL shall set this field to 0 to indicate that this device does not support SCSI synchronous data transfers.</del> The SATL shall implement this field as defined in SPC-3.
WBUS16	U	<del>The SATL shall set this field to 0 to indicate that this device does not support 16-bit transfers. SYNC/WBUS16 applies to parallel SCSI.</del> The SATL shall implement this field as defined in SPC-3.
VENDOR IDENTIFICATION	U	<del>This 8-byte field shall be created using the first 8 bytes of the 40-byte Model Number field from the device identify data retrieved from the device. Endianness shall be swapped to match the SCSI format.</del> The SATL shall set the VENDOR IDENTIFICATION field to "ATA " (i.e., "ATA" followed by five ASCII spaces).
PRODUCT IDENTIFICATION	E	<del>This 16-byte field shall be created using the bytes 8 through 23 of the 40-byte Model Number field from the identify data. Endianness shall be swapped to match the SCSI format.</del> The SATL shall set the PRODUCT IDENTIFICATION field to a representation of the first 16 bytes of the ATA device IDENTIFY DEVICE data MODEL NUMBER field, where each pair of bytes are swapped to create a valid ASCII string format <sup>c</sup> : <ol style="list-style-type: none"> <li>1) byte 0 contains IDENTIFY DEVICE word 27 bits 15:8 (i.e., byte 1);</li> <li>2) byte 1 contains IDENTIFY DEVICE word 27 bits 7:0 (i.e., byte 0);</li> <li>3) byte 2 contains IDENTIFY DEVICE word 28 bits 15:8 (i.e., byte 3);</li> <li>4) byte 3 contains IDENTIFY DEVICE word 28 bits 7:0 (i.e., byte 2);</li> </ol> <p style="text-align: center;">...</p> <ol style="list-style-type: none"> <li>15) byte 14 contains IDENTIFY DEVICE word 34 bits 15:8 (i.e., byte 15); and</li> <li>16) byte 15 contains IDENTIFY DEVICE word 34 bits 7:0 (i.e., byte 14).</li> </ol>

Table 2 — Standard ~~Inquiry~~ **INQUIRY** data fields (part 3 of 3)

Field	SATType	Description or reference
PRODUCT REVISION <u>LEVEL</u>	U	<del>This field shall be created using the 8-byte firmware revision field of the device-Identify data. The lower 4 bytes shall be used and the upper 4 bytes shall be truncated since SCSI supports only 4 bytes for revision number. Endianness shall be swapped to match the SCSI format.</del> <u>The SATL shall set the PRODUCT REVISION LEVEL field to 20202020h (i.e., four ASCII spaces) <sup>c</sup>.</u>
IUS	U	<u>The SATL shall implement this field as defined in SPC-3.</u>
QAS	U	<u>The SATL shall implement this field as defined in SPC-3.</u>
CLOCKING	U	<u>The SATL shall implement this field as defined in SPC-3.</u>
<del>VENDOR DESCRIPTORS</del> <u>VERSION DESCRIPTOR 1 through_ VERSION DESCRIPTOR 8</u>	U	<u>The SATL shall include version descriptors for:</u> <ul style="list-style-type: none"> <li>a) <u>the SCSI architecture model standard (e.g., SAM-3);</u></li> <li>b) <u>this standard;</u></li> <li>c) <u>the SCSI primary commands standard (e.g., SPC-3);</u></li> <li>d) <u>the SCSI block commands standard (e.g., SBC-2);</u></li> <li>e) <u>if the SATL receives SCSI commands through a SCSI target port, the version of the transport protocol to which the SCSI target port was designed;</u></li> <li>f) <u>if the SATL sends ATA commands through a SAS STP initiator port, the version of SAS (e.g., SAS-1.1) to which the SAS initiator port was designed; and</u></li> <li>g) <u>the version of ATA/ATAPI (e.g., ATA/ATAPI-7) to which the ATA device claims compliance in the IDENTIFY DEVICE data MAJOR VERSION NUMBER field (i.e., word 80) and MINOR VERSION NUMBER field (i.e., word 81).</u></li> </ul>
<del>VENDOR-SPECIFIC-PARAMETERS</del> Vendor specific parameters	U	<u>The SATL shall implement these parameters as defined in SPC-3.</u>
<p><sup>a</sup> If the INQUIRY command is issued to an unsupported logical unit (i.e., any logical unit other than logical unit zero) the SATL shall set the PERIPHERAL QUALIFIER field to 011b and shall set the PERIPHERAL DEVICE TYPE to field <del>4ff</del> <u>1Fh</u>.</p> <p><sup>b</sup> <u>The encodings used by T10 for INQUIRY version descriptors (see SPC-3) and T13 for IDENTIFY DEVICE major and minor version numbers (see ATA/ATAPI-7 Volume 1) differ, and the two standards organizations may not define values for the same revisions.</u></p> <p><sup>c</sup> <u>The full ATA IDENTIFY DEVICE data MODEL NUMBER field contents and the REVISION NUMBER field contents are retrieved with the ATA Information VPD page (See 8.1.3.4)</u></p>		

**8.1.3 VPD pages****8.1.2-23.1 Vital Product data - Supported VPD pages VPD page**

Table 3 — Vital Product Data -Unit Serial Number VPD page fields

Field	SATType	Description or reference
PERIPHERAL DEVICE TYPE		The SATL shall set this field to 0 to indicate that a direct access device is connected.
PERIPHERAL QUALIFIER		The SATL shall set this field to 0 to indicate that the specified peripheral device is currently attached to this logical unit.
PAGE CODE		The SATL shall set the field to 80h to indicate Unit Serial Number VPD page.
PAGE LENGTH		The SATL shall set this field to the length of the product serial number.
PRODUCT SERIAL NUMBER		The SATL shall return the 20-byte product serial number found in the device identify data retrieved from the device. The serial number field shall be byte-swapped to match the SCSI data format.
If the INQUIRY command is issued to an unsupported logical unit (i.e. any logical unit other than logical unit zero) the SATL shall set the PERIPHERAL QUALIFIER field to 011b and shall set the PERIPHERAL DEVICE TYPE to field 1fh.		

[All text that follows is new:]

Table 4 defines the Unit Serial Number VPD page (see SPC-3) returned by a SATL for an ATA device.

Table 4 — Unit Serial Number VPD page for SAT

Byte\Bit	7	6	5	4	3	2	1	0
0	PERIPHERAL QUALIFIER			PERIPHERAL DEVICE TYPE				
1	PAGE CODE (80h)							
2	Reserved							
3	PAGE LENGTH (20)							
4	PRODUCT SERIAL NUMBER							
n								

The PERIPHERAL QUALIFIER field shall be set to 000b (i.e., currently connected).

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Editor's Note 2: if port multiplier support is ever added, they might be done as multiple LUNs 0-15 behind one target port. It might be appropriate to use a peripheral qualifier of 001b (not currently connected, yet supported) for each LUN which do not currently have a SATA drive attached.

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The PERIPHERAL DEVICE TYPE field shall be set to 00h (i.e., direct-access block device).

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Editor's Note 3: if port multiplier support is ever added, they might be done as multiple LUNs behind one target port. The port multiplier control might be assigned a LUN and have to use a different peripheral device type.

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The PAGE CODE field shall be set to 80h.

The PAGE LENGTH field shall be set to 20.

The PRODUCT SERIAL NUMBER field contains a representation of the SERIAL NUMBER field in the ATA IDENTIFY DEVICE data (i.e., words 10-19) last retrieved from the ATA device. Each pair of bytes in the SERIAL NUMBER field shall be swapped to create a valid ASCII string format in the PRODUCT SERIAL NUMBER field as described in table 5.

**Table 5 — PRODUCT SERIAL NUMBER field**

Byte	Contents
0	IDENTIFY DEVICE word 10 bits 15:8 (i.e., byte 1)
1	IDENTIFY DEVICE word 10 bits 7:0 (i.e., byte 0)
2	IDENTIFY DEVICE word 11 bits 15:8 (i.e., byte 3)
3	IDENTIFY DEVICE word 11 bits 7:0 (i.e., byte 2)
...	...
18	IDENTIFY DEVICE word 19 bits 15:8 (i.e., byte 19)
19	IDENTIFY DEVICE word 19 bits 7:0 (i.e., byte 18)

NOTE 1 Although SPC-3 defines the PRODUCT SERIAL NUMBER field as right-aligned, ATA/ATAPI-7 does not require its SERIAL NUMBER field to be right-aligned. Therefore, the PRODUCT SERIAL NUMBER field for SAT may not be right-aligned.

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Editor's Note 4: Previously the SAT WG asked that packing be done to ensure the resulting string is right-aligned as required by SPC-3. This revision proposes just making it a fixed width of 20 bytes and ignoring the right-aligned rule.

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### 8.1.3.2 Device Identification VPD page

#### 8.1.3.2.1 Device Identification VPD page overview

The SATL shall return the Device Identification VPD page (see SPC-3) as defined in table 6.

**Table 6 — Device Identification VPD page for SAT**

Byte/Bit	7	6	5	4	3	2	1	0
0	PERIPHERAL QUALIFIER			PERIPHERAL DEVICE TYPE				
1	PAGE CODE (83h)							
2	Reserved							
3	PAGE LENGTH (n - 3)							
4	Identification descriptor for the logical unit (see table 7 and table 9)							
15	Additional identification descriptor(s) (if any)							
16								
n								

The PERIPHERAL QUALIFIER field shall be set to 000b (i.e., currently connected).

The PERIPHERAL DEVICE TYPE field shall be set to 00h (i.e., direct-access block device).

The PAGE CODE field shall be set to 83h.

The PAGE LENGTH field contains the length of the remaining bytes of the VPD page.

One identification descriptor for a logical unit (i.e., a logical unit name) shall be included (see 8.1.3.2.2).

In some environments, one or more additional identification descriptors may be included (see 8.1.3.2.3).

### 8.1.3.2.2 Logical unit name

#### 8.1.3.2.2.1 Logical unit name overview

If the ATA device returns word 87 bit 8 set to one in its IDENTIFY DEVICE data indicating that it supports the WORLD WIDE NAME field (i.e., words 108-111), the SATL shall include an identification descriptor containing a logical unit name as defined in 8.1.3.2.2.2.

If the ATA device returns word 87 bit 8 set to zero in its IDENTIFY DEVICE data indicating that it does not support the WORLD WIDE NAME field (i.e., words 108-111), the SATL shall include an identification descriptor containing a logical unit name as defined in 8.1.3.2.2.3.

#### 8.1.3.2.2.2 Logical unit name derived from the world wide name

Table 7 defines the logical unit name derived from the ATA device world wide name.

**Table 7 — Logical unit name derived from the world wide name**

Byte/Bit	7	6	5	4	3	2	1	0
0	PROTOCOL IDENTIFIER				CODE SET (1h)			
1	PIV (0b)	Reserved	ASSOCIATION (0h)		IDENTIFIER TYPE (3h)			
2	Reserved							
3	IDENTIFIER LENGTH (08h)							
4	NAA				(MSB)			
5	IEEE COMPANY_ID							
6								
7	(LSB)				(MSB)			
8	VENDOR SPECIFIC IDENTIFIER							
11								

The PROTOCOL IDENTIFIER field shall be set to 0h.

The CODE SET field shall be set to 1h (i.e., binary).

The PIV bit shall be set to 0b.

The ASSOCIATION field shall be set to 0h (i.e., logical unit).

The IDENTIFIER TYPE field shall be set to 3h (i.e., NAA).



The NAA field, IEEE COMPANY\_ID field, and VENDOR SPECIFIC IDENTIFIER field shall be based on the IDENTIFY DEVICE data WORLD WIDE NAME field as described in table 8.

**Table 8 — Fields in the logical unit name**

Field		Contents
Field name	Specific bits in table 7	
NAA	Byte 4 bits 7:4	IDENTIFY DEVICE word 108 bits 15:12 <sup>a</sup>
IEEE COMPANY_ID	Byte 4 bits 3:0	IDENTIFY DEVICE word 108 bits 11:8
	Byte 5	IDENTIFY DEVICE word 108 bits 7:0
	Byte 6	IDENTIFY DEVICE word 109 bits 15:8
	Byte 7 bits 7:4	IDENTIFY DEVICE word 109 bits 7:4
VENDOR SPECIFIC IDENTIFIER	Byte 7 bits 3:0	IDENTIFY DEVICE word 109 bits 3:0
	Byte 8	IDENTIFY DEVICE word 110 bits 15:8
	Byte 9	IDENTIFY DEVICE word 110 bits 7:0
	Byte 10	IDENTIFY DEVICE word 111 bits 15:8
	Byte 11	IDENTIFY DEVICE word 111 bits 7:0

<sup>a</sup> This 4-bit field is required to be set to 5h (i.e., IEEE Registered) by ATA/ATAPI-7 Volume 1.

#### 8.1.3.2.2.3 Logical unit name derived from the model number and serial number

Table 9 defines the logical unit name derived from the ATA device model number and serial number.

**Table 9 — Logical unit name derived from the model number and serial number**

Byte/Bit	7	6	5	4	3	2	1	0
0	PROTOCOL IDENTIFIER				CODE SET (2h)			
1	PIV (0b)	Reserved	ASSOCIATION (0h)		IDENTIFIER TYPE (1h)			
2	Reserved							
3	IDENTIFIER LENGTH (68)							
4	VENDOR IDENTIFICATION ("ATA ")							
11	VENDOR SPECIFIC IDENTIFIER (see table 10)							
12								
71								

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**Editor's Note 5:** In revision 5 and earlier of this proposal, identifier type 8h (SCSI name string) was proposed. This revision switches to identifier type 1h (T10 vendor identification) to avoid confusion. Although type 1h does not earn a "should" from SPC-3 like identifier types 2h (EUI-64), 3h (NAA), and 8h (SCSI name string), it is permitted to meet the basic requirement for a logical unit name.

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The PROTOCOL IDENTIFIER field shall be set to 0h.

The CODE SET field shall be set to 2h (i.e., ASCII).

The PIV bit shall be set to 0b.

The ASSOCIATION field shall be set to 0h (i.e., logical unit).

The IDENTIFIER TYPE field shall be set to 1h (i.e., T10 vendor identification).

The VENDOR IDENTIFICATION field contains the string "ATA " (i.e., "ATA" followed by five ASCII spaces).

The VENDOR SPECIFIC IDENTIFIER field shall be set to a representation of the IDENTIFY DEVICE data MODEL NUMBER field concatenated with a representation of the IDENTIFY DEVICE data SERIAL NUMBER field as described in table 10.

**Table 10 — VENDOR SPECIFIC IDENTIFIER field for logical unit name**

Byte	Contents	
	Source field name	Source location
0	MODEL NUMBER field	IDENTIFY DEVICE word 27 bits 15:8
1		IDENTIFY DEVICE word 27 bits 7:0
2		IDENTIFY DEVICE word 28 bits 15:8
...		...
39		IDENTIFY DEVICE word 46 bits 7:0
40	SERIAL NUMBER field	IDENTIFY DEVICE word 10 bits 7:0
41		IDENTIFY DEVICE word 10 bits 15:8
42		IDENTIFY DEVICE word 11 bits 15:0
...		...
59		IDENTIFY DEVICE word 19 bits 7:0

NOTE 2 The logical unit name using the T10 vendor identification format is not guaranteed to be worldwide unique, since ATA/ATAPI-7 only requires the combination of the MODEL NUMBER field and SERIAL NUMBER field to be unique for a given manufacturer but defines no manufacturer identification field.

#### 8.1.3.2.3.1 Target device name overview

In some environments, the SATL includes a target device name based on the IDENTIFY DEVICE data. If this is the case and the SATL includes an identification descriptor containing a logical unit name derived from:

- a) the world wide name (see 8.1.3.2.2.2), then the SATL shall include an identification descriptor containing a target device name as defined in 8.1.3.2.3.2; and
- b) the model number and serial number (see 8.1.3.2.2.3), then the SATL shall include an identification descriptor containing a target device name as defined in 8.1.3.2.3.3.

#### 8.1.3.2.3.2 Target device name derived from world wide name

Table 11 defines the target device name derived from the ATA device world wide name.

**Table 11 — Target device name derived from world wide name**

Byte\Bit	7	6	5	4	3	2	1	0
0	PROTOCOL IDENTIFIER				CODE SET (1h)			
1	PIV (0b)	Reserved	ASSOCIATION (0h)		IDENTIFIER TYPE (3h)			
2	Reserved							
3	IDENTIFIER LENGTH (16)							
4	NAA				(MSB)			
5	IEEE COMPANY_ID							
6								
7	(LSB)				(MSB)			
8	VENDOR SPECIFIC IDENTIFIER							
11	(LSB)							
12	(MSB)							
19	VENDOR SPECIFIC IDENTIFIER EXTENSION							
	(LSB)							

The PROTOCOL IDENTIFIER field shall be set to 0h.

The CODE SET field shall be set to 1h (i.e., binary).

The PIV bit shall be set to 0b.

The ASSOCIATION field shall be set to 2h (i.e., target device).

The IDENTIFIER TYPE field shall be set to 3h (i.e., NAA).

The NAA field, IEEE COMPANY\_ID field, VENDOR SPECIFIC IDENTIFIER field, and VENDOR SPECIFIC IDENTIFIER EXTENSION field shall be based on the IDENTIFY DEVICE data WORLD WIDE NAME field as described in table 12.

**Table 12 — Fields in the target device name**

Field		Contents
Field name	Specific bits in table 7	
NAA	Byte 4 bits 7:4	6h (i.e., IEEE Registered Extended) <sup>a</sup>
IEEE COMPANY_ID	Byte 4 bits 3:0	IDENTIFY DEVICE word 108 bits 11:8
	Byte 5	IDENTIFY DEVICE word 108 bits 7:0
	Byte 6	IDENTIFY DEVICE word 109 bits 15:8
	Byte 7 bits 7:4	IDENTIFY DEVICE word 109 bits 7:4
VENDOR SPECIFIC IDENTIFIER	Byte 7 bits 3:0	IDENTIFY DEVICE word 109 bits 3:0
	Byte 8	IDENTIFY DEVICE word 110 bits 15:8
	Byte 9	IDENTIFY DEVICE word 110 bits 7:0
	Byte 10	IDENTIFY DEVICE word 111 bits 15:8
	Byte 11	IDENTIFY DEVICE word 111 bits 7:0
VENDOR SPECIFIC IDENTIFIER EXTENSION	Byte 12 - 19	00000000_00000000h

<sup>a</sup> The 4-bit NAA field in IDENTIFY DEVICE word 108 bits 15:12 is required to be set to 5h (i.e., IEEE Registered) by ATA/ATAPI-7 Volume 1. The SATL is not required to verify that it is set to 5h before creating an NAA IEEE Registered Extended identifier (with the NAA field set to 6h) from that name.

#### 8.1.3.2.3.3 Target device name derived from model number and serial number

Table 13 defines the target device name derived from the ATA device model number and serial number.

**Table 13 — Target device name derived from model number and serial number**

Byte\Bit	7	6	5	4	3	2	1	0
0	PROTOCOL IDENTIFIER				CODE SET (2h)			
1	PIV (0b)	Reserved	ASSOCIATION (0h)		IDENTIFIER TYPE (1h)			
2	Reserved							
3	IDENTIFIER LENGTH (72)							
4	VENDOR IDENTIFICATION ("ATA ")							
11	VENDOR IDENTIFICATION ("ATA ")							
12	VENDOR SPECIFIC IDENTIFIER (see table 14)							
75	VENDOR SPECIFIC IDENTIFIER (see table 14)							

The PROTOCOL IDENTIFIER field shall be set to 0h.

The CODE SET field shall be set to 2h (i.e., ASCII).

The PIV bit shall be set to 0b.

The ASSOCIATION field shall be set to 2h (i.e., target device).

The IDENTIFIER TYPE field shall be set to 1h (i.e., T10 vendor identification).

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Editor's Note 6: this requires a change to SPC-3 (as of spc3r21b), which does not allow type 1h for device names (just types 2h, 3h, and 8h). Submitted as an SPC-3 letter ballot comment.

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The VENDOR IDENTIFICATION field contains the string "ATA " (i.e., "ATA" followed by five ASCII spaces).

The VENDOR SPECIFIC IDENTIFIER field shall be set to a representation of the IDENTIFY DEVICE data MODEL NUMBER field concatenated with a representation of the IDENTIFY DEVICE data SERIAL NUMBER field as described in table 14.

**Table 14 — VENDOR SPECIFIC IDENTIFIER field for target device name**

Byte	Contents	
	Source field name	Source location or contents
0	MODEL NUMBER field	IDENTIFY DEVICE word 27 bits 15:8
1		IDENTIFY DEVICE word 27 bits 7:0
2		IDENTIFY DEVICE word 28 bits 15:8
...		...
39		IDENTIFY DEVICE word 46 bits 7:0
40	SERIAL NUMBER field	IDENTIFY DEVICE word 10 bits 7:0
41		IDENTIFY DEVICE word 10 bits 15:8
42		IDENTIFY DEVICE word 11 bits 15:0
...		...
59		IDENTIFY DEVICE word 19 bits 7:0
60	None	' '
61		'T'
62		'D'
63		'N'

NOTE 3 The target device name using the T10 vendor identification format is not guaranteed to be worldwide unique, since ATA/ATAPI-7 only requires the combination of the MODEL NUMBER field and SERIAL NUMBER field to be unique for a given manufacturer but defines no manufacturer identification field.

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Editor's Note 7: logical unit names are target device names are not supposed to overlap, so ",TDN" is appended to the logical unit name to create a non-overlapping target device name.

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### 8.1.3.2.3 Examples of additional identification descriptors

#### 8.1.3.2.3.1 Identification descriptors included by a SATL in an ATA host

Figure 1 shows the identification descriptor returned by a SATL in an ATA host (i.e., where the ATA device is being accessed with an ATA host port):

- a) a logical unit name based on ATA IDENTIFY DEVICE data (see table 7 or table 9 in 8.1.3.2.2); and
- b) a target device name based on ATA IDENTIFY DEVICE data (see table 11 or table 13 in 8.1.3.2.3).

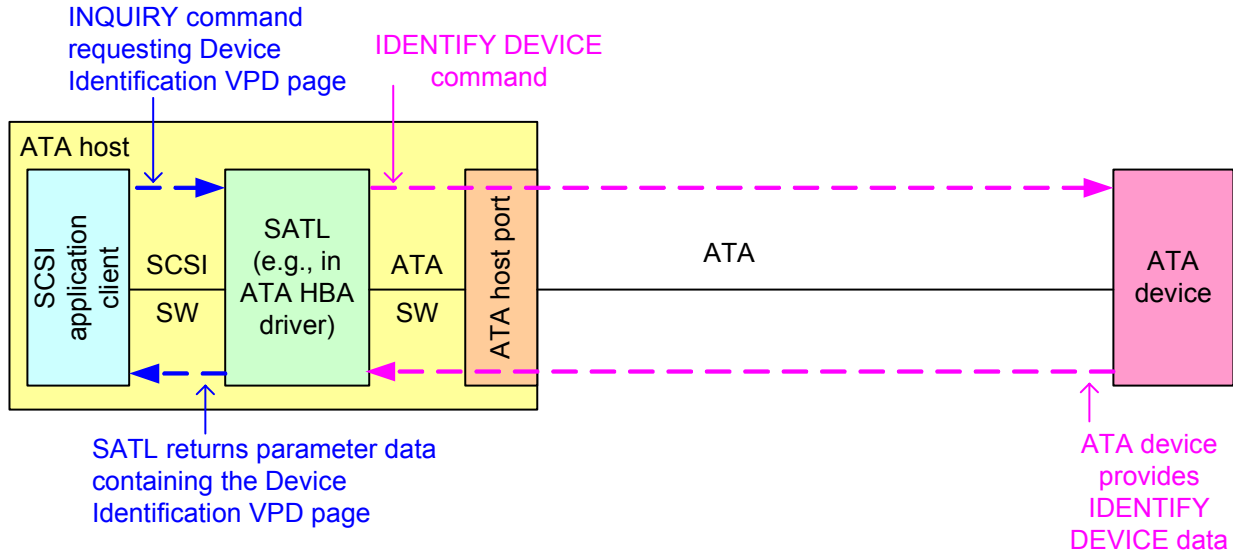


Figure 1 — Identification descriptors included by a SATL in an ATA host

8.1.3.2.3.2 Identification descriptors included by a SATL in a SAS initiator device

Figure 2 shows the identification descriptors returned by a SATL in a SAS initiator device (i.e., where the SATA device is being accessed with a SAS STP initiator port):

- a) a logical unit name based on ATA IDENTIFY DEVICE data (see table 7 or table 9 in 8.1.3.2.2);
- b) a target port identifier based on the SAS STP target port SAS address (see table 15);
- c) a relative target port identifier set to 0001h (see SPC-3); and
- d) a target device name based on ATA IDENTIFY DEVICE data (see table 11 or table 13 in 8.1.3.2.3).

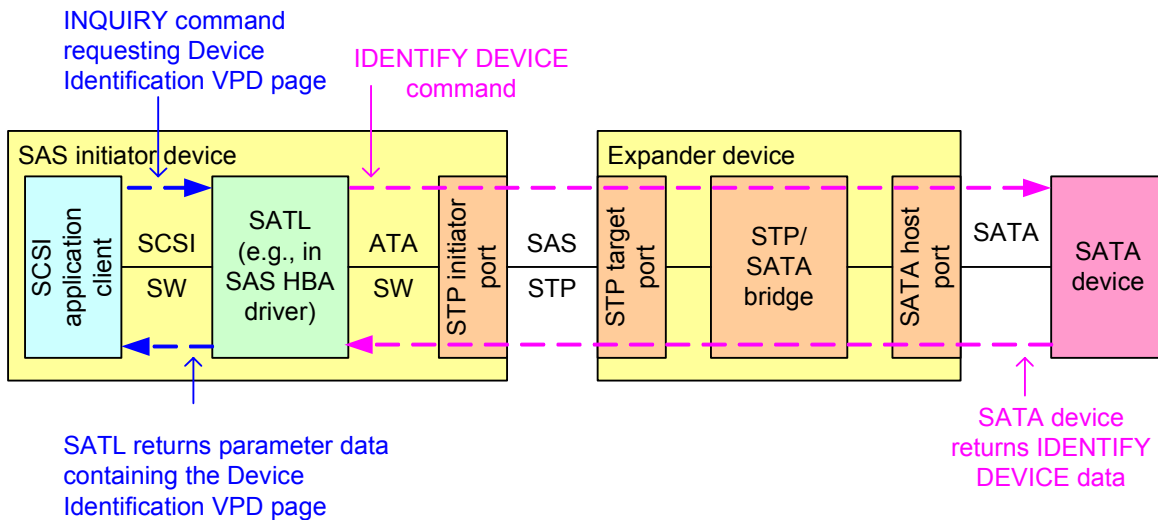


Figure 2 — Identification descriptors included by a SATL in a SAS initiator device

The SATL includes a target port identifier as defined in table 15.

**Table 15 — Target port identifier for SAS**

Byte\Bit	7	6	5	4	3	2	1	0
0	PROTOCOL IDENTIFIER (6h)				CODE SET (1h)			
1	PIV (1b)	Reserved	ASSOCIATION (1h)		IDENTIFIER TYPE (3h)			
2	Reserved							
3	IDENTIFIER LENGTH (08h)							
4	SAS ADDRESS							
11								

The CODE SET field is set to 1h (i.e., binary).

The PIV bit is set to 1b.

The ASSOCIATION field is set to 1h (i.e., target port).

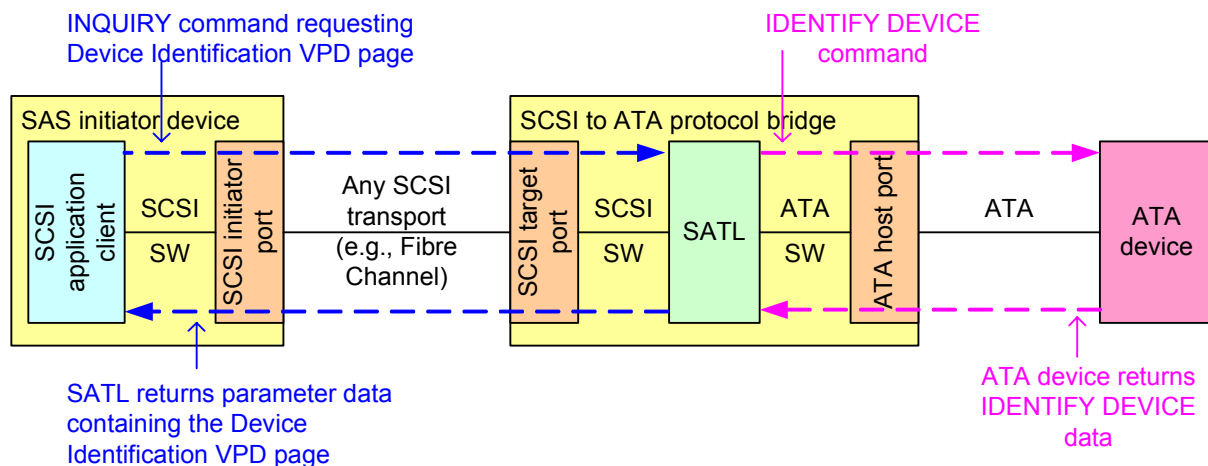
The IDENTIFIER TYPE field is set to 3h (i.e., NAA).

The SAS ADDRESS field is set to the SAS address of the STP target port providing the STP/SATA bridge functionality (i.e., the SAS address of the ATA device in the SAS domain).

**8.1.3.2.3.3 Identification descriptors included by a SATL in a SCSI to ATA protocol bridge**

Figure 3 shows the identification descriptors returned by a SATL in a SCSI to ATA protocol bridge, where the ATA device is being accessed by an ATA host port, and the SATL is being accessed with a SCSI target port using a SCSI transport protocol (e.g, FCP-3 or iSCSI):

- a) a logical unit name based on ATA IDENTIFY DEVICE data (see table 7 or table 9 in 8.1.3.2.2;
- b) any target port identifiers specified by the SCSI transport protocol standard (e.g., for FCP-3, the SATL includes an identifier with identifier type 3h (i.e., NAA) containing the Port\_Name, and may include an identifier with identifier type 4h (i.e., relative target port identifier)); and
- c) any other identification descriptors supported by the protocol bridge (e.g., a target device name).



**Figure 3 — Identification descriptors included by a SATL in a SCSI to ATA protocol bridge**

[\[end of all new section\]](#)

**13 Translation for ATAPI devices**

**13.1 Overview**

This section 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 CDBs and parameter data unaltered to the ATAPI device.

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

- a) pass through INQUIRY CDBs requesting the standard INQUIRY data unaltered;
- b) pass through INQUIRY CDBs requesting VPD pages other than the Supported VPD Pages VPD page and the ATA Information VPD page unaltered;
- c) process INQUIRY CDBs requesting the Supported VPD Pages VPD page (see SPC-3) as described in 13.2.1.2; and
- d) process INQUIRY CDBs requesting the ATA Information VPD page (see 8.1.3.5) 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 CDB 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: 00h (i.e., Supported VPD Pages) and 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 8.1.2.5) and it receives an INQUIRY CDB 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 CDB 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.