ENDL
T E X A S

Date: 19 June 2005
To: T10 Technical Committee
From: Ralph O. Weber
Subject: SPC-4 VPD Page 83 Identifier s/b Designator Changes

This document applies the SPC-3 Letter Ballot comments listed in 05-003r1 such that 'identifier' is changed to 'designator' in the definition of VPD page 83, the Device Identification page. As per agreements reached during the SPC-3 Letter Ballot processing, these changes should be incorporated in an early revision of SPC-4 so that other standards that reference SPC-4 can make equivalent changes expeditiously.

r1 corrects several comment numbers, adds comments that were overlooked in r0, and adds comments that were partially incorporated in SPC-3. r1 also shows changes needed to support the usage of relative target port identifier for consistency with SAM-3 nomenclature.

r2 switches the format of presentation from a list of Letter Ballot comments to detailed text changes relative to SPC-3 revision 23 (the SPC-3 revision in Public Review).

To simplify checking of the changes made by this proposal, instances of identif… that are not modified are shown in bright green.

Proposed SPC-4 changes

3.1.27 designation: When used in reference to access controls, a A name and optional identifier information that specifies a SCSI target device or SCSI target port for association with an alias value (see 3.1.8) in the alias list (see 3.1.7). See 6.2.2.

5.8.2.7 Implicit asymmetric logical units access management

SCSI target devices with implicit asymmetric logical units access management are capable of setting the target port group asymmetric access state of each target port group using mechanisms other than the SET TARGET PORT GROUPS command.

All logical units that report in the standard INQUIRY data (see 6.4.2) that they support asymmetric logical units access and support implicit asymmetric logical unit access (i.e., the TPGS field contains 01b or 11b) shall:

a) Implement the INQUIRY command Device Identification VPD page identifier designator types 4h (see 7.6.3.7) and 5h (see 7.6.3.8); and
b) Support the REPORT TARGET PORT GROUPS command as described in 6.25.

Implicit logical unit access state changes may be disabled with the IALUAE bit in the Control Extension mode page (see 7.4.7).

5.8.2.8 Explicit asymmetric logical units access management

All logical units that report in the standard INQUIRY data (see 6.4.2) that they support asymmetric logical units access and support explicit asymmetric logical unit access (i.e., the TPGS field contains 10b or 11b) shall:

a) Implement the INQUIRY command Device Identification VPD page (see 7.6.3) identifier designator types 4h and 5h;
b) Support the REPORT TARGET PORT GROUPS command as described in 6.25; and

c) Support the SET TARGET PORT GROUPS command as described in 6.31.

6.3.6.2 Identification descriptor target descriptor format

The target descriptor format shown in table 56 instructs the copy manager to locate a SCSI target device and logical unit that returns a Device Identification VPD page (see 7.6.3) containing ~~an Identification~~ a designation descriptor having the specified CODE SET, ASSOCIATION, ~~IDENTIFIER~~ DESIGNATOR TYPE, ~~IDENTIFIER~~ DESIGNATOR LENGTH, and ~~IDENTIFIER~~ DESIGNATOR field values. The copy manager may use any N_Port, target port identifier and logical unit number values that result in matching VPD field values to address the logical unit. If multiple target port identifiers and logical unit number combinations access matching VPD field values, the copy manager may use any combination to address the logical unit and shall try other combinations in the event that one combination becomes non-operational during the processing of an EXTENDED COPY command.

Table 56 — Identification descriptor target descriptor format

Bit Byte	7	6	5	4	3	2	1	0
0	DESCRIPTOR TYPE CODE (E4h)							
1	LU ID TYPE		NUL	PERIPHERAL DEVICE TYPE				
2	(MSB)		RELATIVE INITIATOR PORT IDENTIFIER					
3								(LSB)
4	Reserved				CODE SET			
5	Reserved		ASSOCIATION		~~IDENTIFIER~~ DESIGNATOR TYPE			
6	Reserved							
7	~~IDENTIFIER~~ DESIGNATOR LENGTH (n-7)							
8	~~IDENTIFIER~~ DESIGNATOR							
n								
n+1	Reserved							
27								
28	Device type specific parameters							
31								

The DESCRIPTOR TYPE CODE field, PERIPHERAL DEVICE TYPE field, NUL bit, RELATIVE INITIATOR PORT IDENTIFIER field, and the device type specific parameters are described in 6.3.6.1.

The LU ID TYPE field is reserved for this target descriptor.

The contents of the CODE SET, ASSOCIATION, ~~IDENTIFIER~~ DESIGNATOR TYPE, ~~IDENTIFIER~~ DESIGNATOR LENGTH, and ~~IDENTIFIER~~ DESIGNATOR fields are specified in 7.6.3.

The ~~identifier~~ designator length shall be 20 or less. If the ~~identifier~~ designator length is 20, there shall be no reserved bytes between the target descriptor parameters and the device type specific parameters.

Some combinations of code set, association, ~~identifier~~ designator type, ~~identifier~~ designator length and ~~identifier~~ designator do not uniquely identify a logical unit to serve as a copy target device. The behavior of the copy manager when such combinations are received is unpredictable.

7.6.3 Device Identification VPD page

7.6.3.1 Device Identification VPD page overview

The Device Identification VPD page (see table 294) provides the means to retrieve ~~identification~~ designation descriptors applying to the logical unit. Logical units may have more than one ~~identification~~ designation descriptor (e.g., if several types or associations of ~~identifier~~ designator are supported). ~~Device identifier~~ Designators consist of one or more of the following:

a) Logical unit names;
b) SCSI target port identifiers;
c) SCSI target port names;
d) SCSI target device names;
e) Relative target port identifiers;
f) SCSI target port group number; or
g) Logical unit group number.

~~Identification~~ Designation descriptors shall be assigned to the peripheral device (e.g., a disk drive) and not to the currently mounted media, in the case of removable media devices. Operating systems are expected to use the ~~identification~~ designation descriptors during system configuration activities to determine whether alternate paths exist for the same peripheral device.

Table 294 — Device Identification VPD page

Bit Byte	7	6	5	4	3	2	1	0
0	PERIPHERAL QUALIFIER			PERIPHERAL DEVICE TYPE			
1	PAGE CODE (83h)							
2	(MSB)	PAGE LENGTH (n-3)						
3								(LSB)
	~~Identification~~ Designation descriptor list							
4	~~Identification~~ Designation descriptor (first)							
	⋮							
n	~~Identification~~ Designation descriptor (last)							

The PERIPHERAL QUALIFIER field and the PERIPHERAL DEVICE TYPE field in table 294 are as defined in 6.4.2.

The PAGE LENGTH field indicates the length of the ~~identification~~ designation descriptor list. The relationship between the PAGE LENGTH field and the CDB ALLOCATION LENGTH field is defined in 4.3.4.6.

Each ~~identification~~ designation descriptor (see table 295) contains information identifying the logical unit, SCSI target device containing the logical unit, or access path (i.e., target port) used by the command and returned parameter data. The Device Identification VPD page shall contain the ~~identification~~ designation descriptors enumerated in 7.6.3.2.

Table 295 — ~~Identification~~ Designation descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	PROTOCOL IDENTIFIER				CODE SET			
1	PIV	Reserved	ASSOCIATION		~~IDENTIFIER~~ DESIGNATOR TYPE			
2	Reserved							
3	~~IDENTIFIER~~ DESIGNATOR LENGTH (n-3)							
4	~~IDENTIFIER~~ DESIGNATOR							
n								

The PROTOCOL IDENTIFIER field may indicate the SCSI transport protocol to which the ~~identification~~ designation descriptor applies. If the ASSOCIATION field contains a value other than 01b (i.e., target port) or 10b (i.e., SCSI target device) or the PIV bit is set to zero, then the PROTOCOL IDENTIFIER field contents are reserved. If the ASSOCIATION field contains a value of 01b or 10b and the PIV bit is set to one, then the PROTOCOL IDENTIFIER field shall contain one of the values shown in table 262 (see 7.5.1) to indicate the SCSI transport protocol to which the ~~identification~~ designation descriptor applies.

The CODE SET field indicates the code set used for the ~~IDENTIFIER~~ DESIGNATOR field, as described in table 296. This field is intended to be an aid to software that displays the ~~IDENTIFIER~~ DESIGNATOR field.

Table 296 — CODE SET field

Code	Description
0h	Reserved
1h	The ~~IDENTIFIER~~ DESIGNATOR field shall contain binary values.
2h	The ~~IDENTIFIER~~ DESIGNATOR field shall contain ASCII print-able characters (i.e., code values 20h through 7Eh)
3h	The ~~IDENTIFIER~~ DESIGNATOR field shall contain ISO/IEC 10646-1 (UTF-8) codes
4h - Fh	Reserved

A protocol identifier valid (PIV) bit set to zero indicates the PROTOCOL IDENTIFIER field contents are reserved. If the ASSOCIATION field contains a value of 01b or 10b, then a PIV bit set to one indicates the PROTOCOL IDENTIFIER field contains a valid protocol identifier selected from the values shown in table 262 (see 7.5.1). If the ASSOCIATION field contains a value other than 01b or 10b, then the PIV bit contents are reserved.

The ASSOCIATION field indicates the entity with which the ~~IDENTIFIER~~ DESIGNATOR field is associated, as described in table 297. If a logical unit returns ~~an identification~~ a designation descriptor with the ASSOCIATION field set to 00b or 10b, it shall return the same descriptor when it is accessed through any other I_T nexus.

Table 297 — ASSOCIATION field

Code	Description
00b	The ~~IDENTIFIER~~ DESIGNATOR field is associated with the addressed logical unit.
01b	The ~~IDENTIFIER~~ DESIGNATOR field is associated with the target port that received the request.
10b	The ~~IDENTIFIER~~ DESIGNATOR field is associated with the SCSI target device that contains the addressed logical unit.
11b	Reserved

The ~~IDENTIFIER~~ DESIGNATOR TYPE field (see table 298) indicates the format and assignment authority for the ~~identifier~~ designator.

Table 298 — ~~IDENTIFIER~~ DESIGNATOR TYPE field

Code	Description	Reference
0h	Vendor specific	7.6.3.3
1h	T10 vendor ID based	7.6.3.4
2h	EUI-64 based	7.6.3.5
3h	NAA	7.6.3.6
4h	Relative target port identifier	7.6.3.7
5h	Target port group	7.6.3.8
6h	Logical unit group	7.6.3.9
7h	MD5 logical unit identifier	7.6.3.10
8h	SCSI name string	7.6.3.11
9h - Fh	Reserved	

The ~~IDENTIFIER~~ DESIGNATOR LENGTH field indicates the length in bytes of the ~~IDENTIFIER~~ DESIGNATOR field. The relationship between the ~~IDENTIFIER~~ DESIGNATOR LENGTH field and the CDB ALLOCATION LENGTH field is defined in 4.3.4.6.

The ~~IDENTIFIER~~ DESIGNATOR field contains the ~~identifier~~ designator as described by the ASSOCIATION, ~~IDENTIFIER~~ DESIGNATOR TYPE, CODE SET, and ~~IDENTIFIER~~ DESIGNATOR LENGTH fields.

7.6.3.2 Device ~~identification~~ designation descriptor requirements

7.6.3.2.1 ~~Identification~~ Designation descriptors for logical units other than well known logical units

For each logical unit that is not a well known logical unit, the Device Identification VPD page shall include at least one ~~identification~~ designation descriptor in which a logical unit name (see SAM-3) is indicated. The ~~identification~~ designation descriptor shall have the ASSOCIATION field set to 00b (i.e., logical unit) and the ~~IDENTIFIER~~ DESIGNATOR TYPE field set to:

  a) 1h (i.e., T10 vendor ID based);
  b) 2h (i.e., EUI-64-based);
  c) 3h (i.e., NAA); or
  d) 8h (i.e., SCSI name string).

At least one ~~identification~~ designation descriptor should have the ~~IDENTIFIER~~ DESIGNATOR TYPE field set to:

a) 2h (i.e., EUI-64-based);
b) 3h (i.e., NAA); or
c) 8h (i.e., SCSI name string).

In the case of virtual logical units (e.g., volume sets as defined by SCC-2), ~~identification~~ designation descriptors should contain ~~an IDENTIFIER~~ a DESIGNATOR TYPE field set to:

a) 2h (i.e., EUI-64-based);
b) 3h (i.e., NAA); or
c) 8h (i.e., SCSI name string).

In the case of virtual logical units that have an EUI-64 based ~~identification~~ designation descriptor (see 7.6.3.5) the ~~IDENTIFIER~~ DESIGNATOR LENGTH field should be set to:

a) 0Ch (i.e., EUI-64-based 12-byte ~~identifier~~); or
b) 10h (i.e., EUI-64-based 16-byte ~~identifier~~).

In the case of virtual logical units that have an NAA ~~identification~~ designation descriptor (see 7.6.3.6) the NAA field should be set to 6h (i.e., IEEE Registered Extended).

The Device Identification VPD page shall contain the same set of ~~identification~~ designation descriptors with the ASSOCIATION field set to 00b (i.e., logical unit) regardless of the I_T nexus being used to retrieve the ~~identification~~ designation descriptors.

For logical units that are not well known logical units, the requirements for SCSI target device ~~identification~~ designation descriptors are defined in 7.6.3.2.4 and the requirements for SCSI target port ~~identification~~ designation descriptors are defined in 7.6.3.2.3.

7.6.3.2.2 ~~Identification~~ Designation descriptors for well known logical units

Well known logical units shall not return any ~~identification~~ designation descriptors with the ASSOCIATION field set to 00b (i.e., logical unit).

The Device Identification VPD page shall contain the same set of ~~identification~~ designation descriptors with the ASSOCIATION field set to 10b (i.e., SCSI target device) regardless of the I_T nexus being used to retrieve the ~~identification~~ designation descriptors.

7.6.3.2.3 ~~Identification~~ Designation descriptors for SCSI target ports

7.6.3.2.3.1 Relative target port identifiers

For the target port through which the Device Identification VPD page is accessed, the Device Identification VPD page should include one ~~identification~~ designation descriptor with the ASSOCIATION field set to 01b (i.e., target port) and the ~~IDENTIFIER~~ DESIGNATOR TYPE field set to 4h (i.e., relative target port identifier) identifying the target port being used to retrieve the ~~identification~~ designation descriptors.

7.6.3.2.3.2 Target port names or identifiers

For the SCSI target port through which the Device Identification VPD page is accessed, the Device Identification VPD page should include one ~~identification~~ designation descriptor in which the target port name or identifier (see

SAM-3) is indicated. The ~~identification~~ designation descriptor, if any, shall have the ASSOCIATION field set to 01b (i.e., target port) and the ~~IDENTIFIER~~ DESIGNATOR TYPE field set to:

   a)   2h (i.e., EUI-64-based);
   b)   3h (i.e., NAA); or
   c)   8h (i.e., SCSI name string).

If the SCSI transport protocol standard (see 3.1.102) for the target port defines target port names, the ~~identification~~ designation descriptor, if any, shall contain the target port name. If the SCSI transport protocol for the target port does not define target port names, the ~~identification~~ designation descriptor, if any, shall contain the target port identifier.

7.6.3.2.4 ~~Identification~~ Designation descriptors for SCSI target devices

If the SCSI target device contains a well known logical unit, the Device Identification VPD page shall have one or more ~~identification~~ designation descriptors for the SCSI target device. If the SCSI target device does not contain a well known logical unit, the Device Identification VPD page should have one or more ~~identification~~ designation descriptors for the SCSI target device.

Each SCSI target device ~~identification~~ designation descriptor, if any, shall have the ASSOCIATION field set to 10b (i.e., SCSI target device) and the ~~IDENTIFIER~~ DESIGNATOR TYPE field set to:

   a)   2h (i.e., EUI-64-based);
   b)   3h (i.e., NAA); or
   c)   8h (i.e., SCSI name string).

The Device Identification VPD page shall contain ~~identification~~ designation descriptors, if any, for all the SCSI target device names for all the SCSI transport protocols supported by the SCSI target device.

7.6.3.3 Vendor specific ~~identifier~~ designator format

If the ~~identifier~~ designator type is 0h (i.e., vendor specific), no assignment authority was used and there is no guarantee that the ~~identifier~~ designator is globally unique (i.e., the ~~identifier~~ designator is vendor specific). Table 299 defines the ~~IDENTIFIER~~ DESIGNATOR field format.

Table 299 — Vendor specific ~~IDENTIFIER~~ DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0								
n				VENDOR SPECIFIC IDENTIFIER				

7.6.3.4 T10 vendor ID based format

If the ~~identifier~~ designator type is 1h (i.e., T10 vendor ID based), the ~~IDENTIFIER~~ DESIGNATOR field has the format shown in table 300.

Table 300 — T10 vendor ID based ~~IDENTIFIER~~ DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
7				T10 VENDOR IDENTIFICATION				(LSB)
8				VENDOR SPECIFIC IDENTIFIER				
n								

The T10 VENDOR IDENTIFICATION field contains eight bytes of left-aligned ASCII data (see 4.4.1) identifying the vendor of the product. The data shall be left aligned within this field.The T10 vendor identification shall be one assigned by INCITS. A list of assigned T10 vendor identifications is in Annex E and on the T10 web site (http://www.T10.org).

> NOTE 56 - The T10 web site (http://www.t10.org) provides a convenient means to request an identification code.

The organization associated with the T10 vendor identification is responsible for ensuring that the VENDOR SPECIFIC IDENTIFIER field is unique in a way that makes the entire ~~IDENTIFIER~~ DESIGNATOR field unique. A recommended method of constructing a unique ~~IDENTIFIER~~ DESIGNATOR field is to concatenate the PRODUCT IDENTIFICATION field from the standard INQUIRY data (see 6.4.2) and the PRODUCT SERIAL NUMBER field from the Unit Serial Number VPD page (see 7.6.10).

7.6.3.5 EUI-64 based ~~identifier~~ designator format

7.6.3.5.1 EUI-64 based ~~identifier~~ designator format overview

If the ~~identifier~~ designator type is 2h (i.e., EUI-64 based ~~identifier)~~, the ~~IDENTIFIER~~ DESIGNATOR LENGTH field (see table 301) indicates the format of the ~~identification~~ designation descriptor.

Table 301 — EUI-64 based ~~identifier~~ designator lengths

~~Identifier~~ Designator Length	Description	Reference
08h	EUI-64 identifier	7.6.3.5.2
0Ch	EUI-64 based 12-byte identifier	7.6.3.5.3
10h	EUI-64 based 16-byte identifier	7.6.3.5.4
All other values	Reserved	

7.6.3.5.2 EUI-64 ~~identifier~~ designator format

If the ~~identifier~~ designator type is 2h (i.e., EUI-64 based ~~identifier~~) and the IDENTIFIER DESIGNATOR LENGTH field is set to 08h, the IDENTIFIER DESIGNATOR field has the format shown in table 302. The CODE SET field shall be set to 1h (i.e., binary).

Table 302 — EUI-64 IDENTIFIER DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
2				IEEE COMPANY_ID				(LSB)
3	(MSB)							
7				VENDOR SPECIFIC EXTENSION IDENTIFIER				(LSB)

The IEEE COMPANY_ID field contains a 24 bit OUI (see 3.1.74) assigned by the IEEE.

The VENDOR SPECIFIC EXTENSION IDENTIFIER field contains a 40 bit numeric value that is uniquely assigned by the organization associated with the IEEE company_id as required by the IEEE definition of EUI-64 (see 3.1.37).

7.6.3.5.3 EUI-64 based 12-byte ~~identifier~~ designator format

If the ~~identifier~~ designator type is 2h (i.e., EUI-64 based ~~identifier~~) and the IDENTIFIER DESIGNATOR LENGTH field is set to 0Ch, the IDENTIFIER DESIGNATOR field has the format shown in table 303. The CODE SET field shall be set to 1h (i.e., binary).

Table 303 — EUI-64 based 12-byte IDENTIFIER DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
2				IEEE COMPANY_ID				(LSB)
3	(MSB)							
7				VENDOR SPECIFIC EXTENSION IDENTIFIER				(LSB)
8	(MSB)							
11				DIRECTORY ID				(LSB)

The IEEE COMPANY_ID field and VENDOR SPECIFIC EXTENSION IDENTIFIER field are defined in 7.6.3.5.2.

The DIRECTORY ID field contains a directory identifier, as specified by ISO/IEC 13213:1994.

> NOTE 57 - The EUI-64 based 12 byte format may be used to report IEEE 1394 target port identifiers (see SBP-3).

7.6.3.5.4 EUI-64 based 16-byte ~~identifier~~ designator format

If the ~~identifier~~ designator type is 2h (i.e., EUI-64 based ~~identifier~~) and the ~~IDENTIFIER~~ DESIGNATOR LENGTH field is set to 10h, the ~~IDENTIFIER~~ DESIGNATOR field has the format shown in table 304. The CODE SET field shall be set to 1h (i.e., binary).

Table 304 — EUI-64 based 16-byte ~~IDENTIFIER~~ DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
7				IDENTIFIER EXTENSION				(LSB)
8	(MSB)							
10				IEEE COMPANY_ID				(LSB)
11	(MSB)							
15				VENDOR SPECIFIC EXTENSION IDENTIFIER				(LSB)

The IDENTIFIER EXTENSION field contains a 64 bit numeric value.

The IEEE COMPANY_ID field and VENDOR SPECIFIC EXTENSION IDENTIFIER field are defined in 7.6.3.5.2.

> NOTE 58 - The EUI-64 based 16-byte format may be used to report SCSI over RDMA target port identifiers (see SRP).

7.6.3.6 NAA ~~identifier~~ designator format

7.6.3.6.1 NAA ~~identifier~~ designator basic format

If the ~~identifier~~ designator type is 3h (i.e., NAA ~~identifier~~), the ~~IDENTIFIER~~ DESIGNATOR field has the format shown in table 305. This format is compatible with the Name_Identifier format defined in FC-FS.

Table 305 — NAA ~~IDENTIFIER~~ DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0			NAA					
1				NAA specific data				
n								

The Name Address Authority (NAA) field (see table 306) defines the format of the NAA specific data in the ~~identifier~~ designator.

Table 306 — Name Address Authority (NAA) field

Code	Description	Reference
2h	IEEE Extended	7.6.3.6.3

Table 306 — Name Address Authority (NAA) field

Code	Description	Reference
5h	IEEE Registered	7.6.3.6.3
6h	IEEE Registered Extended	7.6.3.6.4
0h - 1h	Reserved	
3h - 4h	Reserved	
7h - Fh	Reserved	

7.6.3.6.2 NAA IEEE Extended ~~identifier~~ designator format

If NAA is 2h (i.e., IEEE Extended), the eight byte fixed length ~~IDENTIFIER~~ DESIGNATOR field shall have the format shown in table 307. The CODE SET field shall be set to 1h (i.e., binary) and the ~~IDENTIFIER~~ DESIGNATOR LENGTH field shall be set to 08h.

Table 307 — NAA IEEE Extended ~~IDENTIFIER~~ DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0	NAA (2h)				(MSB)			
1	VENDOR SPECIFIC IDENTIFIER A							(LSB)
2	(MSB)		IEEE COMPANY_ID					
4								(LSB)
5	(MSB)		VENDOR SPECIFIC IDENTIFIER B					
7								(LSB)

The IEEE COMPANY_ID field contains a 24 bit canonical form OUI (see 3.1.74) assigned by the IEEE.

The VENDOR SPECIFIC IDENTIFIER A contains a 12 bit numeric value that is uniquely assigned by the organization associated with the IEEE company_id.

The VENDOR SPECIFIC IDENTIFIER B contains a 24 bit numeric value that is uniquely assigned by the organization associated with the IEEE company_id.

> NOTE 59 - The EUI-64 ~~identifier~~ format includes a 40 bit vendor specific identifier. The IEEE Extended ~~identifier~~ format includes 36 bits vendor specific identifier in two fields.

7.6.3.6.3 NAA IEEE Registered ~~identifier~~ designator format

If NAA is 5h (i.e., IEEE Registered), the eight byte fixed length ~~IDENTIFIER~~ DESIGNATOR field shall have the format shown in table 308. The CODE SET field shall be set to 1h (i.e., binary) and the ~~IDENTIFIER~~ DESIGNATOR LENGTH field shall be set to 08h.

Table 308 — NAA IEEE Registered ~~IDENTIFIER~~ DESIGNATOR field format

Bit / Byte	7	6	5	4	3	2	1	0
0	NAA (5h)				(MSB)			
1	IEEE COMPANY_ID							
2								
3				(LSB)	(MSB)			
4	VENDOR SPECIFIC IDENTIFIER							
7								(LSB)

The IEEE COMPANY_ID field contains a 24 bit canonical form OUI (see 3.1.74) assigned by the IEEE.

The VENDOR SPECIFIC IDENTIFIER a 36 bit numeric value that is uniquely assigned by the organization associated with the IEEE company_id.

> NOTE 60 - The EUI-64 ~~identifier~~ format includes a 40 bit vendor specific identifier. The IEEE Registered ~~identifier~~ format includes a 36 bit vendor specific identifier.

7.6.3.6.4 NAA IEEE Registered Extended ~~identifier~~ designator format

If NAA is 6h (i.e., IEEE Registered Extended), the sixteen byte fixed length ~~IDENTIFIER~~ DESIGNATOR field shall have the format shown in table 309. The CODE SET field shall be set to 1h (i.e., binary) and the ~~IDENTIFIER~~ DESIGNATOR LENGTH field shall be set to 10h.

Table 309 — NAA IEEE Registered Extended ~~IDENTIFIER~~ DESIGNATOR field format

Bit / Byte	7	6	5	4	3	2	1	0
0	NAA (6h)				(MSB)			
1	IEEE COMPANY_ID							
2								
3				(LSB)	(MSB)			
4	VENDOR SPECIFIC IDENTIFIER							
7								(LSB)
8	(MSB)	VENDOR SPECIFIC IDENTIFIER EXTENSION						
15								(LSB)

The IEEE COMPANY_ID field contains a 24 bit canonical form OUI (see 3.1.74) assigned by the IEEE.

The VENDOR SPECIFIC IDENTIFIER a 36 bit numeric value that is uniquely assigned by the organization associated with the IEEE company_id.

NOTE 61 - The EUI-64 ~~identifier~~ format includes a 40 bit vendor specific identifier. The IEEE Registered Extended ~~identifier~~ format includes a 36 bit vendor specific identifier.

The VENDOR SPECIFIC IDENTIFIER EXTENSION a 64 bit numeric value that is assigned to make the ~~IDENTIFIER~~ DESIGNATOR field unique.

7.6.3.7 Relative target port identifier designator format

If the ~~identifier~~ designator type is 4h (i.e., relative target port identifier) and the ASSOCIATION field contains 01b (i.e. target port), then the ~~IDENTIFIER~~ DESIGNATOR field shall have the format shown in table 310. The CODE SET field shall be set to 1h (i.e., binary) and the ~~IDENTIFIER~~ DESIGNATOR LENGTH field shall be set to 04h. If the ASSOCIATION field does not contain 01b, use of this ~~identifier~~ designator type is reserved.

Table 310 — Relative target port IDENTIFIER DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0				Obsolete				
1								
2	(MSB)							
3				RELATIVE TARGET PORT IDENTIFIER				(LSB)

The RELATIVE TARGET PORT IDENTIFIER field (see table 311) contains the relative port identifier (see 3.1.88) of the target port on which the INQUIRY command was received.

Table 311 — RELATIVE TARGET PORT IDENTIFIER field

Code	Description
0h	Reserved
1h	Relative port 1, historically known as port A
2h	Relative port 2, historically known as port B
3h - FFFFh	Relative port 3 through 65 535

7.6.3.8 Target port group identifier designator format

If the ~~identifier~~ designator type is 5h (i.e., target port group) and the ASSOCIATION value is 01b (i.e., target port), the four byte fixed length ~~IDENTIFIER~~ DESIGNATOR field shall have the format shown in table 312. The CODE SET field shall be set to 1h (i.e., binary) and the ~~IDENTIFIER~~ DESIGNATOR LENGTH field shall be set to 04h. If the ASSOCIATION field does not contain 01b, use of this ~~identifier~~ designator type is reserved.

Table 312 — Target port group ~~IDENTIFIER~~ DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0				Reserved				
1								
2	(MSB)							
3				TARGET PORT GROUP				(LSB)

The TARGET PORT GROUP field indicates the target port group to which the target port is a member (see 5.8).

7.6.3.9 Logical unit group ~~identifier~~ designator format

A logical unit group is a group of logical units that share the same target port group (see 5.8) definitions. The target port groups maintain the same target port group asymmetric access states for all logical units in the same logical unit group. A logical unit shall be in no more than one logical unit group.

If the ~~identifier~~ designator type is 6h (i.e., logical unit group) and the ASSOCIATION value is 00b (i.e., logical unit), the four byte fixed length ~~IDENTIFIER~~ DESIGNATOR field shall have the format shown in table 313. The CODE SET field shall be set to 1h (i.e., binary) and the ~~IDENTIFIER~~ DESIGNATOR LENGTH field shall be set to 04h. If the ASSOCIATION field does not contain 00b, use of this ~~identifier~~ designator type is reserved.

Table 313 — Logical unit group ~~IDENTIFIER~~ DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0				Reserved				
1								
2	(MSB)			LOGICAL UNIT GROUP				
3								(LSB)

The LOGICAL UNIT GROUP field indicates the logical unit group to which the logical unit is a member.

7.6.3.10 MD5 logical unit identifier designator format

If the ~~identifier~~ designator type is 7h (i.e., MD5 logical unit identifier) and the ASSOCIATION value is 00b (i.e., logical unit), the ~~IDENTIFIER~~ DESIGNATOR field has the format shown in table 314. The CODE SET field shall be set to 1h (i.e., binary). The MD5 logical unit identifier designator shall not be used if a logical unit provides unique identification using ~~identifier~~ designator types 2h (i.e., EUI-64 based ~~identifier~~), 3h (i.e., NAA ~~identifier~~), or 8h (i.e., SCSI name string). A bridge device may return a MD5 logical unit identifier designator type for that logical unit that does not support the Device Identification VPD page (see 7.6.3).

If the ASSOCIATION field does not contain 00b, use of this ~~identifier~~ designator type is reserved.

Table 314 — MD5 logical unit IDENTIFIER DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)			MD5 LOGICAL UNIT IDENTIFIER				
15								(LSB)

The MD5 LOGICAL UNIT IDENTIFIER field contains the message digest of the supplied message input. The message digest shall be generated using the MD5 message-digest algorithm as specified in RFC 1321 (see 2.4) with the following information as message input:

1) The contents of the T10 VENDOR IDENTIFICATION field in the standard INQUIRY data (see 6.4.2);
2) The contents of the PRODUCT IDENTIFICATION field in the standard INQUIRY data;
3) The contents of the PRODUCT SERIAL NUMBER field in the Unit Serial Number VPD page (see 7.6.10);
4) The contents of a vendor specific ~~IDENTIFIER~~ DESIGNATOR field (designator type 0h) from the Device Identification VPD page; and

5) The contents of a T10 vendor ID based ~~IDENTIFIER~~ DESIGNATOR field (designator type 1h) from the Device Identification VPD page.

If a field or page is not available, the message input for that field or page shall be 8 bytes of ASCII space characters (i.e., 20h).

The uniqueness of the MD5 logical unit identifier is dependent upon the relative degree of randomness (i.e., the entropy) of the message input. If it is found that two or more logical units have the same MD5 logical unit identifier, the application client should determine in a vendor specific manner whether the logical units are the same entities.

The MD5 logical unit identifier example described in this paragraph and shown in table 315 and table 316 is not a normative part of this standard. The data available for input to the MD5 algorithm for this example is shown in table 315.

Table 315 — MD5 logical unit identifier example available data

MD5 message input	Available	Contents
T10 VENDOR IDENTIFICATION field	Yes	T10
PRODUCT IDENTIFICATION field	Yes	MD5 Logical Unit
PRODUCT SERIAL NUMBER field	Yes	01234567
vendor specific ~~IDENTIFIER~~ DESIGNATOR field	No	
T10 vendor ID based ~~IDENTIFIER~~ DESIGNATOR field	No	

The concatenation of the fields in table 315 to form input to the MD5 algorithm is shown in table 316.

Table 316 — Example MD5 input for computation of a logical unit identifier

Bytes	Hexadecimal values				ASCII values
00 – 15	54 31 30 20	20 20 20 20	4D 44 35 20	4C 6F 67 69	T10 MD5 Logi
16 – 31	63 61 6C 20	55 6E 69 74	30 31 32 33	34 35 36 37	cal Unit01234567
32 – 47	20 20 20 20	20 20 20 20	20 20 20 20	20 20 20 20	
NOTE 1 Non-printing ASCII characters are shown as '.'.					

Based on the example inputs shown in table 315 and the concatenation of the inputs shown in table 316, the MD5 base 16 algorithm described in RFC 1321 produces the value 8FAC A22A 0AC0 3839 1255 25F2 0EFE 2E7Eh.

7.6.3.11 SCSI name string ~~identifier~~ designator format

If the ~~identifier~~ designator type is 8h (i.e., SCSI name string), the ~~IDENTIFIER~~ DESIGNATOR field has the format shown in table 317. The CODE SET field shall be set to 3h (i.e., UTF-8).

Table 317 — SCSI name string ~~IDENTIFIER~~ DESIGNATOR field format

Bit Byte	7	6	5	4	3	2	1	0
0				SCSI NAME STRING				
n								

The null-terminated, null-padded (see 4.4.2) SCSI NAME STRING field contains a UTF-8 format string. The number of bytes in the SCSI NAME STRING field (i.e., the value in the ~~IDENTIFIER~~ DESIGNATOR LENGTH field) shall be no larger than 256 and shall be a multiple of four.

The SCSI NAME STRING field starts with either:

a) The four UTF-8 characters "eui." concatenated with 16, 24, or 32 hexadecimal digits (i.e., the UTF-8 characters 0 through 9 and A through F) for an EUI-64 based identifier (see 7.6.3.5). The first hexadecimal digit shall be the most significant four bits of the first byte (i.e., most significant byte) of the EUI-64 based identifier;

b) The four UTF-8 characters "naa." concatenated with 16 or 32 hexadecimal digits for an NAA identifier (see 7.6.3.6). The first hexadecimal digit shall be the most significant four bits of the first byte (i.e., most significant byte) of the NAA identifier; or

c) The four UTF-8 characters "iqn." concatenated with an iSCSI Name for an iSCSI-name based identifier (see iSCSI).

If the ASSOCIATION field is set to 00b (i.e., logical unit) and the SCSI NAME STRING field starts with the four UTF-8 characters "iqn.", the SCSI NAME STRING field ends with the five UTF-8 characters ",L,0x" concatenated with 16 hexadecimal digits for the logical unit name extension. The logical unit name extension is a UTF-8 string containing no more than 16 hexadecimal digits. The logical unit name extension is assigned by the SCSI target device vendor and shall be assigned so the logical unit name is worldwide unique.

If the ASSOCIATION field is set to 01b (i.e., target port), the SCSI NAME STRING field ends with the five UTF-8 characters ",t,0x" concatenated with two or more hexadecimal digits as specified in the applicable SCSI transport protocol standard (see 3.1.102).

If the ASSOCIATION field is set to 10b (i.e., SCSI target device), the SCSI NAME STRING field has no additional characters.

> NOTE 62 - The notation used in this subclause to specify exact UTF-8 character strings is described in 3.6.1.

7.6.7 SCSI Ports VPD page

The SCSI Ports VPD page (see table 325) provides a means to retrieve ~~identification~~ designation descriptors for all the SCSI ports in a SCSI target device or SCSI target/initiator device.

Table 325 — SCSI Ports VPD page

Bit Byte	7	6	5	4	3	2	1	0
0	PERIPHERAL QUALIFIER			PERIPHERAL DEVICE TYPE			
1	PAGE CODE (88h)						
2	(MSB)	PAGE LENGTH (n-3)					
3								(LSB)
	~~Identification~~ Designation descriptor list							
4	First SCSI port ~~identification~~ designation descriptor (see table 326)							
	⋮							
n	Last SCSI port ~~identification~~ designation descriptor (see table 326)							

The SCSI Ports VPD page only reports information on SCSI ports known to the device server processing the INQUIRY command. The REPORT LUNS well-known logical unit (see 8.2) may be used to return information on all SCSI ports in the SCSI device (i.e., all target ports and all initiator ports).

If the device server detects that a SCSI port is added or removed from the SCSI device and the SCSI port ~~identification~~ designation descriptor list changes, it shall establish a unit attention condition (see SAM-3), with the additional sense code set to INQUIRY DATA HAS CHANGED.

The PERIPHERAL QUALIFIER field and the PERIPHERAL DEVICE TYPE field are as defined in 6.4.2.

The PAGE LENGTH field specifies the length of the SCSI port ~~identification~~ designation descriptor list. The relationship between the PAGE LENGTH field and the CDB ALLOCATION LENGTH field is defined in 4.3.4.6.

Each SCSI Port ~~identification~~ designation descriptor (see table 326) identifies a SCSI port. The SCSI Port ~~identification~~ designation descriptors may be returned in any order.

Table 326 — SCSI port ~~identification~~ designation descriptor

Bit Byte	7	6	5	4	3	2	1	0
0				Reserved				
1								
2	(MSB)			RELATIVE PORT IDENTIFIER				
3								(LSB)
4				Reserved				
5								
6	(MSB)			INITIATOR PORT TRANSPORTID LENGTH (k - 7)				
7								(LSB)
8				INITIATOR PORT TRANSPORTID, if any				
k								
k+1				Reserved				
k+2								
k+3	(MSB)			TARGET PORT DESCRIPTORS LENGTH (n - (k+4))				
k+4								(LSB)
				Target port descriptor list				
k+5				First target port descriptor (see table 328)				
				⋮				
n				Last target port descriptor (see table 328)				

The RELATIVE PORT IDENTIFIER field (see table 327) contains the relative port identifier (see 3.1.88) of the SCSI port to which the SCSI port ~~identification~~ designation descriptor applies.

Table 327 — RELATIVE PORT IDENTIFIER field

Code	Description
0h	Reserved
1h	Relative port 1, historically known as port A
2h	Relative port 2, historically known as port B
3h - FFFFh	Relative port 3 through 65 535

The INITIATOR PORT TRANSPORTID LENGTH field contains the length of the INITIATOR PORT TRANSPORTID field. An INITIATOR PORT TRANSPORTID LENGTH field set to zero indicates no INITIATOR PORT TRANSPORTID field is present (i.e., the SCSI port is not an initiator port and not a target/initiator port).

If the INITIATOR PORT TRANSPORTID LENGTH field contains a non-zero value, the INITIATOR PORT TRANSPORTID field contains a TransportID identifying the initiator port as specified in 7.5.4.

The TARGET PORT DESCRIPTORS LENGTH field contains the length of the target port descriptors, if any. A TARGET PORT DESCRIPTORS LENGTH field set to zero indicates no target port descriptors are present (i.e., the SCSI port is not a target port and not a target/initiator port).

Each target port descriptor (see table 328) contains an identifier for the target port. The target port descriptors may be returned in any order.

Table 328 — Target port descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	PROTOCOL IDENTIFIER				CODE SET			
1	PIV (1b)	Reserved	ASSOCIATION (01b)		IDENTIFIER DESIGNATOR TYPE			
2	Reserved							
3	IDENTIFIER DESIGNATOR LENGTH (n-3)							
4	IDENTIFIER DESIGNATOR							
n								

The PROTOCOL IDENTIFIER field indicates the SCSI transport protocol to which the ~~identification~~ designation descriptor applies as described in 7.6.3.1.

The CODE SET field, PIV field, ASSOCIATION field, IDENTIFIER DESIGNATOR TYPE field, IDENTIFIER DESIGNATOR LENGTH field, and IDENTIFIER DESIGNATOR field are as defined in the Device Identification VPD page ~~identification~~ designation descriptor (see 7.6.3.1), with the following additional requirements:

a) The PIV bit shall be set to one (i.e., the PROTOCOL IDENTIFIER field always contains a SCSI transport protocol identifier); and
b) The ASSOCIATION field shall be set to 01b (i.e., the descriptor always identifies a target port).

8.3.2.3.2 REPORT LU DESCRIPTORS parameter data format

… <<much uninteresting text skipped>> …

Each Logical Unit descriptor (see table 355) contains information about one logical unit managed by the access controls coordinator. There shall be one Logical Unit descriptor for every logical unit managed by the access controls coordinator.

Table 355 — Logical Unit descriptor format

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved			PERIPHERAL DEVICE TYPE				
1	Reserved							
2	(MSB)			DESCRIPTOR LENGTH (n-3)				
3								(LSB)
4				DEFAULT LUN				
11								
12	Reserved							
13	EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR LENGTH							
14	Reserved							
15	DEVICE IDENTIFIER LENGTH							
16	EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR							
47								
48	(MSB)			DEVICE IDENTIFIER				
79								(LSB)
80	DEVICE TYPE SPECIFIC DATA							
n								

The PERIPHERAL DEVICE TYPE field is as defined in 6.4.2.

The DESCRIPTOR LENGTH field indicates the total number of bytes remaining in the descriptor. If the PERIPHERAL DEVICE TYPE field contains 0h, 4h, or 7h, the DESCRIPTOR LENGTH field shall contain 92 if the descriptor includes the DEVICE TYPE SPECIFIC DATA field and 80 if it does not. If the PERIPHERAL DEVICE TYPE field contains any value other than 0h, 4h, or 7h, the DESCRIPTOR LENGTH field shall contain 76. The relationship between the DESCRIPTOR LENGTH field and the CDB ALLOCATION LENGTH field is defined in 4.3.4.6.

The DEFAULT LUN field contains the default LUN value (see 8.3.1.4.3) for the logical unit described by this logical unit descriptor. The value in the DEFAULT LUN field shall be consistent with the DLGENERATION value returned in the parameter list header (see 8.3.2.3.2). The value in the DEFAULT LUN field shall not identify a well known logical unit.

The EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR LENGTH field indicates the number of non pad bytes in the EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR field.

The DEVICE IDENTIFIER LENGTH field indicated the number of non pad bytes in the DEVICE IDENTIFIER field.

The EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR field shall be derived from one of the Device Identification VPD page (see 7.6.3) ~~identification~~ designation descriptors having 00b in the ASSOCIATION field as follows:

a) If the ~~identification~~ designation descriptor has a length less than 32 bytes, then the EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR field shall be set to the zero-padded (see 4.4.2) ~~identification~~ designation descriptor value. The EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR LENGTH field shall be set to the length of the ~~identification~~ designation descriptor not including pad bytes; or

b) If the ~~identification~~ designation descriptor has a length greater than or equal to 32 bytes, then the EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR field shall be set to the first 32 bytes of the ~~identification~~ designation descriptor. The EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR LENGTH field shall be set to 32.

If there are several ~~identification~~ designation descriptors having 00b in the ASSOCIATION field, the choice of which descriptor to copy to the EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR field is vendor specific, however, all ACCESS CONTROL IN commands with REPORT LU DESCRIPTORS service action shall return the same EVPD ~~IDENTIFICATION~~ DESIGNATION DESCRIPTOR field contents for a specific logical unit.

If a device identifier has been set for the logical unit using the SET DEVICE IDENTIFIER command (see 6.29), the DEVICE IDENTIFIER field shall contain that device identifier subject to the following considerations:

a) If the device identifier has length less than 32 bytes, then the DEVICE IDENTIFIER field shall be set to the zero-padded (see 4.4.2) device identifier value. The DEVICE IDENTIFIER LENGTH field shall be set to the length of the device identifier not including pad bytes; or

b) If the device identifier has length greater than or equal to 32 bytes, then the DEVICE IDENTIFIER field shall be set to the first 32 bytes of the identifier. The DEVICE IDENTIFIER LENGTH field shall be set to 32.

If no device identifier has been established by a SET DEVICE IDENTIFIER command, then the DEVICE IDENTIFIER LENGTH field shall be set to zero and the DEVICE IDENTIFIER field shall be set to zero.

If the PERIPHERAL DEVICE TYPE field contains any value other than 0h, 4h, or 7h, the DEVICE TYPE SPECIFIC DATA field shall not be present in the Logical Unit descriptor.

The Logical Unit descriptor shall include the DEVICE TYPE SPECIFIC DATA field if:

a) The PERIPHERAL DEVICE TYPE field contains 0h, 4h, or 7h;
b) The logical unit supports the READ CAPACITY command (see SBC-2) with:
   A) The RELADR bit set to zero; and
   B) The PMI bit set to zero;
   and
c) The logical unit standard INQUIRY data (see 6.4.2) has the RMB bit set to zero.

If the Logical Unit descriptor includes the DEVICE TYPE SPECIFIC DATA field, then the size of the DEVICE TYPE SPECIFIC DATA field shall be 12 bytes and the field shall contain data equivalent to that returned by a successful READ CAPACITY command with LONGLBA bit set to one, and the RELADR and PMI bits set to zero.