To: T10 Technical Committee
From: Rob Elliott, HP (elliott@hp.com)
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Subject: 07-153r1 SAS-2 SPC-4 Protocol-Specific SCSI Ports VPD page

Revision history
Revision 0 (8 June 2007) First revision, spun off from 07-027r1
Revision 1 (17 July 2007) Incorporated comments from July 2007 SAS protocol WG and CAP WG

Related documents
sas2r10 - Serial Attached SCSI - 2 (SAS-2) revision 10
spc4r11 - SCSI Primary Commands - 4 (SPC-4) revision 11
07-027 - SAS-2 Enabling and disabling Transport Layer Retries (Rob Elliott, HP)

Overview
Logical units supporting SAS-2 need to report a protocol-specific, logical unit-specific TLR CONTROL SUPPORTED bit to indicate they support the new method for enabling transport layer retries.

To support SCSI devices that contain ports with more than one protocol (and might contain initiator ports as well as target ports), a new pair of VPD pages is proposed that are structured similar to the SCSI Ports VPD page (which returns initiator port TransportIDs and target port designators) and indexed by relative target port identifier.

Two VPD pages are proposed for SPC-4:

a) Protocol-Specific Port VPD page: for SCSI target port values shared by all logical units (SCSI initiator port values also fall into this category, which are not tied to a logical unit)(like mode page 19h); and
b) Protocol-Specific Logical Unit VPD page: for SCSI target port values that are logical unit-specific (like mode page 18h). A SCSI target device might contain both SSC logical units that support TLR and SBC logical units that do not; this lets each logical unit return its own value.

In SAS-2, the Protocol-Specific Logical Unit VPD page is defined, containing a TLR CONTROL SUPPORTED bit to indicate that the logical unit supports the new method for enabling transport layer retries.

Suggested changes to SPC-4

7.6.1 Vital product data parameters overview and page codes

This subclause describes the vital product data (VPD) page structure and the VPD pages (see table 343) that are applicable to all SCSI devices. These VPD pages are returned by an INQUIRY command with the EVPD bit set to one (see 6.4) and contain vendor specific product information about a logical unit and SCSI target device. The vital product data may include vendor identification, product identification, unit serial numbers, device operating definitions, manufacturing data, field replaceable unit information, and other vendor specific information. This standard defines the structure of the vital product data, but not the contents.

Table 343 — Vital product data page codes

Page code	VPD Page Name	Reference	Support Requirements
...	...	...	...
~~8Ah - AFh~~	~~Reserved~~		
8Ah - 8Fh	Reserved		
90h	Protocol-Specific Logical Unit Information	7.6.xx	Protocol-specific
91h	Protocol-Specific Port Information	7.6.xy	Protocol-specific
92h - AFh	Reserved		

7.6.xx Protocol-Specific Logical Unit Information VPD page [all new]

The Protocol-Specific Logical Unit Information VPD page contains protocol specific parameters that affect a SCSI port and may be different for each logical unit in the SCSI target device.

Table 344 defines the Protocol-Specific Logical Unit Information VPD page.

Table 344 — Protocol-Specific Logical Unit Information VPD page

Byte\Bit	7	6	5	4	3	2	1	0
0	PERIPHERAL QUALIFIER			PERIPHERAL DEVICE TYPE				
1	PAGE CODE (90h)							
2	(MSB)			PAGE LENGTH (n - 3)				
3								(LSB)
Logical Unit Information descriptor list								
4				Logical Unit Information descriptor (first)(see table 345)				
	...							
				Logical Unit Information descriptor (last)(see table 345)				
n								

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

The PAGE CODE field shall be set to 90h.

The PAGE LENGTH field indicates the length in bytes of the Logical Unit Information descriptor list. The relationship between the PAGE LENGTH field and the CDB ALLOCATION LENGTH field is defined in 4.3.4.6.

The Logical Unit Information descriptor list contains a list of descriptors for SCSI ports known to the device server processing the INQUIRY command. The Logical Unit Information descriptors may be returned in any order.

Table 345 defines the Logical Unit Information descriptor.

Table 345 — Logical Unit Information descriptor

Byte\Bit	7	6	5	4	3	2	1	0
0	(MSB)			RELATIVE PORT IDENTIFIER				
1								(LSB)
2	Reserved				PROTOCOL IDENTIFIER			
3	Reserved							
5								
6	(MSB)			DESCRIPTOR LENGTH (n - 3)				
7								(LSB)
8	Per logical unit SCSI transport protocol specific data							
n								

The RELATIVE PORT IDENTIFIER field contains the relative port identifier (see 3.1.96) of the SCSI port to which the SCSI Port Information descriptor applies and is defined in the SCSI Ports VPD page (see table 371 in 7.6.7).

The PROTOCOL IDENTIFIER field contains one of the values shown in table 313 (see 7.5.1) identifying the SCSI transport protocol standard that defines the SCSI transport protocol specific data in this descriptor.

The DESCRIPTOR LENGTH field indicates the length in bytes of the per logical unit SCSI transport protocol specific data.

The per logical unit SCSI transport protocol specific data is defined by the SCSI transport protocol standard corresponding to the SCSI target port.

[end of all-new section]

7.6.xy Protocol-Specific Port Information VPD page [all new]

The Protocol-Specific Port Information VPD page contains protocol specific parameters that affect a SCSI port and are the same for all logical units in the SCSI target device.

Table 346 defines the Protocol-Specific Port Information VPD page.

Table 346 — Protocol-Specific Port Information VPD page

Byte\Bit	7	6	5	4	3	2	1	0
0	PERIPHERAL QUALIFIER			PERIPHERAL DEVICE TYPE				
1	PAGE CODE (91h)							
2	(MSB)			PAGE LENGTH (n - 3)				
3								(LSB)
Port Information descriptor list								
5	Port Information descriptor (first)(see table 347)							
	...							
	Port Information descriptor (last)(see table 347)							
n								

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

The PAGE CODE field shall be set to 91h.

The PAGE LENGTH field indicates the length in bytes of the Port Information descriptor list. The relationship between the PAGE LENGTH field and the CDB ALLOCATION LENGTH field is defined in 4.3.4.6.

The Port Information descriptor list contains a list of descriptors for SCSI ports known to the device server processing the INQUIRY command. The Port Information descriptors may be returned in any order.

Table 347 defines the Port Information descriptor.

Table 347 — Port Information descriptor

Byte\Bit	7	6	5	4	3	2	1	0
0	(MSB)			RELATIVE PORT IDENTIFIER				
1								(LSB)
2	Reserved				PROTOCOL IDENTIFIER			
3				Reserved				
5								
6	(MSB)			DESCRIPTOR LENGTH (n - 3)				
7								(LSB)
8				Shared SCSI transport protocol specific data				
n								

The PROTOCOL IDENTIFIER field contains one of the values shown in table 313 (see 7.5.1) identifying the SCSI transport protocol standard that defines the SCSI transport protocol specific data in this descriptor.

The RELATIVE PORT IDENTIFIER field contains the relative port identifier (see 3.1.96) of the SCSI port to which the SCSI Port Information descriptor applies and is defined in the SCSI Ports VPD page (see table 371 in 7.6.7).

The DESCRIPTOR LENGTH field indicates the length in bytes of the shared SCSI transport protocol specific data.

The shared SCSI transport protocol specific data is defined by the SCSI transport protocol standard corresponding to the SCSI target port.

[end of all-new section]

C Numeric order codes

C.7 VPD page codes

In Table C.12, add:

90h DT LPWROMAEBKVF Protocol-Specific Logical Unit Information

91h DT LPWROMAEBKVF Protocol-Specific Port Information

Suggested changes to SAS-2

10.2.11 SCSI vital product data (VPD)

7.6.1 Vital product data overview

Table 348 lists VPD pages for which this standard defines special requirements.

Table 348 — VPD pages with special requirements for SAS SSP

Page code	VPD Page Name	Reference	Support Requirements
83h	Device Identification VPD page	10.2.11.1 and SPC-4	Mandatory
90h	Protocol-Specific Logical Unit Information	10.2.11.2 and SPC-4	See [a]

[a] Mandatory if the target port and logical unit support the TLR_CONTROL field set to a non-zero value in the SSP frame header, otherwise optional

10.2.11.1 Device Identification VPD page

In the Device Identification VPD page (83h) returned by the INQUIRY command (see SPC-4), each logical unit in a SAS target device shall include the identification descriptors for the target port identifier (see 4.2.6) and the relative target port identifier (see SAM-4 and SPC-4) listed in table 349.

Table 349 — Device Identification VPD page identification descriptors for the SAS target port

Field in identification descriptor	Identification descriptor	
	Target port identifier	**Relative target port identifier**
IDENTIFIER TYPE	3h (i.e., NAA)	4h (i.e., relative target port identifier)
ASSOCIATION	01b (i.e., SCSI target port)	01b (i.e., SCSI target port)
CODE SET	1h (i.e., binary)	1h (i.e., binary)
IDENTIFIER LENGTH	8	4
PIV (protocol identifier valid)	1	1
PROTOCOL IDENTIFIER	6h (i.e., SAS)	6h (i.e., SAS)
IDENTIFIER	SAS address [a] in NAA IEEE Registered format (see 4.2.2)	Relative port identifier [b] as described in SAM-4 and SPC-4

[a] The IDENTIFIER field contains the SAS address of the SSP target port through which the INQUIRY command was received.
[b] The IDENTIFIER field contains the relative port identifier of the SSP target port through which the INQUIRY command was received.

In the Device Identification VPD page (83h) returned by the INQUIRY command (see SPC-4), each logical unit in a SAS target device shall include an identification descriptor for the SAS target device name (see 4.2.4) using NAA format and may include an identification descriptor for the SAS target device name using the SCSI name string format as listed in table 350.

Table 350 — Device Identification VPD page identification descriptors for the SAS target device

Field in identification descriptor	Identification descriptor for SAS target device	
	NAA format (required)	**SCSI name string format (optional)**
IDENTIFIER TYPE	3h (i.e., NAA)	8h (i.e., SCSI name string)
ASSOCIATION	10b (i.e., SCSI target device)	10b (i.e., SCSI target device)
CODE SET	1h (i.e., binary)	3h (i.e., UTF-8)
IDENTIFIER LENGTH	8	24
PIV (protocol identifier valid)	1	0
PROTOCOL IDENTIFIER	6h (i.e., SAS)	0h
IDENTIFIER	Device name of the SAS target device in NAA IEEE Registered format (see 4.2.2)	Device name of the SAS target device in SCSI name string format (e.g., “naa.” followed by 16 hexadecimal digits followed by 4 ASCII null characters)

Logical units may include identification descriptors in addition to those required by this standard (e.g., SCSI target devices with SCSI target ports using other SCSI transport protocols may return additional target device names for those other SCSI transport protocols).

10.2.11.2 Protocol-Specific SCSI Port Logical Unit Information VPD page [all new]

The Protocol-Specific SCSI Port Logical Unit Information VPD page (see SPC-4) contains parameters for the logical unit that are protocol-specific based on the I_T nexus being used to access the logical unit.

Table 351 defines the Protocol-Specific SCSI Port Logical Unit Information VPD page for SAS target ports.

Table 351 — SCSI Port Logical Unit Information descriptor for SAS SSP

Byte\Bit	7	6	5	4	3	2	1	0
0	(MSB)							
1				RELATIVE PORT IDENTIFIER				(LSB)
2				Reserved			PROTOCOL IDENTIFIER (6h)	
3								
5				Reserved				
6	(MSB)							
7				DESCRIPTOR LENGTH (04h)				(LSB)
Per logical unit SCSI transport specific data								
8				Reserved				TLR CONTROL SUPPORTED
9								
11				Reserved				

The RELATIVE PORT IDENTIFIER field is defined in SPC-4.

The PROTOCOL IDENTIFIER field is defined in SPC-4 and shall be set to 6h.

The DESCRIPTOR LENGTH field is defined in SPC-4 and shall be set to 04h.

A TLR CONTROL SUPPORTED bit set to one indicates that the combination of the SCSI target port and logical unit support the TLR CONTROL field in the SSP frame header (see 9.1). A TLR CONTROL SUPPORTED bit set to zero indicates that the combination of the SCSI target port and logical unit do not support the TLR CONTROL field in the SSP frame header.

[end of all-new section]