To: T10 Technical Committee
From: Rob Elliott, HP (elliott@hp.com)
Date: 6 November 2002
Subject: T10/02-394r2 SAS SPC-3 Protocol Specific log page

Revision History

Revision 0 (30 September 2002) first revision
Revision 1 (15 October 2002) incorporated 10/15 SAS Protocol teleconference comments. Recommended by the SAS Protocol WG for SAS.
Revision 2 (28 October 2002) added a well-known logical unit to return this log page, since it may reach multiple target ports (normal logical units might not be able to do so).
Revision 3 (6 November 2002) incorporated comments from CAP WG. Recommended by the CAP WG for SPC-3.

Related Documents

spc3r09 - SCSI Primary Commands 3 revision 9
sas-r02b - Serial Attached SCSI revision 2b

Overview

SPC-3 defines two protocol-specific mode pages, but no protocol-specific log pages. The protocol-specific mode pages are:

- Protocol Specific Port (19h) - controls the target port being accessed. Changes should not but may affect other target ports of the same protocol. The protocol identifier must match the protocol of the target port through which MODE SENSE is delivered.
- Protocol Specific LUN (18h) - controls the target port/logical unit combination being accessed. Changes should not but may also affect target ports using the same protocol. The protocol identifier must match the protocol of the target port through which MODE SENSE is delivered.

Mode pages offer sub_page formats to avoid consuming mode page codes, while log pages do not have sub_page formats yet. Since log page codes are not yet running out, it may be best to just plan on using a range of log page codes for protocol-specific usage and avoid the complication. At the moment, however, only one page code is needed for SAS.

The log page needs to be able to report parameters for different ports. The first proposed log page for SAS returns phy error logs. The port containing the phy of interest may not be operational, so the data must be retrieved through another target port.

The log page should be able to report about ports of different protocols. Devices might support ports of different protocols at the same time. Mode page 18h and 19h cannot reference other protocol's data at all. With protocol-specific parameters, this is possible.

The log parameter code is the relative target port identifier (which can be reported in the Device Identification VPD page of INQUIRY), so applications can relate the log page parameter data to a specific target port. The protocol-specific data may include other clues, like the port name or port identifier. The relative target port identifier in VPD is 4 bytes long, while the parameter code in log pages is 2 bytes long, so this stops working after 16K ports (which should be reasonable).

In a dual-ported SAS disk drive not capable of acting as a wide port, the log page would contain these parameters:

- Parameter 0001h (relative port 1), Protocol identifier 6h, 1 phy descriptor (for phy 0)
- Parameter 0002h (relative port 2), Protocol identifier 6h, 1 phy descriptor (for phy 1)

In a dual-ported SAS disk drive that is acting as a wide port, the log page would contain these parameters:

- Parameter 0001h (relative port 1), Protocol identifier 6h, 2 phy descriptors (for phy 0 and phy 1)

If a device had a 3-wide SAS port and a FC port, it would have:

- Parameter 0001h (relative port 1), Protocol identifier 6h, 3 phy descriptors (for phy 0, phy 1, and phy 2)
- Parameter 0002h (relative port 2), Protocol identifier 0h, FC details (none defined today)

The log page may be implemented in any logical unit. For devices where logical units do not have knowledge of all the target ports, a well-known logical unit is proposed (which is assumed to have knowledge of all the target ports) supporting the LOG SELECT/LOG SENSE commands mainly for access to this log page.

Suggested Changes to SPC-3

8.4.13 Protocol Specific log page [new section]

The Protocol Specific Port log page provides protocol specific parameters that are associated with all the SCSI targets ports in the SCSI target device. This log page may be implemented in any logical unit, including the TARGET LOG PAGES well-known logical unit (see 9.x). See the SCSI protocol standard (see 3.1.69) for definition of the protocol specific log parameters.

Table xx defines the log page format.

Table xx - Protocol Specific log page

	7	6	5	4	3	2	1	0
0	PAGE CODE (18h)							
1	Reserved							
2	(MSB)	PAGE LENGTH (n-3)						
3								(LSB)
Log parameters								
4	First protocol specific log parameter							
	...							
n	Last protocol specific log parameter							

Table xx defines the log parameter format.

Table xx - Protocol specific log parameter format

	7	6	5	4	3	2	1	0
0	(MSB)	PARAMETER CODE						
1								(LSB)
2	DU	DS	TSD	ETC	TMC		LBIN	LP
3		PARAMETER LENGTH (x-3)						
4	Reserved				PROTOCOL IDENTIFIER			
5		Protocol specific						
x								

The PARAMETER CODE field contains the relative target port identifier (see 8.6.4.6) of the target port for which the parameter data applies. Protocol specific log parameters for relative target ports numbered greater than 65 535 are not supported.

The PARAMETER LENGTH field defines the length of the log parameter.

The PROTOCOL IDENTIFIER field defines the SCSI transport protocol that defines this log parameter (see 8.5.1). The protocol specific data is defined by the corresponding SCSI transport protocol standard.

9 Well known logical units [modify]

9.1 Model for well known logical units

Well known logical units are addressed using the well known logical unit addressing method of extended logical unit addressing (see SAM-2). Each well known logical unit has a well known logical unit number (W-LUN) as shown in table 290.

W-LUN	Description	Reference
00h	Reserved	
01h	REPORT LUNS well known logical unit	9.2
02h	ACCESS CONTROLS well known logical unit	9.3
03h	TARGET LOG PAGES well known logical unit	9.x
~~03h~~04h-FFh	Reserved	

If a SCSI target device receives a W-LUN and that W-LUN is not exist, a task manager shall follow the SCSI rules for selection of invalid logical units (see SAM-2).

If a well known logical unit is supported within a SCSI target device then that logical unit shall support all the commands defined for it.

Access to well known logical units shall not be affected by access controls.

9.x TARGET LOG PAGES well known logical unit [new section]
The TARGET LOG PAGES well known logical unit shall only process the commands listed in table 291. If a command is received by the TARGET LOG PAGES well know logical unit that is not listed in table 291 the device server shall return CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID COMMAND OPERATION CODE.

Command name	Operation code	Type	Reference
INQUIRY	12h	M	7.4
LOG SELECT	4Ch	M	7.5
LOG SENSE	4Dh	M	7.6
REQUEST SENSE	03h	M	7.24
TEST UNIT READY	00h	M	7.26

The TARGET LOG PAGES well known logical unit shall support the Protocol-Specific log page (see 8.4.13) and may support other log pages with parameters that apply to the target device.

Annex B Numeric order codes [modify]
B.4 Log page codes
Add 18h Protocol Specific to all device types except B (RBC). [RBC doesn't implement the LOG SELECT and LOG SENSE commands]

Suggested Changes to SAS
[Modify the log page to follow this format.]

10.1.2 SCSI log parameters
10.1.2.1 Protocol Specific log page for SAS [new section]
The Protocol Specific log page for SAS defined in table 118 is used to report errors that have occurred on the target device's phy(s).

Table xx defines the log page format.

Table xx - Protocol Specific log page for SAS

	7	6	5	4	3	2	1	0
0	PAGE CODE (18h)							
1	Reserved							
2	(MSB)	PAGE LENGTH (n-3)						
3								(LSB)
Log parameters								
4	First protocol specific log parameter							
...	...							
n	Last protocol specific log parameter							

Table xx defines the log parameter format.

Table xx - Protocol specific log parameter format for SAS

	7	6	5	4	3	2	1	0
0	(MSB)							
1				PARAMETER CODE (relative target port identifier)				(LSB)
2	DU	DS	TSD	ETC	TMC		LBIN	LP
3	PARAMETER LENGTH (y-3)							
4	Reserved				PROTOCOL IDENTIFIER (6h)			
5								
6				Reserved				
7	NUMBER OF PHYS							
SAS phy log descriptors								
8	First SAS phy log descriptor							
...	...							
y	Last SAS phy log descriptor							

The PARAMETER CODE field contains the relative target port identifier (see SPC-3) of the target port that this log parameter describes.

The NUMBER OF PHYS field contains the number of SAS phy log descriptors that follow.

Table xx defines the SAS phy log descriptor. Each SAS phy log descriptor is the same length.

Table xx - SAS phy log descriptor

	7	6	5	4	3	2	1	0
0								
2				Reserved				
3	PHY IDENTIFIER							
4	(MSB)							
11				SAS ADDRESS				(LSB)
12	(MSB)							
19				ATTACHED SAS ADDRESS				(LSB)
20	(MSB)							
23				INVALID DWORD COUNT				(LSB)
24	(MSB)							
27				DISPARITY ERROR COUNT				(LSB)
28	(MSB)							
31				LOSS OF DWORD SYNCHRONIZATION COUNT				(LSB)
32	(MSB)							
35				PHY RESET PROBLEM COUNT				(LSB)

The PHY IDENTIFIER field contains the phy identifier (see 4.2.6).

The SAS ADDRESS field contains the SAS address (see 4.2.2) of the phy.

The ATTACHED SAS ADDRESS field contains the SAS address (see 4.2.2) of the currently attached device. If no device is currently attached, the field is set to 00000000_00000000h.

The INVALID DWORD COUNT field, DISPARITY ERROR COUNT field, LOSS OF DWORD SYNCHRONIZATION COUNT field, and PHY RESET PROBLEM COUNT field are defined in 10.3.x.