To: T10 Technical Committee
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Subject: 08-005r0 SAS-2 Mode page tweaks

Revision history
Revision 0 (29 November 2007) First revision

Related documents
sas2r13 - Serial Attached SCSI - 2 (SAS-2) revision 13
spc4r11 - SCSI Primary Commands - 4 (SPC-4) revision 11

Overview
1. Since SAS 1.0, the Disconnect-Reconnect mode page description has mentioned that for any field not implemented (i.e., always returning zero per SPC-4), the value assumed for the functionality is also assumed to be zero. Examples:

a) if the logical unit doesn't honor the MAXIMUM CONNECT TIME LIMIT field, the value 0000h (vendor-specific) is assumed
b) if the logical unit doesn't honor the FIRST BURST SIZE field, the value of 0000h (no first burst) is assumed

According to SPC-4, this principle applies to all unimplemented fields in all implemented mode pages, so stating it in the Disconnect-Reconnect mode page subclause is unnecessary. The rule can be moved into the general mode page overview section (or not stated at all).

If a mode page itself is not implemented, the same principle should apply to all the fields defined for that mode page. This only applies to changeable fields that affect SAS-2 functionality.

Table 1 shows all the mode page fields of interest.

Table 1 — Possibly changeable fields in mode pages defined by SAS-2

Mode page	Field	Zero meaning
Disconnect-Reconnect	BUS INACTIVITY TIME LIMIT	no bus inactivity time limit
	MAXIMUM CONNECT TIME LIMIT	no maximum connect time limit
	MAXIMUM BURST SIZE	no maximum burst size
	FIRST BURST SIZE	no first burst
Protocol-Specific Logical Unit	TRANSPORT LAYER RETRIES	no TLR for COMMAND frames with TLR CONTROL field set to 00b or 11b
Protocol-Specific Port	CONTINUE AWT	follow SAS-1.1 AWT rules
	BROADCAST ASYNCHRONOUS EVENT	disable origination of Broadcast (Asynchronous Event)
	READY LED MEANING	while in active/idle: LED on, flash off during activity while in stopped/standby: LED off, flash on during activity
	I_T NEXUS LOSS TIME	vendor-specific I_T nexus loss time
	INITIATOR RESPONSE TIMEOUT	disable initiator response timeout timer
Phy Control And Discover	PROGRAMMED MINIMUM PHYSICAL LINK RATE	don't change/not programmable
	PROGRAMMED MAXIMUM PHYSICAL LINK RATE	don't change/not programmable
Shared Port Control	POWER LOSS TIMEOUT	vendor-specific
SAS-2 Phy	(no changeable fields)	

2. The I_T NEXUS LOSS TIME and INITIATOR RESPONSE TIMEOUT fields should be described as "minimum" times.

3. The description of the POWER LOSS TIMEOUT field being 0000h should say "specfiies that the maximum time is vendor-specific" rather than "is vendor-specific."

Suggested changes to SAS-2

10.2.7 SCSI mode parameters

10.2.7.1 SCSI mode parameters overview

Table 205 defines mode pages supported by logical units in SCSI target devices in SAS domains (i.e., with SSP target ports) that support the MODE SELECT or MODE SENSE commands.

Table 205 — SSP target port mode pages

Mode page code	Subpage code	Description	Reference
02h	00h	Disconnect-Reconnect mode page	10.2.7.2
18h	00h	Protocol-Specific Logical Unit mode page	10.2.7.3
	01h - DFh	Reserved	
	E0h - FEh	Vendor specific	
	FFh	Return all subpages for this mode page code	SPC-4
19h	00h	Protocol-Specific Port mode page	10.2.7.4
	01h	Phy Control And Discover mode page	10.2.7.5
	02h	Shared Port Control mode page	10.2.7.6
	03h	SAS-2 Phy mode page	10.2.7.7
	04h - DFh	Reserved	
	E0h - FEh	Vendor specific	
	FFh	Return all subpages for this mode page code	SPC-4

If any field in an implemented mode page is not implemented, the value assumed for the functionality of the field shall be zero (i.e., as if the field is set to zero) (see SPC-4).

If a mode page defined by this standard is not implemented, the value assumed for the functionality of each field in that mode page that is:

a) allowed by this standard to be changeable; and
b) is not used solely to define the mode page structure (e.g., the NUMBER OF PHYS field in the Phy Control And Discover mode page) or coordinate access to the mode page (e.g., the GENERATION CODE field in the Phy Control And Discover mode page),

shall be zero (i.e., as if the mode page is implemented and the field is set to zero).

10.2.7.2 Disconnect-Reconnect mode page

10.2.7.2.1 Disconnect-Reconnect mode page overview

The Disconnect-Reconnect mode page (see SPC-4) provides the application client the means to tune the performance of a service delivery subsystem. Table 206 defines the parameters which are applicable to SSP. ~~If any field in the Disconnect-Reconnect mode page is not implemented, the value assumed for the functionality of the field shall be zero (i.e., as if the field in the mode page is implemented and the field is set to zero).~~

The application client sends the values in the fields to be used by the device server to control the SSP connections by means of a MODE SELECT command. The device server shall then communicate the field values to the SSP target port. The field values are communicated from the device server to the SSP target port in a vendor-specific manner.

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10.2.7.4 Protocol-Specific Port mode page

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The I_T NEXUS LOSS TIME field contains the minimum time that the SSP target port shall retry connection requests to an SSP initiator port that are rejected with certain responses indicating that the SSP initiator port may no longer be present (see 8.2.2) before recognizing an I_T nexus loss (see 4.5). Table 209 defines the values of the I_T NEXUS LOSS TIME field. ~~If this mode page is not implemented, the I_T nexus loss time is vendor specific.~~ This value is enforced by the port layer (see 8.2.2).

Table 209 — I_T NEXUS LOSS TIME field

Code	Description
0000h	Vendor-specific amount of time.
0001h to FFFEh	Time in milliseconds.
FFFFh	The SSP target port shall never recognize an I_T nexus loss (i.e., it shall retry the connection requests forever).

NOTE 88 - If this mode page is implemented, the default value of the I_T NEXUS LOSS TIME field should be non-zero. It is recommended that this value be 2 000 ms.

NOTE 89 - An SSP initiator port should retry connection requests for at least the time indicated by the I_T NEXUS LOSS TIME field in the Protocol-Specific Port mode page for the SSP target port to which it is trying to establish a connection (see 4.5).

The INITIATOR RESPONSE TIMEOUT field contains the minimum time in milliseconds that the SSP target port shall wait for the receipt of a frame (e.g., a write DATA frame) before aborting the command associated with that frame. An INITIATOR RESPONSE TIMEOUT field value of zero indicates that the SSP target port shall disable the initiator response timeout timer. ~~If this mode page is not implemented, the logical unit shall not implement an initiator response timeout timer.~~ This value is enforced by the transport layer (see 9.2.6.3).

10.2.7.5 Phy Control And Discover mode page

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The PROGRAMMED MINIMUM PHYSICAL LINK RATE field and PROGRAMMED MAXIMUM PHYSICAL LINK RATE field are defined in the SMP PHY CONTROL function (see 10.4.3.27) for accesses with MODE SELECT commands and in the SMP DISCOVER function (see 10.4.3.9) for accesses with MODE SENSE commands.

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10.2.7.6 Shared Port Control mode page

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The POWER LOSS TIMEOUT field contains the maximum time, in one millisecond increments, that a target port shall respond to connection requests with OPEN_REJECT (RETRY) after receiving NOTIFY (POWER LOSS EXPECTED) (see 7.2.5.11.3). A POWER LOSS TIMEOUT field set to 0000h ~~is~~specifies that the maximum time is vendor-specific. The power loss timeout shall be restarted on each NOTIFY (POWER LOSS EXPECTED) that is received.

Excerpt from SPC-4

7.4.4 Mode parameter block descriptor formats

7.4.4.1 General block descriptor format

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The mode parameters for each mode page are defined in the following subclauses, or in the mode parameters subclause in the command standard (see 3.1.17) for the specific device type. Mode parameters not implemented by the logical unit shall be set to zero.