

To: T10 Technical Committee
From: Rob Elliott, Compaq Computer Corporation (Robert.Elliott@compaq.com)
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Subject: Mode pages equivalents for ECP commands

Revision 0, 25 Oct 2000: first revision

Revision 1, 30 Oct 2000: Removed Deskew and AAF commands from this proposal (00-392r1 for the replacement) – this just leaves Margin Control and the general concept. Selected the overloaded Port Control page alternative and deleted the others. Added a bit in PPR that must be used to maintain margin control settings through negotiation.

Related documents

99-264r0 through r8 (by Larry Lamers and Ron Roberts, Adaptec) proposed putting margin control support in several different places: a new MARGIN CONTROL message, a new MARGIN CONTROL command, and in the information unit L_Q header.

00-257r3 (by John Lohmeyer, LSI Logic), the Expander Communication Protocol (ECP) proposal accepted by T10 in September 2000, includes ECP-based MARGIN CONTROL and MARGIN REPORT commands for communicating with expanders and initiators.

00-378r0 (by George Penokie, Tivoli) is the proposed text for SPI-4 revision 1, which incorporates ECP.

00-391r0 proposed letting targets understand ECP commands themselves, allowing margin control and margin reporting to be implemented via the same mechanism used for expanders.

00-392r1 proposes a REPORT SAVED TRAINING CONFIGURATION VALUES command for ECP. Its predecessors were 00-392r0 and 00-393r0 which proposed REPORT DESKEW VALUES and REPORT AAF values.

Overview

This proposal suggests implementing margin control related commands in targets with mode pages. The page format and semantics are intended to match those in the equivalent ECP commands. MODE SENSE is used to read the data and is equivalent to an inbound function. MODE SELECT is used to write the data and is equivalent to an outbound function.

Since these mode pages are SPI specific, they should be documented in SPI-4. New page numbers, if employed, need to be added to tables in SPC-2 or SPC-3. They should be defined as protocol-specific, so other protocols can reuse the pages.

Since mode page codes are sparse, the new pages are implemented as subpages of the existing Port Control mode page (19h). A field is added to the existing page that indicates which subpage is being written with MODE SELECT and which subpage is being returned on a subsequent MODE SENSE. This causes the page to assume different lengths based on the subpage code.

This alternative upgrades a reserved field (that must be 0h in current devices) into a subpage identifier field. If zero, it maps to the current structure. If non-zero, it indicates a new page is being used.

[Change bars from the original SPI-4 text are only shown for text that was rewritten, not moved.]

18.1.4 Port Control mode page

[subsections added]

18.1.4.1 Port Control mode page overview

The Port Control mode page (see table 73) contains those parameters that select SPI SCSI device port operation options. The page shall be implemented by LUN 0 of all SPI SCSI devices. The page shall not be implemented by logical units other than LUN 0. The implementation of any bit and its associated functions is optional. The page follows the MODE SENSE / MODE SELECT rules specified by SCSI Primary Commands-2 standard. An independent set of parameters shall be maintained for each initiator. The parameters saveable bit in the mode page format header returned with MODE SENSE shall be set to zero (except for the Synchronous Transfer Timeout field), indicating the parameters are not saved through resets. When returning all mode pages with page code 3Fh, all supported subpages shall be included.

After a MODE SELECT, parameter settings shall remain in effect until either:

- a) Settings are changed by another MODE SELECT command,
- b) a reset condition occurs,
- c) an SDTR negotiation completes,
- d) a WDTR negotiation completes, or
- e) a PPR negotiation completes without the MAINTAIN MARGIN CONTROL SETTINGS bit set to one.

Table 73 - Port Control page (19h)

	7	6	5	4	3	2	1	0
0	PS	Reserved	Page Code (19h)					
1	Page Length (06h)							
2	Reserved							
3	Subpage Identifier				Protocol Identifier (1h)			
4	Subpage							
...								
n								

The PROTOCOL IDENTIFIER field of 1h indicates ~~the protocol that~~ this mode page applies to a SPI SCSI device (see SPC-2 for other Port Control page PROTOCOL IDENTIFIERS). ~~The protocol identifier field has a value of 1h to indicate SPI SCSI devices.~~

The SUBPAGE IDENTIFIER field indicates which subpage shall be written with a MODE SELECT command and which subpage shall be returned on a subsequent MODE SENSE command. Subpage Identifier values are listed in table XX.

The PAGE LENGTH field indicates the length of the Port Control page, including the length of the subpage.

Table XX. Subpage Identifier values.

<u>Subpage Identifier</u>	<u>Port Control Page Length</u>	<u>Subpage name</u>
0h	8h	Synchronous Transfer Timeout [existing]
1h	14h	Margin Control [this proposal]
2h	E8h	Saved Training Configuration Values [see 00-392r1]
3h	0Ch	Current Settings [see 00-397r1]
4h – Fh		Reserved

[all text that follows is new, shown without change bars. Margin Control text is taken from 00-257r3 ECP and 00-378r0 (SPI-4 proposed revision 1 annex G). Any changes to those documents should be tracked here.]

18.1.4.2 Synchronous Transfer Timeout subpage

The Synchronous Transfer Timeout subpage (see table xx) is used to set or read the Synchronous Transfer Timeout.

Table xx. Synchronous Transfer Timeout subpage (0h)

Bit Offset	7	6	5	4	3	2	1	0
0	Synchronous Transfer Timeout							
1	Synchronous Transfer Timeout							
2	Reserved							
3	Reserved							

The SYNCHRONOUS TRANSFER TIMEOUT field indicates the maximum amount of time in 1 millisecond increments that the target shall wait before generating an error by doing an unexpected bus free (see 10.3). The target shall only go to a BUS FREE phase if one of the following events causes the timer, once started, to not reset or reload before expiring.

- a) If there is a REQ transition when there are no outstanding REQs waiting for an ACK then load and start the timer.
- b) If there is a REQ transition when there are any outstanding REQs waiting for an ACK then there is no effect on the timer.
- c) If there is an ACK transition when there are outstanding REQs waiting for an ACK then load and start the timer.
- d) If after an ACK transition there are no outstanding REQs waiting for an ACK then stop the timer.

A SYNCHRONOUS TRANSFER TIMEOUT field value of 0000h indicates that the function is disabled. A value of FFFFh indicates an unlimited period.

18.1.4.3 Margin Control subpage

The Margin Control subpage (see table x) contains parameters that set and report margin control values for usage between the initiator-target pair on subsequent synchronous and paced transfers.

Table X — Margin Control subpage (1h)

Bit Offset	7	6	5	4	3	2	1	0
0	RSVD	Reserved				RSVD		
1	DRIVER STRENGTH				Reserved			
2	SIGNAL GROUND BIAS				DRIVER PRECOMPENSATION			
3	SLEW RATE				Reserved			
4	Reserved				Reserved			
5	Reserved				Reserved			
6	Reserved				Reserved			
7	Vendor specific				Vendor specific			
8	Reserved							
9	Reserved							
10	Reserved							
11	Reserved							
12	Reserved							
13	Reserved							
14	Reserved							
15	Reserved							

The margin control fields shall be implemented as two's-complement values ~~with 0000b being the nominal value~~. The maximum supported setting for each field shall be 0111b and the minimum supported setting for each field shall be ~~1111b~~1000b. Up to 16 distinct values are available for each field, representing monotonically changing device response. Devices that support fewer than 16 distinct values for a field should round non-supported settings to a supported value. [make the same editorial changes in annex G]

In the case of the SIGNAL GROUND BIAS fields, values 0000b through 0111b shall enable the bias cancellation circuit and values 1000b through 1111b shall disable the bias cancellation circuit, if disabling of this circuit is supported.

The MODE SELECT command shall return the current settings for the initiator-target pair. Fields that are not implemented shall be reported as 0000b.

Section 16.3.10 PARALLEL PROTOCOL REQUEST Add bit 3 – MAINTAIN MARGIN CONTROL SETTINGS

A MAINTAIN MARGIN CONTROL SETTINGS bit of zero indicates that the target shall reset to their default values any margin control settings set with the Margin Control subpage of the Port Control mode page (see 18.1.4.3). A MAINTAIN MARGIN CONTROL SETTINGS bit of one indicates that the target shall maintain any margin control settings set with the Margin Control subpage.

Section 16.3.14 SYNCHRONOUS DATA TRANSFER REQUEST

In Table 60, to this existing description:

Synchronous transfer (i.e., Each SCSI device transmits data with a transfer period equal to or greater than, and a REQ/ACK offset equal to or less than, the values received in the other device's SDTR message) with ST DATA IN and ST DATA OUT phases. Any protocol options shall no longer be in effect (see 16.3.10).

Add: , and any margin control settings set with the Margin Control subpage (see 18.1.4.3) shall be reset.

Section 16.3.16.1 WIDE DATA TRANSFER REQUEST

To this existing text:

c) if both WDTR messages are not rejected with a MESSAGE REJECT message the WDTR message shall cause a reset of the synchronous transfer agreement to asynchronous mode and any protocol options shall no longer be in effect (i.e., DT DATA phase, paced transfers, information unit transfers, data group transfers, and QAS are disabled) (see 16.3.10).

Add: , and any margin control settings set with the Margin Control subpage (see 18.1.4.3) shall be reset.