

To: T10 Technical Committee
From: Rob Elliott, Compaq Computer Corporation (Robert.Elliott@compaq.com)
Date: 25 October 2000
Subject: Reporting deskew values with ECP

Revision 0: first revision

SPI-4 devices include deskew logic to adjust the skew between the clock and data signals. For DATA IN phases, this is from REQ to data; for DATA OUT phases, it is from ACK to data. The deskewed data signals are DB[15:0], DBP_1, and P_CRCA. Deskew settings are maintained separately for each I_T nexus. A standard way to return these values is desired for lab debug and diagnostic software. This might be useful in judging how much margin a system has left – if the skew values are all being pushed to their maximum values, the system has less margin than one where skew values are all near nominal. A REPORT DESKEW VALUES function using ECP is proposed.

We have no need yet to change the values with a standard command. If wanted, a SET DESKEW VALUES outbound single function paralleling this function would work.

The meanings of the values are vendor-specific. This proposal provides a standard way to read them, but not a standard way to interpret them. Diagnostic software may display the values on-screen or log them to a file, but cannot interpret the values without knowing the device manufacturer and type. Reserved space is left in the header in case some day we do want to define standard meanings for the values (requiring vendors to round to match as much as possible). One of the reserved bytes could be set to a non-zero value indicating compliance to such a definition.

The width of each deskew value is 8 bits. If a vendor implements more precision, some other vendor-specific means is needed to obtain that additional information. If a vendor implements less precision, either a subset of the bits may be used or values may be rounded. Again, this is a vendor-specific choice. For example, if a vendor supports just 4 deskew values, they might be:

- a) 00h, 01h, 02h, 03h
- b) 00h (0), 31h (49), 80h (128), FFh (255)
- c) FFh (-1), 00h (0), 01h (+1), 02h (+2)

The field could be made larger if anyone feels such action is appropriate.

Due to the large amount of data (18 bytes per port – 36 bytes for an expander), an inbound single function is used rather than an inbound multiple function. Multiple function commands expect 16 bytes of data per device.

Change Table G.2 to add a new function code:

Table G.2 — Expander functions

EXPANDER FUNCTION CODE	Expander function	Type
C1h C2h - EFh	REPORT DESKEW VALUES Reserved	Inbound single function

Add this section:

G.6.x REPORT DESKEW VALUES

The REPORT DESKEW VALUES function is used to report the device's paced data transfer deskew values. These values are part of the saved training configuration values maintained by the device (see 18.8.4.2.1), representing the amount of deskew delay applied between the clock signal and each data signal.

The near port deskew values are from ACK to each data bit, only applicable during DATA OUT phases. The far port deskew values are from REQ to each data bit, only applicable during DATA IN phases.

For expanders implementing this function, both near port and far port values shall be included. For initiators implementing this function, only the far port values shall be included. For targets implementing this function, only the near port values shall be included.

Only values for the I_T connection in progress are reported.

The meaning of the fields is vendor-specific. For example, the fields could contain 8-bit signed values indicating the number of steps (e.g. 250 ps steps) of delay added to the clock (REQ or ACK) for each data bit. Certain values may be used to indicate errors (e.g. 80h (-128 if interpreted as signed) to indicate the skew was too large for the deskew circuitry to correct).

The data structure for this function shall include function specific fields described in table G.12x.

Table G.12x — REPORT DESKEW VALUES data structure

Bit Byte	7	6	5	4	3	2	1	0	
0	(MSB)								
1									
2									
3									
4									
5									
6								(LSB)	
7	INITIATOR SCSI ADDRESS								
8	RESERVED								
9	RESERVED								
10	RESERVED								
11	RESERVED								
12	NEAR PORT DATA OUT DB[0] DESKEW VALUE								
...	...								
27	NEAR PORT DATA OUT DB[15] DESKEW VALUE								
28	NEAR PORT DATA OUT P1 DESKEW VALUE								
29	NEAR PORT DATA OUT P_CRCA DESKEW VALUE								
30	FAR PORT DATA IN DB[0] DESKEW VALUE								
...	...								
45	FAR PORT DATA IN DB[15] DESKEW VALUE								
46	FAR PORT DATA IN P1 DESKEW VALUE								
47	FAR PORT DATA IN P_CRCA DESKEW VALUE								