To: T10 Technical Committee
From: SDV working group via Bill Ham (Bill.Ham@Compaq.com)
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Date: 11 September 2001
Subject: T10/01-149r3 SDV working group recommendations for changes to SPI-4

Revision History
Revision 0 (16 July 2001) first revision
Revision 1 (27 July 2001) incorporates comments from July pSCSI WG
Revision 2 (10 September 2001) incorporates comments from September SDV WG
Revision 3 (11 September 2001) incorporates comments from September pSCSI WG

Related Documents
spi4r06 - SCSI Parallel Interface - 4 revision 6

Overview
This document contains the recommendations of the SDV working group for changes to SPI-4 regarding the margin control mode page and ECP page and to define “driver-receiver connection” in the model.

Suggested changes
4.3 Physical architecture of bus
The position of the drivers, receivers, and terminators for a SE bus are shown in figure 2 and for a differential bus are shown in figure 3. The electrical properties of the drivers and receivers are all measured at the stub connections (see figure 4). Unless otherwise noted, all voltages are with respect to the signal ground of the SCSI device.

[figure 2 - SE SCSI bus]
[figure 3 - Differential SCSI bus]

[add this text as a new section:]
4.x Driver-receiver connections

Figure 1 shows a portion of a single SCSI bus segment between two SCSI devices. Each device has a driver and a receiver for each signal. There may be other SCSI devices or terminators not shown in Figure 1 that are connected to the path between the driver and the receiver. Two driver-receiver connections exist between any two SCSI devices or simple expanders, one for each direction.

Dr = Driver Circuit
Rc = Receiver Circuit

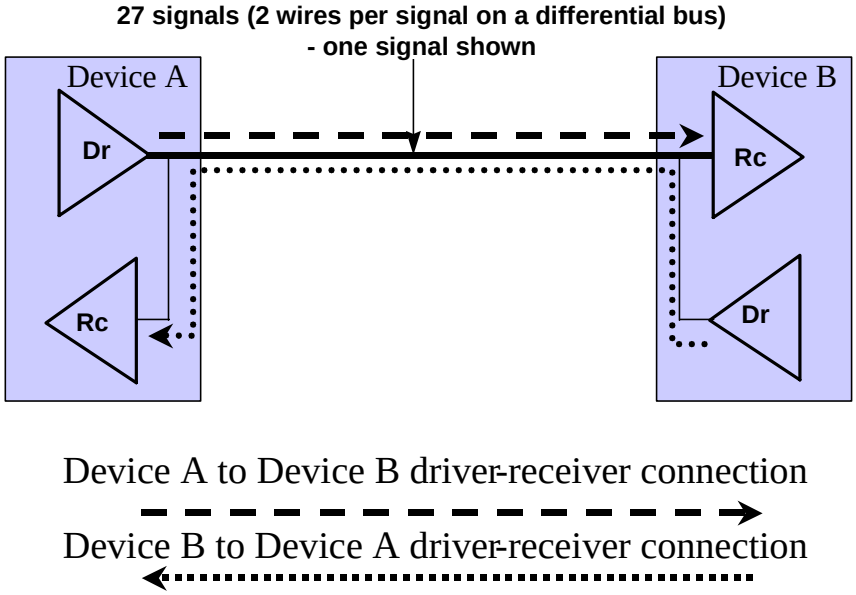

Figure 1 - Device to device driver-receiver connections

18.1.4.1 Margin control subpage

[table]
Table 82 - Margin control subpage (01h):
[In the table, change SIGNAL GROUND BIAS to DRIVER ASYMMETRY]
[In the table, change SLEW RATE to DRIVER SLEW RATE]

~~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 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.~~

~~For 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 DRIVER STRENGTH field indicates the relative amount of driver source current used by the driver (see 7.3.2 and A.2.2). This parameter affects both the strong and weak drivers. A larger value indicates more driver source current.

The DRIVER PRECOMPENSATION field indicates the relative difference between the weak driver and the strong driver amplitudes when precompensation is enabled (see A.2.1). A larger value indicates a larger difference between the weak and strong amplitudes.

The DRIVER ASYMMETRY field indicates the relative difference between the amplitudes of asserted and negated signals launched from the driver (see A.2 and figure A.2). A larger value indicates a relatively stronger asserted signal compared to the negated signal. ~~For drivers with circuitry that achieves the assymmetry through the use of a separate bias circuit (sometimes referred to as a compensationes for terminator negation bias compensation circuit), values 0000b through 0111b shall enable that circuitry and values 1000b through 1111b shall disable that circuitry (see A.2.3).~~

The DRIVER SLEW RATE field indicates the relative difference between the assertion and negation magnitudes divided by the rise or fall time (see A.2.6 and A.2.7). A larger value indicates a faster slew rate.

The default value of each margin control field should be 0000b.

The margin control fields indicate absolute conditions centered around their default values. Absolute conditions means that the previous history of the parameter has no relevance to the value of the parameter. The fields are two's complement values as shown in Table 1. The maximum supported setting for each field is 0111b and the minimum supported setting for each field is 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.

The actual response of the device to a field value is vendor specific and calibration of the actual minimum and maximum responses to different field values is not defined in this standard. Margin control settings should not cause the driver to violate this standards' electrical limits. Margin control settings ~~may~~should affect only the REQUEST, ACKNOWLEDGE, ~~and DATA signals~~DATA BUS, DB(P_CRCA), and DB(P1) signals and should affect all of these signals driven by the device by the same amount.

Table 1 - Summary of margin control field values

Value (binary)	Value (decimal)	Parameter values	~~for the driver asymmetry field, Terminator negation bias compensation circuit in the driver~~
0111b ~~(+7)~~	+7	maximum setting	~~enabled~~
0110b ~~(+6)~~	+6		~~enabled~~
0101b ~~(+5)~~	+5		~~enabled~~
0100b ~~(+4)~~	+4		~~enabled~~
0011b ~~(+3)~~	+3		~~enabled~~
0010b ~~(+2)~~	+2		~~enabled~~
0001b ~~(+1)~~	+1		~~enabled~~
0000b ~~(0)~~	0	recommended default value	~~enabled~~
1111b ~~(-1)~~	-1		~~disabled~~
1110b ~~(-2)~~	-2		~~disabled~~
1101b ~~(-3)~~	-3		~~disabled~~
1100b ~~(-4)~~	-4		~~disabled~~
1011b ~~(-5)~~	-5		~~disabled~~
1010b ~~(-6)~~	-6		~~disabled~~
1001b ~~(-7)~~	-7		~~disabled~~
1000b ~~(-8)~~	-8	minimum setting	~~disabled~~

G.6.1.3 MARGIN CONTROL

The MARGIN CONTROL expander function sets parameter settings in the initiator or expander for usage between the I_T nexus on subsequent synchronous transfers and paced transfers. These parameter settings shall remain in effect until changed by another MARGIN CONTROL expander function or by a hard reset (see 12.4).

The MARGIN CONTROL SEDB is shown in table G.6.

[table]

Table G.6 - MARGIN CONTROL SEDB

[In the table, change each SIGNAL GROUND BIAS to DRIVER ASYMMETRY]
[In the table, change each SLEW RATE to DRIVER SLEW RATE]

Two duplicate sets of margin control fields (i.e., DRIVER STRENGTH, ~~SIGNAL GROUND BIAS,~~ DRIVER PRECOMPENSATION, DRIVER ASYMMETRY, and DRIVER SLEW RATE) are provided, one set for the near port and another set for the far port. If the first SEDB is used for the initiator settings, only the far port fields are used and the near port fields are 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 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.~~

~~For 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.~~

~~For a description of the DRIVER STRENGTH, SIGNAL GROUND BIAS, and DRIVER PRECOMPENSATION fields see 18.1.4.1.~~

FOR a description of the DRIVER STRENGTH, DRIVER PRECOMPENSATION, DRIVER ASYMMETRY, AND DRIVER SLEW RATE fields see 18.1.4.1.