

Maxtor Corporation 500 McCarthy Boulevard Milpitas, CA 95035 USA

To: T10 SAS Protocol Working Group Contact: Mark Evans Phone: 408-894-5310 Email: mark_evans@maxtor.com Date: 04 November 2003

Subject: SAS-1.1, additional LED behavior

Introduction

SAS defines one behavior for the LED signal. This is as a "ready" signal, that is, the signal is driven when the target device is in the active state but not processing a command. This proposal creates a new, optional, behavior for the LED as an "activity" signal, where the signal is not driven when the target device is in the active state and not processing a command (similar to how the analogous signal functions in parallel SCSI environments). In addition, this proposal clarifies the ready LED description in the draft standard. Revision 1 of this proposal moves all text in 10.4.1 into a table. This proposal is based on SAS1r01.

1) Add the following to clause 10.2.6.2.2 Protocol-Specific Port mode page - short format:

Byte\Bit	7	6	5	4	3	2	1	0
0	PS	SPF (0b)		PAGE CODE (19h)				
1	PAGE LENGTH (06H)							
2		Reserved		LED_ACT		PROTOCOL	IDENTIFIER	
3	Reserved							
4	(MSB)	- I_T NEXUS LOSS TIME (LSB)						
5								
6	(MSB)	(MSB) INITIATOR RESPONSE TIMEOUT (LSB)						
7								(LSB)

Table 36 — Protocol-Specific Port mode page for SAS SSP - short format (proposed)

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The LED activity bit (LED_ACT) indicates the behavior of the LED signal. See 10.4.1.

2) Change clause 10.4.1 READY LED signal behavior to be as follows:

A SAS target device uses the READY LED signal to activate an externally visible LED that indicates the state of readiness and activity of the SAS target device. The READY LED signal electrical characteristics are described in 5.4. All SAS target devices using the SAS plug connector (see 5.2.3.2) shall support the READY LED signal.

SAS target devices without SSP target ports may transmit the READY LED signal using vendor-specific patterns.

The system is not required to generate any visual output when the READY LED signal is asserted. Additional vendor-specific flashing patterns may be used to signal vendor-specific conditions.

Table x defines the behavior of a SAS target device based on the setting of the led_act bit in the Protocol Specific Port mode page (see10.2.6.2.2). See 10.2.8 for definition of the power conditions.

Power	LED_ACT setting					
<u>condition or</u> <u>activity</u>	LED_ACT set to 0	LED_ACT set to 1				
<u>Active</u> Idle Standby	 <u>The SAS target device shall:</u> a) assert the READY LED signal continuously except when processing a command; and b) when processing a command, toggle the READY LED signal between the negated and asserted states in a vendor-specified manner (i.e., the LED is usually on, but flashes on and off when commands are processed). The SAS target device shall: 	 <u>The SAS target device shall:</u> <u>negate the READY LED signal continuously except when processing a command; and</u> <u>when processing a command, toggle the READY LED signal between the</u> 				
<u>Stopped</u>	 a) negate the READY LED signal continuously except when processing a command; and b) when processing a command, toggle the READY LED signal between the negated and asserted states in a vendor-specified manner (i.e., the LED is usually off, but flashes on and off when commands are processed). 	negated and asserted states in a vendor-specified manner (i.e., the LED is usually off, but flashes on and off when commands are processed).				
<u>Spin-up/</u> <u>spin-down</u>	If the SAS target device has rotating media and is in the process of performing a spin-up or spin-down, then the SAS target device shall toggle the READY LED signal between the asserted and negated states with a $1 \text{ s} \pm 0.1 \text{ s}$ cycle using a 50 % ± 10 % duty cycle (e.g., the LED is on for 0.5 s and off for 0.5 s); and					
<u>Formatting</u> <u>media</u>	If the SAS target device is in the process of formatting media, then the SAS target device shall toggle the READY LED signal between the asserted and negated states in a vendor-specified manner (e.g., with each cylinder change on a disk drive).					

Table <x> — LED signal behavior summary