

October 14, 2002

To: T10 Technical Committee
 From: Timothy Hogleund (LSI Logic)
 Subject: SAS Programmable PPTOV

This proposal defines the methodology for reporting and configuring the partial pathway timeout value (PPTOV) which is used by SAS expanders to recover from potential deadlock conditions. PPTOV establishes the time interval between detection of partial pathway blockage and the invocation of pathway recovery methods. This proposal specifies that PPTOV shall be reported via the DISCOVER SMP function and configured via the PHY CONTROL SMP function. Modifications to the PHY CONTROL and DISCOVER functions are as follows:

Changes from 02-387r0:

- incorporated feedback from Oct 1, 2002 SAS protocol teleconference call
- recalibrated to PHY CONTROL and DISCOVER from sas-r02a and 02-359r3
- added NOTE XY to Arbitration Fairness (7.12.3)

1. Modify Table 102 PHY CONTROL request as shown below:

Table 102. PHY CONTROL request

Byte	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (40h)							
1	FUNCTION (90h)							
2	Reserved							
3	Reserved							
4	Ignored							
7	Ignored							
8	Reserved							
9	PHY IDENTIFIER							
10	PHY OPERATION							
11	Reserved							
12	Ignored							
31	Ignored							
32	PROGRAMMED MINIMUM PHYSICAL LINK RATE				Ignored			
33	PROGRAMMED MAXIMUM PHYSICAL LINK RATE				Ignored			
34	Ignored							
35	Ignored							
36	Reserved				PPTOV			
37	Reserved							
39	Reserved							
40	(MSB)							
43	CRC							
	(LSB)							

2. Modify Table 88 DISCOVER response as shown below:

Table 88. DISCOVER response

Byte	7	6	5	4	3	2	1	0	
0	SMP FRAME TYPE (41h)								
1	FUNCTION (10h)								
2	FUNCTION RESULT								
3	Reserved								
4	Ignored								
7	Reserved								
8	PHY IDENTIFIER								
9	Ignored								
10	Reserved								
11	Ignored	DEVICE TYPE			ADDRESS DECODE				
12	Reserved			CURRENT PHYSICAL LINK RATE					
13	Reserved			ATTACHED SSP INITIATOR	ATTACHED STP INITIATOR	ATTACHED SMP INITIATOR	Reserved		
14	Reserved			ATTACHED SSP TARGET	ATTACHED STP TARGET	ATTACHED SMP TARGET	ATTACHED SATA TARGET		
15	ATTACHED SAS ADDRESS								
16	SAS ADDRESS								
23	PROGRAMMED MINIMUM PHYSICAL LINK RATE				HARDWARE MINIMUM PHYSICAL LINK RATE				
24	PROGRAMMED MAXIMUM PHYSICAL LINK RATE				HARDWARE MAXIMUM PHYSICAL LINK RATE				
31	Vendor-specific								
32	Reserved				PPTOV				
33	Reserved								
34	Reserved								
39	Reserved								
40	(MSB)	CRC						(LSB)	
43									

3. Add the PPTOV field description to 9.4.4.10 PHY CONTROL and 9.4.4.6 DISCOVER as follows:

The PPTOV field specifies the amount of time in microseconds ~~an the~~ expander ~~link-phy~~ shall wait after receiving Arbitrating(Blocked On Partial) confirmation from the expander connection manager before requesting that the expander connection manager resolve pathway blockage (see 7.13.3.4.1).

The default value for PPTOV shall be 7 microseconds. A PPTOV value of zero microseconds indicates that partial pathway resolution shall be requested by the expander ~~link-phy~~ immediately upon reception of Arbitrating(Blocked On Partial) confirmation from the expander connection manager.

4. Add the following Note to 7.12.3 (Arbitration Fairness):

NOTE XY The PPTOV value allows implementation flexibility in specifying how long an expander device waits before attempting pathway recovery. Optimal values for PPTOV are primarily a function of the topology. Selecting small PPTOV values within a large topology may negatively impact system performance because of the time a device must wait after receiving OPEN_REJECT(PATHWAY BLOCKED) before it may retry the connection request. Similarly, selecting large PPTOV values within a small topology may negatively impact performance due to waiting longer than necessary to detect pathway blockage.