October 15, 2002

To: T10 Technical Committee
From: Timothy Hoglund (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)

Changes from 02-387r1:

- incorporated feedback from Oct 14, 2002 SAS protocol teleconference call – modifications to proposed text to 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								
4	Ignored							
7								
8	Reserved							
9	PHY IDENTIFIER							
10	PHY OPERATION							
11	Reserved							
12	Ignored							
31								
32	PROGRAMMED MINIMUM PHYSICAL LINK RATE				Ignored			
33	PROGRAMMED MAXIMUM PHYSICAL LINK RATE				Ignored			
34	Ignored							
35								
36	Reserved				PPTOV			
37	Reserved							
39								
40	(MSB) CRC							
43								(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								
8	Reserved							
9	PHY IDENTIFIER							
10	Ignored							
11	Reserved							
12	Ignored	DEVICE TYPE			ADDRESS DECODE			
13	Reserved				CURRENT PHYSICAL LINK RATE			
14	Reserved				ATTACHED SSP INITIATOR	ATTACHED STP INITIATOR	ATTACHED SMP INITIATOR	Reserved
15	Reserved				ATTACHED SSP TARGET	ATTACHED STP TARGET	ATTACHED SMP TARGET	ATTACHED SATA TARGET
16	ATTACHED SAS ADDRESS							
23								
24	SAS ADDRESS							
31								
32	PROGRAMMED MINIMUM PHYSICAL LINK RATE				HARDWARE MINIMUM PHYSICAL LINK RATE			
33	PROGRAMMED MAXIMUM PHYSICAL LINK RATE				HARDWARE MAXIMUM PHYSICAL LINK RATE			
34	Vendor-specific							
35								
36	Reserved				PPTOV			
37	Reserved							
39								
40	(MSB)	CRC						
43								(LSB)

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 the expander 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 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~~The default value was chosen to cover a wide range of topologies. Selecting small PPTOV values within a large topology may ~~negatively impact system~~compromise 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~~compromise performance due to waiting longer than necessary to detect pathway blockage.