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To: T10 Technical Committee
From: Bill Galloway
Subj: SAS STP affiliations

The design of a high performance native STP target should not be required to support affiliations. This proposal makes it optional.

Replace 7.16.3 with the following:

7.16.3 Affiliations

Coherent access to the SATA task file registers shall be provided for each STP initiator port. If the STP target port provides one set of task file registers for each STP initiator port then it shall not implement affiliations. If the STP target port provides access to one set of task file registers for all STP initiator ports, then it shall implement affiliations to provide coherency.

An affiliation is a state entered by an STP target port where it refuses to accept connection requests from STP initiator ports other than the one that has established an affiliation.

An STP target port that supports affiliations shall establish an affiliation whenever it accepts a connection request. When an affiliation is established, the STP target port shall reject all subsequent connection requests from other STP initiator ports with OPEN REJECT (STP RESOURCES BUSY).

An STP target port shall maintain an affiliation until any of the following occurs:

- a) Power on;
- b) the SAS target device receives an SMP PHY CONTROL request specifying the phy with the affiliation and specifying a phy operation of HARD RESET (see 10.3.1.9) from any SMP initiator port;
- c) the SAS target device receives an SMP PHY CONTROL request specifying the phy with the affiliation and specifying a phy operation of CLEAR AFFILIATION from the same SAS initiator port which has the affiliation;
- d) A connection to the phy with the affiliation is closed with CLOSE (CLEAR AFFILIATION); or
- e) the STP target port is part of a STP/SATA bridge and a link reset sequence is begun on the SATA physical link.

An affiliation established when the command is transmitted should be kept until all frames for the command have been delivered. This avoids confusing the SATA device, which only knows about one SATA host. STP initiator ports may keep affiliations for longer tenures, but this is discouraged.

An STP target that implements affiliations shall implement one affiliation per port. Multiple phys on the same STP target port shall use the same affiliation. Support for affiliations is indicated in the REPORT SATA PHY response (see xxx). Affiliations shall not be implemented if SMP is not supported.

Only one connection between a wide STP initiator port and a wide STP target port shall be allowed at one time. The STP target port shall reject a second connection request from the same STP initiator port with OPEN_REJECT (STP RESOURCES BUSY).

7.16.x Opening an STP connection

If no connection exists when an STP/SATA bridge receives an SATA_X_RDY from the attached SATA device it shall establish the connection to the STP initiator port before it transmits an SATA_R_RDY to the SATA device.

7.16.4 Closing an STP connection

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~~In a SAS domain with a single STP initiator port, when a SATA device transmits an SATA_X_RDY, the STP/SATA bridge may use the time between SATA_X_RDY and SATA_R_RDY to insert an OPEN address frame to open a connection to the STP initiator port. In a SAS domain with multiple STP initiator ports, the STP/SATA bridge manages affiliations (see 7.16.3). Only data FISes are subject to flow control, so the STP/SATA bridge shall be capable of accepting a whole register FIS frame.~~

7.16.x SMP support

A SAS device that contains an STP target port shall also contain an SMP target port.

Table 68 — CLOSE primitives

Primitive	Description
CLOSE (CLEAR AFFILIATION)	Close an open STP connection and clear the affiliation (see 7.16.3). Processed the same as CLOSE (NORMAL) if: <ul style="list-style-type: none"> a) it is not an STP connection; b) affiliations are not implemented by the STP target port; or c) affiliation is not present.

Table 70 — OPEN_REJECT abandon primitives

Primitive	Originator	Description
OPEN_REJECT (STP RESOURCES BUSY)	Destination phy	STP target port with destination SAS address exists but the STP target port has an affiliation with another STP initiator port or all of the available task file registers have been allocated to other STP initiator ports. (see 7.16.3) Process the same as OPEN_REJECT (WRONG DESTINATION) for non-STP connection requests.

10.3.1.6 REPORT PHY SATA function

The REPORT PHY SATA function returns information about the SATA state for a specified phy. This function shall be implemented by SMP target ports that share an address with an STP target port. ~~that are part of STP/SATA bridges in expander devices and by SMP target ports that support affiliation, in SAS devices also containing STP target ports. This function shall not be implemented by any other type of SMP target port.~~

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Add "AFFILIATIONS" bit to byte 11 bit 2 of the REPORT PHY SATA response (Table 161)

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An AFFILIATIONS bit of one indicates that affiliations are implemented. An AFFILIATIONS bit of zero indicates that affiliations are not implemented.