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To: **T10 Serial Attached SCSI PHY Working Group**
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Date: ~~21~~ **24 June 2002**
Subject: SAS transmission of ~~Transmitting~~ a DONE primitive to close an SSP connection

Introduction

The wording in the latest revision of the SAS draft describing when a DONE should be transmitted strongly suggests that an SSP device should send a DONE primitive when it has no frames to send. However, this could result in one device (the "destination device") that was opened by a second device (the "source device") sending a DONE before the source device had an opportunity to issue a request to the destination device that would require a frame to be transmitted by the destination device. In this case, the destination device would have to wait until a new connection was established before it could respond to the request from the source device.

We propose that the standard specifically allow destination devices to wait for the source device to issue a DONE before issuing its DONE. This allows for the destination device to respond to a request in the same connection. The intent of this is that the destination device will not wait an inordinate amount of time after receiving a DONE before sending its DONE, but will quickly determine if it can immediately respond to the request. The intent is this determination should take less time than the time required to close and then reopen a connection.

In the above scenario, the draft had no hard requirement for either device to send a DONE. This could result in a deadlock. This proposal clarifies that issue.

The following are the changes in SAS-r00b required to implement this proposal. Revision ~~2~~ 3 of this proposal includes input from the SAS Working Group ~~teleconference~~meeting, ~~18~~ 24 June 2002.

7.14.6 Preparing to close an SSP connection

DONE is exchanged prior to closing an SSP connection. When ~~it~~ a source SSP device has no frames to send ~~on its own, an SSP device~~, it ~~should~~ shall send a DONE. When a destination SSP device has no frames to send, it may wait for a vendor-specific period of time, and then shall send a DONE. ~~This~~ After transmission of a DONE ~~signals that it~~ a device ~~will~~ shall not ~~originate~~transmit ~~no~~ any more frames during this connection. ~~However, it~~ However, a device may send ACK, NAK, and RRDY after sending DONE if the other device is still sending frames on the back channel.
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8.1 Overview
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The PL_RQ state machine's purpose is to:
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l) Initiate a "Close Connection" function to get DONE transmitted if the destination device ~~is opened by a receive function and~~ has nothing to transmit to ~~this Initiator (or Target)~~the source device or a vendor-specific time has elapsed since the connection was opened.
....

8.2 PL_RQ1:~~ReceiveQueue~~Receive and queue connection request state machine
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The PL_RQ state machine shall detect if the connection was opened as a result of a device selection (detect "Currently Connected to i" signal from PL_C2 via the SL2_Selected path)~~,~~ and determine ~~that~~ if there is ~~no~~ a pending transmit request~~s~~ in the queue to ~~this Initiator (or Target)~~the source device. The destination device may wait a vendor-specific time and then shall ~~and~~ request a ~~'~~"Close Connection" function from the link layer so that a DONE is transmitted to the ~~destination port~~source device ~~so that the connection can be closed by a DONE being received from the destination port~~.