To: T10 Technical Committee
From: Rob Elliott, HP (elliott@hp.com)
Date: 30 October 2004
Subject: 04-346r0 SAS-1.1 SMP initiator state machine corrections

Revision history
Revision 0 (30 October 2004) First revision

Related documents
sas1r06 - Serial Attached SCSI 1.1 revision 6

Overview
(problems noticed by Yingdong Li at AMCC, yli@amcc.com)

1. If the SMP initiator link later (SMP_IP) state machine receives a frame with an error, it notifies the transport layer (via the port layer). The transport layer is not required to do anything but request a BREAK after a vendor-specific timeout.

Either:

a) the link layer should request a BREAK itself rather than expect the upper layers to timeout; or
b) the transport layer should respond to Frame Received (SMP Failure) by sending SMP Transmit Break without waiting for a timeout.

In this proposal, approach a) is taken. Chances are the SMP target sent a CLOSE after the bad frame, and the transport layer has to deal with that anyway. Using approach b) might imply that the initiator replies with CLOSE rather than BREAK (which is fine too).

2. The SMP initiator transport layer (MT_IT) state machine specifies that it sends a Transmit Break to the port layer if a frame is received with a frame type other than 41h. However, the link layer will already have sent a CLOSE at this time (the frame did not have a CRC error), so this is pointless.

Suggested changes

7.18.4.3 SMP_IP (link layer for SMP initiator phys) state machine

7.18.4.3.4 SMP_IP3:Receive_Frame state

This state checks the SMP response frame and determines if the SMP response frame was successfully received (e.g., no CRC error).

If this state receives a subsequent SOF Received message after receiving an SOF Received message but before receiving an EOF Received message (i.e., SOF, data dwords, SOF, data dwords, and EOF instead of SOF, data dwords, EOF, SOF, data dwords, and EOF), then this state shall discard the Data Dword Received messages received before the subsequent SOF Received message.

This state shall discard the frame ~~and~~, send a Frame Received (SMP Failure) confirmation to the port layer,send a Request Break message to the SL state machines, and terminate the state machine if:

a) this state receives more than 258 Data Dword Received messages after an SOF Received message and before an EOF Received message; or
b) this state receives fewer than 2 Data Dword Received messages after an SOF Received message and before an EOF Received message~~,~~.

If this state receives an Invalid Dword Received message or an ERROR Received message after an SOF Received message and before an EOF Received message, then this state machine shall:

a) ignore the invalid dword or ERROR; or
b) discard the frame ~~and~~, send a Frame Received (SMP Failure) confirmation to the port layer, send a Request Break message to the SL state machines, and terminate the state machine.

If the SMP response frame is received with a CRC error, this state shall discard the frame ~~and~~, send a Frame Received (SMP Failure) confirmation to the port layer, send a Request Break message to the SL state machines; and terminate the state machine.

If the SMP response frame is received with no CRC error and the SMP response frame is valid, this state shall:

a) send a Frame Received confirmation to the port layer; and
b) send a Request Close message to the SL state machines (see 7.14).

If an SMP Transmit Break request is received, this state shall send a Request Break message to the SL state machines and this state machine shall terminate.

This state shall request idle dwords be transmitted by repeatedly sending Transmit Idle Dword messages to the SMP transmitter.

9.4.5.2 MT_IP (transport layer for SMP initiator ports) state machine

9.4.5.2.4 MT_IP3:Receive state

9.4.5.2.4.1 State description

This state waits for a confirmation from the port layer that either an SMP frame has been received or a failure occurred.

Upon entry into this state, this state shall initialize and start the SMP Frame Receive Timeout timer.

If a Frame Received confirmation is received and the SMP frame type is equal to 41h, this state shall send a Received SMP Function Complete confirmation to the management application layer. ~~If the SMP frame type is not equal to 41h, this state shall send an SMP Transmit Break request to the port layer.~~

If a Frame Received confirmation is received and the SMP frame type is not equal to 41h, this state shall send a SMP Frame Transmit Receive Failure confirmation to the management application layer.

If a Connection Closed or Frame Received (SMP Failure) confirmation is received, this state shall send an SMP Frame Transmit Receive Failure confirmation to the management application layer.

If the SMP Frame Receive Timeout timer expires before a Received SMP Function Complete confirmation is received, this state shall send an SMP Frame Receive Timeout confirmation to the management application layer and send an SMP Transmit Break request to the port layer.

9.4.5.2.4.2 Transition MT_IP3:Receive to MT_IP1:Idle

This transition shall occur after one of the following:

a) sending a Received SMP Function Complete confirmation;
b) sending an SMP Frame Transmit Receive Failure confirmation; or
c) sending an SMP Transmit Break request.