Date: July 7, 1999

To: T10 Committee (SCSI)

From: George Penokie (IBM)

Subject: Packetized Error Handling changes for SPI-3

1 Overview

The description of how error are handled while running in packet mode, in some cases, leaves too much to the imagination of the implementor and in other cases allows options where it would be better if there were none. This proposal list some changes to SPI-3 rev 7 that would tighten up the error handling.

1.1 Initiator detected information unit failures

Section 10.5.2.2.1.1 defines how errors are handled while running packets in DT DATA IN phases. But the current description does not distinguish between errors that occur before an I_T_L_Q nexus is formed and after the nexus is formed. It also allows the target to optionally retry any packet. I propose changing this section to the following:

The initiator shall not negate the ACK for the last byte of the iuCRC of any information unit received by the initiator until the iuCRC has been verified to be correct.

If the nexus has been fully identified (i.e., an I_T_L_Q nexus has been established) and the initiator detects an iuCRC error in any information unit, other than a SPI status information unit, it receives while in the DT DATA IN phase the initiator shall create an attention condition on or before the last iuCRC within the failed information unit is acknowledged. When the target switches to a MESSAGE OUT phase the initiator shall send an INITIATOR DETECTED ERROR message (see 16.2.4) to the target. This message notifies the target that data in the information unit was invalid.

If an initiator detects a iuCRC error in a SPI status information unit the initiator shall create an attention condition on or before the iuCRC is acknowledged. If the target detects an attention condition it shall switch to a MESSAGE OUT phase and the initiator shall send an INITIATOR DETECTED ERROR message (see 16.2.4) or an ABORT TASK message to the target. These messages notify the target that the SPI status information unit was invalid.

Editors Note 1 - GOP: There was a suggestion that the initiator should be required to send out ABORT TASK instead of INITIATOR DETECTED ERROR. This would be more consistent with the behavior of the target in response to the message.

If the information unit that failed was not a SPI status information unit then the target shall send a SPI L_Q/SPI status information unit pair to the initiator with a CHECK CONDITION status and a sense key set to ABORTED COMMAND and an additional sense code set to INITIATOR DETECTED ERROR MESSAGE RECEIVED for the task associated with the received INITIATOR DETECTED ERROR message.

If the information unit that failed was a SPI status information unit and the message received was an INITIATOR DETECTED ERROR message then the target shall retry transferring the SPI L_Q/SPI status information unit pair to the initiator with the original status information.

If the information unit that failed was a SPI status information unit and the message received was an ABORT TASK message then the target shall cause a bus free by generating a BUS FREE phase.

If the initiator is receiving a SPI L_Q information unit and the initiator detects an iuCRC error (i.e., t nexus identification fails) while in the DT DATA IN phase the initiator shall create an attention condition on or before the iuCRC is acknowledged. When the target switches to a MESSAGE OUT phase the initiator shall send an INITIATOR DETECTED ERROR message (see 16.2.4) to the target. This message notifies the target that the nexus identification failed. The target shall then cause a bus free by generating a BUS FREE phase, however, the target shall not terminate the task associated with the failed SPI L_Q information unit.

1.2 Target detected information unit failures

Section 10.5.2.2.1.2 defines how errors are handled while running packets in DT DATA OUT phases. But the current description allows the target to optionally retry any packet. I propose to remove the retry option by changing this section to the following:

The target shall only respond to a iuCRC error after all the data in an information unit has been received.

If the nexus has been fully identified (i.e., an I_T_L_Q nexus has been established) and the target detects an iuCRC error in any SPI information unit it receives while in the DT DATA OUT phase the target shall, before receiving another SPI L_Q information unit, switchto a DT DATA IN phase and send a SPI L_Q/SPI status information unit pair to the initiator with a CHECK CONDITION status and a sense key set to ABORTED COMMAND and the additional sense code set to iuCRC ERROR DETECTED for the task associated with the iuCRC error.

If the target detects an iuCRC error on an iuCRC interval that is not at the end of a SPI information unit the target shall not respond to the error until all the bytes of the SPI information unit in which the error occurred have been transferred, however the target may discard the transmitted information.

If the target is receiving a SPI L_Q information unit and the target detects a iuCRC error(i.e., the nexus identification fails) the target shall cause an unexpected bus free by generating a BUS FREE phase (see 10.1.1).

1.3 Additional wording in SPI command information unit section (14.2.1)

The following addition to section 14.2.1 makes it clear that killing a command has no effect on commands already accepted by the target:

If the target terminates a SPI L_Q/SPI command information unit pair it shall have no effect on any other SPI L_Q/SPI command information unit pair.