To : T10 Technical Committee
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Subject : Proposed changes to SPI IU Exception Handling

SPI IU Exception Handling for DT DATA OUT phase

Section 10.8.3.3.4 in SPI-4 rev0 specifies the actions that a target shall take when it receives an information unit with an iuCRC error while in the DT DATA OUT phase. Specifically paragraph 2 states:

"*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, switch to 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.*"

These lines only cover the case of handling iuCRC errors during transfer of command IUs as that is the only time a target *receives* a SPI L_Q IU (as stated in line 3 of the paragraph). Hence we end up with SPI-4 not defining what needs to be done on iuCRC errors detected on data IUs or data stream IUs while in DT DATA OUT phase. If we DO try to apply paragraph 2 towards handling iuCRC errors on data IUs or data stream IUs, we end up with the strange requirement of having to send a SPI L_Q/status IU pair for the failed data IU ONLY while receiving commands from that initiator on a future bus connection. Hence we need to reword section 10.8.3.3.4 to address the issue of handling iuCRC errors for data IUs and data stream IUs. Hence I propose that we specify the way exceptions are handled in three separate paragraphs, one pertaining to command IUs, one pertaining to data IUs and the one pertaining to data stream IUs. Hence we need to add the following paragraphs after paragraph 2 in SPI-4:

"*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 data information unit it receives while in the DT DATA OUT phase the target shall, after receiving all the ACKs for the current SPI data information unit, switch to 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 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 data stream information unit it receives while in the DT DATA OUT phase the target shall terminate the write stream at the end of a data stream information unit, wait until the REQ/ACK offset goes to zero, switch to 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.*"

Further, paragraph 2 states that after an iuCRC error is detected on a command IU, the target shall change phases and transmit a SPI L_Q/status IU pair. This precludes the target from receiving any more commands from the initiator in the same bus connection. Hence I propose that the wordings in paragraph 2 be replaced with the following:

"*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 command*"

information unit it receives while in the DT DATA OUT phase 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 the additional sense code set to iuCRC ERROR DETECTED for the task associated with the iuCRC error. This SPI L_Q/SPI status information unit pair can be transmitted on the same or on a subsequent bus connection with the same initiator. Thus the receipt of a SPI command information unit with an iuCRC error does not preclude the target from receiving more commands from the initiator in the same bus connection."

SPI IU Exception Handling for DT DATA IN phase

Section 12.2 (Attention condition) states:

"*g) If the attention condition is detected during an information unit transfer, the target shall enter MESSAGE OUT phase at the completion of the current SPI information unit.*"

In case the negotiated offset happens to be greater than the size of the SPI data stream information unit, the word "current SPI information unit" is ambiguous. Does "current SPI information unit" refer to the one for which REQs are being sent or the one for which ACKs are being received? Also, paragraph 9 of section 14.3.4 in SPI-4 rev0 (or paragraph 10 in 00-378r0 - SPI-4 rev1 proposal):

"*In the event that the SPI data stream information unit size is smaller than the negotiated offset the target may continue the sequence of SPI data stream information units across two SPI data stream information units but not three.*"

is inconsistent with the requirement g) stated in section 12.2 as the target cannot stop at the current SPI IU boundary (assuming "current" means "all ACKs received from the initiator for the SPI data stream IU") since it has already sent REQs for the "next" SPI data stream IU. Hence, I propose that g) in section 12.2 be reworded as follows:

"*g) If the attention condition is detected during an information unit transfer other than a SPI data stream information unit, the target shall enter MESSAGE OUT phase at the completion of (i.e. after receiving all the ACKs from the initiator) the current SPI information unit. If the attention condition is detected during the transfer of a SPI data stream information unit, the target shall terminate the current stream by entering into MESSAGE OUT phase at the end of any SPI data stream information unit in the current stream.*"