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To: **T10 SAS Protocol Working Group**
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Subject: **SAS-1.1, adding the Terminate Data Transfer protocol service**

Introduction

This proposal adds elements required for the new Terminate Data Transfer protocol service and transport layer retries, and includes several corrections and editorial comments. Other changes required were contained in 04-137 SAS-1.1, ST_T (transport layer for SSP target ports) state machines and 04-277 SAS-1.1, ST_I (transport layer for SSP initiator ports) state machines). This revision of the proposal is based on SAS1r05 and includes input from the SAS Working Group, November 8th, 2004, in Austin, TX. Some of the editor's notes from previous revisions of this proposal have been removed in this revision.

GLOBAL NOTE: The editor of the SAS draft will develop and add a definition for "read data" and "write data". These new terms will then be used throughout the document and be used to replace "data-in data" and "data-out data" in this proposal and the standard as appropriate. The editor will also check on the usage of the terms "data-in command" and "data-out command" to see that these are used correctly in the draft standard.

Item 1) In subclause **4.5 I_T nexus loss,** change as follows:
.....
If the time expires, then the port shall send a Nexus Loss~~t~~ event notification to the SCSI application layer (see 10.2.4)~~; t~~ The SCSI device shall perform the actions defined for I_T nexus loss in SAM-3.

An I_T nexus loss event based on the above conditions is handled by the port layer state machine (see 8.2.2.3).

If an SSP target port checks for duplicate tags and receives a COMMAND frame with a tag that is already in use for a task management function or a TASK frame with a tag that is already in use for a command or another task management function, then the SSP target port shall send a Nexus Loss event notification to the SCSI application layer (see 10.2.4). The SCSI device shall perform the actions defined for I_T nexus loss in SAM-3. An I_T nexus loss event based on the above conditions is handled by the SSP transport layer state machine (see 9.2.6.3.2).

Item 2) In **Figure 112 - PL_OC (port layer overall control) state machine** in subclause **8.2.2.1 PL_OC state machine overview**, add a Cancel message arrow from PL_OC2:Overall_Control state to the PL_PM state machines.

Item 3) In subclause **8.2.2.3.7 PL_OC2:Overall_Control state frame transmission cancellations**, change as follows:

Cancel requests cause this state to cancel previous Transmit Frame requests. A Cancel request <u>shall </u>include~~s~~ the following arguments:

    a)   the destination SAS address; and
    b)   the tag.

If this state receives a Cancel request and <u>has not sent </u>a Tx Frame message ~~has not been sent~~to a PL_PM state machine <u>for the Transmit Frame request specified by the Cancel request</u>, then this state shall:

    a)   discard ~~the~~<u>all </u>Transmit Frame request<u>s for the destination SAS address and tag</u>; and
    b)   send a Transmission Status (Cancel Acknowledge) confirmation to the transport layer.

If this state receives a Cancel request and a Tx Frame message <u>has been sent to a PL_PM state machine </u>for the Transmit Frame request ~~has been sent to a PL_PM state machine~~<u>specified by the Cancel request</u>, then this state shall ~~discard the request~~send a Cancel message to the PL_PM state machine to which the Tx Frame message was sent. The Cancel message shall include the tag.

Item 4) In **Figure 114 - PL_PM (port layer phy manager) state machine (part 2)** in subclause **8.2.3.1 PL_PM state machine overview**, add a Cancel message arrow from the PL_OC state machine to the PL_PM3:Connected state.

Item 5) In subclause **8.2.3.4.1 PL_PM3:Connected state description**, add the following after the paragraph that begins, "If this state receives an ACK/NAK Timeout confirmation...":

<u>If this state receives a Cancel message, then this state shall:</u>

    a)   <u>discard all Tx Frame requests for the destination SAS address and tag;</u>
    b)   <u>send a Transmission Status (Cancel Acknowledge) confirmation to the transport layer including the destination SAS address and the tag as arguments; and</u>
    c)   <u>discard any subsequent confirmations for previous Tx Frame requests sent for the tag.</u>

Item 6) In subclause **9.1 Transport layer overview**, change as follows:

The transport layer defines frame formats. Transport layer state machines interface to the application layer and port layer and construct and parse frame contents. For SSP, the transport layer only receives frames from the port layer ~~that are going to be ACKed ~~<u>for which an ACK is going to be transmitted</u> by the link layer.

Item 7) In subclause **9.2.1 SSP frame format**, change as follows:
.....
For COMMAND <u>frames </u>and TASK frames, the SSP initiator port shall set the TAG field to a value that is unique for the I_T nexus established by the connection (see 7.12). An SSP initiator port shall not reuse the same tag when transmitting COMMAND <u>frames </u>or TASK frames to different logical units in the same SSP target port.~~; it~~ <u>An SSP initiator port </u>may reuse a tag when transmitting frames to different SSP target ports. The TAG field in a COMMAND frame contains the task tag defined in SAM-3. The tag field in a TASK frame does not correspond to a SAM-3 task tag, but corresponds to a SAM-3 association (see 10.2.1). The tag space used in the TAG fields is shared across COMMAND <u>frames </u>and TASK frames (e.g., if a tag is used for a COMMAND frame, it is not ~~simultaneously~~used for a <u>concurrent </u>TASK frame).
.....
The TARGET PORT TRANSFER TAG field provides an additional optional method for an SSP target port to establish a ~~write~~<u>data-out</u> data context when ~~receiving DATA frames while ~~it has ~~multiple~~<u>more than one </u>XFER_RDY frame~~s~~ outstanding <u>(i.e., the SSP target port has sent an XFER_RDY frame for each of two or more commands and has not received all of the data requested by the XFER_RDY frames)</u>. SSP target ports may set the TARGET PORT TRANSFER TAG field to any value when transmitting a frame. SSP target ports that

use this field should set the field in every XFER_RDY frame to a value that is unique for the L_Q portion of the I_T_L_Q nexus.

.....

Item 8) In subclause **9.2.2 Information units**, change as follows:

.....

9.2.2.1 COMMAND information unit

.....

The LOGICAL UNIT NUMBER field contains the address of the logical unit. The structure of the ~~logical unit number~~ LOGICAL UNIT NUMBER field shall be as defined in SAM-3. If the addressed logical unit does not exist, the task manager shall follow the rules for selection of invalid logical units defined in SAM-3.

~~An~~If the ENABLE FIRST BURST bit is set to one ~~specifies that~~, then the SSP target port shall transfer first burst data for the command ~~shall be transferred~~ as defined by the FIRST BURST SIZE field in the Disconnect-Reconnect mode page (see 10.2.6.1). ~~An~~If the ENABLE FIRST BURST bit is set to zero ~~specifies that~~, then the SSP target port shall not transfer ~~first burst size field in the Disconnect-Reconnect mode page shall be ignored (i.e., there shall be no~~ first burst data ~~transferred~~ for the command~~)~~. Application clients shall only set the ENABLE FIRST BURST bit to one if:

  a) the FIRST BURST SIZE field in the Disconnect-Reconnect mode page is non-zero or changeable; and
  b) the logical unit and target port comply with SAS-1.1 or later (e.g., as reported in the standard INQUIRY data version descriptors (see SPC-3)).

The TASK ATTRIBUTE field is defined in table 99.

Table 99 — TASK ATTRIBUTE **field**

Code	Task attribute	Description
000b	SIMPLE	~~Requests~~Specifies that the task is to be managed according to the rules for a simple task attribute (see SAM-3).
001b	HEAD OF QUEUE	~~Requests~~Specifies that the task is to be managed according to the rules for a head of queue task attribute (see SAM-3).
010b	ORDERED	~~Requests~~Specifies that the task is to be managed according to the rules for an ordered task attribute (see SAM-3).
011b	Reserved	
100b	ACA	~~Requests~~Specifies that the task is to be managed according to the rules for an automatic contingent allegiance task attribute (see SAM-3).
101b-111b	Reserved	

.....

9.2.2.4 DATA information unit

.....

~~The~~A DATA frame transmitted by an SSP initiator port shall only contain ~~write~~data-out data for a single XFER_RDY frame.

.....

~~If an SSP target port transmits a DATA frame containing a non-zero value in the number of fill bytes field in the frame header (see 9.2.1), the SSP target port shall not transmit any subsequent DATA frames for that command (i.e., only the last read DATA frame for a command may have data with a length that is not a multiple of four).~~

An SSP target port shall set the NUMBER OF FILL BYTES field (see 9.2.1) to zero in all DATA frames transmitted for a data-in command except the last DATA frame transmitted for the command. An SSP target port may set the NUMBER OF FILL BYTES field to a non-zero value in the last DATA frame that is transmitted for a data-in command (i.e., only the last DATA frame for a command may contain a quantity of data that is not multiple of four bytes).

An SSP initiator port shall set the NUMBER OF FILL BYTES field to zero in all DATA frames transmitted in response to an XFER_RDY frame except the last DATA frame transmitted for the XFER_RDY frame. An SSP initiator port may set the NUMBER OF FILL BYTES field to a non-zero value in the last DATA frame ~~that it transmits~~transmitted in response to an XFER_RDY frame. ~~An SSP initiator port shall set the number of fill bytes field in the frame header (see 9.2.1) to zero in all other DATA frames that it transmits.~~

> NOTE 1 - Combined with the restrictions on the WRITE DATA LENGTH field in the XFER_RDY frame (see 9.2.2.3), this ensures that only the data contained in the last ~~write~~ DATA frame for a data-out command may ~~have data with a length that is~~ not be a multiple of four bytes).

.....

9.2.2.5.1 RESPONSE information unit overview

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~~The SSP target port shall return a RESPONSE frame with the DATAPRES field set to NO_DATA if a command completes without sense data to return.~~

If a command completes without sense data to return, then an SSP target port shall return a RESPONSE frame with the DATAPRES field set to NO_DATA.

~~The~~An SSP target port shall return a RESPONSE frame with the DATAPRES field set to RESPONSE_DATA in response to every TASK frame and in response to errors that occur while the transport layer is processing a COMMAND frame.

~~The SSP target port shall return a RESPONSE frame with the DATAPRES field set to SENSE_DATA if a command completes with sense data to return (e.g., CHECK CONDITION status).~~

If a command completes with sense data to return (e.g., CHECK CONDITION status), then the SSP target port shall return a RESPONSE frame with the DATAPRES field set to SENSE_DATA.
.....

9.2.2.5.2 RESPONSE information unit NO_DATA format

If the DATAPRES field is set to NO_DATA, then:

    a)   the SSP target port shall set the STATUS field ~~shall contain~~to the status code for a command that has ended (see SAM-3 for a list of status codes);
    b)   the SSP target port shall set the SENSE DATA LENGTH field and the RESPONSE DATA LENGTH field ~~shall be set~~to zero~~and shall be ignored by~~;
    c)   the SSP target port shall not include the SENSE DATA field and the RESPONSE DATA field; and
    d)   the SSP initiator port shall ignore the SENSE DATA field ~~or~~and the RESPONSE DATA field~~shall not be present~~.

9.2.2.5.3 RESPONSE information unit RESPONSE_DATA format

If the DATAPRES field is set to RESPONSE_DATA, then:

    a)   the SSP target port shall set the STATUS field and the SENSE DATA LENGTH field ~~shall be set~~to zero~~and shall be ignored by~~;
    b)   the SSP initiator port shall ignore the STATUS field and THE SENSE DATA LENGTH field;
    c)   the SSP target port shall not include the SENSE DATA field~~shall not be present~~;
    d)   the SSP target port shall set the RESPONSE DATA LENGTH field ~~shall be set~~to four. Other lengths are reserved for future standardization; and
    e)   the SSP target port shall include the RESPONSE DATA field~~shall be present~~.

~~Table 106 defines t~~The RESPONSE DATA field~~, which~~ contains information describing protocol failures detected during processing of a request received by the SSP target port. The RESPONSE DATA field shall be present if the SSP target port detects any of the conditions described by a non-zero value in the RESPONSE CODE field~~value~~ and shall be present for a RESPONSE frame sent in response to a TASK frame. Table 106 defines the RESPONSE DATA field.

~~Table 107 defines t~~The RESPONSE CODE field~~, which~~ indicates the error condition or the completion status of a task management function. See 10.2.1.5 and 10.2.1.13 for the mapping of these response codes to SCSI service responses. Table 107 defines the RESPONSE CODE field.

.....

9.2.2.5.4 RESPONSE information unit SENSE_DATA format

If the DATAPRES field is set to SENSE_DATA, then:

   a) the SSP target port shall set the STATUS field~~shall contain~~ to the status code for a command that has ended (see SAM-3 for a list of status codes);
   b) the SSP target port shall set the RESPONSE DATA LENGTH field~~shall be set~~ to zero~~and shall be ignored by the initiator~~;
   c) the SSP initiator port shall ignore the RESPONSE DATA LENGTH field;
   d) the SSP target port shall not include the RESPONSE DATA field~~shall not be present~~;
   e) the SSP target port shall set the SENSE DATA LENGTH field ~~shall be set~~to a non-zero value indicating the number of bytes in the SENSE DATA field. The SSP target port shall not set the value in the SENSE DATA LENGTH field ~~shall not be larger~~to be greater than 1 000 (see table 2); and
   f) the SSP target port shall set the SENSE DATA field ~~shall contain~~to the sense data (see SAM-3).

~~T~~If ~~t~~he value in the SENSE DATA LENGTH field ~~need~~is not ~~be~~ a multiple of four~~. If it is not~~, then the value in the NUMBER OF FILL BYTES field in the SSP frame header is non-zero and fill bytes are present.

.....

Item 9) In subclause **9.2.4 SSP transport layer handling of link layer errors**, change as follows:
.....

9.2.4.3 TASK frame - handling of link layer errors

.....

If the SSP initiator port receives a RESPONSE frame for ~~the~~a TASK frame that arrives before ~~the~~an ACK or NAK for the TASK frame, then the TASK frame was received (i.e., the SSP target port sent an ACK~~ed for the frame~~, the RESPONSE frame is valid, and the task management function is complete). The initiator port may reuse the tag of the TASK frame.

If ~~A~~an SSP initiator port does not receive an ACK for a TASK frame, the SSP initiator port should retransmit ~~each~~the TASK frame ~~that does not receive an ACK~~ at least one time.

.....

9.2.4.4.1 XFER_RDY frame overview

If ~~an SSP target port has~~the TRANSPORT LAYER RETRIES bit is set to one in the Protocol-Specific Logical Unit mode page (see 10.2.6.3), then ~~it~~the SSP target port processes ~~XFER_RDY frame~~ link layer errors that occur for XFER_RDY frames as described in 9.2.4.4.2.

If ~~an SSP target port has~~the TRANSPORT LAYER RETRIES bit is set to zero, then ~~it~~the SSP target port processes ~~XFER_RDY frame~~ link layer errors that occur for XFER_RDY frames as described in 9.2.4.4.3.

.....

9.2.4.5.2 DATA frame with transport layer retries

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If an SSP initiator port is transmitting DATA frames during the next connection established for an I_T_L_Q nexus after the previous connection for that nexus was closed with a DONE (ACK/NAK TIMEOUT).~~While processing the lack of ACK or NAK, if~~ and that SSP initiator port receives a~~n~~ ~~new~~ XFER_RDY frame or a RESPONSE frame for the command, then the SSP initiator port should stop sending DATA frames for the command and ~~it~~ process~~es~~ the XFER_RDY frame or RESPONSE frame ~~and should stop sending the retransmitted write DATA frames~~. ~~It~~The SSP initiator port does not send a ~~write~~data-out DATA frame for the previous XFER_RDY frame after sending a ~~write~~data-out DATA frame ~~for~~ in response to the new XFER_RDY frame.

If an SSP initiator port transmits a ~~write~~data-out DATA frame and receives a NAK for that frame, it retransmits, in the same or in a new connection, all the ~~write~~data-out DATA frames for the previous XFER_RDY frame.

For both data-in and data-out operations~~reads and writes~~, the CHANGING DATA POINTER bit is set to one in the first retransmitted DATA frame. ~~has its CHANGING DATA POINTER bit set to one and subsequent DATA frames have their~~ The CHANGING DATA POINTER bits is set to zero in subsequent DATA frames for the operation.

An SSP port retransmits each DATA frame that does not receive an ACK at least one time. The number of times it retransmits each DATA frame is vendor-specific.

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9.2.4.6 RESPONSE frame - handling of link layer errors

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If an SSP target port transmits a RESPONSE frame and receives a NAK for that frame, it retransmits the RESPONSE frame at least one time with the RETRANSMIT bit set to ~~zero~~one (see 9.2.6.3.3.8).

.....

Item 10) In subclause **9.2.5 SSP transport layer error handling**, change as follows:

9.2.5.1~~2~~ SSP initiator port transport layer error processing summary

[editor's note: the cross-references in this subclause to numbers in subclauses in 9.2.6.2 ST_I (transport layer for SSP initiator ports) state machines are based on the subclause numbering in proposal 04-277r1.]

This subclause contains a summary of how an SSP initiator port processes transport layer errors. This summary does not include every error case. For each instance in this subclause there is at least one cross reference to where specific behavior is defined in this standard.

If an SSP initiator port receives a COMMAND frame, ~~or~~ TASK frame, or ~~an~~other unsupported frame type, ~~it shall~~then the SSP initiator port discards the frame (see 9.2.6.2.2~~5~~).

If an SSP initiator port receives a DATA frame, XFER_RDY frame, or RESPONSE frame with an unknown TAG field value (including a tag for which it has sent a COMMAND frame or TASK frame but not yet received an ACK for that frame), ~~it shall~~then the SSP initiator port discards the frame. ~~It~~The SSP initiator port may then abort the command with that tag (see 9.2.6.2.2~~5~~).

If an SSP initiator port receives an XFER_RDY frame that is not 12 bytes long, ~~it shall~~then the SSP initiator port discards the frame (see 9.2.6.2.2). ~~It~~The SSP initiator port may then abort the command with that tag (see 10.2.2).

If an SSP initiator port receives an XFER_RDY frame in response to a command with no ~~write~~data-out data, ~~it shall~~then the SSP initiator port discards the frame (see 9.2.6.2.2). ~~It shall~~The SSP initiator port then abort~~s~~ the command with that tag (see 10.2.2).

If an SSP initiator port receives an XFER_RDY frame requesting more ~~write~~data-out data than expected, ~~it shall~~then the SSP initiator port discards the frame (see 9.2.6.2.3.3.1) and abort~~s~~ the command (see 10.2.2).

If an SSP initiator port receives an XFER_RDY frame requesting zero bytes, ~~it shall~~then the SSP initiator port discards the frame (see 9.2.6.2.3.3.1) and abort~~s~~ the command (see 10.2.2).

If an SSP initiator port receives an XFER_RDY frame with a requested offset that was not expected, ~~it shall~~then the SSP initiator port discards the frame (see 9.2.6.2.3.3.1) and aborts the command (see 10.2.2).

If an SSP initiator port receives a RESPONSE frame that is not the correct length and the RESPONSE frame was for a command, then this state sends a Command Complete Received confirmation to the SCSI application layer with the Service Response argument set to Service Delivery or Target Failure (see 10.2.1.5).

If an SSP initiator port receives a RESPONSE frame that is not the correct length and the RESPONSE frame was for a task management function, then this state sends a Received Task Management Function – Executed confirmation to the SCSI application layer with the Service Response argument set to Service Delivery or Target Failure (see 10.2.1.13).

If an SSP initiator port receives a RESPONSE frame that is not the correct length, then this state discards the frame after sending a Command Complete Received confirmation or a Received Task Management Function – Executed confirmation to the SCSI application layer (see 9.2.6.2).

If an SSP initiator port receives a DATA frame with more read data than expected, ~~it shall~~then the SSP initiator port discards the frame (see 9.2.6.2.3.7.1) and aborts the command (see 10.2.2). ~~It may~~If the SSP initiator port receives a RESPONSE frame for the command before being able to abort the command, then the SSP initiator port discards the RESPONSE frame.

If an SSP initiator port receives a DATA frame with zero bytes, ~~it shall~~then the SSP initiator port discards the frame (see 9.2.6.2.3.7.1) and aborts the command (see 10.2.2). ~~It may~~If the SSP initiator port receives a RESPONSE frame for the command before being able to abort the command, then the SSP initiator port discards the RESPONSE frame.

If an SSP initiator port receives a DATA frame with a data offset that was not expected, ~~it shall~~then the SSP initiator port discards that frame and any subsequent DATA frame received for that command (see 9.2.6.2.3.7.1) and aborts the command (see 10.2.2). ~~It may~~If the SSP initiator port receives a RESPONSE frame for the command before being able to abort the command, then the SSP initiator port discards the RESPONSE frame.

9.2.5.2~~1~~ SSP target port transport layer error handling summary

This subclause contains a summary of how an SSP target port processes transport layer errors. This summary does not include every error case. For each instance in this subclause there is at least one cross reference to where specific behavior is defined in this standard.

If an SSP target port receives an XFER_RDY frame or ~~an~~other unsupported frame type, then the SSP target port ~~shall~~discards the frame (see 9.2.6.3.2).

If an SSP target port receives a COMMAND frame, and the frame is too short to contain a LUN field~~;~~ or the frame is too short to contain a CDB~~; or c) the ADDITIONAL CDB LENGTH field indicates the frame should be a different length~~, then the SSP target port ~~shall~~returns a RESPONSE frame with the DATAPRES field set to RESPONSE_DATA and the RESPONSE CODE field set to INVALID FRAME (see 9.2.6.3.3.8.1).

If an SSP target port receives a COMMAND frame, and the ADDITIONAL CDB LENGTH field specifies that the frame should be a different length, then the SSP target port returns a RESPONSE frame with the DATAPRES field set to RESPONSE_DATA and the RESPONSE CODE field set to INVALID FRAME (see 9.2.6.3.3.8.1).

If an SSP target port receives a TASK frame that is too short, ~~it shall~~then the SSP target port returns a RESPONSE frame with the DATAPRES field set to RESPONSE_DATA and the RESPONSE CODE field set to INVALID FRAME (see 9.2.6.3.3.8.1).

If an SSP target port receives a COMMAND frame with a tag that is already in use for another command, then the SSP target port may return a CHECK CONDITION status with a sense key of ABORTED COMMAND and an additional sense code of OVERLAPPED COMMANDS DETECTED (see 10.2.1.3).

If an SSP target port receives a COMMAND frame with a tag that is already in use for a task management function or a TASK frame with a tag that is already in use for a command or another task management function, then the SSP target port may process this as an I_T nexus loss event~~return a RESPONSE frame with the datapres field set to RESPONSE_DATA and the response code field set to INVALID FRAME~~ (see 9.2.6.3.2).

If an SSP target port receives a DATA frame with an unknown tag, ~~it shall~~then the SSP target port discards the frame (see 9.2.6.3.2).

If an SSP target port receives a DATA frame that does not contain first burst data and for which there is no XFER_RDY frame outstanding (i.e., the SSP target port has received all data requested by any XFER_RDY frames sent for a command), ~~it shall~~then the SSP target port discards the frame (see 9.2.6.3.2).

If an SSP target port receives a TASK frame with an unknown logical unit number, ~~it shall~~then the SSP target port returns a RESPONSE frame with the DATAPRES field set to RESPONSE_DATA and the RESPONSE CODE field set to INVALID LOGICAL UNIT NUMBER (see 9.2.6.3.2).

If an SSP target port receives a COMMAND frame or TASK frame with a target port transfer tag set to a value other than FFFFh, then the SSP target port may return a RESPONSE frame with the DATAPRES field set to RESPONSE_DATA and the RESPONSE CODE field set to INVALID FRAME (see 9.2.6.3.2).

If an SSP target port is using target port transfer tags and it receives a DATA frame with an unknown target port transfer tag, ~~it shall~~then the SSP target port discards the frame (see 9.2.6.3.2~~3~~).

If an SSP target port receives a DATA frame with a data offset that was not expected, ~~it shall~~then the SSP target port discards that frame ~~and any subsequent DATA frames received for that command~~ and ~~shall~~terminates the command with a CHECK CONDITION status with a sense key of ABORTED COMMAND and an additional sense code of DATA OFFSET ERROR. The SSP target port then discards any subsequent DATA frames received for that command (see 9.2.6.3.3.6.1~~10.2.3~~).

If an SSP target port receives a DATA frame with more ~~write~~data-out data than expected (i.e., the length of the DATA frame ~~extends past the end of~~is longer than the expected ~~write~~data-out data length), ~~it shall~~then the SSP target port discards the frame and terminates the command with a CHECK CONDITION status with a sense key of ABORTED COMMAND and an additional sense code of TOO MUCH WRITE DATA (see 9.2.6.3.3.6.1~~10.2.3~~).

If an SSP target port receives a zero length DATA frame, ~~it shall~~then the SSP target port discards the frame and terminates the command with a CHECK CONDITION status with a sense key of ABORTED COMMAND and an additional sense code of INFORMATION UNIT TOO SHORT (see 9.2.6.3.3.6.1~~10.2.3~~).

Item 10) In subclause **9.2.6.2.2 ST_IFR (initiator frame router) state machine** [note: this is from 04-277r1], change as follows:
.....
If the frame type is RESPONSE then this state machine shall check the length of the information unit. If the length of the information unit is not correct and the RESPONSE frame was for a command, then this state shall send a Command Complete Received confirmation to the SCSI application layer with the Service Response argument set to Service Delivery or Target Failure. If the length of the information unit is not correct and the RESPONSE frame was for a task management function, then this state shall send a Received Task Management Function – Executed confirmation to the SCSI application layer with the Service Response argument set to Service Delivery or Target Failure. After sending a Command Complete Received confirmation or a Received Task Management Function – Executed confirmation to the SCSI application layer for a RESPONSE frame that is not the correct length, the SSP initiator port shall discard the frame.
.....

Item 11) In subclause **9.2.6.3.2 ST_TFR (target frame router) state machine** immediately under **Table 110 — Overlapped tag conditions and actions**, add, "If the frame type is TASK and this state machine does not check the tag, then this state machine shall ignore the RETRANSMIT bit."

Item 12) In subclause **9.2.6.3.2 ST_TFR (target frame router) state machine**, change as follows:
.....
If the frame type is ~~COMMAND or~~ TASK, then this state machine shall check the logical unit number. If the logical unit number is unknown, then this state machine shall send a Request (Send Transport Response) message with an argument of Invalid Logical Unit Number to the ST_TTS1:Target_Start state in an ST_TTS

state machine that does not have an active task.
.....
If this state machine sends a Request (Send Transport Response) message to an ST_TTS state machine as the result of this state machine receiving an invalid frame, then the message shall include the following arguments:

    a)   the connection rate;
    b)   the initiator connection tag;
    c)   the destination SAS address;
    d)   the source SAS address; and
    e)   the tag.

If this state machine sends a Request (Send Transport Response) message to an ST_TTS state machine as the result of this state machine receiving an invalid frame, then this state machine shall discard the frame.

Item 13) In **Table 123 — Command Complete Received transport protocol service arguments** in subclause **10.2.1.5 Command Complete Received transport protocol service**, change item (c) in the Service Response argument to be:

SERVICE DELIVERY OR TARGET FAILURE: The RESPONSE frame is the incorrect length, the RESPONSE frame contains a DATAPRES field set to RESPONSE_DATA and a RESPONSE CODE field set to INVALID FRAME, or a NAK was received for the COMMAND frame was NAKed.

Item 14) In **Table 131 — Received Task Management Function-Executed transport protocol service arguments** in subclause **10.2.1.13 Received Task Management Function-Executed transport protocol service**, change item (d) in the Service Response argument to be:

SERVICE DELIVERY OR TARGET FAILURE: The RESPONSE frame is the incorrect length, the RESPONSE frame contains a DATAPRES field set to RESPONSE_DATA and a RESPONSE CODE field set to INVALID FRAME or TASK MANAGEMENT FUNCTION FAILED, or a NAK was received for the TASK frame was NAKed.

Item 15) In subclause **10.2.2 Application client error handling**, remove the following because the retransmit bit checking is all done at the transport layer:
.....
If an application client calls Send Task Management Request () and an SSP initiator port calls Received Task Management Function Executed () and delivers a Service Response of Service Delivery or Target Failure -ACK/NAK Timeout, the application client should call Send Task Management Request () again with identical arguments except with the Retransmit argument set to one.

If an application client calls Send SCSI Command () and an SSP initiator port calls Command Complete Received () a second time for the command, and the second call includes a Retransmit argument set to one, the application client shall ignore the second call.

If an application client calls Send Task Management Request () and an SSP initiator port calls Received Task Management Function Executed () a second time for the task management function, and the second call includes a Retransmit argument set to one, the application client shall ignore the second call.

Item 16) In **Table 133 — SCSI transport protocol events** in subclause **10.2.4 SCSI transport protocol event notifications**, change as follows:

Event notification	SAS SSP implementation
Transport Reset	Receipt of a hard reset sequence (see 4.4.2)
Nexus Loss~~t~~	Receipt of specific OPEN_REJECTs for a specific time period <u>or duplicate tag condition causing an I_T nexus loss event </u>(see 4.5)