

T10/06-489 revision 0

Date: November 03, 2006

To: T10 Committee (SCSI)

From: George Penokie (IBM)

Subject: SAS-2: Transport layer initiator read data flowchart

1 Overview

What follows is a flowchart that represents the transport layers handling of read data operations at the SCSI initiator that are handled in the ST_ITS6:Receive_Data_In state.

It is not intention of this proposal nor is this proposal requesting the inclusion of these flowcharts into the SAS-2 standard as these flowcharts do not represent all the operations handled by the transport layer. However, it is intended that any future proposal that would impact the area of the transport layer covered by these flowcharts will be required to use them to show how any proposed change would effect the these flowcharts. The source code of the flowcharts is Visio and will be available for modification.

In the process of converting the words that are currently in SAS-2 there were no errors found, however, some of the wording may be somewhat unclear. See below the flowcharts for the suggested changes.

2 ST_ITS transport layer read data flowchart

DATA OFFSET field = Contains the first offset location into read data buffer for the current DATA information unit
 Data-In Buffer Offset = Offset into read data buffer for the last received data frame.
 Data-In Buffer Size = The number of bytes to be read as requested by the application client.

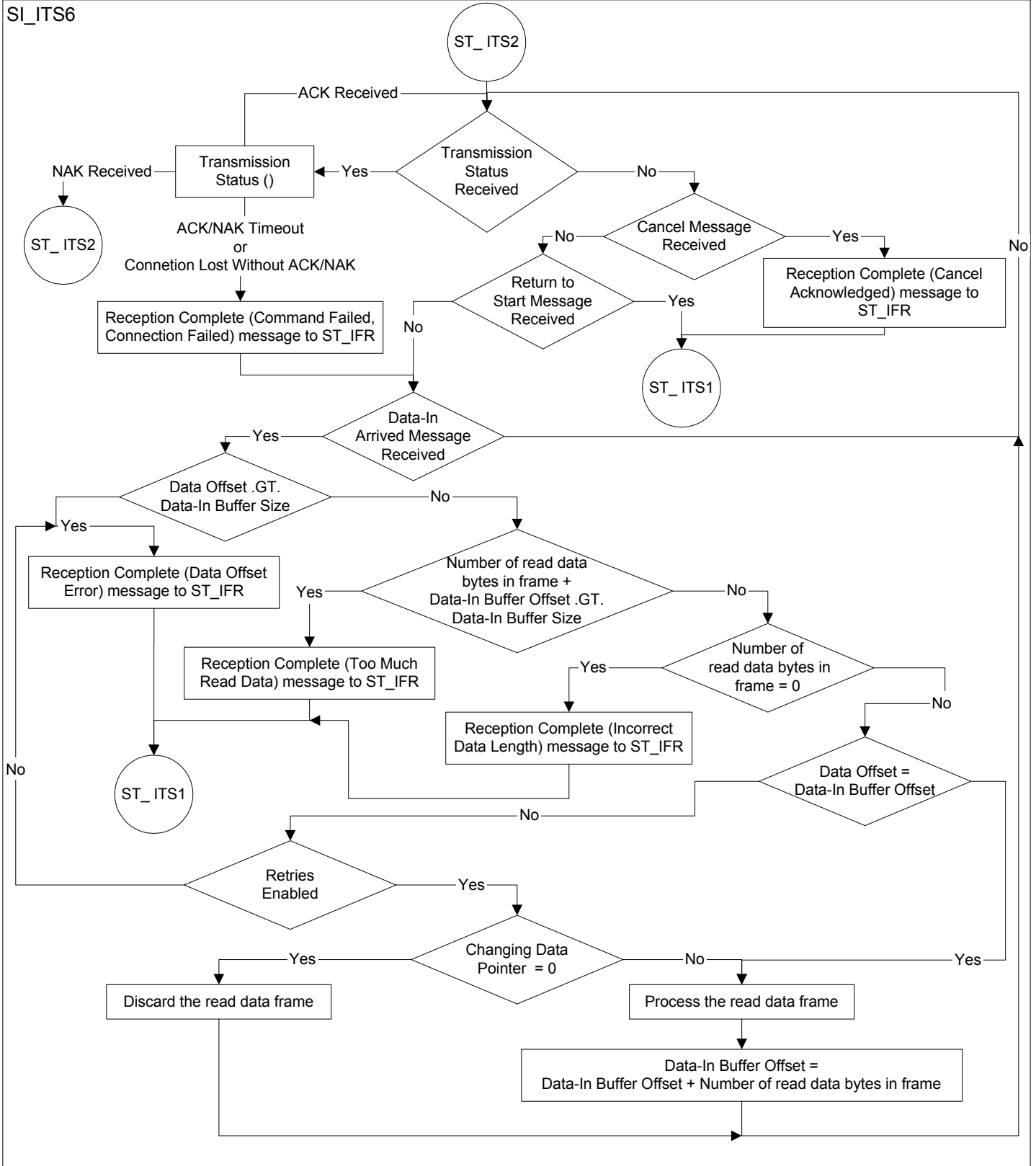


Figure 1 — Representation of transport layer (i.e., ST_TTS6) read data operation

3 Recommended changes to SAS-2

9.2.6.2.3.7 ST_ITS6:Receive_Data_In state

9.2.6.2.3.7.1 State description

If this state receives a Data-In Arrived message, then this state shall verify the values in the read DATA frame received with the message as defined in table 1.

If the verification fails, then this state sends the Reception Complete message specified in table 1 to the ST_IFR state machine.

Table 1 — Reception Complete messages for read DATA frame verification failures

Message sent to ST_IFR ^a	Condition
Reception Complete (Data Offset Error)	Transport layer retries are disabled, and the DATA OFFSET field in the read DATA frame is not equal Data-In Buffer Offset state machine variable.
	The DATA OFFSET field in the read DATA frame is greater than the Data-In Buffer Size state machine argument.
Reception Complete (Too Much Read Data)	The number of bytes in the DATA field in the read DATA information unit plus the Data-In Buffer Offset state machine variable is greater than the Data-In Buffer Size state machine argument.
Reception Complete (Incorrect Data Length)	The number of bytes in the DATA field in the read DATA information unit is zero.
^a If more than one condition is true, then this state shall select which message to send to the ST_IFR state machine using the following order: 1) Reception Complete (Data Offset Error); 2) Reception Complete (Too Much Read Data); or 3) Reception Complete (Incorrect Data Length).	

If:

- a) transport layer retries are enabled;
- b) the CHANGING DATA POINTER bit is set to zero;
- c) the DATA OFFSET field is not set to the Data-In Buffer Offset state machine variable;
- d) the DATA OFFSET field is less than the Data-In Buffer Size state machine argument; and
- e) the DATA OFFSET field plus the ~~length of the Data~~ [number of bytes in the DATA field in the read DATA](#) information unit information unit is less than or equal to the Data-In Buffer Size state machine argument,

then this state should discard all Data-In Arrived messages until a read DATA frame is received in which the CHANGING DATA POINTER bit is set to one. This state shall resume processing additional Data-In Arrived messages when it receives a Data-In Arrived message with the CHANGING DATA POINTER bit set to one.

If the verification succeeds or after this state resumes processing Data-In Arrived messages, then this state shall process the data received in the read DATA frame and set the Data-In Buffer Offset state machine variable to the DATA OFFSET field plus the ~~length of the Data~~ [number of bytes in the DATA field in the read DATA](#) information unit.

If this state receives Transmission Status (ACK/NAK Timeout) or Transmission Status (Connection Lost Without ACK/NAK), then this state shall send a Reception Complete (Command Failed, Connection Failed) to the ST_IFR state machine.

After this state sends a Reception Complete (Command Failed, Connection Failed) message, this state shall continue processing messages and confirmations.

NOTE 1 - The application client may determine the command was received and is being processed by the device server and allow the command to complete.

If this state receives a Cancel message, then this state shall send a Reception Complete (Cancel Acknowledged) message to the ST_IFR state machine. The Reception Complete message shall include the tag as an argument.

NOTE 2 - The Cancel message results from a vendor-specific request from the SCSI application layer after the SCSI application layer has used a task management function to determine that the SAS target port did not receive the COMMAND frame.