To: INCITS T10 Committee
From: Paul Suhler, Quantum
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Document: T10/07-438r1
Subject: ADT-2: SCSI Command IU to initiator only port

Quantum
BACKUP, RECOVERY, ARCHIVE... IT'S WHAT WE DO.

1 Revision History

Revision 0:
Initial revision posted to the T10 web site on 3 October 2007 by Paul Entzel.
Revision 1:
Revised after investigation per action item 07-060, 5 Nov 2007 working group meeting by Paul Suhler.

2 References

T10/SAM-3
T10/SAM-4 revision 13
T10/ADT-2 revision 5
T10/ADC-3 revision 00a
T10/SAS-2 revision 12
T10/FCP-4 revision 0a

3 General

This document proposes modifications to the ADT-2 standard to define how a port that does not support target mode should react to receiving a SCSI Command IU. The method adopted is that shown in ADT-2 rev. 5 clause B.8 Non-retryable error, including figure B.7.

ADT-2 ports are defined to be used for SCSI communications between medium changer devices and removable medium devices. To be effective, an ADT-2 SCSI Initiator port is required on the medium changer device and an ADT-2 SCSI Target port is required on the removable medium device.

ADC-2 also defined a method for the removable medium device to act as a transport layer protocol bridge between the SCSI port(s) used as the primary interface to the device and the ADT-2 ports. This feature allows commands to be addressed to an SMC device server within the automation device to be received by the SCSI ports in the removable medium device and bridged over via the ADT-2 link. For this feature to work, the ADT-2 ports on both ends of the link must be configured to operate as SCSI target/initiator ports.

Note: The term “SCSI target/initiator port” has been dropped from SAM-4, but the concept still exists and is denoted as a SCSI Port class that contains both a SCSI Initiator Port class and a SCSI Target Port class. Neither SAM-3 nor SAM-4 discusses the concept of a SCSI port that supports dynamic capabilities, but they also don’t explicitly forbid it.

Some transport protocols define methods within the link layer to report the target and initiator capabilities of the port. In FCP-4, this information is carried in the PRLI data. In SAS-2, this information is carried in the IDENTIFY frame. Although neither of these standards specifically discusses the concept of changing capabilities within a port, one would assume that the information that defines the capabilities would need to be resent should the capabilities change. ADT-2 does not provide a method to report the initiator and target capabilities of the port nor does it define a method to report changes in these capabilities.

This proposal adds text warning a port to not assume that the other port never will support initiator mode just because it rejects a SCSI command IU.

In the November 2007 working group meeting, it was pointed out that if a protocol error is detected, then ADT-2 4.3.2.4.1 requires that:

> "The port shall send a Recoverable Error Detected message to the receiver error recovery state machine if the port detects an error as defined in 4.6.1.3."

The result of that will be that:
1) The port will send a NAK with PR = 1; and
2) The Receiver Error state machine enters RE1:Pending Recovery. Once there, it won't exit until an Initiate Recovery IU is received.

There is actually no guidance on how to set the PR bit when reporting UNSUPPORTED FRAME TYPE FOR SELECTED PROTOCOL. I believe that we do not want to set the Pending Recovery (PR) bit, since the port state machine is not pending recovery. PR = 1 is for re-syncing the expected frame number. The case we have here is a non-retryable error and should be handled per clause B.8.

Moreover, I believe that the protocol error described in 4.6.1.3 are ADT link-level errors, not invalid values in the value of the PROTOCOL field of the frame header. So, I believe that the Port state machine should not send the message, and that is not incorporated in this proposal.

The uses of the UNSUPPORTED FRAME TYPE FOR SELECTED PROTOCOL status code are modified to include setting PR to 0.

Proposed additions are in blue, removed text is in ~~crossed-out red~~.

4 Changes to ADT-2

Clause 4.1

Modify the following paragraph from subclause 4.1 that immediately follows figure 3:

If ADI Bridging is enabled (see ADC-2), each ADT port in the DT device and automation device ~~acts as~~ is a SCSI target/initiator port. If ADI Bridging is disabled, the DT device port ~~acts as~~ is a SCSI target port and the automation device port ~~acts as~~ is a SCSI initiator port.

Clause 7.1.8

Add to subclause 7.1.8 titled “Reception of Encapsulated SCSI Information Units in exceptional circumstances” the following text:

If a port that does not support SCSI target functions receives a SCSI Command IU or a SCSI Task Management IU, then it shall transmit a NAK IU with the PR bit set to zero and a status code of UNSUPPORTED FRAME TYPE FOR SELECTED PROTOCOL (see table 14) and discard the IU.

> Note x: The exchange originator should not interpret this response as an indication that the port does not have SCSI target port capabilities, only that it does not have SCSI target port capabilities enabled at this time (see 4.1).

Clause 7.2.6

Add the indicated text to the second paragraph in this clause:

DT devices that do not support AER shall send a NAK IU in response with the PR bit set to zero and a status code of UNSUPPORTED FRAME TYPE FOR SELECTED PROTOCOL (see table 14).

Clause 7.2.7.2

Add the indicated text to the third paragraph in this clause:

If an automation device port receives a VHF Data IU for a nonexistent exchange, then it shall transmit a NAK IU with a status code of INVALID EXCHANGE ID (see table 14) and discard the VHF Data IU. If a DT device port receives a VHF Data IU, then it shall transmit a NAK IU with the PR bit set to zero and a status code of UNSUPPORTED FRAME TYPE FOR SELECTED PROTOCOL (see table 14) and discard the VHF Data IU.

Clause 7.2.7.4

Add the indicated text to the second paragraph in this clause:

If a DT device port receives an AER Data IU, then it shall transmit a NAK IU with the PR bit set to zero and a status code of UNSUPPORTED FRAME TYPE FOR SELECTED PROTOCOL (see table 14) and discard the AER Data IU.