Accredited Standards Committee
X3, Information Processing Systems

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Reply to: John Scheible

To: X3T10.1 Membership
From: John Scheible

Subject: SSA-S3P support of CA and ACA proposal

BACKGROUND

Revision 1 of this proposal is an update of revision 0 written for SSA-S2P back in June of 1995. Revision 1 has been updated and refers to SSA-S3P.

SCSI-3 mandates Contingent Allegiance (CA), but CA does not work on a non interlocked interface like SSA. The solution is the optional SCSI-3 concept of Auto Contingent Allegiance (ACA). However, CA is still required by SAM.

Forcing the SCSI-2 Application Client (or SCSI-3 Application client that does not know about ACA) to support ACA is a problem. However, we do not want to handicap the device by forcing it to emulate CA when it doesn't work as expected for SSA.

The solution is to make the target and SSA interface always use ACA. The initiator protocol layer can be used to emulate CA to the Application Client. Then when the Application Client updates to SCSI-3 ACA, the same targets can be used.

PROPOSAL

Make the following changes.

    1)   Add section 9.2 and the following sub clauses.

9.2 Contingent Allegiance vs. Auto Contingent Allegiance.

The concept of Contingent Allegiance requires an interlocked interface to work. In Contingent Allegiance, a CHECK CONDITION Status causes the queue to be held. The "next" command will execute, free the hold on the queue, and clear the sense data. In an interlocked interface like parallel SCSI, the next command can only come after the initiator sees the CHECK CONDITION Status. However, in a non-interlocked serial interface like SSA, the "next" command can be in the pipeline and received at the target before the initiator even receives the CHECK CONDITION Status. This causes the Contingent Allegiance condition to be reset, the queue freed and sense data lost before the initiator even knew a problem existed.

The answer to this problem is the SCSI-3 concept of Auto Contingent Allegiance. In Auto Contingent Allegiance, the queue is held following a CHECK CONDITION STATUS until specifically cleared by a CLEAR ACA task. Pipelined commands are rejected with an ACA ACTIVE status. More complex error recovery can be accomplished by the use of as many commands as needed using the ACA queue type.

Since Contingent Allegiance will not work properly on the SSA interface, the SSA target always uses Auto Contingent Allegiance. However, SSA-S3P needs to support Contingent Allegiance as per SAM. For this reason the initiator SSA-S3P protocol layer uses Auto Contingent Allegiance over the transport layer and emulates Contingent Allegiance to the Application Client as shown in the following sub clauses without the pitfalls of Contingent Allegiance.

9.2.1 Target supports Auto Contingent Allegiance only

If the Application Client running above the SSA-S3P initiator protocol layer requests Contingent Allegiance operation (as defined by the NACA bit being cleared), then the SSA-S3P initiator protocol layer will emulate Contingent Allegiance (see 9.2.2).

The target ignores the NACA bit. The target always assumes the NACA bit is set, regardless of the value of bit 2 of the CONTROL byte in the CDB field. The target will handle Auto Contingent Allegiance as it is described in SAM.

9.2.2 Initiator support of Contingent Allegiance

Contingent Allegiance is supported by making the following changes in the initiator SSA-S3P protocol layer.

   a) Maintain a Contingent Allegiance Table (see Table 1).

   b) When an SMS RECEIVED transport service is received with a valid SCSI STATUS SMS and a STATUS value of CHECK CONDITION STATUS, the DESTINATION ID and LUN field values from the Outstanding Commands Table entry associated with the SCSI STATUS SMS TAG field is entered in the table. The queue within the SSA-S3P initiator is held.

   c) When an SMS RECEIVED transport service is received with a valid SCSI STATUS SMS and a STATUS field value of ACA ACTIVE, then the command is returned to the initiator's queue as if it had not be issued, in such a way that the command will be issued in the order originally intended.

   d) When a Send SCSI Command protocol service request is received and the Contingent Allegiance Table has an entry corresponding the corresponding Destination ID and LUN, then the following actions occur in order.

   1) Send the SCSI command normally except the QUEUE CNTL field shall have a value of AUTO CONTINGENT ALLEGIANCE. The Tag parameter of the SCSI Command is entered in the Contingent Allegiance Table in the entry appropriate for that Destination ID.

   2) Hold any additional Send SCSI Command protocol service requests when an entry exists in the Contingent Allegiance table until the table entry associated with that Destinaition ID is empty.

   3) When the SCSI STATUS SMS returns with the TAG value in the Contingent Allegiance Table, generate a CLEAR ACA SMS as described in 7.15, and when the associated SCSI RESPONSE SMS returns, clear the entry in the Contingent Allegiance Table. The hold on the SSA-S3P initiator queue can now be released, and the queued commands sent.

Table 1 - Contingent Allegiance Table entry format

Field	Description
TAG	The Tag value of the SCSI command from the Task Identifier parameter.
DESTINATION ID	The 8 byte unique ID of the target
LUN	The Logical Unit number from the Task Identifier parameter.

9.2.3 Initiator support of Auto Contingent Allegiance

The initiator support of Auto Contingent Allegiance shall follow the requirements of the SAM specification.

Sincerely,

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