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Subject: Addressability of Logical Unit for resets

The development of hierarchically organized address structures as described in the SCC document (X3T10/1047D, Revision 3) requires the addition of a task management function that can selectively perform a reset for a target below the top level of the hierarchy. To meet this requirement a LOGICAL UNIT RESET task management function is proposed as an addition to the SCSI-3 Architectural Model (SAM, document X3T10/994D, Revision 16). This document proposes architectural concepts for the LOGICAL UNIT RESET function and proposes wording additions to SAM to incorporate the new function.

Revision 1 of this document contains few modifications to the definitions required for SAM. The revision adds the implementation definitions for the Logical Unit Reset to the SCSI-3 Interlocked Protocol (SIP, document X3T9.2/856D, Revision 5) and the Fibre Channel Protocol for SCSI (FCP, document X3T10/993D, Revision 10)

Sincerely,



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Logical Unit Reset Addressability

Proposal

Architectural Concepts:

At present, the TARGET RESET function acts on all logical units attached to the SCSI port. In the case of hierarchically organized address structures, targets actually exist in the address space defined by the logical unit number. LOGICAL UNIT RESET is defined to perform the TARGET RESET function on those targets and logical units existing in the LUN address space. The LOGICAL UNIT RESET function addressed to one of those targets or logical units does not influence other peer units in the hierarchy and resets the addressed unit and all targets and logical units below the addressed unit in the hierarchy. The protocol sequences required to generate the LOGICAL UNIT RESET are protocol dependent.

For SIP, the Target Reset definition is modified to specify that a TARGET RESET performed without a previous IDENTIFY message will perform the TARGET RESET task management function. A TARGET RESET message performed with a previous IDENTIFY message will perform the LOGICAL UNIT RESET task management function to the specified LU.

For FCP, a new bit will be defined in the task management field to specify that the LOGICAL UNIT RESET task management function is to be performed.

Proposed Implementation, Modifications to SAM:

The object address for the LOGICAL UNIT RESET contains the logical unit number of a destination logical unit. The logical unit and all dependent logical units will be reset. SAM must be modified in the following manner.

Section 7 should have the following text added between the descriptions of CLEAR TASK SET and TARGET RESET.

LOGICAL UNIT RESET (Logical Unit Identifier) - Reset the specified logical unit and all targets and logical units hierarchically addressed from the logical unit. All tasks in all task sets for all affected logical units are reset. All hierarchically addressed SCSI devices shall support this function. For SCSI targets not having hierarchical addressing, implementation of this function is a logical unit option.

The following new section 7.n is added between the present section 7.4 and 7.5:

7.n LOGICAL UNIT RESET

Function Call:

Service Response = LOGICAL UNIT RESET (Logical Unit Identifier)

Description:

This function shall be supported by all SCSI targets that support hierarchical address structures. The function is optionally supported by other SCSI targets.

Before returning a Function Complete response the addressed logical unit and all logical units and targets lower in the addressing hierarchy than the addressed logical unit shall perform the hard reset functions specified in clause 6.6.6 and each shall create a unit attention condition in all affected logical units for all initiators as specified in clause 6.6.5. Peer logical units and logical units above the addressed logical unit are not affected by the LOGICAL UNIT RESET function.

Proposed Implementation, Modifications to SIP:

The SIP document is somewhat out of date. Assuming that the new definitions of dual port will be accepted and that functions will be renamed to match the values specified by SAM, the following changes must be made.

Page 22, Table 3, Message Codes

The line describing BUS DEVICE RESET shall be removed and replaced with the following entries notes. The following notes shall be added.

Code	Support		Message Name	Direction	Negate ATN Before last ACK
	Init	Targ			
0Ch	O	M	TARGET RESET (Note 4)	Out	Yes
0Ch	O	O	LOGICAL UNIT RESET (Note 5)	Out	Yes

Notes:
 (4) If an I_T nexus has been established, the message value of 0Ch shall be interpreted as a TARGET RESET task management request.
 (5) If an I_T_L nexus has been established by the execution of an IDENTIFY message out, the message value of 0Ch shall be interpreted as a LOGICAL UNIT RESET task management request.

Page 25, Section 6.3, BUS DEVICE RESET

This section shall be removed and replaced with two sections placed in the correct order as selected by the editor. The references to dual port are deleted from this document pending the selection of the proper multiple port definition.

6.x TARGET RESET

The TARGET RESET message is sent from an initiator to direct a target to clear all I/O processes for all logical units and from all initiators on that SCSI device. This message has the same effect as a reset condition with the hard reset alternative to the selected SCSI device. The target shall issue a BUS FREE request following successful receipt of this message. The target shall create a unit attention condition for all initiators.

The TARGET RESET is differentiated from the LOGICAL UNIT RESET message by the fact that no IDENTIFY message has been transmitted after the selection confirmation has indicated selection won for the TARGET RESET, so that only an I_T nexus has been established.

6.y LOGICAL UNIT RESET

The LOGICAL UNIT RESET message is sent from an initiator to direct a particular logical unit within a target to clear all I/O processes from all initiators for that logical unit.

If a hierarchical address structure has been implemented by the target, the LOGICAL UNIT RESET clears all I/O processes for the specified logical unit and for all logical units below it in the hierarchy. This message has the same effect as a reset condition with the hard reset alternative to all the effected logical units. The effected logical units shall issue a BUS FREE request following successful receipt of this message. The effected logical units shall create a unit attention condition for all initiators.

The LOGICAL UNIT RESET is differentiated from the TARGET RESET message by the fact that an IDENTIFY message has been transmitted after the selection confirmation has indicated selection won for the LOGICAL UNIT RESET, so that the I_T_L nexus has established the logical unit to be reset.

Proposed Implementation, Modifications to FCP:

The FCP document is now in public review. If accepted by the committee, these modifications shall be considered public comments on the FCP document and will be resolved as described below.

Page 7, Table 2

An additional line and note will be added to Table 2 as shown below:

SAM function	FCP equivalent	Optional/ required
LOGICAL UNIT RESET	FCP_CNTL LOGICAL UNIT RESET	Required **
** LOGICAL UNIT RESET is required if hierarchical addressing is used by the target.		

Page 24, Table 14

An additional line will define Byte 2, bit 4 as the LOGICAL UNIT RESET bit.

Page 26, Section 7.1.2.2

Immediately after the section describing TARGET RESET, the following text describing LOGICAL UNIT RESET will be added.

LOGICAL UNIT RESET, when set to one, performs a reset to the identified logical unit and all logical units below that logical unit in the addressing hierarchy as defined in SAM. LOGICAL UNIT RESET resets all tasks for all initiators and resets the internal states of the affected logical units to their initial power on and default states as established by PRLI. A unit attention condition is created for all initiators for all affected logical units. The FCP login state of the affected image pairs is not changed by the LOGICAL UNIT RESET.

The LOGICAL UNIT RESET is transmitted by the initiator (exchange originator) using a new exchange. The initiator and logical units clear all resources that can be cleared unambiguously. Any open exchanges that are in an ambiguous state shall be terminated by whichever port detects the ambiguous state using a recovery abort. The ports may issue additional recovery abort operations if they are unable to determine in a simple manner whether the state of an FCP I/O operation is ambiguous.

For a target or initiator FCP_Port, an exchange is in an ambiguous state if the FCP_Port has sequence initiative and there exists an unacknowledged frame for the sequence or if the FCP_Port has transferred sequence initiative but the transfer of the initiative has not been confirmed. For a target FCP_Port, an exchange is also in an ambiguous state if the exchange exists between the target FCP_Port and an initiator other than the initiator FCP_Port that performed the LOGICAL UNIT RESET.