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for

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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 latest revision of the SCSI-3 Architectural Model (SAM-2), the latest revision of the Fibre Channel Protocol (FCP-2), and the latest revision of the SCSI Interlocked Protocol (SIP, document X3T9.2/856D, Revision 5). This document proposes architectural concepts for the LOGICAL UNIT RESET function and proposes wording additions to those documents to incorporate the new function.

Revision 3 adds the definition of hierarchical logical units for SAM-2 and provides the value for the SIP message. This noticeably simplifies some of the other explanations.

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, a new message is defined to perform the LOGICAL UNIT RESET task management function to the specified logical unit.

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 as modifications to SAM for SAM-2:

The definition of a SCSI target having hierarchical addressing must be provided. A likely section to do this would be in section 4.7.4 immediately after Object definition 6 (Logical Unit). The text would be included as a paragraph immediately following the last line of the Object Descriptions, Logical Unit Identifier.

A logical unit is said to be uniquely addressed if there is no interaction or relationship between that logical unit and any other logical unit in the same target.

A logical unit is said to be hierarchically addressed if an identical value of some number of the high order bits of the logical unit number imply a hierarchical relationship among the logical units having that value. The base logical unit number of a hierarchical addressing structure is that logical unit number having a particular value of high order bits and having all the lower order bits equal to 0. Dependent logical unit numbers are those having the same high order bits as the base logical unit number, but nonzero low-order bits. The logical unit having the base logical unit number has the properties of logical unit 0 with respect to all other hierarchically

addressed logical units having dependent logical unit numbers. The base logical unit always exists in a set of hierarchically addressed logical units and provides a well known address for performing configuration management, status and type verification, and the LOGICAL UNIT RESET task management function for the logical units having dependent logical unit numbers.

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, if any, will be reset. SAM-2 would be the same as SAM revision 18, but modified in the following manner.

Section 6 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 terminate all tasks in all task sets. For SCSI targets having unique addressing, implementation of this function is a logical unit option. All hierarchically addressed SCSI devices shall support this function. Resetting of a base logical unit shall reset all dependent logical units and terminate their task sets.

The following new section 6.n is added between the present section 6.4 and 6.5:

6.n LOGICAL UNIT RESET

Function Call:

Service Response = LOGICAL UNIT RESET (Logical Unit Identifier[])

Description:

This function shall be supported by all SCSI logical units that support hierarchical address structures. The function is optionally supported by uniquely addressed SCSI targets.

Before returning a Function Complete response the addressed logical unit shall perform the hard reset functions specified in clause 5.6.6 and each shall create a unit attention condition for all initiators as specified in clause 5.6.5. If the logical unit specified by the Logical Unit Identifier is a base logical unit in a hierarchically addressed target all dependent logical units for that base logical unit number shall be similarly reset. Logical units that are not dependent logical units are not affected by the LOGICAL UNIT RESET function.

Proposed Implementation, Modifications to SIP, revision 6:

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.

A new set of sections is added between section 5.3.2.16 and 5.3.2.17 to define the request, indication, response, and confirmation for LOGICAL UNIT RESET.

5.3.2.n LOGICAL UNIT RESET request

The application client shall issue a LOGICAL UNIT RESET service request as follows:

LOGICAL UNIT RESET (logical unit identifier|)

See 5.3.1.1 for more information.

5.3.2.n+1 LOGICAL UNIT RESET indication

On the completion of the sequence of services described in clause 5.3.1.2 a LOGICAL UNIT RESET indication is generated to the task manager. The LOGICAL UNIT RESET indication follows:

LOGICAL UNIT RESET (logical unit identifier + initiator identifier,|)

See 5.3.1.2 for more information.

5.3.2.n+2 LOGICAL UNIT RESET response

After the task manager completes the LOGICAL UNIT RESET function it shall send the following response to the target role agent:

LOGICAL UNIT RESET (logical unit identifier + initiator identifier,
service response|).

See 5.3.1.3 for more information.

5.3.2.n+3 LOGICAL UNIT RESET confirmation

On receipt of an indication to the initiator role agent from the parallel interface agent, a LOGICAL UNIT RESET confirmation is generated by the initiator role agent to the application client. The LOGICAL UNIT RESET follows:

LOGICAL UNIT RESET (logical unit identifier, service response|)

See 5.3.1.4 for more information.

Section 8.4, Table 16, Task Management Message Codes

The following lines are added between the line for CLEAR TASK SET and TARGET RESET. Note 3 is added to the end of the table.

Code	Support		Message Name	Direction	Negate ATN Before last ACK
	Init	Targ			
25h	O	(3)	LOGICAL UNIT RESET	Out	Yes
Notes:					
(3) The LOGICAL UNIT RESET message is required if hierarchical addressing is implemented by the target.					

Section 8.4.2

The following text is inserted between sections 8.4.2.2 and 8.4.2.3.

8.4.2.n LOGICAL UNIT RESET

The LOGICAL UNIT RESET message is defined in the SCSI-3 Architecture Mode (SAM-2).

The task management function services for the LOGICAL UNIT RESET function are defined in 5.3.2.

If only an I_T nexus has been established, the LOGICAL UNIT RESET shall be performed as a TARGET RESET.

Proposed Implementation as Modifications to FCP for FCP-2:

The FCP document is now forwarded for final public review and standardization. This proposal is shown as a change in FCP Revision 12 for inclusion in FCP-2.

Section 4.3, 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.		

Section 7.1.2, Table 14

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

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 as defined in SAM-2. 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 is 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 is between the target FCP_Port and an initiator other than the initiator FCP_Port that performed the LOGICAL UNIT RESET.