To:　　　　　T10 Technical Committee
From:　　　　Rob Elliott, Compaq Computer Corporation (Robert.Elliott@compaq.com)
Date:　　　　7 March 2001
Subject:　　　Making Target Reset optional in SAM-2

Revision History
Revision 0: (8 December 2000) first revision
Revision 1: (25 January 2001) incorporates comments from the January CAP meeting. (28 February 2001) Makes target reset a "target port reset" using the terminology in 99-268r6. The name is not changed, but the "target port" is used wherever "target" was previously used.
Revision 2: (7 March 2001) incorporates comments from the March CAP meeting

Related Documents
SAM-2 revision 15

T10/99-268r6 Defining targets/initiators as ports (by George Penokie)

T10/99-245r9 Access Controls (by Jim Hafner)
T10/00-261r0 Discussion of editorial changes to Access Controls (by Jim Hafner)
T10/00-287r1 TransportIDs for Access Controls (by Jim Hafner)
T10/00-381r0 Three minor modifications to Access Controls (by Jim Hafner)
T10/00-425r0 Long Identifiers in SPC-3, SAM-2, SBC-2 and other XOR issues (by Jim Hafner)
T10/01-026r1 SPC-3 Access Control conflicts due to TransportIDs (by Rob Elliott)

Overview
The target reset task management function is inappropriate for modern interconnects and devices. Applications talk to logical units independently. A target reset allows an application to disrupt logical units with which it is not communicating. This complicates sharing of logical units on multi-LUN targets. If one operating system is using LUN 0 and another is using LUN 1, a TARGET RESET issued by either disrupts the other.

There have been numerous workarounds developed. The TASK ABORTED status helps notify the disrupted operating system that its tasks were aborted. Some targets violate the rule that a TARGET RESET resets all logical units, instead only resetting those that were logged into the initiator issuing the TARGET RESET. Eliminating target reset would eliminate the need for these workarounds.

One option is to obsolete TARGET RESET in SAM-2 so future protocol standards like SRP and iSCSI can drop support for it. Since SAM-2 doesn't define any value that means TARGET RESET there is nothing to mark obsolete. All text referring to it could be removed to have the same effect; however, this would leave existing standards like SPI-3 and FCP-2 referring to non-existent terminology in SAM-2. Instead, this proposal suggests leaving target reset defined but not making it mandatory. Protocols could still mark it mandatory if needed. SPI always needs it, since a bus reset signal is defined. FCP will always need it for compatibility with FCP and FCP-2.

This should help discourage new software from using target reset, but still allows old software to use it on existing protocols.

A bridge between an initiator on a protocol supporting it to a target on a protocol that does not will have to map a TARGET RESET into multiple LOGICAL UNIT RESETs for all the logical units exposed to the initiator.

Overview of proposed changes
1.　Make LOGICAL UNIT RESET mandatory for all logical units.

2. Remove the requirement that TARGET RESET be implemented by all targets.
3. Remove the link from the TARGET RESET task management function to the "target hard reset" action (but not the converse). Define TARGET RESET as simply a set of logical unit resets.
4. Remove TARGET RESET task management function from the description of target hard reset causes.
5. Clarify that the target port is the object that handles target resets.
6. Removes "target" from the phrase "target hard reset". "Hard reset" is used by many documents; "target hard reset" is only used by SAM-2.

Proposed changes
[All references to "logical unit reset" and "target reset" in SAM-2 revision 15 are shown to provide context.]

1.1 Requirements precedence
...
Generic requirements are transformed to implementation requirements by an implementation standard. An example of a generic requirement is the target hard reset behavior specified in 5.7.6.

…
3.1 Definitions
…
3.1.38 hard reset: A target port action in response to a reset event ~~or a TARGET RESET task management function~~ in which the target port performs the operations described in 5.7.6. [Editor's note: used by SPC-2 and other standards with the original definition mentioning TARGET RESET.]
…
[Editor's note: "response" changed to "action in response" or removed in several places per March CAP comment – don't want to imply a task management function reply of some sort]

3.1.80 reset event: A protocol-specific event ~~which~~that ~~may~~ triggers a hard reset ~~response~~ from a~~n~~ SCSI device as described in 5.7.6.
[Editor's note: term used by SPC-2, SPI-4, and SMC (glossary only)]

3.1.xx logical unit reset: A logical unit action in response to a logical unit reset event in which the logical unit performs the operations described in 5.7.7.

3.1.xx logical unit reset event: An event that triggers a logical unit reset from a logical unit as described in 5.7.7.

5.4 Task and Command lifetimes
...
The application client assumes that the task exists from the time the **Send SCSI Command** protocol service request is invoked until it receives one of the following target responses:

a) A service response of TASK COMPLETE for that task;
b) Notification of a unit attention condition with one of the following additional sense codes:
a) COMMANDS CLEARED BY ANOTHER INITIATOR (if in reference to the task set containing the task);
b) any additional sense code whose ADDITIONAL SENSE CODE field contains 29h (e.g., POWER ON, RESET, OR BUS DEVICE RESET OCCURRED; POWER ON OCCURRED; SCSI BUS RESET OCCURRED; BUS DEVICE RESET FUNCTION OCCURRED; DEVICE INTERNAL RESET; TRANSCEIVER MODE CHANGED TO SINGLE-ENDED; or TRANSCEIVER MODE CHANGED TO LVD);

c) A service response of SERVICE DELIVERY OR TARGET FAILURE for the command. In this case, system implementations shall guarantee that the task associated with the failed command has ended;

d) A service response of FUNCTION COMPLETE following an ABORT TASK task management request directed to the specified task;

e) A service response of FUNCTION COMPLETE following an ABORT TASK SET or a CLEAR TASK SET task management function directed to the task set containing the specified task; or

f) A service response of FUNCTION COMPLETE in response to a LOGICAL UNIT RESET or TARGET RESET.

The following initiator actions affect the task(s) created by the initiator that takes the action and/or task(s) created by another initiators:

...

d) A logical unit reset (see 5.7.7); or

e) A target reset (see 5.7.6).

5.5.2 When an initiator aborts its own tasks

When an initiator acts to cause its own task(s) to be aborted, no notification that the task(s) have been aborted shall be returned to the initiator other than the completion response for the command or task management function action that caused the task(s) to be aborted and notification(s) associated with related effects of the action (e.g., a target reset unit attention condition).

…

5.7.1.2 Clearing an Auto Contingent Allegiance condition

If the logical unit accepts a value of one for the NACA bit and this bit was set to one in the CONTROL byte of the faulting command, then the SCSI-2 rules for clearing a contingent allegiance condition shall not apply. In this case, the ACA condition shall only be cleared:

a) As the result of a power on or a logical unit reset (see 5.7.7);

…

5.7.5 Unit Attention condition

Each logical unit shall generate a unit attention condition whenever the logical unit has been reset as described in 5.7.6 7 or by a power-on reset.

…

5.7.6 Target hardHard reset

A target hard reset is a target response to a TARGET RESET task management request (see 6.6), or a target port action in response to a target reset event within the service delivery subsystem. The definition of target reset events is protocol and interconnect specific.

Each SCSI protocol standard that defines reset events shall specify the target port's action in response to a the target reset events including the conditions under which a target hard reset shall be executed.

To executeprocess a target hard reset a target port shall also initiate the equivalent of a logical unit reset for all attached logical units as described in 5.7.7.

[Editor's note: "the equivalent of" was added per March CAP. I see no benefit in the phrase here.]

5.7.7 Logical Unit unit reset

A logical unit reset is an action in response to a LOGICAL UNIT RESET task management request (see 6.5), or some other logical unit reset event, or part of an action in response to a TARGET RESET task management function (see 6.6), or such as a target hard reset (see 5.7.6). The definition of such logical unit reset events may be is devicevendor-specific or dependent on

the protocol ~~and interconnect. Each appropriate SCSI standard shall specify the conditions under which a logical unit reset shall be executed.~~

To ~~execute~~process a logical unit reset the logical unit shall:
a) Abort all tasks in its task set(s) as described in 5.5;
b) Clear an auto contingent allegiance (NACA=1, see 5.1.2) or contingent allegiance (NACA=0) condition, if one is present;
c) Release all reservations established using the reserve/release management method (persistent reservations shall not be affected);
d) Return the ~~device's~~ logical unit's operating mode to the appropriate initial conditions, similar to those conditions that would be found following device power-on. The MODE SELECT parameters (see the SPC-2 standard) shall be restored to their last saved values if saved values have been established. MODE SELECT parameters for which no saved values have been established shall be returned to their default values;
e) Set a unit attention condition (see 5.7.5); and
f) Initiate a logical unit reset for all dependent logical units (see 4.12).

In addition to the above, the logical unit shall ~~execute~~process any additional functions required by the applicable standards.

6 Task Management Functions
...
The task management functions are summarized as follows (see the clauses below for detailed definitions of each task management function):
…
LOGICAL UNIT RESET (IN (I_T_L Nexus)) - Perform a logical unit reset as described in 5.7.7 by aborting all tasks in the task set(s) and propagating the reset to all dependent logical units (see 3.1.22). Support for this function is mandatory ~~for hierarchical logical units (see 4.12) and may be supported by non-hierarchical logical unit~~s**.**

TARGET RESET (IN (I_T Nexus)) - ~~Reset the target device and abort all tasks in all task sets (see 5.7.6). All target devices shall support this function.~~ Perform a logical unit reset as described in 5.7.7 for every logical unit.
...
[Editor's note: removes "connected to the target port to which the initiator has access" per the March CAP. This avoids confusing "access" from access controls (which is fully described below) with access assumed from the set of current logins. Target Reset affects all LUs, even those to which the initiator has not logged in. This is the legacy behavior. This proposal is not trying to limit it to LUs that are logged in.]

NOTE 10 The LOGICAL UNIT RESET, TARGET RESET, CLEAR TASK SET, ABORT TASK and ABORT TASK SET functions provide a means to abort one or more tasks prior to normal completion.

All SCSI protocol standards shall provide the functionality needed for a task manager to implement all of the task management functions defined above.

The task manager response to task management requests is subject to the presence of access restrictions, as managed by ACCESS CONTROL OUT commands (see SPC-3), as follows:
a) a task management request of ABORT TASK, ABORT TASK SET or CLEAR ACA shall not be ~~un~~affected by the presence of access restrictions;
b) a task management request of CLEAR TASK SET or LOGICAL UNIT RESET received from an initiator that is denied access to the logical unit (either because it has no access rights or because it is in the pending-enrolled state) shall cause no change to the logical unit;

c) a TARGET RESET task management request shall initiate a logical unit reset as described in 5.7.7 for all logical units to which the initiator has access, and shall cause no change to any logical units to which the initiator is denied access; and

d) the task management function Service Response shall not be affected by the presence of access restrictions.

6.5 LOGICAL UNIT RESET

Function Call:

Service Response = LOGICAL UNIT RESET (IN (I_T_L Nexus))

Description:

This function shall be supported by all logical units that support hierarchical logical units (see 4.12) and may be supported by non-hierarchical logical units.

Before returning a FUNCTION COMPLETE response, the logical unit shall perform the logical unit reset functions specified in 5.7.7. A unit attention condition for all initiators that have access shall be created on each the logical unit as specified in 5.7.5.

[Editor's note: "that have access" is ok here because UAs are not generated for non-logged in initiators. The access control text applies, too.]

NOTE xx: Previous versions of this standard only required LOGICAL UNIT RESET support in logical units that supported hierarchical logical units.

6.6 TARGET RESET

Function Call:

Service Response = TARGET RESET (IN (I_T Nexus))

Description:

This function shall be supported by all target devices.

Before returning a FUNCTION COMPLETE response, the target port shall perform the target hard logical unit reset functions specified in 5.7.67 for every logical unit. A unit attention condition for all initiators that have access shall be created on each of these logical units as specified in 5.7.5.

An initiator should issue LOGICAL UNIT RESETs only to the logical units it is using rather than issuing a TARGET RESET. This avoids resetting logical units that other initiators may be using.

NOTE xx: Previous versions of this standard required TARGET RESET support in all targets. SCSI protocols may or may not require that TARGET RESET be supported. SCSI protocols may require additional actions beyond those specified here.