To: T10 Technical Committee
From: Tim Symons, PMC-Sierra (Tim_Symons@pmc-sierra.com)
Date: 24 April 2006
Subject: 06-097r3 SAS-2 Discovery – configuring bit

Revision Information

- Revision 0 : Initial proposal
- Revision 1 : Remove optional behavior to recommend only one action.
    - Add text to clarify when a BROADCAST (CHANGE) from a self-configuring device can be identified.
    - Remove unnecessary reference to zoning devices.
- Revision 2 : Defined behavior to acknowledge and continue to discover topology if the configuring bit is set to one.
- Revision 3 : Added definition for setting CONFIGURING bit to one or zero (removed from 06-098) and added effect of I_T NEXUS LOSS.

Referenced Document

sas2r03a Serial Attached SCSI – 2 (SAS-2) revision 3
06-098r4 SAS-2 Self-configuring expander device model (Tim Symons, PMC-Sierra)
06-177r1 SAS-2 ZONED BROADCAST processing clarification (Ed D'Avignon, Vitesse and Rob Elliott, HP)
06-189r0 SAS-2 Allow table-to-table expander attachment (Rob Elliott, HP)

Overview

This proposal provides a definition for self-configuring expander devices and defines when the CONFIGURING bit shall be set to one or zero, and defines the required behavior of a management application client in either an HBA or another self-configuring device when a REPORT GENERAL response with the CONFIGURING bit set to one or zero is received.

This proposal is for additional definition in the discover process of the SAS-2 specification to ensure that this case is clearly defined.

[Suggested addition to SAS-2 existing text (included in black), new additional text (included in blue) and changes between revisions shown in red]

3.1 Definitions

3.1.a self-configuring expander device: An expander device containing an SMP initiator port and management application client to perform the discover process and to configure its own expander route table. ~~and the routing tables of attached non self-configuring expander devices.~~

4.7.5 Self-configuring expander device

4.7.5.1 Self configuring operation

The management application client of a self-configuring expander device shall configure routing tables in the expander device (see 4.7.1) and all devices that are not self–configuring devices attached to the expander device. If other self-configuring devices are identified in the topology then the management application client shall not configure devices in topology levels beyond another self-configuring expander device.

4.7.5.2 Self configuring device response to BROADCAST (Change)

When a self-configuring expander device receives a BROADCAST (Change) the self-configuring expander device shall start the discovery process on the expander port that received the BROADCAST (Change). If a change to the expander route table is identified then the management device server shall set its CONFIGURING bit to one in the REPORT GENERAL response (see 10.4.3.3).

A self-configuring expander device shall set its CONFIGURING bit to zero when is has completed configuring all directly and indirectly attached configurable expander devices, up to an end device or another self-configuring expander device. A BROADCAST (Change) shall be originated on each expander port that has access to the expander port based on the zone permission table, other than the one that received the Broadcast (Change). For a non-zoning expander device the notification shall be sent on all ports other than the one that received the BROADCAST (Change).

When a BROADCAST (Change) has been received by an expander device all previously valid SAS addresses shall continue to be routable until they are determined to be no longer valid. When a change has been identified then all unaffected SAS addresses shall continue to be routable.

4.7.1. Discover process overview

……If the expander device's CONFIGURABLE ROUTE TABLE bit is set to one in the SMP REPORT GENERAL function response, the management application client shall configure its expander route table as described in 4.7.3 and 4.7.4.

If a self-configuring expander device's configuring bit in the SMP REPORT GENERAL response is set to one, it may receive responses such as OPEN_REJECT (NO DESTINATION) to connection requests for destination ports two levels beyond the self-configuring expander (see 7.2.5.11).

If a management application client detects a self-configuring expander device with the configuring bit set to one, the SAS port shall stop the I_T Nexus Loss timer for I_T nexuses involving such destination ports while the configuring bit is set to one (see 8.2.2.1).

If a SAS device is attached, the discover process is not required to obtain any more information about the SAS device. Additional discovery software may access that SAS device….

8.2.2.3.2 PL_OC2:Overall_Control state establishing connections

…

If this state receives a Retry Open (No Destination) or a Retry Open (Open Timeout Occurred) message, an I_T Nexus Loss timer has been created for the destination SAS address, and there is no connection established with the destination SAS address, then this state shall check the I_T Nexus Loss timer, and:
  a)   if the I_T Nexus Loss timer is not running and the I_T nexus loss time is not set to FFFFh and the CONFIGURING bit in the REPORT GENERAL response is set to zero (see 10.4.3.3), then this state shall start the timer;
  b)   if the I_T Nexus Loss timer is running, then this state shall not stop the timer; and
  c)   if the I_T Nexus Loss timer has expired, then this state shall process the Retry Open message as if it were an Unable To Connect message (see 8.2.2.3.4).
…

Editors Note : Section 8.2.2.3.2 addresses the "No destination" condition, and by adding the rule to maintain the stopped I_T Nexus loss timer when the CONFIGURING bit is set to one.