Multi-Port Changes for SAM-2 (T10/97-250R1)

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Based On:

- Multi-port proposals approved for SCSI-3.
  - X3T9.2/90-136R3, “Extensions for Dual-Port SCSI”.
  - X3T9.2/93-041R2, “SCSI-3 Changes for Dual-Port Feature”.

- Other documents:
  - X3T9.2/91-149R0, “Extensions for Dual-Port SCSI (again)”.
Review of Changes Approved for SCSI-3

• Change to parallel SCSI I/O Process Model
  – Nexus and I/O process now associated with a Port
  • P_I_T_L_Q implicitly replaces I_T_L_Q as nexus or I/O process identifier.
    – P = port I/D when process or nexus was created.
    – Nexus must always be restored on the port receiving the original command.
Dual-Port I/O Process Example

Initiator issues SCSI command to target 0, LUN 0, Tag 5 via port A. Logical unit creates I/O process A_7_0_0_5.

Initiator issues SCSI command to target 0, LUN 0, Tag 5 via port B. Logical unit creates I/O process B_7_0_0_5.

As seen by target, Initiator at A_7 is different than B_7.
Task Aborts

- Scope of ABORT TASK SET, ABORT TASK, CLEAR TASK SET limited to tasks whose port identifier is the same as the port receiving the task management request.
- Scope of hard reset and TARGET RESET optionally limited to tasks whose port identifier is the same as the port receiving the task management request.
- Controllable by initiator through Control Mode page.
Exceptions

• Contingent Allegiance -- Unchanged.
  – The faulted initiator is identified by Port I/D concatenated with bus I/D.
• Scope of hard resets can be controlled by the initiator via Control Mode page.
  – One or both ports.
  – Extent of Unit Attention due to hard reset corresponds to scope of the reset.
Device Reservations

• Ability to override a reservation.
New Command

• Port status and control command
  – Port control
    • Enable or disable other port
    • Supercede reservations on this or other port
  – Receive port status
    • Port Enabled or Disabled.
    • Reservations owned by an initiator on this/other port.
New Task Management Function

• TARGET RESET OTHER PORT
  – Directs a TARGET RESET to the “other port”.
Issues

• Proposed functions only support two ports.
  – Operations reference “other port”
• Ad hoc device reservation features
• Should multi-port behavior be hidden from host class driver?
  – Managed by transport layer?
Alternatives

• Dual-port limit
  – Do we want to extend to any number of ports?
  – Do we want port-specific hard reset and associated Unit Attention?
    • If eliminated, then multi-port becomes a special case of multi-initiator
    • Some issues could be addressed with Gene Milligan’s multi-initiator proposal
  – Port control/status command
    • Eliminate?
    • Extend to any number of ports?
    • Make protocol-specific and hide in protocol spec.?

• Reservation Management
  – Replace with Persistent Reserve?
Alternatives (cont)

- Concealing multi-port behavior from host class driver.
  - “Class driver” has no awareness of paths or ports.
  - All path and port management is done outside of the SCSI command set.
  - Port dependencies in task references are outside of SAM scope.
    - E.g., In parallel SCSI, the transport layer could automatically issue an ABORT TASK on the port associated with the task.
    - Path failures handled by transport layer.