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To: T10 Committee (SCSI)

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Subject: Alternate SAS Speed Negotiation State Diagram

5.8.0.1

5.8.0.2 SP5:SN_Start state

5.8.0.2.1 State description

This state transmit idles at the beginning of SAS speed negotiation windows.

Upon entering this state, the rate change delay timer is initialized to the rate change delay time value and enabled. The state machine remains in this state until a rate change delay has elapsed.

During this state idles shall be transmitted.

This state sets the SAS speed negotiation rate to:

- a) the lowest supported speed negotiation window if the transition into this state is from the SAS_wait_no_COMSAS state; or
- b) to the value of the speed negotiation window received as an argument.

5.8.0.2.2 Transition SP8:SN_Start to SP10:SN_wait_ALIGN

This transition shall occur when the rate change delay timer times out and the current SAS speed negotiation window is supported.

5.8.0.2.3 Transition SP8:SN_start to SP9:SN_rate_not_supported

This transition shall occur when the rate change delay timer times out and the current SAS speed negotiation window is not supported.

5.8.0.3 SP9:SN_rate_not_supported state**5.8.0.3.1 State description****5.8.0.3.2 Transition SP9:SN_rate_not_supported to SP14:SN_fail****5.8.0.4 SP10:SN_wait_ALIGN state****5.8.0.4.1 State description****5.8.0.4.2 Transition SP10:SN_wait_ALIGN to SP11:SN_await_ALIGN1****5.8.0.4.3 Transition SP10:SN_wait_ALIGN to SP12:SN_pass****5.8.0.4.4 Transition SP10:SN_wait_ALIGN to SP14:SN_fail****5.8.0.5 SP11:SN_wait_ALIGN1 state****5.8.0.5.1 State description****5.8.0.5.2 Transition SP11:SN_wait_ALIGN1 to SP14:SN_fail****5.8.0.5.3 Transition SP11:SN_wait_ALIGN1 to SP14:SN_pass****5.8.0.6 SP13:SN_Pass state****5.8.0.6.1 State description**

This state determines if:

- a) another SAS speed negotiation window is required;
- b) the SAS speed negotiation is complete and the SAS device is an expander; or
- c) the SAS speed negotiation is complete and the SAS device is not an expander.

5.8.0.6.2 Transition SP13:SN_pass to SP16:SN_start

This transition shall occur;

- a) after setting the SAS speed negotiation window to one greater than the current SAS speed negotiation window; and
- b) if the state machine has not fallen back during this current SAS speed negotiation (see x.x.x).

Which speed negotiation window to use is sent as an argument with this transition.

5.8.0.6.3 Transition SP13:SN_pass to SP18:PHY_ready

This transition shall occur:

- a) if speed negotiation has progressed to where it failed and then had fallen back to the last negotiated speed and then subsequently passed.

5.8.0.7 SP14:SN_fail state**5.8.0.7.1 State description**

This state determines if the SAS speed negotiation window failure occurred because:

- a) the maximum SAS speed negotiation window has been attempted and there haven't been any successful negotiated rates;
- b) the SAS speed negotiation failed after dropping back to the last successful SAS speed negotiation window;

- c) the SAS speed negotiation has failed and there was a previous successful SAS speed negotiation; or
- d) no SAS speed negotiation has previously passed and the maximum SAS speed negotiation window has not yet been attempted.

5.8.0.7.2 Transition SP14:SN_fail to SP2:SAS_wait_COMX

This transition shall occur if:

- a) the maximum SAS speed negotiation window has been attempted and there haven't been any successful negotiated rates; or
- b) the SAS speed negotiation failed after dropping back to the last successful SAS speed negotiation window;

5.8.0.7.3 Transition SP14:SN_fail to SP8:SN_start

This transition shall occur:

- a) after setting the SAS speed negotiation window to one less the current SAS speed negotiation window; and
- b) if the SAS speed negotiation has failed and there was a previous successful SAS speed negotiation; or
- a) after setting the SAS speed negotiation window to one greater than the current SAS speed negotiation window; and
- b) if no SAS speed negotiation has previously passed and the maximum SAS speed negotiation window has not yet been attempted.

Which speed negotiation window to use is sent as an argument with this transition.

5.8.0.8 SP18:PHY_ready state

5.8.0.8.1 State description

This state enables the SAS phy dword synchronization state machine (DWS) to provide rule checking for dword synchronization and determination of link failure.

This state shall not be exited until a Dword Synchronization (acquired) parameter is received.

After a Dword Synchronization Acquired parameter is received this state machine monitors for:

- a) the receipt of a COMINIT; and
- b) Dword Synchronization (loss) parameter.

While in this state dwords from the link layer are transmitted at the negotiated rate.

5.8.0.8.2 Transition SP18:PHY_ready to SP1:SAS_reset

This transition shall occur if:

- a) a COMINIT is received; or
- b) a Dword Synchronization (loss) parameter is received.