To: T10 Technical Committee
From: Timothy Hoglund, LSI Logic
Date: 17 February 2004
Subject: T10/04-061r0 SAS-1.1: BREAK handling clarifications

Revision History

Revision 0 (17 February 2004) first revision

Related Documents

sas1r03 - Serial Attached SCSI 1.1 revision 3

Overview

This proposal seeks to clarify BREAK handling cases within an expander by addressing the priority of the BREAK received message with respect to XL state transitions. The current XL state machine is not consistently clear about the priority of the BREAK Received message relative to other requests, responses, indications, and confirmations.

Remedy

Non-idle (not in XL0:Idle state) expander phys need to prioritize BREAK Received messages from the XL receiver above other requests, responses, indications, and confirmations.

This proposal calls for the following state transitions to be qualified with “a BREAK Received message has not been received” and in some cases “a BREAK Received argument was not included in the transition into this state” :

a) Transition XL1:Request_Path to XL0:Idle
b) Transition XL1:Request_Path to XL2:Request_Open
c) Transition XL1:Request_Path to XL4:Open_Reject
d) Transition XL1:Request_Path to XL5:Forward_Open
e) Transition XL3:Open_Confirm_Wait to XL0:Idle
f) Transition XL3:Open_Confirm_Wait to XL1:Request_Path
g) Transition XL3:Open_Confirm_Wait to XL5:Forward_Open
h) Transition XL3:Open_Confirm_Wait to XL7:Connected
i) Transition XL3:Open_Confirm_Wait to XL10:Break_Wait
j) Transition XL6:Open_Response_Wait to XL10:Break_Wait
k) Transition XL7:Connected to XL8:Close_Wait
l) Transition XL7:Connected to XL10:Break_Wait
m) Transition XL8:Close_Wait to XL10:Break_Wait

7.15 XL (link layer for expander phys) state machine

<other stuff>

7.15.4 XL1:Request_Path state

7.15.4.1 State description

<other stuff>

7.15.4.2 Transition XL1:Request_Path to XL0:Idle

~~This transition shall occur after receiving an Arb Lost confirmation.~~
This transition shall occur if:

a) a BREAK Received message has not been received; and
b) an Arb Lost confirmation is received.

7.15.4.3 Transition XL1:Request_Path to XL2:Request_Open

~~This transition shall occur after receiving an Arb Won confirmation.~~
This transition shall occur if:

a) a BREAK Received message has not been received; and
b) an Arb Won confirmation is received.

7.15.4.4 Transition XL1:Request_Path to XL4:Open_Reject

~~This transition shall occur after receiving an Arb Reject confirmation.~~
This transition shall occur if:

a) a BREAK Received message has not been received; and
b) an Arb Reject confirmation is received.

This transition shall include an Arb Reject argument corresponding to the Arb Reject confirmation.

7.15.4.5 Transition XL1:Request_Path to XL5:Forward_Open

This transition shall occur if a Transmit Open indication is received, a BREAK Received message has not been received, and none of the following confirmations have been received:

a) Arbitrating (Normal);
b) Arbitrating (Waiting On Partial);
c) Arbitrating (Blocked On Partial);
d) Arbitrating (Waiting On Connection);
e) Arb Won;
f) Arb Lost;
g) Arb Reject (No Destination);
h) Arb Reject (Bad Destination);
i) Arb Reject (Bad Connection Rate); or
j) Arb Reject (Pathway Blocked).

This transition shall include an OPEN Address Frame Received argument containing the arguments received in the Transmit Open indication.

7.15.4.6 Transition XL1:Request_Path to XL9:Break

This transition shall occur after receiving a BREAK Received message.

7.15.6 XL3:Open_Confirm_Wait state

7.15.6.1 State description

<other stuff>

If a Backoff Retry confirmation is received, this state shall release path resources.

If a BREAK Received message is received or a BREAK Received argument is included in the transition into this state, this state shall send a Transmit Break request to the ECR.

This state shall repeatedly send a Phy Status (Partial Pathway) response to the ECM. After an Arb Status (Waiting on Partial) confirmation is received, this state shall repeatedly send a Phy Status (Blocked Partial Pathway) response to the ECM.

7.15.6.2 Transition XL3:Open_Confirm_Wait to XL0:Idle

~~This transition shall occur after sending a Transmit OPEN_REJECT message.~~
This transition shall occur if:

a) a BREAK Received message has not been received;
b) a BREAK Received argument was not included in the transition into this state; and
c) after sending a Transmit OPEN_REJECT message.

7.15.6.3 Transition XL3:Open_Confirm_Wait to XL1:Request_Path

~~This transition shall occur after receiving a Backoff Retry confirmation, after releasing path resources.~~
This transition shall occur if:

a) a BREAK Received message has not been received;
b) a BREAK Received argument was not included in the transition into this state;
c) after receiving a Backoff Retry confirmation; and
d) after releasing path resources.

7.15.6.4 Transition XL3:Open_Confirm_Wait to XL5:Forward_Open

~~This transition shall occur after receiving a Backoff Reverse Path confirmation.~~
This transition shall occur if:

a) a BREAK Received message has not been received;
b) a BREAK Received argument was not included in the transition into this state; and
c) after receiving a Backoff Reverse Path confirmation.

7.15.6.5 Transition XL3:Open_Confirm_Wait to XL7:Connected

~~This transition shall occur after sending a Transmit OPEN_ACCEPT message.~~
This transition shall occur if:

a) a BREAK Received message has not been received;
b) a BREAK Received argument was not included in the transition into this state; and
c) after sending a Transmit OPEN_ACCEPT message.

7.15.6.6 Transition XL3:Open_Confirm_Wait to XL9:Break

This transition shall occur after sending a Transmit Break request.

7.15.6.7 Transition XL3:Open_Confirm_Wait to XL10:Break_Wait

~~This transition shall occur after receiving a Transmit Break indication.~~
This transition shall occur if:

a) a BREAK Received message has not been received;
b) a BREAK Received argument was not included in the transition into this state; and
c) after receiving a Transmit Break indication.

7.15.9 XL6:Open_Response_Wait state

7.15.9.1 State description

<other stuff>

7.15.9.2 Transition XL6:Open_Response_Wait to XL0:Idle

This transition shall occur after sending an Open Reject response.

7.15.9.3 Transition XL6:Open_Response_Wait to XL1:Request_Path

This transition shall occur after sending a Backoff Retry response, after releasing path resources.

7.15.9.4 Transition XL6:Open_Response_Wait to XL2:Request_Open

This transition shall occur after sending a Backoff Reverse Path response.

7.15.9.5 Transition XL6:Open_Response_Wait to XL7:Connected

This transition shall occur after sending an Open Accept response.

7.15.9.6 Transition XL6:Open_Response_Wait to XL9:Break

This transition shall occur after sending a Transmit Break response.

7.15.9.7 Transition XL6:Open_Response_Wait to XL10:Break_Wait

~~This transition shall occur after receiving a Transmit Break indication.~~
This transition shall occur if:

a) a BREAK Received message has not been received;
b) a BREAK Received argument was not included in the transition into this state; and
c) after receiving a Transmit Break indication.

7.15.10 XL7:Connected state

7.15.10.1 State description

<other stuff>

7.15.10.2 Transition XL7:Connected to XL8:Close_Wait

~~This transition shall occur after receiving a Transmit Close indication.~~
This transition shall occur if:

a) a BREAK Received message has not been received; and
b) after receiving a Transmit Close indication.

7.15.10.3 Transition XL7:Connected to XL9:Break

This transition shall occur after sending a Transmit Break request.

7.15.10.4 Transition XL7:Connected to XL10:Break_Wait

~~This transition shall occur after receiving a Transmit Break indication.~~
This transition shall occur if:

a) a BREAK Received message has not been received; and
b) after receiving a Transmit Break indication.

7.15.11 XL8:Close_Wait state

7.15.11.1 State description

<other stuff>

7.15.11.2 Transition XL8:Close_Wait to XL0:Idle

This transition shall occur after sending a Transmit Close request.

7.15.11.3 Transition XL8:Close_Wait to XL9:Break

This transition shall occur after sending a Transmit Break request.

7.15.11.4 Transition XL8:Close_Wait to XL10:Break_Wait

~~This transition shall occur after a Transmit Break indication is received.~~
This transition shall occur if:

a) a BREAK Received message has not been received; and
b) after receiving a Transmit Break indication.