

To: T10 Technical Committee
 From: Rob Elliott, HP (elliott@hp.com)
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 Subject: T10/02-211r1 SAS address frame field checking

Revision History

Revision 0 (2 June 2002) first revision
 Revision 1 (10 June 2002) incorporated comments from the June 5-7 SAS WG meeting - moves the device name (IDENTIFY) or destination device name (OPEN) to bytes 4-11 of the address frame.

Related Documents

sas-r00a - Serial Attached SCSI revision 00a

Overview

Details are lacking on what recipients should do when a bad address frame is received.

Suggested Changes

7.4.1 Address frames overview

Address frames with unknown address frame types, incorrect lengths, or CRC errors shall be ignored by the recipient.

7.4.2 IDENTIFY address frame

Table 1 defines the IDENTIFY address frame format used for the identification sequence. The IDENTIFY address frame is sent after the phy reset sequence completes indicating a SAS physical link.

Table 1. IDENTIFY address frame format

Byte	7	6	5	4	3	2	1	0
0	Reserved				ADDRESS FRAME TYPE (0h)			
1	PHY IDENTIFIER							
2	Reserved				MAXIMUM PHYSICAL LINK RATE			
3	DEVICE TYPE	STP INITIATOR	STP TARGET	SSP INITIATOR	SSP TARGET	SMP INITIATOR	SMP TARGET	
4	Reserved <u>DEVICE NAME</u>							
10 <u>11</u>	Reserved <u>DEVICE NAME</u>							
20 <u>21</u>	(MSB)	Reserved <u>DEVICE NAME</u>						(LSB)
27								
28	(MSB)	CRC						(LSB)
31								

The recipient shall ignore reserved fields in the IDENTIFY address frame.

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7.4.3 OPEN address frame

Table 2 defines the OPEN address frame format used for connection requests.

Table 2. OPEN address frame format

Byte	7	6	5	4	3	2	1	0
0	INITIATOR	<u>Rsvd</u>	PROTOCOL (<u>3 bits</u>)		ADDRESS FRAME TYPE (1h)			
1	<u>Reserved</u>			FEATURES		LINK RATE		
2	(MSB)							
3	INITIATOR CONNECTION TAG							
4	(LSB)							
9	<u>Reserved</u>							
11	DESTINATION DEVICE NAME							
12	SOURCE DEVICE NAME							
19	SOURCE DEVICE NAME							
20	<u>Reserved</u>							
21	<u>Reserved</u>							
22	SCALE	(MSB)	ARBITRATION WAIT TIME				(LSB)	
23	ARBITRATION WAIT TIME							
24	(MSB)							
27	<u>Reserved</u>							
27	(LSB)							
28	(MSB)							
31	CRC							
31	(LSB)							

The PROTOCOL field indicates the protocol for the connection being requested and is defined in Table 3.

Table 3. Protocol

PROTOCOL	Protocol
<u>000b</u>	SMP
<u>001b</u>	SSP
<u>010b</u>	STP
<u>011b - 111b</u>	Reserved

The destination device shall reject the connection request with OPEN_REJECT(PROTOCOL NOT SUPPORTED) if the PROTOCOL field is set to a value it does not support.

An INITIATOR bit set to one indicates the source device is acting as an initiator device and, if the protocol is SSP, will grant credit (i.e., will send RRDY) when the connection is established. An INITIATOR bit set to zero indicates the source device is acting as a target device and, if the protocol is SSP, may not grant credit when the connection is established.

If a target/initiator device sets the INITIATOR bit to one, it shall operate only in its initiator role during the connection. If a target/initiator device sets the INITIATOR bit to zero, it shall operate only in its target role during the connection.

An initiator-only device shall reject connection requests from an initiator device with OPEN_REJECT(PROTOCOL NOT SUPPORTED). A target-only device shall reject connection requests from a target device with OPEN_REJECT(PROTOCOL NOT SUPPORTED).

The LINK RATE field indicates the rate of the link on which the OPEN address frame originated, and the rate at which all links on the pathway must support, and is defined in xx.

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The FEATURES field shall be set to zero. The destination device shall reject the connection request with OPEN_REJECT(PROTOCOL NOT SUPPORTED) if the FEATURES field is set to a value it does not support.

The INITIATOR CONNECTION TAG field is used for SSP and STP connection requests to provide an initiator port an easier context lookup when the target port originates a connection request. SSP or STP initiator ports shall set the INITIATOR CONNECTION TAG field to FFFFh if they do not require the field be provided by the target port. Otherwise, an SSP or STP initiator port shall set the INITIATOR CONNECTION TAG field to a unique value per target port. When requesting a connection to an initiator port, a target port shall set the INITIATOR CONNECTION TAG field to the value received in connection requests from the initiator port. An initiator port shall use the same tag for all connection requests to the same target port, and may only change the tag when it has no commands outstanding to that target port. Targets are not required to check consistency of the tags in different connection requests from the same initiator port. SMP initiator ports shall set the INITIATOR CONNECTION TAG field to FFFFh.

The destination device shall ignore the contents of reserved fields in the OPEN address frame.

The SCALE bit and the ARBITRATION WAIT TIME field indicate how long the port sending the OPEN address frame has been waiting for a connection request to be accepted, and are defined in xx. See xx for details on arbitration fairness.

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The DESTINATION DEVICE NAME field indicates the device name of the port with which a connection is being requested.

The SOURCE DEVICE NAME field indicates the device name of the port sending the OPEN address frame.

7.5 Identification sequence

7.5.1 Overview

After the phy reset sequence has been completed indicating the physical link is using SAS rather than SATA, each phy shall send an IDENTIFY address frame (see 0) carrying its device name and other information. Each phy shall also expect to receive an IDENTIFY address frame from the phy to which it is attached. The combination of a phy reset sequence and the identification sequence is called a link reset sequence.

If a device supports more than one phy, it shall send the same device name on all phys for which it is capable of sharing within a port.

If a device detects the same device name incoming on different physical links, it shall treat those physical links as a wide link and consider those phys part of the same port.

If a device detects different device names incoming on different physical links, it shall treat those physical links as independent physical links and consider those phys part of different ports attached to different SAS domains.

If a device does not receive a valid IDENTIFY address frame within 1 ms of phy reset sequence completion, it ~~should send its IDENTIFY address frame again. If IDENTIFY continues to not show up, it may~~ shall restart the phy reset sequence.

If a device receives an additional IDENTIFY address frame after receiving the first one, it shall ~~resend its own IDENTIFY address frame~~ ignore it.

7.5.2 Initiator device specific rules

After identifying that it is attached to an expander device after a link reset sequence, or after receiving a CHANGE primitive sequence, an initiator port should perform a level-order traversal of the domain by opening an SMP connection to each expander device and use the DISCOVER function (see xx) to retrieve a list of attached device names . The order of traversal should be:

- 1) expander device to which the initiator port is attached;
- 2) every device attached to that expander device; and
- 3) if another expander device is found, every device attached to that expander device.

When this is done after a link reset sequence, this lets the initiator discover information about all the devices in the domain. When this is done after a CHANGE, this lets the initiator port determine what changed in the domain.

This information may be used to select link rates for connection requests.

7.5.3 Fanout expander device specific rules

After learning that it is attached to an edge expander device, a fanout expander device shall use the SMP DISCOVER function (see xx) to retrieve the list of device names to which the edge expander device is attached.

After receiving a CHANGE primitive sequence from an edge expander device, the fanout expander device shall use the SMP DISCOVER function to obtain an updated list of device names from that edge expander device.