DELL

To: T10 Technical Committee
From: Kevin Marks
Date: June 29, 2006
Subject: T10/06-210r3 – SAS-2: Reporting ZONE PARTICIPATING CAPABLE in the
                    IDENTIFY address frame

Revision History

Revision 0 (5/07/06) – Initial proposal
Revision 1 (5/31/06) – Changes based on May SAS Protocol WG discussions.
- Updated to Rev 4
- Add section 4.1.3
- Fix Participating spelling in table 26
- Removed setting ZONE GROUP PERSISTENT bit to one when both transmitted and received CONFIGURED ZONE PARTICIPATING bit is one and requirement that is the ZONE GROUP PERSISTENT bit be set to one when the ZONE PARTICIPATING bit is set to one.
- Added ZONE PARTICIPATING PERSISTENT bit that when set to zero, sets the CONFIGURED ZONE PARTICIPATING bit to zero if the received SAS address is different from the previously received address. This allows the connection of two ZPSDS to remain separated until the zone manager is ready to mix them.

Revision 2 (6/12/06) - Changes based on June 2 SAS Protocol conference call discussions.
- Updated the CONFIGURED ZONE PARTICIPATING bit text in 4.8.3.1.
- Removed redundant statement about if ZP=1 then ZG=1
- Removed CONFIGURED ZONE PARTICIPATING CHANGEABLE bit from SMP Discover response
- Fixed byte numbering in Discover response
- Added LAST CONFIGURED ZONE PARTICIPATING bit in the SMP Discover response to indicate what the CONFIGURED ZONE PARTICIPATING bit was set to during the last occurring identification sequence.
- Added ZONE PARTICIPATING PERSISTENT bit to the IDENTIFY address frame and modified table 27 to compare transmitted and received bits.

Revision 3 (6/28/2006) – Changes based on June 20th F2F and Feedback from Rob Elliott
- Changed CONFIGURED ZONE PARTICIPATING bit to REQUESTED ZONE PARTICIPATING bit
- Changed zero to 0 and one to 1 in table 27
- Removed LAST REQUESTED ZONE PARTICIPATING bit and replaced with REQUESTED ZONE PARTICIPATING CHANGED BY EXPANDER bit to indicate that at the conclusion of the last link reset sequence, the zoning expander device set the REQUESTED ZONE PARTICIPATING bit to zero.
- Added changes to DISCOVER LIST
- Added NOTE in 4.8.3.1 that REQUESTED ZONE PARTICIPATING bit may be changed by HW after a link reset sequence.
- Add "with zoning enable" as appropriate.
- Added examples in overview

Related Documents

T10/1760-D - SAS-2 Revision 4a
06-201r1 SAS-2 SMP CONFIGURE PHY ZONE functions
06-260r0 SAS-2 zone management use cases

New text to be added
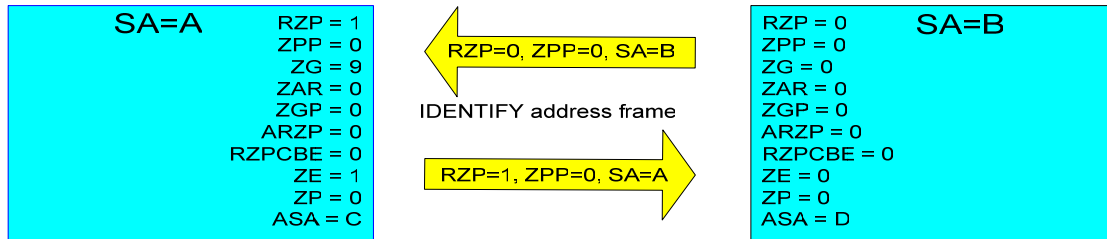~~Text to be deleted~~
<<…Editorial Text…>>

Overview

As currently defined in SAS-2r4a, the ZONE PARTICIPATING bit defines the boundary of the ZPSDS, for each phy in a zoning expander device. If the ZONE PARTICIPATING bit is set to one, this indicated it is within the ZPSDS and if set to zero then it is on the boundary. Because this value may be programmable with a SMP CONFIGURE PHY ZONE function, it leaves a possibility of interoperability issues between zoning devices and non-zoning devices (e.g. SAS-1.1 devices). This proposal aims at removing this possibility of interoperability issues by automating the value of the ZONE PARTICIPATING bit depending on what is attached and a requested value.

This proposal defines a REQUESTED ZONE PARTICIPATING bit in the IDENTIFY address frame that indicates if the phy has been requested to be inside the ZPSDS or on the boundary. Depending on the value transmitted and received in the IDENTIFY address frame, the actual ZONE PARTICIPATING bit value may change after a link reset sequence if the received value is set to zero and transmitted value is set to one. Additionally this proposal defines the effects on the ZONE GROUP field and when both the transmitted and received REQUESTED ZONE PARTICIPATING bit is set to one. The proposed changes to the ZONE GROUP field are an automation of a set of rules already defined in SAS-2r4a.
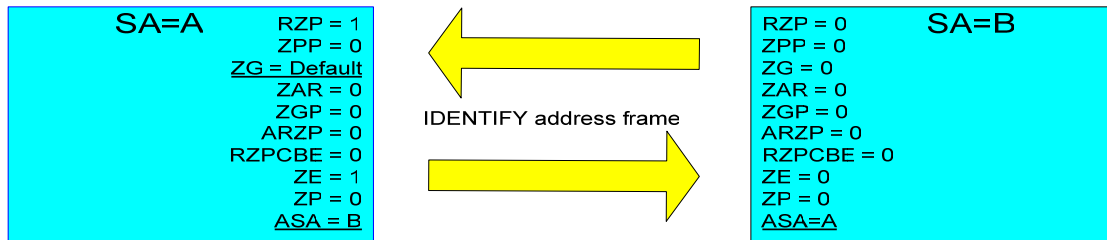
The latest revision of this proposal also include the ZONE PARTICIPATING PERSISTENT bit that if set to zero sets the REQUESTED ZONE PARTICIPATING bit and ZONE PARTICIPATING bit to zero if the received SAS address is different from the previously received address, but if the transmitted and received ZONE PARTICIPATING PERSISTENT bits are set one, then the ZONE PARTICIPATING bit remains one. Additionally the proposal adds a REQUESTED ZONE PARTICIPATING CHANGED BY EXPANDER bit in the SMP Discover response to indicate what the REQUESTED ZONE PARTICIPATING bit was changed by the expander to during the last identification sequence. This allows software to know that the expander changed the request value.

Following are some examples based of this proposal:

RZP   = Request Zone Participating
ZPP   = Zone Participating Persistent
ZG   = Zone Group
ZAR   = Zone Address Resolved
ZGP   = Zone Group Persistent
ARZP   = Attached Requested Zone Participating
RZPCBE = Requested Zone Participating Changed By Expander
ZE   = Zoning Enabled
ZP   = Zone Participating
SA   = SAS Address
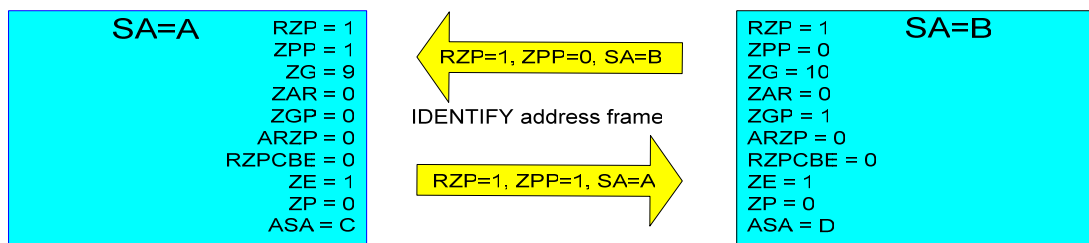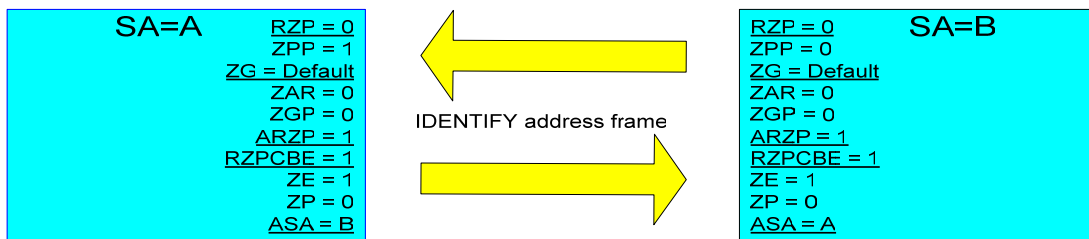ASA   = Attached SAS Address

During Link Reset Sequence

SA=A		SA=B
RZP = 1	← RZP=0, ZPP=0, SA=B	RZP = 0
ZPP = 0	IDENTIFY address frame	ZPP = 0
ZG = 9		ZG = 0
ZAR = 0		ZAR = 0
ZGP = 0		ZGP = 0
ARZP = 0	→ RZP=1, ZPP=0, SA=A	ARZP = 0
RZPCBE = 0		RZPCBE = 0
ZE = 1		ZE = 0
ZP = 0		ZP = 0
ASA = C		ASA = D

After Link Reset Sequence

SA=A		SA=B
RZP = 1	←	RZP = 0
ZPP = 0	IDENTIFY address frame	ZPP = 0
ZG = Default		ZG = 0
ZAR = 0		ZAR = 0
ZGP = 0		ZGP = 0
ARZP = 0	→	ARZP = 0
RZPCBE = 0		RZPCBE = 0
ZE = 1		ZE = 0
ZP = 0		ZP = 0
ASA = B		ASA=A

Example 1- Non-zoning or Zoning Disabled

During Link Reset Sequence

SA=A		SA=B
RZP = 1	← RZP=1, ZPP=0, SA=B	RZP = 1
ZPP = 1	IDENTIFY address frame	ZPP = 0
ZG = 9		ZG = 10
ZAR = 0		ZAR = 0
ZGP = 0		ZGP = 1
ARZP = 0	→ RZP=1, ZPP=1, SA=A	ARZP = 0
RZPCBE = 0		RZPCBE = 0
ZE = 1		ZE = 1
ZP = 0		ZP = 0
ASA = C		ASA = D

After Link Reset Sequence

SA=A		SA=B
RZP = 0	←	RZP = 0
ZPP = 1	IDENTIFY address frame	ZPP = 0
ZG = Default		ZG = Default
ZAR = 0		ZAR = 0
ZGP = 0		ZGP = 0
ARZP = 1	→	ARZP = 1
RZPCBE = 1		RZPCBE = 1
ZE = 1		ZE = 1
ZP = 0		ZP = 0
ASA = B		ASA = A

Example 2- Zoning with one side set to Zone Participating Persistent and different SAS Address recieved

SA=A			SA=B	
RZP = 1			RZP = 1	
ZPP = 0			ZPP = 0	
ZG = 9	RZP=1, ZPP=0, SA=B ←		ZG = 10	
ZAR = 0			ZAR = 0	
ZGP = 1	IDENTIFY address frame		ZGP = 1	
ARZP = 0			ARZP = 0	
RZPCBE = 0	RZP=1, ZPP=0, SA=A →		RZPCBE = 0	
ZE = 1			ZE = 1	
ZP = 0			ZP = 0	
ASA = B			ASA = A	

During Link Reset Sequence

SA=A			SA=B	
RZP = 1			RZP = 1	
ZPP = 0	←		ZPP = 0	
ZG = 1			ZG = 1	
ZAR = 0	IDENTIFY address frame		ZAR = 0	
ZGP = 1			ZGP = 1	
ARZP = 1			ARZP = 1	
RZPCBE = 0	→		RZPCBE = 0	
ZE = 1			ZE = 1	
ZP = 1			ZP = 1	
ASA = B			ASA = A	
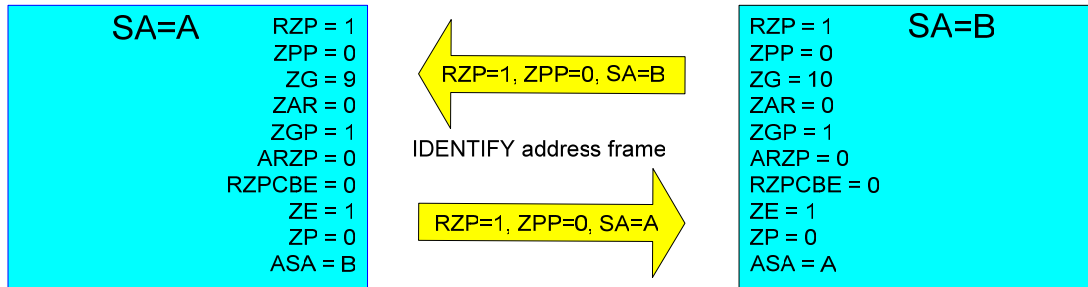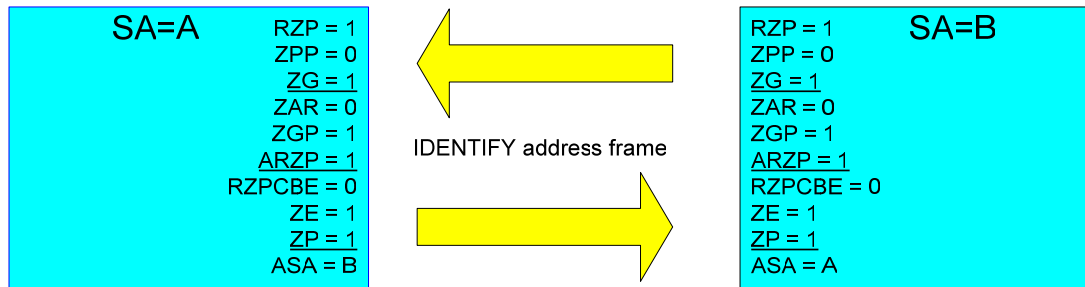
After Link Reset Sequence

Example 3- Zoning with the same SAS Address

SA=A			SA=B	
RZP = 1			RZP = 1	
ZPP = 1	RZP=1, ZPP=1, SA=B ←		ZPP = 1	
ZG = 1			ZG = 1	
ZAR = 0	IDENTIFY address frame		ZAR = 0	
ZGP = 0			ZGP = 0	
ARZP = 1			ARZP = 1	
RZPCBE = 0	RZP=1, ZPP=1, SA=A →		RZPCBE = 0	
ZE = 1			ZE = 1	
ZP = 1			ZP = 1	
ASA = C			ASA = D	

During Link Reset Sequence

SA=A			SA=B	
RZP = 1			RZP = 1	
ZPP = 1	←		ZPP = 1	
ZG = 1			ZG = 1	
ZAR = 0	IDENTIFY address frame		ZAR = 0	
ZGP = 0			ZGP = 0	
ARZP = 1			ARZP = 1	
RZPCBE = 0	→		RZPCBE = 0	
ZE = 1			ZE = 1	
ZP = 1			ZP = 1	
ASA = B			ASA = A	
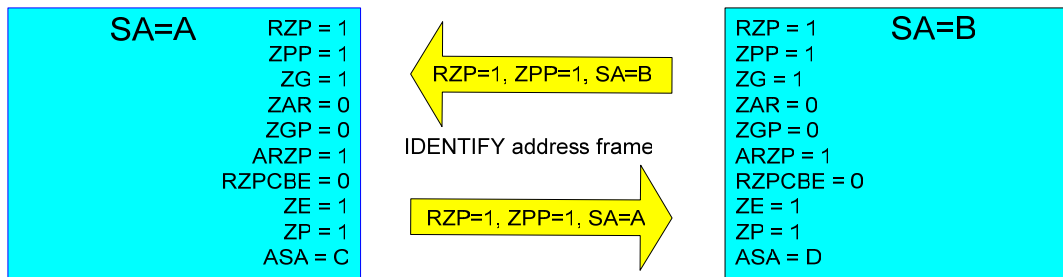
After Link Reset Sequence

Example 4 - Zoning with both sides set to Zone Participating Persistent and different SAS Address

Suggested Changes to SAS-2r4:

4 General
4.1 Architecture
4.1.1 Architecture overview

<< … >>

4.1.2 Physical links and phys

<< ...7th Paragraph...>>

During the identification sequence (see 7.9), a phy:

> a) transmits an IDENTIFY address frame including the device type (i.e., end device, edge expander device, or fanout expander device) of the device containing the phy, the SAS address of the SAS port or expander device containing the phy, the device name of the SAS device or expander device containing the phy, the phy identifier, and bits specifying the SSP initiator phy capability, STP initiator phy capability, SMP initiator phy capability, SSP target phy capability, STP target phy capability, ~~and~~ SMP target phy capability, requested zone participating value and zone participating persistent value.
> b) receives an IDENTIFY address frame containing the same set of information from the attached phy, including the attached device type, the attached SAS address, the attached device name, the attached phy identifier, and bits indicating the attached SSP initiator phy capability, attached STP initiator phy capability, attached SMP initiator phy capability, attached SSP target phy capability, attached STP target phy capability, ~~and~~ attached SMP target phy capability, requested zone participating value and zone participating persistent value..

<< … >>
4.1.3 Ports (narrow ports and wide ports)

<< …6th paragraph... >>

Phys that are able to become part of the same wide port shall set the DEVICE TYPE field, SSP INITIATOR PORT bit, STP INITIATOR PORT bit, SMP INITIATOR PORT bit, SSP TARGET PORT bit, STP TARGET PORT bit, SMP TARGET PORT bit, ZONE PARTICIPATING PERSISTENT bit, REQUESTED ZONE PARTICIPATING bit and SAS ADDRESS field in the IDENTIFY address frame (see 7.8.2) transmitted during the identification sequence to the same set of values on each phy in the wide port. Recipient wide ports are not required to check the consistency of these fields across their phys.

<< … >>

4.8 Zoning
4.8.1 Zoning overview

<< … >>

4.8.2 Zoning expander device requirements

<< … >>

4.8.3 Zone operation

4.8.3.1 Zone phy information

Each phy of a zoning expander device shall support the following zone phy information fields:
- a) REQUESTED ZONE PARTICIPATING bit;
- b) ZONE PARTICIPATING PERSISTENT bit;
- c) ZONE PARTICIPATING bit;
- bd) ZONE ADDRESS RESOLVED bit;
- ce) ZONE GROUP PERSISTENT bit; and
- df) ZONE GROUP field.

The REQUESTED ZONE PARTICIPATING bit is used to establish the boundary of the ZPSDS. The REQUESTED ZONE PARTICIPATING bit is transmitted in the IDENTIFY address frame (see 7.8.2) to the attached phy and is used to determine the values of other zone phy information fields after a link reset sequence (see 4.8.4).

> NOTE xx - The value of the REQUESTED ZONE PARTICIPATING bit may be changed by the zoning expander device following a link reset sequence (see 4.8.4).

The ZONE PARTICIPATING PERSISTENT bit indicates the method used to determine the value of the ZONE PARTICIPATING bit after a link reset sequence (see 4.8.4). The ZONE PARTICIPATING PERSISTENT bit is transmitted in the IDENTIFY address frame (see 7.8.2).

The ZONE PARTICIPATING bit specifies indicates if the phy is a boundary of the ZPSDS. The A ZONE PARTICIPATING bit shall be set to zero indicates when the phy is attached to an end device, or an expander device that does not support zoning or a zoning expander device with zoning disabled (see 10.4.3.3). *<<…This is currently the SMP REPORT GENERAL command…>>* The A ZONE PARTICIPATING bit shall be set to one indicates when the phy is attached to a zoning expander device with zoning enabled and is inside the boundary of the ZPSDS. The ZONE PARTICIPATING bit is not directly changeable and shall only change following a link reset sequence. The value of the ZONE PARTICIPATING bit is dependent on the values of the REQUESTED ZONE PARTICIPATING bit, the REQUESTED ZONE PARTICIPATING bit received in the IDENTIFY address frame, the ZONE PARTICIPATING PERSISTENT bit and the ZONE PARTICIPATING PERSISTENT bit received in the IDENTIFY address frame (see 4.8.4).

The ZONE ADDRESS RESOLVED bit specifies indicates the method used to determine the source zone group for a connection request received by a phy at the boundary of the ZPSDS as specified in table 24 (see 4.8.3.5). *<<…This may need some work with regards to connection requests from inside to a SAS addresses outside this phy…>>*

The ZONE ADDRESS RESOLVED bit may be set to one when:
- a) the phy is contained within a zoning expander device; and
- b) the ZONE PARTICIPATING bit for the phy is set to zero.

The ZONE ADDRESS RESOLVED bit shall be set to zero when:
- a) the phy is contained within a non-zoning expander device; or
- b) the phy is contained within a zoning expander device and the ZONE PARTICIPATING bit for the phy is set to one.

The ZONE GROUP field has a value in the range of 0 to 127 that specifies indicates the zone group to which the phy belongs. If the ZONE PARTICIPATING bit of the phy is set to one, the ZONE GROUP field shall be set to 1. The zone group of the SMP initiator port and SMP target port in a zoning expander device shall be 1.

The ZONE GROUP PERSISTENT bit specifies indicates the method of determining the zone group value of the phy after a link reset sequence when the ZONE PARTICPATING bit is zero (see 4.8.4). If the ZONE PARTICIPATING bit is set to one, the ZONE GROUP PERSISTENT bit shall be set to one.

All phys in an expander port shall have the same zone phy information (see 4.6.2). The default (e.g., power on) values for the zone phy information fields are vendor-specific.

<< … >>

4.8.4 Zone ~~groups~~ phy information and link reset sequences

At the completion of a link reset sequence (see 4.4) and a SATA device is attached, the zoning expander device with zoning enabled shall set the ZONE PARTICIPATING bit to zero. *<<…Do we also want to set the REQUESTED ZONE PARTICIPATING bit to zero?...>>*

At the completion of a link reset sequence and a SATA device is not attached, the zoning expander device with zoning enabled compares the REQUESTED ZONE PARTICIPATING bit and the ZONE PARTICIPATING PERSISTENT bit in the zone phy information with the REQUESTED ZONE PARTICIPATING bit and ZONE PARTICIPATING PERSISTENT bit received in the IDENTIFY address frame (see 7.8.2) from the attached phy. Table 27 specifies the affected phy zone information fields depending on the values of the transmitted and received REQUESTED ZONE PARITICAPTING bits and transmitted and received ZONE PARTICIPATING PERSISTENT bits.

Table 28 — Phy zone information fields affected by a link reset sequence

Transmitted REQUESTED ZONE PARTICIPATING bit	Received REQUESTED ZONE PARTICIPATING bit	Transmitted ZONE PARTICIPATING PERSISTENT bit	Received ZONE PARTICIPATING PERSISTENT bit	Affected phy zone information fields
0b	0b	0b or 1b	0b or 1b	The zoning expander device shall set the ZONE PARTICIPATING bit to zero.
1b	0b			
0b	1b			

1b	1b	0b	0b	If the SAS address received in the IDENTIFY address frame during the identification sequence is different from the SAS address prior to the completion of the link reset sequence, then the zoning expander device shall set:
				  a) the REQUESTED ZONE PARTICIPATING bit to zero; and
				  b) the ZONE PARTICIPATING bit to zero.
				
				If the SAS address received in the IDENTIFY address frame during the identification sequence is the same as the SAS address prior to the completion of the link reset sequence, then the zoning expander device shall set:
				  a) the ZONE PARTICIPATING bit to one;
				  b) the ZONE GROUP field to one; and
				  c) the ZONE ADDRESS RESOLVED bit to zero.

		0b	1b	
		1b	0b	

		1b	1b	The zoning expander device shall set:
				  a) the ZONE PARTICIPATING bit to one;
				  b) the ZONE GROUP field to one; and
				  c) the ZONE ADDRESS RESOLVED bit to zero.

If the ZONE GROUP PERSISTENT bit is set to one, then a link reset sequence (see 4.4) shall not cause the zone group value of an expander phy to change unless the ZONE PARTICIPATING bit changes from zero to one as specified in table 28. If the ZONE GROUP PERSISTENT bit is set to zero, then table 29̶8̶ specifies events based on the initial condition of the expander phy that shall cause the zoning expander device with zoning enabled to change the ZONE GROUP field of the expander phy to its default value (e.g., zero).

Table 298 — Events that cause the ZONE GROUP field to be set to its default value when the ZONE GROUP PERSISTENT bit set to zero

Initial condition	Event after the initial condition is established

Completed link reset sequence with a SAS device attached	A subsequent link reset sequence completes and:
	    a) the SAS address received in the IDENTIFY address frame (see 7.8.2) during the identification sequence is different from the SAS address prior to the completion of the link reset sequence; or
	    b) a SATA device is attached.

Completed link reset sequence with SATA device attached	Either:
	a) A subsequent link reset sequence completes and:
	    A) a hot-plug timeout (see 6.7.5) occurred between the time of the initial condition and the time the link reset sequence completed;
	    B) the zoning expander device has detected the possibility that a new SATA device has been inserted. The method of detection is outside the scope of this standard (e.g., an enclosure services process reports a change in the ELEMENT STATUS CODE field in the Device or Array Device element (see SES-2), or a change in the WORLD WIDE NAME field in the attached SATA device's IDENTIFY DEVICE or IDENTIFY PACKET DEVICE data (see ATA8-ACS)); or
	    C) a SAS device is attached;
	
	    or
	
	b) The expander phy is disabled with the SMP PHY CONTROL function (see10.4.3.16) DISABLE phy operation.

7.8.2 IDENTIFY address frame

Table 98 defines the IDENTIFY address frame format used for the identification sequence. The IDENTIFY address frame is sent after the phy reset sequence completes if the physical link is a SAS physical link.

Table 100 — IDENTIFY address frame format

Byte\Bit	7	6	5	4	3	2	1	0
0	Restricted (for OPEN address frame)	DEVICE TYPE			ADDRESS FRAME TYPE (0h)			
1	Restricted (for OPEN address frame)							
2	Reserved				SSP INITIATOR PORT	STP INITIATOR PORT	SMP INITIATOR PORT	Restricted (for OPEN address frame)
3	Reserved				SSP TARGET PORT	STP TARGET PORT	SMP TARGET PORT	Restricted (for OPEN address frame)
4	DEVICE NAME							
11								
12	SAS ADDRESS							
19								
20	PHY IDENTIFIER							
21	Reserved					ZONE PARTICIP- ATING PERSISTENT	REQUESTED ZONE PARTICIP- ATING	BREAK_REP LY CAPABLE
22	Reserved							
27								
28	(MSB)	CRC						
31								(LSB)

<< 9ᵗʰ Paragraph after table 98 ..>>

The PHY IDENTIFIER field specifies the phy identifier of the phy transmitting the IDENTIFY address frame.

The REQUESTED ZONE PARTICIPATING bit specifies the value of the REQUESTED ZONE PARTICIPATING bit in the zone phy information fields (see 4.8.3.1) at the time the IDENTIFY address frame is transmitted. If the phy transmitting the IDENTIFY address frame is contained in an end device, non-zoning

expander device or zoning expander device with zoning disabled (see x.x.x), then the REQUESTED ZONE PARTICIPATING bit in the IDENTIFY address frame shall be set to zero.

The ZONE PARTICIPATING PERSISTENT bit specifies the value of the ZONE PARTICIPATING PERSISTENT bit in the zone phy information fields (see 4.8.3.1) at the time the IDENTIFY address frame is transmitted. If the phy transmitting the IDENTIFY address frame is contained in an end device, non-zoning expander device or zoning expander device with zoning disabled (see x.x.x), then the ZONE PARTICIPATING PERSISTENT bit shall be set to zero.

The BREAK_REPLY CAPABLE field specifies that the phy is capable of responding to received BREAK primitive sequences with a BREAK_REPLY primitive sequence (see 7.12.5).

See 4.1.3 for additional requirements concerning the DEVICE TYPE field, SSP INITIATOR PORT bit, STP INITIATOR PORT bit, SMP INITIATOR PORT bit, SSP TARGET PORT bit, STP TARGET PORT bit, SMP TARGET PORT bit, and SAS ADDRESS field.

The CRC field is defined in 7.8.1.

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10.4.3.5 DISCOVER function

<< … >>

Table 205 — DISCOVER response (part 2 of 2)

Byte\Bit	7	6	5	4	3	2	1	0
. . .	. . .							
48	Reserved							
49								
50	Vendor Specific							
51								
52	ATTACHED DEVICE NAME							
59								
60	REQUESTED ZONE PARTICIPATING CHANGED BY EXPANDER	ZONE PARTICIPATING PERSISTENT	ATTACHED REQUESTED ZONE PARTICIPATING	REQUESTED ZONE PARTICIPATING	ZONE ADDRESS RESOLVED	ZONE GROUP PERSISTENT	ZONE PARTICIPATING	ZONE ENABLED
61	Reserved							
62								
63	ZONE GROUP							
64	(MSB)			CRC				
67								(LSB)

<< … >>

The ATTACHED DEVICE NAME field shall be updated:
> a) after the identification sequence completes, if a SAS phy or expander phy is attached; or

b) after the COMSAS Detect Timeout timer expires (see 6.8.3.9), if a SATA phy is attached.

A REQUESTED ZONE PARTICIPATING CHANGED BY EXPANDER bit set to one indicates that the zoning expander device set the REQUESTED ZONE PARTICIPATING bit in the zone phy information to zero at the completion of the last link reset sequence. A REQUESTED ZONE PARTICIPATING CHANGED BY EXPANDER bit set to zero indicates that the zoning expander device did not set the REQUESTED ZONE PARTICIPATING bit in the zone phy information to zero at the completion of the last link reset sequence.

> NOTE xx - The zoning manager may use the REQUESTED ZONE PARTICIPATING CHANGED BY EXPANDER bit to see why the REQUESTED ZONE PARTICIPATING bit has changed in the DISCOVER response from what it last programmed the value to.

The ZONE PARTICIPATING PERSISTENT bit contains the value of the ZONE PARTICIPATING PERSISTENT bit in the zone phy information (see 4.8.3.1). *<<…Do I need to add an ATTACHED ZONE PARTICIPATING PERSISTENT bit to the DISCOVER response. The value can actually be determined based on the bits already present…>>*

The ATTACHED REQUESTED ZONE PARTICIPATING bit indicates the value of the REQUESTED ZONE PARTICIPATING bit received in the IDENTIFY address frame (see 7.8.2) from the attached phy during the identification sequence.

The REQUESTED ZONE PARTICIPATING bit contains the value of the REQUESTED ZONE PARTICIPATING bit in the zone phy information (see 4.8.3.1).

The ZONE ADDRESS RESOLVED bit contains the value of the ZONE ADDRESS RESOLVED bit in the zone phy information (see 4.8.3.1).

The ZONE GROUP PERSISTENT bit contains the value of the ZONE GROUP PERSISTENT bit in the zone phy information (see 4.8.3.1).

The ZONE PARTICIPATING bit contains the value of the ZONE PARTICIPATING bit in the zone phy information (see 4.8.3.1).

A ZONING ENABLED bit set to one indicates that zoning is enabled in the expander device and that the REQUESTED ZONE PARTICIPATING CHANGED BY EXPANDER bit, ZONE PARTICIPATING PERSISTENT bit, ATTACHED REQUESTED ZONE PARTICIPATING bit, REQUESTED ZONE PARTICIPATING bit, ZONE ADDRESS RESOLVED bit, the ZONE GROUP PERSISTENT bit, the ZONE PARTICIPATING bit, and the ZONE GROUP field are valid. A ZONING ENABLED bit set to zero indicates that zoning is disabled in the expander device and that those fields are not valid.

The ZONE GROUP field contains the value of the ZONE GROUP field in the zone phy information (see 4.8.3.1). Zone group values between 128 and 255, inclusive, are reserved.

The CRC field is defined in 10.4.3.2.
<< … >>

10.4.3.11 DISCOVER LIST function

10.4.3.11.1 DISCOVER LIST function overview
<< … >>
10.4.3.11.2 DISCOVER LIST request
<< … >>
10.4.3.11.3 DISCOVER LIST response
<< … >>
10.4.3.11.4 DISCOVER LIST response SHORT FORMAT descriptor

Table 227 defines the SHORT FORMAT descriptor.

Table 227 — SHORT FORMAT descriptor

Byte\Bit	7	6	5	4	3	2	1	0
...	**....**							
7	Reserved							
8	ZONE GROUP							
9	REQUESTED ZONE PARTICIP-ATING CHANGED BY EXPANDER	ZONE PARTICIP-ATING PERSISTENT	ATTACHED REQUESTED ZONE PARTICIPATING	REQUESTED ZONE PARTICIP-ATING	ZONE ADDRESS RESOLVED	ZONE GROUP PERSISTENT	ZONE PARTICI-PATING	ZONE ENABLED
10	ATTACHED PHY IDENTIFIER							
11	PHY CHANGE COUNT							
12 **19**	SAS ADDRESS							
20 **23**	Reserved							

All fields in the SHORT FORMAT descriptor are defined in the SMP DISCOVER response (see 10.4.3.5)