To: T10 Technical Committee
From: Rob Elliott, HP (elliott@hp.com)
Date: 17 July 2007
Subject: 07-280r1 SAS-2 SMP DISCOVER virtual phy clarifications

Revision history
Revision 0 (18 June 2007) First revision
Revision 1 (17 July 2007) Incorporated comments from July 2007 SAS protocol WG

Related documents
sas2r10 - Serial Attached SCSI - 2 (SAS-2) revision 10
07-154r1 - SAS-2 ATTACHED SAS ADDRESS for virtual phys (Bob Sheffield, Intel) (incorporated into sas2r09a)

Overview
The definitions of several of the SMP DISCOVER response ATTACHED fields are not worded to also cover virtual phys. 07-154 corrected the definition of the ATTACHED SAS ADDRESS field, but several other fields need similar changes.

Suggested changes

10.4.3.8 DISCOVER function

The DISCOVER function returns information about the specified phy. This SMP function provides information from the IDENTIFY address frame received by the phy and additional phy-specific information. This SMP function shall be implemented by all management device servers.

NOTE 1 - The DISCOVER LIST function (see 10.4.3.14) returns information about one or more phys.

Table 234 defines the request format.

Table 234 — DISCOVER request

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (40h)							
1	FUNCTION (10h)							
2	Reserved							
3	REQUEST LENGTH (02h)							
4	Reserved							
7								
8	Reserved							IGNORE ZONE GROUP
9	PHY IDENTIFIER							
10	Reserved							
11								
12	(MSB)							
15	CRC							(LSB)

The SMP FRAME TYPE field shall be set to 40h.

The FUNCTION field shall be set to 10h.

The REQUEST LENGTH field shall be set to 02h. For compatibility with previous versions of this standard, a REQUEST LENGTH field set to 00h specifies that there are 2 dwords before the CRC field.

An IGNORE ZONE GROUP bit set to one specifies that the management device server shall return information about the specified phy (i.e., the phy specified by the PHY IDENTIFIER field) regardless of the zone permission table.

An IGNORE ZONE GROUP bit set to zero specifies that the management device server shall:

a) if the SMP initiator port has access to the specified phy based on the zone permission table, return the requested information; and
b) if the SMP initiator port does not have access to the specified phy, return a function result of PHY VACANT in the response frame.

If the management device server is not in a zoning expander device with zoning enabled, it shall ignore the IGNORE ZONE GROUP bit.

The PHY IDENTIFIER field specifies the phy (see 4.2.8) for which the information is being requested.

The CRC field is defined in 10.4.3.1.

Table 235 defines the response format.

Table 235 — DISCOVER response (part 1 of 3)

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (41h)							
1	FUNCTION (10h)							
2	FUNCTION RESULT							
3	RESPONSE LENGTH (17h)							
4	(MSB) EXPANDER CHANGE COUNT							
5								(LSB)
6	Reserved							
8								
9	PHY IDENTIFIER							
10	Reserved							
11								
12	Reserved	ATTACHED DEVICE TYPE			ATTACHED REASON			
13	Reserved				NEGOTIATED LOGICAL LINK RATE			
14	Reserved				ATTACHED SSP INITIATOR	ATTACHED STP INITIATOR	ATTACHED SMP INITIATOR	ATTACHED SATA HOST
15	ATTACHED SATA PORT SELECTOR	Reserved			ATTACHED SSP TARGET	ATTACHED STP TARGET	ATTACHED SMP TARGET	ATTACHED SATA DEVICE
16	SAS ADDRESS							
23								

Table 235 — DISCOVER response (part 2 of 3)

Byte\Bit	7	6	5	4	3	2	1	0
24	ATTACHED SAS ADDRESS							
31								
32	ATTACHED PHY IDENTIFIER							
33	Reserved					ATTACHED INSIDE ZPSDS PERSISTENT	ATTACHED REQUESTED INSIDE ZPSDS	ATTACHED BREAK_REPLY CAPABLE
34	Reserved							
39								
40	PROGRAMMED MINIMUM PHYSICAL LINK RATE				HARDWARE MINIMUM PHYSICAL LINK RATE			
41	PROGRAMMED MAXIMUM PHYSICAL LINK RATE				HARDWARE MAXIMUM PHYSICAL LINK RATE			
42	PHY CHANGE COUNT							
43	VIRTUAL PHY	Reserved			PARTIAL PATHWAY TIMEOUT VALUE			
44	Reserved				ROUTING ATTRIBUTE			
45	Reserved	CONNECTOR TYPE						
46	CONNECTOR ELEMENT INDEX							
47	CONNECTOR PHYSICAL LINK							
48	Reserved							
49								
50	Vendor specific							
51								
52	ATTACHED DEVICE NAME							
59								
60	Reserved	REQUESTED INSIDE ZPSDS CHANGED BY EXPANDER	INSIDE ZPSDS PERSISTENT	REQUESTED INSIDE ZPSDS	Reserved	ZONE GROUP PERSISTENT	INSIDE ZPSDS	ZONING ENABLED
61	Reserved							
62								
63	ZONE GROUP							
64	SELF-CONFIGURATION STATUS							
65	SELF-CONFIGURATION LEVELS COMPLETED							
66	Reserved							
67								

Table 235 — DISCOVER response (part 3 of 3)

Byte\Bit	7	6	5	4	3	2	1	0
68	SELF-CONFIGURATION SAS ADDRESS							
75								
76	Reserved							
91								
92	Reserved							
93								
94	REASON				NEGOTIATED PHYSICAL LINK RATE			
95	Reserved							HARDWARE MUXING SUPPORTED
96	(MSB)	CRC						
99								(LSB)

The SMP FRAME TYPE field shall be set to 41h.

The FUNCTION field shall be set to 10h.

The FUNCTION RESULT field is defined in 10.4.3.2.

The RESPONSE LENGTH field shall be set to 17h. For compatibility with previous versions of this standard, a RESPONSE LENGTH field set to 00h indicates that there are 12 dwords before the CRC field.

The EXPANDER CHANGE COUNT field is defined in the SMP REPORT GENERAL response (see 10.4.3.3).

The PHY IDENTIFIER field indicates the phy for which ~~physical configuration link~~ information is being returned.

The ATTACHED DEVICE TYPE field indicates the device type attached to this phy ~~detected received during the link reset sequence~~ and is defined in table 236.

Table 236 — ATTACHED DEVICE TYPE **field**

Code	Description
000b	No device attached
001b	~~End device~~ SAS device or SATA device
010b	Expander device
011b	Expander device compliant with a previous version of this standard
All others	Reserved

~~The~~If the phy is a physical phy, the ATTACHED DEVICE TYPE field shall only be set to a value other than 000b after:

a) if a SAS device or expander device is attached, after the identification sequence is complete; ~~or~~
b) if a SATA phy is attached and the STP/SATA bridge does not retrieve IDENTIFY (PACKET) DEVICE data, after the STP/SATA bridge receives the initial Register - Device to Host FIS; and
c) if a SATA phy is attached and the STP/SATA bridge retrieves IDENTIFY (PACKET) DEVICE data, after the STP/SATA bridge receives IDENTIFY (PACKET) DEVICE data or it encounters a failure retrieving that data.

Editor's Note 1: "End device" definition in 3.1.69 only covers SAS devices

~~The~~If the phy is a physical phy and a SAS phy or expander phy is attached, the ATTACHED REASON field indicates the value of the REASON field received in the IDENTIFY address frame (see 7.8.2) during the identification sequence. If the phy is a physical phy and a SATA phy is attached, the ATTACHED REASON field shall be set to 0h after the initial Register - Device to Host FIS has been received. If the phy is a virtual phy, the ATTACHED REASON field shall be set to 0h.

The NEGOTIATED LOGICAL LINK RATE field is defined in table 237 and indicates the logical link rate being used by the phy. For physical phys, this is negotiated during the link reset sequence. For virtual phys, this field should be set to the maximum physical link rate supported by the expander device. This field may be different from the negotiated physical link rate when multiplexing is enabled.

Table 237 — NEGOTIATED LOGICAL LINK RATE field

NEGOTIATED PHYSICAL LINK RATE field	Multiplexing	NEGOTIATED LOGICAL LINK RATE field
9h (i.e., G2)	Disabled	9h (i.e., 3 Gbps)
	Enabled	8h (i.e., 1,5 Gbps)
Ah (i.e., G3)	Disabled	Ah (i.e., 6 Gbps)
	Enabled	9h (i.e., 3 Gbps)
All others	Any	Same as the NEGOTIATED LOGICAL LINK RATE field

NOTE 2 - In previous versions of this standard that did not define multiplexing, the NEGOTIATED LOGICAL LINK RATE field was called the NEGOTIATED PHYSICAL LINK RATE field and the NEGOTIATED PHYSICAL LINK RATE field in byte 94 did not exist.

Table 238 ~~describes~~defines the ATTACHED SATA PORT SELECTOR bit and the ATTACHED SATA DEVICE bit.

Table 238 — ATTACHED SATA PORT SELECTOR and ATTACHED SATA DEVICE bits

ATTACHED SATA PORT SELECTOR **bit value** [a] [b] [d]	ATTACHED SATA DEVICE **bit value** [c] [d]	**Description**
0	0	Either: a) The phy is a virtual phy, or b) The phy is a physical phy, and neither ~~Neither~~ a SATA port selector nor a SATA device is attached and ready on the selected phy.
0	1	The phy is a physical phy and the attached phy is a SATA device phy. No SATA port selector is present (i.e., the SP state machine did not detect COMWAKE in response to the initial COMINIT, but sequenced through the normal (non-SATA port selector) SATA device OOB sequence).
1	0	The phy is a physical phy, the attached phy is a SATA port selector host phy, and either: a) the attached phy is the inactive host phy, or b) the attached phy is the active host phy and a SATA device is either not present or not ready behind the SATA port selector (i.e., the SP state machine detected COMWAKE while waiting for COMINIT).
1	1	The phy is a physical phy, the attached phy is a SATA port selector's active host phy, and a SATA device is present behind the SATA port selector (i.e., the SP state machine detected COMWAKE while waiting for COMINIT, timed out waiting for COMSAS, and exchanged COMWAKE with an attached SATA device).

[a] The ATTACHED SATA PORT SELECTOR bit is invalid if the NEGOTIATED LOGICAL LINK RATE field is set to UNKNOWN (i.e., 0h), DISABLED (i.e., 1h), or RESET_IN_PROGRESS (i.e., 5h).
[b] Whenever the ATTACHED SATA PORT SELECTOR bit changes, the phy shall originate a Broadcast (Change)(see 7.11).
[c] For the purposes of the ATTACHED SATA DEVICE bit, ~~the~~a SATA port selector is not considered a SATA device.
[d] The ATTACHED SATA PORT SELECTOR bit and the ATTACHED SATA DEVICE bit are updated as specified in the SP state machine (see 6.8).

An ATTACHED SATA HOST bit set to one indicates a SATA host port is attached. An ATTACHED SATA HOST bit set to zero indicates a SATA host port is not attached.

NOTE 3 - Support for SATA hosts is outside the scope of this standard.

If a SAS phy reset sequence occurs (see 6.7.4)(i.e., one or more of the ATTACHED SSP INITIATOR PORT bit, ATTACHED STP INITIATOR PORT bit, the ATTACHED SMP INITIATOR PORT bit, the ATTACHED SSP TARGET PORT bit, the ATTACHED STP TARGET PORT bit, and/or the ATTACHED SMP TARGET PORT bit is set to one), then the ATTACHED SATA PORT SELECTOR bit, the ATTACHED SATA DEVICE bit, and the ATTACHED SATA HOST bit shall each be set to zero.

An ATTACHED SSP INITIATOR PORT bit set to one indicates the attached phy supports an SSP initiator port. An ATTACHED SSP INITIATOR PORT bit set to zero indicates the attached phy does not support an SSP initiator port. If the phy is a physical phy, the ~~The~~ ATTACHED SSP INITIATOR PORT bit indicates the value of the SSP INITIATOR PORT bit received in the IDENTIFY address frame (see 7.8.2) during the identification sequence.

An ATTACHED STP INITIATOR PORT bit set to one indicates the attached phy supports an STP initiator port. An ATTACHED STP INITIATOR PORT bit set to zero indicates the attached phy does not support an STP initiator port.

If the phy is a physical phy, the ~~The~~ ATTACHED STP INITIATOR PORT bit indicates the value of the STP INITIATOR PORT bit received in the IDENTIFY address frame (see 7.8.2) during the identification sequence.

An ATTACHED SMP INITIATOR PORT bit set to one indicates the attached phy supports an SMP initiator port. An ATTACHED SMP INITIATOR PORT bit set to zero indicates the attached phy does not support an SMP initiator port. If the phy is a physical phy, the ~~The~~ ATTACHED SMP INITIATOR PORT bit indicates the value of the SMP INITIATOR PORT bit received in the IDENTIFY address frame (see 7.8.2) during the identification sequence.

An ATTACHED SSP TARGET PORT bit set to one indicates the attached phy supports an SSP target port. An ATTACHED SSP TARGET PORT bit set to zero indicates the attached phy does not support an SSP target port. If the phy is a physical phy, the ~~The~~ ATTACHED SSP TARGET PORT bit indicates the value of the SSP TARGET PORT bit received in the IDENTIFY address frame (see 7.8.2) during the identification sequence.

An ATTACHED STP INITIATOR PORT bit set to one indicates the attached phy supports an STP target port. An ATTACHED STP INITIATOR PORT bit set to zero indicates the attached phy does not support an STP target port. If the phy is a physical phy, the ~~The~~ ATTACHED STP TARGET PORT bit indicates the value of the STP TARGET PORT bit received in the IDENTIFY address frame (see 7.8.2) during the identification sequence.

An ATTACHED SMP INITIATOR PORT bit set to one indicates the attached phy supports an SMP target port. An ATTACHED SMP INITIATOR PORT bit set to zero indicates the attached phy does not support an SMP target port. If the phy is a physical phy, the ~~The~~ ATTACHED SMP TARGET PORT bit indicates the value of the SMP TARGET PORT bit received in the IDENTIFY address frame (see 7.8.2) during the identification sequence.

If the phy is a physical phy, the ~~The~~ ATTACHED SSP INITIATOR PORT bit, ATTACHED STP INITIATOR PORT bit, ATTACHED SMP INITIATOR PORT bit, ATTACHED SSP TARGET PORT bit, ATTACHED STP TARGET PORT bit, and ATTACHED SMP TARGET PORT bit shall be updated at the end of the identification sequence.

If a SATA phy reset sequence occurs (see 6.7.3)(i.e., the ATTACHED SATA PORT SELECTOR bit is set to one, the ATTACHED SATA DEVICE bit is set to one, or the ATTACHED SATA HOST bit is set to one), then the ATTACHED SSP INITIATOR PORT bit, ATTACHED STP INITIATOR PORT bit, ATTACHED SMP INITIATOR PORT bit, ATTACHED SSP TARGET PORT bit, ATTACHED STP TARGET PORT bit, and ATTACHED SMP TARGET PORT bit shall each be set to zero.

~~The SAS ADDRESS field contains the value of the SAS ADDRESS field transmitted in the IDENTIFY address frame (see 7.8.2) during the identification sequence.~~ If the phy is an expander phy, the SAS ADDRESS field contains the SAS address of the expander device (see 4.2.4). If the phy is a SAS phy, the SAS ADDRESS field contains the SAS address of the SAS port (see 4.2.7). If the phy is a physical phy, the SAS ADDRESS field contains the value of the SAS ADDRESS field transmitted in the IDENTIFY address frame (see 7.8.2) during the identification sequence.

~~This means~~The ATTACHED SAS ADDRESS field is defined as follows:

a) if the attached port is an expander port, the ATTACHED SAS ADDRESS field contains the SAS address of the attached expander device (see 4.2.4);
b) if the attached port is a SAS port, the ATTACHED SAS ADDRESS field contains SAS address of the attached SAS port (see 4.2.7); and
c) if the attached port is a SATA device port, the ATTACHED SAS ADDRESS field contains the SAS address of the STP/SATA bridge (see 4.6.2).

For a physical phy, the ATTACHED SAS ADDRESS field contains the value of the SAS ADDRESS field received in the IDENTIFY address frame (see 7.8.2) during the identification sequence. ~~For a virtual phy, the ATTACHED SAS ADDRESS field contains the SAS address of the port in the SAS device to which the virtual phy is attached.~~

For a physical phy, the ~~The~~ ATTACHED SAS ADDRESS 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.

An STP initiator port should not make a connection request to the attached SAS address until the ATTACHED DEVICE TYPE field is set to a value other than 000b (see table 236).

The ATTACHED PHY IDENTIFIER field ~~contains a phy identifier for the attached phy~~is defined as follows:

~~a) If the attached phy is a SAS phy or an expander phy, the ATTACHED PHY IDENTIFIER field contains the value of the PHY IDENTIFIER field received in the IDENTIFY address frame (see 7.8.2) during the identification sequence. This means:~~

~~A) If the attached phy is a SAS phy, the ATTACHED PHY IDENTIFIER field contains the phy identifier of the attached SAS phy in the attached SAS device;~~

~~B) If the attached phy is an expander phy, the ATTACHED PHY IDENTIFIER field contains the phy identifier (see 4.2.8) of the attached expander phy in the attached expander device; and~~

b) If the attached phy is a SAS phy, the ATTACHED PHY IDENTIFIER field contains the phy identifier of the attached SAS phy in the attached SAS device;

c) If the attached phy is an expander phy, the ATTACHED PHY IDENTIFIER field contains the phy identifier (see 4.2.8) of the attached expander phy in the attached expander device; and

d) If the attached phy is a SATA device phy, the ATTACHED PHY IDENTIFIER field contains 00h;

e) If the attached phy is a SATA port selector phy and the expander device is able to determine the port of the SATA port selector to which it is attached, the ATTACHED PHY IDENTIFIER field contains 00h or 01h; and

f) If the attached phy is a SATA port selector phy and the expander device is not able to determine the port of the SATA port selector to which it is attached, the ATTACHED PHY IDENTIFIER field contains 00h.

If the phy is a physical phy and the attached phy is a SAS phy or an expander phy, the ATTACHED PHY IDENTIFIER field contains the value of the PHY IDENTIFIER field received in the IDENTIFY address frame (see 7.8.2) during the identification sequence.

For a physical phy, the ~~The~~ ATTACHED PHY IDENTIFIER 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.

If the phy is a physical phy, the ~~The~~ ATTACHED INSIDE ZPSDS PERSISTENT bit indicates the value of the INSIDE ZPSDS PERSISTENT bit received in the IDENTIFY address frame (see 7.8.2) from the attached phy during the identification sequence. If the phy is a virtual phy, the ATTACHED INSIDE ZPSDS PERSISTENT bit shall be set to zero.

If the phy is a physical phy, the ~~The~~ ATTACHED REQUESTED INSIDE ZPSDS bit indicates the value of the REQUESTED INSIDE ZPSDS bit received in the IDENTIFY address frame (see 7.8.2) from the attached phy during the identification sequence. If the phy is a virtual phy, the ATTACHED REQUESTED INSIDE ZPSDS bit shall be set to zero.

If the phy is a physical phy, the ~~The~~ ATTACHED BREAK_REPLY CAPABLE bit indicates the value of the BREAK_REPLY CAPABLE bit received in the IDENTIFY address frame (see 7.8.2) during the identification sequence. If a phy reset sequence occurs (see 6.7) then the ATTACHED BREAK_REPLY CAPABLE bit shall be set to zero. If the phy is a virtual phy, the ATTACHED BREAK_REPLY CAPABLE bit shall be set to one.

Editor's Note 2: SAS-2 designs are required to support BREAK_REPLY, so a virtual phy following SAS-2 must support it. Only physical phys that could attach to SAS-1.1 designs may report zero.

The PROGRAMMED MINIMUM PHYSICAL LINK RATE field indicates the minimum physical link rate set by the PHY CONTROL function (see 10.4.3.26). The values are defined in table 239. The default value shall be the value of the HARDWARE MINIMUM PHYSICAL LINK RATE field.

The HARDWARE MINIMUM PHYSICAL LINK RATE field indicates the minimum physical link rate supported by the phy. The values are defined in table 240.

The PROGRAMMED MAXIMUM PHYSICAL LINK RATE field indicates the maximum physical link rate set by the PHY CONTROL function (see 10.4.3.26). The values are defined in table 239. The default value shall be the value of the HARDWARE MAXIMUM PHYSICAL LINK RATE field.

Table 239 — PROGRAMMED MINIMUM PHYSICAL LINK RATE **and** PROGRAMMED MAXIMUM PHYSICAL LINK **rate fields**

Code	Description
0h	Not programmable
1h - 7h	Reserved
8h	1,5 Gbps
9h	3 Gbps
Ah	6 Gbps
Bh - Fh	Reserved for future physical link rates

The HARDWARE MAXIMUM PHYSICAL LINK RATE field indicates the maximum physical link rate supported by the phy. The values are defined in table 240. If the phy is a virtual phy, the field should be set to the maximum physical link rate supported by the expander device.

Table 240 — HARDWARE MINIMUM PHYSICAL LINK RATE **and** HARDWARE MAXIMUM PHYSICAL LINK RATE **fields**

Code	Description
0h - 7h	Reserved
8h	1,5 Gbps
9h	3 Gbps
Ah	6 Gbps
Bh - Fh	Reserved for future physical link rates

The PHY CHANGE COUNT field counts the number of Broadcast (Change)s originated by an expander phy. Expander devices shall support this field. Other device types shall not support this field. This field shall be set to zero at power on. The expander device shall increment this field at least once when it originates a Broadcast (Change) for any reason described in 7.11 from the specified expander phy and shall not increment this field when forwarding a Broadcast (Change).

After incrementing the PHY CHANGE COUNT field, the expander device is not required to increment the PHY CHANGE COUNT field again unless a DISCOVER response is transmitted. The PHY CHANGE COUNT field shall wrap to zero after the maximum value (i.e., FFh) has been reached.

NOTE 4 - Application clients that use the PHY CHANGE COUNT field should read it often enough to ensure that it does not increment a multiple of 256 times between reading the field.

A VIRTUAL PHY bit set to one indicates the phy is part of an internal port and the attached device is contained within the expander device. A VIRTUAL PHY bit set to zero indicates the phy is a physical phy and the attached device is not contained within the expander device.

The PARTIAL PATHWAY TIMEOUT VALUE field indicates the partial pathway timeout value in microseconds (see 7.12.4.4) set by the PHY CONTROL function (see 10.4.3.26).

NOTE 5 - The recommended default value for PARTIAL PATHWAY TIMEOUT VALUE is 7 µs.

The ROUTING ATTRIBUTE field indicates the routing attribute supported by the phy (see 4.6.7.1) and is defined in table 241.

Table 241 — ROUTING ATTRIBUTE field

Code	Name	Description
0h	Direct routing attribute	Direct routing method for attached end devices. Attached expander devices are not supported on this phy.
1h	Subtractive routing attribute	Either: a) subtractive routing method for attached expander devices; or b) direct routing method for attached end devices.
2h	Table routing attribute	Either: a) table routing method for attached expander devices; or b) direct routing method for attached end devices.
All others	Reserved	

The ROUTING ATTRIBUTE field shall not change based on the attached device type.

The CONNECTOR TYPE field indicates the type of connector used to access the phy, as reported by the enclosure services process for the enclosure (see the SAS Connector element in SES-2). A CONNECTOR TYPE field set to 00h indicates no connector information is available and that the CONNECTOR ELEMENT INDEX field and the CONNECTOR PHYSICAL LINK fields are invalid and shall be ignored.

The CONNECTOR ELEMENT INDEX indicates the element index of the SAS Connector element representing the connector used to access the phy, as reported by the enclosure services process for the enclosure (see the SAS Connector element in SES-2).

The CONNECTOR PHYSICAL LINK field indicates the physical link in the connector used to access the phy, as reported by the enclosure services process for the enclosure (see the SAS Connector element in SES-2).

The ATTACHED DEVICE NAME field is defined as follows:

a) if the attached phy is an expander phy, the ATTACHED DEVICE NAME field contains the device name of the attached expander device (see 4.2.4);
b) if the attached phy is a SAS phy, the ATTACHED DEVICE NAME field contains the device name of the attached SAS device (see 4.2.7); and
c) if the attached phy is a SATA device phy, the ATTACHED DEVICE NAME field contains the world wide name of the SATA device (see 4.6.2) or 00000000 00000000h.

For physical phys, Table 242 defines the ATTACHED DEVICE NAME field.

Table 242 — ATTACHED DEVICE NAME field

Condition	Update time	Value
A SAS phy or expander phy is attached	Completion of the identification sequence	The management device server shall set this field to the DEVICE NAME field in the incoming IDENTIFY address frame (i.e., the attached expander device name or attached SAS device name (see 4.2.4))
A SATA phy is attached	Expiration of the COMSAS Detect Timeout timer (see 6.6.3)	The management device server shall set this field to 00000000 00000000h
	Reception of IDENTIFY (PACKET) DEVICE data from the SATA device [a]	Either: a) if IDENTIFY (PACKET) DEVICE data word 255 (i.e., the Integrity word) is correct and words 108-111 (i.e., the World Wide Name field) are not set to zero, the management device server shall set this field to the world wide name indicated by words 108-111 according to table 12 in 4.2.5; b) if IDENTIFY (PACKET) DEVICE data word 255 (i.e., the Integrity word) is correct and words 108-111 (i.e., the World Wide Name) are set to zero, the management device server shall set this field to 00000000 00000000h; or c) if IDENTIFY (PACKET) DEVICE data word 255 (i.e., the Integrity word) is not correct, the management device server shall set this field to 00000000 00000000h.
	Processing a PHY CONTROL function SET ATTACHED DEVICE NAME phy operation	The management device server shall set this field to the value specified in the ATTACHED DEVICE NAME field in the PHY CONTROL request (see 10.4.3.26).
[a] This row only applies if the expander device originates the IDENTIFY (PACKET) DEVICE command.		

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

NOTE 6 - The zone manager may use the REQUESTED INSIDE ZPSDS CHANGED BY EXPANDER bit to determine why the REQUESTED INSIDE ZPSDS bit has changed in the DISCOVER response from the value to which it last set the bit.

The INSIDE ZPSDS PERSISTENT bit contains the value of the INSIDE ZPSDS PERSISTENT bit in the zone phy information (see 4.9.3.1).

The REQUESTED INSIDE ZPSDS bit contains the value of the REQUESTED INSIDE ZPSDS bit in the zone phy information (see 4.9.3.1).

The ZONE GROUP PERSISTENT bit contains the value of the ZONE GROUP PERSISTENT bit in the zone phy information (see 4.9.3.1).

The INSIDE ZPSDS bit contains the value of the INSIDE ZPSDS bit in the zone phy information (see 4.9.3.1).

A ZONING ENABLED bit set to one indicates that zoning is enabled in the expander device. A ZONING ENABLED bit set to zero indicates that zoning is disabled in the expander device.

The ZONE GROUP field contains the value of the ZONE GROUP field in the zone phy information (see 4.9.3.1).

The SELF-CONFIGURATION STATUS field indicates the status of a self-configuring expander device pertaining to the specified phy and is defined in table 243.

Table 243 — SELF-CONFIGURATION STATUS field

Code	Description
00h	No status available
01h - FFh	As defined for the STATUS TYPE field in the self-configuration status descriptor in the REPORT SELF-CONFIGURATION STATUS response (see table 233 in 10.4.3.5)

The SELF-CONFIGURATION LEVELS COMPLETED field indicates the number of levels of expander devices beyond the expander port containing the specified phy for which the self-configuring expander device's management application client has completed the discover process and is defined in table 244.

Table 244 — SELF-CONFIGURATION LEVELS COMPLETED field

Code	Description
00h	The management application client: a) has not begun the discover process through the expander port containing the specified phy; or b) has not completed the discover process through the expander port containing the specified phy.
01h	The management application client has completed discovery of the expander device attached to the expander port containing the specified phy (i.e., level 1).
02h	The management application client has completed discovery of the expander devices attached to the expander device attached to the expander port containing the specified phy (i.e., level 2).
...	...
FFh	The management application client has completed discovery of the expander devices attached at level 255.

NOTE 7 - The self-configuration levels completed field does not reflect the level of externally configurable expander devices that the configuration subprocess updates to enable the discover process to proceed to higher levels.

The SELF-CONFIGURATION SAS ADDRESS field indicates the SAS address of the SMP target port to which the self-configuring expander device established a connection or attempted to establish a connection using the specified phy and resulted in the status indicated by the SELF-CONFIGURATION STATUS field.

The REASON field indicates the reason for the last reset of the phy. ~~The~~If the phy is a physical phy, the REASON field indicates the value of the REASON field transmitted in the IDENTIFY address frame (see 7.8.2) during the identification sequence. If a SATA phy is attached, the REASON field indicates the reason for the link reset sequence (see 7.8.2).

The NEGOTIATED PHYSICAL LINK RATE field is defined in table 245 ~~and indicate the physical link rate negotiated during the link reset sequence or other conditions of the phy~~. If the phy is a physical phy, the field indicates the physical link rate negotiated during the physical link rate sequence. If the phy is a virtual phy, the field should be set to the maximum physical link rate supported by the expander device. The negotiated physical link rate may be less than the programmed minimum physical link rate or greater than the programmed maximum physical link rate if the programmed physical link rates have been changed since the last link reset sequence.

Table 245 — NEGOTIATED PHYSICAL LINK RATE **field**

SP state machine ResetStatus state machine variable	Code	Description
UNKNOWN	0h	Phy is enabled; unknown physical link rate. [a]
DISABLED	1h	Phy is disabled.
PHY_ RESET_ PROBLEM	2h	Phy is enabled; a phy reset problem occurred (see 6.7.4.2.4).
SPINUP_ HOLD	3h	Phy is enabled; detected a SATA device and entered the SATA spinup hold state. The SMP PHY CONTROL function (see 10.4.3.26) phy operations of LINK RESET and HARD RESET may be used to release the phy.
PORT_ SELECTOR	4h	Phy is enabled; detected a SATA port selector. The physical link rate has not been negotiated since the last time the phy's SP state machine entered the SP0:OOB_COMINIT state. The SATA spinup hold state has not been entered since the last time the phy's SP state machine entered the SP0:OOB_COMINIT state. The value in this field may change to 3h, 8h, 9h, or Ah if attached to the active phy of the SATA port selector. Presence of a SATA port selector is indicated by the ATTACHED SATA PORT SELECTOR bit (see table 238).
RESET_ IN_ PROGRESS	5h	Phy is enabled; the expander phy is performing an SMP PHY CONTROL function (see 10.4.3.26) phy operation of LINK RESET or HARD RESET. This value is returned if the specified phy contained a value of 8h, 9h, or Ah in this field when an SMP PHY CONTROL function phy operation of LINK RESET or HARD RESET phy operation is processed.
UNSUPPORTED_ PHY_ ATTACHED	6h	Phy is enabled; a phy is attached without any commonly supported settings.
Reserved	7h	Reserved
G1	8h	Phy is enabled; 1,5 Gbps physical link rate.
G2	9h	Phy is enabled; 3 Gbps physical link rate.
G3	Ah	Phy is enabled; 6 Gbps physical link rate.
Reserved	Bh - Fh	Phy is enabled; reserved for future logical or physical link rates.

[a] This code may be used by an application client in its local data structures to indicate an unknown negotiated logical or physical link rate (e.g., before the discover process has queried the phy).

A HARDWARE MUXING SUPPORTED bit set to one indicates the phy supports multiplexing (see 6.10). A HARDWARE MUXING SUPPORTED bit set to zero indicates the phy does not support multiplexing. This value is not adjusted based on the negotiated physical link rate.

The CRC field is defined in 10.4.3.2.