

T10/07-397 revision 1

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To: T10 Committee (SCSI)

From: George Penokie (IBM)

Subject: SAS-2: Indeterminate response length to a SMP REPORT GENERAL function

1 Overview

As a result of proposal 05-306r2 (SAS-2 STP connection time limits and STP/SMP I_T nexus loss) a REQUEST LENGTH field was added to all the SMP function and a RESPONSE LENGTH field was added to all the SMP responses (even though neither of those has anything to do with STP or I_T nexus loss).

This change created a minefield for SAS 1.1 and SAS 2 compatibility by changing the SAS 1.1 SMP requests and responses from fixed structures to variable length structures (to understand the magnitude of this change consider what would happen if we changed any of the existed fixed length SCSI CDBs to a variable length CDB). Also, on SCSI CDBs that have parameters lists that are returned there is an allocation length specified which tells the target the maximum amount of data that can be sent. That is there to allow parameters lists to become longer in future generations of standards without impacting past implementations. There was no allocation length like field added in the SMP functions with the length additions so there will forever be having a problem with response length changes.

The only thing that keeps this from being a total disaster is that for all except two of the SMP functions the new REQUEST LENGTH field had to contain a non-zero value for SAS-2 compliance and all the new RESPONSE LENGTH fields have to contain non-zero values if the SMP request contained a non-zero value in the REQUEST LENGTH field. This works except that there is a good chance that a SAS 1.1 SMP device may fail a SAS 2 SMP function as the a reserved field contains a value. But the SAS-2 device knowing that this could happen would have to adjust to sending SAS 1.1 SMP functions. If it were not for the two SMP functions that have the same response length for both SAS 1.1 and SAS-2 then all this would be manageable (if not pretty).

The two SMP function that have the REQUEST LENGTH field set to zero in both SAS 1.1 and the current version of SAS-2 are the REPORT GENERAL function and the REPORT MANUFACTURER INFORMATION function. Of those REPORT MANUFACTURER INFORMATION function has no difference in the length of the response length so it should work (as long as the SAS 1.1 initiator ignores the value in the new RESPONSE LENGTH field).

The real problem is that the REPORT GENERAL function which has different lengths for SAS 1.1 (i.e., 32 bytes) and SAS-2 (i.e., 72 bytes). The problem occurs when a SAS 1.1 device issues a REPORT GENERAL function to a SAS-2 SMP device. The SAS-2 SMP device is required to deliver 72 bytes. That can cause the SAS 1.1 initiator to choke as it is only expecting 32 bytes.

This proposal addresses this issue by adding a bit to the REPORT GENERAL function that specifies if this initiator is requesting a response length of 32 bytes or 72 bytes. It also includes a bit in the in the REPORT GENERAL response to specify if the SMP device supports the short response length or the long response length.

The bit in the REPORT GENERAL function allow SAS-2 SMP devices to know the length of the response data. The bit in the REPORT GENERAL response allows a SAS-2 initiator to know if it is talking to an SMP device that support the long or short SMP response.

Of this to work without the possibility of any errors occurring is that a SAS-2 initiator would have to first issue a REPORT GENERAL function with the bit set to short. If the response contains the I support long response indication then it can send a REPORT GENERAL function with the bit set to long. If the response contains the I don't support long indication them it will have to use the SAS 1.1 SMP function formats for all SMP functions to that SMP device.

Revision 1 - Expanded the correction to all SMP functions requests and responses that have different lengths between SAS 1.1 and SAS 2.

2 Proposed SAS-2 changes

10.4.3.3 REPORT GENERAL function

The REPORT GENERAL function returns general information about the SAS device (e.g., a SAS device contained in an expander device). This SMP function shall be implemented by all management device servers.

Table 1 defines the request format.

Table 1 — REPORT GENERAL request

Byte\Bit	7	6	5	4	3	2	1	0	
0	SMP FRAME TYPE (40h)								
1	FUNCTION (00h)								
2	REQUEST LONG	Reserved							
3	REQUEST LENGTH (00h)								
4	(MSB)	CRC							
7							(LSB)		

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

The FUNCTION field shall be set to 00h.

[The REQUEST LONG bit set to one specifies that the management device server shall return the response format defined in table 3. The REQUEST LONG bit set to zero specifies that the management device server shall return the response format defined in table 3.](#)

The REQUEST LENGTH field shall be set to 00h.

The CRC field is defined in 10.4.3.1.

Table 2 — REPORT GENERAL response ([REQUEST LONG = 0](#)) (part 1 of 2)

Byte\Bit	7	6	5	4	3	2	1	0	
0	SMP FRAME TYPE (41h)								
1	FUNCTION (00h)								
2	FUNCTION RESULT								
3	RESPONSE LENGTH (00h)								
4	(MSB)	EXPANDER CHANGE COUNT							
5							(LSB)		
6	(MSB)	EXPANDER ROUTE INDEXES							
7							(LSB)		
8	LONG RESPONSE	Reserved							
9	NUMBER OF PHYS								

Table 2 — REPORT GENERAL response ([REQUEST LONG = 0](#)) (part 2 of 2)

Byte\Bit	7	6	5	4	3	2	1	0	
10	TABLE TO TABLE SUPPORTED	Reserved			CONFIGURES OTHERS	CONFIGURING	EXTERNALLY CONFIGURABLE ROUTE TABLE		
11	Reserved								
12	ENCLOSURE LOGICAL IDENTIFIER								
19	ENCLOSURE LOGICAL IDENTIFIER								
20	Reserved								
27	Reserved								
28	(MSB)	CRC							
31							(LSB)		

Table 3 — REPORT GENERAL response ([REQUEST LONG = 1](#)) (part 1 of 3)

Byte\Bit	7	6	5	4	3	2	1	0	
0	SMP FRAME TYPE (41h)								
1	FUNCTION (00h)								
2	FUNCTION RESULT								
3	RESPONSE LENGTH (10h)								
4	(MSB)	EXPANDER CHANGE COUNT						(LSB)	
5	EXPANDER CHANGE COUNT								
6	(MSB)	EXPANDER ROUTE INDEXES						(LSB)	
7	EXPANDER ROUTE INDEXES								
8	LONG RESPONSE	Reserved							
9	NUMBER OF PHYS								
10	TABLE TO TABLE SUPPORTED	Reserved			CONFIGURES OTHERS	CONFIGURING	EXTERNALLY CONFIGURABLE ROUTE TABLE		
11	Reserved								
12	ENCLOSURE LOGICAL IDENTIFIER								
19	ENCLOSURE LOGICAL IDENTIFIER								
20	Reserved								
29	Reserved								

Table 3 — REPORT GENERAL response ([REQUEST LONG = 1](#)) (part 2 of 3)

Byte\Bit	7	6	5	4	3	2	1	0	
30	(MSB)	STP BUS INACTIVITY TIME LIMIT							
31								(LSB)	
32	(MSB)	STP MAXIMUM CONNECT TIME LIMIT							
33								(LSB)	
34	(MSB)	STP SMP I_T NEXUS LOSS TIME							
35								(LSB)	
36	NUMBER OF ZONE GROUPS	Reserved	ZONE LOCKED	PHYSICAL PRESENCE SUPPORTED	PHYSICAL PRESENCE ASSERTED	ZONING SUPPORTED	ZONING ENABLED		
37	Reserved								
38	(MSB)	MAXIMUM NUMBER OF ROUTED SAS ADDRESSES							
39								(LSB)	
40		ACTIVE ZONE MANAGER SAS ADDRESS							
47									
48	(MSB)	ZONE LOCK INACTIVITY TIME LIMIT							
49								(LSB)	
50		Reserved							
51									
52		Reserved							
53		FIRST ENCLOSURE CONNECTOR ELEMENT INDEX							
54		NUMBER OF ENCLOSURE CONNECTOR ELEMENT INDEXES							
55		Reserved							
56	REDUCED FUNCTIONALITY	Reserved							
57		TIME TO REDUCED FUNCTIONALITY							
58		INITIAL TIME TO REDUCED FUNCTIONALITY							
59		MAXIMUM REDUCED FUNCTIONALITY TIME							
60	(MSB)	LAST SELF-CONFIGURATION STATUS DESCRIPTOR INDEX							
61								(LSB)	
62	(MSB)	MAXIMUM NUMBER OF STORED SELF-CONFIGURATION STATUS DESCRIPTORS							
63								(LSB)	

Table 3 — REPORT GENERAL response ([REQUEST LONG = 1](#)) (part 3 of 3)

Byte\Bit	7	6	5	4	3	2	1	0
64	(MSB)	LAST PHY EVENT INFORMATION DESCRIPTOR INDEX						(LSB)
65								(LSB)
66	(MSB)	MAXIMUM NUMBER OF STORED PHY EVENT INFORMATION DESCRIPTORS						(LSB)
67								(LSB)
68	(MSB)	CRC						(LSB)
71								(LSB)

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

The FUNCTION field shall be set to 00h.

The FUNCTION RESULT field is defined in 10.4.3.2.

The RESPONSE LENGTH field shall be set to [00h or 10h](#). ~~For compatibility with previous versions of this standard, a RESPONSE LENGTH field set to 00h indicates that there are 6 dwords before the CRC field.~~

The EXPANDER CHANGE COUNT field counts the number of Broadcast (Change)s originated by an expander device (see 7.11). Management device servers in expander devices shall support this field. Management device servers in other device types (e.g., end devices) shall set this field to 0000h. This field shall be set to at least 0001h at power on. If the expander device has originated Broadcast (Change) for any reason described in 7.11 since transmitting a REPORT GENERAL response, it shall increment this field at least once from the value in the previous REPORT GENERAL response. It shall not increment this field when forwarding a Broadcast (Change). This field shall wrap to at least 0001h after the maximum value (i.e., FFFFh) has been reached.

NOTE 1 - Application clients that use the EXPANDER CHANGE COUNT field should read it often enough to ensure that it does not increment a multiple of 65 536 times between reading the field.

NOTE 2 - Management device servers in expander devices compliant with previous versions of this standard may return an EXPANDER CHANGE COUNT field set to 0000h.

NOTE 3 - The originated Broadcast (Change) count is also reported in the REPORT BROADCAST response (see 10.4.3.8).

The EXPANDER ROUTE INDEXES field indicates the maximum number of expander route indexes per phy for the expander device (see 4.6.7.3). Management device servers in externally configurable expander devices containing phy-based expander route tables shall support this field. Management device servers in other device types (e.g., end devices, externally configurable expander devices with expander-based expander route tables, and self-configuring expander devices) shall set the EXPANDER ROUTE INDEXES field to zero. Not all phys in an externally configurable expander device are required to support the maximum number indicated by this field.

[The LONG RESPONSE bit set to one indicates that the management device server supports returning non-zero values in the SMP responses RESPONSE LENGTH field when the REQUEST LENGTH field is sent to a non-zero value or the REQUEST LONG bit is set to one.](#)

[The LONG RESPONSE bit set to zero indicates that the management device server returns a value of zero in the RESPONSE LENGTH field for the following SMP functions:](#)

- a) [REPORT GENERAL function](#);
- b) [REPORT MANUFACTURER INFORMATION function \(see 10.4.3.4\)](#);
- c) [READ GPIO REGISTER function \(See SFF-8485\)](#);
- d) [DISCOVER function \(see 10.4.3.9\)](#);

- e) [REPORT PHY ERROR LOG function \(see 10.4.3.10\);](#)
- f) [REPORT PHY SATA function \(see 10.4.3.11\);](#)
- g) [REPORT ROUTE INFORMATION function \(see 10.4.3.12\); and](#)
- h) [WRITE GPIO REGISTER \(See SFF-8485\) function.](#)

The LONG RESPONSE bit set to zero indicates that in the following SMP function requests should contain a value of zero in the REQUEST LENGTH field:

- a) [DISCOVER function \(see 10.4.3.9\);](#)
- b) [REPORT PHY ERROR LOG function \(see 10.4.3.10\);](#)
- c) [REPORT PHY SATA function \(see 10.4.3.11\);](#)
- d) [CONFIGURE ROUTE INFORMATION function \(see 10.4.3.27\);](#)
- e) [PHY CONTROL function \(see 10.4.3.28\); and](#)
- f) [PHY TEST FUNCTION function \(see 10.4.3.29\).](#)

The NUMBER OF PHYS field indicates the number of phys in the device, including any virtual phys and any vacant phys.

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10.4.3.4 REPORT MANUFACTURER INFORMATION function

The REPORT MANUFACTURER INFORMATION function returns vendor and product identification. This SMP function may be implemented by any management device server.

Table 4 defines the request format.

Table 4 — REPORT MANUFACTURER INFORMATION request

Byte\Bit	7	6	5	4	3	2	1	0	
0	SMP FRAME TYPE (40h)								
1	FUNCTION (01h)								
2	Reserved								
3	REQUEST LENGTH (00h)								
4	(MSB)	CRC							
7							(LSB)		

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

The FUNCTION field shall be set to 01h.

The REQUEST LENGTH field shall be set to 00h.

The CRC field is defined in 10.4.3.1.

Table 5 defines the response format.

Table 5 — REPORT MANUFACTURER INFORMATION response

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (41h)							
1	FUNCTION (01h)							
2	FUNCTION RESULT							
3	RESPONSE LENGTH (00h or 0Eh)							
4	(MSB)	EXPANDER CHANGE COUNT						(LSB)
5	Reserved							
6	Reserved							
7	Reserved							
8	Reserved							SAS-1.1 FORMAT
9	Reserved							
11	Reserved							
12	(MSB)	VENDOR IDENTIFICATION						(LSB)
19	Reserved							
20	(MSB)	PRODUCT IDENTIFICATION						(LSB)
35	Reserved							
36	(MSB)	PRODUCT REVISION LEVEL						(LSB)
39	Reserved							
40	(MSB)	COMPONENT VENDOR IDENTIFICATION						(LSB)
47	Reserved							
48	(MSB)	COMPONENT ID						(LSB)
49	Reserved							
50	COMPONENT REVISION LEVEL							
51	Reserved							
52	Vendor specific							
59	Reserved							
60	(MSB)	CRC						(LSB)
63	Reserved							

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

The FUNCTION field shall be set to 01h.

The FUNCTION RESULT field is defined in 10.4.3.2.

The LONG RESPONSE bit set to one indicates that the management device server supports returning non-zero values in the SMP responses RESPONSE LENGTH field when the REQUEST LENGTH field is sent to a non-zero value or the REQUEST LONG bit is set to one.

If the LONG RESPONSE bit in the REPORT GENERAL response is set to one, then the RESPONSE LENGTH field shall be set to 0Eh. If the LONG RESPONSE bit in the REPORT GENERAL response is set to zero, then the RESPONSE LENGTH field shall be set to 00h. ~~For compatibility with previous versions of this standard, a RESPONSE LENGTH field set to 00h indicates that there are 14 dwords before the CRC field.~~

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

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10.4.3.5 REPORT SELF-CONFIGURATION STATUS function

10.4.3.5.1 REPORT SELF-CONFIGURATION STATUS function overview

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10.4.3.5.2 REPORT SELF-CONFIGURATION STATUS request

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10.4.3.5.3 REPORT SELF-CONFIGURATION STATUS response

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10.4.3.5.4 Self-configuration status descriptor

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10.4.3.6 REPORT ZONE PERMISSION TABLE function

10.4.3.6.1 REPORT ZONE PERMISSION TABLE function overview

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10.4.3.6.2 REPORT ZONE PERMISSION TABLE request

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10.4.3.6.3 REPORT ZONE PERMISSION TABLE response

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10.4.3.6.4 Zone permission descriptor

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10.4.3.7 REPORT ZONE MANAGER PASSWORD function

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10.4.3.8 REPORT BROADCAST function

10.4.3.8.1 REPORT BROADCAST function overview

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10.4.3.8.2 REPORT BROADCAST request

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10.4.3.8.3 REPORT BROADCAST response

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10.4.3.8.4 REPORT BROADCAST response broadcast descriptor

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10.4.3.9 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 4 - The DISCOVER LIST function (see 10.4.3.15) returns information about one or more phys.

Table 6 defines the request format.

Table 6 — DISCOVER request

ByteBit	7	6	5	4	3	2	1	0	
0	SMP FRAME TYPE (40h)								
1	FUNCTION (10h)								
2	Reserved								
3	REQUEST LENGTH (00h or 02h)								
4	Reserved								
7	Reserved								
8	Reserved							IGNORE ZONE GROUP	
9	PHY IDENTIFIER								
10	Reserved								
11	Reserved								
12	(MSB)	CRC							
15							(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.~~

If the LONG RESPONSE bit in the REPORT GENERAL response is set to one, then the REQUEST LENGTH field shall be set to 02h. If the LONG RESPONSE bit in the REPORT GENERAL response is set to zero, then the REQUEST LENGTH field should be set to 00h.

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 (see table 315 in 10.4.3.2).

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.

[If the LONG RESPONSE bit in the REPORT GENERAL response is set to zero, then table 7 defines the response format. If the LONG RESPONSE bit in the REPORT GENERAL response is set to one, then table 8 defines the response format.](#)

~~Table 8 defines the request format.~~

Table 7 — DISCOVER response (LONG RESPONSE = 0) (part 1 of 2)

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (41h)							
1	FUNCTION (10h)							
2	FUNCTION RESULT							
3	RESPONSE LENGTH (00h)							
4	(MSB)	EXPANDER CHANGE COUNT						(LSB)
5								
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								
24	ATTACHED SAS ADDRESS							
31								

Table 7 — **DISCOVER response (LONG RESPONSE = 0)** (part 2 of 2)

Byte\Bit	7	6	5	4	3	2	1	0	
32	ATTACHED PHY IDENTIFIER								
33	Reserved					ATTACHED INSIDE ZPSDS PERSISTENT	ATTACHED REQUESTED INSIDE ZPSDS	ATTACHED BREAK_REPLY CAPABLE	
34	Reserved								
39	Reserved								
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	Reserved								
50	Vendor specific								
51	Reserved								
52	(MSB)	CRC						(LSB)	
55									

Table 8 — **DISCOVER response (LONG RESPONSE = 1)** (part 1 of 4)

Byte\Bit	7	6	5	4	3	2	1	0	
0	SMP FRAME TYPE (41h)								
1	FUNCTION (10h)								
2	FUNCTION RESULT								
3	RESPONSE LENGTH (1Ah)								
4	(MSB)	EXPANDER CHANGE COUNT						(LSB)	
5									
6	Reserved								
8	Reserved								
9	PHY IDENTIFIER								
10	Reserved								
11									

Table 8 — DISCOVER response (LONG RESPONSE = 1) (part 2 of 4)

Byte\Bit	7	6	5	4	3	2	1	0
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								
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

Table 8 — DISCOVER response (LONG RESPONSE = 1) (part 3 of 4)

Byte\Bit	7	6	5	4	3	2	1	0
61	Reserved							
62	Reserved							
63	ZONE GROUP							
64	SELF-CONFIGURATION STATUS							
65	SELF-CONFIGURATION LEVELS COMPLETED							
66	Reserved							
67	Reserved							
68	SELF-CONFIGURATION SAS ADDRESS							
75	Reserved							
76	PROGRAMMED PHY CAPABILITIES							
79	Reserved							
80	CURRENT PHY CAPABILITIES							
83	Reserved							
84	ATTACHED PHY CAPABILITIES							
87	Reserved							
88	Reserved							
93	Reserved							
94	REASON				NEGOTIATED PHYSICAL LINK RATE			
95	Reserved						NEGOTIATED SSC	HARDWARE MUXING SUPPORTED
96	Reserved	DEFAULT INSIDE ZPSDS PERSISTENT	DEFAULT REQUESTED INSIDE ZPSDS	Reserved	DEFAULT ZONE GROUP PERSISTENT	Reserved	DEFAULT ZONING ENABLED	
97	Reserved							
98	Reserved							
99	DEFAULT ZONE GROUP							
100	Reserved	SAVED INSIDE ZPSDS PERSISTENT	SAVED REQUESTED INSIDE ZPSDS	Reserved	SAVED ZONE GROUP PERSISTENT	Reserved	SAVED ZONING ENABLED	
101	Reserved							
102	Reserved							

Table 8 — DISCOVER response (LONG RESPONSE = 1) (part 4 of 4)

Byte\Bit	7	6	5	4	3	2	1	0
103	SAVED ZONE GROUP							
104	Reserved		SHADOW INSIDE ZPSDS PERSISTENT	SHADOW REQUESTED INSIDE ZPSDS	Reserved		SHADOW ZONE GROUP PERSISTENT	Reserved
105	Reserved							
106	Reserved							
107	SHADOW ZONE GROUP							
108	(MSB)							
111	CRC							
	(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 00h or 1Ah. ~~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.~~

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10.4.3.10 REPORT PHY ERROR LOG function

The REPORT PHY ERROR LOG function returns error logging information about the specified phy. This SMP function may be implemented by any management device server.

Table 9 defines the request format.

Table 9 — REPORT PHY ERROR LOG request

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (40h)							
1	FUNCTION (11h)							
2	Reserved							
3	REQUEST LENGTH (<u>00h or 02h</u>)							
4	Reserved							
8	Reserved							
9	PHY IDENTIFIER							
10	Reserved							
11	Reserved							
12	(MSB)							
15	CRC							
	(LSB)							

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

The FUNCTION field shall be set to 11h.

~~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.~~

If the LONG RESPONSE bit in the REPORT GENERAL response is set to one, then the REQUEST LENGTH field shall be set to 02h. If the LONG RESPONSE bit in the REPORT GENERAL response is set to zero, then the REQUEST LENGTH field should be set to 00h.

The PHY IDENTIFIER field specifies the phy (see 4.2.8) for which information shall be reported.

The CRC field is defined in 10.4.3.1.

If the LONG RESPONSE bit in the REPORT GENERAL response is set to zero, then table 10 defines the response format. If the LONG RESPONSE bit in the REPORT GENERAL response is set to one, then table 11 defines the response format.

~~Table 11 defines the response format.~~

Table 10 — REPORT PHY ERROR LOG response (LONG RESPONSE = 0)

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (41h)							
1	FUNCTION (11h)							
2	FUNCTION RESULT							
3	RESPONSE LENGTH (00h)							
4	(MSB)	EXPANDER CHANGE COUNT						(LSB)
5								
6	Reserved							
8								
9	PHY IDENTIFIER							
10	Reserved							
11								
12	(MSB)	CRC						(LSB)
15								

Table 11 — REPORT PHY ERROR LOG response ([LONG RESPONSE = 1](#))

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (41h)							
1	FUNCTION (11h)							
2	FUNCTION RESULT							
3	RESPONSE LENGTH (06h)							
4	(MSB)	EXPANDER CHANGE COUNT						(LSB)
5								
6	Reserved							
8								
9	PHY IDENTIFIER							
10	Reserved							
11								
12	(MSB)	INVALID DWORD COUNT						(LSB)
15								
16	(MSB)	RUNNING DISPARITY ERROR COUNT						(LSB)
19								
20	(MSB)	LOSS OF DWORD SYNCHRONIZATION COUNT						(LSB)
23								
24	(MSB)	PHY RESET PROBLEM COUNT						(LSB)
27								
28	(MSB)	CRC						(LSB)
31								

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

The FUNCTION field shall be set to 11h.

The FUNCTION RESULT field is defined in 10.4.3.2.

The RESPONSE LENGTH field shall be set to [00h or 06h](#). ~~For compatibility with previous versions of this standard, a RESPONSE LENGTH field set to 00h indicates that there are 6 dwords before the CRC field.~~

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10.4.3.11 REPORT PHY SATA function

The REPORT PHY SATA function returns information about the SATA state for a specified phy. This SMP function shall be implemented by management device servers behind SMP target ports that share SAS

addresses with STP target ports and by management device servers in expander devices with STP/SATA bridges. This SMP function shall not be implemented by any other type of management device server.

Table 12 defines the request format.

Table 12 — REPORT PHY SATA request

Byte/Bit	7	6	5	4	3	2	1	0	
0	SMP FRAME TYPE (40h)								
1	FUNCTION (12h)								
2	Reserved								
3	REQUEST LENGTH (00h or 02h)								
4	Reserved								
8	Reserved								
9	PHY IDENTIFIER								
10	AFFILIATION CONTEXT								
11	Reserved								
12	(MSB)	CRC							
15								(LSB)	

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

The FUNCTION field shall be set to 12h.

~~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.~~

If the LONG RESPONSE bit in the REPORT GENERAL response is set to one, then the REQUEST LENGTH field shall be set to 02h. If the LONG RESPONSE bit in the REPORT GENERAL response is set to zero, then the REQUEST LENGTH field should be set to 00h.

The PHY IDENTIFIER field specifies the phy (see 4.2.8) for which information shall be reported.

The AFFILIATION CONTEXT field specifies the relative identifier of the affiliation context for which information shall be reported (see 7.17.4).

The CRC field is defined in 10.4.3.1.

If the LONG RESPONSE bit in the REPORT GENERAL response is set to zero, then table 13 defines the response format. If the LONG RESPONSE bit in the REPORT GENERAL response is set to one, then table 14 defines the response format.

Table 13 defines the response format..

Table 13 — REPORT PHY SATA response ([LONG RESPONSE = 0](#))

Byte/Bit	7	6	5	4	3	2	1	0	
0	SMP FRAME TYPE (41h)								
1	FUNCTION (12h)								
2	FUNCTION RESULT								
3	RESPONSE LENGTH (00h)								
4	(MSB)	EXPANDER CHANGE COUNT						(LSB)	
5									
6	Reserved								
8									
9	PHY IDENTIFIER								
10	Reserved								
11	Reserved					STP I_T NEXUS LOSS OCCURRED	AFFILIATIONS SUPPORTED	AFFILIATION VALID	
12	Reserved								
15									
16	STP SAS ADDRESS								
23									
24	REGISTER DEVICE TO HOST FIS								
43									
44	Reserved								
47									
48	AFFILIATED STP INITIATOR SAS ADDRESS								
55									
56	(MSB)	CRC						(LSB)	
59									

Table 14 — REPORT PHY SATA response ([LONG RESPONSE = 1](#)) (part 1 of 2)

Byte/Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (41h)							
1	FUNCTION (12h)							
2	FUNCTION RESULT							
3	RESPONSE LENGTH (10h)							
4	(MSB)	EXPANDER CHANGE COUNT						(LSB)
5								
6	Reserved							
8								
9	PHY IDENTIFIER							
10	Reserved							
11	Reserved					STP I_T NEXUS LOSS OCCURRED	AFFILIATIONS SUPPORTED	AFFILIATION VALID
12	Reserved							
15								
16	STP SAS ADDRESS							
23								
24	REGISTER DEVICE TO HOST FIS							
43								
44	Reserved							
47								
48	AFFILIATED STP INITIATOR SAS ADDRESS							
55								
56	STP I_T NEXUS LOSS SAS ADDRESS							
63								

Table 14 — REPORT PHY SATA response ([LONG RESPONSE = 1](#)) (part 2 of 2)

Byte/Bit	7	6	5	4	3	2	1	0
64	Reserved							
65	AFFILIATION CONTEXT							
66	CURRENT AFFILIATION CONTEXTS							
67	MAXIMUM AFFILIATION CONTEXTS							
68	(MSB)	CRC						(LSB)
71								

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

The FUNCTION field shall be set to 12h.

The FUNCTION RESULT field is defined in 10.4.3.2.

The RESPONSE LENGTH field shall be set to [00h or 10h](#). ~~For compatibility with previous versions of this standard, a RESPONSE LENGTH field set to 00h indicates that there are 13 dwords before the CRC field.~~

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10.4.3.12 REPORT ROUTE INFORMATION function

The REPORT ROUTE INFORMATION function returns an expander route entry from a phy-based expander route table within an expander device (see 4.6.7.3). This SMP function shall be supported by management device servers in expander devices if the EXPANDER ROUTE INDEXES field is set to a non-zero value in the SMP REPORT GENERAL response (see 10.4.3.3). This SMP function may be used as a diagnostic tool to resolve topology issues.

Table 15 defines the request format.

Table 15 — REPORT ROUTE INFORMATION request

Byte\Bit	7	6	5	4	3	2	1	0	
0	SMP FRAME TYPE (40h)								
1	FUNCTION (13h)								
2	Reserved								
3	REQUEST LENGTH (00h)								
4	Reserved								
5	Reserved								
6	(MSB)	EXPANDER ROUTE INDEX							
7							(LSB)		
8	Reserved								
9	PHY IDENTIFIER								
10	Reserved								
11	Reserved								
12	(MSB)	CRC							
15							(LSB)		

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

The FUNCTION field shall be set to 13h.

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.

The EXPANDER ROUTE INDEX field specifies the expander route index for the expander route entry being requested (see 4.6.7.3).

The PHY IDENTIFIER field specifies the phy for which the expander route entry is being requested.

The CRC field is defined in 10.4.3.1.

Table 16 defines the response format.

Table 16 — REPORT ROUTE INFORMATION response

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (41h)							
1	FUNCTION (13h)							
2	FUNCTION RESULT							
3	RESPONSE LENGTH (00h or 09h)							
4	(MSB)	EXPANDER CHANGE COUNT						(LSB)
5								
6	(MSB)	EXPANDER ROUTE INDEX						(LSB)
7								
8	Reserved							
9	PHY IDENTIFIER							
10	Reserved							
11								
12	EXPANDER ROUTE ENTRY DISABLED	Reserved						
13	Reserved							
15								
16	ROUTED SAS ADDRESS							
23								
24	Reserved							
39								
40	(MSB)	CRC						(LSB)
43								

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

The FUNCTION field shall be set to 13h.

The FUNCTION RESULT field is defined in 10.4.3.2.

~~The RESPONSE LENGTH field shall be set to 09h. For compatibility with previous versions of this standard, a RESPONSE LENGTH field set to 00h indicates that there are 9 dwords before the CRC field.~~

If the LONG RESPONSE bit in the REPORT GENERAL response is set to one, then the RESPONSE LENGTH field shall be set to 09h. If the LONG RESPONSE bit in the REPORT GENERAL response is set to zero, then the RESPONSE LENGTH field shall be set to 00h.

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10.4.3.13 REPORT PHY EVENT function

10.4.3.13.1 REPORT PHY EVENT function overview

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10.4.3.13.2 REPORT PHY EVENT request

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10.4.3.13.3 REPORT PHY EVENT response

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10.4.3.13.4 REPORT PHY EVENT response phy event descriptor

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10.4.3.14 REPORT PHY BROADCAST COUNTS function

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10.4.3.15 DISCOVER LIST function

10.4.3.15.1 DISCOVER LIST function overview

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10.4.3.15.2 DISCOVER LIST request

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10.4.3.15.3 DISCOVER LIST response

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10.4.3.15.4 DISCOVER LIST response SHORT FORMAT descriptor

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10.4.3.16 REPORT PHY EVENT LIST function

10.4.3.16.1 REPORT PHY EVENT LIST function overview

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10.4.3.16.2 REPORT PHY EVENT LIST request

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10.4.3.16.3 REPORT PHY EVENT LIST response

...

10.4.3.16.4 REPORT PHY EVENT LIST response phy event list descriptor

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10.4.3.17 REPORT EXPANDER ROUTE TABLE LIST function

10.4.3.17.1 REPORT EXPANDER ROUTE TABLE LIST function overview

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10.4.3.17.2 REPORT EXPANDER ROUTE TABLE LIST request

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10.4.3.17.3 REPORT EXPANDER ROUTE TABLE LIST response

...

10.4.3.17.4 REPORT EXPANDER ROUTE TABLE descriptor

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10.4.3.18 CONFIGURE GENERAL function

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10.4.3.19 ENABLE DISABLE ZONING function

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10.4.3.20 ZONED BROADCAST function

...

10.4.3.21 ZONE LOCK function

...

10.4.3.22 ZONE ACTIVATE function

...

10.4.3.23 ZONE UNLOCK function

...

10.4.3.24 CONFIGURE ZONE MANAGER PASSWORD function

...

10.4.3.25 CONFIGURE ZONE PHY INFORMATION function

10.4.3.25.1 CONFIGURE ZONE PHY INFORMATION function overview

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10.4.3.25.2 CONFIGURE ZONE PHY INFORMATION request

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10.4.3.25.3 Zone phy configuration descriptor

...

10.4.3.25.4 CONFIGURE ZONE PHY INFORMATION response

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10.4.3.26 CONFIGURE ZONE PERMISSION TABLE function

10.4.3.26.1 CONFIGURE ZONE PERMISSION TABLE function overview

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10.4.3.26.2 CONFIGURE ZONE PERMISSION TABLE request

...

10.4.3.26.3 Zone permission configuration descriptor

...

10.4.3.26.4 CONFIGURE ZONE PERMISSION TABLE response

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10.4.3.27 CONFIGURE ROUTE INFORMATION function

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10.4.3.28 PHY CONTROL function

The PHY CONTROL function requests actions by the specified phy. This SMP function may be implemented by any management device server. In zoning expander devices, if zoning is enabled then this function shall only be processed from SMP initiator ports that have access to zone group 2 or the zone group of the specified phy (see 4.9.3.2).

Table 17 defines the request format.

Table 17 — PHY CONTROL request

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (40h)							
1	FUNCTION (91h)							
2	Reserved							
3	REQUEST LENGTH (00h or 09h)							
4	(MSB)	EXPECTED EXPANDER CHANGE COUNT						(LSB)
5	Reserved							
6	Reserved							
8	Reserved							
9	PHY IDENTIFIER							
10	PHY OPERATION							
11	Reserved							UPDATE PARTIAL PATHWAY TIMEOUT VALUE
12	Reserved							
23	Reserved							
24	ATTACHED DEVICE NAME							
31	Reserved							
32	PROGRAMMED MINIMUM PHYSICAL LINK RATE				Reserved			
33	PROGRAMMED MAXIMUM PHYSICAL LINK RATE				Reserved			
34	Reserved							
35	Reserved							
36	Reserved				PARTIAL PATHWAY TIMEOUT VALUE			
37	Reserved							
39	Reserved							
40	(MSB)	CRC						(LSB)
43	Reserved							

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

The FUNCTION field shall be set to 91h.

~~The REQUEST LENGTH field shall be set to 09h. For compatibility with previous versions of this standard, a REQUEST LENGTH field set to 00h specifies that there are 9 dwords before the CRC field.~~

If the LONG RESPONSE bit in the REPORT GENERAL response is set to one, then the REQUEST LENGTH field shall be set to 09h. If the LONG RESPONSE bit in the REPORT GENERAL response is set to zero, then the REQUEST LENGTH field should be set to 00h.

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10.4.3.29 PHY TEST FUNCTION function

The PHY TEST FUNCTION function requests actions by the specified phy. This SMP function may be implemented by any management device server. In zoning expander devices, if zoning is enabled then this function shall only be processed from SMP initiator ports that have access to zone group 2 or the zone group of the specified phy (see 4.9.3.2).

Table 18 defines the request format.

Table 18 — PHY TEST FUNCTION request

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (40h)							
1	FUNCTION (92h)							
2	Reserved							
3	REQUEST LENGTH (00 or 09h)							
4	(MSB)	EXPECTED EXPANDER CHANGE COUNT						(LSB)
5								
6	Reserved							
8								
9	PHY IDENTIFIER							
10	PHY TEST FUNCTION							
11	PHY TEST PATTERN							
12								
14	Reserved							
15	Reserved				PHY TEST PATTERN PHYSICAL LINK RATE			
16								
18	Reserved							
19	PHY TEST PATTERN DWORDS CONTROL							
20								
27	PHY TEST PATTERN DWORDS							
28								
39	Reserved							
40	(MSB)	CRC						(LSB)
43								

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

The FUNCTION field shall be set to 92h.

~~The REQUEST LENGTH field shall be set to 09h. For compatibility with previous versions of this standard, a REQUEST LENGTH field set to 00h specifies that there are 9 dwords before the CRC field.~~

If the LONG RESPONSE bit in the REPORT GENERAL response is set to one, then the REQUEST LENGTH field shall be set to 09h. If the LONG RESPONSE bit in the REPORT GENERAL response is set to zero, then the REQUEST LENGTH field should be set to 00h.