To: T10 Technical Committee
From: Tyson Hartshorn, LSI
Date: 17 April 2007
Subject: Serial Attached SCSI - 2 (SAS-2)

Revision history
Revision 0, 07-103r0 (17 April 2007) First revision.

Related documents
sas2r09 - Serial Attached SCSI 2 revision 9.

Overview

The current method for retrieving phy broadcast counts is by per phy SMP requests. This proposal suggests a descriptor list method that provides an optimized interface for retrieving this information.

Suggested changes

1. Remove the Phy Identifier field from the Report Phy Broadcast Counts request and replace with a Starting Phy Identifier that specifies the first phy for which a descriptor shall be returned.

2. Add Starting Phy Identifier, Number of Report Phy Broadcast Counts Descriptors, and Descriptor Length fields to the Report Phy Broadcast Counts response to facilitate the phy based descriptor list mechanism.

3.

9.4.5.4 REPORT PHY BROADCAST COUNTS function

The REPORT PHY BROADCAST COUNTS function returns Broadcast (see 4.1.13) received counts from directly attached end devices for the specified ~~phy~~ phys. This SMP function should be implemented by management device servers in expander devices. This SMP function shall not be implemented by management device servers in end devices.

After incrementing a count, the expander device is not required to increment the count again unless a REPORT PHY BROADCAST COUNTS response is transmitted.

Editor's Note 61: That rule is too far from the "shall increment" rules below. Create subsections so this can go in an overview section?

NOTE 81 - Application clients that use the REPORT PHY BROADCAST COUNTS function should request it often enough to ensure that the counts contained in the REPORT PHY BROADCAST COUNTS response do not increment a multiple of 256 times between requests.

Table 180 defines the request format.

Table 180 — REPORT PHY BROADCAST COUNTS request

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

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

The FUNCTION field shall be set to 15h.

The REQUEST LENGTH field contains the number of dwords that follow, not including the CRC field (i.e., 2).

~~The PHY IDENTIFIER field specifies the phy (see 4.2.7) for which information shall be reported.~~

The STARTING PHY IDENTIFIER field specifies the phy identifier of the first phy for which the information is being requested.

The CRC field is defined in 10.4.3.1.

Table 181 defines the response format.

Table 181 — REPORT PHY BROADCAST COUNTS response

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (41h)							
1	FUNCTION (15h)							
2	FUNCTION RESULT							
3	RESPONSE LENGTH ~~(05h)~~ ((n - 7) / 4)							
4	(MSB)		EXPANDER CHANGE COUNT					
5								(LSB)
6			Reserved					
8								
~~9~~	~~PHY IDENTIFIER~~							
9	STARTING PHY IDENTIFIER							
10	NUMBER OF PHY BROADCAST COUNTS DESCRIPTORS							
11	DESCRIPTOR LENGTH							
12			Reserved					
31								
32			Vendor specific					
47								
REPORT PHY BROADCAST COUNTS descriptor list								
48			REPORT PHY BROADCAST COUNTS descriptor (first)					
	...							
			REPORT PHY BROADCAST COUNTS descriptor (last)					
n - 4								
n - 3	(MSB)		CRC					
n								(LSB)

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

The FUNCTION field shall be set to ~~14h~~ 15h.

The FUNCTION RESULT field is defined in 10.4.3.2.

The RESPONSE LENGTH field contains the number of dwords that follow, not including the CRC field.

The EXPANDER CHANGE COUNT field is defined in the SMP REPORT GENERAL response (see 9.4.5.4).

~~The PHY IDENTIFIER field indicates the phy (see 4.2.7) for which information is being reported.~~

The STARTING PHY IDENTIFIER field indicates the phy identifier of the first phy in the REPORT PHY BROADCAST COUNTS descriptor list.

The NUMBER OF REPORT PHY BROADCAST COUNTS DESCRIPTORS field indicates the number of REPORT PHY BROADCAST COUNTS descriptors returned in the REPORT PHY BROADCAST COUNTS descriptor list.

The DESCRIPTOR LENGTH field indicates the length of the REPORT PHY BROADCAST COUNTS descriptor.

A RESERVED 4 COUNT VALID bit set to one indicates that the BROADCAST RESERVED 4 COUNT field is valid (i.e., implemented). A RESERVED 4 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED 4 COUNT field is not valid.

A RESERVED 3 COUNT VALID bit set to one indicates that the BROADCAST RESERVED 3 COUNT field is valid (i.e., implemented). A RESERVED 3 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED 3 COUNT field is not valid.

An ASYNCHRONOUS EVENT VALID bit set to one indicates that the BROADCAST ASYNCHRONOUS EVENT COUNT field is valid (i.e., implemented). An ASYNCHRONOUS EVENT COUNT VALID bit set to zero indicates that the BROADCAST ASYNCHRONOUS EVENT COUNT field is not valid.

An EXPANDER COUNT VALID bit set to one indicates that the BROADCAST EXPANDER COUNT field is valid (i.e., implemented). An EXPANDER COUNT VALID bit set to zero indicates that the BROADCAST EXPANDER COUNT field is not valid.

An SES COUNT VALID bit set to one indicates that the BROADCAST SES COUNT field is valid (i.e., implemented). An SES COUNT VALID bit set to zero indicates that the BROADCAST SES COUNT field is not valid.

A RESERVED CHANGE 1 COUNT VALID bit set to one indicates that the BROADCAST RESERVED CHANGE 1 COUNT field is valid (i.e., implemented). A RESERVED CHANGE 1 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED CHANGE 1 COUNT field is not valid.

A RESERVED CHANGE 0 COUNT VALID bit set to one indicates that the BROADCAST RESERVED CHANGE 0 COUNT field is valid (i.e., implemented). A RESERVED CHANGE 0 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED CHANGE 0 COUNT field is not valid.

A CHANGE COUNT VALID bit set to one indicates that the BROADCAST CHANGE COUNT field is valid (i.e., implemented). A CHANGE COUNT VALID bit set to zero indicates that the BROADCAST CHANGE COUNT field is not valid.

The BROADCAST CHANGE COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Change)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Change) from an attached end device and shall not increment this field when it receives a Broadcast (Change) from an attached expander device.

The BROADCAST RESERVED CHANGE 0 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved Change 0)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved Change 0) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved Change 0) from an attached expander device.

The BROADCAST RESERVED CHANGE 1 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved Change 1)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved Change 1) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved Change 1) from an attached expander device.

The BROADCAST SES COUNT field indicates the value of a wrapping counter counting the number of Broadcast (SES)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (SES) from an attached end device and shall not increment this field when it receives a Broadcast (SES) from an attached expander device.

~~The BROADCAST EXPANDER COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Expander)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Expander) from an attached end device and shall not increment this field when it receives a Broadcast (Expander) from an attached expander device.~~

~~The BROADCAST ASYNCHRONOUS EVENT COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Asynchronous Event)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Asynchronous Event) from an attached end device and shall not increment this field when it receives a Broadcast (Asynchronous Event) from an attached expander device.~~

~~The BROADCAST RESERVED 3 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved 3)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved 3) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved 3) from an attached expander device.~~

~~The BROADCAST RESERVED 4 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved 4)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved 4) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved 4) from an attached expander device.~~

The CRC field is defined in 10.4.3.2.

Table 182: REPORT PHY BROADCAST COUNTS descriptor

Byte\Bit	7	6	5	4	3	2	1	0
0	PHY IDENTIFIER							
1	FUNCTION RESULT							
3	Reserved							
4								
5	RESERVED 4 COUNT VALID	RESERVED 3 COUNT VALID	ASYNCHRONOUS EVENT COUNT VALID	EXPANDER COUNT VALID	SES COUNT VALID	RESERVED CHANGE 1 COUNT VALID	RESERVED CHANGE 0 COUNT VALID	CHANGE COUNT VALID
6	Reserved							
11								
12	BROADCAST CHANGE COUNT							
13	BROADCAST RESERVED CHANGE 0 COUNT							
14	BROADCAST RESERVED CHANGE 1 COUNT							
15	BROADCAST SES COUNT							
16	BROADCAST EXPANDER COUNT							
17	BROADCAST ASYNCHRONOUS EVENT COUNT							
18	BROADCAST RESERVED 3 COUNT							
19	BROADCAST RESERVED 4 COUNT							
20	Reserved							
23								

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

The FUNCTION RESULT field is defined in 10.4.3.2.

A RESERVED 4 COUNT VALID bit set to one indicates that the BROADCAST RESERVED 4 COUNT field is valid (i.e., implemented). A RESERVED 4 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED 4 COUNT field is not valid.

A RESERVED 3 COUNT VALID bit set to one indicates that the BROADCAST RESERVED 3 COUNT field is valid (i.e., implemented). A RESERVED 3 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED 3 COUNT field is not valid.

An ASYNCHRONOUS EVENT VALID bit set to one indicates that the BROADCAST ASYNCHRONOUS EVENT COUNT field is valid (i.e., implemented). An ASYNCHRONOUS EVENT COUNT VALID bit set to zero indicates that the BROADCAST ASYNCHRONOUS EVENT COUNT field is not valid.

An EXPANDER COUNT VALID bit set to one indicates that the BROADCAST EXPANDER COUNT field is valid (i.e., implemented). An EXPANDER COUNT VALID bit set to zero indicates that the BROADCAST EXPANDER COUNT field is not valid.

An SES COUNT VALID bit set to one indicates that the BROADCAST SES COUNT field is valid (i.e., implemented). An SES COUNT VALID bit set to zero indicates that the BROADCAST SES COUNT field is not valid.

A RESERVED CHANGE 1 COUNT VALID bit set to one indicates that the BROADCAST RESERVED CHANGE 1 COUNT field is valid (i.e., implemented). A RESERVED CHANGE 1 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED CHANGE 1 COUNT field is not valid.

A RESERVED CHANGE 0 COUNT VALID bit set to one indicates that the BROADCAST RESERVED CHANGE 0 COUNT field is valid (i.e., implemented). A RESERVED CHANGE 0 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED CHANGE 0 COUNT field is not valid.

A CHANGE COUNT VALID bit set to one indicates that the BROADCAST CHANGE COUNT field is valid (i.e., implemented). A CHANGE COUNT VALID bit set to zero indicates that the BROADCAST CHANGE COUNT field is not valid.

The BROADCAST CHANGE COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Change)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Change) from an attached end device and shall not increment this field when it receives a Broadcast (Change) from an attached expander device.

The BROADCAST RESERVED CHANGE 0 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved Change 0)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved Change 0) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved Change 0) from an attached expander device.

The BROADCAST RESERVED CHANGE 1 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved Change 1)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved Change 1) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved Change 1) from an attached expander device.

The BROADCAST SES COUNT field indicates the value of a wrapping counter counting the number of Broadcast (SES)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (SES) from an attached end device and shall not increment this field when it receives a Broadcast (SES) from an attached expander device.

The BROADCAST EXPANDER COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Expander)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives

a Broadcast (Expander) from an attached end device and shall not increment this field when it receives a Broadcast (Expander) from an attached expander device.

The BROADCAST ASYNCHRONOUS EVENT COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Asynchronous Event)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Asynchronous Event) from an attached end device and shall not increment this field when it receives a Broadcast (Asynchronous Event) from an attached expander device.

The BROADCAST RESERVED 3 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved 3)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved 3) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved 3) from an attached expander device.

The BROADCAST RESERVED 4 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved 4)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved 4) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved 4) from an attached expander device.

Table 183 — Function result priority (part 1 of 4)

SMP function	SMP function result priority
REPORT GENERAL (see 10.4.3.3)	1) INVALID REQUEST FRAME LENGTH; 2) SMP FUNCTION FAILED; and 3) SMP FUNCTION ACCEPTED
REPORT MANUFACTURER INFORMATION (see 10.4.3.4)	1) INVALID REQUEST FRAME LENGTH; 2) SMP FUNCTION FAILED; and 3) SMP FUNCTION ACCEPTED
READ GPIO REGISTER (see SFF-8485)	1) INVALID REQUEST FRAME LENGTH; 2) SMP FUNCTION FAILED; and 3) SMP FUNCTION ACCEPTED
REPORT SELF-CONFIGURATION STATUS (see 10.4.3.5)	1) INVALID REQUEST FRAME LENGTH; 2) SMP FUNCTION FAILED; and 3) SMP FUNCTION ACCEPTED
REPORT ZONE PERMISSION TABLE (see 10.4.3.6)	1) INVALID REQUEST FRAME LENGTH; 2) SMP FUNCTION FAILED; and 3) SMP FUNCTION ACCEPTED
DISCOVER (see 10.4.3.7)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) PHY VACANT; 4) SMP FUNCTION FAILED; and 5) SMP FUNCTION ACCEPTED
REPORT PHY ERROR LOG (see 10.4.3.8)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) PHY VACANT; 4) SMP FUNCTION FAILED; and 5) SMP FUNCTION ACCEPTED

Table 183 — Function result priority (part 2 of 4)

SMP function	SMP function result priority
REPORT PHY SATA (see 10.4.3.9)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) PHY VACANT; 4) PHY DOES NOT SUPPORT SATA; 5) SMP FUNCTION FAILED; and 6) SMP FUNCTION ACCEPTED
REPORT ROUTE INFORMATION (see 10.4.3.10)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) PHY VACANT; 4) INDEX DOES NOT EXIST; 5) SMP FUNCTION FAILED; and 6) SMP FUNCTION ACCEPTED
REPORT PHY EVENT INFORMATION (see 10.4.3.11)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) PHY VACANT; 4) SMP FUNCTION FAILED; and 5) SMP FUNCTION ACCEPTED
REPORT PHY BROADCAST COUNTS (see 9.4.5.4)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) SMP FUNCTION FAILED; and 4) SMP FUNCTION ACCEPTED
DISCOVER LIST (see 10.4.3.13)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) UNKNOWN DESCRIPTOR TYPE; 4) UNKNOWN PHY FILTER; 5) SMP FUNCTION FAILED; and 6) SMP FUNCTION ACCEPTED
REPORT EXPANDER ROUTE TABLE (see 10.4.3.14)	1) INVALID REQUEST FRAME LENGTH; 2) SMP FUNCTION FAILED; and 3) SMP FUNCTION ACCEPTED
CONFIGURE GENERAL (see 10.4.3.15)	1) INVALID REQUEST FRAME LENGTH; 2) SMP ZONE VIOLATION; 3) INVALID EXPANDER CHANGE COUNT; 4) SMP FUNCTION FAILED; and 5) SMP FUNCTION ACCEPTED
WRITE GPIO REGISTER (see SFF-8485)	1) INVALID REQUEST FRAME LENGTH; 2) SMP FUNCTION FAILED; and 3) SMP FUNCTION ACCEPTED
ENABLE DISABLE ZONING (see 10.4.3.16)	1) INVALID REQUEST FRAME LENGTH; 2) ZONE LOCK VIOLATION; 3) UNKNOWN ENABLE DISABLE ZONING VALUE; 4) NO MANAGEMENT ACCESS RIGHTS; 5) INVALID EXPANDER CHANGE COUNT; 6) SMP FUNCTION FAILED; and 7) SMP FUNCTION ACCEPTED

Table 183 — Function result priority (part 3 of 4)

SMP function	SMP function result priority
ZONED BROADCAST (see 10.4.3.17)	1) INVALID REQUEST FRAME LENGTH; 2) SMP ZONE VIOLATION; 3) SMP FUNCTION FAILED; and 4) SMP FUNCTION ACCEPTED
ZONE LOCK (see 10.4.3.18)	1) INVALID REQUEST FRAME LENGTH; 2) ZONE LOCK VIOLATION; 3) NO MANAGEMENT ACCESS RIGHTS; 4) INVALID EXPANDER CHANGE COUNT; 5) SMP FUNCTION FAILED; and 6) SMP FUNCTION ACCEPTED
ZONE ACTIVATE (see 10.4.3.19)	1) INVALID REQUEST FRAME LENGTH; 2) ZONE LOCK VIOLATION; 3) INVALID EXPANDER CHANGE COUNT; 4) SMP FUNCTION FAILED; and 5) SMP FUNCTION ACCEPTED
ZONE UNLOCK (see 10.4.3.20)	1) INVALID REQUEST FRAME LENGTH; 2) ZONE LOCK VIOLATION; 3) NOT ACTIVATED; 4) BUSY; 5) SMP FUNCTION FAILED; and 6) SMP FUNCTION ACCEPTED
CONFIGURE ZONE PHY INFORMATION (see 10.4.3.21)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) ZONE LOCK VIOLATION; 4) UNKNOWN ZONE PHY INFORMATION VALUE; 5) INVALID EXPANDER CHANGE COUNT; 6) SMP FUNCTION FAILED; and 7) SMP FUNCTION ACCEPTED
CONFIGURE ZONE PERMISSION (see 10.4.3.22)	1) INVALID REQUEST FRAME LENGTH; 2) ZONE LOCK VIOLATION; 3) INVALID EXPANDER CHANGE COUNT; 4) SMP FUNCTION FAILED; and 5) SMP FUNCTION ACCEPTED
CONFIGURE ROUTE INFORMATION (see 10.4.3.23)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) PHY VACANT; 4) INDEX DOES NOT EXIST; 5) INVALID EXPANDER CHANGE COUNT; 6) SMP FUNCTION FAILED; and 7) SMP FUNCTION ACCEPTED

Table 183 — Function result priority (part 4 of 4)

SMP function	SMP function result priority
PHY CONTROL (see 10.4.3.24)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) PHY VACANT; 4) SMP ZONE VIOLATION; 5) LOGICAL LINK RATE NOT SUPPORTED; 6) UNKNOWN PHY OPERATION; 7) PHY DOES NOT SUPPORT SATA; 8) INVALID EXPANDER CHANGE COUNT; 9) SMP FUNCTION FAILED; and 10) SMP FUNCTION ACCEPTED
PHY TEST FUNCTION (see 10.4.3.25)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) PHY VACANT; 4) SMP ZONE VIOLATION; 5) UNKNOWN PHY TEST FUNCTION; 6) PHY TEST FUNCTION IN PROGRESS; 7) INVALID EXPANDER CHANGE COUNT; 8) SMP FUNCTION FAILED; and 9) SMP FUNCTION ACCEPTED
CONFIGURE PHY EVENT INFORMATION (see 10.4.3.26)	1) INVALID REQUEST FRAME LENGTH; 2) PHY DOES NOT EXIST; 3) PHY VACANT; 4) SMP ZONE VIOLATION; 5) UNKNOWN PHY EVENT INFORMATION SOURCE; 6) INVALID EXPANDER CHANGE COUNT; 7) SMP FUNCTION FAILED; and 8) SMP FUNCTION ACCEPTED