

To: T10 Technical Committee  
 From: Rob Elliott, HP (elliott@hp.com)  
 Date: 15 July 2004  
 Subject: 04-183r1 SAS-1.1 BROADCAST (CHANGE) on virtual phy resets

### **Revision history**

Revision 0 (21 June 2004) First revision  
 Revision 1 (15 July 2004) Incorporated comments from July SAS protocol WG

### **Related documents**

sas1r05 - Serial Attached SCSI 1.1 revision 5

### **Overview**

It needs to be made clear that the SMP PHY CONTROL function LINK RESET and HARD RESET phy operations on a virtual phy do result in BROADCAST (CHANGE).

They might not be viewed as having SP state machines, so the general rule written in terms of transitions to SP0:OOB\_COMINIT might not be viewed as applying. They might not be viewed as performing a link reset sequence, so that general rule might not be viewed as applying.

To behave the same as an externally attached SMP target port, if there is any amount of time during the internal reset where the attached SAS address becomes unavailable, there must be two BROADCAST (CHANGE)s.

### **Suggested changes**

#### **7.11 SAS domain changes**

After power on or receiving BROADCAST (CHANGE), an application client in each SAS initiator port should scan the SAS domain using the discover process (see 4.6.7.4) to search for SAS initiator devices, SAS target devices, and expander devices.

The expander device shall transmit BROADCAST (CHANGE) from at least one phy in each expander port other than the expander port that is the cause for transmitting BROADCAST (CHANGE).

Expander devices shall transmit BROADCAST (CHANGE) for the following reasons:

- a) after an expander phy's SP state machine transitions from the SP15:SAS\_PHY\_Ready or SP22:SATA\_PHY\_Ready state to the SP0:OOB\_COMINIT state (see 6.7);

NOTE 1 ~~this~~ This occurs when the expander phy is reset or disabled with the SMP PHY CONTROL function DISABLE, LINK RESET, HARD RESET, or TRANSMIT SATA PORT SELECTION SIGNAL phy operations (see 10.4.3.10) as well as when dword synchronization is unexpectedly lost;

- b) after a virtual phy has been disabled with the SMP PHY CONTROL function DISABLE PHY phy operation or internally reset with either the LINK RESET or HARD RESET phy operation (see 10.4.3.10);
- c) after the SATA spinup hold state has been reached (see 6.9);
- d) after the link reset sequence completes (see 7.9);
- e) after a virtual phy has been enabled or internally reset with with the SMP PHY CONTROL function LINK RESET or HARD RESET phy operation (see 10.4.3.10);
- f) after a self-configuring expander device has completed configuration and has changed its CONFIGURING bit from one to zero in the SMP REPORT GENERAL function (see 10.4.3.3); and
- g) after the expander device receives BROADCAST (CHANGE).

For a virtual phy, if there is any time after a reset is originated during which connection requests to the attached SAS address result in connection responses of OPEN REJECT (NO DESTINATION), the expander device shall transmit the BROADCAST (CHANGE) twice, once at the start of the reset (i.e., when the SAS address becomes unavailable) and once at its completion (i.e., when the SAS address becomes available).

BROADCAST (CHANGE) may be sent by SAS initiator ports to force other SAS initiator ports and expander ports to re-run the discover process, but should not be sent by SAS target ports.

A SAS initiator port that detects BROADCAST (CHANGE) shall follow the SAS initiator device rules (see 7.9.2) to discover the topology.

A fanout expander device that detects BROADCAST (CHANGE) shall follow the fanout device rules (see 7.9.3) to discover the topology.

An edge expander device that detects BROADCAST (CHANGE) shall follow the edge device rules (see 7.9.4).

See 10.4.3.3 for details on counting BROADCAST (CHANGE) generation in an expander device.

#### 10.4.3.10 PHY CONTROL function

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**Table 1 — Phy operation**

Code	Operation	Description
00h	NOP	No operation.
01h	LINK RESET	<p>If the specified phy is not a virtual phy, perform a link reset sequence (see 4.4) on the specified phy and enable the specified phy. If the specified phy is a virtual phy, perform an internal reset and enable the specified phy. <a href="#">See 7.11 for BROADCAST (CHANGE) requirements related to this phy operation in an expander device.</a></p> <p>Any affiliation (see 7.17.4) shall continue to be present. The phy shall bypass the SATA spinup hold state.</p> <p>The SMP response shall be returned without waiting for the link reset to complete.</p>
02h	HARD RESET	<p>If the specified phy is not a virtual phy, perform a link reset sequence (see 4.4) on the specified phy and enable the specified phy. If the attached phy is not a SATA phy, the link reset sequence shall include a hard reset sequence (see 4.4.2). If the attached phy is a SATA phy, the phy shall bypass the SATA spinup hold state. <a href="#">See 7.11 for BROADCAST (CHANGE) requirements related to this phy operation in an expander device.</a></p> <p>If the specified phy is a virtual phy, perform an internal reset and enable the specified phy.</p> <p>Any affiliation (see 7.17.4) shall be cleared.</p> <p>The SMP response shall be returned without waiting for the hard reset to complete.</p>
03h	DISABLE	<p>Disable the specified phy (i.e., stop transmitting valid dwords and receiving dwords on the specified phy). The LINK RESET and HARD RESET operations may be used to enable the phy. <a href="#">See 7.11 for BROADCAST (CHANGE) requirements related to this phy operation in an expander device.</a></p>
04h	Reserved	

Table 1 — Phy operation

Code	Operation	Description
05h	CLEAR ERROR LOG	Clear the error log counters (see 10.4.3.6) for the specified phy.
06h	CLEAR AFFILIATION	Clear an affiliation (see 7.17.4) from the STP initiator port with the same SAS address as the SMP initiator port that opened this SMP connection. If there is no such affiliation, the SMP target port shall return a function result of SMP FUNCTION FAILED in the response frame.
07h	TRANSMIT SATA PORT SELECTION SIGNAL	<p><a href="#">This function shall only be supported by phys in an expander device.</a></p> <p>If the expander phy incorporates an STP/SATA bridge and supports attachment of a SATA port selector, this command shall cause the phy to transmit the SATA port selection signal (see 6.5) that causes the SATA port selector to engage the attached phy as the active phy (and consequently render the alternate phy inactive). <a href="#">See 7.11 for BROADCAST (CHANGE) requirements related to this phy operation in an expander device.</a></p> <p>If the expander phy has an active affiliation it shall be cleared (<a href="#">see 7.17.4</a>).</p> <p>If the expander phy does not implement an STP/SATA bridge or does not support attachment of a SATA port selector, then the expander device shall return a function result of PHY DOES NOT SUPPORT SATA.</p> <p>If the expander phy does support attachment of a SATA port selector but is attached to a SAS device, the expander device shall return a function result of SMP FUNCTION FAILED.</p>
All others	Reserved	