

To: T10 Technical Committee
 From: Rob Elliott, HP (elliott@hp.com)
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 Subject: 03-357r0 SAS-1.1 Invert the Disable First Burst bit

Revision history

Revision 0 (20 October 2003) First revision

Related documents

sas1r01 - Serial Attached SCSI 1.1 revision 1
 03-249r2 First Burst simplification (Bob Nixon, Emulex) [accepted into sas1r01]

Overview

The sense of the DISABLE FIRST BURST bit (proposed by 03-249r2) places a burden on devices that do not support the misplaced first burst feature, rather than on those rare devices that do. It also makes SAS 1.1 devices behave differently than the vast majority of SAS 1.0 devices that are not supporting first burst. In particular, it causes problems with SAS 1.0 targets that check reserved fields.

The bit should be ENABLE FIRST BURST rather than DISABLE FIRST BURST, placing the burden for enabling it on the devices that support the feature.

A SAS 1.0 target has two options if it sees the bit set to one, regardless of its meaning:

- a) if it checks reserved fields, reject the frame by returning a RESPONSE frame with a response code of INVALID FRAME; or
- b) if it does not check reserved fields, accept the frame.

Impact of the DISABLE sense

Table 2 shows the results if a SAS 1.1 initiator sets DISABLE FIRST BURST to zero to allow first burst if the mode page agrees. Setting the bit to 0 doesn't obligate the initiator to use first burst; presumably it will honor the mode page setting.

Table 1 — SAS 1.1 initiator setting DISABLE FIRST BURST to zero

Target version	First burst enabled in mode page?	Result
1.0	yes	Good. Target accepts the frame. Initiator honors the mode page and uses first burst.
	no ^a	Good. Target accepts the frame. Initiator honors the mode page and does not use first burst.
1.1	yes	Good. Target accepts the frame. Initiator honors the mode page and uses first burst.
	no ^a	Good. Target accepts the frame. Initiator honors the mode page and does not use first burst.
^a Very likely scenario.		

Table 2 shows the results if a SAS 1.1 initiator sets DISABLE FIRST BURST to one to force first burst off regardless of the mode page. An initiator that doesn't support first burst at all would prefer to do this, which saves it if the mode page accidentally gets enabled (e.g. by another initiator).

Table 2 — SAS 1.1 initiator setting DISABLE FIRST BURST to one

Target version	First burst enabled in mode page?	Target checks reserved fields	Result
1.0	yes	yes	Good. Target rejects the frame. Since the initiator is confused anyway and was not going to use first burst, this is helpful, short-circuiting a write command timeout.
		no	<u>Bad</u> . Target accepts the frame and waits for a first burst, but initiator never sends it because it thinks it has disabled first burst with the bit. Leads to write command timeout. Workaround requires the initiator to change the mode page, which it cannot do without using first burst since MODE SELECT itself is a write command.
	no ^a	yes ^a	<u>Bad</u> . Target rejects the frame. Initiator cannot send a write command even though it does not plan to use first burst. Workaround requires every 1.1 initiator to verify the version of every SAS target using (optional) INQUIRY data, and not set the bit when talking to a 1.0 target.
		no ^a	Good. Target accepts the frame and proceeds with first burst disabled.
1.1	yes	either	Good. Target accepts the frame and proceeds with first burst disabled.
	no ^a	either ^a	Good. Target accepts the frame and proceeds with first burst disabled.
^a Very likely scenario.			

Table 3 shows the results if a SAS 1.0 initiator sets DISABLE FIRST BURST to zero, which is the only setting it knows. A SAS 1.0 initiator never sets DISABLE FIRST BURST to one.

Table 3 — SAS 1.0 initiator (setting DISABLE FIRST BURST to zero)

Target version	First burst enabled in mode page?	Initiator tries to use first burst	Result
1.0	yes	yes	Good. Target accepts the frame and proceeds with first burst enabled.
		no	Bad . Target accepts the frame and waits for a first burst, but initiator never sends it. Leads to write command timeout. Workaround requires the initiator to change the mode page, which it cannot do without using first burst since MODE SELECT itself is a write command. An initiator without any first burst capability is stuck; no solution.
	no ^a	yes	Bad . Target accepts the frame. Initiator first burst data is ignored; XFER_RDY confusion. Workaround requires the initiator to change the mode page; it has to leave the bit zero and not use first burst to do so (if it can figure out it is experiencing this case) since MODE SELECT itself is a write command.
		no ^a	Good. Target accepts the frame and proceeds with first burst disabled.
1.1	yes	yes	Good. Target accepts the frame and proceeds with first burst enabled.
		no	Bad . Target accepts the frame and waits for the first burst, but initiator never sends it. Leads to write command timeout. Workaround requires the initiator to change the mode page, which it cannot do without using first burst since MODE SELECT itself is a write command. It can set DISABLE FIRST BURST to one to do so.
	no ^a	yes	Bad . Target accepts the frame. Initiator first burst data is ignored; XFER_RDY confusion. Workaround requires the initiator to change the mode page; it has to turn off first burst to do so (if it can figure out it is experiencing this case) since MODE SELECT itself is a write command.
		no ^a	Good. Target accepts the frame and proceeds with first burst disabled.

^a Very likely scenario.

Impact of the ENABLE sense

Changing the set moves the error cases all into the first-burst-supporting domain.

Table 4 shows the results if a SAS 1.1 initiator sets ENABLE FIRST BURST to zero to force first burst off regardless of the mode page.

Table 4 — SAS 1.1 initiator setting ENABLE FIRST BURST to zero

Target version	First burst enabled in mode page?	Result
1.0	yes	Bad . Target accepts the frame. Target then waits for a first burst, but initiator never sends it because it thinks it has disabled first burst with the bit. Leads to write command timeout. Workaround: If the initiator doesn't support first burst, none.
	no ^a	Good. Target accepts the frame and proceeds with first burst disabled.
1.1	yes	Good. Target accepts the frame and proceeds with first burst disabled.
	no ^a	Good. Target accepts the frame and proceeds with first burst disabled.
^a Very likely scenario.		

Table 5 shows the results if a SAS 1.1 initiator sets ENABLE FIRST BURST to one to allow first burst if the mode page agrees.

Table 5 — SAS 1.1 initiator setting ENABLE FIRST BURST to one

Target version	First burst enabled in mode page?	Target checks reserved fields	Result
1.0	yes	yes	Bad . Target rejects the frame. Initiator cannot send a write command. Workaround: If the SAS 1.1 initiator checks the INQUIRY version descriptors and the mode page, it can determine it is talking to a 1.0 target with first burst enabled and set ENABLE FIRST BURST to zero, working around this case.
		no	Good. Target accepts the frame and proceeds with first burst enabled.
	no ^a	yes ^a	Bad . Target rejects the frame. Initiator cannot send a write command. Workaround: If the SAS 1.1 initiator only sets ENABLE FIRST BURST to one when it thinks the mode page is enabled and is planning to use first burst, then this problem goes away.
		no ^a	Good. Target accepts the frame and proceeds with first burst disabled.
1.1	either	either	Good. Target accepts the frame and proceeds with first burst disabled.
^a Very likely scenario.			

Table 3 shows the results if a SAS 1.0 initiator sets ENABLE FIRST BURST to zero, which is the only setting it knows. A SAS 1.0 initiator never sets ENABLE FIRST BURST to one.

Table 6 — SAS 1.0 initiator (setting ENABLE FIRST BURST to zero)

Target version	First burst enabled in mode page?	Initiator tries to use first burst	Result
1.0	yes	yes	Good. Target accepts the frame and proceeds with first burst enabled.
		no	Bad . Target accepts the frame and waits for a first burst, but initiator never sends it. Leads to write command timeout. Workaround requires the initiator to change the mode page, which it cannot do without using first burst since MODE SELECT itself is a write command. An initiator without any first burst capability is stuck; no solution.
	no ^a	yes	Bad . Target accepts the frame. Initiator first burst data is ignored; XFER_RDY confusion. Workaround requires the initiator to change the mode page; it has to turn off first burst to do so (if it can figure out it is experiencing this case) since MODE SELECT itself is a write command.
		no ^a	Good. Target accepts the frame and proceeds with first burst disabled.
1.1	yes	yes	Bad . Target accepts the frame and turns off first burst, overriding its mode page. Workaround: initiator must change the mode page.
		no	Good. Target accepts the frame and proceeds with first burst disabled. The initiator is not honoring the mode page.
	no ^a	yes	Bad . Target accepts the frame. Initiator first burst data is ignored; XFER_RDY confusion. Workaround requires the initiator to change the mode page; it has to turn off first burst to do so (if it can figure out it is experiencing this case) since MODE SELECT itself is a write command.
		no ^a	Good. Target accepts the frame and proceeds with first burst disabled.

^a Very likely scenario.

Suggested changes

Change DISABLE FIRST BURST to ENABLE FIRST BURST throughout. Including:

9.2.4.1 COMMAND frame

A ~~DISABLE~~ ~~ENABLE~~ FIRST BURST bit set to ~~zero~~[one](#) specifies that first burst data shall be transferred as defined by the first burst size field in the Disconnect-Reconnect mode page (see 10.2.6.1). A ~~DISABLE~~ ~~ENABLE~~ FIRST BURST bit set to ~~one~~[zero](#) specifies that the FIRST BURST SIZE field in the Disconnect-Reconnect mode page shall be ignored (i.e., there shall be no first burst data transferred for the command). [Application clients shall only set the ENABLE FIRST BURST bit to one if:](#)

- [the FIRST BURST SIZE field in the Disconnect-Reconnect mode page indicates that first burst is supported by the logical unit and target port; and](#)
- [the logical unit reports that its target port complies with SAS-1.1 or later in the standard INQUIRY data version descriptors \(see SPC-3\).](#)