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To: SCSI Standards Committee X3T9.2

12 August 1987

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Subject: Mode Select Implementations to Support Copy

Some otherwise reasonable implementations of maintaining Mode Select parameters in SCSI target devices can prevent proper operation of device to device Copy commands. If a SCSI target maintains an independent set of mode selections for each possible initiator ID, the Copy Master device does not inherit parameters previously set by the Host. If the target device requires particular mode select parameters for proper operation in a system, means to set them up for Copy operations should be available as well as for direct Host operations. The Copy Master must be able to inherit such parameters, discover the appropriate selections, be informed of them by direct action of the host or the target device must supply the correct parameters by default.

Storing Mode Select Parameters

An examination of the SCSI standard may leave one with the impression that Mode Select parameters are to be stored on a device specific basis. This is certainly appropriate for format control parameters. This is also consistent with the history of SCSI arising as it did with bridge controllers where RAM space was dear.

However, especially for embedded SCSI controller devices, storing parameters on a per SCSI ID basis is a reasonable alternative. The advantage of this method is that each host can separately customize its use of the target device and is not affected by the operations of other hosts via spurious Unit Attentions. The disadvantage of this method for devices used as Copy sources or destinations where the Copy Master is a different device flows directly from the independence of different SCSI hosts cited above.

Impossible Solutions

1) Disallow saving mode select parameters on a SCSI ID basis. This is a simplistic solution that has two problems, it obsoletes some perfectly good SCSI-1 products and it restricts a mode of operation with general merit because of a special case problem.

2) Disallow device to device Copy. Same comments as (1) above.

3) Disallow SCSI targets where the mode select parameters need to be set up and impact the way data is transferred to or from the media. As above (1), plus this ignores other parameters such as disconnect / reselect control that the host may want control over.

4) Require that the Copy Manager set the appropriate mode. This is at least conceivable, however, it's rather awkward. The Copy Manager needs a way to determine the appropriate parameters. This could be done by sending Copy Managers a new sort of Mode Select which would pass the Mode Select data to be sent to the source or destination device of a subsequent Copy command. The information could also be embedded as a new sort of copy segment descriptor. This sort of operation greatly expands the role of the Copy Manager and is rather inelegant.

Possible Solutions

5) Where a target to be used in a Copy command stores parameters by SCSI ID, the host which will send the copy should send the target device a new sort of Mode Select which will set the parameters for all possible hosts. In this way the Copy Manager will have the appropriate parameters set up for him. The disadvantage is that it would interfere with the operation of other hosts who use the target device, they will get Unit Attention indications but should recover reasonably.

6) The host which will send the Copy command should send a 3rd party Mode Select with the parameters the target is to use in upcoming commands from the Copy Manager SCSI device. This has the advantage of letting the host do the Copy set up. In addition it is symmetrical with 3rd Party Reservations.

Described below are the proposed additions to the Mode Select command to implement this last solution.

In order to make possible self configuration of this functionality the host needs to know how a target stores mode select parameters. The 3rd Party option of the Mode Select command shall be implemented but SCSI-2 target devices which implement parameter storage per SCSI ID. With this requirement a host would know that if the 3rd party mode select were necessary, it would be available. It is also appropriate that the mode select parameter method be available through the implemented options page of Mode Sense.

A 3rd Party option for the Mode Sense command is also described. This option may not be strictly necessary as the page format and supported parameters should be the same for any initiator.

It is somewhat unfortunate that the Command Descriptor formats cannot be more similar. The most desirable case is one where these commands and Reserve and Release use the same bits for the 3rd Party function.

MODE SELECT Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation Code (15h)							
1	Logical Unit Number			PF	Third Party Device ID			SP
2	Reserved							3rdPty
3	Reserved							
4	Parameter List Length							
5	Control Byte							

Third Party Mode Select

The third-party option of the Mode Select command allows an initiator to set the Mode Select parameters for another SCSI device. This is intended for use in multiple-initiator systems that use the COPY command. Third-party Mode Select shall be implemented in any SCSI target device that stores Mode Select Parameters independently for each SCSI ID.

If the third-party (3rdPty) bit is zero, then this Mode Select command selects the target device parameters for subsequent commands from this initiator. It may also set the parameters used by commands from other initiators.

If the 3rdPty bit is one then the Mode Select command shall set the parameters for use by commands from the SCSI device specified in the third-party device ID field. The target shall preserve the parameters until they are superseded by another valid Mode Select command, or reset by a BUS DEVICE RESET message from any initiator, or a "hard" RESET condition. This definition implies that if there is any chance that another initiator would supersede the mode selection, that it should be protected by unit reservations.

MODE SENSE Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation Code (1Ah)							
1	Logical Unit Number			PF	Third Party Device ID			3rdPty
2	PC		Page Code					
3	Reserved							
4	Allocation Length							
5	Control Byte							

Third Party Mode Sense

The third-party option of the Mode Sense command allows an initiator to examine the Mode Select parameters for another SCSI device. This is intended for use in multiple-initiator systems that use the COPY command. Third-party Mode Sense shall be implemented in any SCSI target device that stores Mode Select Parameters independently for each SCSI ID.

If the third-party (3rdPty) bit is zero, then this Mode Sense command selects the target device parameters for subsequent commands from this initiator.

If the 3rdPty bit is one then the Mode Sense command shall report the parameters for use by commands from the SCSI device specified in the third-party device ID field.