To: T10 Technical Committee
From: Rob Elliott, HP (elliott@hp.com)
Date: 29 December 2003
Subject: 03-316r2 SPC-3 Mode Page Policy VPD page

Revision history

Revision 0 (6 September 2003) First revision
Revision 1 (14 September 2003) Incorporated comments from September CAP WG. Changed from a mode page to a VPD page and return an “if not specified” setting as page code 3Fh/subpage code FFh.
Revision 2 (29 December 2003) Incorporated comments from November CAP WG - got rid of subpage-only (any/FFh) and mode page-only (3Fh/any) wildcards, added a “per target port” mode page policy and a bit indicating when multiple logical units share a mode page.

Related documents

spc3r14 - SCSI Primary Commands revision 14

Overview

There is no way in SCSI to tell the policy being used for a mode page. The policies are described in the MODE SELECT (6) command description in section 6.7.

Table 1 — Mode page policies (Table 90 in spc3r14)

Mode page policy	Logical unit maintains
Shared	One copy of the mode page (shared by all I_T nexuses)
Per initiator port	Separate copies of the mode page for each initiator port (shared by all target ports)
Per I_T nexus	Separate copies of the mode page for each I_T nexus

Assuming the worst case, each mode page could have a different policy. A new VPD page is proposed which reports, for each mode page, which policy is in effect.

The Protocol-Specific Port mode page and Disconnect-Reconnect mode page do not exactly fit in those three categories. They could be:

a) shared by all initiator ports but different per target port (“per target port”); or
b) shared by all initiator ports and shared by all target ports (“shared”).

To describe a), a new policy of “per target port” is proposed.

Also, these pages are shared by all the logical units behind a target port, as well. A separate bit is proposed to indicate that multiple logical units share a page. If there is only one logical unit in the target device, it doesn’t matter what the value is; nevertheless, values of one for the Disconnect-Reconnect and Protocol-Specific Logical Unit pages are recommended.

Table 2 summarizes the rules for each mode page. The table is not proposed to go into SPC-3 - it is just informative for this proposal.

Table 2 — Mode page policy examples

Mode page	Mode page policy				Multiple logical units share?
	Shared	Per initiator port	Per target port	Per I_T nexus	
Control	may	may		may	no
Disconnect-Reconnect	may		should		yes
Extended	subpage specific				
Extended Device-Type Specific	subpage specific				
Informational Exceptions Control	may	may		may	no
Power Conditions	shall				no
Protocol Specific Logical Unit	may		should		no
Protocol Specific Port	may		should		yes
Command-set specific mode pages	probably shared				no

Suggested changes

6.7 MODE SELECT (6) command

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Logical units shall maintain current and saved values of each mode page based on any of the policies listed in table 90. The policy used for each mode page may be reported in the Mode Page Policy VPD page (see 7.6.nn).

Table 3 — Mode page policies [replace table 90 with this table]

Mode page policy	Number of mode pages	Portion of the I_T nexus	
		Initiator port	Target port
Shared	One copy of the mode page, shared by all I_T nexuses.	ignored	ignored
Per target port	Separate copies of the mode page for each target port, each shared by all initiator ports.	ignored	separate
Per initiator port	Separate copies of the mode page for each initiator port, each shared by all target ports.	separate	ignored
Per I_T nexus	Separate copies of the mode page for each I_T nexus.	separate	separate

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7.4.6 Control mode page

The Control mode page (see table 223) provides controls over several SCSI features that are applicable to all device types (e.g., task set management and error logging). If a field in this mode page is changed while there is a task already in the task set, it is vendor specific whether the old or new value of the field applies to that task. The mode page policy for the Control mode page shall be shared, per initiator port, or per I_T_L nexus.

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If the mode page policy (see 6.7) for this mode page is per initiator port or per I_T nexus, the TST field, if changeable, shall reflect in the mode pages for all initiator ports the state selected by the most recent MODE SELECT from any initiator port (i.e., the TST field is always shared). If the most recent MODE SELECT changes the setting of this field the device server shall establish a unit attention condition for all initiator ports except the one that issued the MODE SELECT command (see SAM-2). The device server shall set the additional sense code to MODE PARAMETERS CHANGED.

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7.4.7 Control Extension mode page

The Control Extension mode page (see table 221) is a subpage of the Control mode page (see 7.4.6) provides controls over SCSI features that are applicable to all device types. *The mode page policy (see 6.7) for this subpage shall be shared.* If a field in this mode subpage is changed while there is a task already in the task set, it is vendor specific whether the old or new value of the field applies to that task.

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7.4.8 Disconnect-Reconnect mode page

The Disconnect-Reconnect mode page (see table 229) provides the application client the means to tune the performance of the service delivery subsystem. The name for this mode page, disconnect-reconnect, comes from the SCSI parallel interface. The mode page policy for the Disconnect-Reconnect mode page shall be shared or per-target port, and should be per-target port.

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The Disconnect-Reconnect mode page controls parameters that affect one or more target ports. The parameters that may be implemented are specified in the SCSI transport protocol standard (see 3.1.76) for the target port. *If a target device has multiple target ports, changes in the parameters for one target port should not affect other target ports.*

The parameters for a target port affect its behavior regardless of which initiator port is forming an I_T nexus with the target port. The parameters may be accessed by MODE SENSE (see 6.9) and MODE SELECT (see 6.7) commands directed to any logical unit accessible through the target port. If a parameter value is changed, all logical units accessible through the target port shall establish a unit attention condition with an additional sense code of MODE PARAMETERS CHANGED for all initiator ports that form I_T_L nexuses through that target port except the initiator port which made the change.

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7.4.9 Extended mode page

The Extended mode page (see table 230) provides a means to specify subpages that are defined for all device types. Subpage code 00h is reserved, therefore all Extended mode pages use the sub_page format.

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7.4.10 Extended Device-Type Specific mode page

The Extended Device-Type Specific mode page (see table 231) provides a means to specify subpages that are defined differently for each device type. Subpage code 00h is reserved, therefore all Extended Device-Type Specific mode pages use the sub_page format.

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7.4.11 Informational Exceptions Control mode page

The Informational Exceptions Control mode page (see table 232) defines the methods used by the target to control the reporting and the operations of specific informational exception conditions. This page shall only apply to informational exceptions that report an additional sense code of FAILURE PREDICTION THRESHOLD EXCEEDED or WARNING to the application client. The mode page policy for the Informational Exceptions Control mode page shall be shared, per initiator port, or per I_T_L nexus.

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7.4.12 Power Condition mode page

The Power Condition mode page provides an application client the methods to control the power condition of a logical unit (see 5.9). These methods include causing the logical unit to transition to a specified power condition without delay and activating and setting of idle condition and standby condition timers to specify that the logical unit wait for a period of inactivity before transitioning to a specified power condition. The mode page policy for the Power Condition mode page shall be shared.

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7.4.13 Protocol Specific Logical Unit mode page

The Protocol Specific Logical Unit mode page (see table 236) provides protocol specific controls that are associated with a logical unit.

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During an I_T_L nexus, the Protocol Specific Logical Unit mode page controls parameters that affect both:

a) One or more target ports; and

b) The logical unit.

The parameters that may be implemented are specified in the SCSI transport protocol standard (see 3.1.76) for the target port. The mode page policy for the Protocol Specific Port mode page shall be shared or per-target port, and should be per-target port I*f a logical unit is accessible through multiple target ports, changes in the parameters for one target port should not affect other target ports.*

The parameters for a target port and logical unit affect their behavior regardless of which initiator port is forming an I_T_L nexus with the target port and logical unit. If a parameter value is changed, the logical unit shall establish a unit attention condition with an additional sense code of MODE PARAMETERS CHANGED for all initiator ports that form I_T_L nexuses through that target port other than the initiator port which made the change.

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7.4.14 Protocol Specific Port mode page

The Protocol Specific Port mode page provides protocol specific controls that are associated with a SCSI port. The page_0 format (see table 237) is used for subpage 00h and sub_page format (see table 238) is used for subpages 01h through FEh. See the SCSI protocol standard (see 3.1.76) for definition of the protocol specific mode parameters.

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The Protocol Specific Port mode page controls parameters that affect one or more target ports. The parameters that may be implemented are specified in the SCSI transport protocol standard (see 3.1.76) for the target port. The mode page policy for the Protocol Specific Port mode page shall be shared or per-target port, and should be per-target port. *If a target device has multiple target ports, changes in the parameters for one target port should not affect other target ports.*

The parameters for a target port affect its behavior regardless of which initiator port is forming an I_T nexus with the target port. The parameters may be accessed by MODE SENSE (see 6.9) and MODE SELECT (see 6.7) commands directed to any logical unit accessible through the target port. If a parameter value is changed, all logical units accessible through the target port shall establish a unit attention condition with an additional sense code of MODE PARAMETERS CHANGED for all initiator ports that form I_T_L nexuses through that target port except the initiator port which made the change.

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7.6.nn Mode Page Policy VPD page [new section]

[**Editor's note:** allocate a new VPD page code for this page. 86h is suggested since 03-183 is claiming 85h. Add to table 269 - VPD page codes.]

The Mode Page Policy VPD page (see table 4) indicates which mode page policy (see 6.7) is in effect for each mode page supported by the logical unit.

Table 4 — Mode Page Policy VPD page

Bit Byte	7	6	5	4	3	2	1	0
0	PERIPHERAL QUALIFIER			DEVICE TYPE				
1	PAGE CODE (86h)							
2	PAGE LENGTH (n - 3)							
3								
4	Mode page policy descriptors							
n								

The PERIPHERAL QUALIFIER field and the the DEVICE TYPE field are defined in 6.4.2.

The PAGE LENGTH field specifies the length of the mode page policy descriptor list.

If this VPD page is supported, the device server shall return mode page policy descriptors describing every mode page and subpage supported by the logical unit.

Table 5 describes the mode page policy descriptor.

Table 5 — Mode page policy descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved		POLICY PAGE CODE					
1	POLICY SUBPAGE CODE							
2	Reserved					MULTIPLE LOGICAL UNITS SHARE	MODE PAGE POLICY	
3	Reserved							

The POLICY PAGE CODE field and POLICY SUBPAGE CODE field indicate the mode page and subpage to which the descriptor applies.

If the first mode page policy descriptor contains a POLICY PAGE CODE field set to 3Fh and a POLICY SUBPAGE CODE field set to FFh, the descriptor applies to all mode pages and subpages not subsequently described.

Otherwise, the POLICY PAGE CODE field and the POLICY SUBPAGE CODE field indicate a single mode page and subpage to which the descriptor applies. Except for the first descriptor, the POLICY PAGE CODE field shall not be set to 3Fh and the POLICY SUBPAGE CODE field shall not be set to FFh.

A MULTIPLE LOGICAL UNITS SHARE bit of one indicates the mode page is shared by more than one logical unit. A MULTIPLE LOGICAL UNITS SHARE bit of zero indicates the logical unit maintains its own copy of the mode page.

The descriptors for the Disconnect-Reconnect mode page (see 7.4.8) and the Protocol Specific Logical Unit mode page (see 7.4.13) should have their MULTIPLE LOGICAL UNITS SHARE bits set to one.

The MODE PAGE POLICY field defines the mode page policy for the mode page as defined in table 6. See table 90 in 6.7 for descriptions of the mode page policies.

Table 6 — Mode page policies

Value	Description
00b	Shared
01b	Per target port
10b	Per initiator port
11b	Per I_T nexus