

To: T10 Technical Committee
 From: Dennis Spicher (dennis.spicher@hp.com) and Rob Elliott, HP (elliott@hp.com)
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 Subject: T10/02-251r0 SES-2 Enclosure Status element bypass status enhancement

Revision History

Revision 0 (27 June 2002) first revision

Related Documents

ses2r00 – SCSI Enclosure Services - 2 revision 00
 02-194r0 - SES-2 Protocol-specific device element information

Overview

A read-modify-write sequence is impossible using the Enclosure Status page and the Enclosure Control page to modify one of the control bits in a device element. It is not possible to reconstruct the previous state of the ENABLE BYP A and ENABLE BYP B control bits from the status bits available from the ENABLE BYP A, ENABLE BYP B, BYP A ENBLED, and BYP B ENBLED fields, since the latter two bits include three reasons the bypass may be enabled: application client, enclosure, and device but only uniquely identify one cause (the device).

Two options are presented below:

1. Small modifications to the Enclosure Status page
2. Add a control version of the protocol-specific Device Element Information page and put all the bits in those control and status pages

Suggested Changes

Option 1: Small modifications to the Enclosure Status page

Pros: minimal changes

Cons: leaves Fibre Channel specific material in a general page, limited to two ports (A and B) per device, changes the meaning of bits 3:2 to only report what the application client wrote rather than OR all three sources

7.2.2 Device element defined for enclosure pages

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The format of the STATUS INFORMATION field for a device element type in the Enclosure Status page is defined in table 28.

Table 28 – Device element for Enclosure Status page

	7	6	5	4	3	2	1	0
0	COMMON STATUS							
1	SLOT ADDRESS							
2	RSVD	DO NOT REMOVE	<u>RSVD</u> <u>ENCLOSURE BYPASSED A</u>	<u>RSVD</u> <u>ENCLOSURE BYPASSED B</u>	READY TO INSERT	RMV	IDENT	REPORT
3	RSVD	FAULT SENSED	FAULT REQSTD	DEVICE OFF	<u>ENABLE BYP-A</u> <u>APP CLIENT BYPASSED A</u>	<u>ENABLE BYP-B</u> <u>APP CLIENT BYPASSED B</u>	<u>BYP-A ENBLED DEVICE BYPASSED A</u>	<u>BYP-B ENBLED DEVICE BYPASSED B</u>

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The ENCLOSURE BYPASSED A bit is set to one to indicate that Port A has been bypassed by request of the enclosure services process and is set to zero to indicate that Port A is not being bypassed

under control of the enclosure services process. The device may still be bypassed under control of the application client or device.

The ENCLOSURE BYPASSED B bit is set to one to indicate that Port B has been bypassed by request of the enclosure services process and is set to zero to indicate that Port B is not being bypassed under control of the enclosure services process. The device may still be bypassed under control of the application client or device.

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~~The enable bypass A bit (ENABLE BYP A) is set to indicate that Port A has been bypassed by request of the application client, the device, or the enclosure. The ENABLE BYP A bit is cleared if the port bypass is disabled and the device is included on the device interface.~~

~~The enable bypass B bit (ENABLE BYP B) is set to indicate that Port B has been bypassed by request of the application client, the device, or the enclosure. The ENABLE BYP B bit is cleared if the port bypass is disabled and the device is included on the device interface.~~

The APP CLIENT BYPASSED A bit is set to one to indicate that Port A has been bypassed by request of an application client and is set to zero to indicate that Port A is not being bypassed under control of an application client. The device may still be bypassed under control of the enclosure services process or device.

The APP CLIENT BYPASSED B bit is set to one to indicate that Port B has been bypassed by request of an application client and is set to zero to indicate that Port B is not being bypassed under control of an application client. The device may still be bypassed under control of the enclosure services process or device.

~~The bypass A enabled bit (BYP A ENABLED) is set to indicate that port A of the device is bypassed under control of the device. The device may be removed, turned off, not operational, or controlling the bypass signals under control of the device server. The BYP A ENABLED bit is cleared to indicate that Port A is not being bypassed under control of the device. The device may still be bypassed under control of the enclosure services process.~~

~~The bypass B enabled bit (BYP B ENABLED) is set to indicate that port B of the device is bypassed under control of the device. The device may be removed, turned off, not operational, or controlling the bypass signals under control of the device server. The BYP B ENABLED bit is cleared to indicate that Port B is not being bypassed under control of the device. The device may still be bypassed under control of the enclosure services process.~~

The DEVICE BYPASSED A bit is set to one to indicate that Port A has been bypassed by request of the device and is set to zero to indicate that Port A is not being bypassed under control of the device. When set to one, the device may be removed, turned off, not operational, or controlling the bypass signals under control of the device server. When set to zero, the device may still be bypassed under control of the enclosure services process or device.

The DEVICE BYPASSED B bit is set to one to indicate that Port B has been bypassed by request of the device and is set to zero to indicate that Port B is not being bypassed under control of the device. When set to one, the device may be removed, turned off, not operational, or controlling the bypass signals under control of the device server. When set to zero, the device may still be bypassed under control of the enclosure services process or device.

Option 2: Use protocol-specific Device Element Information page

Pros: extensible, obsoletes the old broken bits rather than changes their meanings

Cons: complicated

6.1.x Device Element Control diagnostic page

The optional Device Element Control diagnostic page provides control information to each of the elements identified by device elements in the Configuration diagnostic page.

The Device Element Control diagnostic page is transmitted by the SEND DIAGNOSTIC command. The request for a page using the RECEIVE DIAGNOSTIC RESULTS command with PAGE CODE 09h is defined as the request for a Device Element Status diagnostic page.

Only device elements are included in the Device Element Control diagnostic page. The device elements shall be in the same order as the device elements in the Enclosure Status diagnostic page. The Device Element Control diagnostic page accepts a device information descriptor for each of the device elements that have been allowed for by the NUMBER OF POSSIBLE ELEMENTS field in the Configuration diagnostic page. The device information descriptors shall be in the same order as the ELEMENT STATUS fields in the Enclosure Status diagnostic page.

The format of the Device Element Control diagnostic page is described in table x.

Table x - Device Element Control diagnostic page

<u>Category</u>	<u>7</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>	
<u>Diagnostic page header</u>	<u>0</u>	<u>PAGE CODE (09h)</u>							
	<u>1</u>	<u>Reserved</u>							
	<u>2</u>	<u>(MSB)</u>	<u>PAGE LENGTH</u>						<u>(LSB)</u>
	<u>3</u>								
	<u>4</u>	<u>(MSB)</u>	<u>GENERATION CODE</u>						<u>(LSB)</u>
	<u>7</u>								
	<u>8</u>	<u>Zero or more Device Element Control descriptors</u>							
	<u>n</u>								

The format of the Device Element Control descriptor is specified in table x.

Table x - Device Element Control descriptor

	<u>7</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
<u>0</u>	<u>Reserved</u>				<u>PROTOCOL IDENTIFIER</u>			
<u>1</u>	<u>DEVICE ELEMENT CONTROL DESCRIPTOR LENGTH (n - 2)</u>							
<u>2</u>	<u>PROTOCOL-SPECIFIC INFORMATION</u>							
<u>n-1</u>								

6.1.x.2 Fibre Channel Device Element Control descriptor

The format of the Device Element Control descriptor for Fibre Channel devices is specified in table fc.

Table fc – Fibre Channel Device Element Control descriptor

	<u>7</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>	
<u>0</u>	<u>Reserved</u>				<u>PROTOCOL IDENTIFIER (0h)</u>				
<u>1</u>	<u>DEVICE ELEMENT CONTROL DESCRIPTOR LENGTH (n - 2)</u>								
<u>2</u>	<u>NUMBER OF PORTS</u>								
<u>3</u>	<u>Reserved</u>								
<u>4</u>	<u>(MSB)</u>	<u>Reserved</u>							
<u>11</u>		<u>Reserved</u>							<u>(LSB)</u>
	<u>One port descriptor for each port</u>								
<u>12</u>	<u>Reserved</u>								
<u>13</u>	<u>Reserved</u>				<u>Rsvd</u>	<u>Rsvd</u>	<u>REQUEST BYPASS</u>		
<u>14</u>	<u>Reserved</u>								
<u>15</u>	<u>Reserved</u>								
<u>16</u>	<u>Reserved</u>								
<u>17</u>	<u>(MSB)</u>	<u>Reserved</u>							
<u>19</u>		<u>Reserved</u>							<u>(LSB)</u>
<u>20</u>	<u>(MSB)</u>	<u>Reserved</u>							
<u>27</u>		<u>Reserved</u>							<u>(LSB)</u>
<u>28 - n</u>	<u>...</u>								

[Editor's note: this wastes a lot of space but matches the Status page. It could be compacted if that is not important.]

The PROTOCOL IDENTIFIER field of 0h indicates the descriptor is describing Fibre Channel SCSI ports.

A REQUEST BYPASS bit of one indicates the port shall be bypassed. A bit of zero indicates the port is not required to be bypassed. The port may still be bypassed under control of the enclosure services process or device.

6.1.x Device Element Information-Status diagnostic page

6.1.x.1 Device Element Information-Status diagnostic page overview

The optional Device Element Information-Status diagnostic page provides additional information about Device elements.

The Device Element Information-Status diagnostic page reports an OVERALL STATUS field for each TYPE DESCRIPTOR HEADER in the Configuration diagnostic page that defines a device element and an ELEMENT STATUS field for each of the device elements that have been allowed for by the corresponding NUMBER OF POSSIBLE ELEMENTS field.

Only device elements are included in the Device Element Information-Status diagnostic page. The device elements shall be in the same order as the device elements in the Enclosure Status diagnostic page. The Device Element Information-Status diagnostic page returns a device element informationStatus descriptor for each of the device elements that have been allowed for by the NUMBER OF POSSIBLE ELEMENTS field in the Configuration diagnostic page. The device element information-status descriptors shall be in the same order as the ELEMENT STATUS fields in the Enclosure Status diagnostic page.

The Device Element Information-Status diagnostic page is read by the RECEIVE DIAGNOSTIC RESULTS command. ~~If a PAGE CODE of 09h is transmitted using a SEND DIAGNOSTIC command, the command shall be treated as having an invalid field error (see 4.4). The transmission of a page using the SEND DIAGNOSTIC command with PAGE CODE 09h is defined as the transmission of a Device Element Control diagnostic page.~~

The format of the Device Element InformationStatus diagnostic page is described in table x.

Table x - Device Element Information-Status diagnostic page

Category		7	6	5	4	3	2	1	0	
Diagnostic page header	0	PAGE CODE (09h)								
	1	Reserved								
	2	(MSB)	PAGE LENGTH						(LSB)	
	3									
	4	(MSB)	GENERATION CODE						(LSB)	
	7									
	8		Zero or more Device Element <u>InformationStatus</u> descriptors							
	n									

The format of the Device Element InformationStatus descriptor is specified in table x.

Table x - Device Element InformationStatus descriptor

	7	6	5	4	3	2	1	0
0	Reserved			PROTOCOL IDENTIFIER				
1	DEVICE <u>INFORMATIONELEMENT STATUS</u> DESCRIPTOR LENGTH (n - 2)							
2	PROTOCOL-SPECIFIC INFORMATION							
n-1								

The PROTOCOL IDENTIFIER field is defined in SPC-3 and identifies the protocol of the device being described by the Device Element InformationStatus descriptor.

The DEVICE ELEMENT INFORMATION-STATUS DESCRIPTOR LENGTH field indicates the length of the Device Element InformationStatus descriptor.

6.1.x.2 Fibre Channel Device Element InformationStatus descriptor

The format of the Device Element InformationStatus descriptor for Fibre Channel devices is specified in table fc.

Table fc – Fibre Channel Device Element InformationStatus descriptor

	7	6	5	4	3	2	1	0
0	Reserved				PROTOCOL IDENTIFIER (0h)			
1	DEVICE <u>ELEMENT INFORMATION STATUS</u> DESCRIPTOR LENGTH (n - 2)							
2	NUMBER OF PORTS							
3	Reserved							
4	(MSB) _____ NODE WWN _____ (LSB)							
11								
One port descriptor for each port								
12	PORT POSITION							
13	Reserved				ENCLOSURE BYPASSED	DEVICE BYPASSED	APP CLIENT BYPASSED	
14	Reserved							
15	Reserved							
16	PORT REQUESTED HARD ADDRESS							
17	(MSB) _____ PORT FC ADDRESS _____ (LSB)							
19								
20	(MSB) _____ PORT WWN _____ (LSB)							
27								
28 - n	...							

The PROTOCOL IDENTIFIER field of 0h indicates the descriptor is describing Fibre Channel SCSI ports.

The NUMBER OF PORTS field indicates how many SCSI ports are being described. There is one port descriptor for each port.

The NODE WWN field contains the node WWN of the corresponding Fibre Channel node.

The PORT POSITION field indicates the position of the corresponding Fibre Channel port on a Fibre Channel arbitrated loop. The PORT REQUESTED HARD ADDRESS field contains the Fibre Channel Arbitrated Loop requested hard address of the corresponding Fibre Channel port.

The ENCLOSURE BYPASSED bit is set to one to indicate that the corresponding Fibre Channel port has been bypassed by request of the enclosure services process and is set to zero to indicate that the port is not being bypassed under control of the enclosure services process. The port may still be bypassed under control of the application client or device.

The DEVICE BYPASSED bit is set to one to indicate that the corresponding Fibre Channel port has been bypassed by request of the device and is set to zero to indicate that the port is not being bypassed under control of the device. When set to one, the device may be removed, turned off, not operational, or controlling the bypass signals under control of the device server. When set to zero, the port may still be bypassed under control of the enclosure services process or device.

~~The APP CLIENT BYPASSED bit is set to one to indicate that the corresponding Fibre Channel port has been bypassed by request of an application client and is set to zero to indicate that the port is not being bypassed under control of an application client. The port may still be bypassed under control of the enclosure services process or device.~~

The PORT FC ADDRESS field contains the Fibre Channel address of the corresponding Fibre Channel port. Applications may compare the lower 8 bits of this field with the PORT REQUESTED HARD ADDRESS field to determine whether the port was assigned its requested address.

The PORT WWN field contains the port WWN of the corresponding Fibre Channel port.

7.3 Field definitions for all element types

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7.3.2 Device element defined for enclosure pages

The format of the CONTROL INFORMATION field for a device element type in the Enclosure Control diagnostic page is defined in table 29.

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The format of the STATUS INFORMATION field for a device element type in the Enclosure Status diagnostic page is defined in table 30.

Table 30 — Device element for Enclosure Status diagnostic page

	7	6	5	4	3	2	1	0
0	COMMON STATUS							
1	SLOT ADDRESS							
2	Rsvd	DO NOT REMOVE	Rsvd	Rsvd	READY TO INSERT	RMV	IDENT	REPORT
3	Rsvd	FAULT SENSED	FAULT REQSTD	DEVICE OFF	Obsolete ENABLE BYP-A	Obsolete ENABLE BYP-B	Obsolete BYP-A ENBLED	Obsolete BYP-B ENBLED

For the ELEMENT STATUS field, the SLOT ADDRESS field is set to the value of the SCSI address of the primary parallel SCSI target port of the SCSI target device and is vendor specific for SCSI target devices without parallel SCSI target ports.

For the OVERALL STATUS field, the SLOT ADDRESS field is vendor specific.

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~~The enable bypass A bit (ENABLE BYP A) is set to indicate that Port A has been bypassed by request of the application client, the device, or the enclosure. The ENABLE BYP A bit is cleared if the port bypass is disabled and the device is included on the device interface.~~

~~The enable bypass B bit (ENABLE BYP B) is set to indicate that Port B has been bypassed by request of the application client, the device, or the enclosure. The ENABLE BYP B bit is cleared if the port bypass is disabled and the device is included on the device interface.~~

~~The bypass A enabled bit (BYP A ENBLED) is set to indicate that port A of the device is bypassed under control of the device. The device may be removed, turned off, not operational, or controlling the bypass signals under control of the device server. The BYP A ENBLED bit is cleared to indicate that Port A is not being bypassed under control of the device. The device may still be bypassed under control of the enclosure services process.~~

~~The bypass B enabled bit (BYP B ENBLED) is set to indicate that port B of the device is bypassed under control of the device. The device may be removed, turned off, not operational, or controlling the bypass signals under control of the device server. The BYP B ENBLED bit is cleared to indicate~~

~~that Port B is not being bypassed under control of the device. The device may still be bypassed under control of the enclosure services process.~~