

To: T10 Technical Committee
From: Rob Elliott, HP (elliott@hp.com)
Date: 8 November 2003
Subject: 03-347r1 SES-2 Reporting peer enclosure service processes

Revision history

Revision 0 (15 October 2003) First revision
Revision 1 (8 November 2003) Incorporated comments from November CAP WG - moved relative field left one bit.

Related documents

ses2r04 - SCSI Enclosure Services - 2 revision 4

Overview

It is possible to build an enclosure that contains multiple enclosure service processes. They could be in the same or different SCSI domains.

Figure 1 shows a single enclosure service process accessed through two target ports. The asymmetric logical unit access commands (REPORT/SET TARGET PORT GROUPS) can be used to coordinate access if it behaves in active-optimized/active-nonoptimized or active/standby manner.

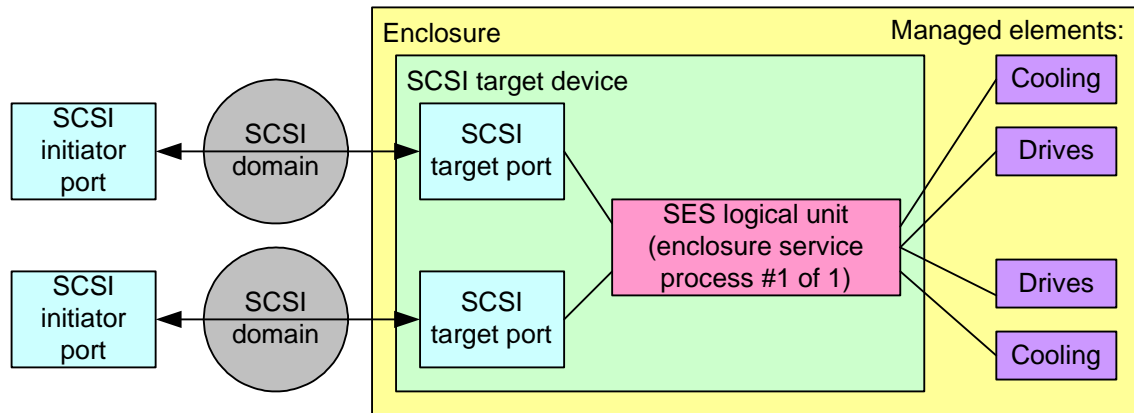


Figure 1 — Single enclosure services process

Figure 2 shows multiple enclosure service processes. Both return the same enclosure serial number, etc. in the Configuration diagnostic page. They might each have the ability to manage the full enclosure or just part of it (this can be determined by examining which elements they manage).

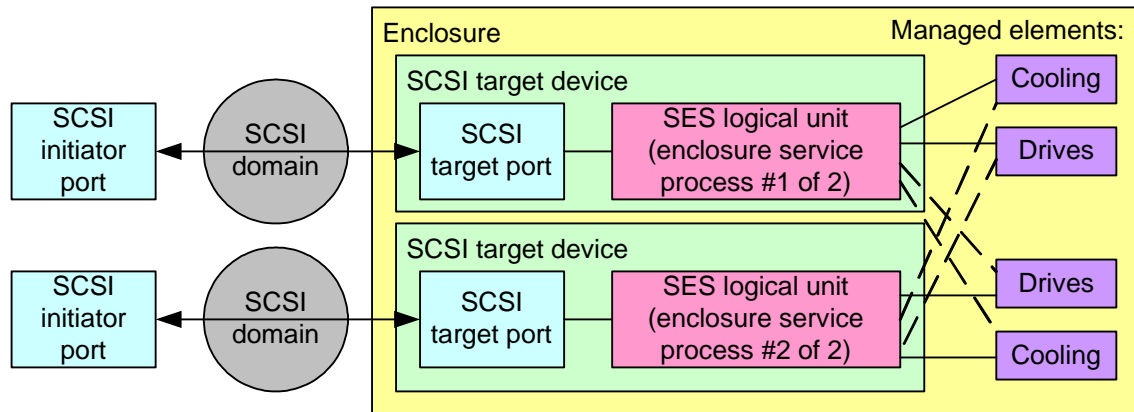


Figure 2 — Multiple enclosure service processes

Bob Snively (Brocade) asked that a way be added to identify these situations to software. New fields are proposed for the Configuration diagnostic page that return the total number of enclosure service processes and a relative identifier (1 .. n) indicating which one is being accessed. Applications accessing the same enclosure from different domains can use this information to understand what the others are seeing.

Suggested changes

6.1.2 Configuration diagnostic page

The Configuration diagnostic page returns a list of elements in an enclosure. This page shall be implemented if the device supports enclosure services and does not use the Short Enclosure Status diagnostic page (see 6.1.13). The element list shall include all elements with defined element status or controls and may list any other elements in the enclosure. The Configuration diagnostic page provides enclosure descriptor information and parameters. The Configuration diagnostic page optionally provides descriptive text that applications clients may use to identify elements in more detail. The Configuration diagnostic page is read by the RECEIVE DIAGNOSTIC RESULTS command. If a PAGE CODE of 01h is transmitted using a SEND DIAGNOSTIC command, the command shall be treated as having an invalid field error (see 4.5).

Table 1 provides an overview of the components of the Configuration diagnostic page.

Table 1 — Layout of Configuration diagnostic page

Component name	Description	Reference
Diagnostic page header	Describes diagnostic page	SPC-3
Generation code	Generation code	6.1.2
Enclosure descriptor header	Describes enclosure descriptor	6.1.2
Enclosure descriptor	Enclosure identification information	6.1.2
Type descriptor header list for Device elements and Array Device elements	Contains type descriptor headers for Device elements and Array Device elements (see 7.3.2 and 7.3.3) in the enclosure	6.1.2
Type descriptor header list for other elements	Identifies all other element types included in enclosure	6.1.2
Type descriptor text	Provides optional text descriptions for each element type in the enclosure	6.1.2

The format of the Configuration diagnostic page is described in table 2.

Table 2 — Configuration diagnostic page [reformatted]

Byte/Bit	7	6	5	4	3	2	1	0	
Diagnostic page header									
0	PAGE CODE (01h)								
1	NUMBER OF SUB-ENCLOSURES								
2	(MSB)	PAGE LENGTH (n-3)							
3								(LSB)	
Generation code									
4	(MSB)	GENERATION CODE							
7								(LSB)	
Enclosure descriptor header									
8	Reserved	RELATIVE ENCLOSURE SERVICE PROCESS IDENTIFIER			Reserved	NUMBER OF ENCLOSURE SERVICE PROCESSES			
9	SUB-ENCLOSURE IDENTIFIER								
10	NUMBER OF ELEMENT TYPES SUPPORTED (T)								
11	ENCLOSURE DESCRIPTOR LENGTH (m)								
Enclosure descriptor									
12		ENCLOSURE LOGICAL IDENTIFIER							
19									
20		ENCLOSURE VENDOR IDENTIFICATION							
27									
28		PRODUCT IDENTIFICATION							
43									
44		PRODUCT REVISION LEVEL							
47									
48		Vendor-specific enclosure information							
(11 + m)									
Type descriptor header list									
(4 bytes)	TYPE DESCRIPTOR HEADER (first element type)								
...									
(4 bytes)	TYPE DESCRIPTOR HEADER (T th element type)								
Type descriptor text									
variable	TYPE DESCRIPTOR TEXT (first element type)								
...									
last byte = n	TYPE DESCRIPTOR TEXT (T th element type)								

Unless sub-enclosures are defined (see annex A), the NUMBER OF SUB-ENCLOSURES field shall be 00h.

The GENERATION CODE field is a four-byte counter that shall be incremented by one by the enclosure services process every time the enclosure configuration is modified such that the Configuration diagnostic page changes. The counter shall not be changed by status changes for elements already described by the Configuration diagnostic page. Enclosures that do not change in configuration may use a fixed value of zero for the GENERATION CODE.

Enclosure services type devices shall establish a unit attention condition (see SAM-3 and SPC-3) for all initiators when there is a change in the GENERATION CODE field's value. The additional sense code for the unit attention condition shall be TARGET OPERATING CONDITIONS HAVE CHANGED. The unit attention condition shall be cleared for all initiators without being reported by the execution of a RECEIVE DIAGNOSTIC RESULTS command that requests a Configuration diagnostic page (PAGE CODE of 01h).

Application clients accessing an enclosure services process through a device other than an enclosure services type device should verify that the value of the GENERATION CODE field has not unexpectedly changed, since no unit attention condition is established by such devices.

The NUMBER OF ENCLOSURE SERVICE PROCESSES field indicates the number of enclosure service processes supported by the enclosure. A value of 0h means the number is not known.

The RELATIVE ENCLOSURE SERVICE PROCESS IDENTIFIER field identifies the enclosure service process relative to other enclosure service processes in the enclosure. A value of 0h is reserved.

Unless sub-enclosures are defined (see annex A), the SUB-ENCLOSURE IDENTIFIER FIELD shall be 00h.

The NUMBER OF ELEMENT TYPES SUPPORTED field defines the number of TYPE DESCRIPTOR HEADER fields that follow the enclosure descriptor.

The ENCLOSURE DESCRIPTOR LENGTH field specifies the number of bytes contained in the enclosure descriptor. The value shall be a multiple of four, having allowed values between 36 and 252. The ENCLOSURE DESCRIPTOR LENGTH includes the length of the ENCLOSURE LOGICAL IDENTIFIER field, the ENCLOSURE VENDOR IDENTIFICATION field, the PRODUCT IDENTIFICATION field, the PRODUCT REVISION LEVEL field, and any vendor specific enclosure information.

The ENCLOSURE LOGICAL IDENTIFIER field shall use an 8-byte NAA identifier, the format of which is defined in SPC-3 vital product data (see SPC-3). The ENCLOSURE LOGICAL IDENTIFIER is unique to the enclosure and may be different from the world wide name of the device providing the enclosure services.

The ENCLOSURE VENDOR IDENTIFICATION field shall contain the identification string for the vendor of the enclosure in the same format as specified for the vendor identification field of the standard INQUIRY data (see SPC-3). The ENCLOSURE VENDOR IDENTIFICATION may be different from the vendor identification of the device providing the enclosure services.

The PRODUCT IDENTIFICATION field shall contain the product identification string for the enclosure in the same format as specified for the product identification field of the standard INQUIRY data (see SPC-3). The PRODUCT IDENTIFICATION field may be different from the product identification of the device providing the enclosure services.

The PRODUCT REVISION LEVEL field shall contain the product revision level string for the enclosure in the same format as specified for the product revision level field of the standard INQUIRY data (see SPC-3). The PRODUCT REVISION LEVEL may be different from the product revision level of the device providing the enclosure services.

The VENDOR-SPECIFIC ENCLOSURE INFORMATION field is optional.

The TYPE DESCRIPTOR HEADER field indicates the element type being described, the number of such elements, and the length of an optional text describing the element type. The format of the TYPE DESCRIPTOR HEADER is shown in table 3. The elements of an enclosure shall be listed in the same order in:

- a) the Configuration diagnostic page;
- b) the type descriptor text of the Configuration diagnostic page;
- c) the Enclosure Status diagnostic page;
- d) the Enclosure Control diagnostic page; and

- e) the Threshold In and Threshold Out diagnostic pages.

Elements shall be listed in this order, regardless of their sub-enclosure identifiers:

- 1) All those elements defining SCSI devices; and
- 2) Elements of of other types.

Type descriptor headers for elements other than Device elements and Array Device elements may be listed in any order in the Configuration diagnostic page. The type descriptor text strings shall be placed after all type descriptor headers.

Table 3 — Type descriptor header format

Byte\Bit	7	6	5	4	3	2	1	0
0	ELEMENT TYPE							
1	NUMBER OF POSSIBLE ELEMENTS							
2	SUB-ENCLOSURE IDENTIFIER							
3	TYPE DESCRIPTOR TEXT LENGTH							

The ELEMENT TYPE field in the type descriptor header indicates the element type being described in the header. The list of element types is shown in table 26.

More than one type descriptor header may contain a given ELEMENT TYPE value. As an example, there may be two power supplies that provide +12 volts, and five power supplies that provide +5 volts. In this case, a separate TYPE DESCRIPTOR HEADER may be used for the +12 volt power supplies and for the +5 volt power supplies.

The NUMBER OF POSSIBLE ELEMENTS field in the type descriptor header indicates the number of elements of the indicated type that it is possible to install in the enclosure. The actual number of elements installed may be smaller than the number that the configuration is capable of accepting. The NUMBER OF POSSIBLE ELEMENTS may be zero, indicating that only the OVERALL CONTROL, OVERALL STATUS, or OVERALL THRESHOLD field is present in the applicable control, status, or threshold page, but that individual ELEMENT CONTROL, ELEMENT STATUS, or ELEMENT THRESHOLD fields are absent (see 6.1.3, 6.1.4, 6.1.8, 6.1.9, 6.1.10, and 6.1.11). The maximum number of elements referenced by a single type descriptor header shall be 255.

The SUB-ENCLOSURE IDENTIFIER field in the type descriptor header specifies a vendor specific identifier for the enclosure where the elements described by this type descriptor reside. For an enclosure services process that is directly accessed as an enclosure services device or through a logical unit of another type, the SUB-ENCLOSURE IDENTIFIER shall be 00h. Such an enclosure is defined as a primary sub-enclosure. The alternative accessing structure for sub-enclosures is described in annex A.

The TYPE DESCRIPTOR TEXT LENGTH field in the type descriptor header specifies the length in bytes of the type descriptor text string for the names element. Vendor specific element types shall have a TYPE DESCRIPTOR TEXT LENGTH field that is nonzero and shall have a TYPE DESCRIPTOR TEXT field adequate to identify the element to an application client. Other element types may have a TYPE DESCRIPTOR TEXT LENGTH of zero.

The TYPE DESCRIPTOR TEXT field in the Configuration diagnostic page is an optional text string from zero to 255 bytes for each type descriptor header. The text string, if it has a length greater than zero, may contain any descriptive information about the element type that may be useful to an application client that is displaying the configuration of the enclosure. The TYPE DESCRIPTOR TEXT items shall be placed in the same order as the type descriptor headers, except that text items of 0 length shall be omitted.

Examples of information that may be included in the TYPE DESCRIPTOR TEXT field include the manufacturer's part number for a replacement element, a brief description of the element and its properties, or instructions about configuration limitations and redundancy requirements of the elements of that type.

The TYPE DESCRIPTOR TEXT uses the character encoding and language specified by the language element (see 7.3.18).