



Exos AP 4U100

GEM 5 SES-3 Addenda

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Revision History

Revision	Date	Description
00-A	2023-03-30	Initial release

Table of Contents

1	Introduction	4
1.1	Scope	4
1.2	Terms and Abbreviations	4
1.3	Notation Conventions	5
1.4	References	5
2	Supported ANSI SES-3 Pages and Elements	6
3	Element to Device Mapping	7
3.1	Enclosure FRU Layout	7
3.1.1	Enclosure Front View	7
3.1.2	Enclosure Rear View	7
3.1.3	Enclosure Plan View (with drives)	8
3.1.4	Enclosure Plan View (without drives)	9
3.2	SES Element Mapping	10
3.3	GEMNet Addresses	15
4	Diagnostic Page Layouts	16
4.1	Diagnostic Page 00h	16
4.2	SES Page 01h	16
4.3	SES Page 02h and Page 05h Layout	19
4.3.1	SES Page 05h Threshold Support	22
4.4	SES Page 07h Layout	23
4.4.1	Page 07h Descriptor Strings	27
4.5	SES Page 0Ah Layout	28
4.5.1	SES Page 0Ah Layout	28
4.6	Vendor Unique Page 91h Layout	35
4.7	Vendor Unique Page 92h Layout	41
4.8	Vendor Unique Page 93h Layout	45

1 Introduction

1.1 Scope

This document is provided as an extension to the GEM 5 SES-3 Specification to detail exact SES page layouts and specification deviations implemented by the Exos AP 4U100 12G SAS storage server product. It is a guide to inform both customers and product testers of the intended SES page structure a product variant provides.

This document is not intended to cover all specifics of SES implementation for the Seagate storage enclosure platform. For details on element/descriptor formats and behavior, the GEM 5 SES-3 Specification [3] and ANSI T-10 SES Specification [1] should be referenced.

This document applies to the following enclosure product IDs.

- AP-34100-CFFRH

1.2 Terms and Abbreviations

AGG	Aggregate
ANSI	American National Standards Institute
BMC	Baseboard Management Controller
CDB	Command Descriptor Block
CLI	Command Line Interface
EEPROM	Electrically Erasable Programmable Read-Only Memory
EIIOE	Element Index Includes Overall Element
EIP	Element Index Present
EM	Enclosure Management
ESI	Enclosure Services Interface Processor
ESP	Enclosure Services Process
FRU	Field Replaceable Unit
GEM	Generic Enclosure Management
IOM	I/O Module
LED	Light-Emitting Diode
LSB	Least Significant Bit
MSB	Most Significant Bit
NAA	Network Address Authority
PCM	Power Cooling Module
PSU	Power Supply Unit
RQST	Request
RSVD	Reserved
SAS	Serial Attached SCSI
SBB	Storage Bridge Bay
SBBMI	SBB Midplane Interconnect
SCSI	Small Computer System Interface
SEP	Storage Enclosure Processor
SES	SCSI Enclosure Services
SGPIO	Serial General Purpose I/O
TWI	Two Wire Interface
VPD	Vital Product Data

Application client	An object that is the source of SCSI commands.
Attached ESP	An ESP that is attached to another device server.
Critical condition	An enclosure condition established when one or more elements inside the enclosure have failed or are operating outside of their specification. The failure of the element makes continued normal operation of at least some

	elements in the enclosure impossible. Some elements within the enclosure may be able to continue normal operation.
Information condition	An enclosure condition that should be made known to the application client. The condition is not an error and does not reduce the capabilities of the devices in the enclosure.
Non-critical condition	An enclosure condition established when one or more elements inside the enclosure have failed or are operating outside of their specifications. The failure of the elements does not affect continued normal operation of the enclosure. All SCSI devices in the enclosure continue to operate according to their specifications. The ability of the devices to operate correctly if additional failures occur may be reduced by a noncritical condition.
Standalone ESP	An ESP that is also the device server.
Subenclosure	An enclosure accessed through a primary subenclosure's ESP.
Unrecoverable condition	An enclosure condition established when one or more elements inside the enclosure have failed and have disabled some functions of the enclosure. The enclosure may be incapable of recovering or bypassing the failure and requires repairs to correct the condition.

1.3 Notation Conventions

<value>h	Indicates a hexadecimal number, e.g., <i>23h</i>
<value>	A value without leading zeroes and no suffix indicates a decimal number, e.g., <i>34</i> .
[option0, option1]	Indicates possible options for this field.
[valueX..valueY]	Indicates options range from valueX to valueY.
[defaultX: valueX..valueY]	Indicates the default value "defaultX", with possible alternatives.
[XX]	Indicates variable values.

1.4 References

- [1] T10 SES-3r10
- [2] SCSI Primary Commands – 4 (SPC-4) Revision 36n
- [3] GEM 4 ANSI SES-3 Specification
- [4] GEM Command Line Interface Specification

2 Supported ANSI SES-3 Pages and Elements

Table 1 lists the ANSI SES pages and Vendor Unique SES pages supported by the enclosure. Table 2 lists the ANSI and Vendor Specific SES elements supported by the enclosure.

Table 1 – Supported SES Pages

Page Code	Description	Control/Status
ANSI SES Pages		
00h	Supported Diagnostics Pages Diagnostic Page	Status
01h	Configuration Diagnostic Page	Status
02h	Enclosure Diagnostic Page	Control and Status
03h	Help Text Diagnostic Page	Status
05h	Threshold Out Diagnostic Page	Control and Status
07h	Element Descriptor Diagnostic Page	Status
0Ah	Additional Element Status Diagnostic Page	Status
0Eh	Download Microcode Control Diagnostic Page	Control and Status
Vendor Specific Pages		
84h/85h	In-band CLI Control Page	Control and Status
90h	Customer VPD Control Page	Control and Status
91h	Statistics Page	Status
92h	Extended Status Page	Status
93h	LED Status	Status

Table 2 – Supported SES Elements

Element Code	Description	Element count
ANSI SES Elements		
17h	Array Device	100
02h	Power Supply	4
03h	Cooling Element	12
04h	Temperature Sensor	54
05h	Door Lock Sensor	2
06h	Audible Alarm	1
07h	Enclosure Services Controller Electronics	2
0Eh	Enclosure	1
12h	Voltage Sensor	8
13h	Current Sensor	8
18h	SAS Expander	14
19h	SAS Connector	20
Vendor Specific SES Elements		
86h	SBB Midplane Interconnect	2
89h	Enclosure Electronics Power	2
8Ah	Enclosure Settings	1
8Bh	Enclosure Electronics Diagnostics	2
8Ch	BMC	2
90h	Sideplane	12

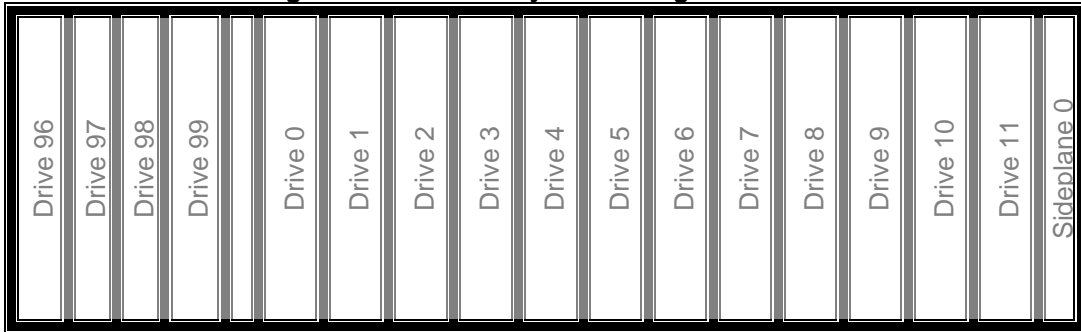
3 Element to Device Mapping

3.1 Enclosure FRU Layout

The layout of the enclosure with respect to physical FRU location is as follows.

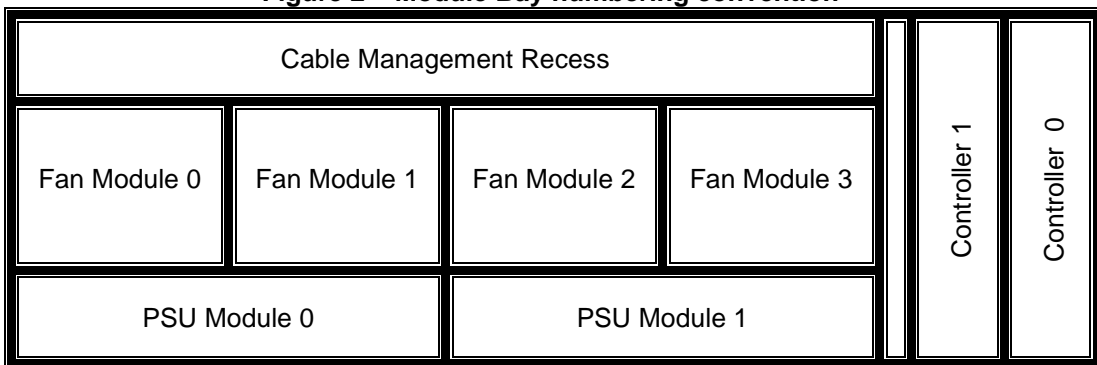
3.1.1 Enclosure Front View

Figure 1 – Module Bay numbering convention



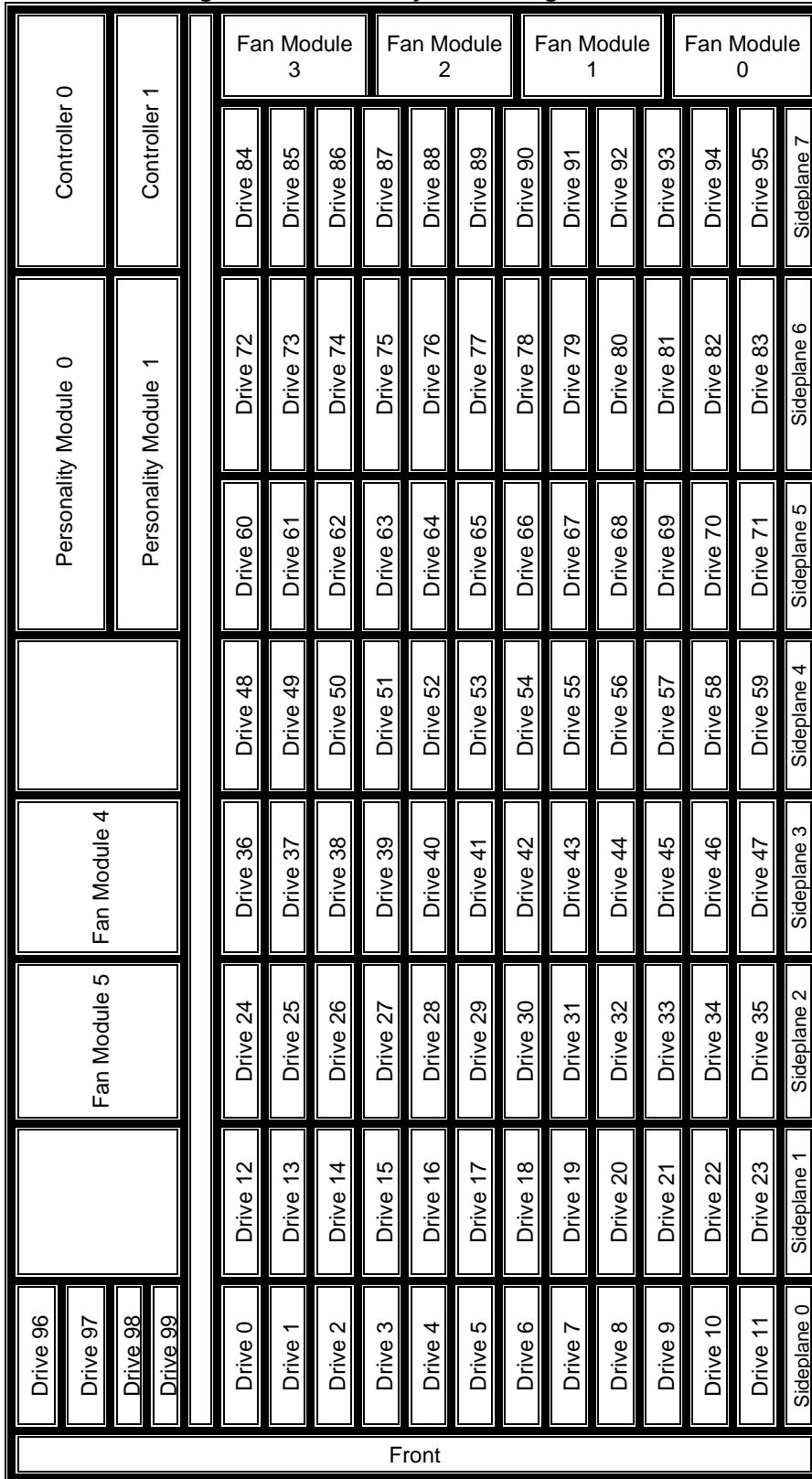
3.1.2 Enclosure Rear View

Figure 2 – Module Bay numbering convention



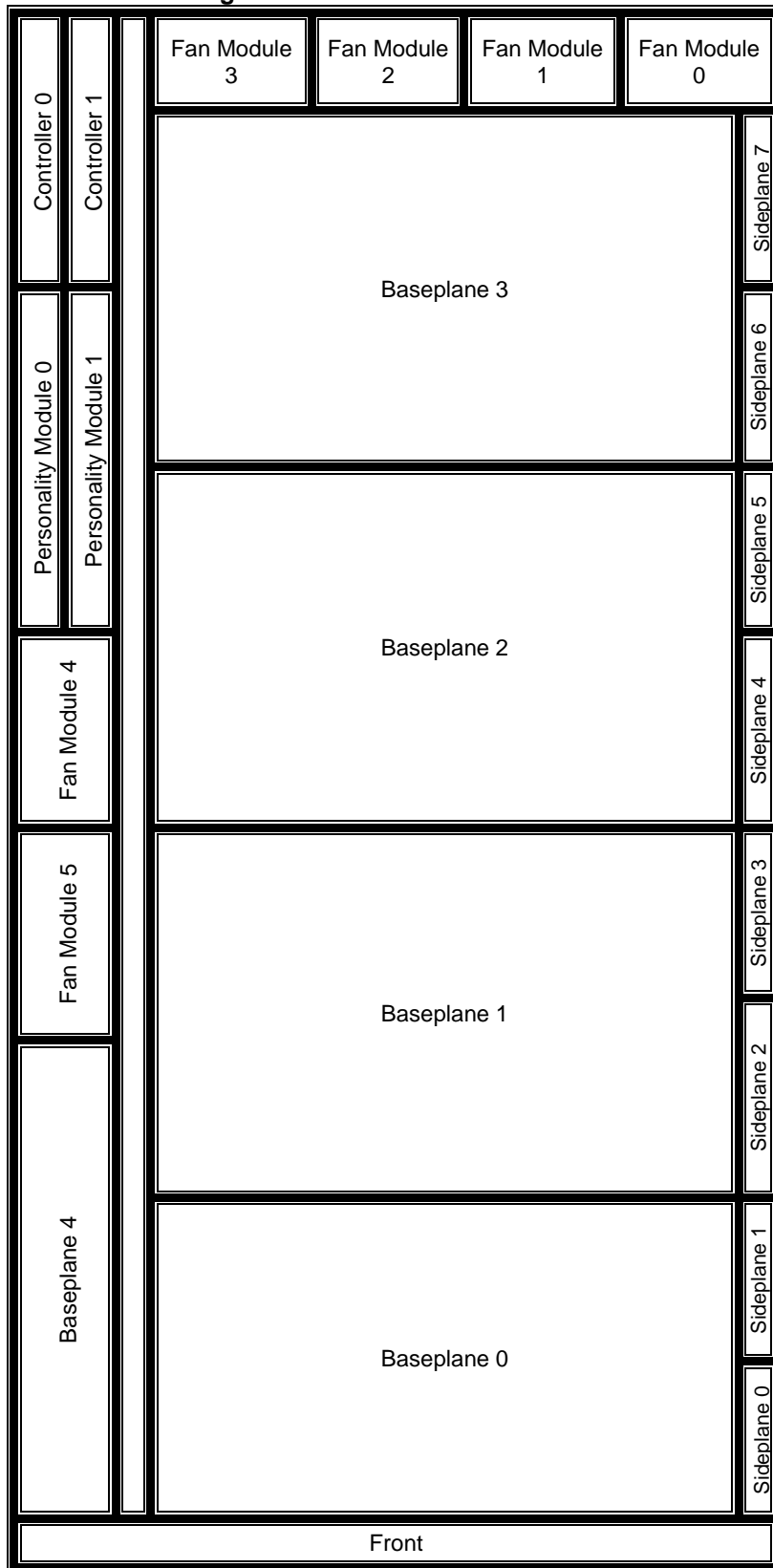
3.1.3 Enclosure Plan View (with drives)

Figure 3.3 - Drive Bay numbering convention



3.1.4 Enclosure Plan View (without drives)

Figure 3.4 – Plan view without drives



3.2 SES Element Mapping

For SES Pages 02h, 05h, 07h and 92h the element to physical device mapping is shown in Table 3.

Table 3 - SES Element Descriptions

Global Element Index	Relative Element Index	Description	Associated FRU
Array Device Elements			
0	0	Array Device element representing Disk Drive Bay 0	Enclosure
		...	
99	99	Array Device element representing Disk Drive Bay 99	Enclosure
Power Supply Elements			
100	0	Power Supply element representing PSU core 0	PSU Module 0
101	1	Power Supply element representing PSU core 1	PSU Module 0
102	2	Power Supply element representing PSU core 2	PSU Module 1
103	3	Power Supply element representing PSU core 3	PSU Module 1
Cooling Elements			
104	0	Cooling element representing Fan 0	Fan Module 0
105	1	Cooling element representing Fan 1	Fan Module 0
106	2	Cooling element representing Fan 2	Fan Module 1
107	3	Cooling element representing Fan 3	Fan Module 1
108	4	Cooling element representing Fan 4	Fan Module 2
109	5	Cooling element representing Fan 5	Fan Module 2
110	6	Cooling element representing Fan 6	Fan Module 3
111	7	Cooling element representing Fan 7	Fan Module 3
112	8	Cooling element representing Fan 8	Fan Module 4
113	9	Cooling element representing Fan 9	Fan Module 4
114	10	Cooling element representing Fan 10	Fan Module 5
115	11	Cooling element representing Fan 11	Fan Module 5
Temperature Sensor Elements			
116	0	Midplane 0 Temperature Sensor	Enclosure
117	1	Midplane 1 Temperature Sensor	Enclosure
118	2	Sideplane 1 Expander Temperature Sensor	Sideplane 1
119	3	Sideplane 0 Expander Temperature Sensor	Sideplane 0
120	4	Sideplane 3 Expander Temperature Sensor	Sideplane 3
121	5	Sideplane 2 Expander Temperature Sensor	Sideplane 2
122	6	Sideplane 5 Expander Temperature Sensor	Sideplane 5
123	7	Sideplane 4 Expander Temperature Sensor	Sideplane 4
124	8	Sideplane 7 Expander Temperature Sensor	Sideplane 7
125	9	Sideplane 6 Expander Temperature Sensor	Sideplane 6
126	10	Baseplane 0 Temperature Sensor	Enclosure
127	11	Baseplane 0 Temperature Sensor	Enclosure
128	12	Baseplane 1 Temperature Sensor	Enclosure
129	13	Baseplane 1 Temperature Sensor	Enclosure
130	14	Baseplane 2 Temperature Sensor	Enclosure
131	15	Baseplane 2 Temperature Sensor	Enclosure

Global Element Index	Relative Element Index	Description	Associated FRU
132	16	Baseplane 3 Temperature Sensor	Enclosure
133	17	Baseplane 3 Temperature Sensor	Enclosure
134	18	Sideplane 8 Expander Temperature Sensor	PM 0
135	19	Sideplane 9 Expander Temperature Sensor	PM 0
136	20	Sideplane 10 Expander Temperature Sensor	PM 1
137	21	Sideplane 11 Expander Temperature Sensor	PM 1
138	22	SSD Baseplane 0 Temperature Sensor	Enclosure
139	23	SSD Baseplane 1 Temperature Sensor	Enclosure
140	24	PSU Core 0 Hotspot Temperature Sensor	PSU 0
141	25	PSU Core 0 Inlet Temperature Sensor	PSU 0
142	26	PSU Core 0 Exhaust Temperature Sensor	PSU 0
143	27	PSU Core 1 Hotspot Temperature Sensor	PSU 1
144	28	PSU Core 1 Inlet Temperature Sensor	PSU 1
145	29	PSU Core 1 Exhaust Temperature Sensor	PSU 1
146	30	PSU Core 2 Hotspot Temperature Sensor	PSU 2
147	31	PSU Core 2 Inlet Temperature Sensor	PSU 2
148	32	PSU Core 2 Exhaust Temperature Sensor	PSU 2
149	33	PSU Core 3 Hotspot Temperature Sensor	PSU 3
150	34	PSU Core 3 Inlet Temperature Sensor	PSU 3
151	35	PSU Core 3 Exhaust Temperature Sensor	PSU 3
152	36	Canister 0 Intake	Canister 0
153	37	Canister 0 Near CPU	Canister 0
154	38	Canister 0 Internal	Canister 0
155	39	Canister 0 Exhaust 1	Canister 0
156	40	Canister 0 Exhaust 2	Canister 0
157	41	Canister 0 CPU 0 Temperature Sensor	CPU 0
158	42	Canister 0 CPU 0 DIMM Aggregate Temperature Sensor	MM0:AGG
159	43	Canister 0 CPU 1 Temperature Sensor	CPU 1
160	44	Canister 0 CPU 1 DIMM Aggregate Temperature Sensor	MM1:AGG
161	45	Canister 1 Intake	Canister 1
162	46	Canister 1 Near CPU	Canister 1
163	47	Canister 1 Internal	Canister 1
164	48	Canister 1 Exhaust 1	Canister 1
165	49	Canister 1 Exhaust 2	Canister 1
166	50	Canister 1 CPU 0 Temperature Sensor	CPU 0
167	51	Canister 1 CPU 0 DIMM Aggregate Temperature Sensor	MM0:AGG
168	52	Canister 1 CPU 1 Temperature Sensor	CPU 1
169	53	Canister 1 CPU 1 DIMM Aggregate Temperature Sensor	MM1:AGG
Door Lock Sensor Elements			
170	0	Controller Channel Lid Removed Sensor	Enclosure
171	1	Main Lid Removed Sensor	Enclosure
Audible Alarm Elements			
172	0	Ops Panel Buzzer State ¹	Enclosure
Enclosure Services Controller Electronics Elements			

Global Element Index	Relative Element Index	Description	Associated FRU
173	0	Element associated with SEP device	Controller 0
174	1	Element associated with SEP device	Controller 1
Enclosure Elements			
175	0	Element representing the Enclosure	Enclosure
Voltage Sensor Elements			
176	0	PSU Core 0 +12V Rail Voltage Sensor ²	PSU Module 0
177	1	PSU Core 0 Input Rail Voltage Sensor ²	PSU Module 0
178	2	PSU Core 1 +12V Rail Voltage Sensor ²	PSU Module 0
179	3	PSU Core 1 Input Rail Voltage Sensor ²	PSU Module 0
180	4	PSU Core 2 +12V Rail Voltage Sensor ²	PSU Module 1
181	5	PSU Core 2 Input Rail Voltage Sensor ²	PSU Module 1
182	6	PSU Core 3 +12V Rail Voltage Sensor ²	PSU Module 1
183	7	PSU Core 3 Input Rail Voltage Sensor ²	PSU Module 1
Current Sensor Elements			
184	0	PSU Core 0 +12V Rail Current Sensor ²	PSU Module 0
185	1	PSU Core 0 Input Rail Current Sensor ²	PSU Module 0
186	2	PSU Core 1 +12V Rail Current Sensor ²	PSU Module 0
187	3	PSU Core 1 Input Rail Current Sensor ²	PSU Module 0
188	4	PSU Core 2 +12V Rail Current Sensor ²	PSU Module 1
189	5	PSU Core 2 Input Rail Current Sensor ²	PSU Module 1
190	6	PSU Core 3 +12V Rail Current Sensor ²	PSU Module 1
191	7	PSU Core 3 Input Rail Current Sensor ²	PSU Module 1
SAS Expander Elements			
192	0	Sideplane 0 (B Channel) Expander	Sideplane 0
193	1	Sideplane 1 (A Channel) Expander	Sideplane 1
194	2	Sideplane 2 (B Channel) Expander	Sideplane 2
195	3	Sideplane 3 (A Channel) Expander	Sideplane 3
196	4	Sideplane 4 (B Channel) Expander	Sideplane 4
197	5	Sideplane 5 (A Channel) Expander	Sideplane 5
198	6	Sideplane 6 (B Channel) Expander	Sideplane 6
199	7	Sideplane 7 (A Channel) Expander	Sideplane 7
200	8	PM 0 (A Channel) Expander A	PM 0
201	9	PM 1 (B Channel) Expander A	PM 1
202	10	PM 0 (A Channel) Expander B	PM 0
203	11	PM 1 (B Channel) Expander B	PM 1
204	12	Canister Expander 0	Controller 0
205	13	Canister Expander 1	Controller 1
SAS Connector Elements			
206	0	SAS Connector for Expander A to MiniSAS HD Port A	PM 0
207	1	SAS Connector for Expander A to SAS Controller A	PM 0
208	2	SAS Connector for Expander A to SAS Controller B	PM 0
209	3	SAS Connector for Expander B to MiniSAS HD Port B	PM 0
210	4	SAS Connector for Expander B to SAS Controller A	PM 0
211	5	SAS Connector for Expander B to SAS Controller B	PM 0

Global Element Index	Relative Element Index	Description	Associated FRU
212	6	SAS Connector for Expander A to MiniSAS HD Port A	PM 1
213	7	SAS Connector for Expander A to SAS Controller A	PM 1
214	8	SAS Connector for Expander A to SAS Controller B	PM 1
215	9	SAS Connector for Expander B to MiniSAS HD Port B	PM 1
216	10	SAS Connector for Expander B to SAS Controller A	PM 1
217	11	SAS Connector for Expander B to SAS Controller B	PM 1
218	12	SAS Connector for Expander B to Sideplane 1	PM 0
219	13	SAS Connector for Expander B to Sideplane 3	PM 0
220	14	SAS Connector for Expander A to Sideplane 5	PM 0
221	15	SAS Connector for Expander A to Sideplane 7	PM 0
222	16	SAS Connector for Expander B to Sideplane 0	PM 1
223	17	SAS Connector for Expander B to Sideplane 2	PM 1
224	18	SAS Connector for Expander B to Sideplane 4	PM 1
225	19	SAS Connector for Expander B to Sideplane 6	PM 1
SBB Midplane Interconnect Elements			
226	0	Enclosure Interconnect Electronics	Controller 0
227	1	Enclosure Interconnect Electronics	Controller 1
Enclosure Electronics Power Elements			
228	0	Enclosure Power Status and Control	Controller 0
229	1	Enclosure Power Status and Control	Controller 1
Enclosure Settings Elements			
230	0	Enclosure Ops Panel Settings ³	Enclosure ??
Enclosure Electronics Diagnostics Elements			
231	0	SEP Diagnostics status and Control	Controller 0
232	1	SEP Diagnostics status and Control	Controller 1
BMC Elements			
233	0	BMC	Canister Slot 0
234	1	BMC	Canister Slot 1
Sideplane Elements			
235	0	Sideplane 0 Status and Control	Sideplane 0
236	1	Sideplane 1 Status and Control	Sideplane 1
237	2	Sideplane 2 Status and Control	Sideplane 2
238	3	Sideplane 3 Status and Control	Sideplane 3
239	4	Sideplane 4 Status and Control	Sideplane 4
240	5	Sideplane 5 Status and Control	Sideplane 5
241	6	Sideplane 6 Status and Control	Sideplane 6
242	7	Sideplane 7 Status and Control	Sideplane 7
243	8	Sideplane 8 Status and Control	Sideplane 8
244	9	Sideplane 9 Status and Control	Sideplane 9
245	10	Sideplane 10 Status and Control	Sideplane 10
246	11	Sideplane 11 Status and Control	Sideplane 11

Global Element Index	Relative Element Index	Description	Associated FRU
<p>¹The ops panel buzzer is a “no fit” option on the enclosure. In the case a buzzer is not fitted, the audible alarm element will still be represented.</p> <p>²Not available on all PSUs. If the sensor is not available on a specific power supply model, the SES Page 02h element status is set to NOT INSTALLED (05h).</p> <p>³The enclosure does not support a display for the enclosure ID. However, this element is still provided to aid host side software in configuring/determining an enclosure’s position in a rack.</p> <p>⁴ 5th bit of enclosure setting element will always report as 1, indicating that ops panel is not present or not supported.</p>			

3.3 GEMNet Addresses

The *gncli* command is used to issue GEM CLI commands to the Sideplane expanders (see [4] for details). To target a specific expander, this command uses either SES expander IDs or GEMNet addresses. Table 4 shows the GEMNet/Expander Address to use to target a specific Sideplane expander.

Table 4 - gncli Expander Addresses

Expander	GEMNet Address	Expander Address
Sideplane 0 Expander	3,0,1	<i>exp:0</i>
Sideplane 1 Expander	3,0,0	<i>exp:1</i>
Sideplane 2 Expander	3,1,1	<i>exp:2</i>
Sideplane 3 Expander	3,1,0	<i>exp:3</i>
Sideplane 4 Expander	3,2,1	<i>exp:4</i>
Sideplane 5 Expander	3,2,0	<i>exp:5</i>
Sideplane 6 Expander	3,3,1	<i>exp:6</i>
Sideplane 7 Expander	3,3,0	<i>exp:7</i>
PM 0 Expander A	3,4,0	<i>exp:8</i>
PM 1 Expander A	3,4,1	<i>exp:9</i>
PM 0 Expander B	3,5,0	<i>exp:10</i>
PM 1 Expander B	3,5,1	<i>exp:11</i>

4 Diagnostic Page Layouts

4.1 Diagnostic Page 00h

Diagnostics Page 00h lists all SES pages supported by the SEP. The page 00h response reported by the documented product is shown in Table 5.

Table 5 - Diagnostic Page 00h Layout

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (00h)							
1	Reserved							
2	(MSB)	PAGE LENGTH (13)						(LSB)
3								
4	SUPPORTED PAGE LIST							
15	(00 01 02 03 05 07 0A 84 85 90 91 92 93 h)							

4.2 SES Page 01h

SES Page 01h provides information on enclosure identification and element layout in SES pages 02h, 05h, 07h and 92h. Table 6 covers the layout of Page 01h for the enclosure documented within this addendum.

Table 6 - SES Page 01h Layout

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (01h)							
1	NUMBER OF SECONDARY SUBENCLOSURES (00h)							
2	(MSB)	PAGE LENGTH (255)						(LSB)
3								
4	(MSB)	GENERATION CODE						(LSB)
7								
Enclosure Descriptor List ¹								
8	RSVD	RELATIVE ENCLOSURE SERVICES PROCESS ID			RSVD	NUMBER OF ENCLOSURE SERVICES PROCESSES (2h)		
9	SUBENCLOSURE IDENTIFIER (00h)							
10	NUMBER OF TYPE DESCRIPTOR HEADERS (12h)							
11	ENCLOSURE DESCRIPTOR LENGTH (60)n							
12	(MSB)	ENCLOSURE LOGICAL IDENTIFIER						(LSB)
19	(Determined by Midplane VPD)							
20	(MSB)	ENCLOSURE VENDOR IDENTIFICATION ("SEAGATE ")						(LSB)
27								

Bit Byte	7	6	5	4	3	2	1	0
28	(MSB)	PRODUCT IDENTIFICATION ("SP-34100")						(LSB)
43								(LSB)
44	(MSB)	PRODUCT REVISION LEVEL (Determined by GEM firmware version)						(LSB)
47								(LSB)
48	(MSB)	ENCLOSURE SERIAL NUMBER (Determined by Midplane VPD)						(LSB)
62								(LSB)
63		ENCLOSURE CONFIGURATION SETTINGS (00h)						
64	(MSB)	ENCLOSURE ID (Determined by value of enclosure shelf ID)						(LSB)
66								(LSB)
67		Reserved						
70								
71		ENCLOSURE OPTIONAL SETTINGS (00h)						
Type Descriptor Header List ²								
72	(MSB)	Array Device Descriptor (17 64 00 00 h)						(LSB)
75								(LSB)
76	(MSB)	Power Supply Descriptor (02 04 00 00 h)						(LSB)
79								(LSB)
80	(MSB)	Cooling Descriptor (03 0C 00 00 h)						(LSB)
83								(LSB)
84	(MSB)	Temperature Sensor Descriptor (04 36 00 00 h)						(LSB)
87								(LSB)
88	(MSB)	Door Lock Sensor Descriptor (05 02 00 00 h)						(LSB)
91								(LSB)
92	(MSB)	Audible Alarm Descriptor (06 01 00 00 h)						(LSB)
95								(LSB)
96	(MSB)	Enclosure Services Controller Electronics Descriptor (07 02 00 00 h)						(LSB)
99								(LSB)
100	(MSB)	Enclosure Descriptor (0E 01 00 00 h)						(LSB)
103								(LSB)
104	(MSB)	Voltage Sensor Descriptor (12 08 00 00 h)						(LSB)
107								(LSB)
108	(MSB)	Current Sensor Descriptor (13 08 00 00 h)						(LSB)
111								(LSB)
112	(MSB)	SAS Expander Descriptor (18 0E 00 00 h)						(LSB)
115								(LSB)
116	(MSB)	SAS Connector Descriptor (19 14 00 00 h)						(LSB)
119								(LSB)
120	(MSB)	SBB Midplane Interconnect Descriptor (86 02 00 19 h)						(LSB)
123								(LSB)
124	(MSB)	Enclosure Electronics Power Descriptor (89 02 00 1B h)						(LSB)

Bit Byte	7	6	5	4	3	2	1	0
127								(LSB)
128	(MSB)	Enclosure Settings Descriptor (8A 01 00 12 h)						
131								(LSB)
132	(MSB)	Enclosure Electronics Diagnostics Descriptor (8B 02 00 21 h)						
135								(LSB)
136	(MSB)	Sideplane Descriptor (90 0C 00 09 h)						
139								(LSB)
140	(MSB)	BMC Descriptor (8C 02 00 03 h)						
143								(LSB)
Type Descriptor Text List ³								
144	(MSB)	SBB Midplane Interconnect Text Descriptor ("SBB Midplane Interconnect")						
168								(LSB)
169	(MSB)	Enclosure Electronics Power Text Descriptor ("Enclosure Electronics Power")						
195								(LSB)
196	(MSB)	Enclosure Settings Text Descriptor ("Enclosure Settings")						
213								(LSB)
214	(MSB)	Enclosure Electronics Diagnostics Text Descriptor ("Enclosure Electronics Diagnostics")						
246								(LSB)
247	(MSB)	Sideplane Text Descriptor ("Sideplane")						
255								(LSB)
256	(MSB)	BMC Text Descriptor ("BMC")						
258								(LSB)
¹ See sections 6.2.1 – 6.2.3 in [3] for further details ² See section 6.2.4 in [3] for further details on the element descriptor format ³ See section 6.2.5 in [3] for further details								

4.3 SES Page 02h and Page 05h Layout

SES Page 02h and SES Page 05h both conform to the same overall page layout, with 4-byte elements listed in the same order as defined by SES Page 01h. As such, both page structures are defined in Table 7.

Table 7 - SES Page 02h and SES Page 05h Layout

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (02h/05h)							
1	SHORT STATUS ¹ (Page 02h) / Reserved (Page 05h)							
2	(MSB)	PAGE LENGTH (1064)						(LSB)
3								
4	(MSB)	GENERATION CODE						(LSB)
7								
Status Descriptor List ² (Page 02h) / Threshold Descriptor List ³ (Page 05h)								
8	(MSB)	Array Device Overall Element Descriptor						(LSB)
11								
12	(MSB)	Array Device Element 0 Descriptor						(LSB)
15								
...								
408	(MSB)	Array Device Element 99 Descriptor						(LSB)
411								
412	(MSB)	Power Supply Overall Element Descriptor						(LSB)
415								
416	(MSB)	Power Supply Element 0 Descriptor						(LSB)
419								
...								
428	(MSB)	Power Supply Element 3 Descriptor						(LSB)
431								
432	(MSB)	Cooling Overall Element Descriptor						(LSB)
435								
436	(MSB)	Cooling Element 0 Descriptor						(LSB)
439								
...								
480	(MSB)	Cooling Element 11 Descriptor						(LSB)
483								
484	(MSB)	Temperature Sensor Overall Element Descriptor						(LSB)
487								
488	(MSB)	Temperature Sensor Element 0 Descriptor						(LSB)
491								
...								
700	(MSB)	Temperature Sensor Element 53 Descriptor						(LSB)

Bit Byte	7	6	5	4	3	2	1	0	
703								(LSB)	
704	(MSB)	Door Lock Sensor Overall Element Descriptor							
707								(LSB)	
708	(MSB)	Door Lock Sensor Element 0 Descriptor							
711								(LSB)	
712	(MSB)	Door Lock Sensor Element 1 Descriptor							
715								(LSB)	
716	(MSB)	Audible Alarm Overall Element Descriptor							
719								(LSB)	
720	(MSB)	Audible Alarm Element 0 Descriptor							
723								(LSB)	
724	(MSB)	Enclosure Services Controller Electronics Overall Element Descriptor							
727								(LSB)	
728	(MSB)	Enclosure Services Controller Electronics Element 0 Descriptor							
731								(LSB)	
732	(MSB)	Enclosure Services Controller Electronics Element 1 Descriptor							
735								(LSB)	
736	(MSB)	Enclosure Overall Element Descriptor							
739								(LSB)	
740	(MSB)	Enclosure Element 0 Descriptor							
743								(LSB)	
744	(MSB)	Voltage Sensor Overall Element Descriptor							
747								(LSB)	
748	(MSB)	Voltage Sensor Element 0 Descriptor							
751								(LSB)	
		...							
776	(MSB)	Voltage Sensor Element 7 Descriptor							
779								(LSB)	
780	(MSB)	Current Sensor Overall Element Status Descriptor							
783								(LSB)	
784	(MSB)	Current Sensor Element 0 Descriptor							
787								(LSB)	
		...							
812	(MSB)	Current Sensor Element 7 Descriptor							
815								(LSB)	
816	(MSB)	SAS Expander Overall Element Descriptor							
819								(LSB)	
820	(MSB)	SAS Expander Element 0 Descriptor							
823								(LSB)	

Bit Byte	7	6	5	4	3	2	1	0	
	...								
872	(MSB)	SAS Expander Element 13 Descriptor							
875									(LSB)
876	(MSB)	SAS Connector Overall Element Descriptor							
879									(LSB)
880	(MSB)	SAS Connector Element 0 Descriptor							
883									(LSB)
	...								
956	(MSB)	SAS Connector Element 19 Descriptor							
959									(LSB)
960	(MSB)	SBB Midplane Interconnect Overall Element Descriptor							
963									(LSB)
964	(MSB)	SBB Midplane Interconnect Element 0 Descriptor							
967									(LSB)
968	(MSB)	SBB Midplane Interconnect Element 1 Descriptor							
971									(LSB)
972	(MSB)	Enclosure Electronics Power Overall Element Descriptor							
975									(LSB)
976	(MSB)	Enclosure Electronics Power Element 0 Descriptor							
979									(LSB)
980	(MSB)	Enclosure Electronics Power Element 1 Descriptor							
983									(LSB)
984	(MSB)	Enclosure Settings Overall Element Descriptor							
987									(LSB)
988	(MSB)	Enclosure Settings Element 0 Descriptor							
991									(LSB)
992	(MSB)	Enclosure Electronics Diagnostics Overall Element Descriptor							
995									(LSB)
996	(MSB)	Enclosure Electronics Diagnostics Element 0 Descriptor							
999									(LSB)
1000	(MSB)	Enclosure Electronics Diagnostics Element 1 Descriptor							
1003									(LSB)
1004	(MSB)	BMC Overall Element Descriptor							
1007									(LSB)
1008	(MSB)	BMC Element 0 Descriptor							
1011									(LSB)
1012	(MSB)	BMC Element 1 Descriptor							
1015									(LSB)
1016	(MSB)	Sideplane Overall Element Descriptor							
1019									(LSB)

Bit Byte	7	6	5	4	3	2	1	0
1020	(MSB) _____ Sideplane Element 0 Descriptor _____ (LSB)							
1023								
	...							
1064	(MSB) _____ Sideplane Element 11 Descriptor _____ (LSB)							
1067								
¹ See section 6.3.2.1 in [3] for details on the SHORT STATUS format ² See section 7 of [3] for status descriptor format details for each element type ³ See [3] for threshold descriptor format details								

4.3.1 SES Page 05h Threshold Support

Not all SES element types support SES Page 05h threshold status or control descriptors. Where an element does not support a threshold descriptor, it shall set its status descriptor to all zeros, i.e., [00 00 00 00 h]. Table 8 shows which element types are expected to support a threshold.

Table 8 - Threshold Descriptor Support

Element Type	Threshold Descriptor Support
Array Device	No
Power Supply	No
Cooling Element	No
Temperature Sensor	Yes
Door Lock Sensor	No
Audible Alarm	No
Enclosure Services Controller Electronics	No
Enclosure	No
Voltage Sensor	No
Current Sensor	No
SAS Expander	No
SAS Connector	No
SBB Midplane Interconnect	No
Enclosure Electronics Power	No
Enclosure Settings	No
Enclosure Electronics Diagnostics	No
Sideplane	No
BMC	No
All Overall Elements	No

4.4 SES Page 07h Layout

Table 9 shows the page 07h layout implemented by the documented product.

GEM uses SES Page 07h to report version and serialization information for each of the enclosure FRUs. It may also provide supplemental information with regards to physical element location within the enclosure. Not all elements provide a descriptor string. Where this is the case, 00h will be reported for the descriptor length.

Please note the example below provides a typical representation of the page output. To allow for variation in output, it is recommended that any client should fully parse the page content and not rely on fixed offsets. For example, the temperature sensor element descriptors will only be reported if the associated FRU is present. The descriptor headers will always be present and report a non-zero value if there is data available to read and parse.

Table 9 - SES Page 07h Layout

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (07h)							
1	Reserved							
2	(MSB)	PAGE LENGTH (variable length n-3)						(LSB)
3								
4	(MSB)	GENERATION CODE						(LSB)
7								
Element Descriptor List								
8	(MSB)	Array Device Overall Element Descriptor (00 00 00 00 h)						(LSB)
11								
12	(MSB)	Array Device Element 0 Descriptor (00 00 00 00 h)						(LSB)
15								
...								
408	(MSB)	Array Device Element 99 Descriptor (00 00 00 00 h)						(LSB)
411								
412	(MSB)	Power Supply Overall Element Descriptor (00 00 00 00 h)						(LSB)
415								
416	(MSB)	Power Supply Element 0 Descriptor (00 00 00 4d h)						(LSB)
496	77 bytes of descriptor data ¹							
...								
659	(MSB)	Power Supply Element 3 Descriptor (00 00 00 4d h)						(LSB)
739	77 bytes of descriptor data ¹							
740	(MSB)	Cooling Overall Element Descriptor (00 00 00 00 h)						(LSB)
743								
744	(MSB)	Cooling Element 0 Descriptor (00 00 00 5b h)						(LSB)
838	91 bytes of descriptor data ¹							
...								
1789	(MSB)	Cooling Element 11 Descriptor						(LSB)

Bit Byte	7	6	5	4	3	2	1	0
1883	(00 00 00 5b h) 91 bytes of descriptor data ¹							(LSB)
1884	Temperature Sensor Overall Element Descriptor							
1887	(00 00 00 00 h)							(LSB)
1888	(MSB)	Temperature Sensor Element 0 Descriptor						
1947	(00 00 00 38 h) 56 bytes of descriptor data ¹							(LSB)
	...							
5008	(MSB)	Temperature Sensor Element 53 Descriptor						
5067	(00 00 00 38 h) 56 bytes of descriptor data ¹							(LSB)
5068	(MSB)	Door Lock Sensor Overall Element Descriptor						
5071	(00 00 00 00 h)							(LSB)
5072	(MSB)	Door Lock Sensor Element 0 Descriptor						
5075	(00 00 00 00 h)							(LSB)
5076	(MSB)	Door Lock Sensor Element 1 Descriptor						
5079	(00 00 00 00 h)							(LSB)
5080	(MSB)	Audible Alarm Overall Element Descriptor						
5083	(00 00 00 00 h)							(LSB)
5084	(MSB)	Audible Alarm Element 0 Descriptor						
5087	(00 00 00 00 h)							(LSB)
5088	(MSB)	Enclosure Services Controller Electronics Overall Element Descriptor						
5091	(00 00 00 00 h)							(LSB)
5092	(MSB)	Enclosure Services Controller Electronics Element 0 Descriptor						
5221	(00 00 00 7E h) 126 bytes of descriptor data ¹							(LSB)
5222	(MSB)	Enclosure Services Controller Electronics Element 1 Descriptor						
5351	(00 00 00 7E h) 126 bytes of descriptor data ¹							(LSB)
5352	(MSB)	Enclosure Overall Element Descriptor						
5355	(00 00 00 00 h)							(LSB)
5356	(MSB)	Enclosure Element 0 Descriptor						
4532	(00 00 00 49 h) 73 bytes of descriptor data ¹							(LSB)
5433	Voltage Sensor Overall Element Descriptor (00 00 00 00 h)							
5436	(00 00 00 00 h)							(LSB)
5437	(MSB)	Voltage Sensor Element 0 Descriptor						
5496	(00 00 00 38 h) 56 bytes of descriptor data ¹							(LSB)
	...							
5857	(MSB)	Voltage Sensor Element 7 Descriptor						
5916	(00 00 00 38 h) 56 bytes of descriptor data ¹							(LSB)
5917	(MSB)	Current Sensor Overall Element Status Descriptor						
5920	(00 00 00 00 h)							(LSB)
5921	(MSB)	Current Sensor Element 0 Descriptor						
5980	(00 00 00 38 h) 56 bytes of descriptor data ¹							(LSB)

Bit Byte	7	6	5	4	3	2	1	0	
	...								
6341	(MSB)	Current Sensor Element 7 Descriptor (00 00 00 38 h)							
6400		56 bytes of descriptor data ¹							(LSB)
6401	(MSB)	SAS Expander Overall Element Descriptor (00 00 00 00 h)							
6404		SAS Expander Element 0 Descriptor (00 00 00 8C h)							(LSB)
6405	(MSB)	SAS Expander Element 0 Descriptor (00 00 00 8C h)							
6548		140 bytes of descriptor data ¹							(LSB)
	...								
8277	(MSB)	SAS Expander Element 13 Descriptor (00 00 00 8C h)							
8420		140 bytes of descriptor data ¹							(LSB)
8421	(MSB)	SAS Connector Overall Element Descriptor (00 00 00 00 h)							
8424		SAS Connector Element 0 Descriptor (00 00 00 14 h)							(LSB)
8425	(MSB)	SAS Connector Element 0 Descriptor (00 00 00 14 h)							
8449		20 bytes of descriptor data ¹							(LSB)
	...								
8991	(MSB)	SAS Connector Element 19 Descriptor (00 00 00 14 h)							
9004		20 bytes of descriptor data ¹							(LSB)
9005	(MSB)	SBB Midplane Interconnect Overall Element Descriptor (00 00 00 00 h)							
9008		SBB Midplane Interconnect Element 0 Descriptor (00 00 00 00 h)							(LSB)
9009	(MSB)	SBB Midplane Interconnect Element 0 Descriptor (00 00 00 00 h)							
9012		SBB Midplane Interconnect Element1 Descriptor (00 00 00 00 h)							(LSB)
9013	(MSB)	SBB Midplane Interconnect Element1 Descriptor (00 00 00 00 h)							
9016		Enclosure Electronics Power Overall Element Descriptor (00 00 00 00 h)							(LSB)
9017	(MSB)	Enclosure Electronics Power Overall Element Descriptor (00 00 00 00 h)							
9020		Enclosure Electronics Power Element 0 Descriptor (00 00 00 00 h)							(LSB)
9021	(MSB)	Enclosure Electronics Power Element 0 Descriptor (00 00 00 00 h)							
9024		Enclosure Electronics Power Element1 Descriptor (00 00 00 00 h)							(LSB)
9025	(MSB)	Enclosure Electronics Power Element1 Descriptor (00 00 00 00 h)							
9028		Enclosure Settings Overall Element Descriptor (00 00 00 00 h)							(LSB)
9029	(MSB)	Enclosure Settings Overall Element Descriptor (00 00 00 00 h)							
9032		Enclosure Settings Element 0 Descriptor (00 00 00 00 h)							(LSB)
9033	(MSB)	Enclosure Settings Element 0 Descriptor (00 00 00 00 h)							
9036		Enclosure Electronics Diagnostics Overall Element Descriptor (00 00 00 00 h)							(LSB)
9037	(MSB)	Enclosure Electronics Diagnostics Overall Element Descriptor (00 00 00 00 h)							
9040		Enclosure Electronics Diagnostics Element 0 Descriptor (00 00 00 00 h)							(LSB)
9041	(MSB)	Enclosure Electronics Diagnostics Element 0 Descriptor (00 00 00 00 h)							
9044		Enclosure Electronics Diagnostics Element1 Descriptor (00 00 00 00 h)							(LSB)
9045	(MSB)	Enclosure Electronics Diagnostics Element1 Descriptor (00 00 00 00 h)							
9048		Enclosure Electronics Diagnostics Element1 Descriptor (00 00 00 00 h)							(LSB)

Bit Byte	7	6	5	4	3	2	1	0	
9049	(MSB)	BMC Overall Element Descriptor							
9052		(00 00 00 00 h)							(LSB)
9053	(MSB)	BMC Element 0 Descriptor							
9157		(00 00 00 65 h)							
		101 bytes of descriptor data							(LSB)
9158	(MSB)	BMC Element 1 Descriptor							
9262		(00 00 00 65 h)							
		101 bytes of descriptor data							(LSB)
9263	(MSB)	Sideplane Overall Element Descriptor							
9266		(00 00 00 00 h)							(LSB)
9267	(MSB)	Sideplane Element 0 Descriptor							
9270		(00 00 00 00 h)							(LSB)
		...							
9311	(MSB)	Sideplane Element 11 Descriptor							
9314		(00 00 00 00 h)							(LSB)
¹ See section 4.4.1 for descriptor string format									

4.4.1 Page 07h Descriptor Strings

The descriptor string formats used by each element that supports them are shown in Table 14. Note that the string formats may be subject to change over time as new FRUs are supported by the enclosure or additional information becomes available. Refer to [3] for full details on descriptor string decoding.

Table 14 - FRU Descriptor string formats

Element Type	Descriptor String
Power Supply	TP=XX;SN=XXXXXXXXXXXXXXXXXX;F1=XXXX;F2=XXXX;VR=XX;VC=XXXXXXXX;PN=XXXXXX XXXXX;
Cooling	TP=XX;SN=XXXXXXXXXXXXXXXXXX;CF=XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX; CC=XXXXXXXXXXXX;PN=XXXXXXXXXX;
Temperature Sensor	NM=XXXXXXXXXXXXXXXXXXXXXXXXXXXX;LO=XXXXXXXXXXXXXXXXXX;
Enclosure Services Controller Electronics	TP=XX;SN=XXXXXXXXXXXXXXXXXX;F1=XXXX;BL=XXXX;VR=XX;VC=XXXXXXXX;CR=XXXX; FR=XX;FC=XXXXXXXX;PN=XXXXXXXXXX;FF1=XXXXXXXX;PC=XXXXXXXX;
Enclosure	SN=XXXXXXXXXXXXXXXXXX;VR=XX;VC=XXXXXXXX;CR=XXXX;PN=XXXXXXXXXX;CM=XX;T P=XX;
Voltage Sensor	NM=XXXXXXXXXXXXXXXXXXXXXXXXXXXX;LO=XXXXXXXXXXXXXXXXXX;
Current Sensor	NM=XXXXXXXXXXXXXXXXXXXXXXXXXXXX;LO=XXXXXXXXXXXXXXXXXX;
SAS Expander	BL=XXXX;FC=XXXXXXXX;VR=XX;VC=XXXXXXXX;CR=XXXX;PC=XXXXXXXX;F1=XXXX;F F1=XXXXXXXX;SN=XXXXXXXXXXXXXXXXXX;PN=XXXXXXXXXX;TP=XX;BR=XX;BC=XXXXXX XX;
SAS Connector	WN=XXXXXXXXXXXXXXXXXX;
BMC	SN=XXXXXXXXXXXXXXXXXX;FXXXX;F1=XXXX;F2=XXXX;F3=XXXX;PN=XXXXXXXXXX;GD= XXXXXXXXXXXXXXXXXXXXXXXXXXXX;

4.5 SES Page 0Ah Layout

On the Exos AP 34100 enclosure, Page 0Ah is configured to report expander and drive descriptor for both enclosure data paths. This results in the same page data being reported regardless of which controller SES target is queried.

4.5.1 SES Page 0Ah Layout

Table 15 - SES Page 0Ah Layout

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (0Ah)							
1	Reserved							
2	(MSB)	PAGE LENGTH (7560)						(LSB)
3								
4	(MSB)	GENERATION CODE						(LSB)
7								
Device Slot 0 Additional Status Descriptor								
8	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
9	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (34)							
10	Reserved							EIOE (0)
11	ELEMENT INDEX (0)							
12	NUM OF DEVICE PHY DESCRIPTORS (1)							
13	DESC TYPE (0)	Reserved						NOT ALL PHYS (1)
14	Reserved							
15	DEVICE SLOT NUMBER (0)							
16	(MSB)	Phy Descriptor for Device 0 (Slot 0 phy)						(LSB)
43								
44	(MSB)	Phy Descriptor for Device 0 (Slot 1 phy)						(LSB)
71								
...								
Device Slot 99 Additional Status Descriptor								
6344	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
6345	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (34)							
6346	Reserved							EIOE (0)
6347	ELEMENT INDEX (99)							
6348	NUM OF DEVICE PHY DESCRIPTORS (1)							
6349	DESC TYPE (0)	Reserved						NOT ALL PHYS (1)
6350	Reserved							
6351	DEVICE SLOT NUMBER (99)							
6352	(MSB)	Phy Descriptor for Device 99 (Slot 0 phy)						(LSB)
6379								

Bit Byte	7	6	5	4	3	2	1	0
6380	(MSB) _____							
6407	Phy Descriptor for Device 99 (Slot 1 phy) _____ (LSB)							
Enclosure Electronics Element 0 Status Descriptor								
6408	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
6409	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (18)							
6410	Reserved							EIOE (0)
6411	ELEMENT INDEX (173)							
6412	NUM OF EXPANDER PHY DESCRIPTORS (1)							
6413	DESC TYPE (1)	Reserved						
6414	Reserved							
6415	Reserved							
6416	(MSB) _____							
6431	Phy Descriptor for Device 0 _____ (LSB)							
Enclosure Electronics Element 1 Status Descriptor								
6432	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
6433	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (18)							
6434	Reserved							EIOE (0)
6435	ELEMENT INDEX (174)							
6436	NUM OF EXPANDER PHY DESCRIPTORS (1)							
6437	DESC TYPE (1)	Reserved						
6438	Reserved							
6439	Reserved							
6440	(MSB) _____							
6451	Phy Descriptor for Device 1 _____ (LSB)							
Expander 0 Additional Status Descriptor								
6452	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
6453	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)							
6454	Reserved							EIOE (0)
6455	ELEMENT INDEX (192)							
6456	NUM OF EXPANDER PHY DESCRIPTORS (36)							
6457	DESC TYPE (1)	Reserved						
6458	Reserved							
6459	Reserved							
6460	(MSB) _____							
6467	EXPANDER SAS ADDRESS _____ (LSB)							
6468	(MSB) _____							
6469	Phy Descriptor 0 for Expander 0 (Sideplane 0) _____ (LSB)							
	...							

Bit Byte	7	6	5	4	3	2	1	0	
6538	(MSB)	Phy Descriptor 35 for Expander 0 (Sideplane 0)							
6539								(LSB)	
Expander 1 Additional Status Descriptor									
6540	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)					
6541	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)								
6542	Reserved						EII OE (0)		
6543	ELEMENT INDEX (193)								
6544	NUM OF EXPANDER PHY DESCRIPTORS (36)								
6545	DESC TYPE (1)	Reserved							
6546	Reserved								
6547	Reserved								
6548	(MSB)	EXPANDER SAS ADDRESS							
6555								(LSB)	
6556	(MSB)	Phy Descriptor 0 for Expander 1 (Sideplane 1)							
6557								(LSB)	
	...								
6626	(MSB)	Phy Descriptor 35 for Expander 1 (Sideplane 1)							
6627								(LSB)	
Expander 2 Additional Status Descriptor									
6628	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)					
6629	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)								
6670	Reserved						EII OE (0)		
6671	ELEMENT INDEX (194)								
6672	NUM OF EXPANDER PHY DESCRIPTORS (36)								
6673	DESC TYPE (1)	Reserved							
6674	Reserved								
6675	Reserved								
6676	(MSB)	EXPANDER SAS ADDRESS							
6683								(LSB)	
6684	(MSB)	Phy Descriptor 0 for Expander 2 (Sideplane 2)							
6685								(LSB)	
	...								
6754	(MSB)	Phy Descriptor 35 for Expander 2 (Sideplane 2)							
6755								(LSB)	
Expander 3 Additional Status Descriptor									
6756	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)					
6757	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)								
6758	Reserved						EII OE (0)		

Bit Byte	7	6	5	4	3	2	1	0
6759	ELEMENT INDEX (195)							
6760	NUM OF EXPANDER PHY DESCRIPTORS (36)							
6761	DESC TYPE (1)		Reserved					
6762	Reserved							
6763	Reserved							
6764	(MSB)	EXPANDER SAS ADDRESS						(LSB)
6771	(LSB)							
6772	(MSB)	Phy Descriptor 0 for Expander 3 (Sideplane 3)						(LSB)
6773	(LSB)							
	...							
6842	(MSB)	Phy Descriptor 35 for Expander 3 (Sideplane 3)						(LSB)
6843	(LSB)							
Expander 4 Additional Status Descriptor								
6844	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
6845	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)							
6846	Reserved							EII OE (0)
6847	ELEMENT INDEX (196)							
6848	NUM OF EXPANDER PHY DESCRIPTORS (36)							
6849	DESC TYPE (1)		Reserved					
6850	Reserved							
6851	Reserved							
6852	(MSB)	EXPANDER SAS ADDRESS						(LSB)
6859	(LSB)							
6860	(MSB)	Phy Descriptor 0 for Expander 4 (Sideplane 4)						(LSB)
6861	(LSB)							
	...							
6930	(MSB)	Phy Descriptor 35 for Expander 4 (Sideplane 4)						(LSB)
6931	(LSB)							
Expander 5 Additional Status Descriptor								
6932	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
6933	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)							
6934	Reserved							EII OE (0)
6935	ELEMENT INDEX (197)							
6936	NUM OF EXPANDER PHY DESCRIPTORS (36)							
6937	DESC TYPE (1)		Reserved					
6938	Reserved							
6939	Reserved							
6940	(MSB)	EXPANDER SAS ADDRESS						(LSB)

Bit Byte	7	6	5	4	3	2	1	0	
6947	(LSB)								
6948	(MSB)	Phy Descriptor 0 for Expander 5 (Sideplane 5)							
6949	(LSB)								
	...								
7018	(MSB)	Phy Descriptor 35 for Expander 5 (Sideplane 5)							
7019	(LSB)								
Expander 6 Additional Status Descriptor									
7020	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)					
7021	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)								
7022	Reserved							EIOE (0)	
7023	ELEMENT INDEX (198)								
7024	NUM OF EXPANDER PHY DESCRIPTORS (36)								
7025	DESC TYPE (1)	Reserved							
7026	Reserved								
7027	Reserved								
7028	(MSB)	EXPANDER SAS ADDRESS							
7035	(LSB)								
7036	(MSB)	Phy Descriptor 0 for Expander 6 (Sideplane 6)							
7037	(LSB)								
	...								
7106	(MSB)	Phy Descriptor 35 for Expander 6 (Sideplane 6)							
7107	(LSB)								
Expander 7 Additional Status Descriptor									
7108	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)					
7109	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)								
7110	Reserved							EIOE (0)	
7111	ELEMENT INDEX (199)								
7112	NUM OF EXPANDER PHY DESCRIPTORS (36)								
7113	DESC TYPE (1)	Reserved							
7114	Reserved								
7115	Reserved								
7116	(MSB)	EXPANDER SAS ADDRESS							
7113	(LSB)								
7114	(MSB)	Phy Descriptor 0 for Expander 7 (Sideplane 7)							
7115	(LSB)								
	...								
7184	(MSB)	Phy Descriptor 35 for Expander 7 (Sideplane 7)							
7185	(LSB)								

Bit Byte	7	6	5	4	3	2	1	0
Expander 8 Additional Status Descriptor								
7186	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
7187	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)							
7188	Reserved							EIIOE (0)
7189	ELEMENT INDEX (200)							
7190	NUM OF EXPANDER PHY DESCRIPTORS (36)							
7191	DESC TYPE (1)	Reserved						
7192	Reserved							
7193	Reserved							
7194	(MSB)	EXPANDER SAS ADDRESS						(LSB)
7199								
7200	(MSB)	Phy Descriptor 0 for Expander 8 (Expander B)						(LSB)
7201								
	...							
7270	(MSB)	Phy Descriptor 35 for Expander 8 (Expander B)						(LSB)
7271								
Expander 9 Additional Status Descriptor								
7272	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
7273	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)							
7274	Reserved							EIIOE (0)
7275	ELEMENT INDEX (201)							
7276	NUM OF EXPANDER PHY DESCRIPTORS (36)							
7277	DESC TYPE (1)	Reserved						
7278	Reserved							
7279	Reserved							
7280	(MSB)	EXPANDER SAS ADDRESS						(LSB)
7287								
7288	(MSB)	Phy Descriptor 0 for Expander 9 (Expander A)						(LSB)
7289								
	...							
7358	(MSB)	Phy Descriptor 35 for Expander 9 (Expander A)						(LSB)
7359								
Expander 10 Additional Status Descriptor								
7360	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
7361	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)							
7362	Reserved							EIIOE (0)
7363	ELEMENT INDEX (202)							
7364	NUM OF EXPANDER PHY DESCRIPTORS (36)							

Bit Byte	7	6	5	4	3	2	1	0
7365	DESC TYPE (1)		Reserved					
7366	Reserved							
7367	Reserved							
7368	(MSB)	EXPANDER SAS ADDRESS						(LSB)
7375	(LSB)							
7376	(MSB)	Phy Descriptor 0 for Expander 10 (Expander A)						(LSB)
7377	(LSB)							
	...							
7446	(MSB)	Phy Descriptor 35 for Expander 10 (Expander A)						(LSB)
7447	(LSB)							
Expander 11 Additional Status Descriptor								
7448	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
7449	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (86)							
7450	Reserved							EII OE (0)
7451	ELEMENT INDEX (203)							
7452	NUM OF EXPANDER PHY DESCRIPTORS (36)							
7453	DESC TYPE (1)		Reserved					
7454	Reserved							
7455	Reserved							
7456	(MSB)	EXPANDER SAS ADDRESS						(LSB)
7463	(LSB)							
7464	(MSB)	Phy Descriptor 0 for Expander 11 (Expander A)						(LSB)
7465	(LSB)							
	...							
7534	(MSB)	Phy Descriptor 35 for Expander 11 (Expander A)						(LSB)
7535	(LSB)							
Expander 12 Additional Status Descriptor								
7536	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				
7537	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (14)							
7538	Reserved							EII OE (0)
7539	ELEMENT INDEX (204)							
7540	NUM OF EXPANDER PHY DESCRIPTORS (0)							
7541	DESC TYPE (1)		Reserved					
7542	Reserved							
7543	Reserved							
7544	(MSB)	EXPANDER SAS ADDRESS						(LSB)
7551	(LSB)							
Expander 13 Additional Status Descriptor								
7552	INVALID	Reserved	EIP (1)	PROTOCOL IDENTIFIER (6)				

Bit Byte	7	6	5	4	3	2	1	0
7553	ADDITIONAL ELEMENT STATUS DESCRIPTOR LENGTH (14)							
7554	Reserved							EIIOE (0)
7555	ELEMENT INDEX (205)							
7556	NUM OF EXPANDER PHY DESCRIPTORS (0)							
7557	DESC TYPE (1)	Reserved						
7558	Reserved							
7559	Reserved							
7560	(MSB)	EXPANDER SAS ADDRESS						(LSB)
7567								

4.6 Vendor Unique Page 91h Layout

Vendor unique page 91h is used to report enclosure statistics counters. The layouts of the control and status pages are identical, however, the bit definitions within the descriptors vary (see [3] for details). Table 10 covers the basic layout of page 91h for the documented product.

Table 10 - SES Page 91h Layout

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (91h)							
1	Reserved							
2	(MSB)	PAGE LENGTH (8820)						(LSB)
3								
4	(MSB)	GENERATION CODE						(LSB)
7								
Expander 0 Phy Statistics Descriptor								
8	ELEMENT TYPE CODE (18h)							
9	TYPE RELATIVE INDEX (0)							
10	DESCRIPTOR FORMAT REVISION (01h)							
11	NUMBER OF PHY STATISTICS DESCRIPTORS (36)							
12	PHY STATISTICS DESCRIPTOR LENGTH (28)							
13	(MSB)	EXPANDER CHANGE COUNT						(LSB)
14								
15	Reserved							
16	(MSB)	Phy 0 Statistics Descriptor ¹						(LSB)
43								
...								
996	(MSB)	Phy 35 Statistics Descriptor ¹						(LSB)
1023								
Expander 1 Phy Statistics Descriptor								

Bit Byte	7	6	5	4	3	2	1	0
1024	ELEMENT TYPE CODE (18h)							
1025	TYPE RELATIVE INDEX (1)							
1026	DESCRIPTOR FORMAT REVISION (01h)							
1027	NUMBER OF PHY STATISTICS DESCRIPTORS (36)							
1028	PHY STATISTICS DESCRIPTOR LENGTH (28)							
1029	(MSB)	EXPANDER CHANGE COUNT						(LSB)
1030								
1031	Reserved							
1032	(MSB)	Phy 0 Statistics Descriptor ¹						(LSB)
1059								
	...							
1676	(MSB)	Phy 35 Statistics Descriptor ¹						(LSB)
1703								
	Expander 2 Phy Statistics Descriptor							
1704	ELEMENT TYPE CODE (18h)							
1705	TYPE RELATIVE INDEX (2)							
1706	DESCRIPTOR FORMAT REVISION (01h)							
1707	NUMBER OF PHY STATISTICS DESCRIPTORS (36)							
1708	PHY STATISTICS DESCRIPTOR LENGTH (28)							
1709	(MSB)	EXPANDER CHANGE COUNT						(LSB)
1710								
1711	Reserved							
1712	(MSB)	Phy 0 Statistics Descriptor ¹						(LSB)
1739								
	...							
2692	(MSB)	Phy 35 Statistics Descriptor ¹						(LSB)
2719								
	Expander 3 Phy Statistics Descriptor							
2720	ELEMENT TYPE CODE (18h)							
2721	TYPE RELATIVE INDEX (3)							
2722	DESCRIPTOR FORMAT REVISION (01h)							
2723	NUMBER OF PHY STATISTICS DESCRIPTORS (36)							
2724	PHY STATISTICS DESCRIPTOR LENGTH (28)							
2725	(MSB)	EXPANDER CHANGE COUNT						(LSB)
2726								
2727	Reserved							
2728	(MSB)	Phy 0 Statistics Descriptor ¹						(LSB)
2756								

Bit Byte	7	6	5	4	3	2	1	0	
	...								
3372	(MSB)	Phy 35 Statistics Descriptor ¹							
3399									(LSB)
	Expander 4 Phy Statistics Descriptor								
3400	ELEMENT TYPE CODE (18h)								
3401	TYPE RELATIVE INDEX (4)								
3402	DESCRIPTOR FORMAT REVISION (01h)								
3403	NUMBER OF PHY STATISTICS DESCRIPTORS (36)								
3404	PHY STATISTICS DESCRIPTOR LENGTH (28)								
3405	(MSB)	EXPANDER CHANGE COUNT							
3406									(LSB)
3407	Reserved								
3408	(MSB)	Phy 0 Statistics Descriptor ¹							
3435									(LSB)
	...								
3388	(MSB)	Phy 35 Statistics Descriptor ¹							
4415									(LSB)
	Expander 5 Phy Statistics Descriptor								
4416	ELEMENT TYPE CODE (18h)								
4417	TYPE RELATIVE INDEX (5)								
4418	DESCRIPTOR FORMAT REVISION (01h)								
4419	NUMBER OF PHY STATISTICS DESCRIPTORS (36)								
4420	PHY STATISTICS DESCRIPTOR LENGTH (28)								
4421	(MSB)	EXPANDER CHANGE COUNT							
4422									(LSB)
4423	Reserved								
4424	(MSB)	Phy 0 Statistics Descriptor ¹							
4451									(LSB)
	...								
5068	(MSB)	Phy 35 Statistics Descriptor ¹							
5095									(LSB)
	Expander 6 Phy Statistics Descriptor								
5096	ELEMENT TYPE CODE (18h)								
5097	TYPE RELATIVE INDEX (6)								
5098	DESCRIPTOR FORMAT REVISION (01h)								
5099	NUMBER OF PHY STATISTICS DESCRIPTORS (36)								
6000	PHY STATISTICS DESCRIPTOR LENGTH (28)								
6001	(MSB)	EXPANDER CHANGE COUNT							

Bit Byte	7	6	5	4	3	2	1	0	
6002	(LSB)								
6003	Reserved								
6004	(MSB)	Phy 0 Statistics Descriptor ¹							
6031	(LSB)								
	...								
6084	(MSB)	Phy 35 Statistics Descriptor ¹							
6111	(LSB)								
	Expander 7 Phy Statistics Descriptor								
6112	ELEMENT TYPE CODE (18h)								
6113	TYPE RELATIVE INDEX (7)								
6114	DESCRIPTOR FORMAT REVISION (01h)								
6115	NUMBER OF PHY STATISTICS DESCRIPTORS (36)								
6116	PHY STATISTICS DESCRIPTOR LENGTH (28)								
6117	(MSB)	EXPANDER CHANGE COUNT							
6118	(LSB)								
6119	Reserved								
6120	(MSB)	Phy 0 Statistics Descriptor ¹							
6147	(LSB)								
	...								
6764	(MSB)	Phy 35 Statistics Descriptor ¹							
6791	(LSB)								
	Expander 8 Phy Statistics Descriptor								
6792	ELEMENT TYPE CODE (18h)								
6793	TYPE RELATIVE INDEX (8)								
6794	DESCRIPTOR FORMAT REVISION (01h)								
6795	NUMBER OF PHY STATISTICS DESCRIPTORS (36)								
6796	PHY STATISTICS DESCRIPTOR LENGTH (28)								
6797	(MSB)	EXPANDER CHANGE COUNT							
6798	(LSB)								
6799	Reserved								
6800	(MSB)	Phy 0 Statistics Descriptor ¹							
6827	(LSB)								
	...								
7780	(MSB)	Phy 35 Statistics Descriptor ¹							
7807	(LSB)								
	Expander 9 Phy Statistics Descriptor								
7808	ELEMENT TYPE CODE (18h)								
7809	TYPE RELATIVE INDEX (9)								

Bit Byte	7	6	5	4	3	2	1	0
7810	DESCRIPTOR FORMAT REVISION (01h)							
7811	NUMBER OF PHY STATISTICS DESCRIPTORS (36)							
7812	PHY STATISTICS DESCRIPTOR LENGTH (28)							
7813	(MSB)	EXPANDER CHANGE COUNT						(LSB)
7814								
7815	Reserved							
7816	(MSB)	Phy 0 Statistics Descriptor ¹						(LSB)
7843								
	...							
8747	(MSB)	Phy 35 Statistics Descriptor ¹						(LSB)
8823								
	Expander 10 Phy Statistics Descriptor							
7808	ELEMENT TYPE CODE (18h)							
7809	TYPE RELATIVE INDEX (10)							
7810	DESCRIPTOR FORMAT REVISION (01h)							
7811	NUMBER OF PHY STATISTICS DESCRIPTORS (36)							
7812	PHY STATISTICS DESCRIPTOR LENGTH (28)							
7813	(MSB)	EXPANDER CHANGE COUNT						(LSB)
7814								
7815	Reserved							
7816	(MSB)	Phy 0 Statistics Descriptor ¹						(LSB)
7843								
	...							
8747	(MSB)	Phy 35 Statistics Descriptor ¹						(LSB)
8823								
	Expander 11 Phy Statistics Descriptor							
7808	ELEMENT TYPE CODE (18h)							
7809	TYPE RELATIVE INDEX (11)							
7810	DESCRIPTOR FORMAT REVISION (01h)							
7811	NUMBER OF PHY STATISTICS DESCRIPTORS (36)							
7812	PHY STATISTICS DESCRIPTOR LENGTH (28)							
7813	(MSB)	EXPANDER CHANGE COUNT						(LSB)
7814								
7815	Reserved							
7816	(MSB)	Phy 0 Statistics Descriptor ¹						(LSB)
7843								
	...							
8747	(MSB)	Phy 35 Statistics Descriptor ¹						(LSB)

Bit	7	6	5	4	3	2	1	0
Byte								
8823								(LSB)
¹ See [3] for full details on the format of the Phy Statistics status/control descriptor								

4.7 Vendor Unique Page 92h Layout

Vendor unique page 92h extends the status that can be represented in page 02h for each element. The page structure itself represents that of page 07h with descriptor headers used to advertise the size of additional data available for each element. Not all elements provide page 92h descriptors and where this is the case the descriptor length will be set to 0.

Table 11 - SES Page 92h Layout

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (92h)							
1	Reserved							
2	(MSB)	PAGE LENGTH (3189)						(LSB)
3								
4	(MSB)	GENERATION CODE						(LSB)
7								
Extended Status Descriptor List								
8	(MSB)	Array Device Overall Element Descriptor (00 00 00 00 h)						(LSB)
11								
12	(MSB)	Array Device Element 0 Descriptor (00 00 00 00 h)						(LSB)
15								
...								
408	(MSB)	Array Device Element 99 Descriptor (00 00 00 00 h)						(LSB)
411								
412	(MSB)	Power Supply Overall Element Descriptor (00 00 00 00 h)						(LSB)
422	11 bytes of Descriptor data ¹							
423	(MSB)	Power Supply Element 0 Descriptor (00 00 00 00 h)						(LSB)
430	8 bytes of Descriptor data ¹							
...								
447	(MSB)	Power Supply Element 3 Descriptor (00 00 00 00 h)						(LSB)
454	8 bytes of Descriptor data ¹							
455	(MSB)	Cooling Overall Element Descriptor (00 00 00 00 h)						(LSB)
458								
459	(MSB)	Cooling Element 0 Descriptor (00 00 00 00 h)						(LSB)
462								
...								
503	(MSB)	Cooling Element 11 Descriptor (00 00 00 00 h)						(LSB)
506								
507	(MSB)	Temperature Sensor Overall Element Descriptor (00 00 00 00 h)						(LSB)
510								
511	Temperature Sensor Element 0 Descriptor (00 00 00 00 h)							
514								

Bit Byte	7	6	5	4	3	2	1	0	
	...								
723	(MSB)	Temperature Sensor Element 53 Descriptor							
726		(00 00 00 00 h)							(LSB)
727	(MSB)	Door Lock Sensor Overall Element Descriptor							
730		(00 00 00 00 h)							(LSB)
731	(MSB)	Door Lock Sensor Element 0 Descriptor							
734		(00 00 00 00 h)							(LSB)
735	(MSB)	Door Lock Sensor Element 1 Descriptor							
738		(00 00 00 00 h)							(LSB)
739	(MSB)	Audible Alarm Overall Element Descriptor							
742		(00 00 00 00 h)							(LSB)
743	(MSB)	Audible Alarm Element 0 Descriptor							
746		(00 00 00 00 h)							(LSB)
747	(MSB)	Enclosure Services Controller Electronics Overall Element Descriptor							
750		(00 00 00 00 h)							(LSB)
751	(MSB)	Enclosure Services Controller Electronics Element 0 Descriptor							
754		(00 00 00 00 h)							(LSB)
755	(MSB)	Enclosure Services Controller Electronics Element 1 Descriptor							
758		(00 00 00 00 h)							(LSB)
759	(MSB)	Enclosure Overall Element Descriptor							
762		(00 00 00 00 h)							(LSB)
763	(MSB)	Enclosure Element 0 Descriptor							
766		(00 00 00 00 h)							(LSB)
767	(MSB)	Voltage Sensor Overall Element Descriptor							
770		(00 00 00 00 h)							(LSB)
771	(MSB)	Voltage Sensor Element 0 Descriptor							
774		(00 00 00 00 h)							(LSB)
	...								
799	(MSB)	Voltage Sensor Element 7 Descriptor							
802		(00 00 00 00 h)							(LSB)
803	(MSB)	Current Sensor Overall Element Status Descriptor							
806		(00 00 00 00 h)							(LSB)
807	(MSB)	Current Sensor Element 0 Descriptor							
810		(00 00 00 00 h)							(LSB)
	...								
811	(MSB)	Current Sensor Element 7 Descriptor							
814		(00 00 00 00 h)							(LSB)
815	(MSB)	SAS Expander Overall Element Descriptor							
818		(00 00 00 00 h)							(LSB)

Bit Byte	7	6	5	4	3	2	1	0	
819	(MSB)	SAS Expander Element 0 Descriptor							
822		(00 00 00 00 h)							(LSB)
		...							
871	(MSB)	SAS Expander Element 13 Descriptor							
874		(00 00 00 00 h)							(LSB)
875	(MSB)	SAS Connector Overall Element Descriptor							
878		(00 00 00 00 h)							(LSB)
879	(MSB)	SAS Connector Element 0 Descriptor							
1390		(01 00 02 00 h)							
		512 bytes of descriptor data ¹							(LSB)
		...							
2987	(MSB)	SAS Connector Element 19 Descriptor							
2990		(00 00 00 00 h)							(LSB)
2991	(MSB)	SBB Midplane Interconnect Overall Element Descriptor							
2994		(00 00 00 00 h)							(LSB)
2995	(MSB)	SBB Midplane Interconnect Element 0 Descriptor							
2998		(00 00 00 00 h)							(LSB)
2999	(MSB)	SBB Midplane Interconnect Element 1 Descriptor							
3002		(00 00 00 00 h)							(LSB)
3001	(MSB)	Enclosure Electronics Power Overall Element Descriptor							
3004		(00 00 00 00 h)							(LSB)
3005	(MSB)	Enclosure Electronics Power Element 0 Descriptor							
3008		(00 00 00 00 h)							(LSB)
3009	(MSB)	Enclosure Electronics Power Element 1 Descriptor							
3012		(00 00 00 00 h)							(LSB)
3013	(MSB)	Enclosure Settings Overall Element Descriptor							
3016		(00 00 00 00 h)							(LSB)
3017	(MSB)	Enclosure Settings Element 0 Descriptor							
3020		(00 00 00 00 h)							(LSB)
3021	(MSB)	Enclosure Electronics Diagnostics Overall Element Descriptor							
3024		(00 00 00 00 h)							(LSB)
3025	(MSB)	Enclosure Electronics Diagnostics Element 0 Descriptor							
3028		(00 00 00 00 h)							(LSB)
3029	(MSB)	Enclosure Electronics Diagnostics Element 1 Descriptor							
3032		(00 00 00 00 h)							(LSB)
3033	(MSB)	Sideplane Overall Element Descriptor							
3036		(00 00 00 00 h)							(LSB)
3037	(MSB)	Sideplane Element 0 Descriptor							
3040		(00 00 00 00 h)							(LSB)
		...							

Bit Byte	7	6	5	4	3	2	1	0
3081	(MSB)	Sideplane Element 11 Descriptor (00 00 00 00 h)						(LSB)
3084								
3085	(MSB)	BMC Overall Element Descriptor (00 00 00 00 h)						(LSB)
3088								
3089	(MSB)	BMC Element 0 Descriptor (02 00 00 32 h)						(LSB)
		50 bytes of descriptor data ¹						
3139	(MSB)	BMC Element 1 Descriptor (02 00 00 32 h)						(LSB)
3188		50 bytes of descriptor data ¹						
¹ See [3] for extended status descriptor format for SAS connectors								

4.8 Vendor Unique Page 93h Layout

Vendor unique Page 93h reports the state of all firmware-controlled indicators within the enclosure. Table 12 covers the basic layout of page 93h for the documented product

Table 12 - SES Page 93h Layout

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (93h)							
1	Reserved							
2	(MSB)	PAGE LENGTH (640)						(LSB)
3								
LED Status Descriptor List								
4	(MSB)	Sled 0 Card Fault LED Descriptor						(LSB)
7								
...								
48	(MSB)	Sled 11 Card Fault LED Descriptor						(LSB)
51								
52	(MSB)	Disk 0 Fault LED Descriptor						(LSB)
55								
...								
448	(MSB)	Disk 99 Fault LED Descriptor						(LSB)
451								
452	(MSB)	Unit Identifier LED Descriptor						(LSB)
455								
456	(MSB)	Logic Fault LED Descriptor						(LSB)
459								
460	(MSB)	Module Fault LED Descriptor						(LSB)
463								
464	(MSB)	Cooling Module 0 Fault LED Descriptor						(LSB)
467								
...								
508	(MSB)	Cooling Module 11 Fault LED Descriptor						(LSB)
511								
512	(MSB)	Cooling Module 0 Status LED Descriptor						(LSB)
515								
...								
556	(MSB)	Cooling Module 11 Status LED Descriptor						(LSB)
559								
560	(MSB)	Module Fault Rear LED Descriptor						(LSB)
563								
564	(MSB)	Module Fault Side LED Descriptor						(LSB)

Bit Byte	7	6	5	4	3	2	1	0	
567	(LSB)								
568	(MSB)	Port Link Status Ops A LED Descriptor							
571	(LSB)								
572	(MSB)	Port Link Status Ops B LED Descriptor							
575	(LSB)								
576	(MSB)	PCM 0 Shutdown LED Descriptor							
579	(LSB)								
	...								
588	(MSB)	PCM 3 Shutdown LED Descriptor							
591	(LSB)								
592	(MSB)	Card Status LED Descriptor							
595	(LSB)								
596	(MSB)	Card Fault LED Descriptor							
599	(LSB)								
600	(MSB)	Canister Identifier LED Descriptor							
603	(LSB)								
604	(MSB)	Port 0 Activity LED Descriptor							
607	(LSB)								
	...								
632	(MSB)	Port 7 Activity LED Descriptor							
635	(LSB)								
636	(MSB)	Port 0 Fault LED Descriptor							
639	(LSB)								
640	(MSB)	Port 1 Fault LED Descriptor							
643	(LSB)								
1 PCM Shutdown LED can be referred for PCM Ident LED									