Release Note for AIC SAS 12G 4U76swap_SE / 4U60swap_SE Expander

October 3, 2019

Changelog

10/03/2019 (FW 1.12.7.56 + MFG 1.7.0.53 + FW 1.12.8.54 + MFG 1.8.0.53 + FW 1.12.15.54 + MFG 1.15.0.53) - Part Number (SEE-00120756_A01 + SEG-0007C053_A01 + SEE-00120854_A01 + SEG-0008C053_A01 + SEE-00121554_A01 + SEG-0015C053_A01)

Old Part Number SEE-00120755_A01 is replaced by SEE-00120756_A01

1. Bug fix: the CLI command 'sensor' should report "Voltage Sensor 12V" for "4U76swap Hub", but "Voltage Sensor 1.8V" for "4U60swap Hub".

1/31/2019 (FW 1.12.7.55 + MFG 1.7.0.53 + FW 1.12.8.54 + MFG 1.8.0.53 + FW 1.12.15.54 + MFG 1.15.0.53) - Part Number (SEE-00120755_A01 + SEG-0007C053_A01 + SEE-00120854_A01 + SEG-0008C053_A01 + SEE-00121554_A01 + SEG-0015C053_A01)

Old Part Number SEE-00120754_A01 is replaced by SEE-00120755_A01

Old Part Number SEE-00120853_A01 is replaced by SEE-00120854_A01

Old Part Number SEE-00121553_A01 is replaced by SEE-00121554_A01

1. Bug fix: SES page 0xA reports improper data

6/11/2018 (FW 1.12.7.54 + MFG 1.7.0.53 + FW 1.12.8.53 + MFG 1.8.0.53 + FW 1.12.15.53 + MFG 1.15.0.53) - Part Number (SEE-00120754_A01 + SEG-0007C053_A01 + SEE-00120853_A01 + SEG-0008C053_A01 + SEE-00121553_A01 + SEG-0015C053_A01)

Old Part Number SEE-00120753_A01 is replaced by SEE-00120754_A01.

Old Part Number SEG-0007C052_A01 is replaced by SEG-0007C053_A01.

Old Part Number SEE-00120852_A01 is replaced by SEE-00120853_A01.

Old Part Number SEG-0008C052_A01 is replaced by SEG-0008C053_A01.

Old Part Number SEE-00121552_A01 is replaced by SEE-00121553_A01.

Old Part Number SEG-0015C052_A01 is replaced by SEG-0015C053_A01.

1. Migrate to SDK16.
2. Set the same ELI to all expanders in the same chassis for 4U76 SE

10/23/2017 (FW 1.12.7.53 + MFG 1.7.0.52 + FW 1.12.8.52 + MFG 1.8.0.52 + FW 1.12.15.52 + MFG 1.15.0.52) - Part Number (SEE-00120753_A01 + SEG-0007C052_A01 + SEE-00120852_A01 + SEG-0008C052_A01 + SEE-00121552_A01 + SEG-0015C052_A01)

Old Part Number B98-00XUXXE0120751 is replaced by SEE-00120753_A01.

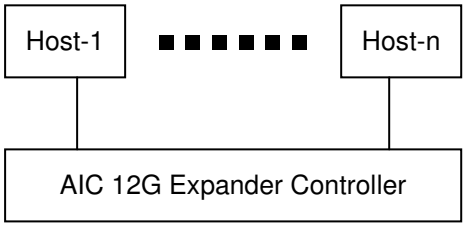
Old Part Number B98-00XUXXG007C051 is replaced by SEG-0007C052_A01.
Old Part Number B98-00XUXXE0120851 is replaced by SEE-00120852_A01.
Old Part Number B98-00XUXXG008C051 is replaced by SEG-0008C052_A01.
Old Part Number B98-004U76E0121551 is replaced by SEE-00121552_A01.
Old Part Number B98-004JZCG015C051 is replaced by SEG-0015C052_A01.

1. Add zonecount option 3 for 4U76 SE.
2. Add ELI synchronizing between master and slave hub expander.

10/18/2016 (FW 1.12.7.51 + MFG 1.7.0.51 + FW 1.12.8.51 + MFG 1.8.0.51 + FW 1.12.15.51 + MFG 1.15.0.51) - Part Number (B98-00XUXXE0120751 + B98-00XUXXG007C051 + B98-00XUXXE0120851 + B98-00XUXXG008C051 + B98-004U76E0121551 + B98-004JZCG015C051)

1. Initial revision

1. Support Multiple Host/Path Access



To have multiple host/path access support (the host number can be up to the number of wide ports on each AIC 12G Expander Controller), only the following drives are supported for shared access:

(A) SAS drive / Nearline SAS drive

(B) SATA drive with an interposer which provides SATA-to-SAS conversion

Locating a drive via any HBA utility is not supported. Users should send standard SES command to the enclosure (4U76swap: Hub) to locate a drive.

1.1 Unsupported Feature

(A) Enclosure logical identifier can be changed.

(B) Locating a drive via any HBA utility. Users should send standard SES command to

locate a drive.

(C) The management software MegaRAID Storage Manager with LSI 6G RAID Card is not supported.

2. SES Inband Features

2.1. SES Pages

00h - List of supported diagnostic pages

01h - SES configuration

02h - SES enclosure control / enclosure status

04h – SES String In

05h – SES Threshold Out / In

07h - SES element descriptor

0Ah - SES additional element

0Eh - SES download microcode control / SES download microcode status

82h – SES Vendor specific page : Chassis Number

83h – SES Vendor specific page : Canister Number

2.2. SES Elements

02h - Power Supply

03h - Cooling

04h - Temperature Sensor

0Eh - Enclosure

12h - Voltage

17h - Array Device

2.3 Implementation on SES Pages

2.3.1 SES String In Page

Get PMBUS information with String In Page.

String In Format

BYTE/BIT	7	6	5	4	3	2	1	0
0	I2C congestion status (0: no congestion, 1: congestion or failure)							
1	PSU Module1 STATUS_WORD							
2								
3	PSU Module2 STATUS_WORD							
4								
5~14	Reserved (0xFF)							

2.3.2 SES Threshold Out / In

It includes only Temperature Sensor and Voltage Sensor elements.

Threshold control element format

BYTE/BIT	7	6	5	4	3	2	1	0
0	REQUESTED HIGH CRITICAL THRESHOLD							
1	REQUESTED HIGH WARNING THRESHOLD							
2	REQUESTED LOW WARNING THRESHOLD							
3	REQUESTED LOW CRITICAL THRESHOLD							

Threshold status element format

BYTE/BIT	7	6	5	4	3	2	1	0
0	HIGH CRITICAL THRESHOLD							
1	HIGH WARNING THRESHOLD							
2	LOW WARNING THRESHOLD							
3	LOW CRITICAL THRESHOLD							

2.3.3 SES Vendor specific page: Chassis Number (page code 82h) Out / In

The length N of chassis number can be 0 to 30 bytes. If no chassis number is entered (N=0), then chassis number is cleared.

Chassis Number control format

BYTE/BIT	7	6	5	4	3	2	1	0
0~N	Chassis Number							

If no chassis number is found, return Status = 1 (failed) only, else return Status=0 (success) followed by chassis number.

Chassis Number status format

BYTE/BIT	7	6	5	4	3	2	1	0
0	Status (0: success, 1: failed)							
1~N (if success)	Chassis Number							

2.3.4 SES Vendor specific page: Canister Number (page code 83h) Out / In

The length N of canister number can be 0~30 bytes. If no canister number is entered (N=0), then canister number is restored to default: 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 (8 spaces in ASCII).

Canister Number control format

BYTE/BIT	7	6	5	4	3	2	1	0
0~N	Canister Number							

If no canister number is found, return Status = 1 (failed) only, else return Status=0 (success) followed by canister number.

Canister Number status format

BYTE/BIT	7	6	5	4	3	2	1	0
0	Status (0: success, 1: failed)							
1~N (if success)	Canister Number							

2.4. Implementation on SES Elements

Only the fields highlighted in green are supported.

2.4.1. Power Supply Element

2.4.1.1. Power Supply Control Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	Reserved						
2	Reserved							
3	Reserved	RQST FAIL	RQST ON	Reserved				

Field	Value
RQST ON	Please refer to section “SES Element Control Functions” for details.

2.4.1.2. Power Supply Status Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON STATUS							

	Reserved	PRDFAIL	DISABLED	SWAP	ELEMENT STATUS CODE			
1	IDENT	Reserved						
2	Reserved				DC OVER VOLTAGE	DC UNDER VOLTAGE	DC OVER CURRENT	Reserved
3	HOT SWAP	FAIL	RQSTED ON	OFF	OVERTMP FAIL	TEMP WARN	AC FAIL	DC FAIL

Field	Value
ELEMENT STATUS CODE	OK: No failure or warning conditions detected CRITICAL: FAIL bit is set due to one or more failure condition
FAIL	A failure condition is detected
RQSTED ON	1: On 0: Off
OFF	1: Off 0: On
AC FAIL	A failure condition is detected
DC FAIL	A failure condition is detected

2.4.2. Cooling Element

2.4.2.1. Cooling Control Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	Reserved						
2	Reserved							
3	Reserved	RQST FAIL	RQST ON	Reserved		REQUESTED SPEED CODE		

Field	Value
RQST IDENT	Please refer to section “SES Element Control Functions” for details.
REQUESTED SPEED CODE	Please refer to section “SES Element Control Functions” for details.

2.4.2.2. Cooling Status Element

BYTE/BIT	7	6	5	4	3	2	1	0

0	COMMON STATUS					
	Reserved	PRDFAIL	DISABLED	SWAP	ELEMENT STATUS CODE	
1	IDENT	Reserved				ACTUAL FAN SPEED (MSB)
2	ACTUAL FAN SPEED (LSB)					
3	HOT SWAP	FAIL	RQSTED ON	OFF	Reserved	ACTUAL SPEED CODE

Field	Value
ELEMENT STATUS CODE	OK: Actual fan speed > 0 CRITICAL: The fan RPM can't be detected or equal to 0.
IDENT	Applicable only for Cooling element 0 0: Enable the smart fan function 1: Disable the smart fan function
ACTUAL FAN SPEED	Current fan RPM
FAIL	The fan RPM can't be detected or equal to 0.
ACTUAL SPEED CODE	Speed code level bases on current fan RPM.

2.4.3. Temperature Sensor Element

2.4.3.1. Temperature Sensor Control Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	RQST FAIL	Reserved					
2	Reserved							
3	Reserved							

2.4.3.2. Temperature Sensor Status Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON STATUS							
	Reserved	PRDFAIL	DISABLED	SWAP	ELEMENT STATUS CODE			
1	IDENT	FAIL	Reserved					
2	TEMPERATURE							
3	Reserved				OT FAILURE	OT WARNING	UT FAILURE	UT WARNING

Field	Value

ELEMENT STATUS CODE	OK: Everything is Ok NON-CRITICAL: If either warning limit is exceeded CRITICAL: If either failure limit is exceeded
FAIL	A warning or failure condition is detected
TEMPERATURE	Temperature reading
OT FAILURE	Temperature has exceeded the failure high threshold value
OT WARNING	Temperature has exceeded the warning high threshold value
UT FAILURE	Temperature is below the failure low threshold value
UT WARNING	Temperature is below the warning low threshold value

2.4.4. Enclosure Element

2.4.4.1. Enclosure Control Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	Reserved						
2	POWER CYCLE REQUEST	POWER CYCLE DELAY						
3	POWER OFF DURATION						REQUEST FAILURE	REQUEST WARNING

Field	Value
RQST IDENT	Please refer to section “SES Element Control Functions” for details.
REQUEST FAILURE	Please refer to section “SES Element Control Functions” for details.
REQUEST WARNING	Please refer to section “SES Element Control Functions” for details.

2.4.4.2. Enclosure Status Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON STATUS							
	Reserved	PRDFAIL	DISABLED	SWAP	ELEMENT STATUS CODE			
1	IDENT	Reserved						
2	TIME UNTIL POWER CYCLE						FAILURE INDICATION	WARNING INDICATION

3	REQUEST POWER OFF DURATION	FAILURE REQUESTED	WARNING REQUESTED

Field	Value
ELEMENT STATUS CODE	OK
IDENT	0: Identify LED of Hub is OFF 1: Identify LED of Hub is solid ON
FAILURE REQUESTED	Set by the REQUEST FAILURE on Enclosure Control Element
WARNING REQUESTED	Set by the REQUEST WARNING on Enclosure Control Element

2.4.5. Voltage Element

2.4.5.1. Voltage Control Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	RQST FAIL	Reserved					
2	Reserved							
3	Reserved							

2.4.5.2. Voltage Status Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON STATUS							
	Reserved	PRDFAIL	DISABLED	SWAP	ELEMENT STATUS CODE			
1	IDENT	FAIL	Reserved		WARN OVER	WARN UNDER	CRIT OVER	CRIT UNDER
2	VOLTAGE							
3								

Field	Value
ELEMENT STATUS CODE	OK: Everything is Ok NON-CRITICAL: If either warning limit is exceeded CRITICAL: If either failure limit is exceeded
FAIL	A warning or failure condition is detected
WARN OVER	Voltage has exceeded the warning high threshold value
WARN UNDER	Voltage is below the warning low threshold value

CRIT OVER	Voltage has exceeded the failure high threshold value
CRIT UNDER	Voltage is below the failure low threshold value
VOLTAGE	Voltage reading

2.4.6. Array Device Element

2.4.6.1. Array Device Control Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved0			
1	RQST OK	RQST RSVD DEVICE	RQST HOT SPARE	RQST CONS CHECK	RQST IN CRIT ARRAY	RQST IN FAILED ARRAY	RQST REBULD/ REMAP	RQST R/R ABORT
2	RQST ACTIVE	DO NOT REMOVE	Reserved2	RQST MISSING	RQST INSERT	RQST REMOVE	RQST IDENT	Reserved1
3	Reserved5	Reserved4	RQST FAULT	DEVICE OFF	ENABLE BYP A	ENABLE BYP B	Reserved3	

Field	Value
PRDFAIL	Please refer to section “SES Element Control Functions” for details.
RQST OK	Please refer to section “SES Element Control Functions” for details.
RQST RSVD DEVICE	Please refer to section “SES Element Control Functions” for details.
RQST HOT SPARE	Please refer to section “SES Element Control Functions” for details.
RQST CONS CHECK	Please refer to section “SES Element Control Functions” for details.
RQST IN CRIT ARRAY	Please refer to section “SES Element Control Functions” for details.
RQST IN FAILED ARRAY	Please refer to section “SES Element Control Functions” for details.
RQST REBUILD/REMAP	Please refer to section “SES Element Control Functions” for details.
RQST R/R ABORT	Please refer to section “SES Element Control Functions” for details.
RQST ACTIVE	Please refer to section “SES Element Control Functions” for

	details.
DO NOT REMOVE	Please refer to section “SES Element Control Functions” for details.
Reserved2	Please refer to section “SES Element Control Functions” for details.
RQST MISSING	Please refer to section “SES Element Control Functions” for details.
RQST INSERT	Please refer to section “SES Element Control Functions” for details.
RQST REMOVE	Please refer to section “SES Element Control Functions” for details.
RQST IDENT	Please refer to section “SES Element Control Functions” for details.
Reserved5	Please refer to section “SES Element Control Functions” for details.
RQST FAULT	Please refer to section “SES Element Control Functions” for details.
DEVICE OFF	Please refer to section “SES Element Control Functions” for details.

2.4.6.2. Array Device Status Element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON STATUS							
	Reserved	PRDFAIL	DISABLED	SWAP	ELEMENT STATUS CODE			
1	OK	RSVD DEVICE	HOT SPARE	CONS CHK	IN CRIT ARRAY	IN FAILED ARRAY	REBUILD/ REMAP	R/R ABORT
2	APP CLIENT BYPASSED A	DO NOT REMOVE	ENCLOSURE BYPASSED A	ENCLOSURE BYPASSED B	READY TO INSERT	RMV	IDENT	REPORT
3	APP CLIENT BYPASSED B	FAULT SENSED	FAULT REQSTD	DEVICE OFF	BYPASSED A	BYPASSED B	DEVICE BYPASSED A	DEVICE BYPASSED B

Field	Value
PRDFAIL	Set by the PRDFAIL on Array Device Control Element
ELEMENT STATUS CODE	OK: A drive is detected in the slot NOT INSTALLED: No drive is installed in the slot
OK	Set by the RQST OK on Array Device Control Element

RSVD DEVICE	Set by the RQST RSVD DEVICE on Array Device Control Element
HOT SPARE	Set by the RQST HOT SPARE on Array Device Control Element
CONS CHK	Set by the RQST CONS CHECK on Array Device Control Element
IN CRIT ARRAY	Set by the RQST IN CRIT ARRAY on Array Device Control Element
IN FAILED ARRAY	Set by the RQST IN FAILED ARRAY on Array Device Control Element
REBUILD/REMAP	Set by the RQST REBUILD/REMAP on Array Device Control Element
R/R ABORT	Set by the RQST R/R ABORT on Array Device Control Element
DO NOT REMOVE	Set by the DO NOT REMOVE on Array Device Control Element
READY TO INSERT	Set by the RQST INSERT on Array Device Control Element
RMV	Set by the RQST REMOVE on Array Device Control Element
IDENT	Set by the RQST IDENT on Array Device Control Element
FAULT REQSTD	Set by the RQST FAULT on Array Device Control Element
DEVICE OFF	Set by the DEVICE OFF on Array Device Control Element

2.5. SES Element Control Functions

2.5.1. LED indicators (blue and red) associated with an attached disk drive

Array Device Slot control element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved0			
1	RQST OK	RQST RSVD DEVICE	RQST HOT SPARE	RQST CONS CHECK	RQST IN CRIT ARRAY	RQST IN FAILED ARRAY	RQST REBULD/ REMAP	RQST R/R ABORT
2	RQST ACTIVE	DO NOT REMOVE	Reserved2	RQST MISSING	RQST INSERT	RQST REMOVE	RQST IDENT	Reserved1
3	Reserved5	Reserved4	RQST FAULT	DEVICE OFF	ENABLE BYP A	ENABLE BYP B	Reserved3	

The default behavior for blue LED is "LED is on when the disk is not busy, and off when the disk is executing a command". When the "RQST IDENT" bit is set, the blue LED overwrites its default behavior with a slow blink while the red LED is off. The blue LED is set "Activity" for

not overwriting its default behavior.

The behavior “Fast Blink” is “LED is blinking at 2Hz frequency”.

The behavior “Slow Blink” is “LED is blinking at 1Hz frequency”.

The behavior “ON”/”OFF” is “LED is solid ON/OFF without blinking”.

Slot Control Bit	Blue LED	Red LED
RQST OK	Activity	OFF
RQST RSVD DEVICE	Activity	OFF
RQST HOT SPARE	Activity	OFF
RQST CONS CHECK	Activity	Fast Blink
RQST IN CRIT ARRAY	Activity	Slow Blink
RQST IN FAILED ARRAY	Activity	Slow Blink
RQST REBUILD/REMAP	Activity	Fast Blink
RQST R/R ABORT	Activity	Slow Blink
RQST ACTIVE	Activity	OFF
DO NOT REMOVE	Activity	OFF
RQST MISSING	ON	ON
RQST INSERT	Activity	Slow Blink
RQST REMOVE	Activity	Slow Blink
RQST IDENT	Slow Blink	OFF
RQST FAULT	ON	ON
DEVICE OFF	OFF	OFF
PRDFAIL	Activity	Slow Blink

2.5.2. How to turn on/off the power of a drive slot

Array Device Slot control element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved0			
1	RQST OK	RQST RSVD DEVICE	RQST HOT SPARE	RQST CONS CHECK	RQST IN CRIT ARRAY	RQST IN FAILED ARRAY	RQST REBULD/ REMAP	RQST R/R ABORT
2	RQST ACTIVE	DO NOT REMOVE	Reserved2	RQST MISSING	RQST INSERT	RQST REMOVE	RQST IDENT	Reserved1
3	Reserved5	Reserved4	RQST FAULT	DEVICE OFF	ENABLE BYP A	ENABLE BYP B	Reserved3	

The "DEVICE OFF" for a drive slot is defined in the bit4, byte3 of the "Array Device Slot control element" in the SES specification. Set the bit to turn off a slot power, and vice versa. We use the software package "sg3_utils" on Linux for example, and have a SAS HBA and a cable to connect your host with the expander.

(A) Show the device for AIC Expander Controller (canister)

```
$ sg_map -i

/dev/sg2    AIC 12G     4U76swap: Hub    0c07
```

(B) Get the current state of a slot power. The "Device off=0" means the slot power is on.

```
$ sg_ses --page=2 /dev/sg2

Element 0 descriptor:
  App client bypass B=0, Fault sensed=0, Fault reqstd=0, Device off=0
```

(C) Get the descriptor of a slot power

```
$ sg_ses --page=7 /dev/sg2

Element 0 descriptor: Disk001
```

(D) Turn off a slot power

```
$ sg_ses --descriptor=Disk001 --set=3:4:1 /dev/sg2
```

(E) Turn on a slot power

```
$ sg_ses --descriptor=Disk001 --clear=3:4:1 /dev/sg2
```

2.5.3. How to power off the entire enclosure

Power Supply control element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	Reserved						
2	Reserved							
3	Reserved	RQST FAIL	RQST ON	Reserved				

The "RQST ON" for Power Supply is defined in the bit5, byte3 of the "Power Supply

control element" in the SES specification. Clear the bit on Power Supply Element “PowerSupply01” or “PowerSupply02” to power off the entire enclosure. We use the software package "sg3_utils" on Linux for example, and have a SAS HBA and a cable to connect your host with the expander.

(A) Show the device for AIC Expander Controller (canister)

$ sg_map -i

/dev/sg2 AIC 12G 4U76swap: Hub 0c07

(B) Power off the entire enclosure

$ sg_ses --descriptor=PowerSupply01 --clear=3:5:1 /dev/sg2

2.5.4. How to identify the enclosure

Enclosure control element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	Reserved						
2	POWER CYCLE REQUEST	POWER CYCLE DELAY						
3	POWER OFF DURATION						REQUEST FAILURE	REQUEST WARNING

When the identify LED of Hub is off, the identity is disabled. When solid on, the identity is enabled. The "RQST IDENT" for Enclosure is defined in the bit7, byte1 of the "Enclosure control element" in the SES specification. Set the bit to enable the identity. Clear the bit to disable the identity. We use the software package "sg3_utils" on Linux for example, and have a SAS HBA and a cable to connect your host with the expander.

(A) Show the device for AIC Expander Controller (canister)

$ sg_map -i

/dev/sg2 AIC 12G 4U76swap: Hub 0c07

(B) Enable the identity

$ sg_ses --descriptor=EnclosureElement01 --set=1:7:1 /dev/sg2

(C) Disable the identity

$ sg_ses --descriptor=EnclosureElement01 --clear=1:7:1 /dev/sg2

2.5.5. How to enable/disable the enclosure alarm by your software

Enclosure control element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	Reserved						
2	POWER CYCLE REQUEST	POWER CYCLE DELAY						
3	POWER OFF DURATION						REQUEST FAILURE	REQUEST WARNING

The system alarm LED is used for the enclosure alarm and power alarm. The "REQUEST FAILURE" and “REQUEST WARNING” for Enclosure are defined in the bit1, byte3 and bit0, byte3 of the "Enclosure control element" in the SES specification. Setting either bit can enable the enclosure alarm. Clearing both bits disables the enclosure alarm. We use the software package "sg3_utils" on Linux for example, and have a SAS HBA and a cable to connect your host with the expander.

(A) Show the device for AIC Expander Controller (canister)

$ sg_map -i

/dev/sg2 AIC 12G 4U76swap: Hub 0c07

(B) Enable the enclosure alarm

$ sg_ses --descriptor=EnclosureElement01 --set=3:1:1 /dev/sg2

or

$ sg_ses --descriptor=EnclosureElement01 --set=3:0:1 /dev/sg2

(C) Disable the enclosure alarm

$ sg_ses --descriptor=EnclosureElement01 --clear=3:1:1 /dev/sg2

and

$ sg_ses --descriptor=EnclosureElement01 --clear=3:0:1 /dev/sg2

2.5.6. How to manually change PWM (fan speed) for all Cooling elements

Cooling control element

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved			
1	RQST IDENT	Reserved						
2	Reserved							
3	Reserved	RQST FAIL	RQST ON	Reserved		REQUESTED SPEED CODE		

The "RQST IDENT" for Cooling is defined in the bit7, byte1 and the "REQUESTED SPEED CODE" is defined in the bit2 ~ 0, byte3 of the "Cooling control element" in the SES specification. Set "RQST IDENT" bit to disable the smart fan function, and then change PWM or fan speed for all Cooling elements by setting the "REQUESTED SPEED CODE" bits. Clear "RQST IDENT" bit to enable the smart fan function again. Please disable the smart fan function before changing PWM or fan speed. Only Cooling element 0 supports this feature. We use the software package "sg3_utils" on Linux for example, and have a SAS HBA and a cable to connect your host with the expander.

(A) Show the device for AIC Expander Controller (canister)

$ sg_map -i

/dev/sg2 AIC 12G 4U76swap: Hub 0c07

(B) Set "RQST IDENT" of Cooling element 0 to disable the smart fan function

$ sg_ses --descriptor=SystemCoolingElement01 --set=1:7:1 /dev/sg2

(C) Set "REQUESTED SPEED CODE" of Cooling element 0 to change PWM or fan speed for all Cooling elements. Set "REQUESTED SPEED CODE"=7 (100% PWM) for example.

$ sg_ses --descriptor=SystemCoolingElement01 --set 3:2:3=7 /dev/sg2

REQUESTED SPEED CODE	PWM
7	100%
6	90%
5	80%
4	70%
3	60%
2	50%
1	40%

0	Leave at current speed

2.5.7 How to update firmware / MFG for the Edge expanders.

BYTE/BIT	7	6	5	4	3	2	1	0
0	COMMON CONTROL							
	SELECT	PRDFAIL	DISABLE	RST SWAP	Reserved0			
1	RQST OK	RQST RSVD DEVICE	RQST HOT SPARE	RQST CONS CHECK	RQST IN CRIT ARRAY	RQST IN FAILED ARRAY	RQST REBULD/ REMAP	RQST R/R ABORT
2	RQST ACTIVE	DO NOT REMOVE	Reserved2	RQST MISSING	RQST INSERT	RQST REMOVE	RQST IDENT	Reserved1
3	Reserved5	Reserved4	RQST FAULT	DEVICE OFF	ENABLE BYP A	ENABLE BYP B	Reserved3	

The three edges (L,C,R) are hidden behind the hub, so please follow the steps below to update firmware and MFG of the Edge-L via inband SAS. The same steps can be applied to the Edge-C and Edge-R. We use the software package "sg3_utils" and LSI utility “g3Xflash” on Linux for example, and have a SAS HBA and a cable to connect your host with the expander.

(A) Show the device for AIC Expander Controller

$ sg_map -i

/dev/sg2 AIC 12G 4U76swap: Hub 0c07

(B) Set "Reserved2" of Disk001 to make the Edge-L visible (Use Disk001 for Edge-L, Disk006 for Edge-C and Disk011 for Edge-R)

$ sg_ses --descriptor=Disk001 --set=2:5:1 /dev/sg1

(C) Get SAS address for the Hub. The SAS address (500605B0:000272BF) is used for the Hub.

$./g3Xflash -i get avail

(D) Reset the Hub to have an additional device: Edge-L in Linux

$./g3Xflash -i 500605b0000272bf reset exp

(E) Show the devices for the Hub and the Edge-L

$ sg_map -i

/dev/sg1 AIC 12G 4U76swap: Hub 0c07

/dev/sg2 AIC 12G 4U76swap: Edge-L 0c08

(F) Update firmware of the Edge-L

$ sg_write_buffer --id=0x0 --in=<firmware filename> --mode=0x2 --offset=0 /dev/sg2

(G) Update MFG of the Edge-L

$ sg_write_buffer --id=0x83 --in=<MFG filename> --mode=0x2 --offset=0 /dev/sg2

(H) Get SAS address of the Edge-L. The SAS address (50015B20:9000EBBF) is used for the Edge-L.

$ ./g3Xflash –i get avail

(I) Reset the Edge-L to activate its new firmware / MFG.

$./g3Xflash -i 50015b209000ebbf reset exp

(J) Get the current firmware version of the Edge-L for confirmation.

$./g3Xflash -i 50015b209000ebbf get ver

(K) Set "Reserved5" of Disk001 to make the Edge-L invisible (Use Disk001 for Edge-L, Disk006 for Edge-C and Disk011 for Edge-R)

$ sg_ses --descriptor=Disk001 --set=3:7:1 /dev/sg1

(L) Reset the Hub to refresh the change of the Edge-L in Linux

$./g3Xflash -i 500605b0000272bf reset exp

3. Serial Command Line Interface Functions

The RS232 setting - baud rate: 38400 bps, data bits: 8, parity: none, stop bits: 1, flow control: none

3.1. How to enable/disable T10 zoning

The default T10 zoning configuration is off.

(A) Check the current zoning state

cmd> phyzone state

Zoning is OFF

(B) Enable zoning

cmd> phyzone on

(C) Disable zoning

cmd> phyzone off

3.2. How to configure T10 zoning

After enabling T10 zoning, seven predefined groups are Group1, Group8, Group9, Group10, Group11, Group12, and Group13. Each PHY should be in one of the seven groups, and all PHYs in a wide port should be in the same group. Each PHY in Group1 can access any PHY in other groups, and vice versa. Each PHY in Group8 cannot access any PHY in Group9, and vice versa.

The command syntax is "phyzone phy_index group". The following example shows how to setup one drive accessed only by the first port and another drive accessed only by the second port.

The configuration for the example is

(A) PHY8 - PHY11 for the first wide port of HUB

(B) PHY4 - PHY7 for the second wide port of HUB

(C) PHY20 - PHY35 for drives on EDGE

Step 1: Read the current group for PHY4 of HUB

cmd> phyzone 4

Phy 4 for Zone Group 1

Step 2: Assign the second port (PHY4 - PHY7) of HUB for Group9

cmd> phyzone 4 9

cmd> phyzone 5 9

cmd> phyzone 6 9

cmd> phyzone 7 9

Step 3: Assign the first port (PHY8 – PHY11) of HUB for Group8

cmd> phyzone 8 8

cmd> phyzone 9 8

cmd> phyzone 10 8

cmd> phyzone 11 8

Step 4: Assign the drive on PHY20 of EDGE to be accessed only by the first port of HUB instead of the second port

cmd> phyzone 20 8

Step 5: Assign the drive on PHY21 of EDGE to be accessed only by the second port of HUB instead of the first port

cmd> phyzone 21 9

Step 6: Reset HUB and EDGE for taking effect with the new settings

cmd> reset

3.3. How to get all revisions in AIC SAS 12G Expander

(A) Expander firmware revision

cmd> rev

(B) Expander configuration revision

cmd> showmfg

(C) MCU firmware revision or sensor information (MCU firmware revision is reported by Hub only)

cmd> sensor

3.4. How to configure temperature sensor (HUB only)

Four temperature settings in Celsius are T1, T2, warning threshold, and alarm (critical) threshold. The T1, T2 and alarm (critical) threshold are applied to the smart fan function.

(A) Get the current temperature settings

cmd> temperature

Temperature in Celsius (t1=20 C, t2=55 C, warning=50 C, alarm=55 C)

(B) Set temperature with new T1=18 C, T2=52 C, warning threshold=48 C, and alarm threshold=54 C. The new setting will take effect after reset.

cmd> temperature 18 52 48 54

cmd> reset

(C) We also take expander temperature into consideration, and the temperature parameters for expander are non-changeable. Expander temperature parameters: T1=40, T2=86 (max 115*0.75), and no warning and alarm. The smart fan function will use the highest PWM output which is calculated from system and expander temperature parameters.

3.5. How to configure enclosure address

(A) Get the current enclosure address

cmd> enclosure_addr

Enclosure Address: 0x500605B0000272BF

(B) Set the enclosure address with 0x500605B0000272BF. The new setting will take effect after reset.

cmd> enclosure_addr 500605B0000272BF

cmd> reset

3.6. How to configure standby timer for all disk drives (EDGE only)

This feature is applicable for SAS/SATA drives. Standby timer is in units of minutes. Setting standby timer with 0 minute disables this feature.

(A) Get current standby timer

cmd> standby_timer

Standby Timer : 0 minutes

(B) Set the standby timer with 10 minutes. The new setting will take effect after reset.

cmd> standby_timer 10

cmd> reset

3.7. How to configure wide port checker

This feature is applicable for SAS drives instead of SATA drives. If there is no connection with any active SAS initiator by checking all wide ports, AIC Expander Controller stops all attached SAS drives to save power consumption of SAS drives. Otherwise, AIC Expander Controller starts all attached SAS drives to provide drive access service to any active SAS initiator. The same setting should be applied to HUB and EDGE.

(A) Get the current state of wide port checker

cmd> check_wide_port

Checking wide port is OFF

(B) Enable checking wide port. The new setting will take effect after reset.

cmd> check_wide_port on

cmd> reset

(C) Disable checking wide port. The new setting will take effect after reset.

cmd> check_wide_port off

cmd> reset

3.8. How to power off/on all disk drives automatically

This feature is applicable for SAS/SATA drives. If there is no connection with any active SAS initiator by checking all wide ports, AIC Expander Controller powers off all attached SAS/SATA drives to save power consumption. Otherwise, AIC Expander Controller powers on all attached SAS/SATA drives to provide drive access service to any active SAS initiator. The same setting should be applied to HUB and EDGE.

cmd> check_wide_port standby

cmd> reset

3.9. How to configure EDFB (EDGE only)

The default EDFB configuration is off.

(A) Check the current configuration

cmd> edfb

EDFB is OFF

(B) Enable EDFB

cmd> edfb on

(C) Disable EDFB

cmd> edfb off

3.10. How to configure power setting (Hub only)

This feature is for restoring on AC power loss. Three supported options are "keep off", "keep on", and "keep last state". The default setting is "keep off".

(A) Get the current power setting

```
cmd> power_setting
Power setting: keep off
```

(B) Set "keep off"

```
cmd> power_setting keep_off
```

(C) Set "keep on"

```
cmd> power_setting keep_on
```

(D) Set "keep last state"

```
cmd> power_setting keep_last_state
```

3.11. How to configure zone count

Remove the SAS cable between the HBA/RAID card and the 4U76swap before configuring zone count. Power the 4U76swap off after configuring zone count. Power on the 4U76swap, and then insert the SAS cable.

Four zone configurations supported are one zone, two zones, and four zones (there are 2 configurations for four zones). The default configuration is one zone of which T10 zoning configuration is disabled. T10 zoning configuration of the other configurations (two zones and four zones) is enabled. All COM ports for HUB and EDGE should be applied with the same configuration.

(A) Get current zone count

```
cmd> zonecount
Zone Count 1
```

(B) Set zone count = 2

```
cmd> zonecount 2
Succeeded to set zone count 2
```

(C) Predefined zones follow.

(C-1) When Zone Count Option = 1, T10 zoning is disabled.

HUB:

Zone #	1
Wideport	1, 2, 3, 4, 5, 6

EDGE:

Zone #	1
Slot	1~60, 61~68(4U76 only), 71~78(4U76 only)

(C-2) When Zone Count Option = 2, T10 zoning is enabled.

HUB:

Zone #	1	2
Wideport	1, 2, 3	4, 5, 6

EDGE:

Zone #	1	2
Slot	1~30, 61~68 (4U76 only)	31~60, 71~78 (4U76 only)

(C-3) When Zone Count Option = 3, T10 zoning is enabled.

No disk could be seen if we connect HBA/RAID card with port 5 and 6 of HUB.

HUB:

Zone #	1	2	3	4	Others
Wideport	1	2	3	4	5, 6

EDGE:

Zone #	1	2	3	4
Slot	1~15, 61~64 (4U76 only)	16~30, 65~68 (4U76 only)	31~45, 71~74 (4U76 only)	46~60, 75~78 (4U76 only)

(C-4) When Zone Count Option = 4, T10 zoning is enabled.

No disk could be seen if we connect HBA/RAID card with port 5 and 6 of HUB.

HUB:

Zone #	1	2	3	4	Others
Wideport	1	2	3	4	5, 6

EDGE:

Zone #	1	2	3	4
Slot	1~15	16~30	31~45, 61~68 (4U76 only)	46~60, 71~78 (4U76 only)

3.12. How to configure zoning of the wide port (HUB only)

(A) Get current zoning of wide port 1

cmd> zone_port 1

Wideport 01 for Zone Group 01

(B) Set wideport 1 as Zone Group 8

cmd> zone_port 1 8

Succeeded to set zone group for the phy.

3.13. How to configure zoning of the disk slot (EDGE only)

(A) Get current zoning of Disk Slot 10

cmd> zone_slot 10

Slot 10 for Zone Group 1

(B) Set Disk Slot 10 as Zone Group 8

cmd> zone_slot 10 8

Succeeded to set zone group for the phy