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Release Note for AIC SAS 12G 4U60_SE / 4U90_SE Expander

July 26, 2024

Changelog

7/26/2024 (Hub FW 1.12.62.51 + Hub MFG 1.62.0.52 + 30-Bay Edge FW 1.12.63.51 + 30-Bay Edge MFG 1.63.0.52) - Part Number (SEE-00126251_A01 + SEG-0062C052_A01 + SEE-00126351_A01 + SEG-0063C052_A01)

Old Part Number SEG-0062C051_A01 is replaced by SEG-0062C052_A01.

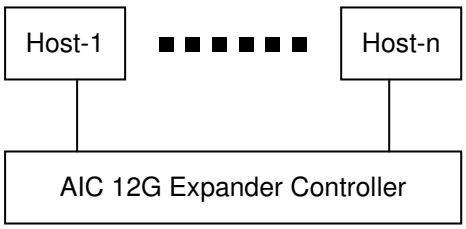
Old Part Number SEG-0063C051_A01 is replaced by SEG-0063C052_A01.

1. Support Broadcom HBA 9600
2. Bug fix: lower the priority of the slot LED control bit "DO NOT REMOVE" on Broadcom HBA 9600

3/21/2024 (Hub FW 1.12.62.51 + Hub MFG 1.62.0.51 + 30-Bay Edge FW 1.12.63.51 + 30-Bay Edge MFG 1.63.0.51) - Part Number (SEE-00126251_A01 + SEG-0062C051_A01 + SEE-00126351_A01 + SEG-0063C051_A01)

1. Built with SDK 25
2. 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

1.1. Unsupported Features

(A) Enclosure logical identifier can be changed.

(B) Locate a drive via any HBA utility. Users should send standard SES command to the enclosure (4U60-Hub / 4U90-Hub) to locate a drive.

2. SES Inband Features

2.1. SES Pages

00h - List of supported diagnostic pages

01h - SES configuration

02h - SES enclosure control / enclosure status

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

8Ch - SES Vendor specific page : Firmware Version and MFG Version

8Dh - SES vendor specific page: BMC Firmware Version

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 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							

2.3.2. SES vendor specific page: Chassis Number (page code 82h) Out / In

The length N of chassis number can be 0 ~ 247 bytes. If no chassis number is input (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, report Status = 1 (failed). Otherwise report 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							

2.3.3. SES vendor specific page: Canister Number (page code 83h) Out / In

The length N of canister number can be 0 ~ 247 bytes. If no canister number is input (N=0), then canister number is restored to its SAS address.

Canister Number control format

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

If no canister number is found, report Status = 1 (failed). Otherwise report 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							

2.3.4. SES Vendor specific page: Firmware Version and MFG Version (page code 8Ch) In

There are one firmware version (4 bytes) and one MFG version (4 bytes) per expander. There are 3 expanders in 4U60 and 4 expanders in 4U90.

Firmware Version and MFG Version status format

BYTE/BIT	7	6	5	4	3	2	1	0
0~3	Hub expander firmware version							
4~7	Hub expander MFG version							
8~11	First Edge firmware version							
12~15	First Edge MFG version							
16~19	Second Edge firmware version							
20~23	Second Edge MFG version							
24~27	Third Edge firmware version (only applicable to 4U90)							
28~31	Third Edge MFG version (only applicable to 4U90)							

2.3.5. SES vendor specific page: BMC Firmware Version (page code 8Dh) In

There are 3 bytes for BMC firmware version.

BMC Firmware Version status format

BYTE/BIT	7	6	5	4	3	2	1	0
0-2	BMC Firmware Version							

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				

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 UNKNOWN: The power supply can't be read
DC OVER CURRENT	An output overcurrent fault has occurred
FAIL	A failure condition is detected
OVERTMP FAIL	Over temperature fault has occurred
TEMP WARN	Over temperature warning has occurred
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: Everything is Ok NON-CRITICAL: Either warning limit is exceeded CRITICAL: The fan RPM can’t be detected, or either failure limit is exceeded. UNKNOWN: The fan RPM can’t be read
IDENT	Applicable only for Cooling element 0 0: Enable the auto fan function 1: Disable the auto fan function
ACTUAL FAN SPEED	Current fan RPM
FAIL	The fan RPM can’t be detected, or either failure limit is exceeded.

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: Either warning limit is exceeded CRITICAL: Either failure limit is exceeded UNKNOWN: The temperature can't be read
FAIL	A warning or failure condition is detected
TEMPERATURE	Temperature reading
OT FAILURE	Temperature exceeds the failure high threshold value
OT WARNING	Temperature exceeds 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
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
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: Either warning limit is exceeded CRITICAL: Either failure limit is exceeded UNKNOWN: The voltage can't be read
FAIL	A warning or failure condition is detected
WARN OVER	Voltage exceeds the warning high threshold value
WARN UNDER	Voltage is below the warning low threshold value
CRIT OVER	Voltage exceeds 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 0.5Hz 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 4U60-Hub-P0 0c3e

(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 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 4U60-Hub-P0 0c3e

(B) Enable the enclosure alarm

$ sg_ses --descriptor=EnclosureElement00 --set=3:1:1 /dev/sg2

or

$ sg_ses --descriptor=EnclosureElement00 --set=3:0:1 /dev/sg2

(C) Disable the enclosure alarm

$ sg_ses --descriptor=EnclosureElement00 --clear=3:1:1 /dev/sg2

and

$ sg_ses --descriptor=EnclosureElement00 --clear=3:0:1 /dev/sg2

2.5.4. 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 auto 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 auto fan function again. Please disable the auto 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     4U60-Hub-P0          0c3e
```

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

```
$ sg_ses --descriptor=CoolingElement00 --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=CoolingElement00 --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

2.5.5. How to update firmware/MFG for Edge expanders

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	

All Edge expanders are hidden behind Hub, so please follow the steps below to update firmware/MFG on Edge0 via inband SAS. The same steps can be applied to the other Edge expanders. 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 (canister)

$ sg_map -i

/dev/sg2 AIC 12G 4U60-Hub-P0 0c3e

(B) Set the "Reserved2" of the first Array Device element on the Edge expander to make it visible. On 4U60, please use “Disk001” for Edge0 and “Disk031” for Edge1. On 4U90, please use “Disk001” for Edge0, “Disk031” for Edge1, and “Disk061” for Edge2.

$ sg_ses --descriptor=Disk001 --set=2:5:1 /dev/sg2

(C) Get SAS address for Hub. This example uses SAS address (500605B0:000272BF) for Hub.

$./g3Xflash -i get avail

(D) Reset Hub to have an additional device for Edge0

$./g3Xflash -i 500605b0000272bf reset exp

(E) Show the devices for Hub and Edge0

$ sg_map -i

```
/dev/sg2    AIC 12G     4U60-Hub-P0         0c3e
/dev/sg3    AIC 12G     4U60-Edge0          0c3f
```

(F) Update firmware on Edge0

$ sg_write_buffer --id=0x0 --in=<firmware filename> --mode=0x2 --offset=0 /dev/sg3

(G) Update MFG on Edge0

$ sg_write_buffer --id=0x83 --in=<MFG filename> --mode=0x2 --offset=0 /dev/sg3

(H) Get SAS address for Edge0. This example uses SAS address (50015B20:9000EBBF) for Edge0.

$ ./g3Xflash –i get avail

(I) Reset Edge0 to activate its new firmware/MFG

$./g3Xflash -i 50015b209000ebbf reset exp

(J) Get the current firmware version on Edge0 for confirmation

$./g3Xflash -i 50015b209000ebbf get ver

(K) Set the "Reserved5" of the first Array Device element on the Edge expander to make it invisible

$ sg_ses --descriptor=Disk001 --set=3:7:1 /dev/sg2

(L) Reset Hub to refresh the change on Edge0

$./g3Xflash -i 500605b0000272bf reset exp

2.5.6. How to update all firmware/MFG through in-band SES with a tar ball which includes all Edge firmware/MFG and Hub firmware/MFG

Please follow the steps below to update all firmware/MFG through in-band SES with a tar ball which includes all Edge firmware/MFG and Hub firmware/MFG. 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. The version of the software package "sg3_utils" must be v1.41 or

newer.

If Broadcom 24Gb SAS/NVMe eHBA 96xx card is used, the profile ID of the card has to be changed before all firmware/MFG update. The eHBA 96xx firmware phase 8.7 (or newer) and the utility “scrutinyCLI version 8.6” (or newer) can support the profile ID change in the following.

1. Run "show -all" using ScrutinyCLI. This should show “Profile Id: 0x2” and "Supported Profile Id: 0x2, 0x0, 0x3".
    - Profile Id 0x0: IT HBA for SAS/SATA/NVMe
    - Profile Id 0x1: EVP (Entry RAID)
    - Profile Id 0x2: Feature HBA
    - Profile Id 0x3: IT HBA for SAS/SATA only
2. Change the profile ID using "ctrl -personality -profileid 0" command
3. Reboot the system to activate the new profile
4. Run "show -all" again to confirm the new profile “Profile Id: 0x0”

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

```
$ sg_map -i

/dev/sg2    AIC 12G      4U60-Hub-P0          0c3e
```

(B) Set the time-out interval with the option “-t”. The update process on 4U60_SE takes about 180 seconds, and the update process on 4U90_SE takes about 240 seconds.

```
$ sg_write_buffer /dev/sg2 --id=0x04 --bpw=4k --in=4U60_SE_4U90_SE.tar
--mode=0x2 --offset=0 -t 600
```

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, five predefined groups are Group1, Group8, Group9, Group10, and Group11. Each PHY should be in one of the five 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 PHYs for the wide ports and drives in the example are not the PHY map in the 4U60 / 4U90.

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) Sensor information, model, and CPLD firmware revision (CPLD firmware revision is reported by Hub only)

cmd> sensor

3.4. How to configure enclosure address (Hub only)

(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

3.5. 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
```

3.6. 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
```

3.7. 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
```

3.8. How to configure EDFB (Edge only)

The default EDFB configuration is on.

(A) Check the current configuration

```
cmd> edfb
EDFB is OFF
```

(B) Enable EDFB

```
cmd> edfb on
```

(C) Disable EDFB

```
cmd> edfb off
```

3.9. How to configure zone count (Hub only)

Remove the SAS cable between the HBA/RAID card and the 4U60 / 4U90 before configuring zone count. Power the 4U60 / 4U90 off after configuring zone count. Power on the 4U60 / 4U90, and then insert the SAS cable.

Three zone configurations supported are one zone, two zones, and 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.

(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

(C-1) For 4U60

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

Hub:

Zone #	1
Wideport	1, 2, 3, 4

Edge:

Zone #	1
Slot	1~60

(C-1-2) When Zone Count = 2, T10 zoning is enabled.

Hub:

Zone #	1	2
Wideport	1, 2	3, 4

Edge:

Zone #	1	2
Slot	1~30	31~60

(C-1-3) When Zone Count = 4, T10 zoning is enabled.

Hub:

Zone #	1	2	3	4
Wideport	1	2	3	4

Edge:

Zone #	1	2	3	4
Slot	1~15	16~30	31~45	46~60

(C-2) For 4U90

(C-2-1) When Zone Count = 1, T10 zoning is disabled.

Hub:

Zone #	1
Wideport	1, 2, 3, 4

Edge:

Zone #	1
Slot	1~90

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

Hub:

Zone #	1	2
Wideport	1, 2	3, 4

Edge:

Zone #	1	2
Slot	1~45	46~90

(C-2-3) When Zone Count = 4, T10 zoning is enabled.

Hub:

Zone #	1	2	3	4
Wideport	1	2	3	4

Edge:

Zone #	1	2	3	4
Slot	1~23	24~46	47~68	69~90

3.11. How to configure zoning of the wide port (Hub only)

After enabling T10 zoning, five predefined groups are Group1, Group8, Group9, Group10, and Group11.

(A) Get current zoning of the wide port 1

cmd> zone_port 1

Wideport 01 for Zone Group 01

(B) Set the wide port 1 as Zone Group 8

cmd> zone_port 1 8

Succeeded to set zone group for the phy.

3.12. How to configure zoning of the disk slot (Edge only)

After enabling T10 zoning, five predefined groups are Group1, Group8, Group9, Group10, and Group11.

(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

4. Vendor Specific Vital Product Data (VPD) Page

The Vendor Specific VPD pages provide MFR_ID, MFR_MODEL, MFR_REVISION, MFR_SERIAL, and MFR_FW_ REVISION of the power module 0 (page code 0xC1) and power module 1 (page code 0xC2).

Vendor Specific VPD Page Format

BYTE/BIT	7	6	5	4	3	2	1	0
1	MFR_ID							
m								
m+1	0x20 (ASCII code space)							
m+2	MFR_MODEL							
n								
n+1	0x20 (ASCII code space)							
n+2	MFR_REVISION							
o								
o+1	0x20 (ASCII code space)							
o+2	MFR_SERIAL							
p								
p+1	0x20 (ASCII code space)							
p+2	MFR_FW_REVISION							
q								
q+1	0x20 (ASCII code space)							