Release Note for AIC SAS 12G 4U72PV_SE / 4U102PV_SE Expander

February 2, 2021

Changelog

02/02/2021 (Hub FW 1.12.45.52 + Hub MFG 1.45.0.51 + 30-Bay Edge FW 1.12.46.53 + 30-Bay Edge MFG 1.46.0.52 + 24-Bay Edge FW 1.12.47.53 + 24-Bay Edge MFG 1.47.0.52) - Part Number (SEE-00124552_A01 + SEG-0045C051_A01 + SEE-00124653_A01 + SEG-0046C052_A01 + SEE-00124753_A01 + SEG-0047C052_A01)

       Old Part Number SEE-00124551_A01 is replaced by SEE-00124552_A01.

1. Bug fix: hub can't detect 4U72 or 4U102

11/06/2020 (Hub FW 1.12.45.51 + Hub MFG 1.45.0.51 + 30-Bay Edge FW 1.12.46.53 + 30-Bay Edge MFG 1.46.0.52 + 24-Bay Edge FW 1.12.47.53 + 24-Bay Edge MFG 1.47.0.52) - Part Number (SEE-00124551_A01 + SEG-0045C051_A01 + SEE-00124653_A01 + SEG-0046C052_A01 + SEE-00124753_A01 + SEG-0047C052_A01)

       Old Part Number SEE-00124652_A01 is replaced by SEE-00124653_A01.

       Old Part Number SEE-00124752_A01 is replaced by SEE-00124753_A01.

1. Bug fix: I2C slave can't work on some hardware

06/20/2020 (Hub FW 1.12.45.51 + Hub MFG 1.45.0.51 + 30-Bay Edge FW 1.12.46.52 + 30-Bay Edge MFG 1.46.0.52 + 24-Bay Edge FW 1.12.47.52 + 24-Bay Edge MFG 1.47.0.52) - Part Number (SEE-00124551_A01 + SEG-0045C051_A01 + SEE-00124652_A01 + SEG-0046C052_A01 + SEE-00124752_A01 + SEG-0047C052_A01)

       Old Part Number SEE-00124651_A01 is replaced by SEE-00124652_A01.

       Old Part Number SEG-0046C051_A01 is replaced by SEG-0046C052_A01.

       Old Part Number SEE-00124751_A01 is replaced by SEE-00124752_A01.

   Old Part Number SEG-0047C051_A01 is replaced by SEG-0047C052_A01.

1. Enable EDFB
2. Bug fix: predicted failure for Microsemi RAID mode
3. Bug fix: reset Edge I2C channel to Hub because the I2C channel hangs sometimes
4. Bug fix: reset Secondary Edge I2C channel to Primary Edge because the I2C channel hangs sometimes

12/04/2019 (Hub FW 1.12.45.51 + Hub MFG 1.45.0.51 + 30-Bay Edge FW 1.12.46.51 + 30-Bay Edge MFG 1.46.0.51 + 24-Bay Edge FW 1.12.47.51 + 24-Bay Edge MFG 1.47.0.51) -

Part Number (SEE-00124551_A01 + SEG-0045C051_A01 + SEE-00124651_A01 + SEG-0046C051_A01 + SEE-00124751_A01 + SEG-0047C051_A01)

1. Initial revision
2. Built with SDK 12

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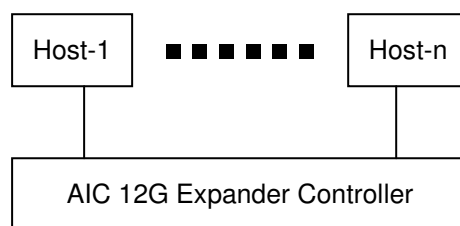
To have multiple host/path access support (the host number can be up to the number of wide ports on each AIC 12G Expander Controller), only the following drives are supported for shared access:

(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 (4U72serverHub / 4U102serverHub) to locate a drive.

(C) The management software MegaRAID Storage Manager with LSI 6G RAID Card.

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

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 (0: no congestion, 1: congestion or failure)							
1	Module1 STATUS_WORD							
2								
3	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							

BYTE/BIT	7	6	5	4	3	2	1	0
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: 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						

BYTE/BIT	7	6	5	4	3	2	1	0
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 (HubCoolingElement00) and Cooling element 6 (SysCoolingElement00) 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							

BYTE/BIT	7	6	5	4	3	2	1	0
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

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

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	Reserved			
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	Reserved	RQST MISSING	RQST INSERT	RQST REMOVE	RQST IDENT	Reserved
3	Reserved		RQST FAULT	DEVICE OFF	ENABLE BYP A	ENABLE BYP B	Reserved	

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.
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.
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	Reserved			
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	Reserved	RQST MISSING	RQST INSERT	RQST REMOVE	RQST IDENT	Reserved
3	Reserved		RQST FAULT	DEVICE OFF	ENABLE BYP A	ENABLE BYP B	Reserved	

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	Reserved			
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	Reserved	RQST MISSING	RQST INSERT	RQST REMOVE	RQST IDENT	Reserved
3	Reserved		RQST FAULT	DEVICE OFF	ENABLE BYP A	ENABLE BYP B	Reserved	

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    4U102serverHub   0c2d
```

(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 manually change PWM (fan speed) for the 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 the first Cooling element of each type (Hub fans and System fans) 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   4U102serverHub   0c2d

(B) Set "RQST IDENT" of the first Cooling element to disable the smart fan function. "HubCoolingElement00" is the first cooling element for the Hub / motherboard, and "SysCoolingElement00" is the first cooling element for the HDDs / backplane. Take "SysCoolingElement00" for example.
    $ sg_ses --descriptor= SysCoolingElement00 --set=1:7:1 /dev/sg2

(C) Set "REQUESTED SPEED CODE" of "SysCoolingElement00" to change PWM or fan speed for all Cooling elements. Set "REQUESTED SPEED CODE"=7 (100% PWM) for example.
    $ sg_ses --descriptor= SysCoolingElement00 --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

2.5.4. How to update firmware / MFG for 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	

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   4U102serverHub      0c2d
```

(B) Set the "Reserved2" of the first Array Device element on the Edge expander to make it visible. On 4U72server, please use "Disk001" for Edge0, "Disk025" for Edge1, and "Disk049" for Edge2. On 4U102server, please use "Disk001" for Edge0, "Disk031" for Edge1, "Disk055" for Edge2, and "Disk079" for Edge3.

```
$ 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   4U102serverHub      0c2d
/dev/sg3   AIC 12G   4U102serverEdge0    0c2e
```

(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
```

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) PHY0 – PHY15 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 PHY0 of Edge to be accessed only by the first port of Hub instead of the second port

```
cmd> phyzone 0 8
```

Step 5: Assign the drive on PHY1 of Edge to be accessed only by the second port of Hub instead of the first port

```
cmd> phyzone 1 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
```

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 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