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# Release Note for AIC SAS 24G 2U24_2MS Expander

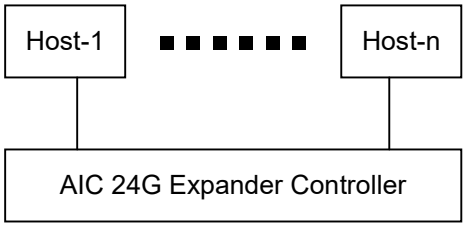
DEC 9, 2024

## Changelog

12/09/2024 (FW 1.24.6.1 + MFG 1.6.0.1) – Part Number (SEE-00240601_A01 + SEG-0006D001_A01)

1. Built with SDK 8
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 24G 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

## 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

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: 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 | | | | |

| 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<br>CRITICAL: FAIL bit is set due to one or more failure condition<br>UNKNOWN: The power supply can’t be read |
| DC OVER CURRENT | An output overcurrent fault has occurred |
| FAIL | A failure condition is detected |
| RQSTED ON | 1: On<br>0: Off for Disk Power Supply |
| OFF | 1: Off for Disk Power Supply |

| | |
|---|---|
| | 0: On |
| 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<br>NON-CRITICAL: Either warning limit is exceeded<br>CRITICAL: The fan RPM can’t be detected, or either failure limit is exceeded.<br>UNKNOWN: The fan RPM can’t be read |

| | |
|---|---|
| IDENT | Applicable only for Cooling element 0<br>0: Enable the auto fan function<br>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<br>NON-CRITICAL: Either warning limit is exceeded<br>CRITICAL: Either failure limit is exceeded<br>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 |
|---|---|
| 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 | Set by the RQST IDENT on Enclosure Control Element |
| 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<br>NON-CRITICAL: Either warning limit is exceeded<br>CRITICAL: Either failure limit is exceeded<br>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 | 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 drive bay<br>NOT INSTALLED: No drive is installed in the drive bay |
| 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 hard drive must be inserted into the backplane**)

The behavior “Fast Blink” is “LED is blinking at 4Hz 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 | Activity | ON |
| RQST INSERT | Activity | Slow Blink |
| RQST REMOVE | Activity | Slow Blink |
| RQST IDENT | Activity | Slow Blink |
| RQST FAULT | Activity | ON |
| DEVICE OFF | OFF | OFF |
| PRDFAIL | Activity | Slow Blink |

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

**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 bay is defined in the bit4, byte3 of the "Array Device Slot control element" in the SES specification. Set the bit to turn off a drive bay 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 24G  2U24  2MS  1806

(B) Get the current power state of a drive bay. The "Device off=0" means the drive bay 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 drive bay

$ sg_ses --page=7 /dev/sg2

Element 0 descriptor: Disk001

(D) Turn off a drive bay power

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

(E) Turn on a drive bay power

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

2.5.3. How to power off/on all drive bays manually

**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 “DiskPowerSupply” to power off all drive bays. Set the bit on Power Supply Element “DiskPowerSupply” to power on all drive bays. 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 24G  J2024 2MS  1806

(B) Power off all drive bays

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

(C) Power on all drive bays

$ sg_ses --descriptor=DiskPowerSupply --set=3:5:1 /dev/sg2

2.5.4. 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 24G  J2024 2MS  1806

(B) Enable the enclosure alarm

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

or

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

(C) Disable the enclosure alarm

$ sg_ses --descriptor=EnclosureElement --clear=3:1:2 /dev/sg2

2.5.5. 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 24G J2024 2MS 1806

(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 |

2.5.6. How to enable/disable the enclosure identification

**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 blue and red LEDs of all the drives are used for the enclosure identification with slow blink. The "RQST IDENT" for Enclosure is defined in the bit7, byte1 of the "Enclosure control element" in the SES specification. Setting the bit can enable the enclosure identification. Clearing the bit disables the enclosure identification. 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 24G     J2024 2MS          1806
```

(B) Enable the enclosure identification

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

(C) Disable the enclosure identification

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

## 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 bay accessed only by the first wide port and another drive bay accessed only by the second wide port. The PHYs for the wide ports and drives in the example are not the PHY map in the Hotswap35.

The configuration for the example is

(A) PHY0 ~ PHY3 for the first wide port

(B) PHY4 ~ PHY7 for the second wide port

(C) PHY12 ~ PHY35 for drive bays

Step 1: Read the current group for PHY4

cmd> phyzone 4

Phy 4 for Zone Group 1

Step 2: Assign the second wide port (PHY4 ~ PHY7) for Group9

cmd> phyzone 4 9

cmd> phyzone 5 9

cmd> phyzone 6 9

cmd> phyzone 7 9

Step 3: Assign the first wide port (PHY0 ~ PHY3) for Group8

cmd> phyzone 0 8

cmd> phyzone 1 8

cmd> phyzone 2 8

cmd> phyzone 3 8

Step 4: Assign the drive bay on PHY12 to be accessed only by the first wide port instead of the second wide port

cmd> phyzone 12 8

Step 5: Assign the drive bay on PHY13 to be accessed only by the second wide port instead of the first wide port

cmd> phyzone 13 9

Step 6: Reset for taking effect with the new settings

cmd> reset

3.3. How to get all revisions in AIC SAS 24G Expander

(A) Expander firmware revision

cmd> rev

(B) Expander configuration revision

cmd> showmfg

(C) Model and sensor information

cmd> sensor

3.4. How to configure temperature sensor

There are 12 temperature sensors. Four temperature settings in Celsius per sensor are T1, T2, warning threshold, and alarm (critical) threshold (**The Sensor is under unified**

**control**). The T1 and T2 are applied to the auto fan function.

(A) Get the current settings of Temperature Sensor

cmd> temperature

Temperature in Celsius (t1=40 C, t2=60 C, warning=53 C, alarm=55 C)

(B) Set 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

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

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.

(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.

```
cmd> check_wide_port standby
cmd> reset
```

The function will not work properly when the drive bay power is turned off with SES command of clearing “RQST_ON” of the Power Supply Element “DiskPowerSupply”.

The drive bay power will be turned on/off when SAS cable is connected/disconnected, even if the drive bay power is turned off/on by BMC or SES command of array device before SAS cable connected/disconnected.

3.9. How to configure EDFB

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

## 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) | | | | | | | |