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»Kontron Application Note«

AT8070: IPMI Sensor User Guide

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Customer Service

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Scope

This document's main purpose is to show how to analyze and understand events generated by sensors of the AT8070 (and RTM8063) which are stored in the System Event Log (SEL).

Typical situations in which the SEL needs to be consulted are as followed:

- Unexpected shutdown or reboot
- Front plate LEDs showing abnormality
- Any unusual behavior

In many cases, analyzing the SEL will allow to determine the root cause of the events and provide essential guidance in determining either preventive or corrective action.

This document also contains information needed to understand sensor readings. Readings provide useful information on the board's status (e.g.: which jumpers are present, current POST code, etc.).

In order to be able to accomplish these tasks, the user will first be introduced to "Sensors" as defined in the *IPMI specification* v2.0. Once the first level knowledge has been acquired, detailed information will be provided on how to analyze and interpret the data collected from these sensors with tools such as *ipmitool* and Pigeon Point's *clia*. *"Annex A"* includes a detailed list of all the sensors implemented on the AT8070 and RTM8063.

1. Sensor Introduction

Sensor Model

"Access to monitored information, such as temperatures and voltages, fan status, etc., is provided via the IPMI Sensor Model. Instead of providing direct access to the monitoring hardware IPMI provides access by abstracted sensor commands, such as the Get Sensor Reading command, implemented via a management controller. This approach isolates software from changes in the platform management hardware implementation.

Sensors are classified according to the type of readings they provide and/or the type of events they generate. A sensor can return either an analog or discrete reading. Sensor events can be discrete or threshold-based.

The different event types, sensor types, and monitored entities are represented using numeric codes defined in the IPMI specification. IPMI avoids reliance on strings for management information. Using numeric codes facilitates internationalization, automated handling by higher level software, and reduces management controller code and data space requirements."[1]

For the purpose of this document, the two most important characteristics of a sensor are:

- Event/Reading Type
- Sensor Type

Sensor Type

"Discrete" sensors defined with an *Event/Reading Type* 6Fh (Sensor-specific) will use *"Sensor-Specific"* definition for their offset and *"Event Data"*. *"Sensor-specific"* definition is available for many Sensor Types and may be "OEM" defined for OEM-class sensors.

[1] IPMI v2.0 Section 1.7.5 p:13

Sensor Classes

Sensors fall into the following classes:

Discrete:

- These are State Sensors - The reading they return contains two bytes where each bit can represent a unique state.
- Up to 15 possible states (not 16 since bit15 from the returned reading is reserved)
- More than one state may be active simultaneously.
- Events are generated by a unique state. Thus, Event Messages do not return a bit field, just a single offset value corresponding to a single event.

'Digital' Discrete:

- A digital sensor is not really a unique class, but a term commonly used to refer to special case of a discrete sensor that only has two possible states.

Threshold:

- Threshold based.
- Changes event status on reading comparison to threshold values.
- Threshold enumerations may be considered a special case of the discrete sensor type.

***OEM*:**

- Special case of discrete where the meanings of the state's (offsets) are OEM-defined.

Event/Reading Type

"Event/Reading Type codes are used in SDRs (sensor data records) and Event Messages to indicate the trigger type for an event. These codes are also used in SDRs to indicate what types of present reading a sensor provides.

Event/Reading Type Codes are used to specify a particular enumeration (offset) that identifies a set of possible events that can be generated by a sensor. For "Discrete" sensors, the specification of an Event/Reading Type code enumeration also indicates the type of reading the sensor provides."[2]

Event/Reading Type are listed in the following Table.

Table 1:*"Event/Reading Type"* Code Ranges[3]

Event/Reading Type Code category	7-bit Event/Reading Type Code Range	Sensor Class	Description
unspecified	00h	n/a	Event/Reading Type unspecified.
Threshold	01h	threshold	Threshold-based. Indicates a sensor that utilizes values that represent discrete threshold states in sensor access and/or events. The Event/Reading event offsets for the different threshold states are given in *Table 42-2, Generic Event/Reading Type Codes*, below.
Generic	02h-0Ch	discrete	Generic Discrete. Indicates a sensor that utilizes an Event/Reading Type code & State bit positions / event offsets from one of the sets specified for Discrete or 'digital' Discrete Event/Reading class in *Table 42-2, Generic Event/Reading Type Codes*, below.
Sensor-specific	6Fh	discrete	Sensor-specific Discrete. Indicates that the discrete state information is specific to the sensor type. State bit positions / event offsets for a particular sensor type are specified in the 'sensor-specific offset' column in *Table 42-3, Sensor Type Codes*, below.
OEM	70h-7Fh	OEM	OEM Discrete. Indicates that the discrete state information is specific to the OEM identified by the Manufacturer ID for the IPM device that is providing access to the sensor.

[2] IPMI v2.0 Section 42.1, p:498

[3] IPMI v2.0 Table 42-1, Event/Reading Type Code Ranges, p:499

Sensor Reading

Reading from a sensor is available through the *"Get Sensor Reading"* command. All other more complex commands which provide sensor readings use this raw command. Therefore, it is important to understand the format in which data is returned.

Table 2: "Get Sensor Reading" Command[4]

Request Data	1	sensor number (FFh = reserved)
Response Data	1	Completion Code.
	2	Sensor reading Byte 1: byte of reading. Ignore on read if sensor does not return an numeric (analog) reading.
	3	[7] - 0b = All Event Messages disabled from this sensor [6] - 0b = sensor scanning disabled [5] - 1b = reading/state unavailable (formerly "initial update in progress"). This bit is set to indicate that a 're-arm' or 'Set Event Receiver' command has been used to request an update of the sensor status, and that update has not occurred yet. Software should use this bit to avoid getting an incorrect status while the first sensor update is in progress. This bit is only required if it is possible for the controller to receive and process a 'Get Sensor Reading' or 'Get Sensor Event Status' command for the sensor before the update has completed. This is most likely to be the case for sensors, such as fan RPM sensors, that may require seconds to accumulate the first reading after a re-arm. The bit is also used to indicate when a reading/state is unavailable because the management controller cannot obtain a valid reading or state for the monitored entity, typically because the entity is not present. See *Section 16.4, Event Status, Event Conditions, and Present State* and *Section 16.6, Re-arming* for more information. [4:0] - reserved. Ignore on read.
	(4)	For threshold-based sensors Present threshold comparison status [7:6] - reserved. Returned as 1b. Ignore on read. [5] - 1b = at or above (≥) upper non-recoverable threshold [4] - 1b = at or above (≥) upper critical threshold [3] - 1b = at or above (≥) upper non-critical threshold [2] - 1b = at or below (≤) lower non-recoverable threshold [1] - 1b = at or below (≤) lower critical threshold [0] - 1b = at or below (≤) lower non-critical threshold For discrete reading sensors [7] - 1b = state 7 asserted [6] - 1b = state 6 asserted [5] - 1b = state 5 asserted [4] - 1b = state 4 asserted [3] - 1b = state 3 asserted [2] - 1b = state 2 asserted [1] - 1b = state 1 asserted [0] - 1b = state 0 asserted
	(5)	For discrete reading sensors only. (Optional) (00h Otherwise) [7] - reserved. Returned as 1b. Ignore on read. [6] - 1b = state 14 asserted [5] - 1b = state 13 asserted [4] - 1b = state 12 asserted [3] - 1b = state 11 asserted [2] - 1b = state 10 asserted [1] - 1b = state 9 asserted [0] - 1b = state 8 asserted

Completion Code:

This will not be displayed if the Request Message completes successfully and normally.

Byte 1: Sensor Reading

[4] IPMI v2.0 Table 35-15, Get Sensor Reading Command, p:464

- For "Discrete" Sensors, will return **00h**
- For "Threshold" based sensors, will return the analog reading. This value is coded according to the Event/Reading Type and/or Sensor type. Tools such as ipmitool provide commands which will decode this information in a human readable format.

Byte 2:

- Provides information on the sensor

Byte 3:

- For "Threshold" based sensor: Indicates were the reading stands against the threshold values.
- For "Discrete" sensors: Indicates which sensor offsets (states) are asserted for offset **00h** to **07h**.

Byte 4:

- For "Threshold" based sensor: 80h (since bit 7 is always 1b)
- For "Discrete" sensors: Indicates which sensor offsets (states) are asserted for offset **08h** to 14h.

NOTE: Sensors have a reading mask which is *"OEM"* defined. This is used to ignore unused states during reading. Therefore, if a state that should be asserted is not read, the *"Reading Mask"* should be verified.

Event Data

When a sensor changes state, an *"Event Message"* is sent to the SEL only if the *"Event Mask"* indicates that the new state must generate an event.

The *"Event Data"* contains 3 bytes where only the first byte is used. The signification of these bytes is listed in *"Annex A"* for every sensors implemented on the AT8070 and RTM8063.

Entity

"An Entity ID is a standardized numeric code that is used in SDRs to identify the types of physical entities or FRUs in the system"[5]

In the case of the AT8070, up to 4 entities can be present:

- FRU0 Front Board (the board itself)
- FRU1 PICMG Rear Transition Module (RTM8070)
- FRU2 Disk1 or Disk Bay1 (RTM's Disk1)
- FRU3 Disk2 or Disk Bay2 (RTM's Disk2)

[5] IPMI v2.0 Section 39, p:488

Sensor ID

Sensors have a numerical ID used to identify them. The sensor ID as seen in the list from *"Annex A"* might not be the same in particular cases.

The reason is that the sensor ID's are determined during the board's activation according to the order in which the entities are activated. First sensors to be designated an ID are the ones populated on *FRU0* (Entity: Front Board). Afterwards, it depends on which entity is the first to ask for activation. Therefore, the RTM's sensors might have an offset compared to the IDs from the *"Annex A"* list.

The consequence is that only sensor 0 to 103 will be fixed. Therefore, all other Entities' (FRU1 and up) sensors from the list should not be referred by a specific numerical ID but rather by their sensor name (IE: "FRU1:AMC power denied...).

2. ipmitool

This section does not list all commands that can be used to get information from sensors. However, these commands provide most of the relevant information.

ipmitool can be obtained from: http://ipmitool.sourceforge.net/

"Get Sensor Reading" Command

This PICMG command, introduced in previous section, can be used by raw command:

```
# ipmitool raw 0x04 0x2d <id>
```

0x04 : Network function Code for Sensor Event
0x2d : Get Sensor Reading command
<id> : Sensor ID

Sensor Command

This command provides information on the board's sensors. It is also the only sensor-command (excluding raw commands) that lists the reading "Data Byte" 3 and 4 (see "Sensor Reading" from section "1. Sensor Introduction"). Other *ipmitool* command provides sensor reading "Data Byte" 3.

```
# ipmitool sensor
```

Figure 1: "ipmitool sensor" command

Sensor	Analog Reading	Type	Reading Byte 3&4	Threshold Values					
IPMC Storage Err	0x0	discrete	0x0080	na	na	na	na	na	na
IPMC SEL State	0x0	discrete	0x0080	na	na	na	na	na	na
ME Availability	0x0	discrete	0x4280	na	na	na	na	na	na
Jumper Status	0x0	discrete	0x0080	na	na	na	na	na	na
IPMI Info-1	0x0	discrete	0x0080	na	na	na	na	na	na
IPMI Info-2	0x0	discrete	0x0080	na	na	na	na	na	na
RTM:IPMI Info-2	0x0	discrete	0x0080	na	na	na	na	na	na
RTM:IPMI Info-1	0x0	discrete	0x0080	na	na	na	na	na	na
RTM:MMC Stor Err	0x0	discrete	0x0080	na	na	na	na	na	na
RTM:MMC FwUp	0x0	discrete	0x0080	na	na	na	na	na	na
RTM:MMC Reboot	0x0	discrete	0x0180	na	na	na	na	na	na
RTM:FRU Agent	0x0	discrete	0x0180	na	na	na	na	na	na
RTM:IPMBL State	0x88	discrete	0x0880	na	na	na	na	na	na
RTM:Ver Change	0x0	discrete	0x0080	na	na	na	na	na	na
RTM:Health Error	0x0	discrete	0x0180	na	na	na	na	na	na
RTM:Pwr Good Ev	0x0	discrete	0x4780	na	na	na	na	na	na
RTM:Power Good	0x0	discrete	0x4780	na	na	na	na	na	na
RTM:Power State	0x0	discrete	0x0180	na	na	na	na	na	na
RTM:Disk Bay	0x0	discrete	0x0480	na	na	na	na	na	na
RTM:USB1 OC	0x0	discrete	0x0180	na	na	na	na	na	na
RTM:USB0 OC	0x0	discrete	0x0180	na	na	na	na	na	na
RTM:SFP-B OC	0x0	discrete	0x0180	na	na	na	na	na	na
RTM:SFP-B Pres	0x0	discrete	0x0080	na	na	na	na	na	na
RTM:SFP-A OC	0x0	discrete	0x0180	na	na	na	na	na	na
RTM:SFP-A Pres	0x0	discrete	0x0080	na	na	na	na	na	na
RTM:Vcc +12VDisk	12.100	Volts	ok	10.560	11.165	na	na	12.870	13.475
RTM:Vcc +12V	10.899	Volts	ok	0.000	10.395	na	na	14.301	16.002
RTM:Vcc BlueLED	6.612	Volts	ok	3.876	5.814	na	na	7.410	9.424
RTM:Vcc +1.2V	1.197	Volts	ok	0.000	1.121	na	na	1.285	1.588
RTM:Vcc +5V	5.079	Volts	ok	0.000	4.666	na	na	5.346	6.124
RTM:Vcc +3.3V	3.296	Volts	ok	0.000	3.072	na	na	3.536	4.032
RTM:Vcc +3.3VSUS	3.298	Volts	ok	0.000	2.941	na	na	3.672	4.335
RTM:Temp MMC	27.000	degrees C	ok	-20.000	-10.000	-5.000	60.000	70.000	80.000
RTM:Temp SASCtrl	56.000	degrees C	ok	-20.000	-10.000	-5.000	105.000	115.000	125.000
RTM:Temp Air Out	37.000	degrees C	ok	-10.000	0.000	5.000	60.000	70.000	80.000
RTM:Temp Air In	27.000	degrees C	ok	-10.000	0.000	5.000	60.000	70.000	80.000

SDR Command

The following command will provide additional information on sensors.

ipmitool sdr list –v

Figure 2: "ipmitool sdr list –v" Command

```
Sensor ID              : RTM:SFP-A OC (0x82)
 Entity ID             : 192.96 (PICMG Rear Transition Module)
 Sensor Type (Discrete): Current
 States Asserted       : Digital State
                         [State Deasserted]
 Assertions Enabled    : Digital State
                         [State Asserted]
 Deassertions Enabled  : Digital State
                         [State Asserted]

Sensor ID              : RTM:SFP-A Pres (0x81)
 Entity ID             : 192.96 (PICMG Rear Transition Module)
 Sensor Type (Discrete): Slot / Connector
 Assertions Enabled    : Slot/Connector
                         [Fault Status]
                         [Device Installed]
 Deassertions Enabled  : Slot/Connector
                         [Fault Status]
                         [Device Installed]

Sensor ID              : RTM:Vcc +12VDisk (0x80)
 Entity ID             : 192.96 (PICMG Rear Transition Module)
 Sensor Type (Analog)  : Voltage
 Sensor Reading        : 12.100 (+/- 0.220) Volts
 Status                : ok
 Nominal Reading       : 11.990
 Normal Minimum        : 11.165
 Normal Maximum        : 12.870
 Positive Hysteresis   : 0.495
 Negative Hysteresis   : 0.495
 Minimum sensor range  : Unspecified
 Maximum sensor range  : Unspecified
 Event Message Control : Per-threshold
 Readable Thresholds   : lnr lcr ucr unr
 Settable Thresholds   : lnr lcr ucr unr
 Threshold Read Mask   : lnr lcr ucr unr
 Assertions Enabled    : lcr- lnr- ucr+ unr+
 Deassertions Enabled  : lcr- lnr- ucr+ unr+
```

SEL Command

The command "ipmitool sel" shows the sensor's NAME, ID and "Event Data" (in human-readable format) for each event logged. In some cases, *ipmitool* is not able to analyze the "Event Data" and will print Event Data 1,2 and 3. When this occurs, the list in *Annex A* should be used to decode these bytes.

ipmitool sel list

Figure 3: "ipmitool sel list" Command

```
134 | 11/03/2009 | 14:55:15 | Voltage #0x6b | Lower Critical going low
135 | 11/03/2009 | 14:55:19 | FRU Hot Swap #0x02 | Transition to M4 | Asserted
136 | 11/03/2009 | 14:55:20 | FRU Hot Swap #0x03 | Transition to M4 | Asserted
137 | 11/03/2009 | 14:55:21 | FRU Hot Swap #0x01 | Transition to M4 | Asserted
138 | 11/03/2009 | 14:55:29 | Version Change #0x51 | Firmware or software change detected | Asserted
139 | 11/03/2009 | 14:55:33 | Reset #0x43 | State Asserted
13a | 11/03/2009 | 15:08:27 | System ACPI Power State #0x4e | S0/G0: working | Asserted
13b | 11/03/2009 | 15:56:59 | Reset #0x43 | State Asserted
13c | 11/03/2009 | 15:56:59 | Reset #0x43 | State Asserted
13d | 11/03/2009 | 15:57:33 | Reset #0x43 | State Asserted
13e | 11/03/2009 | 15:59:00 | Reset #0x43 | State Asserted
13f | 11/03/2009 | 16:18:22 | Reset #0x43 | State Asserted
140 | 11/03/2009 | 16:19:16 | System ACPI Power State #0x4e | S0/G0: working | Asserted
141 | 11/03/2009 | 16:22:57 | Reset #0x43 | State Asserted
142 | 11/03/2009 | 16:22:57 | Reset #0x43 | State Asserted
143 | 11/03/2009 | 16:23:58 | System ACPI Power State #0x4e | S0/G0: working | Asserted
144 | 11/03/2009 | 16:26:13 | Reset #0x43 | State Asserted
145 | 11/03/2009 | 16:26:14 | Reset #0x43 | State Asserted
146 | 11/03/2009 | 16:26:33 | Reset #0x43 | State Asserted
147 | 11/03/2009 | 16:27:45 | Reset #0x43 | State Asserted
148 | 11/03/2009 | 16:29:26 | System ACPI Power State #0x4e | S0/G0: working | Asserted
149 | 11/03/2009 | 20:56:15 | IPMB-0 Status #0x53 | IPMB-A enabled, IPMB-B disabled | Asserted
14a | 11/03/2009 | 20:56:26 | IPMB-0 Status #0x53 | IPMB-A enabled, IPMP-B enabled | Asserted
```

It is recommended to use Pigeon Point's "*clia* sel" command to analyze SEL data since it provides more details on sensors.

3. Pigeon Point's *clia*

This section will cover the 'sensordata' and 'sel' commands from the Shelf Manager's "*Command Line Interpreter*".

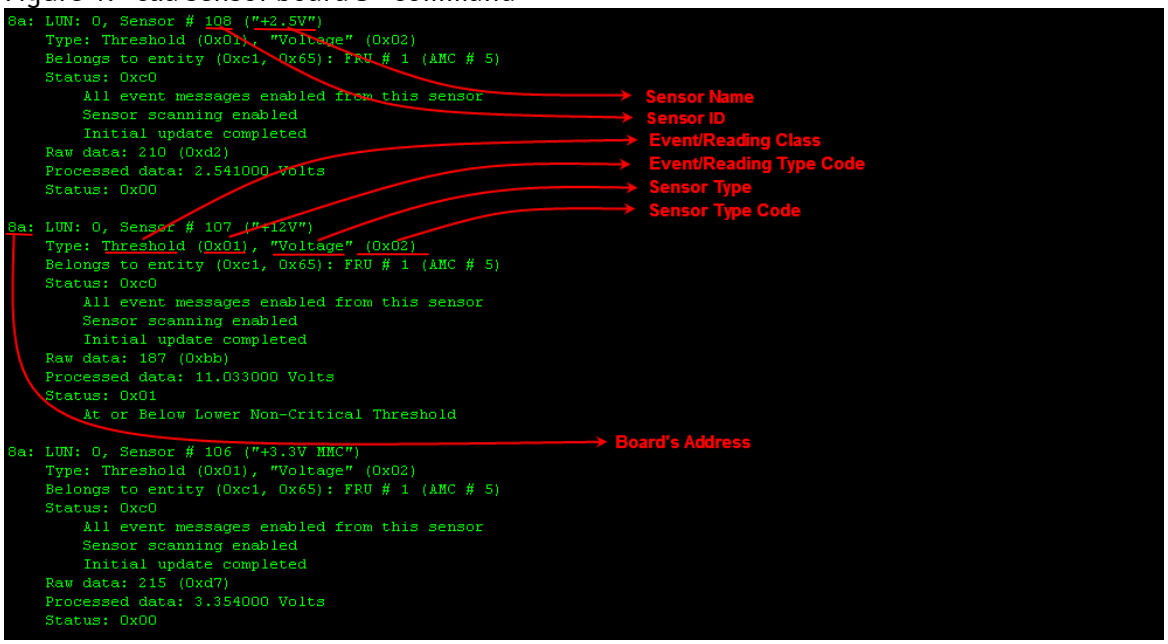
For more info consult Pigeon Point's web site: http://www.pigeonpoint.com/

Sensordata Command

This command can be used to get more details on the sensors' current readings. It also indicates whether "Event Messages" are enabled or not for each sensor.

clia sensor board 5 (in this example, the board is located in slot 5)

Figure 4: "clia sensor board 5" Command

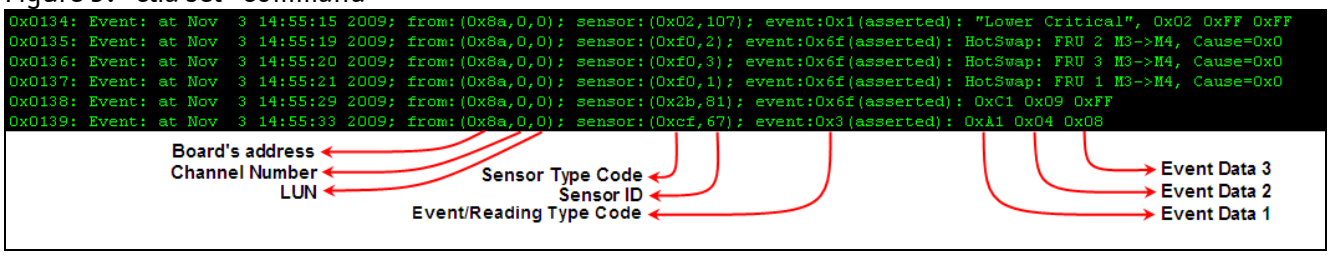


Sel Command

The "*clia* sel" command shows all the information you will need to find a definition for the event "Data Bytes" in *"Annex A"*'s list. Some Events are directly analyzed.

clia sel board 5 (in this example, the board is located in slot 5)

Figure 5: "clia sel" Command



4. Example

Analyzing the SEL

Whenever an unusual situation is reported, the SEL should be consulted:

Figure 6: SEL Event Example

```
0x0138: Event: at Nov  3 14:55:29 2009; from:(0x8a,0,0); sensor:(0x2b,81); event:0x6f(asserted): 0xC1 0x09 0xFF
```

Since the sensor's ID (81) is between 0 and 103 (as explained section "1. Sensor Introduction"), its ID can be used to locate the sensor in the "*Annex A*" list:

Sensor ID	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Offset	Data Byte 1	Data Byte 2	Data Byte 3
81	FW Ver Change / PICMG Front Board (160.96)	Sensor-specific (Discrete 0x6f) / Version Change (0x2b)	00h (bit 0): Hardware change detected with associated Entity. Informational. This offset does not imply whether the hardware change was successful or not. Only that a change occurred. 01h (bit 1): Firmware or software change detected with associated Entity. Informational. Success or failure not implied. 02h (bit 2): Hardware incompatibility detected with associated Entity. 03h (bit 3): Firmware or software incompatibility detected with associated Entity. 04h (bit 4): Entity is of an invalid or unsupported hardware version. 05h (bit 5): Entity contains an invalid or unsupported firmware or software version. 06h (bit 6): Hardware Change detected with associated Entity was successful. (deassertion event means 'unsuccessful'). 07h (bit 7): Software or F/W Change detected with associated Entity was successful. (deassertion event means 'unsuccessful')	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	bit[7:0]: Version change type 00h unspecified 01h management controller device ID (change in one or more fields from 'Get Device ID') 02h management controller firmware revision 03h management controller device revision 04h management controller manufacturer ID 05h management controller IPMI version 06h management controller auxiliary firmware ID 07h management controller firmware boot block 08h other management controller firmware 09h system firmware (EFI / BIOS) change 0Ah SMBIOS change 0Bh operating system change 0Ch operating system loader change 0Dh service or diagnostic partition change 0Eh management software agent change 0Fh management software application change 10h management software middleware change 11h programmable hardware change (e.g. FPGA) 12h board/FRU module change (change of a module plugged into associated entity) 13h board/FRU component change (addition or removal of a replaceable component on the board/FRU that is not tracked as a FRU)	FFh

Let's analyze the "Event Data":

Event Data 1: 0xC1

0xC1 = 1100 0001
Bit[7:6] = 11b : sensor-specific event extension code in byte 2
Bit[5:4] = 00b : unspecified byte 3
Bit[3:0] = 00001b : offset from Event/Reading code (offset which triggered the event)
→ **01h** (bit 1): Firmware or software change detected with associated Entity. Informational. Success or failure not implied.

Event Data 2: 0x09

bit[7:0]: Version change type
→ system firmware (EFI / BIOS) change

If the sensor's ID is out of the 0:103 range, use the "*clia* sensor" or "*ipmitool* sensor" command to determine the sensor's name. With this name, run a search in the "*Annex A*" list and verify that the other information match since it may occur that two sensors have the same name while they can belong to different "Entity".

Read a "discrete" sensor

In some cases, it can be useful to consult a discrete sensor's current state. For example, to know which jumpers are installed on a board without pulling it out of the chassis, the "Jumper Status" sensors should be consulted.

To do so, use the "*ipmitool sensor*" command or the raw "Get Sensor Reading" command. These commands will provide "Reading Byte" 3&4 (which correspond to "Response Data Byte" 4&5 as shown section "1. Sensor Introduction"). To analyze the reading, table 2 and the offset column on "*Annex A*" should be consulted.

Example: Reading Bytes 3&4 = 0xA193 for the "Jumper Status" sensor.

Meaning:

0xA193 = 1010 0001 1001 0011

- **00h** (bit 0): Jumper 00 Present (JP1: 1-2)
- **05h** (bit 5): Jumper 05 Present (JP1: 11-12)
- **07h** (bit 7): Jumper 07 Present (JP2: 1-2)
- **08h** (bit 8): Jumper 08 Present (JP2: 3-4)
- **09h** (bit 9): Jumper 09 Present (JP2: 5-6)
- **0Ch** (bit 12): Jumper 12 Present (JP2: 11-12)

Annex A – List of AT8070/RTM8063 sensors

ID (Hex)	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Description	Offset	Data Byte 1	Data Byte 2	Data Byte 3
0 (00)	FRU0 Hot Swap/ Front Board (160.96)	Sensor specific (Discrete 0x6F) / Hot Swap (0xF0)	Board FRU Hot Swap Sensor for FRU 0 (Front Board)	**0** = M0 – FRU Not Installed **1** = M1 – FRU Inactive **2** = M2 – FRU Activation Request **3** = M3 – FRU Activation In Progress **4** = M4 – FRU Active **5** = M5 – FRU Deactivation Request **6** = M6 – FRU Deactivation In Progress **7** = M7 – FRU Communication Lost **8**-Fh = Reserved	[7:4] = **Ah** *(OEM code in Event Data 2 & 3)* [3:0] = Current State **0** = M0 – FRU Not Installed **1** = M1 – FRU Inactive **2** = M2 – FRU Activation Request **3** = M3 – FRU Activation In Progress **4** = M4 – FRU Active **5** = M5 – FRU Deactivation Request **6** = M6 – FRU Deactivation In Progress **7** = M7 – FRU Communication Lost **8**-Fh = Reserved	[7:4] = Cause of state change. See Table 3-23, “Cause of state change values,” for values. [3:0] = Previous State 0 = M0 – FRU Not Installed 1 = M1 – FRU Inactive 2 = M2 – FRU Activation Request 3 = M3 – FRU Activation In Progress 4 = M4 – FRU Active 5 = M5 – FRU Deactivation Request 6 = M6 – FRU Deactivation In Progress 7 = M7 – FRU Communication Lost 8-Fh = Reserved	[7:0] = FRU Device ID
1 (01)	FRU1 Hot Swap/ RTM (192.96)	Sensor specific (Discrete 0x6F) / Hot Swap (0xF0)	Board FRU Hot Swap Sensor for FRU 1 (RTM) Available only when RTM is inserted				
2 (02)	FRU2 Hot Swap/ RTM Disk (4.96)	Sensor specific (Discrete 0x6F) / Hot Swap (0xF0)	Board FRU Hot Swap Sensor for FRU 2 (RTM Disk1) Available only when RTM and 1+ disk is inserted				
3 (03)	FRU3 Hot Swap/ RTM Disk (4.96)	Sensor specific (Discrete 0x6F) / Hot Swap (0xF0)	Board FRU Hot Swap Sensor for FRU 3 (RTM Disk2) Available only when RTM and 1+ disk is inserted				
4 (04)	FRU0 Reconfig/ Front Board (160.96)	Sensor specific (Discrete 0x6F) / System Event (0x12)	Sensor Population Change on Carrier	**00h** (bit 0): System Reconfigured **01h** (bit 1): OEM System Boot Event **02h** (bit 2): Undetermined system hardware failure **03h** (bit 3): Entry added to Auxiliary Log **04h** (bit 4): PEF Action **05h** (bit 5): Timestamp Clock Synch.	[7:6] - 00b = unspecified byte 2 01b = trigger reading in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = trigger threshold value in byte 3 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] = Offset from Event/Reading Code for threshold event.	See Sensor Specific Event (Annex B)	-
5 (05)	Temp Board Inlet/ Front Board (66.97)	Threshold based (Threshold 0x01) / Temperature (0x01)	Board Inlet Temp (°C)	Threshold Values: **00h** : Lower Non-critical: going low **01h** : Lower Non-critical: going high **02h** : Lower Critical: going low **03h** : Lower Critical: going high **04h** : Lower Non-recoverable: going low **05h** : Lower Non-recoverable: going high **06h** : Upper Non-critical: going low **07h** : Upper Non-critical: going high **08h** : Upper Critical: going low **09h** : Upper Critical: going high **0Ah** : Upper Non-recoverable: going low **0Bh** : Upper Non-recoverable: going high	[7:6] - 00b = unspecified byte 2 01b = trigger reading in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = trigger threshold value in byte 3 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] = Offset from Event/Reading Code for threshold event.	Reading that triggered the event, FFh or not present if unspecified. Do not confuse reading with Threshold Value	Threshold value that triggered event, FFh or not present if unspecified. If present, Event Data 2 must be present
6 (06)	Temp CPU 0/ Front Board: CPU (65.97)	Threshold based (Threshold 0x01) / Temperature (0x01)	CPU0 Temp (°C)				
7 (07)	Temp CPU 1/ Front Board: CPU (65.98)	Threshold based (Threshold 0x01) / Temperature (0x01)	CPU1 Temp (°C)				
8 (08)	Temp Vcore 0/ Front Board: CPU (65.61)	Threshold based (Threshold 0x01) / Temperature (0x01)	CPU0 Vcore Switcher Temp (°C)				
9 (09)	Temp Vcore 1/ Front Board: CPU (65.62)	Threshold based (Threshold 0x01) / Temperature (0x01)	CPU1 Vcore Switcher Temp (°C)				
10 (0A)	Temp DIMM A/ Front Board: Mem (32.96)	Threshold based (Threshold 0x01) / Temperature (0x01)	DIMM A Temp (°C)				
11 (0B)	Temp DIMM B/ Front Board: Mem (32.97)	Threshold based (Threshold 0x01) / Temperature (0x01)	DIMM B Temp (°C)				
12 (0C)	Temp DIMM C/ Front Board: Mem (32.98)	Threshold based (Threshold 0x01) / Temperature (0x01)	DIMM C Temp (°C)				
13 (0D)	Temp DIMM D/ Front Board: Mem (32.99)	Threshold based (Threshold 0x01) / Temperature (0x01)	DIMM D Temp (°C)				
14 (0E)	Temp DIMM E/ Front Board: Mem (32.100)	Threshold based (Threshold 0x01) / Temperature (0x01)	DIMM E Temp (°C)				
15 (0F)	Temp DIMM F/ Front Board: Mem (32.101)	Threshold based (Threshold 0x01) / Temperature (0x01)	DIMM F Temp (°C)				
16 (10)	Temp DIMM G/ Front Board: Mem (32.102)	Threshold based (Threshold 0x01) / Temperature (0x01)	DIMM G Temp (°C)				

ID (Hex)	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Description	Offset	Data Byte 1	Data Byte 2	Data Byte 3
17 (11)	Temp DIMM H/ Front Board: Mem (32.103)	Threshold based (Threshold 0x01) / Temperature (0x01)	DIMM H Temp (°C)	Threshold Values: **00h** : Lower Non-critical: going low **01h** : Lower Non-critical: going high **02h** : Lower Critical: going low **03h** : Lower Critical: going high **04h** : Lower Non-recoverable: going low **05h** : Lower Non-recoverable: going high **06h** : Upper Non-critical: going low **07h** : Upper Non-critical: going high **08h** : Upper Critical: going low **09h** : Upper Critical: going high **0Ah** : Upper Non-recoverable: going low **0Bh** : Upper Non-recoverable: going high	[7:6] - 00b = unspecified byte 2 01b = trigger reading in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = trigger threshold value in byte 3 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] = Offset from Event/Reading Code for threshold event.	Reading that triggered the event, FFh or not present if unspecified. Do not confuse reading with Threshold Value	Threshold value that triggered event, FFh or not present if unspecified. If present, Event Data 2 must be present
18 (12)	Temp Disk/ RTM Disk (4.96)	Threshold based (Threshold 0x01) / Temperature (0x01)	Disk Temperature (°C)				
19 (13)	Temp Disk1/ RTM Disk (4.96)	Threshold based (Threshold 0x01) / Temperature (0x01)	Disk 1 Temperature (°C) Available only when RTM8063 and 1+ disk(s) is present				
20 (14)	Temp Disk2/ RTM Disk (4.97)	Threshold based (Threshold 0x01) / Temperature (0x01)	Disk 2 Temperature (°C) Available only when RTM8063 and both disks are present				
21 (15)	Board Input Power/ Front Board (160.96)	Threshold based (Threshold 0x01) / Other Unit-Based Sensor (Watt) (0x0B)	Complete blade power consumption (W) (including managed FRU)	Threshold Values: **00h** : Lower Non-critical: going low **01h** : Lower Non-critical: going high **02h** : Lower Critical: going low **03h** : Lower Critical: going high **04h** : Lower Non-recoverable: going low **05h** : Lower Non-recoverable: going high **06h** : Upper Non-critical: going low **07h** : Upper Non-critical: going high **08h** : Upper Critical: going low **09h** : Upper Critical: going high **0Ah** : Upper Non-recoverable: going low **0Bh** : Upper Non-recoverable: going high	[7:6] - 00b = unspecified byte 2 01b = trigger reading in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = trigger threshold value in byte 3 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] = Offset from Event/Reading Code for threshold event.	Reading that triggered the event, FFh or not present if unspecified. Do not confuse reading with Threshold Value	Threshold value that triggered event, FFh or not present if unspecified. If present, Event Data 2 must be present
22 (16)	FRU0 Brd Power/ Front Board (160.96)	Threshold based (Threshold 0x01) / Other Unit-Based Sensor (Watt) (0x0B)	FRU 0 (Board) Power consumption (W)				
23 (17)	FRU1 RTM Power/ Front Board (160.96)	Threshold based (Threshold 0x01) / Other Unit-Based Sensor (Watt) (0x0B)	FRU1 (RTM) + FRU2 (RTM Disk1) + FRU3 (RTM Disk2) Power consumption (W)				
24 (18)	Vcc -48V Feed/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	-48v feed Voltage: board input power (V)	Threshold Values: **00h** : Lower Non-critical: going low **01h** : Lower Non-critical: going high **02h** : Lower Critical: going low **03h** : Lower Critical: going high **04h** : Lower Non-recoverable: going low **05h** : Lower Non-recoverable: going high **06h** : Upper Non-critical: going low **07h** : Upper Non-critical: going high **08h** : Upper Critical: going low **09h** : Upper Critical: going high **0Ah** : Upper Non-recoverable: going low **0Bh** : Upper Non-recoverable: going high	[7:6] - 00b = unspecified byte 2 01b = trigger reading in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = trigger threshold value in byte 3 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] = Offset from Event/Reading Code for threshold event.	Reading that triggered the event, FFh or not present if unspecified. Do not confuse reading with Threshold Value	Threshold value that triggered event, FFh or not present if unspecified. If present, Event Data 2 must be present
25 (19)	Vcc +12V SUS/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-Board 12V suspend (mgmt) power (V)				
26 (1A)	Vcc +5V SUS/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 5.0V suspend (mgmt) power (V)				
27 (1B)	Vcc +3.3V SUS/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 3.3V suspend (mgmt) power (V)				
28 (1C)	Vcc +1.8V SUS/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 1.8V suspend (mgmt) power (V)				
29 (1D)	Vcc +1.5V SUS/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 1.5V suspend (mgmt) power supply (V)				
30 (1E)	Vcc +1.25V SUS/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 1.25V suspend (mgmt) power supply (V)				
31 (1F)	Vcc +1.2V SUS/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 1.2V suspend (mgmt) power supply (V)				
32 (20)	Vcc +1.0V SUS/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 1.0V suspend (mgmt) power supply (V)				
33 (21)	Vcc +0.75V SUS/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 0.75V suspend (mgmt) power supply (V)				
34 (22)	Vcc +1.5V/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 1.5V payload power supply (V)				
35 (23)	Vcc +1.2V/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 1.2V payload power supply (V)				

ID (Hex)	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Description	Offset	Data Byte 1	Data Byte 2	Data Byte 3
36 (24)	Vcc +1.1V ME/ Front Board (160.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board 1.1V payload power supply (V)	Threshold Values: **00h** : Lower Non-critical: going low **01h** : Lower Non-critical: going high **02h** : Lower Critical: going low **03h** : Lower Critical: going high **04h** : Lower Non-recoverable: going low **05h** : Lower Non-recoverable: going high **06h** : Upper Non-critical: going low **07h** : Upper Non-critical: going high **08h** : Upper Critical: going low **09h** : Upper Critical: going high **0Ah** : Upper Non-recoverable: going low **0Bh** : Upper Non-recoverable: going high	[7:6] - 00b = unspecified byte 2 01b = trigger reading in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = trigger threshold value in byte 3 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] = Offset from Event/Reading Code for threshold event.	Reading that triggered the event, FFh or not present if unspecified. Do not confuse reading with Threshold Value	Threshold value that triggered event, FFh or not present if unspecified. If present, Event Data 2 must be present
38 (26)	Vcc VCORE 0/ Front Board: Pwr (20.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board CPU0 Vcore payload power supply (V)				
39 (27)	Vcc VTT CPU 0/ Front Board: Pwr (20.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board CPU0 VTT payload power supply (V)				
40 (28)	Vcc VDDQ CPU 0/ Front Board: Pwr (20.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board CPU0 VDDQ payload power supply (V)				
41 (29)	Vcc VSA CPU 0/ Front Board: Pwr (20.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board CPU0 VSA payload power supply (V)				
42 (2A)	Vcc PLL CPU 0/ Front Board: Pwr (20.96)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board CPU0 PLL payload power supply (V)				
43 (2B)	Vcc VCORE 1/ Front Board: Pwr (20.97)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board CPU1 Vcore payload power supply (V)				
44 (2C)	Vcc VTT CPU 1/ Front Board: Pwr (20.97)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board CPU1 VTT payload power supply (V)				
45 (2D)	Vcc VDDQ CPU 1/ Front Board: Pwr (20.97)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board CPU1 VDDQ payload power supply (V)				
46 (2E)	Vcc VSA CPU 1/ Front Board: Pwr (20.97)	Threshold based (Threshold 0x01) / Voltage (0x02)	On-board CPU1 VSA payload power supply (V)				
47 (2F)	Vcc PLL CPU 1/ Front Board: Pwr (20.97)	Threshold based (Discrete 0x01) / Voltage (0x02)	On-board CPU1 VSA payload power supply (V)				
48 (30)	Fuse-Pres A Feed/ Front Board (160.96)	Sensor specific (Discrete 0x6F) / Power Supply (0x08)	Fuse presence /fault detection -48V supply A	Redundancy States Used: **00h** (bit 0): Fully Redundant (formerly "Redundancy Regained") Indicates that full redundancy has been regained. **01h** (bit 1): Redundancy Lost Entered any non-redundant state, including Non-redundant: Insufficient Resources.	[7:6] - 00b = unspecified byte 2 01b = trigger reading in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = trigger threshold value in byte 3 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] = Offset from Event/Reading Code for threshold event.	-	-
49 (31)	Fuse-Pres B Feed/ Front Board (160.96)	Sensor specific (Discrete 0x6F) / Power Supply (0x08)	Fuse presence /fault detection -48V supply B				
50 (32)	Power State/ Front Board (160.96)	Sensor specific (Discrete 0x6F) / Kontron OEM Power State Sensor (0xD0)	Board Power State	**00h**: Power ON **01h**: Power OFF **02h**: Power ON Request **03h**: Power ON in progress **04h**: Power OFF Request **05h**: Graceful Power OFF Request **06h**: Power OFF in progress **07h**: Synchronise Graceful Power OFF **08h**: Power OFF Now Request	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	-	-
51 (33)	Power Good/ Front Board (160.96)	OEM (Discrete 0x77) / Power Supply (0x08)	Current power good status	Bit 0: VccGood 12V Bit 1: VccGood 5V Bit 2: VccGood 3.3V Bit 3: VccGood 2.5V Bit 4: VccGood 1.8V Bit 5: VccGood 1.5V Bit 6: VccGood 1.2V Bit 7: VccGood Core Bit 8: VccGood -5V Bit 9: VccGood 1.1V Bit 10: VccGood 1.05V Bit 11: VccGood 1.25V	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	-	-
52 (34)	Power Good Event/ Front Board (160.96)	OEM (Discrete 0x77) / Power Supply (0x08)	Power good status event that occur since the last power on or reset				

ID (Hex)	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Description	Offset	Data Byte 1	Data Byte 2	Data Byte 3
53 (35)	Board Reset/ Front Board (160.96)	Digital Discrete (Discrete 0x03)/ OEM (Kontron Reset Sensor) (0xCF)	Board reset type and sources	**00h** State asserted **01h** State Deasserted	[7:6] - OEM Data in Byte 2 [5:4] - OEM Data in Byte 3 [3:0] - Reserved	Event Data 2: Reset Type 00h: Warm reset **01h**: Cold reset **02h**: Forced Cold [Warm reset reverted to cold] **03h**: Soft reset [Software jump] **04h**: Hard Reset **05h**: Forced Hard [Warm reset reverted to Hard]	Event Data 3: Reset Source **00h**: IPM Watchdog [cold warm forced cold] (IPM Watchdog2 sensor gives additional details) **01h:** IPM commands [cold warm or forced cold] (chassis control fru control) **02h**: Processor internal check stop **03h**: Processor internal reset request **04h**: Reset button [warm or forced cold] **05h**: Power up [cold] **06h**: Legacy Initial Watchdog / Warm Reset Loop Detection [cold reset] **07h**: Legacy Programmable Watchdog [cold Warm or forced cold] **08h**: Software initiated [soft cold, warm or forced cold] **09h**: Setup Reset [Software initiated Cold] **0Ah**: Power Cycle/Full Reset/Global Platform Reset **FFh**: Unknown
54 (36)	POST Value / Front Board (160.96)	Sensor specific (Discrete 0x6F) / OEM (Kontron POST value sensor) (0xC6)	Show current postcode value. No event generated by this sensor	**00h** to **07h** (bit[0:7]): Post Code low byte value (see AT8070 Manual section C) **14h** (bit 14): Post code Error All other offset are unused. Only offset 14h triggers an event	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	**For offset 14h:** POST Low Nibble (see AT8070 Manual section C)	**For offset 14h:** POST High Nibble (see AT8070 Manual section C)
55 (37)	Memory Err / Front Board (160.96)	Sensor specific (Discrete 0x6F) / Memory (0x0C)	Memory Error	**00h** Correctable ECC / other correctable memory error **01h** Uncorrectable ECC / other uncorrectable memory error **02h** Parity **03h** Memory Scrub Failed (stuck bit) **04h** Memory Device Disabled **05h** Correctable ECC / other correctable memory error logging limit reached **06h** Presence detected. Indicates presence of entity associated with the sensor. Typically the entity will be a 'memory module' or other entity representing a physically replaceable unit of memory. **07h** Configuration error. Indicates a memory configuration error for the entity associated with the sensor. i.e.: a given implementation of the entity is not supported by the system (e.g., particular size of the memory module is unsupported) or that the entity is part of an unsupported memory configuration (e.g. configuration is not supported since the memory module doesn't match other memory modules). **08h** Spare. Indicates entity associated with the sensor represents a 'spare' unit of memory. *(Event Data 3 field may contain an event extension code)* **09h** Memory Automatically Throttled. (memory throttling triggered by a hardware-based mechanism operating independent from system software, such as automatic thermal throttling or throttling to limit power consumption.) **0Ah** Critical over-temperature. Memory device has entered a critical over-temperature state, exceeding specified operating conditions. Memory devices in this state may produce errors or become inaccessible.	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	[7:4] - Optional offset from 'Severity' Event/Reading Code. (0Fh if unspecified). [3:0] - Optional offset from Event/Reading Type Code for previous discrete event state. (0Fh if unspecified.)	The Event Data 3 field can be used to provide an event extension code for the 8h offset [7:0] - Memory module/device (e.g. DIMM/SIMM/RIMM) identification, relative to the entity that the sensor is associated with (if SDR provided for this sensor).

ID (Hex)	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Description	Offset	Data Byte 1	Data Byte 2	Data Byte 3
56 (38)	DIMM A Status/ Front Board: Mem (32.96)	Sensor specific (Discrete 0x6F) / Entity Presence (0x25)	DIMM A Status & Presence	This sensor type provides a mechanism that allows a management controller to direct system management software to ignore a set of sensors based on detecting that presence of an entity. This sensor type is not typically used for event generation - but to just provide a present reading. **00h** Entity Present. This indicates that the Entity identified by the Entity ID for the sensor is present. **01h** Entity Absent. This indicates that the Entity identified by the Entity ID for the sensor is absent. If the entity is absent, system management software should consider all sensors associated with that Entity to be absent as well - and ignore those sensors. **02h** Entity Disabled. The Entity is present, but has been disabled. A deassertion of this event indicates that the Entity has been enabled.	No Event for this Sensor	No Event for this Sensor	No Event for this Sensor
57 (39)	DIMM B Status/ Front Board: Mem (32.97)	Sensor specific (Discrete 0x6F) / Entity Presence (0x25)	DIMM B Status & Presence				
58 (3A)	DIMM C Status/ Front Board: Mem (32.98)	Sensor specific (Discrete 0x6F) / Entity Presence (0x25)	DIMM C Status & Presence				
59 (3B)	DIMM D Status/ Front Board: Mem (32.99)	Sensor specific (Discrete 0x6F) / Entity Presence (0x25)	DIMM D Status & Presence				
60 (3C)	DIMM E Status/ Front Board: Mem (32.100)	Sensor specific (Discrete 0x6F) / Entity Presence (0x25)	DIMM E Status & Presence				
61 (3D)	DIMM F Status/ Front Board: Mem (32.101)	Sensor specific (Discrete 0x6F) / Entity Presence (0x25)	DIMM F Status & Presence				
62 (3E)	DIMM G Status/ Front Board: Mem (32.102)	Sensor specific (Discrete 0x6F) / Entity Presence (0x25)	DIMM G Status & Presence				
63 (3F)	DIMM H Status/ Front Board: Mem (32.103)	Sensor specific (Discrete 0x6F) / Entity Presence (0x25)	DIMM H Status & Presence				
64 (40)	Memory Resize/ Front Board (160.96)	Digital Discrete (Discrete 0x03) / POST Memory Resize (0x0E)	POST Memory Resize - Indicates if CMOS memory size has changed	**00h** (bit 0): State Deasserted **01h** (bit 1): State Asserted	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	-	-
65 (41)	Boot Error/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / Boot Error (0x1E)	Boot Error	**00h** No bootable media **01h** Non-bootable diskette left in drive **02h** PXE Server not found **03h** Invalid boot sector **04h** Timeout waiting for user selection of boot source	7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	[7:4] - Optional offset from 'Severity' Event/Reading Code. (0Fh if unspecified). [3:0] - Optional offset from Event/Reading Type Code for previous discrete event state. (0Fh if unspecified.)	-
66 (42)	CMOS Passwd/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / Platform Security Violation Attempt (0x06)	CMOS Password Failure	**00h** Secure Mode (Front Panel Lockout) Violation attempt **01h** Pre-boot Password Violation - user password **02h** Pre-boot Password Violation attempt - setup password **03h** Pre-boot Password Violation - network boot password **04h** Other pre-boot Password Violation **05h** Out-of-band Access Password Violation	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	[7:4] - Optional offset from 'Severity' Event/Reading Code. (0Fh if unspecified). [3:0] - Optional offset from Event/Reading Type Code for previous discrete event state. (0Fh if unspecified.)	-
67 (43)	PCIe Error/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / Critical Interrupt (0x13)	General PCIe Error	**00h** Front Panel NMI / Diagnostic Interrupt **01h** Bus Timeout **02h** I/O channel check NMI **03h** Software NMI **04h** PCI PERR **05h** PCI SERR **06h** EISA Fail Safe Timeout **07h** Bus Correctable Error **08h** Bus Uncorrectable Error **09h** Fatal NMI (port 61h, bit 7) **0Ah** Bus Fatal Error **0Bh** Bus Degraded (bus operating in a degraded performance state)	7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	[7:4] - Optional offset from 'Severity' Event/Reading Code. (0Fh if unspecified). [3:0] - Optional offset from Event/Reading Type Code for previous discrete event state. (0Fh if unspecified.)	-
68 (44)	PCIe RTM Error/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / Critical Interrupt (0x13)	RTM PCIe Error				
69 (45)	PCIe BI Error/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / Critical Interrupt (0x13)	Base Interface PCIe Error				
71 (47)	PCIe FI 1 Error/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / Critical Interrupt (0x13)	Fabric Interface PCIe Error				

ID (Hex)	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Description	Offset	Data Byte 1	Data Byte 2	Data Byte 3
72 (48)	PCIe MI Error/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / Critical Interrupt (0x13)	Mgmt Interface PCIe Error	**00h** Front Panel NMI / Diagnostic Interrupt **01h** Bus Timeout **02h** I/O channel check NMI **03h** Software NMI **04h** PCI PERR **05h** PCI SERR **06h** EISA Fail Safe Timeout **07h** Bus Correctable Error **08h** Bus Uncorrectable Error **09h** Fatal NMI (port 61h, bit 7) **0Ah** Bus Fatal Error **0Bh** Bus Degraded (bus operating in a degraded performance state)	7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	[7:4] - Optional offset from 'Severity' Event/Reading Code. (0Fh if unspecified). [3:0] - Optional offset from Event/Reading Type Code for previous discrete event state. (0Fh if unspecified.)	-
73 (49)	Bios Flash 0/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / Boot Error (0x1E)	Bios Flash 0	**00h** No bootable media **01h** Non-bootable diskette left in drive **02h** PXE Server not found **03h** Invalid boot sector **04h** Timeout waiting for user selection of boot source	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	[7:4] - Optional offset from 'Severity' Event/Reading Code. (0Fh if unspecified). [3:0] - Optional offset from Event/Reading Type Code for previous discrete event state. (0Fh if unspecified.)	-
74 (4A)	Bios Flash 1/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / Boot Error (0x1E)	Bios Flash 1				
75 (4B)	ACPI State/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / System ACPI Power State (0x22)	Advance Configuration and Power Interface State	**00h** S0 / G0 "working" **01h** S1 "sleeping with system h/w & processor context maintained" **02h** S2 "sleeping, processor context lost" **03h** S3 "sleeping, processor & h/w context lost, memory retained." **04h** S4 "non-volatile sleep / suspend-to disk" **05h** S5 / G2 "soft-off" **06h** S4 / S5 soft-off, particular S4 / S5 state cannot be determined **07h** G3 / Mechanical Off **08h** Sleeping in an S1, S2, or S3 states (used when particular S1, S2, S3 state cannot be determined) **09h** G1 sleeping (S1-S4 state cannot be determined) **0Ah** S5 entered by override **0Bh** Legacy ON state **0Ch** Legacy OFF state **0Eh** Unknown	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	[7:4] - Optional offset from 'Severity' Event/Reading Code. (0Fh if unspecified). [3:0] - Optional offset from Event/Reading Type Code for previous discrete event state. (0Fh if unspecified.)	-
76 (4C)	IPMI Watchdog/ Front Board (160.96)	Sensor Specific (Discrete 0x6F) / Watchdog 2 (0x23)	IPMI Watchdog (payload watchdog)	This sensor is recommended for new IPMI v1.0 and later implementations. **00h** Timer expired, status only (no action, no interrupt) **01h** Hard Reset **02h** Power Down **03h** Power Cycle **04h**-**07h** reserved **08h** Timer interrupt *(Event Data 2 can be used to provide an event extension code)*	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	[7:4]: interrupt type 0h = none 1h = SMI 2h = NMI 3h = Messaging Interrupt Fh = unspecified all others = reserved [3:0]: timer use at expiration: 0h = reserved 1h = BIOS FRB2 2h = BIOS/POST 3h = OS Load 4h = SMS/OS 5h = OEM Fh = unspecified all others = reserved	-
77 (4D)	Health Error/ Front Board (160.96)	Digital Discrete (Discrete 0x03) / Platform Alert (0x24)	General health status: Aggregation of critical sensors (This list is flexible and could be adjust based on customer requirements)	This sensor can be used for returning the state and generating events associated with alerts that have been generated by the platform mgmt. subsystem **00h** platform generated page **01h** platform generated LAN alert **02h** Platform Event Trap generated, formatted per IPMI PET specification **03h** platform generated SNMP trap, OEM format	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	-	-

ID (Hex)	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Description	Offset	Data Byte 1	Data Byte 2	Data Byte 3
78 (4E)	IPMB0 Link State/ Front Board (160.96)	Sensor specific (Discrete 0x6F) / Physical IPMB-0 (0xF1)	IPMB-0 fault detection sensor	**00h** IPMB-A disabled, IPMB-B disabled **01h** IPMB-A enabled, IPMB-B disabled **02h** IPMB-A disabled, IPMB-B enabled **03h** IPMB-A enabled, IPMP-B enabled	[7:4] – Ah = (OEM code in Event Data 2 & 3) [3:0] - Offset 00h = IPMB-A disabled, IPMB-B disabled 01h = IPMB-A enabled, IPMB-B disabled 02h = IPMB-A disabled, IPMB-B enabled 03h = IPMB-A enabled, IPMP-B enabled	[7:4] = Channel Number. For AdvancedTCA®, this will typically be 0h to indicate IPMB-0 [3:0] = Reserved	[7] – IPMB B Override State 0b = Override state, bus isolated 1b = Local Control state – IPM Controller determines state of bus. [6:4] = IPMB B Local Status 0h = No Failure. Bus enabled if no override in effect. 1h = Unable to drive clock HI 2h = Unable to drive data HI 3h = Unable to drive clock LO 4h = Unable to drive data LO 5h = Clock low timeout 6h = Under test (the IPM Controller is attempting to determine if it is causing a bus hang) 7h = Undiagnosed Communications Failure [3] – IPMB A Override Status *(Same interpretation as [7])* [2:0] = IPMB A Local Status *(Same interpretation as [6:4])*
79 (4F)	FRU0 IPMBL State/ Front Board (160.96)	Sensor specific (Discrete 0x6F) / OEM (Kontron OEM IPMB-L link state) (0xC3)	IPMB-L branch from FRU0 fault detection sensor	**02h** (bit 2): IPMB-L Disable **03h** (bit 3): IPMB-L Enable	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	Always 0	Bit[7:3]: Always 0 Bit[2:0]: 0h = No failure 1h = Unable to drive clock HI 2h = Unable to drive data HI 3h = Unable to drive clock LO 4h = Unable to drive data LO 5h = clock low timeout 6h = Under test (the IPM Controller is attempting to determine who is causing a bus hang) 7h = Undiagnosed Communication Failure
80 (50)	FRU1 IPMBL State / Front Board (160.96)	Sensor specific (Discrete 0x6F) / OEM (Kontron OEM IPMB-L link state) (0xC3)	IPMB-L branch from FRU1 fault detection sensor				
81 (51)	CPU0 Status/ Front Board: CPU (3.96)	Sensor specific (Discrete 0x6F) / Processor (0x07)	Processor 0 Status	**00h** IERR **01h** Thermal Trip **02h** FRB1/BIST failure **03h** FRB2/Hang in POST failure (used hang is believed to be due or related to a processor failure. Use System Firmware Progress sensor for other BIOS hangs.) **04h** FRB3/Processor Startup/ Initialization failure (CPU didn't start) **05h** Configuration Error **06h** SM BIOS 'Uncorrectable CPU-complex Error' **07h** Processor Presence detected **08h** Processor disabled **09h** Terminator Presence Detected **0Ah** Processor Automatically Throttled (processor throttling triggered by a hardware-based mechanism operating independent from system software, such as automatic thermal throttling or throttling to limit power consumption.) **0Bh** Machine Check Exception (Uncorrectable) **0Ch** Correctable Machine Check Error	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	[7:4] - Optional offset from 'Severity' Event/Reading Code. (0Fh if unspecified). [3:0] - Optional offset from Event/Reading Type Code for previous discrete event state. (0Fh if unspecified.)	-
82 (52)	CPU1 Status/ Front Board: CPU (3.97)	Sensor specific (Discrete 0x6F) / Processor (0x07)	Processor 1 Status				
83 (53)	FRU Over Icc/ Front Board (160.96)	Digital Discrete (Discrete 0x03) / OEM (Kontron OEM FRU Over Current) (0xCB)	FRU Over Current Sensor	**00h** (bit 0): State Deasserted **01h** (bit 1): State Asserted	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	**00h**: Over Current on Management power. **01h**: Over Current on Payload power.	FRU ID
84 (54)	FRU Sensor Error/ Front Board (160.96)	Digital Discrete (Discrete 0x03) / OEM (Kontron OEM FRU sensor error) (0xCC)	FRU Error during external FRU Sensor discovery	**00h** (bit 0): State Deasserted **01h** (bit 1): State Asserted	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	-	FRU ID

ID (Hex)	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Description	Offset	Data Byte 1	Data Byte 2	Data Byte 3
85 (55)	FRU Pwr Denied / Front Board (160.96)	Digital Discrete (Discrete 0x03)/ OEM (Kontron FRU Power denied) (0xCD)	FRU Power Denial Detection	**00h** (bit 0): State Deasserted **01h** (bit 1): State Asserted	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	Power denial cause **00h** : Explicit by shelf manager or application **01h** : Decided by carrier based on fru information **03h** : Timeout (shelf manager didn't grant power in time) **FFh** : Undefined	FRU ID
86 (56)	FRU MngtPwr Fail / Front Board (160.96)	Digital Discrete (Discrete 0x03)/ OEM (Kontron FRU Management Power Fail) (0xD2)	FRU Mgmt Power Fail	**00h** (bit 0): State Deasserted **01h** (bit 1): State Asserted	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	-	FRU ID
87 (57)	FRU0 Agent/ Front Board (160.96)	Generic Discrete (Discrete 0x0A)/ OEM (Kontron FRU Info Agent) (0xC5)	FRU Information Agent - FRU0 Data Error Detection	Only offset 00h, 01h, 02h, 06h and 08h will trigger an event **00h** (bit 0) = transition to Running **01h** (bit 1) = transition to In Test **02h** (bit 2) = transition to Power Off **03h** (bit 3) = transition to On Line **04h** (bit 4) = transition to Off Line **05h** (bit 5) = transition to Off Duty **06h** (bit 6) = transition to Degraded **07h** (bit 7) = transition to Power Save **08h** (bit 8) = Install Error	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	Event Data 2 is used as bit flag error Bit 7: unspecifiedError Bit 6: notPresentError Bit 5: multirecHeaderError Bit 4: multirecDataError Bit 3: timeout error Bit 2: ipmcError Bit 1: fruDataError Bit 0: commonHeaderError	Event Data 3 is used a bit flag error Bit 7: SetClockState Not Supported Bit 6: SetClockState Error Bit 5: SetPortState Not Supported Bit 4: SetPortState Error Bit 3: Clock Internal Mismatch Bit 2: Clock Match Error, Not a single clock matches Bit 1: Internal mismatch Bit 0: Match Error, Not in single link matches
88 (58)	FRU1 Agent/ Front Board (160.96)	Generic Discrete (Discrete 0x0A)/ OEM (Kontron FRU Info Agent) (0xC5)	FRU Information Agent - FRU1 Data Error Detection				
89 (59)	FRU2 Agent/ Front Board (160.96)	Generic Discrete (Discrete 0x0A)/ OEM (Kontron FRU Info Agent) (0xC5)	FRU Information Agent - FRU2 Data Error Detection				
90 (5A)	FRU3 Agent/ Front Board (160.96)	Generic Discrete (Discrete 0x0A)/ OEM (Kontron FRU Info Agent) (0xC5)	FRU Information Agent - FRU3 Data Error Detection				
91 (5B)	Ver Change IPMC/ Front Board (160.96)	Sensor specific (Discrete 0x6F)/ Version Change (0x2B)	IPMC Firmware Change Detection	**00h** Hardware change detected with associated Entity. Informational. This offset does not imply whether the hardware change was successful or not. Only that a change occurred. **01h** Firmware or software change detected with associated Entity. Informational. Success or failure not implied. **02h** Hardware incompatibility detected with associated Entity. **03h** Firmware or software incompatibility detected with associated Entity. **04h** Entity is of an invalid or unsupported hardware version. **05h** Entity contains an invalid or unsupported firmware or software version. **06h** Hardware Change detected with associated Entity was successful. (deassertion event means 'unsuccessful'). **07h** Software or F/W Change detected with associated Entity was successful. (deassertion event means 'unsuccessful') *(Event data 2 can may contain additional event information on the type of version change)*	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	bit[7:0]: Version change type **00h** unspecified **01h** mgmt controller device ID (change in one or more fields from 'Get Device ID') **02h** mgmt controller firmware revision **03h** mgmt controller device revision **04h** mgmt controller manufacturer ID **05h** mgmt controller IPMI version **06h** mgmt controller auxiliary firmware ID **07h** mgmt controller firmware boot block **08h** other mgmt controller firmware **09h** system firmware (EFI/BIOS) **0Ah** SMBIOS change **0Bh** operating system change **0Ch** operating system loader change **0Dh** service or diagnostic partition **0Eh** mgmt software agent **0Fh** mgmt software application change **10h** mgmt software middleware change **11h** programmable hardware (e.g. FPGA) **12h** board/FRU module change (change of a module plugged into associated entity) **13h** board/FRU component (addition/removal of a replaceable component on the board/FRU not tracked as a FRU) **14h** board/FRU replaced with equivalent version **15h** board/FRU replaced with newer version **16h** board/FRU replaced with older version **17h** board/FRU hardware configuration change (e.g. strap, jumper, cable change, etc.)	-
92 (5C)	Ver Change FPGA/ Front Board (34.97)	Sensor specific (Discrete 0x6F)/ Version Change (0x2B)	FPGA Firmware Change Detection				
93 (5D)	Ver Change BIOS/ Front Board (34.98)	Sensor specific (Discrete 0x6F)/ Version Change (0x2B)	BIOS Firmware Change Detection				

ID (Hex)	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Description	Offset	Data Byte 1	Data Byte 2	Data Byte 3
94 (5E)	EventRcv ComLost/ Front Board (160.96)	Digital Discrete (Discrete 0x03)/ Cable/Interconnect (0x1B)	Detects communication with the event receiver (ShMc)	**00h** Cable/Interconnect is connected **01h** Configuration Error - Incorrect cable connected / Incorrect interconnection	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	-	-
95 (5F)	IPMC Reboot/ Front Board (160.96)	Digital Discrete (Discrete 0x03)/ Platform Alert (0x24)	IPMC reboot detection	**00h** (bit 0): State Deasserted **01h** (bit 1): State Asserted	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	-	-
96 (60)	IPMC Storage Err/ Front Board (160.96)	Sensor specific (Discrete 0x6F) / Management Subsystem Health (0x28)	Mgmt sub-system health: non-volatile memory error	**00h** sensor access degraded or unavailable (A sensor that is degraded will still return valid results, but may be operating with a slower response time, or may not detect certain possible states. A sensor that is unavailable is not able to return any results (scanning is disabled) **01h** controller access degraded or unavailable (Access to the controller has been degraded, or is unavailable, but the party that is doing the monitoring cannot determine which.) **02h** management controller off-line (controller cannot be accessed for normal operation because it has been intentionally taken off-line for a non-error condition. Note that any commands that are available must function according to specification.) **03h** management controller unavailable (controller cannot be accessed because of an error condition) **04h** Sensor failure (the sensor is known to be in error. It may still be accessible by software) *(Event Data 2 can be used to provide additional information on the type of failure for this offset)* **05h** FRU failure *(Event Data 2 and 3 can be used to provide additional information on the type of failure for this offset)*	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	**For Offset 04h:** [7:0] - Sensor Number. Number of the failed sensor corresponding to event offset 04h or 00h. **For Offset 05h:** [7] - logical/physical FRU device 0b = device is not a logical FRU Device 1b = device is logical FRU Device (accessed via FRU commands to mgmt. controller) [6:5] - reserved. [4:3] - LUN for Master Write-Read command or FRU Command. 00b if device is non-intelligent device directly on IPMB. [2:0] - Private bus ID (if bus = Private) 00b if device directly on IPMB, or device is a logical FRU Device. See Sensor Specific Event (Annex B)	**For Offset 05h: Logical FRU device** (accessed via FRU commands to mgmt. controller): [7:0] - FRU Device ID within controller that generated the event (FFh = reserved) **For Offset 05h**: **non-intelligent FRU device:** [7:1] - 7-bit I2C Slave Address of FRU device . This is relative to the bus the device is on. For devices on the IPMB, this is the slave address of the device on the IPMB. For devices on a private bus, this is the slave address of the device on the private bus. [0] - reserved. See Sensor Specific Event (Annex B)
97 (61)	IPMC SEL State/ Front Board (160.96)	Sensor specific (Discrete 0x6F) / Event Logging Disable (0x10)	Specify if the status of the SEL (Cleared/Almost Full/Full)	**00h** (bit 0): Correctable Memory Error Logging Disabled **01h** (bit 1): Event 'Type' Logging Disabled **02h** (bit 2): Log Area Reset/Cleared **03h** (bit 3): All Event Logging Disabled **04h** (bit 4): SEL Full **05h** (bit 5): SEL Almost Full **06h** (bit 6): Correctable Machine Check Error Logging Disabled	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	See Sensor Specific Event (Annex B)	See Sensor Specific Event (Annex B)
98 (62)	SEL Time Set/ Front Board: IPMC (7.96)	Sensor specific (Discrete 0x6F) / System Event (0x12)	Specify when SEL time change	**00h** (bit 0):System Reconfigured **01h** (bit 1):OEM System Boot Event **02h** (bit 2):Undetermined system hardware failure **03h** (bit 3):Entry added to Auxiliary Log **04h** (bit 4):PEF Action **05h** (bit 5):Timestamp Clock Synch.	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	See Sensor Specific Event (Annex B)	-

ID (Hex)	Sensor Name / Entity (ID)	Event/Reading Type (Class and Code) / Sensor Type (Code)	Description	Offset	Data Byte 1	Data Byte 2	Data Byte 3
99 (63)	Jumper Status/ Front Board (160.96)	Sensor specific (0x6F)/ OEM (Kontron OEM Jumper Status) (0xD3)	Reflects on-board jumper presence	**00h** (bit 0):Jumper 00 Present (JP1:1-2) **01h** (bit 1):Jumper 01 Present (JP1:3-4) **02h** (bit 2):Jumper 02 Present (JP1:5-6) **03h** (bit 3):Jumper 03 Present (JP1:7-8) **04h** (bit 4):Jumper 04 Present (JP1: 9-0) **05h** (bit 5):Jumper 05 Present (JP1:11-12) **06h** (bit 6):Jumper 06 Present (JP1:13-14) **07h** (bit 7):Jumper 07 Present (JP2:1-2) **08h** (bit 8):Jumper 08 Present (JP2:3-4) **09h** (bit 9):Jumper 09 Present (JP2:5-6) **0Ah** (bit 10):Jumper 10 Present (JP2:7-8) **0Bh** (bit 11):Jumper 11 Present(JP2:9-10) **0Ch** (bit 12):Jumper 12 Present(JP2:1-12) **0Dh**(bit 13):Jumper13 Present(JP2:13-14) **0Eh**(bit 14):Jumper 14Present (JP4:TEST)	No Event for this Sensor	No Event for this Sensor	No Event for this Sensor
100 (64)	ME Availability / Front Board (192.96)	Generic Discrete (Discrete 0x0A) / Management Subsystem Health (0x28)	Provides status on the chipset Mgmt Engine	**00h** (bit 0) = transition to Running **01h** (bit 1) = transition to In Test **02h** (bit 2) = transition to Power Off **03h** (bit 3) = transition to On Line **04h** (bit 4) = transition to Off Line **05h** (bit 5) = transition to Off Duty **06h** (bit 6) = transition to Degraded **07h** (bit 7) = transition to Power Save **08h** (bit 8) = Install Error	[7:6] - 00b = unspecified byte 2 01b = previous state and/or severity in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = reserved 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] - Offset from Event/Reading Code for discrete event state	-	-
101 (65)	LAN BI 0 Link/ Front Board (192.96)	Sensor Specific (Discrete 0x6F) / LAN (0x27)	Base Interface 0 link status	**00h** LAN Heartbeat Lost **01h** LAN Heartbeat	[7:6] - 00b = unspecified byte 2 01b = trigger reading in byte 2 10b = OEM code in byte 2 11b = sensor-specific event extension code in byte 2 [5:4] - 00b = unspecified byte 3 01b = trigger threshold value in byte 3 10b = OEM code in byte 3 11b = sensor-specific event extension code in byte 3 [3:0] = Offset from Event/Reading Code for threshold event.	-	-
102 (66)	LAN BI 1 Link/ Front Board (192.96)	Sensor Specific (Discrete 0x6F) / LAN (0x27)	Base Interface 1 link status				
103 (67)	LAN FI 1 Link/ Front Board (192.96)	Sensor Specific (Discrete 0x6F) / LAN (0x27)	Fabric Interface 1 link status				
104 (68)	LAN FI 2 Link/ Front Board (192.96)	Sensor Specific (Discrete 0x6F) / LAN (0x27)	Fabric Interface 2 link status				
107 (6B)	IPMI Info-1/ Front Board (192.96)	Kontron OEM Internal Diagnostic (Discrete 0x70) / Kontron OEM Firmware Info (0xC0)	Internal Mgmt Controller firmware diagnostic	Sensor giving info about firmware state according to the Event/Reading Type. The 2 first bits will have assertion mask set. Used with event/reading type code: --- 0x70-OEM Firmware Info 1 0x71-OEM Firmware Info 2 0x75-OEM Firmware Info 2	Should not generate Event. Please contact Kontron Canada Inc. Technical Support if an Event is triggered.	-	-
108 (6C)	IPMI Info-2/ Front Board (192.96)	Kontron OEM Internal Diagnostic (Discrete 0x75) / Kontron OEM Firmware Info (0xC0)	Internal Mgmt Controller firmware diagnostic				

Annex B – Sensor-Specific Event

Sensor Type	Sensor Type Code	Sensor Offset	Event Data 2	Event Data 3
System Event	12h	00h	No Event Generated	
		01h	No Event Generated	
		02h	No Event Generated (this event would typically require system-specific diagnostics to determine FRU / failure type)	
		03h	(see PICMG 2.0: 31.12, Get Auxiliary Log Status Command and 31.13, Set Auxiliary Log Status Command, for more information) [7:4] - Log Entry Action 0h = entry added 1h = entry added because event did not be map to standard IPMI event 2h = entry added along with one or more corresponding SEL entries 3h = log cleared 4h = log disabled 5h = log enabled all other = reserved [3:0] - Log Type 0h = MCA Log 1h = OEM 1 2h = OEM 2 all other = reserved	
		04h	The following bits reflect the PEF Actions that are about to be taken after the event filters have been matched. The event is captured before the actions are taken. [7:6] - reserved [5] - 1b = Diagnostic Interrupt (NMI) [4] - 1b = OEM action [3] - 1b = power cycle [2] - 1b = reset [1] - 1b = power off	
		05h	This event can be used to record when changes are made to the timestamp clock(s) so that relative time differences between SEL entries can be determined. See Note [1]. [7] - first/second 0b = event is first of pair. 1b = event is second of pair. [6:4] - reserved [3:0] - Timestamp Clock Type 0h = SEL Timestamp Clock updated. (Also used when both SEL and SDR Timestamp clocks are linked together.) 1h = SDR Timestamp Clock updated.	
Management Subsystem Health	28h	00h	-	-
		01h	-	-
		02h	-	-
		03h	-	-
		04h	[7:0] - Sensor Number. Number of the failed sensor corresponding to event offset 04h or 00h.	-
		05h	[7] - logical/physical FRU device 0b = device is not a logical FRU Device 1b = device is logical FRU Device (accessed via FRU commands to mgmt. controller) [6:5] - reserved. [4:3] - LUN for Master Write-Read command or FRU Command. 00b if device is non-intelligent device directly on IPMB. [2:0] - Private bus ID if bus = Private. 000b if device directly on PMB, or device is a logical FRU Device.	**For Logical FRU device** (accessed via FRU commands to mgmt. controller): [7:0] - FRU Device ID within controller that generated the event. FFh = reserved. **For non-intelligent FRU device:** [7:1] - 7-bit I2C Slave Address of FRU device . This is relative to the bus the device is on. For devices on the IPMB, this is the slave address of the device on the IPMB. For devices on a private bus, this is the slave address of the device on the private bus. [0] - reserved.

Sensor Type	Sensor Type Code	Sensor Offset	Event Data 2	Event Data 3
System Firmware Progress (formerly POST Error)	0Fh	00h	00h Unspecified. 01h No system memory is physically installed in the system. 02h No usable system memory, all installed memory has experienced an unrecoverable failure. 03h Unrecoverable hard-disk/ATAPI/IDE device failure. 04h Unrecoverable system-board failure. 05h Unrecoverable diskette subsystem failure. 06h Unrecoverable hard-disk controller failure. 07h Unrecoverable PS/2 or USB keyboard failure. 08h Removable boot media not found 09h Unrecoverable video controller failure 0Ah No video device detected 0Bh Firmware (BIOS) ROM corruption detected 0Ch CPU voltage mismatch (processors that share same supply have mismatched voltage requirements) 0Dh CPU speed matching failure 0Eh to FFh reserved	
		01h	uses same Event Data 2 definition as following System Firmware Progress offset	
		02h	00h Unspecified. 01h Memory initialization. 02h Hard-disk initialization 03h Secondary processor(s) initialization 04h User authentication 05h User-initiated system setup 06h USB resource configuration 07h PCI resource configuration 08h Option ROM initialization 09h Video initialization 0Ah Cache initialization 0Bh SM Bus initialization 0Ch Keyboard controller initialization 0Dh Embedded controller/management controller initialization 0Eh Docking station attachment 0Fh Enabling docking station 10h Docking station ejection 11h Disabling docking station 12h Calling operating system wake-up vector 13h Starting operating system boot process, e.g. calling Int 14h Baseboard or motherboard initialization 15h reserved 16h Floppy initialization 17h Keyboard test 18h Pointing device test 19h Primary processor initialization 1Ah to FFh reserved	

Sensor Type	Sensor Type Code	Sensor Offset	Event Data 2	Event Data 3
Event Logging Disabled	10h	00h	[7:0] - Memory module/device (e.g. DIMM/SIMM/RIMM) identification, relative to the entity that the sensor	-
		01h	Event Logging is disabled for following event/reading type and offset has been disabled. Event Data 2: Event/Reading Type Code	[7:6] - reserved. Write as 00b. [5] - 1b = logging has been disabled for all events of given type [4] - 1b = assertion event 0b = deassertion event [3:0] - Event Offset
		02h	-	-
		03h	-	-
		04h	-	-
		05h	-	If Event Data 3 is not provided, then by default this event represents the SEL has reached a point of being 75% or more full. For example, if the SEL supports 215 entries, the 75% value would be 161.25 entries. Therefore, the event would be generated on the 162nd entry. Note that if this event itself is logged, it would be logged as the 163rd entry. Event Data 3: Contains hex value from 0 to 100 decimal (00h to 64h) representing the % of which the SEL is filled at the time the event was generated: 00h is 0% full (SEL is empty), 64h is 100% full, etc.
		06h	If the following field is not provided, then this event indicates that Correctable Machine Check error logging has been disabled for all Processor sensors. Event Data 2: may be optionally used to return an Entity Instance or a vendor selected processor number that identifies the processor associated with this event. [7:0] - Instance ID number of the (processor) Entity that the sensor is associated with (if SDR provided for this sensor), or a vendor selected logical processor number if no SDR.	If Event Data 2 is provided then Event Data 3 may be optionally used to indicate whether Event Data 2 is being used to hold an Entity Instance number or a vendor-specific processor number. If Event Data 2 is provided by Event Data 3 is not, then Event Data 2 is assumed to hold an Entity Instance number. [7] - 0b = Entity Instance number 1b = Vendor-specific processor number [6:0] - reserved

1. To track the relationship between timestamps, the timestamp change events should be logged in pairs - the first event being logged just before the timestamp clock update followed by a second event that is logged after the timestamp clock has been updated. This enables software that reads the SEL to be able to determine time relationship between events that were logged before the update and those logged afterward. The generation of these events is normally the responsibility of the software that changes the timestamp clock. Note that some implementations may queue events prior to their being logged. It is recommended that generic software read the SEL to verify that the first event has been recorded with the relative timestamp before setting the new timestamp value and generating the second event.

Annex C – Cause of State Change Values

Cause offset	Cause of State Change Description
0h	Normal State Change. This is used when the FRU is proceeding normally through the state chart. For instance, an M3 to M4 transition is a normal state change. Other values in this table can be used to provide greater levels of detail about what initiated a transition. Valid for the M0 to M1, M1 to M2, M2 to M3, M3 to M4, M4 to M5, M5 to M6, and M6 to M1 transitions.
1h	Change Commanded by Shelf Manager with Set FRU Activation. The Shelf Manager has issued a command to change states, typically during an insertion or extraction. Valid for the M2 to M1, M2 to M3, M4 to M6, M5 to M4, and M5 to M6 transitions.
2h	State Change due to operator changing a Handle Switch. The FRU has changed states as a result of an operator changing the state of a Handle Switch. Valid for the M1 to M2, M3 to M6, M4 to M5, and M5 to M4 transitions.
3h	State Change due to FRU programmatic action. The FRU has changed states due to some non-operator related internal requirement (such as Locked bit being cleared). Valid for the M1 to M2, M3 to M6, M4 to M5, and M5 to M4 transitions
4h	Communication Lost or Regained. The Shelf Manager has lost or regained contact with the FRU and generated an event on its behalf. Valid for the M2 to M7, M3 to M7, M4 to M7, M5 to M7, and M6 to M7, M7 to M1, M7 to M2, M7 to M3, M7 to M4, M7 to M5 and M7 to M6 transitions.
5h	Communication Lost or Regained–locally detected. The FRU has changed state as a result of an internal detection by the IPM Controller. This is only valid for FRUs represented by a physically separate IPM Controller (e.g., mezzanine cards). Valid for the M2 to M7, M3 to M7, M4 to M7, M5 to M7, M6 to M7, M7 to M1, M7 to M2, M7 to M3, M7 to M4, M7 to M5 and M7 to M6 transitions.
6h	Surprise State Change due to extraction. The FRU has changed state abruptly to M0 due to a non-compliant removal from the system. This is only valid for FRUs represented by a physically separate IPM Controller (e.g., mezzanine cards). Valid for the M2 to M0, M3 to M0, M4 to M0, M5 to M0, M6 to M0, and M7 to M0 transitions.
7h	State Change due to provided information. A new state is known for the FRU that could not be deduced previously. This is used when a user verifies that a FRU has been extracted from the Shelf and is no longer available. Valid for the M7 to M0 state transition.
8h	Invalid Hardware Address Detected. This is an error condition where the Hardware Address did not pass the parity check. Valid for the M0 to M0 transition.
9h	Unexpected Deactivation. The FRU has transitioned to deactivating without requesting permission from the Shelf Manager first. Valid for M4 to M6 transition.
Ah	Surprise State Change due to power failure. Case 1: The FRU has abruptly changed state to M0 due to a serious power failure that precludes further use of the FRU until it is extracted and reinserted or replaced (for example, due to overcurrent in the Management Power domain). This is valid for M0, M1, M2, M3, M4, M5, M6, and M7 to M0 transitions. Case 2: The FRU has cut off the power to its Payload or a managing FRU has cut off the Payload Power to its Managed FRU due to an unexpected power failure that does not preclude further use of the FRU (for example, due to overcurrent in the Payload Power domain). This is valid for M3, M4, M5, M7 to M6, and M6, M7 to M1 transitions.
Fh	State Change, Cause Unknown. No cause could be determined.
All other values	Reserved