

ONSEN SC, RC, IPMI – Status and Issues

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- **No Issues.**
- No problems with RC (also noted in report on 5.2.18 by Yamada-san)
- ONSEN monitoring o.k.
 - Ready for Phase 2, input/output monitoring as needed
- Using “precompiled” OPI for ONSEN, IPMI, PXDRC. No problems detected.
 - Some cosmetic suggestions (colors, logos, ...)
- Remark: Same GUI is used in Giessen for “full setup” tests
- Cosmetics; new features added if needed
- Display glitch on NSM side; NSM bridge does not handle/detect disconnects
 - Fixed in NSM bridge code, but not used
- Some annoying delay until PV gets valid (heartbeat) after FPGA reprogram
- IPMI IOCs need to be restarted if hardware changes

- PXD RC, ONSEN RC, ONSEN SC, ONSEN IPMI already designed for full PXD operation
 - Scalability proven in lab setup
 - → No modification needed for Phase 3
 - TODO: EPICS upgrade
- Remark: EPICS 7 is part of basf2 externals since v01-06-01
 - Needed for DQM → SC → Alarmsystem
- Ongoing work:
 - Implement new (hardware) features
 - Non expert GUI
 - Alarms

- All ONSEN/DATCON IPMI hardware (MMC and IPMC) production was finished before TB 2016
- EPICS / Slow control / CSS was used for IPMI monitoring (boards and shelf) since then
 - Sensor reading by IOC based on ipmitool
 - IOC to send commands to boards (e.g. reprogram FPGA)
- Different shelves are in use, each with different sensors:
 - DHH ATCA Shelf (2 slot) with Kontron Shm700
 - DHH ATCA Shelf (6 slot) with Kontron Shm700
 - ONSEN ATCA Shelf (2 slot) with Kontron Shm500 (lab)
 - ONSEN ATCA Shelf (14 slot) with Kontron Shm500 (lab)
 - ONSEN ATCA Shelf (14 slot) with Kontron Shm500 (final one)
 - ONSEN ATCA Shelf (14 slot) with Kontron Shm500 (borrowed for Phase 2)
 - DATCON MicroTCA Shelf with NAT MCH-Base12-GbE
- For each of these, EPICS database files and OPI have been created
- Reworked db structure for maximum synergy

- Concerns: Scalability 2+2 → 9+33 boards (Carrier/IPMC+AMC/MMC), >560 sensors
 - Updates on IOC: prevent timeouts and performance bottlenecks
 - Parallelize IOCs: one IOC per carrier + one for shelf, (limited by maximum connections to Shelf Manager)
- Concerns: IPMB bus collisions and recovery
 - Collisions normal for 2-wire bus with >10 masters, should be recovered automatically (in silicon!), but its not always working
- **Test full shelf over several weeks → no IPMI related problem found**

- ONSEN Upgrade
 - IPMC for new Belle2 ONSEN Carrier Board designed.
 - Carrier follow PICMG rules more strictly
 - Solves some workarounds needed in current firmware
 - No problems expected
 - MMC controller for new RTM
 - Same hardware, only minor software changes
- Some strange behaviour on DHH Shelves found
 - Remote Shutdown **dangerous** to boards without IPMC
 - Fans turn off but power keeps on.
 - Some quirks in FRU sensor (would raise a false alarm in monitoring).
- IPMI for DHH Carrier and AMCs – not started yet

(IPMI) Hardware Issues – DHH Shelf (2Slot)

Part 1 Part 2

Shelf

	A	B
-48V ACB Fuse	Present	Present
-48V ACB Volt	Present	Present
-48V Bus Volt	Present	Present

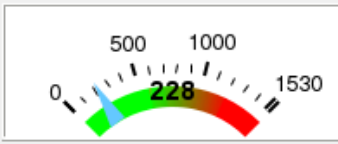
3.3V local 3.54 V V Bat 3.38 V

Cooling State **Transition to OK**
 Fan State **Transition to OK**
 Op. State **Fully Redundant**

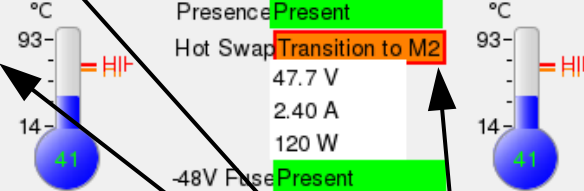
I2C PWR A 3.53 V
 I2C PWR B 3.60 V

PEM / PSU

PEM FRU **Transition to M2**
 IPMB **IPMB-A enabled, IPMP-B en**
 Shelf Power 228 W
 Air Filter **Present**



PEM A	PEM B
Presence Present	Presence Present
Hot Swap Transition to M2	Hot Swap Transition to M2
47.7 V	47.7 V
2.16 A	2.40 A
108 W	120 W
-48V Fuse Present	-48V Fuse Present
Over Temp Absent	Over Temp Absent
Fault Absent	Fault Absent



Part 1 Part 2

Fan1



Fan2



Fan Trays

	Fan Tray 0	Fan Tray 1
Presence	Present	Present
HotSwap	Transition to M2	Transition to M2
IPMB Stat	IPMB-A enabled	IPMB-A enabled
-48V Fuse A	Present	Present
-48V Bus A	Present	Present
-48V A	Present	Present
-48V Fuse B	Present	Present
-48V Bus B	Present	Present
-48V B	Present	Present

FRUs

BMC (0)	Transition to M4
EPROM1 (1)	Transition to M4
EPROM2 (2)	Transition to M4
SAP (3)	Transition to M4

S Alarm Panel

Present



IPMB Status	IPMB-A enabled, IPMP-B en	System Event	-1
ShM Redundancy	Redundancy Lost	BMC Watchdog	0
Shelf EEPROM 1	Present	Telco Alarms	0
Shelf EEPROM 2	Present	Teco Alarm Inp	0

FRU 0	Transition to M4	
20V AUX	Absent	
IPMB Status	IPMB-A enabled, IPMP-B en	
Reboot Reason	1024	
CPLD	1	

Component reports “in activation” (M2) and not “ready” (M4); still everything is running fine.

Wrong Sensor Value?

Sensor Information

Verbose mode turned on

```
66: LUN: 0, Sensor # 0 ("PEMA Hot Swap")
Type: Discrete (0x6f), "Hot Swap" (0xf0)
Belongs to entity (0x15, 97): [FRU # 1]
Assertion Mask: 0x00ff
Deassertion Mask: 0x0000
Settable / Readable Mask: 0x00ff

66: LUN: 0, Sensor # 1 ("PEMB Hot Swap")
Type: Discrete (0x6f), "Hot Swap" (0xf0)
Belongs to entity (0x15, 98): [FRU # 2]
Assertion Mask: 0x00ff
Deassertion Mask: 0x0000
Settable / Readable Mask: 0x00ff

66: LUN: 0, Sensor # 2 ("PEM IPMB LINK")
Type: Discrete (0x6f), "IPMB Link" (0xf1)
Belongs to entity (0x15, 96): [FRU # 0]
Assertion Mask: 0x000f
Deassertion Mask: 0x0000
Settable / Readable Mask: 0x000f
```

Sensor Data Information

Verbose mode turned on

```
66: LUN: 0, Sensor # 0 ("PEMA Hot Swap")
Type: Discrete (0x6f), "Hot Swap" (0xf0)
Belongs to entity (0x15, 0x61): FRU # 1
Status: 0xc0
All event messages enabled from this sensor
Sensor scanning enabled
Initial update completed
Sensor reading: 0x00
Current State Mask 0x0004

66: LUN: 0, Sensor # 1 ("PEMB Hot Swap")
Type: Discrete (0x6f), "Hot Swap" (0xf0)
Belongs to entity (0x15, 0x62): FRU # 2
Status: 0xc0
All event messages enabled from this sensor
Sensor scanning enabled
Initial update completed
Sensor reading: 0x00
Current State Mask 0x0004

66: LUN: 0, Sensor # 2 ("PEM IPMB LINK")
Type: Discrete (0x6f), "IPMB Link" (0xf1)
Belongs to entity (0x15, 0x60): FRU # 0
Status: 0xc0
All event messages enabled from this sensor
Sensor scanning enabled
Initial update completed
Sensor reading: 0x88
Current State Mask 0x0008
```

Sensor reading ("Mask") tells M2, but Shelf Manager reports M4 state. (ShM keeps Track of Messages; but IPMI ioc uses sensor reading)

Clearly a firmware problem (or a questionable implementation) on the FRU ...
But on several at the same time???

FRU Information

```
66: FRU # 0
Entity: (0x15, 0x60)
Hot Swap State: M4 (Active), Previous: M7 (Communication Lost), Last State Change Cause: Communication Lost (0x4)
Device ID String: "PEM IPMC"

66: FRU # 1
Entity: (0x15, 0x61)
Hot Swap State: M4 (Active), Previous: M7 (Communication Lost), Last State Change Cause: Communication Lost (0x4)
Device ID String: "PEMA"

66: FRU # 2
Entity: (0x15, 0x62)
Hot Swap State: M4 (Active), Previous: M7 (Communication Lost), Last State Change Cause: Communication Lost (0x4)
Device ID String: "PEMB"
```

(IPMI) Hardware Issues – ONSEN Shelf

ipmi_shelf_itoh_internal@IOA.opi AMC Health ipmi_overview.opi ipmi_shelf_dhh_2slot_internal@IHA1.opi

Part 1 Part 2

Shelf

	A	B
-48V ACB Fuse	Present	Present
-48V ACB Volt	Present	Present
-48V Bus Volt	Present	Present

Cooling State: Transition to OK
Fan State: Transition to OK
Op. State: Fully Redundant

3.3V local 3.36 V		5.0V local 5.08 V	
1.8V DDR 1.73 V		1.35V IMX VDD 1.37 V	
I2C PWR A 3.68 V		I2C PWR B 3.66 V	

Fans

Hot Swap: Transition to M4	Circ. Breaker 1: Device Present
HS ShFRU1: Transition to M4	Circ. Breaker 2: Device Present
HS ShFRU2: Transition to M4	PSU1 Presence: Device Absent
IPMB: IPMB-A enabled, IPMP-B en	PSU2 Presence: Device Absent
Air Filter: Device Present	PSU3 Presence: Device Absent
Version Change: 0	PSU4 Presence: Device Absent

Fan 3.3V: 3.39 V Fan 3.6V ext.: 3.67 V

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↑ No Power Supply, that is strange.

Message History (ES)

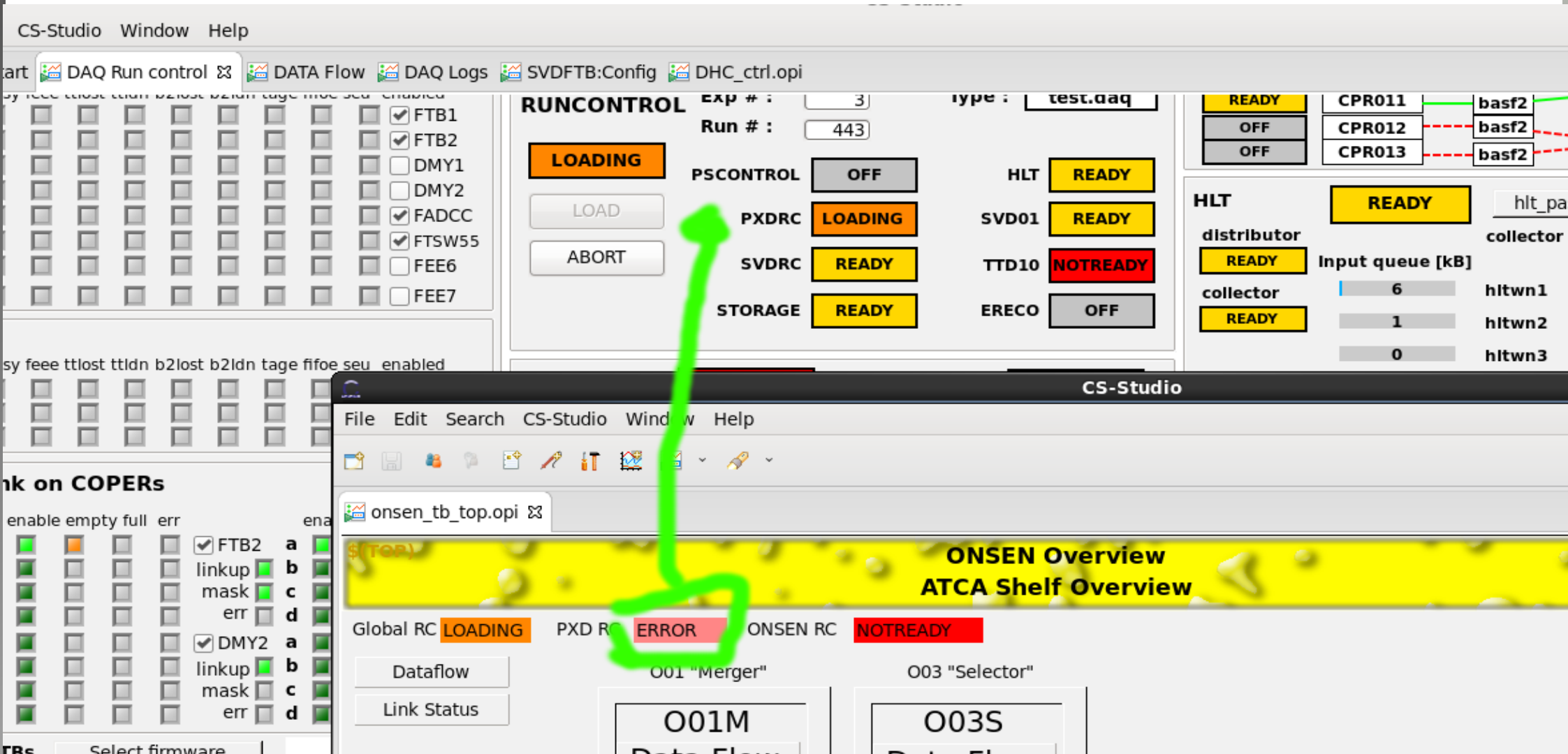
Start: -1 hour End: now Times Filter

CREATETIME	DELTA	SEVER	TEXT	APPLICATION-I	NAME	USE	HOS*
2017-12-20 22:55:53.665	00:00:0	INFO	sensor 0x5a/Fan Tach 6: Read valid again.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:53.653	00:00:0	INFO	sensor 0x5a/Fan Tach 5: Read valid again.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:53.641	00:00:0	INFO	sensor 0x5a/Fan Tach 4: Read valid again.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:53.628	00:00:0	INFO	sensor 0x5a/Fan Tach 3: Read valid again.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:53.616	00:00:0	INFO	sensor 0x5a/Fan Tach 2: Read valid again.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:53.606	00:00:2	INFO	sensor 0x5a/Fan Tach 1: Read valid again.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:23.690	00:00:0	WARNIN	sensor 0x5a/Fan Tach 8: Read invalid.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:23.678	00:00:0	WARNIN	sensor 0x5a/Fan Tach 7: Read invalid.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:23.666	00:00:0	WARNIN	sensor 0x5a/Fan Tach 6: Read invalid.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:23.656	00:00:0	WARNIN	sensor 0x5a/Fan Tach 5: Read invalid.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:23.644	00:00:0	WARNIN	sensor 0x5a/Fan Tach 4: Read invalid.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:23.632	00:00:0	WARNIN	sensor 0x5a/Fan Tach 3: Read invalid.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:23.620	00:00:0	WARNIN	sensor 0x5a/Fan Tach 2: Read invalid.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc
2017-12-20 22:55:23.608	00:00:4	WARNIN	sensor 0x5a/Fan Tach 1: Read invalid.	ipmi-sensor-IOA	static void IPMIIOC::Device::aiCallback(CALLBACK*)	epics	pxdioc

Every O(10) minutes read problems on fan sensors... recovering on the SCAN / next readout cycle.
Reason unclear, no indication of problems in the ShM SEL log.

We did not observe this with the “Lab” or “Final” Shelf in GI or DESY.

NSM Gateway: Hidden Local State



Old picture, but „problem“ can be reproduced in current setup.
Remark: Its only a (cosmetic) GUI issue.

- Old: ONSEN Firmware required “abort → not ready → loading” sequence before each run.
 - This has been fixed. Cycle “ready → start → running → stop → ready” is now working as expected by run control.
- EB/HLT → ONSEN race conditions:
 - Old: EB/HLT could connect before the TCP was initialized.
 - Rework activation + deactivation of links (TCP/IP and Aurora) to prevent race conditions between sub-systems and disconnected TCP/IP connections (timeouts).