ONSEN SC, RC, IPMI – Status and Issues

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"Shifter" Comments

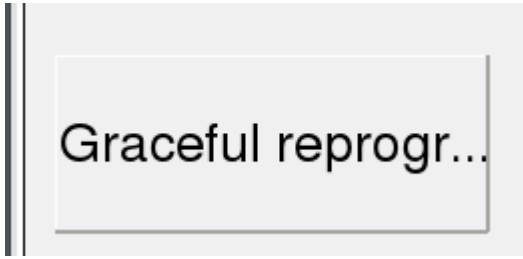
- **No Issues.**
- No problems with RC.
  - Still some annoying delay until PV gets valid after FPGA reprogram
- ONSEN monitoring o.k.
  - Ready for Phase 2, input/ouput monitoring as neeeded
- Using "precompiled" OPI for ONSEN, IPMI, PXDRC. No problems detected.
- Some cosmetic suggestions (colors, logos, …)
- Remark: Same GUI is used in GI for "full setup" tests
- "No changes needed for phase 3" (Simon)
  - Cosmetics only
- (Thanks to Simon & Thomas for improvements and comments)
- Alarm system still missing (→ Michael)

Left-overs from last B2GM

- Items from last times TODO list
  - Adjust loglevels – done
  - Autobuild rpms – done
  - Run as service – done
  - Check upgrade to EPICS 3.16 – not done

- Changes since TB
  - (as reported already)
- Known Issues
  - Display glitch on NSM side; NSM bridge does not handle/detect disconnects
- TODO
  - Does not work with new EPICS (3.16, 7); Reason unknown.
    - Some rewrite needed
  - Work on NSM side of PXDRC.

- Changes since TB
  - (as reported already at B2GM)
  - A lot of small improvements.
  - “Clean” shutdown and program of FPGAs
    - → “ONSEN reset” button which could be operated by all shifters
- Known Issues
  - Heartbeat PV takes some time after FPGA program (→ RC)
- TODO
  - Check EPICS (3.16, 7)
  - New ONSEN parameters (error masks)



Current IPMI Status

- 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

IPMI – Test with new "final" ONSEN Shelf and Boards

- 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

Other IPMI Items

- 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

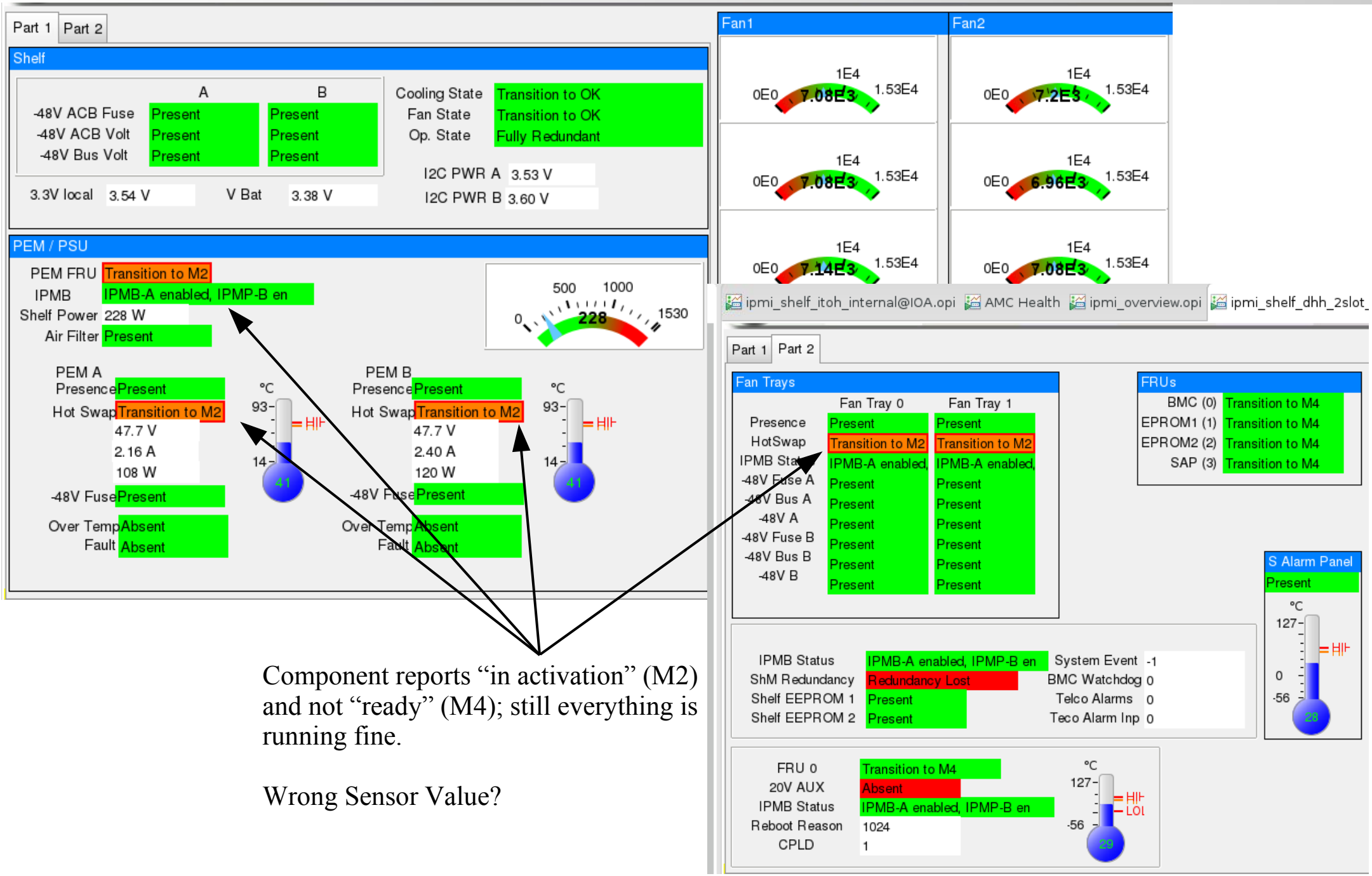
- Some strange behaviour on DHH Shelves found
  - Remote Shutdown **dangerous** to boards without IPMC
  - Fans turn off but power keeps on.
- Some quirks in FRU sensor (would raise a false alarm in monitoring).

Summary

- 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
  - But: EPICS upgrade might require rewriting part of Run Control
- Ongoing work ONSEN SC to implement new hardware features
- TODO:
  - Non expert shifter summary gui
  - Alarms

Backup

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



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

Wrong Sensor Value?

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

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
```

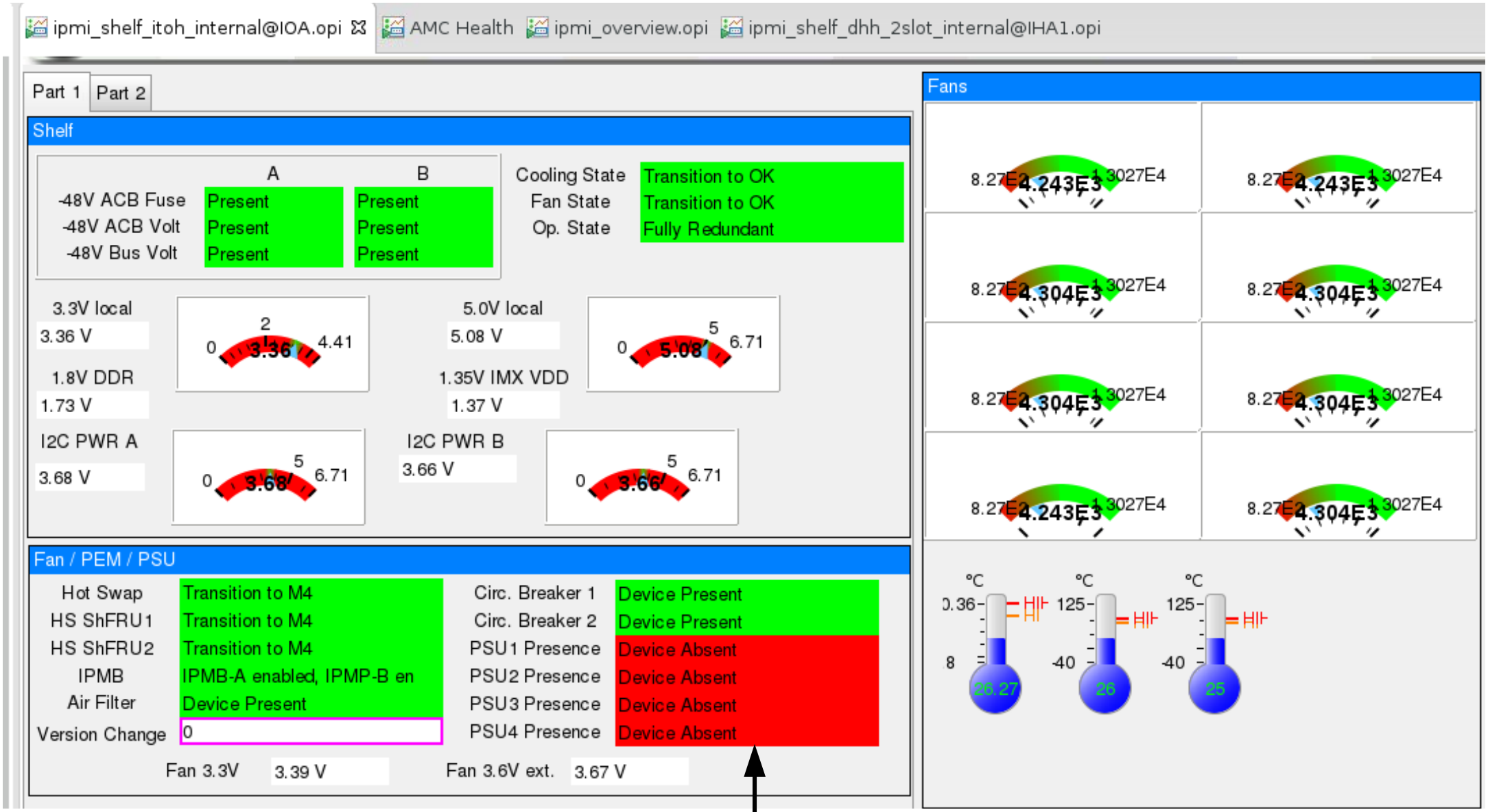
FRU Information

```
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"
```

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???

(IPMI) Hardware Issues – ONSEN Shelf



No Power Supply, that is strange.

(IPMI) Hardware Issues – ONSEN Shelf

Message History (ES)

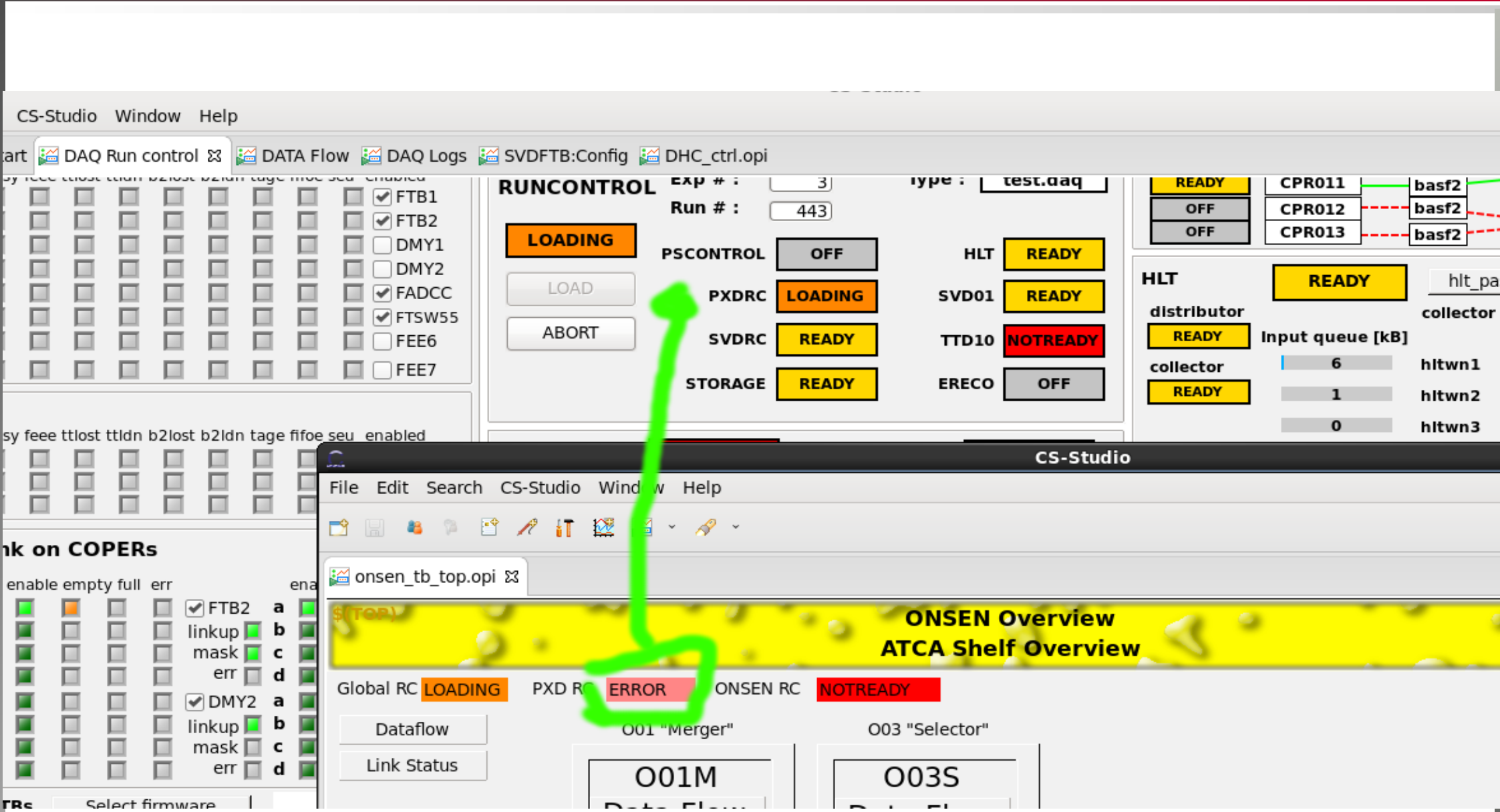
Start: -1 hour End: now Times Filter

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.

Fixed: RC ↔ Firmware Issues (Low Level)

- 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).