ONSEN Status in Phase 3

Simon Reiter

II. Physics Institute
Justus Liebig University, Giessen

PXD Workshop and 23rd International Workshop
on DEPFET Detectors and Applications,
May 2019

JUSTUS-LIEBIG-
UNIVERSITÄT
GIESSEN

Belle II

Outline

1 ONSEN status / features

2 ONSEN related issues
- ONSEN RC errors
- Missing HLT events at run start
- HLT processing time
- Incompatible module cabling
- Disabled DHH data checks

ONSEN status / features

- Currently only 1/8 of the full system in use
- Load Balancing tested with event builder
  - Activation of 1/2 system via slow control (IPMI) required
- ONSEN firmware is running without problems!

- ONSEN provides pixel count separated for each module
  - reveals spikes in occupancy at 2 Hz resolution (10 Hz possible)
  - But: does not allow masking of modules on the fly
- No tests with DATCON so far.

ONSEN related issues
ONSEN RC errors

"HLT ahead of DHH"

- Trigger number difference between incoming data of DHH and HLT is negative $\Rightarrow$ HLT faster than DHH ?!
- Appears sometime simultaneously with other errors (see JIRA BIIPXDH-269)
  - ▸ reveals missing triggers from DHH (data flow stopped)
  - ▸ origin still unclear, situation improved with current firmware

"EB2 link loss"

- Event Builder 2 drops link to ONSEN
- Further investigation by Yamagata-san ongoing, but still unclear
  - EB2TX did receive nearly no update since phase 2, when it was never observed
- Might be chain reaction:
  - ▸ HLT $\rightarrow$ EB2RX $\rightarrow$ EB2TX $\rightarrow$ ONSEN

ONSEN related issues
Missing HLT events at run start

- Missing events from HLT
  - some processes on worked nodes die
  - PXD data lost in ONSEN memory
- Mainly happens at run start
  - 1000 events
- Check in ONSEN is currently disabled, to prevent run stop after 4.2 M events
- Not problematic at current occupancy of 0.05%

Might be solved!
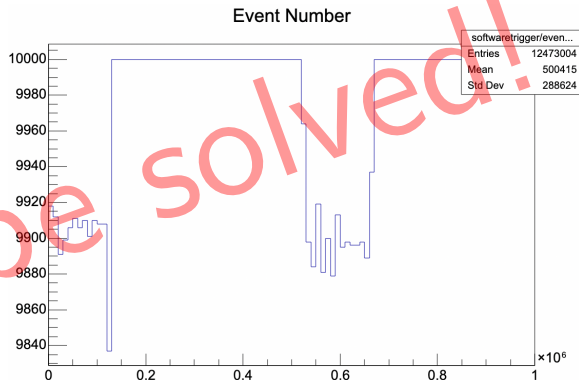
ONSEN related issues
HLT processing time

- ONSEN memory designed for $< 5s$ processing time
- Not problematic at current occupancy at $\sim 0.05\%$ and trigger rate at $< 5\,\text{kHz}$
- Situation will improve with load balancing
- Partly due to the initialization of basf2 ($\sim 30\text{s}$)
  - might improve in future by moving initialization to LOADING stage

hltDelay

DAQ/DelayLog	
Entries	189725
Mean	2.375
Std Dev	9.028
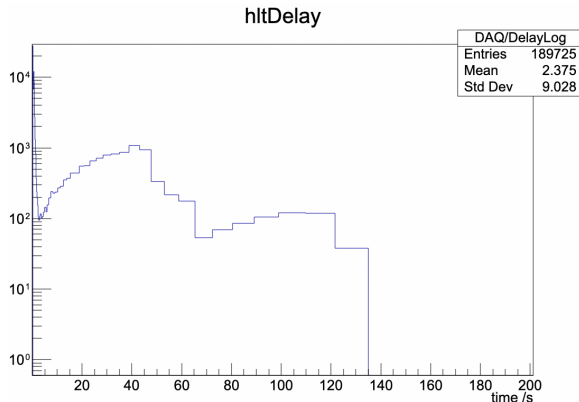
ONSEN related issues
Incompatible module cabling

- No proper ROI selection possible
- Firmware design requires increasing DHE ID per DHC
  - required for matching IDs between data and ROIs
- Possible solutions:
  1. ~~Insert patch panel on top of Belle to disentangle combined fibers before reaching DHE~~
  2. Change order in DHC firmware

ONSEN related issues
Disabled DHH data checks

- Check of increasing DHE ID
- Check of correct Start of Row word in ZS frame
    - Showed connection to occupancy drops
- Check of DHP Frame ID
    - Frame ID to be in sync with Frame Number in DHE header (6 bits)

    Activated since May 24th
- Check of trigger shift to previous event
    - will help to check if events have been skipped
    - will verify load balancing from DHH

    Activated since May 24th

Summary

- Overall ONSEN runs very stable, no down times

- Only a few not urgent related issues

Thanks for your attention!

BackUp
DHE ID matching

DHE ID of ROIs and DHH data have to be in ascending order.

Procedure in firmware:

- Extract DHE ID from DHH data stream
- Skip ROIs with lower DHE ID
- Gather all ROIs with same DHE ID and do selection