

NP04 DAQ Performance

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FD1-HD TB Meeting
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Overview

- Functional readiness
- Current status
- Ongoing work before beam
- Performance and tuning
- Summary

Functional readiness

- TPC fully integrated with baseline Ethernet readout
- PDS calibration and readout (self-triggered & streaming) integrated with legacy FELIX readout
- Laser calibration system almost fully integrated, but few remaining issues to sort out
- CRT integration almost complete, but one main outstanding issue prevents running it
- Central Trigger Board interface has been tested, but will need some time for commissioning with first beam signals
 - Validate we see signals at the CTB, create triggers at the right timestamp for the signals, and finally ensure all beam information is available

Current status

- New stable software release prepared and in use
- Software-based trigger commissioning work largely complete
 - Stable configurations for trigger primitive generation
 - Have available simple trigger for HV anomalies
- Readout performance evaluation and optimization campaign successful
 - Optimized hardware and software with resource allocation and utilization tuning
 - No packet drops, trigger primitive generation on collection + induction planes
- High-rate triggering tests and results
 - Saturating available network capabilities
 - Trigger inhibits cause occasional frame drops

Ongoing work before beam

- “Data challenge” testing at high trigger rates
 - Recently validated that we can hit ~27Hz with 4ms readout windows without writing data. Aim for repeating the test today with data writing.
- Firmware update in timing system for triggering on timing commands needed for APA1 calibration: high priority
- DQM updates
 - Basic interactive setup is working, but want to deploy more automated generation and display of results for shifters to see
- Debugging of CRT readout / final work with CRT triggers
- Other minor testing for some software patches (e.g.: reduce spurious warnings)

Performance

- Measured maximum trigger rate: ~27 Hz with 4 ms readout
 - Main limitation: saturating available switched network's bandwidth
- The DAQ has a lot of tunable parameters via configuration
 - Trigger configurations
 - No plans for TPC-based trigger during beam run
 - Trigger capable of merging overlapping readout windows or not: proposal would be not to maintain same window size per record
 - Trigger Primitive Generation (TPG) and streaming
 - Baseline TPG configuration would be to produce TPs on two planes per APA (collection + first induction)
 - This leads to ~200 MB/s total TP rate being written to disk

Tuning

- We will have configurations prepared, but may need some tuning of DAQ parameters to handle beam conditions
 - E.g.: buffering to maximize trigger rate we can handle during spill, and allow data to continue to flow out in off-spill periods
- This may take roughly a day to two days
 - Validate / understand the trigger rate we see at the DAQ
 - Given triggering conditions...
 - Work to tune to needed buffering capacity / timeout conditions on data
 - Work to tune trigger configurations to ensure quality data (e.g.: limit rate, limit overlaps / merging, etc.)

Summary

- The DAQ is performing well and ready for beam next week
- Some remaining work is ongoing
- Configuration preparations and testing on daily basis
- Outstanding questions on how much data to retain and transfer to offline
 - Feedback and agreement on DAQ readout, trigger and TPG configurations

DB Liaison: Roland Sipos

HW DB contact: TBD



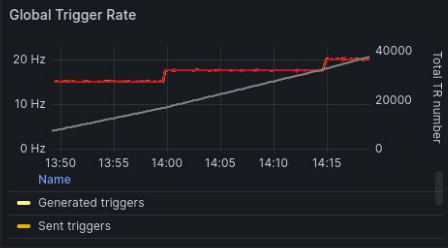
Partition name np04hd

Subsystems Global NP04 servers CERN - NP04 Network CERN - Ethernet Inputs

Status



Current Status RUNNING	App Fwk Error State NO ERRORS	Run time 39.8 min	Sending triggers at 20 Hz	Current Run number 26930	Trigger Status OK	Current Issued triggers 37604	Current Written TRs 37620
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Message Reporting

Receiver (NIC Stats)

Input Packets	Input Bytes
12.3 Mp/s	82.8 GiB/s
12.2 Mp/s	82.6 GiB/s
12.2 Mp/s	82.5 GiB/s

Legend for Input Packets: np04hd.runp04srv021eth0.nic_reader_0 (green), np04hd.runp04srv022eth0.nic_reader_0 (yellow), np04hd.runp04srv028eth0.nic_reader_0 (blue), np04hd.runn04srv029eth0.nic_reader_0 (orange)

