Current status of DAQ system

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on behalf of DAQ group

Purchase of equipment

1. Computer servers – 5 pieces
2. White Rabbit Evaluate packages – 3 pieces
3. Prototype of L2 card

Stand for development of DAQ and on-line filter

- In September – November 2023 we have purchased 5 computer servers.
- During September 2023 – April 2024 the special room/lab in LIT was rebuilt and fully equipped. It includes all network environment and the full climate control for personal and computers

Stand for development of DAQ and on-line filter

Stand for development of DAQ and on-line filter

The network structure have been fully configured. It includes the lab in LNP at distance of about 1 km. A good condition for emulation of our future experimental aria.

White Rabbit development kits for TSS

During June – November 2023 we purchased 3 White rabbit switch Evaluate packages from China, Sync (Beijing) Technology co., LTD.

White Rabbit switch WRS-18A - 3 pieces

Cute-WR-A7-PKG – WR node 6 pieces

Now we have the tools for development of our synchronization system. The first results will be presented in the next talks.

Development board for L2 concentrator

From April 2024 we are purchasing the prototype of L2 concentrator card: ZYNQ UltraScale+ FPGA Development Board Z19-P form Alinx.

In case of success we will have the tools for implementation of our L2 concentrator.

The first results of L2 development will be presented in the next talks.

Front-end electronics for the triggerless DAQ

Front-end electronics of the detectors has to meet the requirements of a free-running DAQ

General FEE requirements from the DAQ system:

- Self-triggered (*trigger-less*) FEE operation
- Digitizing on-board
- Timestamp included in the output format
- Large memory to store the data accumulated in a time slice
- Zero suppression

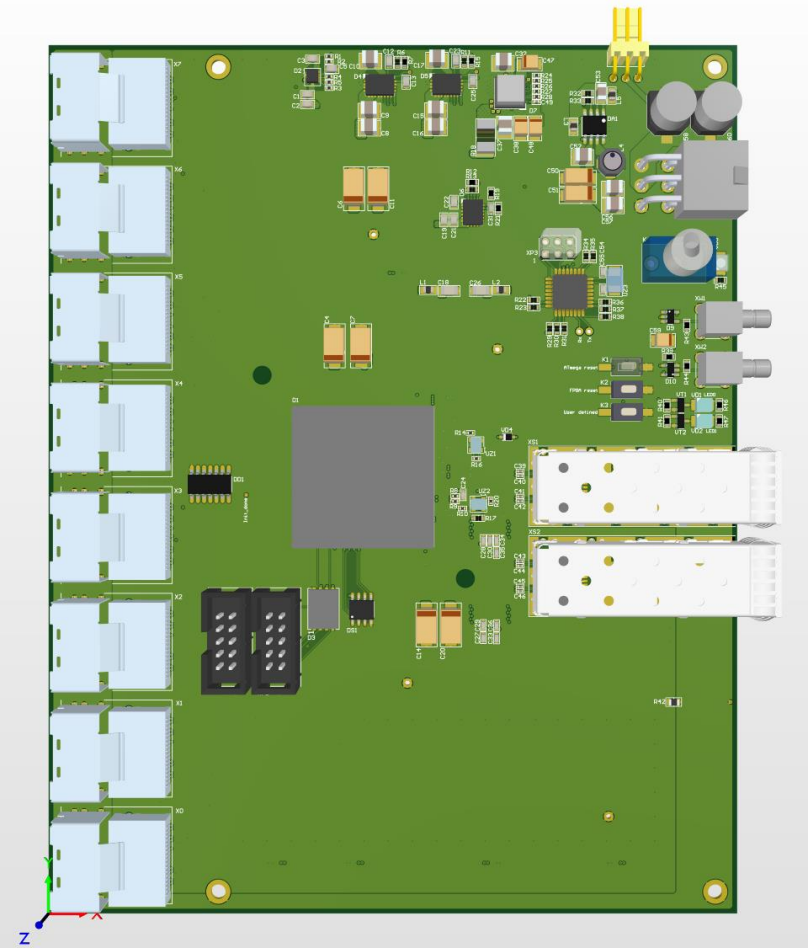
  FPGA or ASIC based digital output to DAQ

For the moment only Range System has the Front-End electronics designed according to these requirements (high level of readiness)

Front-end electronics for the triggerless DAQ

PCB of L1 concentrator (prototype)

- Cyclone 10GX (105YF780E6G)
- 8x Links for connect front-end boards (miniSAS* connectors) 8 diff pairs per connector
- SFP+ 10Gb transceiver for data transmission to L2
- SFP+ 10Gb transceiver for TSS (White Rabbit)



Concentrator tasks:

- Collecting data from the front-end boards.
- Distribution of clock from TSS.
- Distribution of commands from TSS.
- Data integrity and timestamp control.
- Reconfiguring front-end boards (firmware)?

*(*additional info on presentation slide 6*)

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Open questions

- Front Electronics cards exists for RS only. We NEED contribution from all other detector groups.
- Where L1 Concentrator will be installed: inside or outsides the Range system? (e-link <10m)
- Radiation hardness of FPGA, in the case of installation of L1 Concentrator inside the Range system
- Which Time Synchronization: White Rabbit or TCS?

Continue R&D

Progress

- We have the really working collaboration for development of the DAQ hardware:
  JINR Dubna,
  St. Petersburg Polytechnical University,
  Tomsk State University.
- Agreement with iThemba LABS, National Research Foundation, South Africa (ZA) for development of the software part of DAQ. (report on 23rd May at 10:00)

Thank you for your attentions.