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## The Ethernet readout of the DUNE DAQ system

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In 2023 the Deep Underground Neutrino Experiment (DUNE) Data Acquisition (DAQ) system transitioned to the new Ethernet based readout. The adaption of the Ethernet protocol mainly required integration aspects to the available generic and modular readout subsystem. This work includes a completely new I/O device library implementation, interfacing with the detector electronics via a firmware block that is provided by the DAQ, and the frame unpacker of the Trigger Primitive Generation (TPG) utilizing the new detector electronics data format. In order to sustain the multiple 100 Gb/s aggregated input data streams' high-throughput and low latency requirements, the new software stack for the I/O device control, configuration, monitoring and readout of Network Interface Controllers (NICs) is built upon the Data Plane Development Kit (DPDK). This framework and set of libraries support routing capabilities based on configurable rules that the DAQ heavily relies on for load-balancing purposes. With this feature the readout splits up the aggregated 100 Gb/s link to the resulting individual data streams, that are passed down to their corresponding processing pipelines for trigger primitive generation and buffering. Extensive monitoring capabilities are also provided by the library, which monitors errors related to data consistency and integrity, and also aids the performance optimization work of the software stack.

In this contribution we describe the new high-throughput Ethernet based readout integrated to the DUNE DAQ system, and the first performance optimizations and results using the ProtoDUNE experiments hardware apparatus at the Neutrino Platform at CERN.

### Minioral

Yes

### IEEE Member

No

### Are you a student?

No

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