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Prototyping a Multi-10-Gigabit Ethernet Event-Builder for a Cherenkov Telescope Array

Monday, 14 October 2013 15:00 (45 minutes)

We are developing the prototype of a high speed data acquisition (DAQ) system for the Cherenkov Telescope Array. This experiment will be the next generation ground-based gamma-ray instrument. It will be made up of approximately 100 telescopes of at least three different sizes, from 6 to 24 meters in diameter.

Each camera equipping the telescopes is composed of hundreds of light detecting modules pushing out data through gigabit Ethernet links. They will generate a total data flow of up to 24 Gb/s. Merging and handling such data rates with a single off the shelf computer and switches without any data loss require well designed and tested software and hardware. In a first stage, the software receives and reconstructs the incoming partial events. In a second stage, it performs on-line calculations with the data in order to improve event selection and sends the remaining data to the central DAQ. For the purpose of testing and stimulating our DAQ system, we designed and started to build a full scale dummy camera cluster with single board computers. This cluster provides 300 physical gigabit Ethernet ports which will send pre-calculated simulation data to the DAQ system, reproducing the timing and the instantaneous flow of a real camera. With this equipment, we are able to validate our hardware and software architectures. We will present our approach for the development of such a high data rate system, first measurements and solutions that we have applied to solve the problems we encountered to sustain the maximum dataflow reliably.

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