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Timing and Readout Control in the LHCb Upgraded Readout System

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In 2019, the LHCb experiment at CERN will undergo a major upgrade where its detectors electronics and entire readout system will be changed to read-out events at the full LHC rate of 40 MHz. In this paper, the new timing, trigger and readout control system for such upgrade is reviewed. Particular attention is given to the distribution of the clock, timing and synchronization information across the entire readout system using generic FTTH technology like Passive Optical Networks. Moreover the system will be responsible to generically control the Front-End electronics by transmitting configuration data and receiving monitoring data, offloading the software control system from the heavy task of manipulating complex protocols of thousands of Front-End electronics devices. The way in which this was implemented is here reviewed with a description of results from first implementations of the system, including usages in test-benches, measurements of timing and latency control and future developments.

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