Contribution ID: **4** Type: **Short Talk**

Ethernet evaluation in data distribution traffic for the LHCb filtering farm at CERN

Tuesday 18 May 2021 15:00 (13 minutes)

This paper evaluates the real-time distribution of data over Ethernet for the upgraded LHCb data acquisition cluster at CERN. The total estimated throughput of the system is 32 Terabits per second. After the events are assembled, they must be distributed for further data selection to the filtering farm of the online trigger. High-throughput and very low overhead transmissions will be an essential feature of such a system. In this work RoCE high-throughput Ethernet protocol and Ethernet flow control algorithms have been used to implement lossless events distribution. To generate LHCb-like traffic, a custom benchmark has been implemented. It was used to stress-test the selected Ethernet networks and to check resilience to uneven workload distribution. Performance tests were made with selected evaluation clusters. 100 Gb/s and 25 Gb/s links were used. Performance results and overall evaluation of this Ethernet-based approach are discussed.

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Session Classification: Facilities and Networks

Track Classification: Online Computing