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Upgrade of the Cathode Strip Chamber Level 1 Trigger Optical Links at CMS

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We present the results of initial tests of prototype optical links of an upgraded trigger for the Cathode Strip Chamber sub-detector at the CMS experiment at CERN. After presenting an overview of the existing system and upgrade requirements, we describe the hardware and firmware developed to drive the new links.
Results of initial tests with the prototype Track Finder board and further plans are given in the conclusion.

Summary

Currently, 180 optical links provide transmission of the Level 1 trigger primitives from 60 peripheral crates to the Track Finder within the Endcap Cathode Strip Chamber (CSC) detector at the CMS experiment at CERN. Presently there is a limit of 3 trigger primitives per crate serving a cluster of 9 chambers. With an anticipated LHC luminosity increase up to 1035 cm-2s-1 at 7TeV/beam, simulation studies suggest that we can expect 2..3 times more trigger primitives per bunch crossing from the peripheral crates.
To comply with this requirement, the source in the peripheral crate (Muon Port Card, MPC), the receiver in the Track Finder crate (Sector Processor, SP) and the optical plant should be upgraded. At the same time it is very desirable to preserve
all the old links intact for compatibility with the present Track Finder during transition period.
We present here the results of our efforts in the past two years to upgrade the MPC board and optical fibers, including the hardware and firmware developments, data transmission tests and latency measurements.

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