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the Optical Synchronization and Link Board project, oSLB

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The calorimeter trigger synchronization of the Compact Muon Solenoid experiment at the large hadron collider (LHC) uses a synchronization method implemented in the synchronization and link board (SLB). The board allows the synchronization of electromagnetic and hadronic trigger primitives at the LHC frequency (40.08 MHz) and its transmission to the Regional Calorimeter Trigger. The new generation of the Calorimeter Trigger boards requires the usage optical links at a rate of 4.8Gb/s. The design options for the optical version of the oSLB as well the technological choices are presented.

Summary

The upgrade of the Calorimeter Trigger (CT) system foresees the use of input optical links at a rate of 4.8Gb/s, which should allow the implementation of a compact trigger system based on uTCA technology with better performance compared to the present system. This choice will imply to replace the high speed electrical links, implemented in SLB mezzanines that currently synchronize and transmit the calorimeter trigger primitives from ECAL and HCAL to the CT, by new optical links.

Since HCAL is migrating to uTCA technology the SLB functionality will be embedded on the new HCAL trigger boards. However in ECAL it will be necessary to change the present SLB interface to an optical version, the oSLB.

The oSLB will replace the high speed 4x 1.2GB/s electrical links by two optical links per Trigger Tower running at 4.8Gb/s. The two redundant links allow to run and commission the present Calorimeter Trigger system in parallel with the new uTCA Trigger. Making use of the newest FPGA technologies, additional trigger data monitoring capabilities, in particular histograms of the LHC bunch occupancies in the full orbit, can be included in the new oSLB.

On the Regional Calorimeter Trigger side all electrical mezzanines (RM) have to be also replaced with an optical version . These boards match the oSLB technological choices. A preliminary design of the optical version of the Receiver Modules (oRM) is also presented.

This presentation covers the research on the optical components and the studies made to implement the new optical interface, as well the studies to reduce costs and the planning for installation on LS1.

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