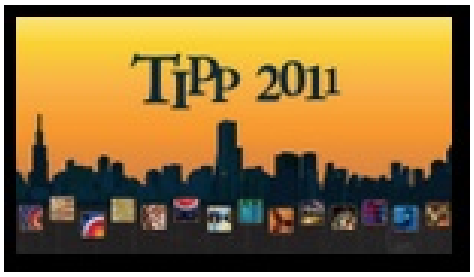

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A Versatile Link for high-speed, radiation resistant optical transmission in LHC upgrades

Saturday 11 June 2011 09:00 (30 minutes)

The Versatile Link project is launched to develop a physical layer general purpose optical link with high bandwidth; radiation and magnetic resistance that meets the requirements of LHC upgrade experiments. This paper will present the latest results on system specifications, front-end transceiver prototypes, passive components studies and commercial back-end transceiver tests.

System optical power budgets are specified for single mode (1310nm) and multi-mode (850nm) operations, with target data rate of ˜5Gbps and length of 150 meters. Noise and interference penalties are simulated using 10GbE link model and verified by bit error rate measurement on reference links. The available powers are specially constrained by radiation degradation of the front-end receivers. We will report the power budgets for all link variants where at least 1.8 dB safety margins are maintained.

Versatile Transceiver (VTRx), the front-end module to be installed on-detector, is based on commercial small form pluggable (SFP+) package, modified to optimize size and mass, assembled to host qualified laser, PIN diode, special designed driver and amplifier. A set of VTRxs with validated components are prototyped. Lab test results will be presented.

We will also present the radiation test results on front-end components and passive components. The total fluence tests for lasers and PINs are characterized up to 4 x 1015/cm2. SEU tests are performed on PINs and receiver subassembly. Special ASIC is immune to long burst errors and forward error coding is an effective way to suppress short burst errors. Radiation induced absorption in a number of single mode and multi-mode fibers, at -25℃ and up to 500 kGy, are measured. High performance candidates are identified.

Commercial off-of-the-shelf parts are examined as back-end transceivers. Compliant tests on 10Gbps SFP+, 4x4 parallel optical engines and 6.25Gbps SNAP 12 transmitter/receivers will be reported.

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