

GE21 Optohybrid Board Version 2

6 March 2019

LpGBT Based OH: Advantages

- **One LpGBT replaces 2 GBTx and one SCA ASICs**
 - 1 GBT link per board, 288 per system (vs 576 links with GBTx)
- **Trigger path to backend is embedded into the GBT link**
 - Remove 288 optical fibers
 - Need more links between the FPGA and LpGBT
- **Master-Slave interface is not needed any more**
 - Upgraded OTMB has enough optical inputs (12+4) to serve one chamber
 - Differential pairs previously used by Master-Slave interface will be re-assigned for the FPGA-to-LpGBT links
- **PROM is not needed**
 - Reliable configuration of Artix-7 FPGA from GBTx has been demonstrated
- **Overall saving of \$200...300 per OH board**

LpGBT Based OH: Issues

- **Availability of LpGBT and VL+ parts**
 - Samples promised by CERN in Q1/2/3 of 2019
 - If VL+ mezzanine is not available, it can be replaced by a commercial part
- **All GEB and VFAT boards must be modified to support individual addressing of VFAT slots**
 - limited number of down-elinks in the LpGBT ASIC
- **OH needs new circuitry to fan-out 320Mbps clock and data links to 12 VFATs**
 - Micrel SY89113U is a good candidate
 - Need evaluation, including rad testing
 - Impact on signal routing (OH and GEB)?
- **Both LpGBT and VL+ will be evolving**

Tentative Plan

- **Build 3..4 LpGBT based OH prototypes in summer 2019**
 - Schematic design is mostly finished, see all details at http://padley.rice.edu/cms/OH_GE21_LpGBT/lpohdesign.html
 - Expect 2 months for PCB layout and routing
 - 2 months for fabrication and assembly
 - 2..3 months for initial tests
- **If at least one modified GEB (Gen 2) and 12 modified VFAT boards are available in the fall, integration tests are possible before the end of 2019**