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The Upgrade Path From Legacy VME to VXS Dual Star Connectivity For Large Scale Data Acquisition and Trigger Systems

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New instrumentation modules have been designed by Jefferson Lab that take advantage of the higher performance and elegant backplane connectivity of the VITA 41 standard of VXS. These new modules are required to meet the 200KHz trigger rates envisioned for the 12GeV experimental program. Upgrading legacy VME designs to the high speed gigabit serial extensions that VXS offers, comes with significant challenges, including electronic engineering design, plus firmware and software development issues. This paper will detail our system design approach including the critical system requirement stages, and explain the pipeline design techniques and selection criteria for the FPGA that require embedded Gigabit serial transceivers. The entire trigger system is synchronous and operates at 250MHz clock with synchronization signals, and the global trigger signals distributed to each front end readout crate via the second switch slot in the 21 slot VXS backplane.. The readout of the buffered detector signals relies on 2eSST over the standard VME64x path at >200MB/s. We have achieved 20Gb/s transfer rate of trigger information within one VXS crate and will present results using production modules in a two crate test configuration with both VXS crates fully populated. The VXS trigger modules that reside in the front end crates, will be ready for production orders by the end of the fiscal year. VXS Global trigger modules are in the design stage now, and will be complete to meet the installation schedule for the 12GeV Physics program.