CMM++ specification and status

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CMM++ project specification

- **The first version of the CMM++ project specification available:**
  - http://ermoline.web.cern.ch/ermoline/CMM++/
- **This document specify:**
  - CMM++ functional requirements,
  - CMM/CMM++ differences,
  - technical aspects of the CMM++ implementation.
- **The engineering solutions will be reflected in the detailed hardware and firmware specifications.**
- **Documents time schedule:**
  - Now - Jun 2011: clarifications and additions (e.g. – data formats)
    - ⇨ June 2011: Preliminary Design Review (L1Calo Upgrade meeting)
  - Jul 2011 - Jan 2012: engineering specification, design documentation
   - ⇨ Sep 2012: Production Readiness Review

CMM++ functional requirements

- **Backward compatibility :**
  - *be designed to fit in the CMM positions in the processor crates ,*
  - *inherit all main logical components, electrical interfaces, programming model and data formats of the current CMM,*
  - *be able to implement all different version of CMM FPGA logic, adapted to new hardware.*
- **Data source for topological processor:**
  - *receive extra data from upgraded processor modules over the crate backplane at higher data transfer rate (160Mb/s),*
  - *transmit data to the TP via multi-fiber optical ribbon link(s),*
    - ⇨ "Test" and "Upgrade" modes
  - *transmit extra data from upgraded processor modules to the L1Calo Read-Out Drivers.*
- **Standalone mode**
  - *receive data via additional multi-fiber optical ribbon links,*
  - *provide interface to the new upgraded CTP.*

CMM/CMM++ differences
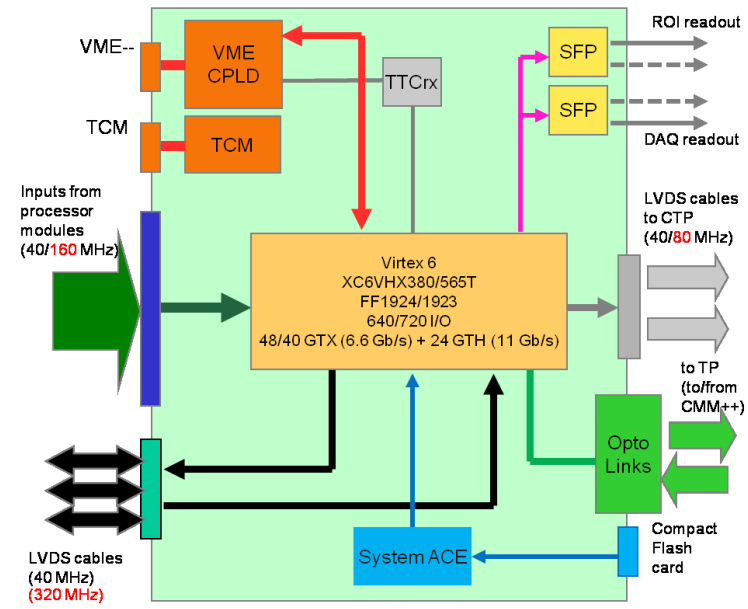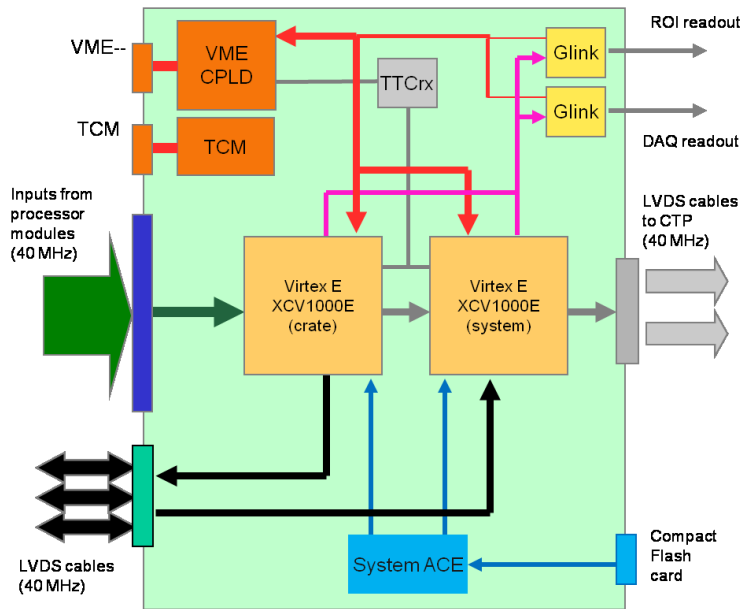
■ Main modifications to the CMM hardware:

■ *replacement of the obsolete FPGA devices by new parts to receive data at 160Mb/s from the backplane, transmit and receive data via multi-fiber optical ribbon link using transceivers in FPGA,*

■ *implementation of the G-link protocol in firmware,*

■ *implementation of multi-fiber optical ribbon links,*

■ *selection of FPGA(s) configuration according to the mode of operation.*

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CMM++ modes
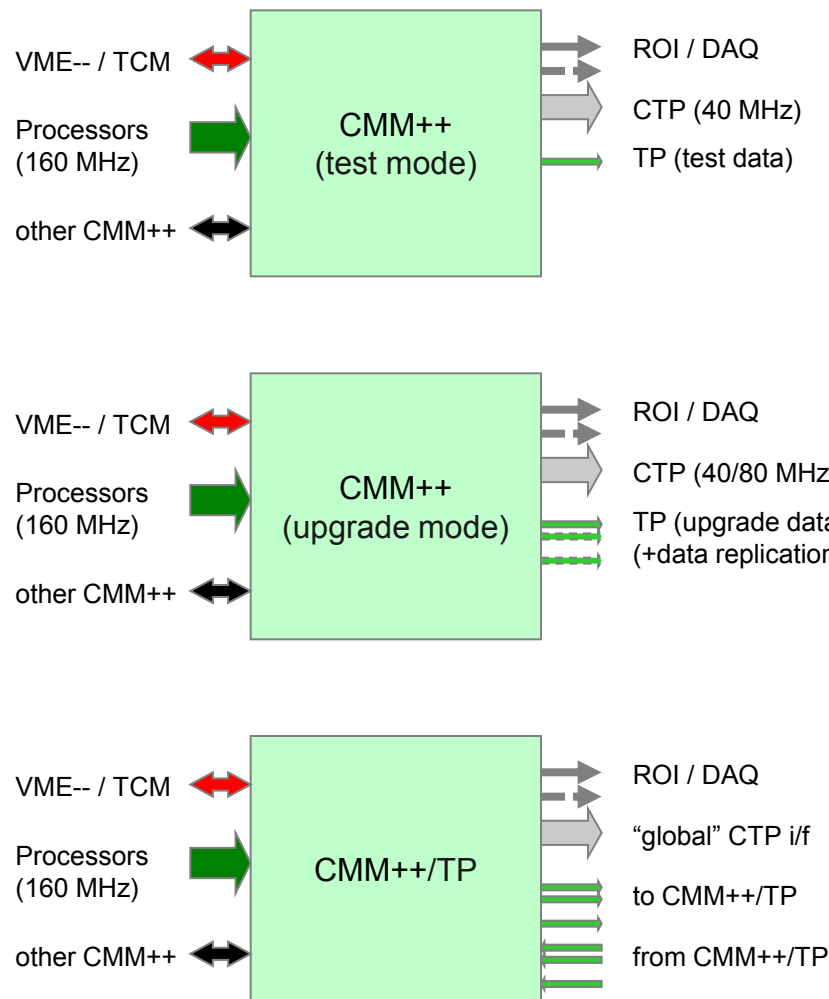
- **Test mode:**
  - backward compatible mode
  - backward compatible data format
  - data to the TP for test purposes.
- **Upgrade mode:**
  - new data format
  - data processing/reduction
    - ⇨ to fit in a single TP module
  - data replication to multiple TPs
- **Standalone (CMM++/TP) mode :**
  - no TP available
  - data processing/replication
  - data reception from other CMM++
    - ⇨ passive fibers re-grouping
  - multiple (CMM++/TP)s

CMM++ updated development schedule

- **2011: Project and engineering specifications**
  - CMM++ project Preliminary Design Review
  - Preliminary design studies
  - Test rig installed, checked out at MSU
- **2012: Prototype design and fabrication**
  - CMM++ schematics and PCB layout
  - Production Readiness Review
  - Prototype fabrication, CMM firmware ported on CMM++
  - Tests in basic test stand at MSU
- **2013: Prototype testing/installation/commissioning, final fabrication**
  - Prototype tests in test rig at CERN
  - CMM++ firmware development and test
  - Test in the L1Calo system during shutdown
  - Fabricate and assemble full set of CMM++ modules
- **2014: Final commissioning in the L1Calo trigger system**