

CMX online software

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Overview

- **CMX online software**
 - CMX package
 - Bit manipulation class, data formats class
 - JEM jet simulation
- **CMX timing software**
 - Timing procedure
 - Prototype implementation

CMX online software

- **CMX online software package copy of CMM package**
 - Copy of CMM simulation
 - Basic structure available: cmxServices, cmxSim, cmxTests
 - Reading test vectors
 - Creation of test vectors, but no sensible patterns defined, yet
- **cmxServices = FPGA register map**
 - Update with FW development
 - Abstract functions available for setting delays (on 24+1 times 16 data/clock lines)
 - Planned: abstract functions for reading/writing timing test patterns

CMX online software

- **cmxSim**
 - Data formats implemented in classes
 - JEM (jet and energy sum), CP -> CMX
 - crate CMX -> system CMX
 - CMX -> ROS, CTP
 - Also partially support conversion into the other direction
 - Readability
 - Good for physics test vector generation
 - Data format coding from the other end
 - Uses an underlying class that allows bit operations “words-on-words” and Glink data formats (data rotated, so that n -information words are transferred bitwise in n clock ticks)

CMX online software

- **Online software development, finished tasks**
 - Thresholding of jets implemented
 - JEM system and crate merger implemented
- **Online software development, on-going**
 - Update of CMM parts in the software
 - JET Daq merger
 - Energy sum merger, similar to CMM
 - Eg (CPM) merger, similar to CMM
 - CMX test vector generation
 - CMX to Topo development
 - CMX stand-alone test environment
 - Code is already available, need to adapt this

CMX timing software

- CMX timing procedure (only a outline):
 - Scan of delay settings for each data line (24x16) and for the source synchronous clock line
 - Scan of delay of DSKEW2 to synchronize with system domain
 - Procedure involves comparison of data patterns in firmware
 - Cannot use parity errors, since the number of combinations is too large
 - Firmware has pattern comparison memories, JEM/CPM has the same pattern loaded for playback
 - Involved synchronization of playback (for simple patterns not needed, for complicated stress patterns use BCCRESET)

CMX timing software

- CMX timing procedure software:
 - Implemented:
 - Software scans the delays of data bit and source-synchronous clock in 2x31 steps
 - Histogramming of data comparison errors versus delay (difference)
 - Finding optimal, error free delay settings (bathtub plot, but only with 1= error, 0= error free)
 - Same scan for DSKEW2 delay setting
 - Storing histograms for cross checks, storing (and analysing) histograms for different (stress) patterns
 - Writing delay values to database
 - On-going:
 - Still abstract connections to CMX registers and database
 - Reading/writing comparison patterns in Wojtek's private code, need to put into cmxServices
 - Standalone testing (histogram analysis is working already)
 - Integration into the TDAQ software as a "calibration run"

Summary

- **CMX online software**
 - Copy of CMM packages
 - Data mostly formats available, except Topo
 - Implemented new functionality: thresholding of jets
 - Other parts seem more or less the same as in Jet part (structure) or CMMsim (functionality)
- **CMX timing software**
 - Prototype implementation ready, needs testing and correspondence of abstract functions in CMX firmware