CMX software status

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L1Calo joint meeting
22nd September 2014

Overview

- **Online software overview**

    - **cmxServices**

        - online setup of CMX

    - **cmxSim**

        - simulation of algorithms

        - generation of test pattern

    - **cmxTests**

        - collection of debug and calibration tools

- **Status for M5**

- **Plans for online software**

Online software for M5

- **CMX services**

  - Minimal setup for CMX

    - Setup of TTCrx clock select

    - Reset of clock manager

    - No other settings are made or change

    - Code hangs or crashes when CMX is not properly configured with the a BF configuration

  - Additions to access to spy memories

    - Mostly a duplication of read/write code for source memories is used for system memory, CTP output spy memories

    - Set/read spy memory start addresses, mode of operation: spy, verify, playback

    - RTM memories is using a generic code, less code duplication, common debug code

    - read-out related: DAQ offset, BCID offset, slice size

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Online software for M5

- **cmxSim**

  - Jet simulation:

    - **thresholding and summing** complete using threshold values from database

    - **crate-system** summing complete

    - tested with playback runs from JEM

      - spying output on RTM memories (simple pattern, energy ramp)

      - CTP spy memories (simple pattern, energy ramp, random pattern - system side - self test with spy memories in verify mode)

    - DAQ and ROI output ready

    - full output of simulation can be used for spy memories self tests in verify mode

Online software for M5

- **cmxSim**

  - SumET simulation:

    - CMM cloned version for crate and system ready for testing

  - CP simulation:

    - in progress, data formats done, logic in progress

  - Data to Topo simulation:

    - in progress, cable in database connected
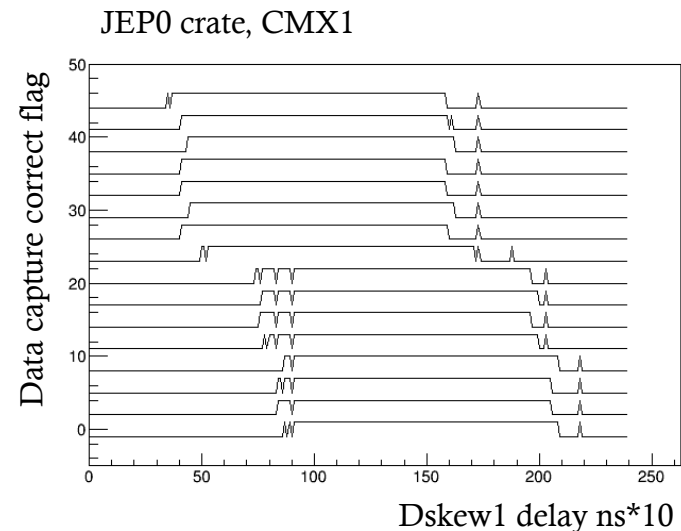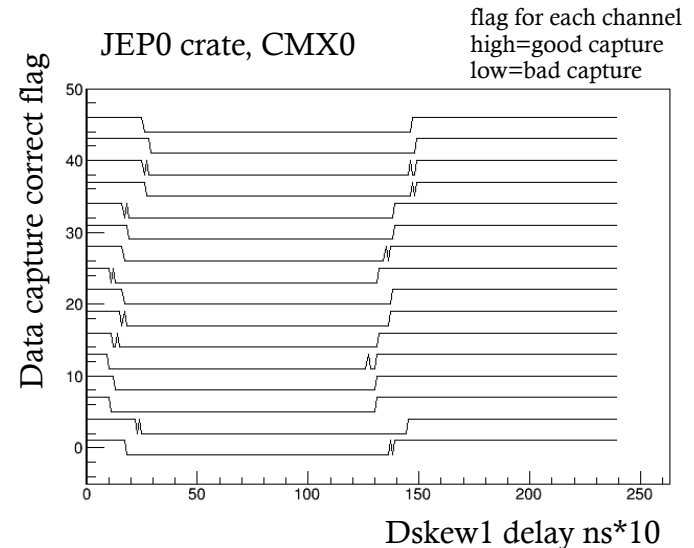
Online software for M5

- **cmxTests**

  - Timing calibration codes, to be run sequentially

    - **Fine-delay timing** using source memories and internal comparison with known patterns (by hand or load from JEM simulation)

      - ready since M4

      - output root files, but results are not stored
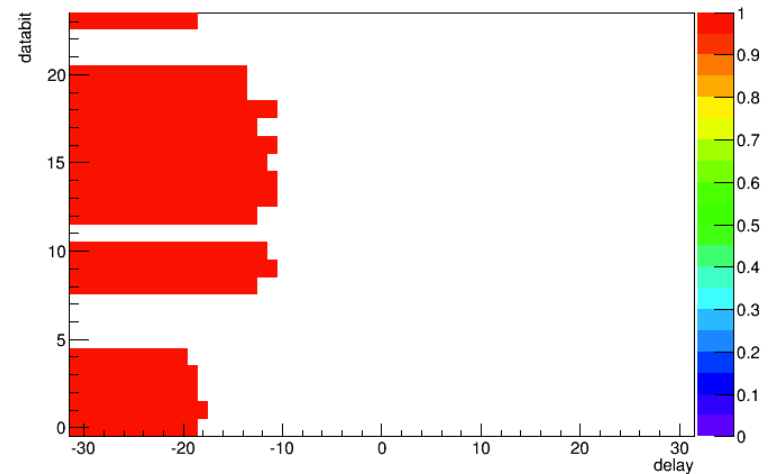
Online software for M5

- **Dskew1** using system memories

  - scan over Dskew1 delay and checking correct capture of data into the system memory

  - can detect correct or incorrect data pattern with know pattern (energy ramp)

  - Problem with slow (order of 1s) lock onto new Dskew1 phase uncovered

  - no graphical output, results not stored

- **Dskew2** is set by hand at the moment

- **Setup (bash) scripts for CMX in test rig and P1 to set good values**

flag for each channel
high=good capture
low=bad capture

JEP0 crate, CMX0

Data capture correct flag

Dskew1 delay ns*10

JEP0 crate, CMX1

Data capture correct flag

Dskew1 delay ns*10

Online software for M5

- **cmxTests**

  - Simulation code used in standalone simulation to test against firmware test bench with very generic patterns with nested loops: ramping energy, JEM, number of jets

    - with fixed threshold: successful debugging of firmware and simulation, e.g.: saturation not correct in firmware at first (spotted in standalone), then not correct in JEM simulation (spotted in jemSim)

Online software for M5

- **tool to quickly read CMX status registers (mostly on the board support) developed by Andrew**

  - used for hardware check out at MSU/CERN

  - record miniPod light level output (useful for long term test of miniPod reliability

- **tool to write/read CF via VME and trigger reloading firmware configuration developed by Chris**

  - first version available, but read/write from systemACE buffer to CF needs debugging

Plans for online software

- **CMX services**

  - need to fully integrate read/write default timing values/ read-out related settings from database

  - reset CMX firmware into a good state at configure step

  - checking of firmware status and version

  - minor updates to accommodate additions in the latest BF firmware version

Plans for online software

- **cmxSim**

  - test SumEt simulation *(to do, when firmware is ready)*

  - finalize CP simulation *(ready by M6)*

  - set correct output format from simulation in database (now by hand)

Plans for online software

high priority, ready before M6
medium priority, ready for M6
low priority

- **cmxTests**

  - Verification of jet simulation with thresholds

    - threshold per JEM and eta dependent threshold

  - consolidate timing software and procedures: fine delay and Dskew1 timing

    - output of test results in root files and histograms

    - design of more stressful patterns (need to reverse-engineer JEM and CPM algorithms)

    - automatic calculation of best settings (correct data capture and comply with timing constraints) from Dskew1 timing scan

    - store test results in database

  - Automatic test of Dskew2 timing

    - Dskew2 scan with checks for data integrity

    - minimize latency by setting the optimal Dskew2 delay

    - store test results database

Plans for online software

- **cmxTests**

  - Tests of many slices readout

  - Automatic analysis of read-out data to obtain DAQ offset

  - Automatic analysis of read-out data to check trigger reliability

  - read/write from systemACE buffer to CF debugging