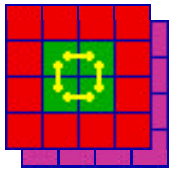
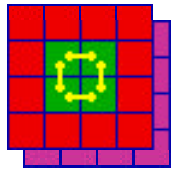
CPM testing: Glinks, DAQ and RoI



- Initial tests at RAL
- Birmingham test setup
- Problems:
  - Hardware
  - Firmware
  - Software
- Summary of Results

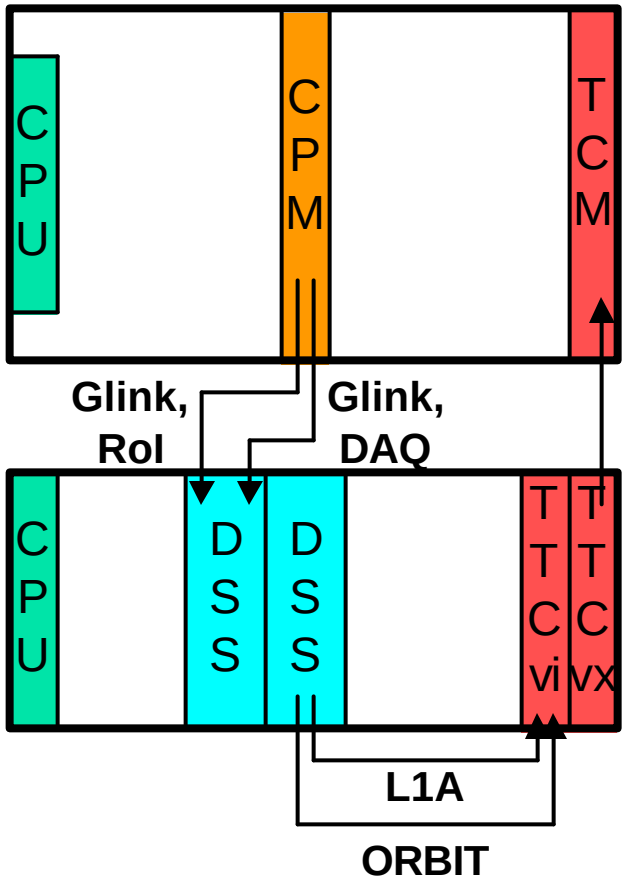
Initial tests at RAL



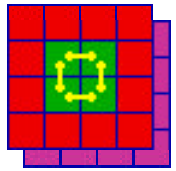
- Took place mid August
- First serious use of DSS L1A Generation
  - Of which more later…
- Using ROD to DSS slink sink
  - Plus standard cpRod Test software analysis
- Correct pattern of RoIs captured
- Correct DAQ data captured, 1-5 slices
- Hit data incorrect (firmware formatting)
- BC Numbers incorrect (no BC reset generated)

Birmingham Test Setup

- DSS (GIO/ECL variant)
  - Produces L1A and ORBIT
  - Connected directly into TTCvi
- TTCvi/TTCvx
  - Programmed to use external trigger and orbit
  - Also program B channel 0 to produce BC-reset
- CPM
  - Serialiser playback data
  - (Could also use LVDS DSS)
- DSS (Glink sink variant)
  - Accepts any Glink packet
    - CPM DAQ or RoI
    - Also tried CMM briefly
  - Filling controlled by software
  - Has some advantages over using ROD

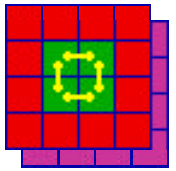


Problems: Hardware



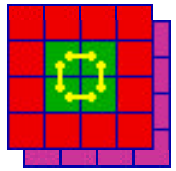
- CPM #4 DAQ Glink output initially failed
  - Dry joint on chip (not checked by JTAG)
- CPM Glink outputs failed to lock with two CPMs in adjacent slots
  - Noise on power supply
  - Only occurs once serialisers (on other CPM) loaded
  - FIO load from backplane was causing a component to oscillate
  - Richard implemented temporary fix (new design should be OK)
- DSS Glink input instability
  - Could not get new Glink sink cards to lock reliably
  - 'Solved' by reverting to original Glink sink daughter-card
  - Possibly new cards would work with better cables/grounding etc

Problems: Firmware



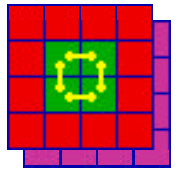
- Final parity bit on RoI and DAQ inverted
  - Fixed quickly while still at RAL
- Parity bits on 2nd and 4th slices inverted
- Hit words formatted incorrectly
- Problems with closely spaced triggers:
  - Parity incorrect in RoI stream
  - Data length problem with 5 slices
- Much work needed on readout offsets
  - Three offsets needed:
    - Data into DAQ stream
    - Hits into DAQ stream
    - RoIs into RoI stream
  - Settings need to be stable run-to-run
  - Needed PLD update to decode TTC commands correctly

Problems: Software



- Required better understanding, then new software for TTCvi
  - Signal parity of TTCvi inputs
  - Tuning of TTCvi input timing
  - Generation of BC reset
  - Generation of synchronous playback memory start
- Needed new DSS readout and control mechanism
  - Created ‘glink kicker’ cf cpm kicker, cpRod kicker
  - No synchronization between readout software and L1As
- Needed new parameters in database
- Some untested software features used for first time

Summary of Results



- CPM Glink streams work well on CPM#1 and CPM#4
  - Tested up to 130 kHz
  - Tested with closely spaced L1As
  - Readout offsets stable and (reasonably) predictable
  - Overnight test had no errors
    - DAQ stream with 5 slices, about 10^9 words tested
  - Tests with ROD not so extensive, but so far no problems

- Comments
  - Tests with DSS Glink sink invaluable
  - Now have minimal, but sufficient equipment and software tools to fully test a CPM at Birmingham