T/DAQ Workshop

Detector Interface Session

SCT-Pixels

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21 October 1998

SCT/Pixel RODs
Schedule

Design requirements for SCT and Pixels are very similar, so a common ROD is being designed at UCI/Wisconsin/LBL

Full details at URL:

http://positron.ps.uci.edu/~rodatlas/rodwork.html

- **Pre-prototype ROD ("ROD99")**

  - **available Spring 1999**
  - **intended to handle 24 SCT or 48 Pixel modules**
  - **9U VME module (customised P3 connector and backplane)**
  - **Back of Crate (BOC) card for optical interfaces (to Front Ends and ROBs)**
  - **~16-18 RODs per crate (depending on other requirements of ROD crate)**
  - **interface to TTC via distribution module (aka MCCC). Distributes TTC commands via custom backplane to RODs. RODs transmit Clock and Control to FEs**

- ROC communicates via VME backplane with RODs

- **Prototype ROD**

  - expected Spring 2000
  - final channel count (aim is to handle 48 SCT or 96 Pixel modules if possible)
  - other functionality as in final ROD in light of lessons learnt with ROD99

- **Performance Readiness Review**

  - Autumn/Winter 2000
  - if all is well, start final ROD production

ROD production expected to be completed in Autumn 2002

ROD tasks and requirements

- **Calibration**

  - event created by CalStrobe command to Front end (+ L1Accept)
  - module data not distinguishable from normal event
  - use Trigger Type from TTC to flag ROD (may need >1 type, as not all channels calibrated on every event)
  - calibration needs of SCT and Pixel are very different:
    SCT – typically scan one or two parameters and accumulate occupancy histograms. Limited extra processing on ROD.
    Pixels – much more demanding – may want crude pulse-height measurement for each pixel. ROD may need to do significant processing on the measurements.
  - Unlikely events will routinely go to ROB or ROC, though may need to on occasion. Histograms/processed data to ROC.
  - May wish to calibrate in beam gaps – though it may prove impracticable

- **Need to have capability for calibration runs – whether these will be needed between physics runs or only in setup periods is unknown**

- **Monitoring**

  - **"spy mode" on event data via ROC**
  - **histogramming in ROD (eg. occupancy)**
  - **for debugging – need to be able handle all events via ROC (at up to ~1kHz)**
  - **keep track of chip error counts, missing events, other protocol errors**
  - **ROD might be allowed to disable a module automatically if error rate too high – but must flag this (either in data and/or to status display).**
  - **need monitoring also in Event Builder so can use track segments.**

- **Control**

  - **initialisation of Front Ends (and selves) when instructed**
  - **details depend on database information and/or explicit Run Control commands**

- possibly disable a module if appears faulty (cf. monitoring)
- synchronise events from modules – handle missing events
- also need control of optolinks, power and bias supplies etc. from DCS.

- **Run Control**

  - overlaps with previous section
  - Start of Run: initialise RODs, download database, tell ROD to initialise FEs
  - End of Run: organise update of databases, save histograms
  - During Run: handle dead ROD (eg. reset or end run early)

- **Timing**

  - ROD will determine relative timing of detector modules. Mechanism not determined – may involve TDC on ROD itself or on BOC card.

- **Databases**

  - **ROD needs access to configuration database to:**
    - **Initialise Front Ends**
    - **Initialise own inputs from FEs (enable/disable)**
    - **Initialise monitoring (eg. ignore channels)**
    - **Update database at End of Run (revised configuration) – probably via ROC**
  - **ROD needs access to calibration database to:**
    - **Know which channels to pulse and pulse size**
    - **Load threshold information into DACs**
  - **no need for RODs to access metrology database**
  - **code versions for ROD and ROC need to be in a database**
  - **Event Builder will need access to metrology information as well as configuration and calibration databases for eg. track fitting**
  - **If tools currently in development for Back end could be used for handling databases by RODs/ROCs, Event Builder and offline, this could be very attractive.**

- **Errors**

  - **Inform Run Control (status display may show error counts?)**
  - **Also flag ROB and ROC**
  - **In some cases, might reset appropriate FEs, but this is probably in light of experience and must have ability to override (eg. if reset rate excessive, want to debug the problem).**

- **Special Triggers**

  - **Calibration triggers – possibly in “beam gap” (see earlier). More likely as separate calibration runs (could be at start or end of physics runs – depends on time taken).**
  - **Random triggers at low level – could use to study detector behaviour. If envisaged as “long deadtime” events, could use as calibration triggers.**

- **Event format**

  - **Minor discrepancies in documents, but basically appears OK. Need to see final confirmed version before formal agreement**

- **Partitioning**

  - **16 partitions probably more than we could handle in practice. However, total number of ROD crates will be 5-10 in SCT, 2-5 in Pixels (depending on number of modules per ROD), so >4 partitions might be useful in both SCT and Pixel.**

Test Beam 1999-2004

- **1999 similar to previous years – 2-3 periods to test out modules in preparation for PRR. Possibly a joint run with TRT/SCT/Pixels, but maybe outside test beam**

- **2000+ - further module testing to ~2002, moving towards ATLAS trigger rates. Need for ATLAS T/DAQ increases over years.**

- **In parallel, we will have “system tests” with significant number of modules in “final” ATLAS physical arrangement – this will start next month with prototype Low Voltage supplies, cabling etc. and will utilise ATLAS-style equipment as and when it is available. In particular, RODs will be used as they become available.**