DCT Upgrade Analysis/Monitoring Tools

Su Dong
DCT Upgrade Commissioning

- Sep/03 starting with 1/8 then 1/4 detector wedge using prototype TSF + production ZPD and interface boards.

- **Stage 1 goal**: establish TSF->ZPD signal flow to produce ZPD tracks & stable DCZ DAQ operation.

- **Stage 2 goal**: Detailed debugging of signal quality and algorithm logic through regular high stat parasitic data. Establish new TSF->BLT path.

- **Stage 3 goal**: Commission pre-prod and production TSFs as they gradually added to the system (~Nov/03).

- **Stage 4 goal**: Test new DCZ->GLT triggers when there are sufficient number of TSFs.

- **Stage 5 goal**: Full DCZ driving L1 to BaBar (Jan/04 ?) and new L1Sim going to physics production.
Monitoring/Analysis Tools

- **L1TNtuple:**
  Detailed analysis for specific issues and correlating different types of data for performance study. This is our best offline development tool – with “everything” in hand for convenient and flexible study. Suitable for looking at ~100K events.

- **L1SimChecker:**
  - TSF Digi -> ZPD Digi prediction with L1Sim compared to actual ZPD digis.
  - Similar applications for TSF->BLT, ZPD->GLT, BLT->GLT and GLT input->output checks.
  These are very powerful bitwise debugging tools for the hardware and simulation itself for low level errors.
  Highly desirable for making these tools modular and standalone as we want to use them for many cases: against XTC, DB, Ntuples; inside L1FMon, teststand ROM etc. if possible. Should be able to run against a few runs of XTCs for high statistic summary.
Monitoring/Analysis Tools

- **TSF digi comparator:**
  Direct comparison of new and old TSF digis (some nontrivial code still needed to handle wedge boundary, timing difference etc.). Should be able to run against a few runs for high stat summary. Embed in L1TFmon + other Apps?

- **Wired Event Display:**
  - Many items to upgrade: New/old TSF display, ZPD mask/track and BLT/GLT/EMT quantities.
  - Running against XTC with in-job Reco. Should in fact push this to run against trickle stream live for general shift console.

This is not just for fun. Many types of problems take a few seconds to get a clue of the source here which can otherwise take a long time to understand or even undetected.
Monitoring/Analysis Tools

- **L1TFmon:**
  - Initial goal: Add new DCZ occupancy plots similar to current FMon.
  - Enhancing monitoring for online hardware status: damage stat, framing errors etc localized to board level.
  - Embed SimChecker/Digi-comparator for bitwise algorithm and interface transmission checks.

- **L1TOprMon:**
  Global performance with Reco as reference. Add ZPD track efficiency and resolution checks. Also need parasitic TSF/BLT checks similar to existing DCT monitoring.

The XTC playback capability and good archive are essential part of the monitoring in addition to live operation.