RHU-Lumi DAQ Interface

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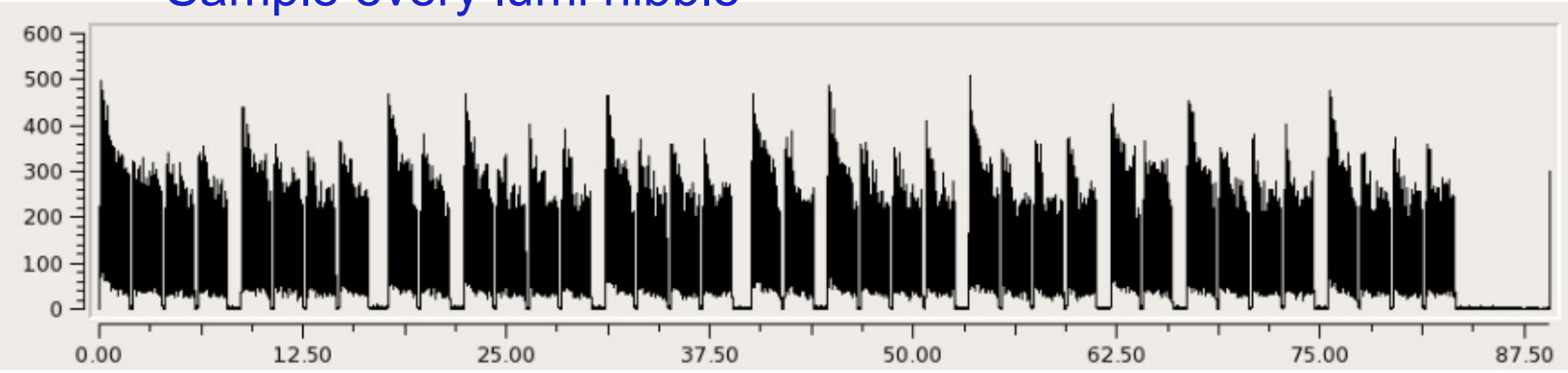
Recording Histogramming Unit (RHU)

Readout of full-orbit histograms, collection of post-mortem information

- No deadtime
- 8 histogram input channels (discriminated hits)
- Additional input signals: orbit clock, bunch clock, beam abort
- Bins of 6.25 ns (4/bunch bucket), 14256 bins/orbit, incoming/outgoing beam separation of 2 bins in principle
- Configurable sampling period

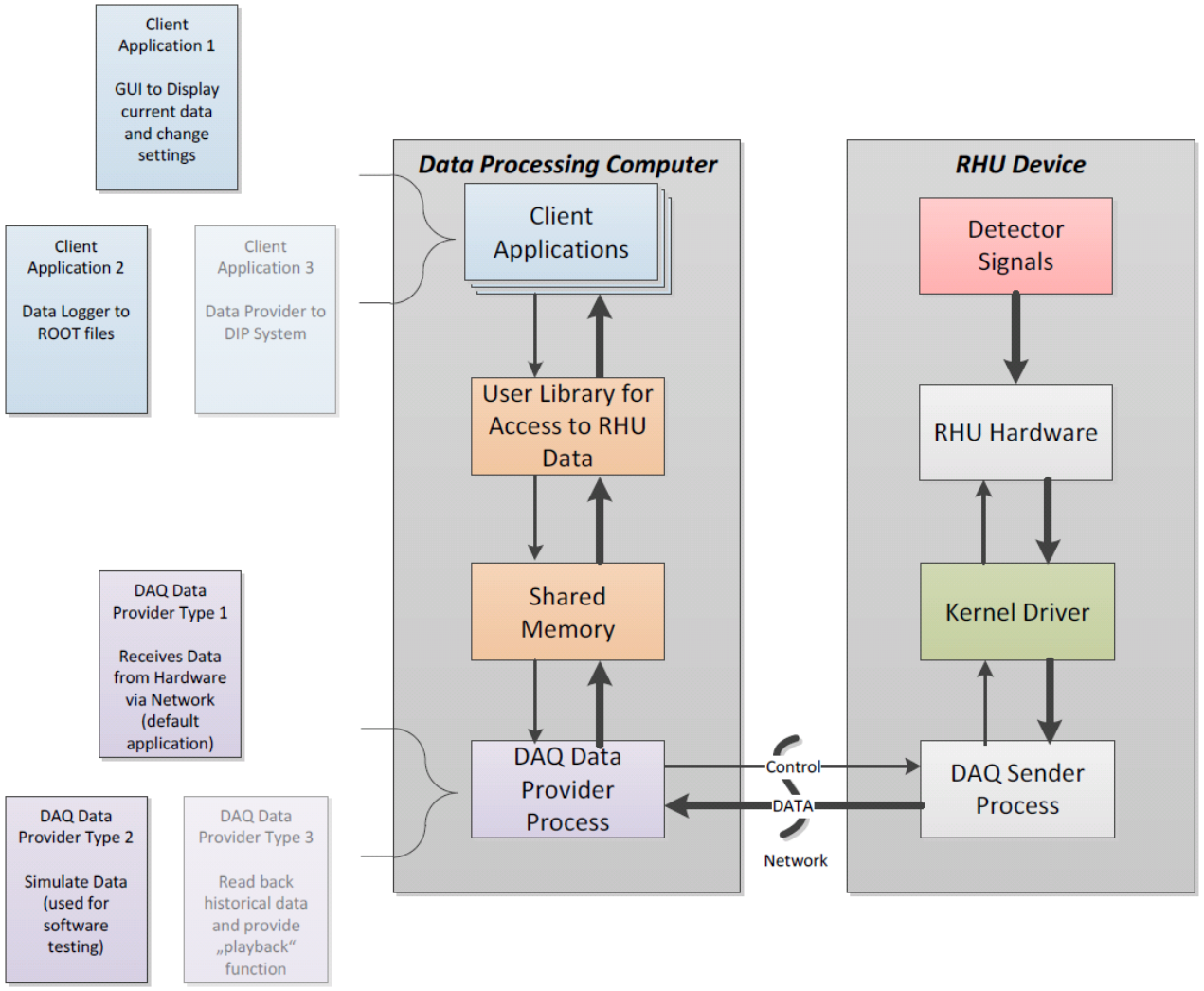
To be added: capability for sampling period boundary signal

- Sample every lumi nibble

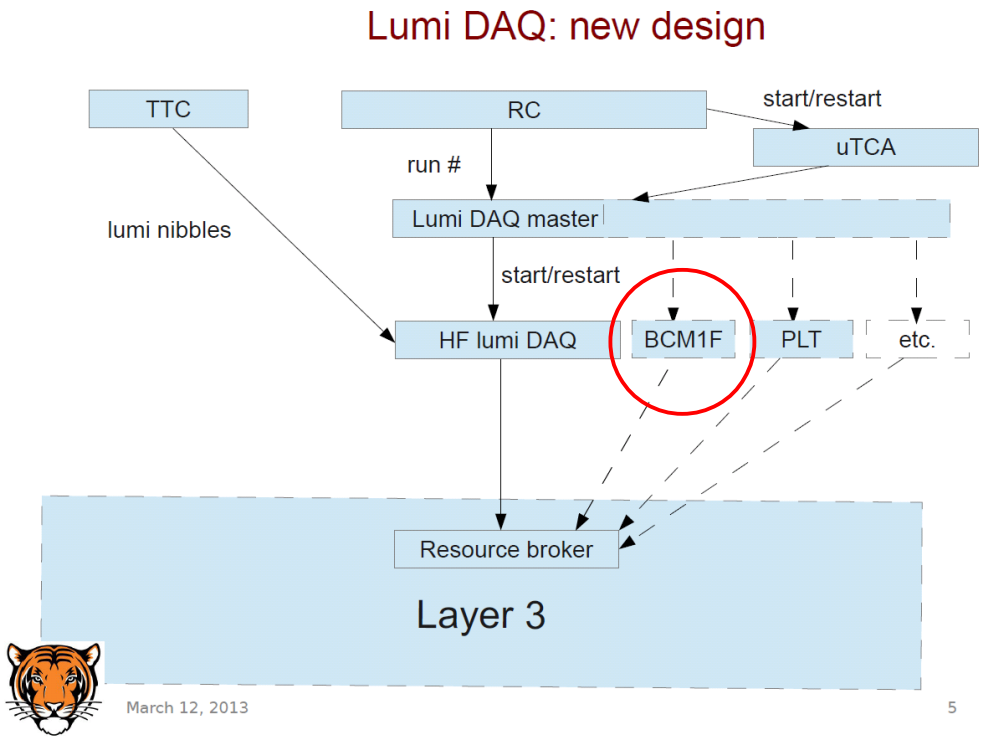


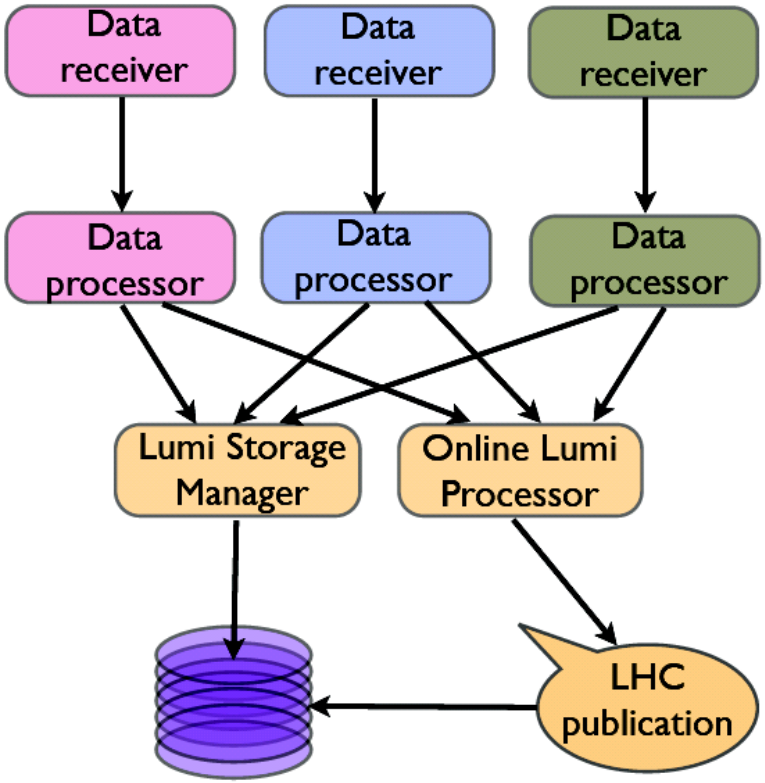
RHU Software

Current setup:



New Lumi DAQ Setup





Upgrade Reqirements for interface

General

- Add BCM1F to Lumi DAQ
- Many more channels, multiple RHU's
- 25-ns running

TTC-wise

- TTC signals and method of decoding them – including lumi nibble count/reset debate

DAQ-wise

- Interface for RHU-LumiDAQ communication: data format, transfer protocol

General Considerations

Multiple RHUs (6)

- Each needs TTC signals
- Multiple receiver processes on same computer (~3 per PC)
- Need computers and sockets

TTC Considerations

Nature of lumi nibble signal?

- Need to decide among rest of Lumi DAQ community

How to decode TTC signals/give to RHU?

- Common method for other Lumi DAQ users? e.g. Number of TTCrx's needed
- Options: decode directly on RHU, or single board and fanout (or across backplane)

What RHU will do with the different signals

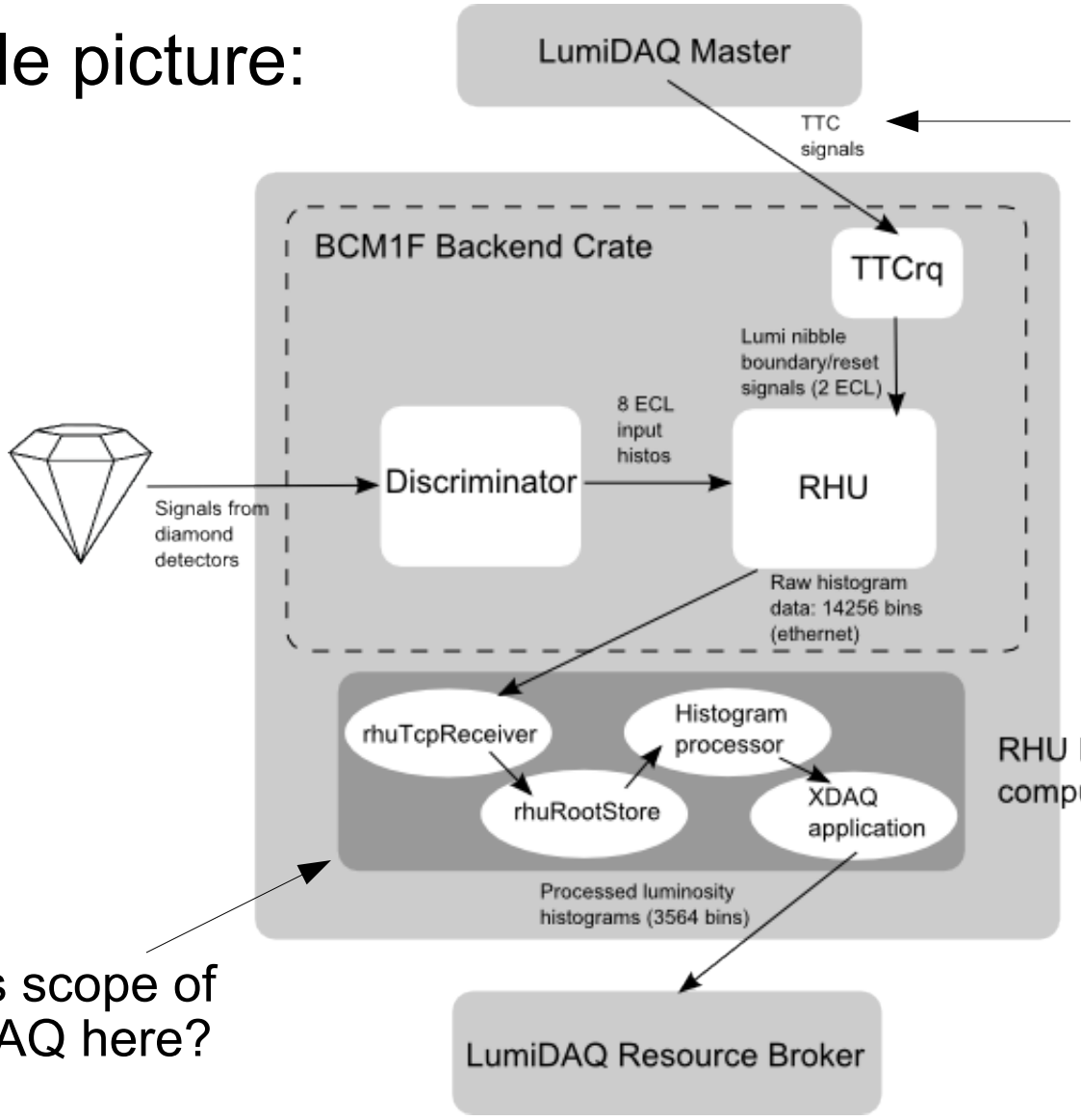
- Stop (or restart), start necessary? RHU doesn't need to stop
- Lumi nibble boundary – sample period

DAQ Considerations

- Common data format among all Lumi DAQ users: 3564 bins
- Implementation in XDAQ – scope?
  - RhuTcpReceiver + library already exists
- Converting histograms from RHU format to Lumi DAQ common format
  - 4 RHU bins per bx (i.e. per Lumi DAQ bin).
  - Possible histogram processor between RHU and Lumi DAQ?
  - Suggestion: Send one 3564-bin histogram 4x per lumi nibble
- Transfer to central Lumi DAQ resource broker

Upgrade Concept

Possible picture:



To Be Done

- Decide method for TTC signal decoding, multiplicity/fanout
  - Format, hardware/firmware
- Develop of necessary XDAQ software for processing/transfer
  - BCM1F XDAQ process as RHU client? i.e. make use of RHU interface library to get data from shared memory

→ Discussion already in progress at this workshop...

Backup

TTC: Lumi Nibble Signal Debate

Scenario 1

- Subsystem gets lumi nibble boundary signal
- In case subsystem drops out, lumi nibble count distributed for resynchronization and restart without starting new run
  - Lumi nibble count = 0 at beginning of (lumi) run

Scenario 2

- Subsystem gets lumi nibble boundary signal
- Lumi nibble reset signal distributed
  - In case subsystem drops out: for primary lumi system, start new run. For secondary lumi system, who cares?

Situation still very dynamic