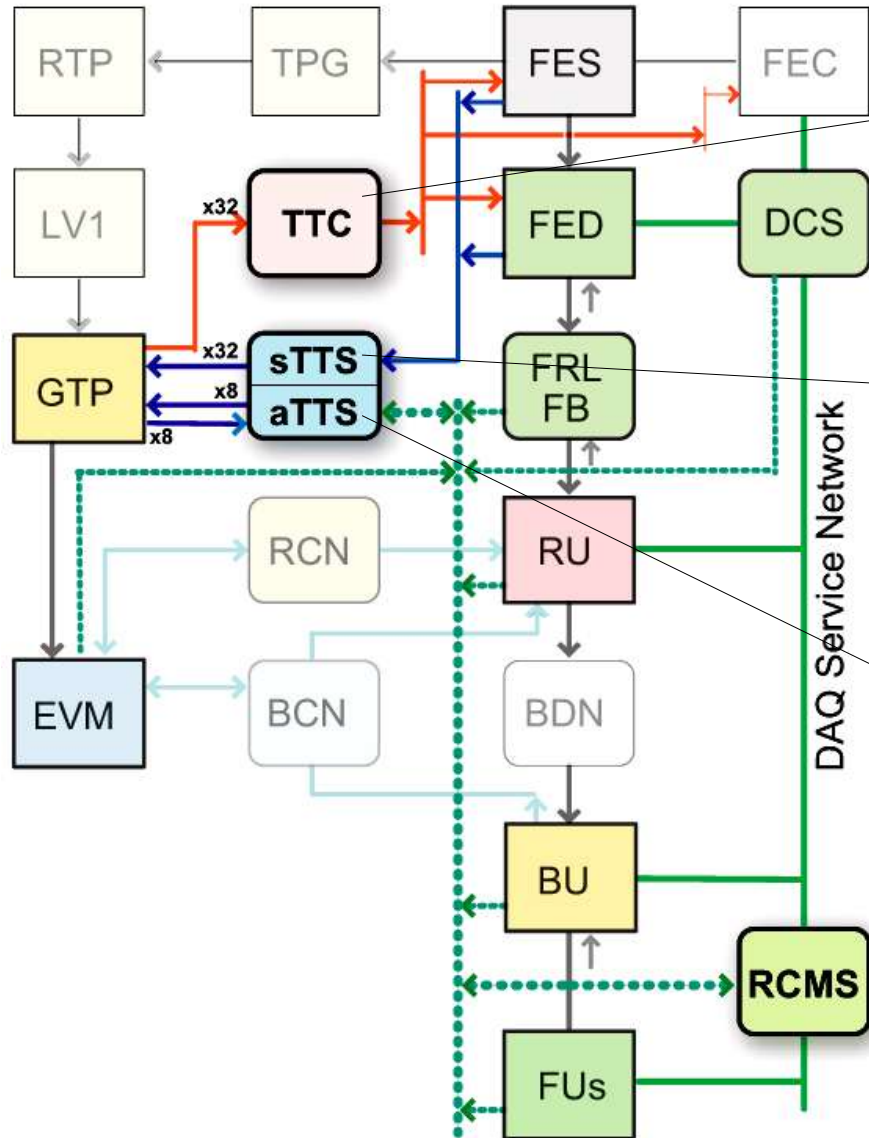




FMM status (Attila Racz & Lucien Pollet)

FMM helper module (Claude Jacobs)

Software release: DAQKit-01 (CMD group)



**TTC signals**  
**from GTP to FES**  
 distributed by an optical tree  
 (~ 1000 leaves)

**sTTS signals**  
**from FED to GTP**  
 collected by a FMM tree  
 (~ 700 roots)

**aTTS messages**  
**From DAQ to TTS and**  
**From TTS-GTP to RCMS**  
 Transported by the DAQ service  
 network (e.g. Ethernet)  
 (~ 1000s nodes)

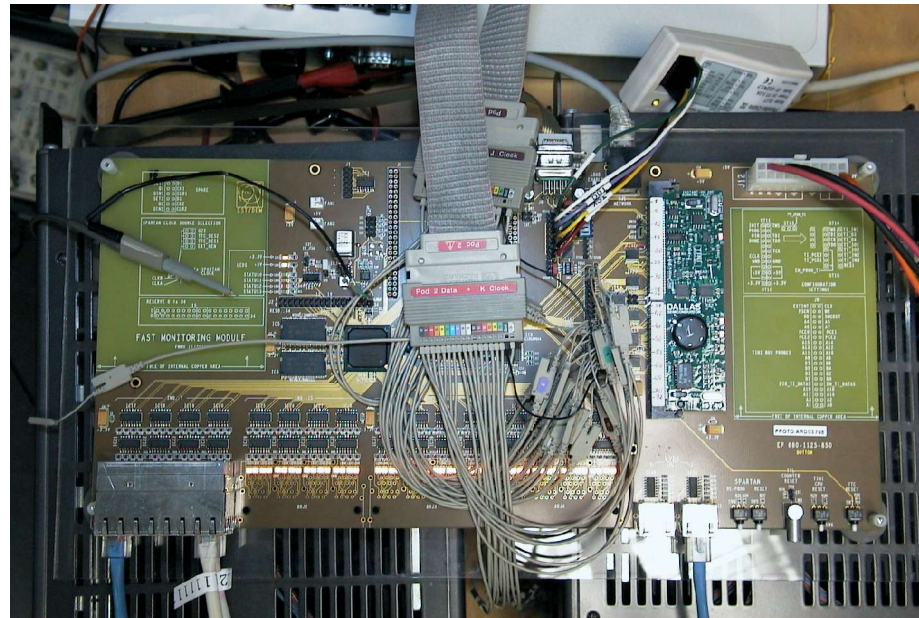


# FMM status

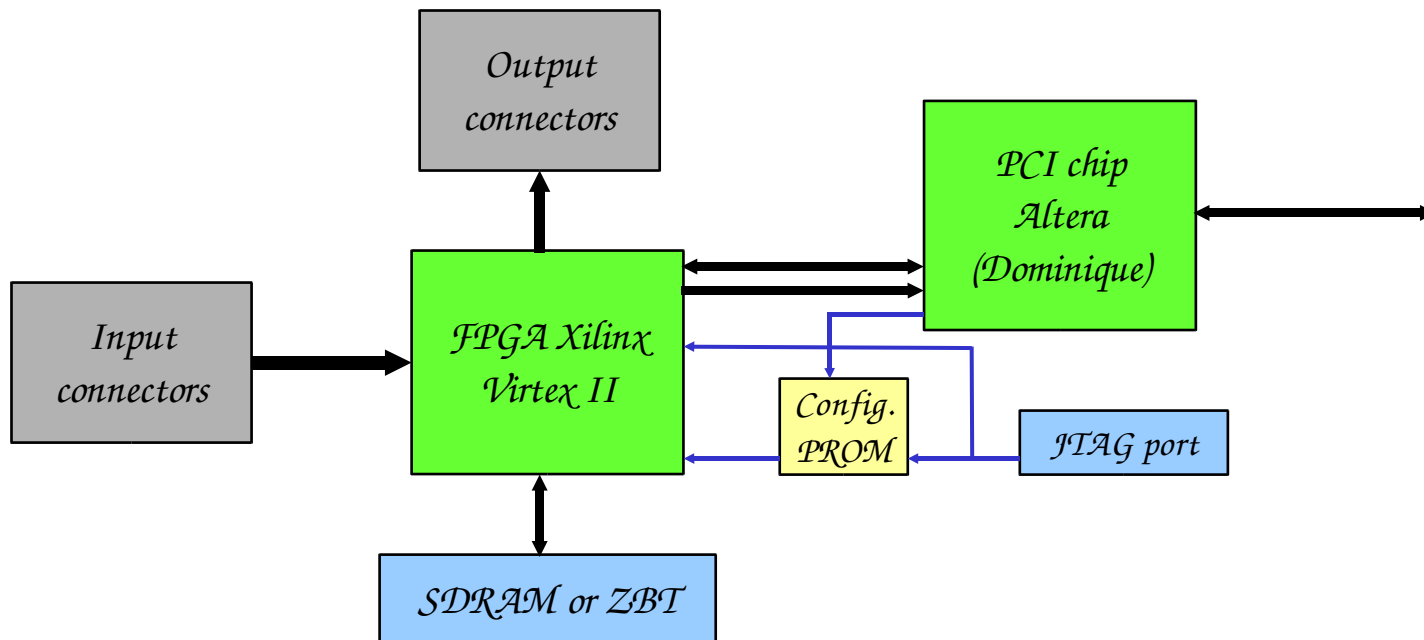


- Functionality of FMM
  - Merge sTTS signals in tree structure
  - Monitor deadtime caused by each FED
  - Keep history of sTTS activity for post-mortem analysis

- Current prototype limitations:
  - slow interface to history memory ( $O(20\text{kB}/\text{sec})$ )
  - large access latency (1s)
  - no deadtime monitors



- Compact PCI card
  - PCI interface (33 MHz / 32 bit)
    - access latency :  $O(\mu\text{s})$
    - data through-put with DMA:  $O(100\text{MB/s})$





# FMM estimation of data volume



- data volume:
    - each transition 16 bytes:
      - 4x20 bits for all input signals
      - 40 bits time time tag
  - Table : data volume as function of transition rate
  - PCI bandwidth is much higher than what is needed.
- For the most pathologic case:

1 crate 8 FMM:  
 $8 \times 1.5 \text{ MB/s} = 12 \text{ MB/s}$

<i>Transition rate (all inputs)</i>	<i>History length per MB (second)</i>	<i>Data rate to the history memory</i>
<i>10Hz</i>	65000 <i>(1.8 hour)</i>	<i>160 bytes/sec</i>
<i>100Hz</i>	655 <i>(~11 min)</i>	<i>1.5 kB/sec</i>
<i>1kHz</i> <i>Worries...</i>	65	<i>15 kB/sec</i>
<i>10kHz</i> <i>Pathologic...</i>	6.5	<i>156 kB/sec</i>
<i>100kHz</i> <i>Very Pathologic...</i>	0.65	<i>1.5 MB/sec</i>



# Final prototype design



- **New modularity**
  - 20 inputs and 4 outputs
  - possible configurations :  
1x 20 in => 1 out  
2x 10 in => 1 out
  - total of 46 FMMs (no change wrt old design 32 => 1)
  - more efficient use of available channels
  - 6 crates with max 8 FMMs
  - use trigger distributor to distribute global signals and interface to TTC
- **Larger FPGA** (10000 instead of 6000 logic cells)
  - eases implementation of deadtime counters



# Status of final FMM prototype



- Schematics finalized end March.
- PCB development starts April.
- Firmware: will be finalized during PCB development

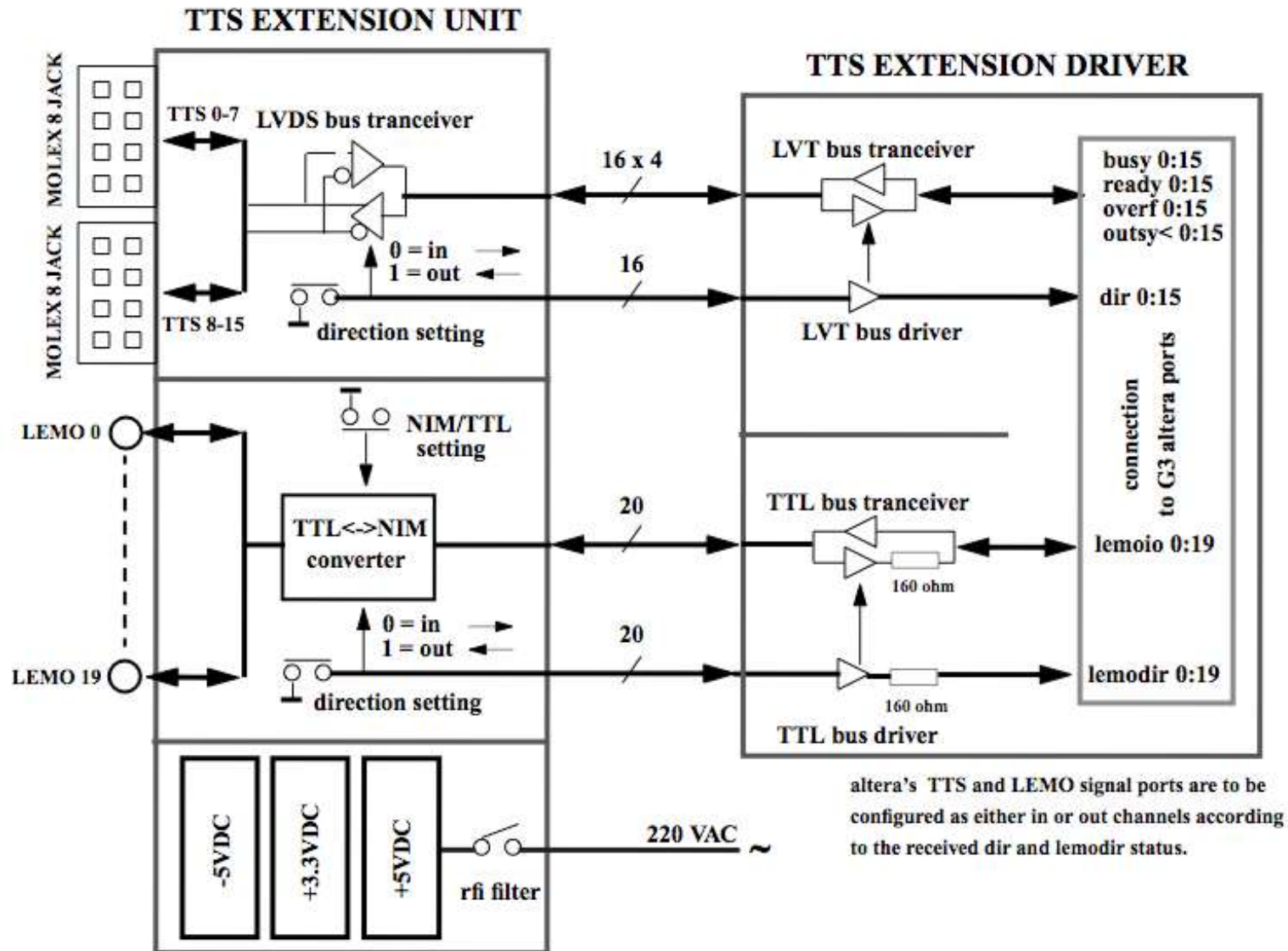


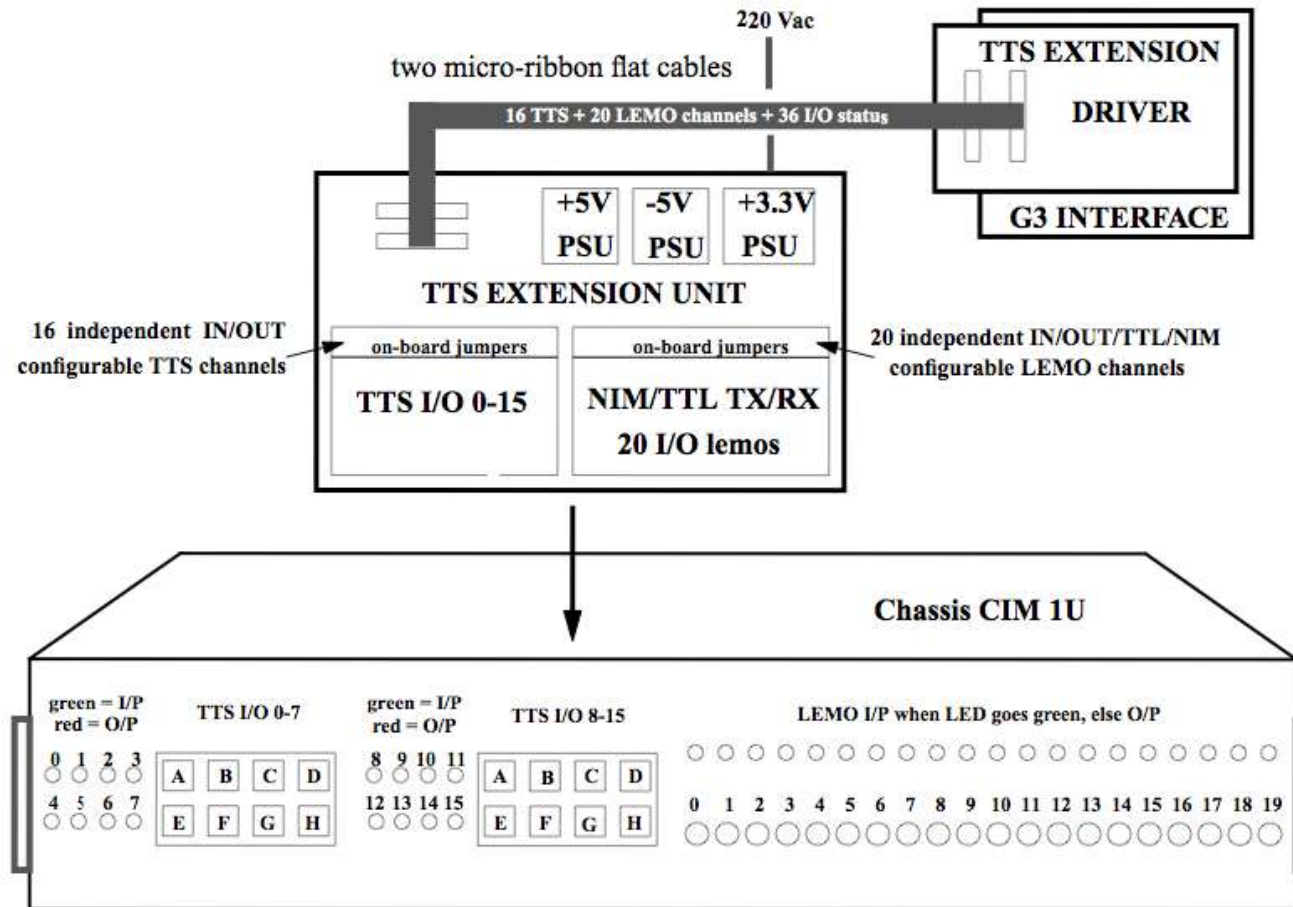


# sTTS extension board



- **Purpose:**
  - Universal sTTS signal generator/receiver
  - Used to debug / test FMM
  - Used in DAQ prototype to generate sTTS signals for pseudo-FEDs
  - possible usage in sub-detector groups to evaluate sTTS status of their components in test-setups
- **Features:**
  - **16 sTTS ports** : either input or output
  - **20 multi purpose lemo connectors** (input or output)
  - All signals connected to **FPGA in GIII board**.







# DAQKit-01



- What is DAQKit-01
  - A release of a bundle of Online Software packages
  - They will have been verified to work correctly on a **reference platform**
  - The DAQKit-01 should contain **all necessary “tools”** to build
    - small DAQ systems for test-beam or laboratory
    - develop local DAQ components



# Reference platform for DAQkit-01



- **OS system:**
  - CERN Linux 7.3.3 Workstation installation with kernel sources
- **Additional packages needed:**
  - gcc-alt-3.2.3 compiler (available as RPM from ASIS)
  - Java SDK 1-4-2 (available as RPM)
  - MySQL 4-0-18-0 (available as RPMs)
  - Xerces 2-3-0 (available from XDAQ web site)
  - log4cplus V1.0 (available from XDAQ web site)



# Components of DAQKit-01



- **XDAQ core**
  - the CMD online software framework
- **ptATCP**
  - TCP transport layer to shuffle data via the xdaq i2o peer transport
- **XPhys**
  - XDAQ application to interface the bigphys kernel patch
  - needed to build zero-copy DAQ systems (work with hardware which uses DMA to transfer data into and out of a PC)



# DAQKit-01 components



- **itools**
  - fedkit driver and generic PCI driver
- **Fedkit application**
  - XDAQ application to read data via an Slink into a PC (uses the fedkit driver)
- **EVB**
  - latest version of the event builder
- **Job Control**
  - XDAQ application to start and stop XDAQ executives on a computing node



# DAQKit-01 components



- **HAL**
  - Hardware Access Library
- **SBS driver**
  - version which compiles and installs on CERN Linux 7.3.3
- **RCMS**
  - Run Control to Control XDAQ based DAQ systems (including Filter unit(s), allows to access reconstruction parameters via RCMS)





# DAQKit-01 components



- Filter software
  - “stand alone” filter unit which gives interface to reconstruction code.
  - Filter skeleton which interfaces to EVB and reconstruction code
  - Root based data quality monitoring service



# Status of DAQKit-01



- Original plan: release end of march
- This will not be met
  - The testing and debugging is not yet finished
  - A lot of documentation must still be written
- Hope: **release end of April**