Installation and Commissioning Plans for the jFEX

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Uli/Julio

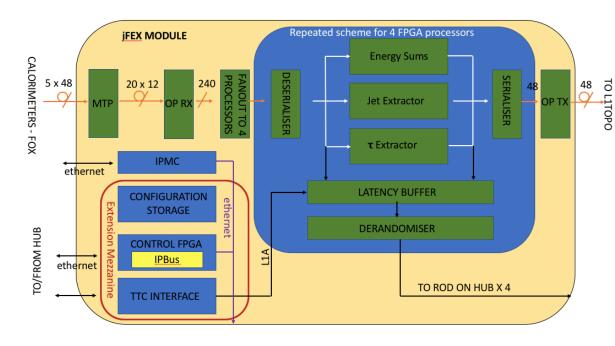
Agenda

- Introduction
- jFEX Status
- Hardware Availability
- Surface Test Facility
- Installation
- Commissioning
- Summary

Introduction

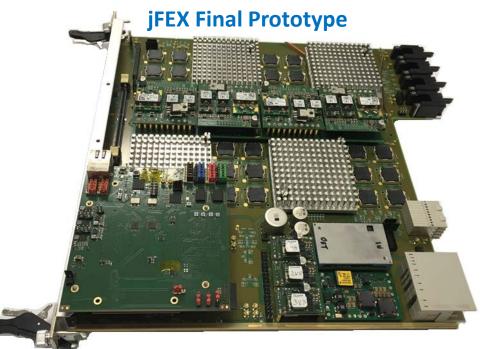
- jFEX identifies jet candidates and calculates ΣE_T and E_T^{miss} for each BC
- $|\eta| < 4.9$ with different granularities
- 6 modules to be built
- Hardware details
 - ATCA board
 - 4 Xilinx UltrascalePlus FPGAs per module
 - XCVU9P-2FLGA2577E
 - Up to 120 MGTs per FPGAs
 - 24 MiniPOD: 20 RX + 4 TX
 - Modular design
 - Mezzanines
 - Power
 - Control

jFEX functionality – Block Diagram



jFEX Status

- Final Design Review took place end of May
 - Firmware: May 29
 - https://indico.cern.ch/event/728398/
 - Hardware: May 30
 - https://indico.cern.ch/event/728400/
- Green light for producing the jFEX Pre-Production modules on June 12
- Ongoing PCB production
- Order of all components placed
- Expect delivery from assembly company: beginning of October
- Firmware
 - Ongoing integration of infrastructure firmware (MGTs, board control, IOs and etc.) and algorithms



Hardware Availability (Plan)

- jFEX First Prototype Currently at CERN (STF)
 - Equipped with one UltraScale FPGA
- jFEX Final Prototype Currently in Mainz
 - Equipped with four UltraScale+ FPGAs
- jFEX Pre-Production Module Available from November 2018 onwards
 - Pre-Production module will be used as spare
- jFEX Production Modules Available from May 2019 onwards
 - 9 (+ 1) modules
 - 6 to be installed
 - 3 (+ 1) spares

Surface Test Facility (1)

Final Prototype = Pre-Production Module = Production Module

- No hardware changes are foreseen from prototype to production module
- Initial integration tests with other systems can start at anytime with Final Prototype
 - And with Pre-Production by November
- Combined tests with TREX schedule for beginning of September (in Heidelberg)
- Combined tests with ROD (Hub) to take place soon

Surface Test Facility (2)

- Setup ready for tests with jFEX First Prototype and FTM since July
 - Tests of optical links, TTC clock reception, IPBus and etc. were performed
 - jFEX Final Prototype is currently in Mainz, but will be shipped back to CERN soon
- What can and cannot be done elsewhere?
 - Will we be able to perform tests with some calorimeter boards?
 - How/what will be the DCS setup on the STF?



Surface Test Facility Pre-Production Module

- Validation of Pre-Production module will take place at the STF
 - Smoke tests and basic validation of board optical/electrical links (IBERT) to be done in Mainz
 - Validation of all optical/electrical inputs/outputs simultaneously (IBERT and formatted data)
 - Power consumption
 - Ripple measurement
 - Thermal dissipation
 - LHC clock reception
 - MGTREF clock jitter measurement
 - Validation of the backplane high-speed links
 - Readout and TTC data
 - Latency measurement
 - IPMC

• Firmware consolidation

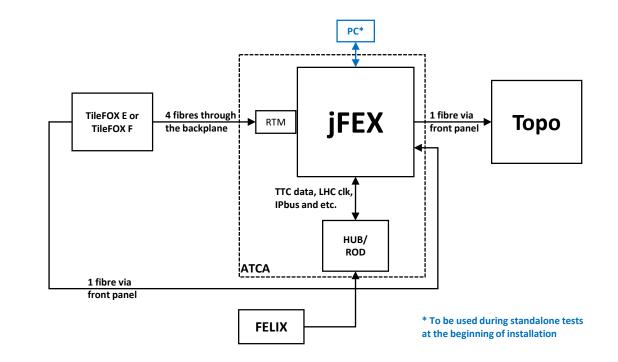
- Tests with integrated firmware (infrastructure and algorithms)
- Latency measurement
- Combined tests with other parts of the system

Surface Test Facility Production Module

- Initial production modules acceptance tests will take place in Mainz
 - Smoke tests and basic validation of board optical/electrical links (IBERT)
- Finalization of production modules acceptance tests on ATCA crate with HUB/ROD and/or FTM
 - Same test list of the Pre-Production module
- Full slice test from Latome/TREX via jFEX to Topo
 - As much as possible inputs
 - Formatted data
 - With all possible infrastructure parts
 - Hub/ROD, FELIX, IPBus, DCS and etc.
 - Final evaluation on power consumption and cooling with closed shelf
- Integration with "L1Calo STF partition"

USA15 Installation (1)

- jFEX connections
 - LATOME
 - TREX
 - FOX
 - Hub/ROD To be installed before jFEX
 - FELIX
 - Торо
 - Installation schedule for December 2019
- Initial tests
 - Verification of board functioning after transport
 - Establishment of board communication and control
 - IPbus and DCS
 - Integration tests with HUB/ROD
 - Combined tests with calorimeters



Ideally, similar to what was done in STF during 2018 and 2019

USA15 Installation (2)

- Starts in November 2019
 - Followed by 3 months re-integration & commissioning
 - What is the installation sequence?
 - Will the crate be already in USA15?
 - With all FOX connections done?
 - Or will it be transported from the STF with all boards?
 - When will the Hub/ROD be installed?
 - Will we take care of transportation and fibre connection ourselves?
 - Should we perform tests with the Prototype/Pre-Production module in USA15 before installation?

Commissioning

- Validation of (FOX) input mapping
- Integration with ATLAS partition
- Online monitoring
- Combined tests with calorimeter
- Timing calibrations
- Pre-beam commissioning with cosmics
- Commissioning with beam
- Validation with bit-wise simulation
- Cross-comparison with legacy system

Summary

- Ongoing production of the jFEX Pre-Production module
- Pre-Commissioning to take place during 2018 and 2019 at the STF
 - Setup ready on the STF for jFEX
 - Finalization of production modules acceptance tests
- Installation in USA15 scheduled for November 2019



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