Software component for final version of ATCA-based LLRF system – demonstration in September 2009 at FLASH

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Goal: Demonstration at FLASH of an almost complete ATCA-based LLRF system for XFEL. The benefits of the demonstration will be:

- evaluation of hardware,
- identification of missing hardware components, links, functionality
- evaluation of communication links throughput, computation power required, bottlenecks,
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Hardware setup in Extension Hall for ACC4/5/6:

- ATCA Shelf with Shelf Manager
- 4 DESY carriers (V2, V3)
- 10 TEWS TAMC900
- 10 Cryoelectra DWC on 4 RTM modules
- AMC-VM
- AMC-TIM - timing module
- ADlink CPU 6900 – with PCIe riser card for RC, DOOCS servers, etc.
- ATS1936 – for switching Ethernet on the backplane

Software for the hardware setup:

1. System components for ATCA carrier (based on which carrier???? V2, V3)
    a. IPMC on the carrier
    b. VHDL firmware for Spartan
    c. VHDL component for external memory
    d. VHDL component for Ethernet to Base Interface
    e. Linux kernel for PowerQUICC – for V3
    f. Drivers for PCIe on ADlink CPU-6900
    g. Configuration of Ethernet switch on the carrier – for V3
    h. Front-end servers – DOOCS or TINE (DOOCS with ADlink 6900)
    i. Part of the distributed LLRF controller which includes all algorithms implemented so far
    j. DOOCS server or/and front-end server for distributed controller
    k. VHDL firmware for LLL (AMC-Carrier, Carrier-Carrier)
2. Software for TAMC900:
    a. VHDL for TAMC900 – IQ detection, partial vector sum – part of the distributed LLRF controller
    b. VHDL component for external memory
    c. VHDL full speed DAQ through PCIe
3. Software for AMC-B
    a. MMC
    b.
4. Software for timing module
    a. VHDL firmware on AMC-B for timing configuration
    b. DOOCS server
5. Software for vector modulator

    a. VHDL firmware for AMC-VM configuration
    b. VHDL part of the distributed LLRF controller
6. Software AMC communication module (what module??? – optical links for LLL, Ethernet)
    a. Communication in distributed system – LLL, Ethernet
    b. Communication with piezo drivers
    c. Communication with beam based feedback
7. Configuration of Diversified Technology ATS1936 Ethernet switch
8. DOOCS panels for ATCA 5-slot management based on IPMI-DOOCS server