LAPP IPMC Mezzanine
HARDWARE & SOFTWARE

xTCA Interest Group Meeting
27/03/2014

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IPMC Mezzanine V2.1 -> V2.2

- Mechanical
  - Small size: DDR3 VLP Mini-DIMM
  - Vertical or horizontal mounting
- Based on ARM Cortex M4 µC
- Hardware is fully tested and required a small HW modification
  - Tested with a mix of Boundary Scan tests (internal connections) and operational tests (connectors)
  - Coming soon: full BS test
- Documentation available
  http://lappwiki.in2p3.fr/twiki/bin/view/AtlasLapp/ATCA
- 20 boards cabled in 2 batches
  - 19 available and 1 more to be tested
  - All modified to be compliant with V2.2
- New production (V2.2) foreseen mid 2014 then yearly
- Users have been contacted to get their quantities and date requirements.
## Users requests

<table>
<thead>
<tr>
<th>Experiment/Subdetector</th>
<th>Contact</th>
<th>June 2014</th>
<th>June 2015</th>
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<td>BELLE</td>
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</table>

**FTK:**
- 3 April (Autumn)
- 7 June (Summer)
- 53
IPMC Features

• IPMC features
  – IPMBus with on board buffers, Hardware address detection
  – Hot Swap management with ATCA Leds and front panel switch
  – Management of up to 8 AMC + RTM
  – On board Event LOG
  – FRU & SDR access via I2C
  – Access to ATCA board sensors via I2C
  – IPM_IO: Configurable User Signals for Payload management, ekeying ...

⇒ Reduce number of devices and save time for ATCA carrier designers
Non-IPMC Features

- Ethernet
- JTAG Master
- Custom interface
  - Up to 35 user IO
- USB port
- IPMC firmware upgrade
  \(\rightarrow\) auto back to Factory Firmware if core freezes

Applications:
- Carrier FPGA or µC firmware upgrade via Ethernet
- Interface between Ethernet / USB and user defined bus
- Etc… (user ideas)
**LAPP IPMC V2 Test Board**

- **ATCA board**
- Designed to tests and debug IPMC mezzanine V2.1- V2.2 (Hard and Soft)
  - Board powering (hot swap, power negotiation)
  - IPMB and communication with shelf manager
  - Sensors reading
  - E-keying
  - AMC power management with different devices
  - AMC management (communication with MMC)
  - Ethernet / USB / UART
  - User_IO and IPM_IO

**Features**
- 4 AMC slot + 1 MMC slot
- Communications between 2 AMCs, and to the fabric for E-keying tests
- Spy FPGA connected to IPMC signals
LAPP IPMC V2 Test Board

- Board fully tested and functional
- Can be used as “reference design” for carrier designer for the IPMC part
- Documentation and schematic available
  http://lappwiki.in2p3.fr/twiki/bin/view/AtlasLapp/ATCA
- 5 boards tested and available

Blade with IPMC being tested at CERN with Polaris Tools
Software project name

INTELLIGENT PLATFORM MANAGEMENT CONTROLLER SOFTWARE

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Specifications

The IPMC software solution is fully compliant with the following specifications:

- IPMI v1.5 *(document revision 1.1)* and some relevant subset of IPMI v2.0 *(document revision 1.0)*.
- PICMG 3.0 R3.0 *(AdvancedTCA™ base specification)*.
- AMC.0 R2.0 *(AdvancedMC™ base specification)*.
Software environment

Features

• Linux host development
• 32-bit ARM Cortex-M4 microcontroller
• Written in standard ANSI C
• GCC (4.7.0) tool chain
• Open Source Configuration Management environment: - CMT
• FRU (ATCA board) Hex generation utility (using M4 preprocessor)
• OpenOCD (0.6.1) utility (Linux/Windows)
  • Need USB to JTAG interface Debug-Adapter-Hardware
  • Olimex ARM-USB-TINY-H
  • NGX technology
  • ...

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Software design

Focus

• Distributed bare-metal application
• Event (message) driven architecture
• The component (module) based design of the IPMC software source code allows the user to easily customize without modifying the existing code.

• IPMI Controller (FRU/SDR monitoring).
• ATCA User interface (e-keying, specific configuration)
• OEM functionalities (full user non-ATCA application)
  • JTAG master (e.g. upgrade of ATCA blade firmware)
  • SVF player
  • IPMC firmware Upgrade via TCP/IP (e.g. Base Interface)
# Software status

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<th>Package</th>
<th>Unit Testing</th>
<th>Integration Testing</th>
<th>System Testing</th>
<th>Comment</th>
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### Software status

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**AMC Management**
To do list...
Help is welcome 😊

• Short term plan
  • Complete IPM Controller tests
  • Complete sensors monitoring
  • Implement the Carrier E-Keying
  • Complete Carrier Management Controller tests

• Long term plan
  • Outsource some features (i.e. package)
  • Validation of IPMI/PICMG specifications
  • SDR and FRU Hex generation utility (e.g. GUI)
  • Quick Configuration utility (e.g. GUI)
  • Fully compliant with IPMI v2.0
  • Implement HPM.1 Upgrade Commands
  • Software Forge