CERN-IPMC Solution for AdvancedTCA Blades

TWEPP 2017

CERN EP-ESE-BE

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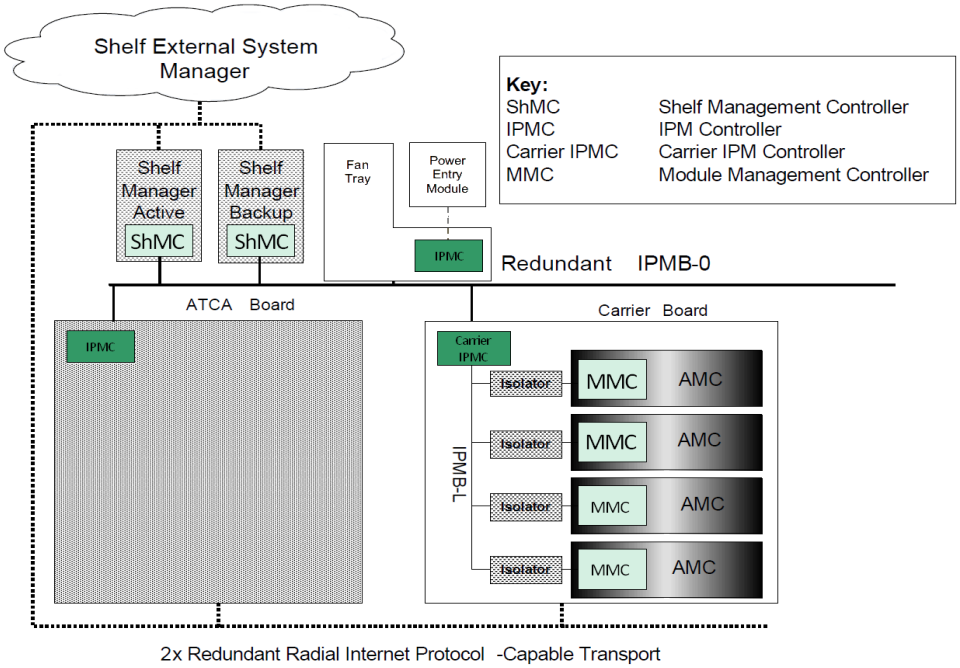
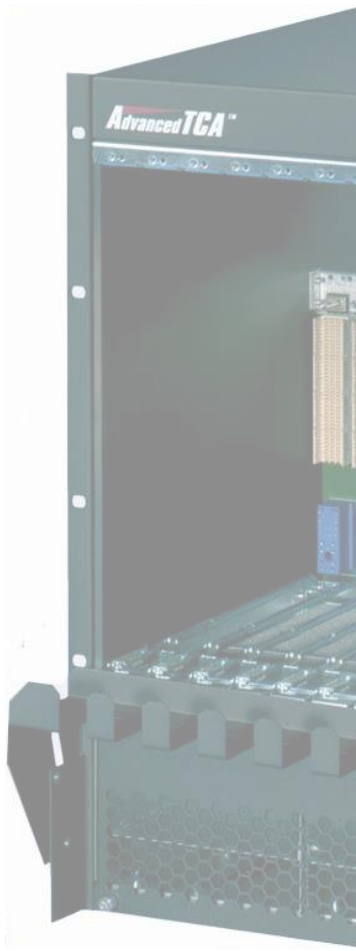
ATCA standard: Hardware Platform Management

❑ Role of the Intelligent Controller for AdvancedTCA blades:



- Monitoring sensors
  - Voltages, temperatures …
- Controlling the system
  - Power management, port/clock activation …
- Ensuring proper operations
  - Compatibility between the different boards, hot swap, redundancy …



Outline

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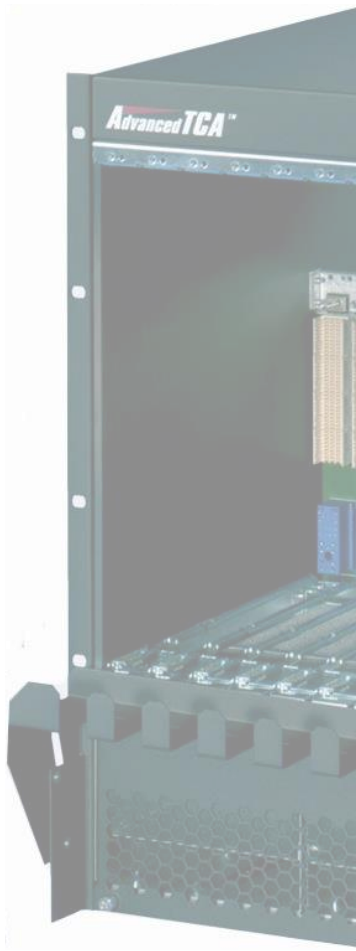
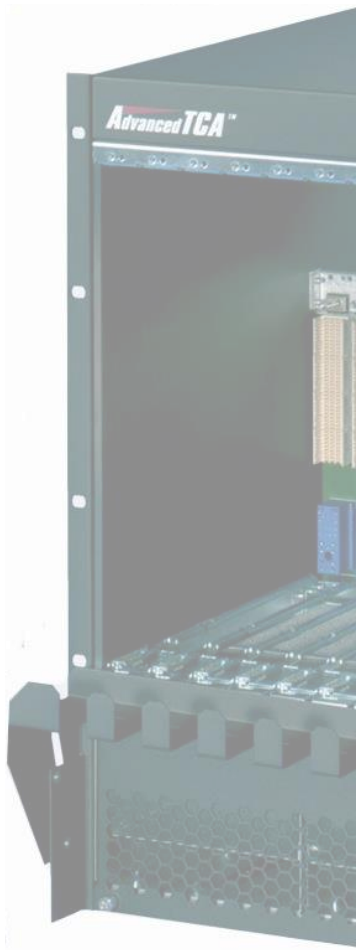
- Mezzanine architecture
- Software architecture
- User customization
- Automatic tester
- Status
- Additional news



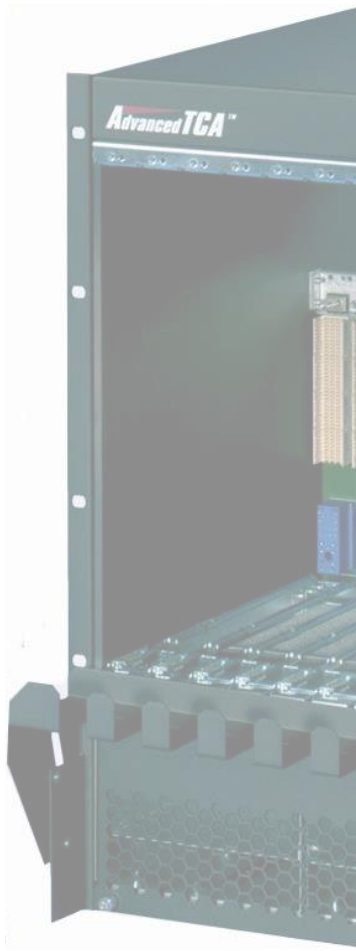
General overview

- Adaptation of the Pigeon Point IPMC solution
- Mezzanine card designed at CERN
  - Compatible with already designed AdvancedTCA boards
  - Pinout compatible with the existing LAPP IPMC card
  - DIMM-DDR3 VLP form factor



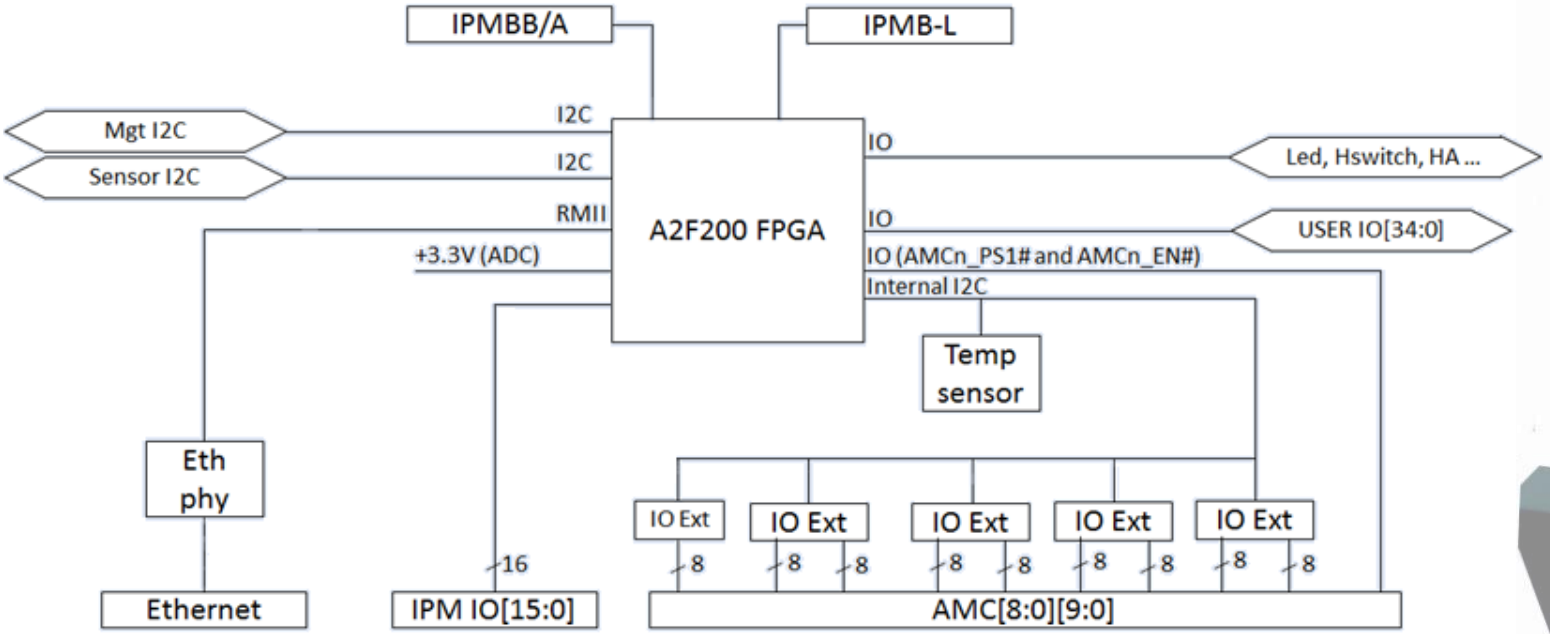
General overview

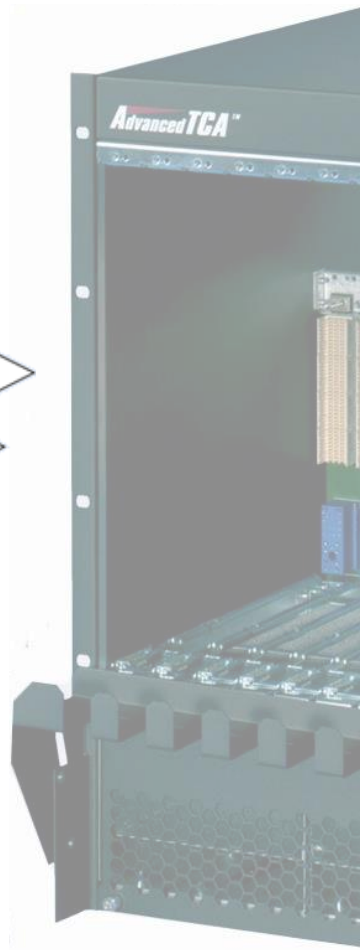
- Supported features [**fully tested**]:
  - AdvancedTCA Rev.3.0
    - Hot swap (FRU info., handle switch, LEDs, Hardware address, etc.)
    - Sensor monitoring (SDR, measurement, events, etc.)
    - Rear Transition Module (intelligent and non-intelligent RTM)
  - AMCs (up to 8 AMCs + 1 iRTM)
  - Ethernet interface (RMCP/RMCP+, TPC/IP, UDP)
  - Serial interface (SoL or debug interface)
  - User I/Os (35 User I/Os + 16 IPM I/Os)
  - JTAG Master (Xilinx Virtual Cable daemon)



Mezzanine architecture

- Based on a SmartFusion FPGA (Microsemi A2F200)
- Software runs on an embedded SOC (ARM Cortex M3)
  - IDE used: SoftConsole v3.4





Software architecture

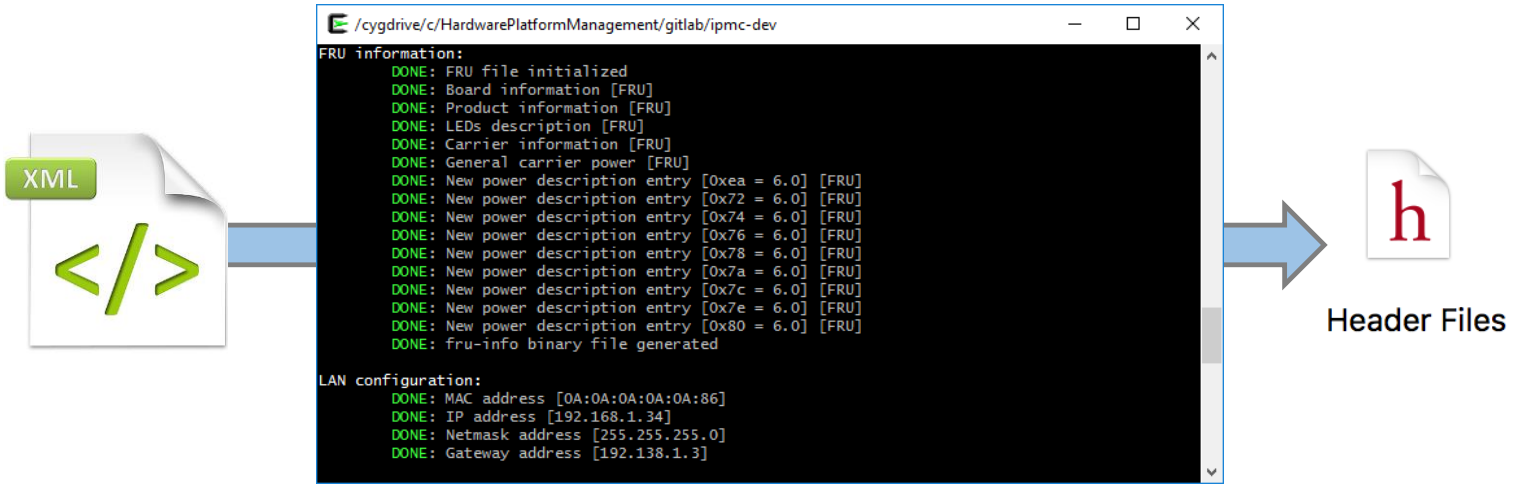
git

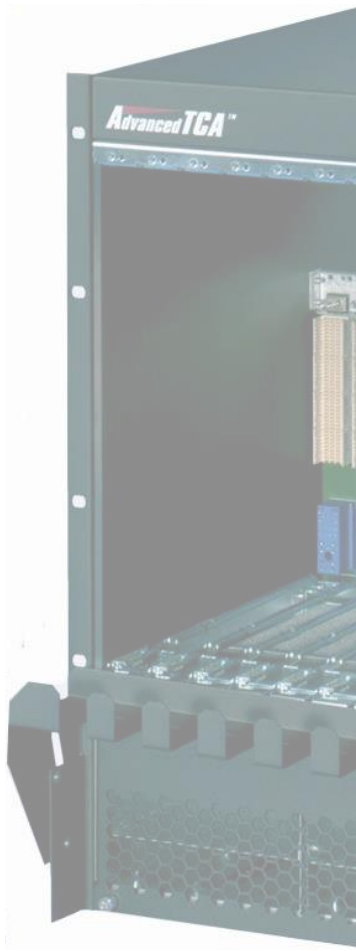
- **IPMC-config**
  - **Header C files**
    - Firmware configuration: LAN, AMCs, etc.
  - **FRU information**
    - FRU configuration and binary files
  - **SDR information**
    - SDR configuration and binary files
- **IPMC-core**
  - **Application**
    - AdvancedTCA management functions
- **IPMC-sensors**
  - **Drivers**
    - Sensor management functions
- **IPMC-tools**
  - **Python scripts**
    - Python libraries used to generate the user configuration files
- **IPMC-user**
  - **OEM commands**
  - **Callback functions**
    - Init / Main-loop / Timer based user callback functions

User customization

- User customizable features (mainly header files):
  - FRU Information (Device ID, Manufacturer info., Product info.)
  - LAN (MAC address, Default IP, slot specific IP, Gateway, Netmask)
  - Modules (AMCs, iRTM/Non-intelligent RTM)
  - Sensors
  - E-Keying
  - Power sequencing

- Python tools to generate configuration files





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Files generated by the python tool

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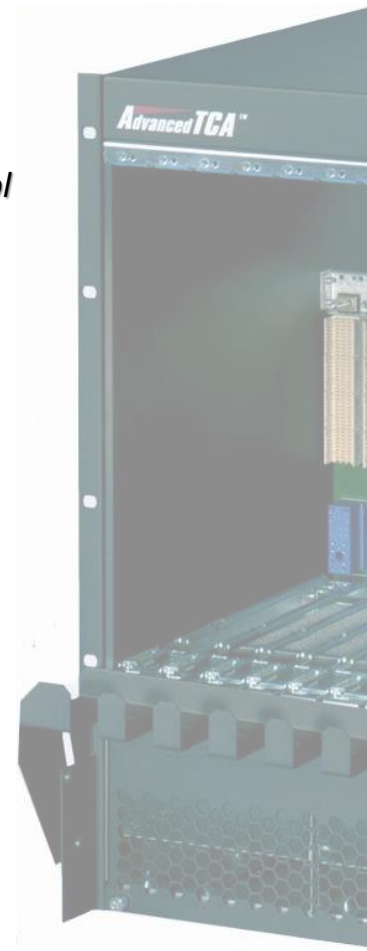
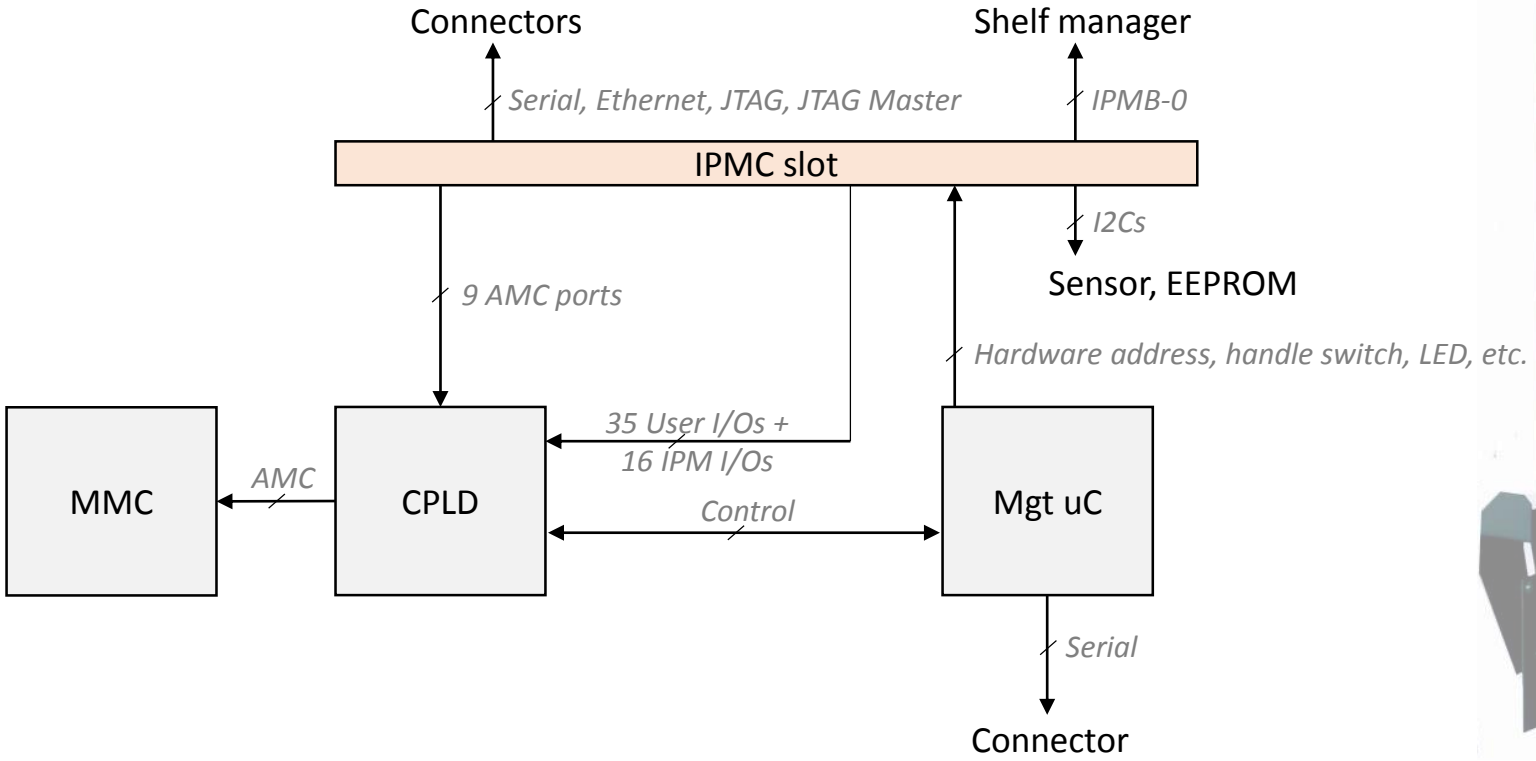
Examples available



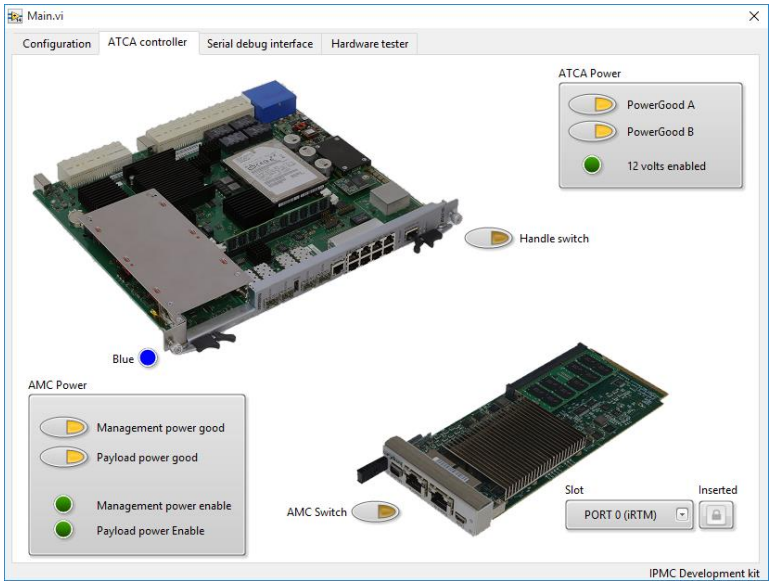
Automatic tester

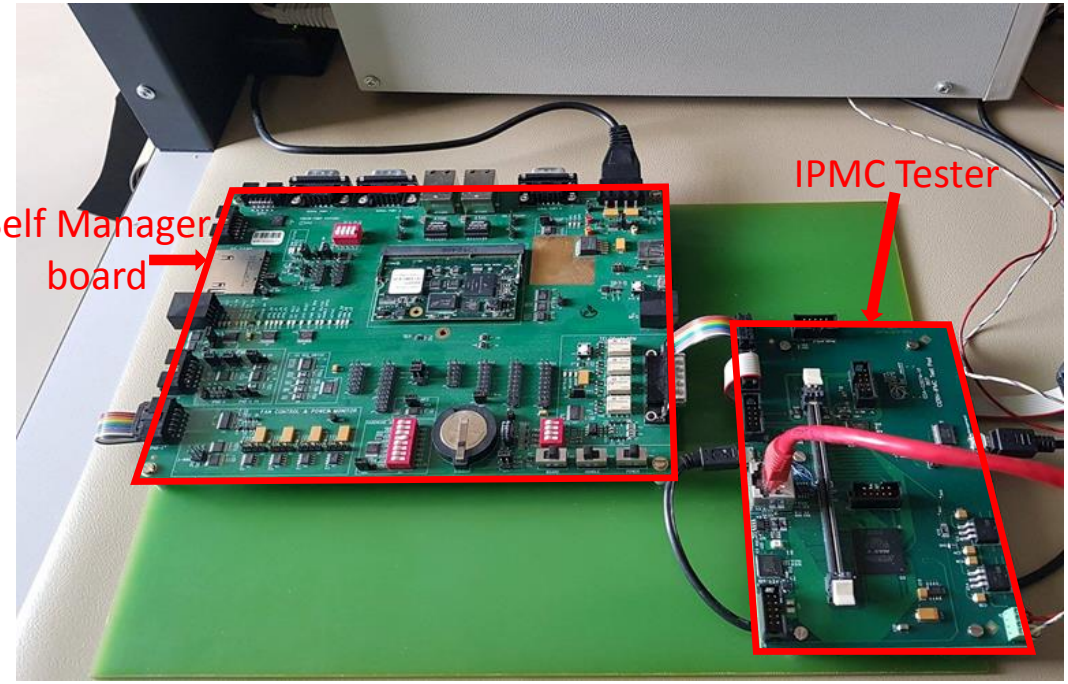
- Used to verify the IPMC functionality after production
- All of the interfaces are tested



Automatic tester

- IPMC tester board connected to a shelf manager development kit from Pigeon Point
- Software interface
  - Offers automatic/manual test of IPMCs
  - IPMI communication is based on a DLL written in C





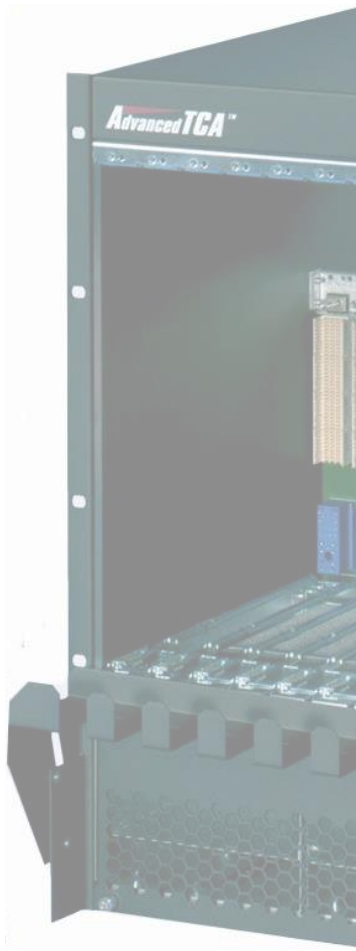
Status

- CERN-IPMC kit includes:
  - Mezzanine card
  - Pigeon Point licence fees
  - Access to the Git repository
  - Support

- Price: 200.- Chf
  - Purchase contact: epesebe-xtca-support@cern.ch

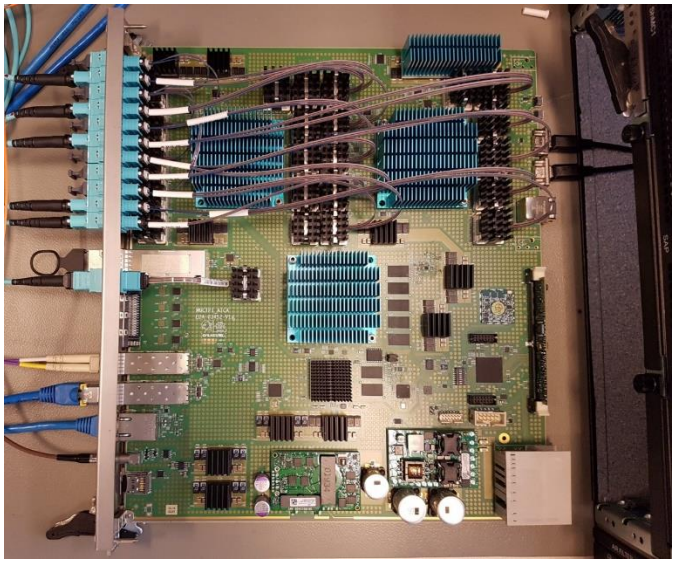
- Source code available on GIT
  - Link: https://gitlab.cern.ch/ep-ese-be-xtca/ipmc-dev
  - Distribution under NDA to be compliant with the Pigeon Point licence.
  - Examples and readme.md file (start-up guide)

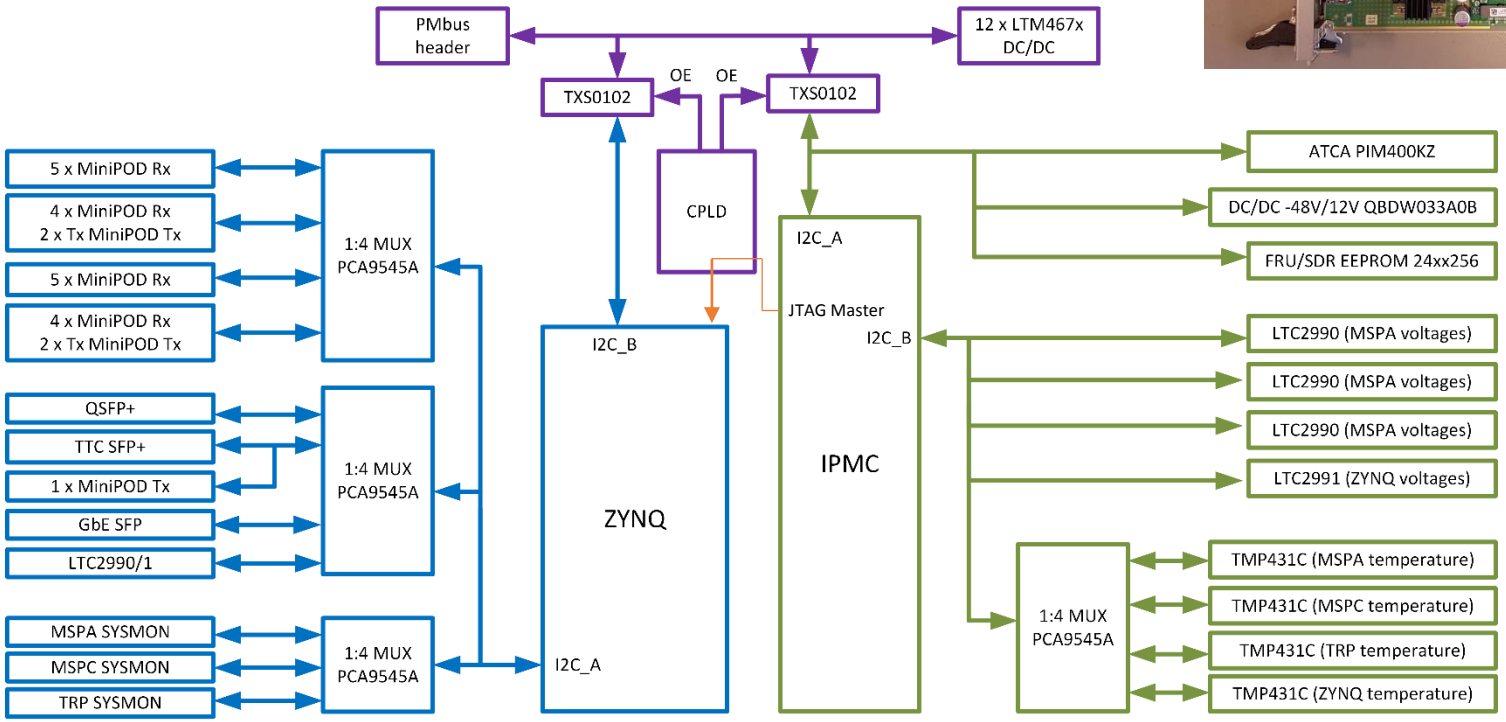
- First batch of 52 IPMCs has been produced and is being tested
  - Being beta-tested by 2 users in ATLAS (MUCTPI) and CMS (Demonstrator).



Status

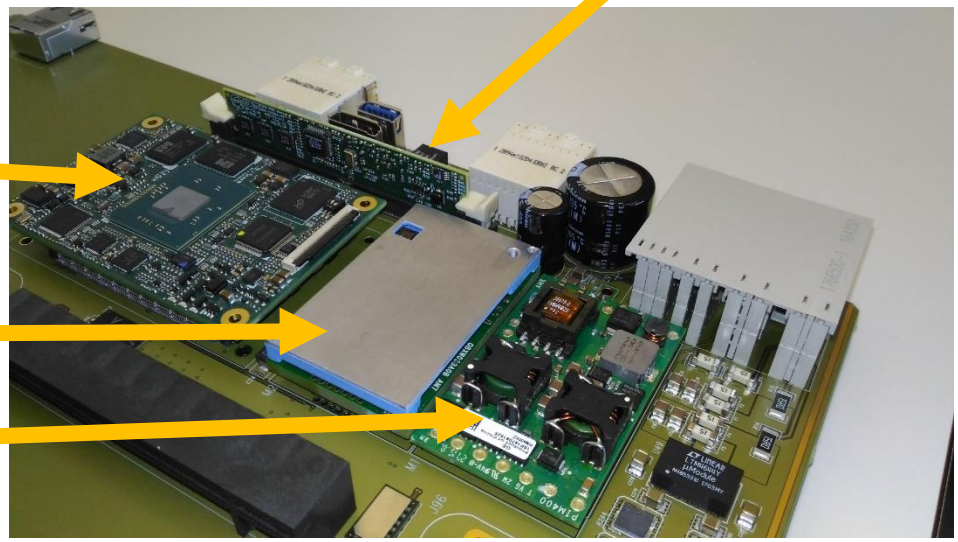
- Being used by Atlas: MUCTPI
  - ATCA management ✓
  - I2C interfaces ✓
  - OEM commands ✓
  - Xilinx Virtual Cable ✓ (only using Windows)



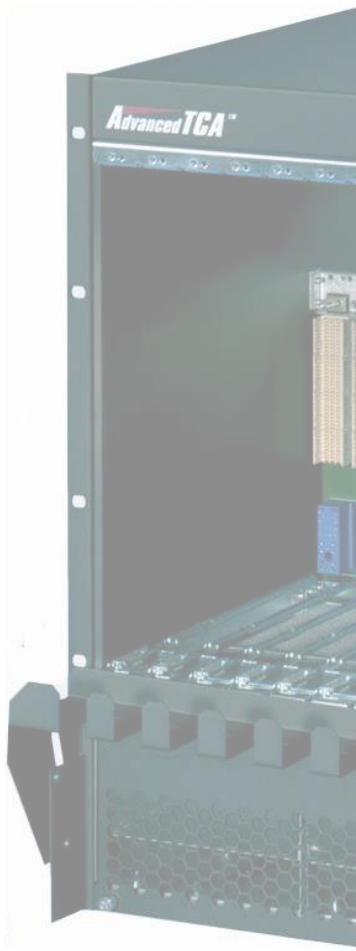


Status

- Being used with an ATCA demo board (CMS)
- Testing IPMC Ethernet/IPMI connectivity.
  - IPMI communication with hub/shelf manager ✓
  - Ethernet communication to carrier switch ✓
    - Replacing the Ethernet PHY by a more recent one is evaluated
- Communication issues with the Shelf Manager
  - Works only with a specific configuration
  - Being currently evaluated



Additional news



Additional news

- ATCA shelf tenders

	Horizontal shelf	Vertical shelf	-48Vdc PS
Technical specification	Q4 2016	Q4 2016	Q4 2016
Technical evaluation	Q1-Q2 2017	NA	NA
CERN price enquiry	Q2 2017	Q2 2017	Q3 2017
Select contractor (pre-series)	NA	Q3 2017	Q3 2017
Full qualification	NA	Q1 2018	Q4 2017

  - **Goal: Procurement contracts ready for the user's purchase orders by Q1/Q2 2018.**

- AdvancedTCA rack evaluation
  - Currently performed by the ATLAS technical coordination team
  - Poster: *ATCA Thermal Management Study for the ATLAS Phase-II Upgrade* by Claudio Bortolin

Thank you

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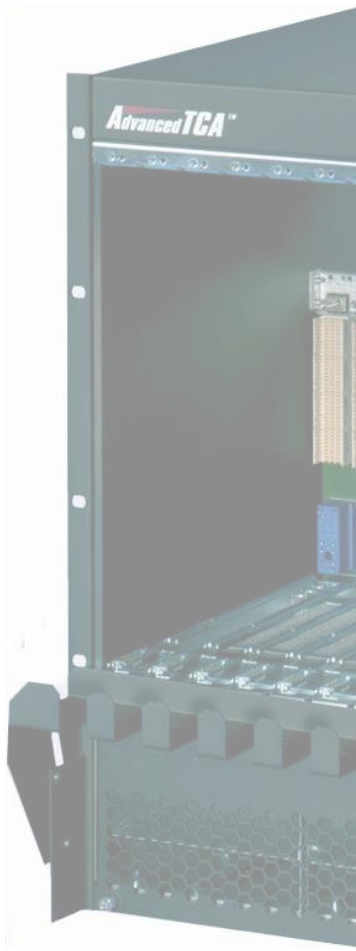
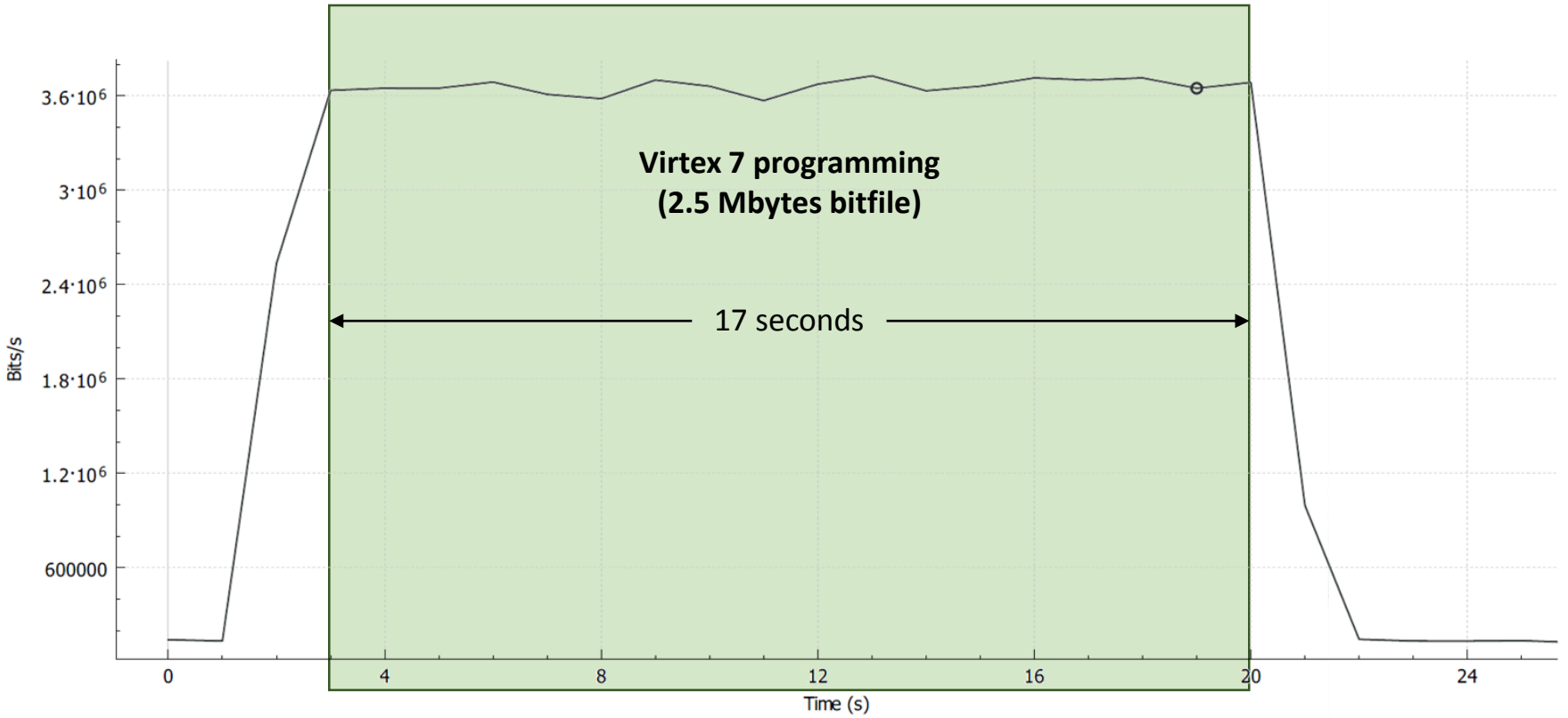


General overview

- JTAG Master (XVCd):



Measured using Wireshark: network transactions