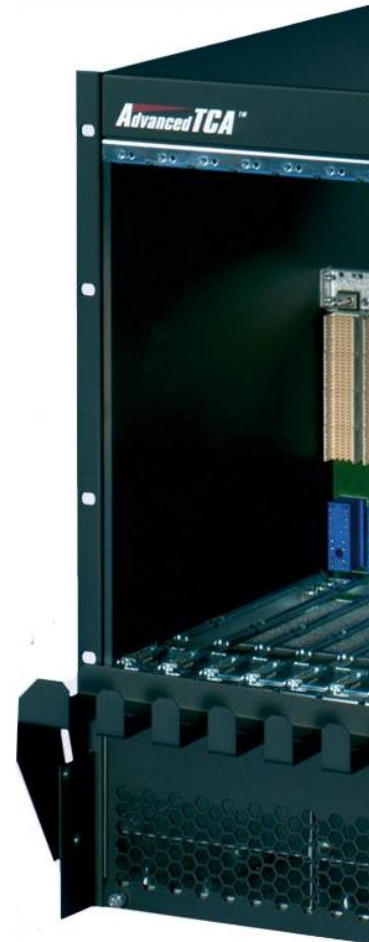


# Design of an AdvancedTCA board Management Controller Solution

## **xTCA interest group meeting**

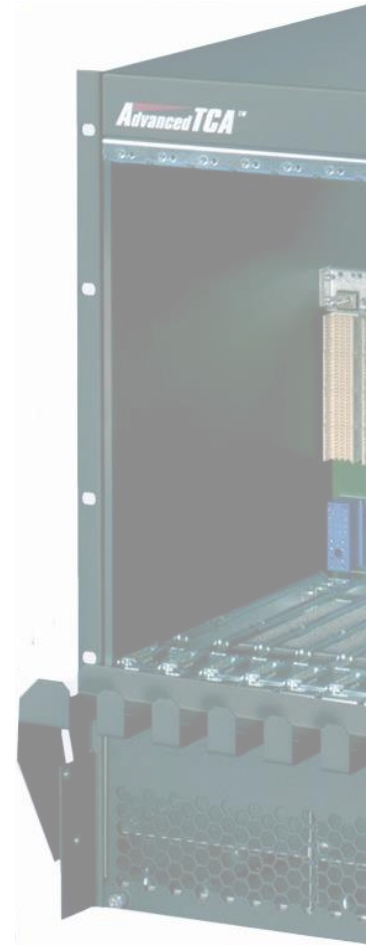
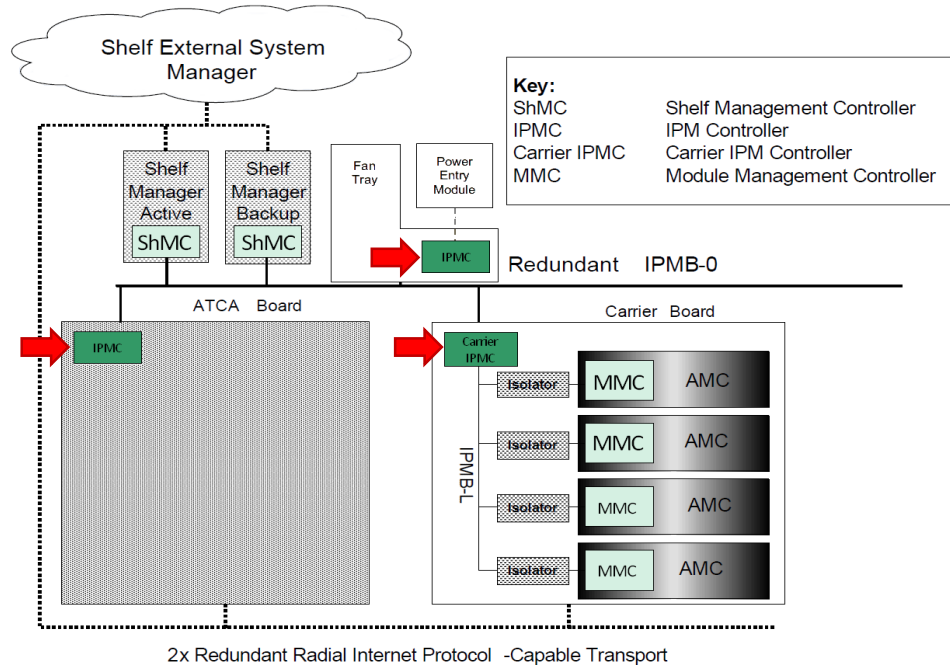
CERN EP-ESE-BE

Vincent Bobillier, Stefan Haas, Markus Joos,  
Julian Mendez, Sylvain Mico and Francois Vasey



# ATCA standard: Hardware Platform Management

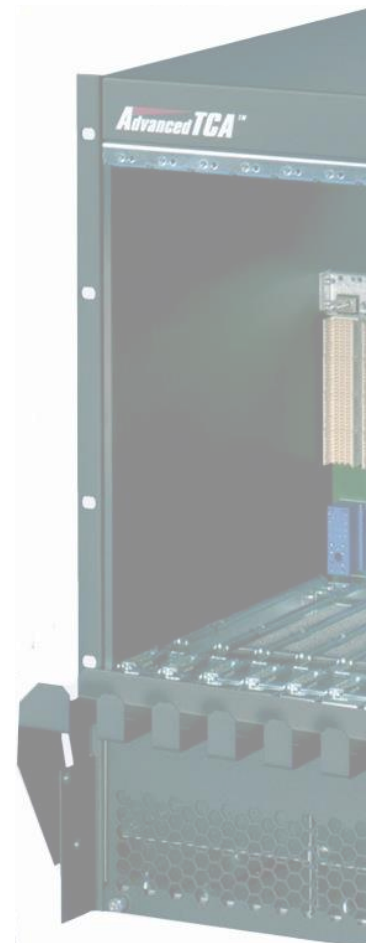
## □ Role of the Intelligent Controller for AdvancedTCA blades:



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

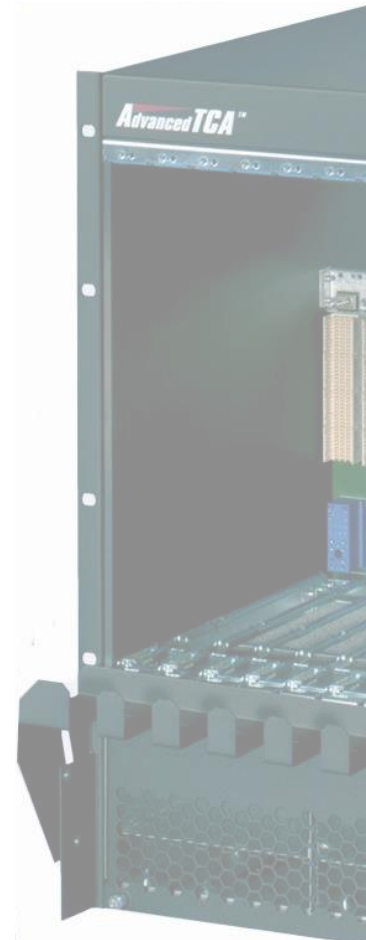
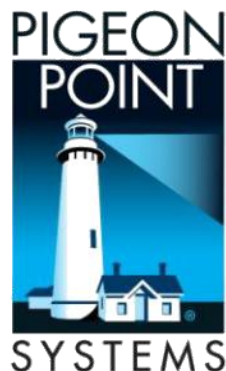
# Outline

- Pigeon Point IPMC
- CERN IPMC specifications
- Development
- Status and next steps

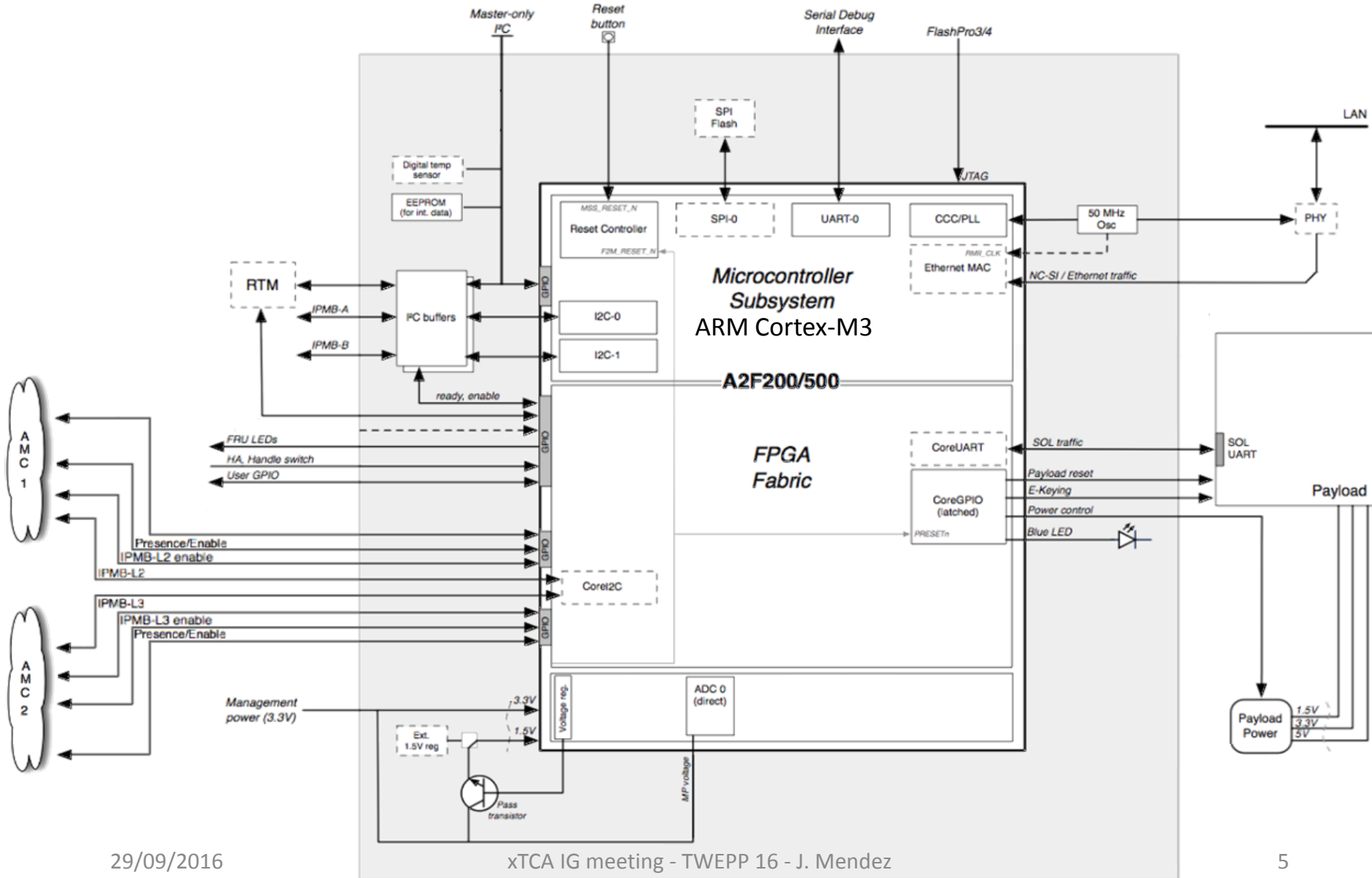


# Overview

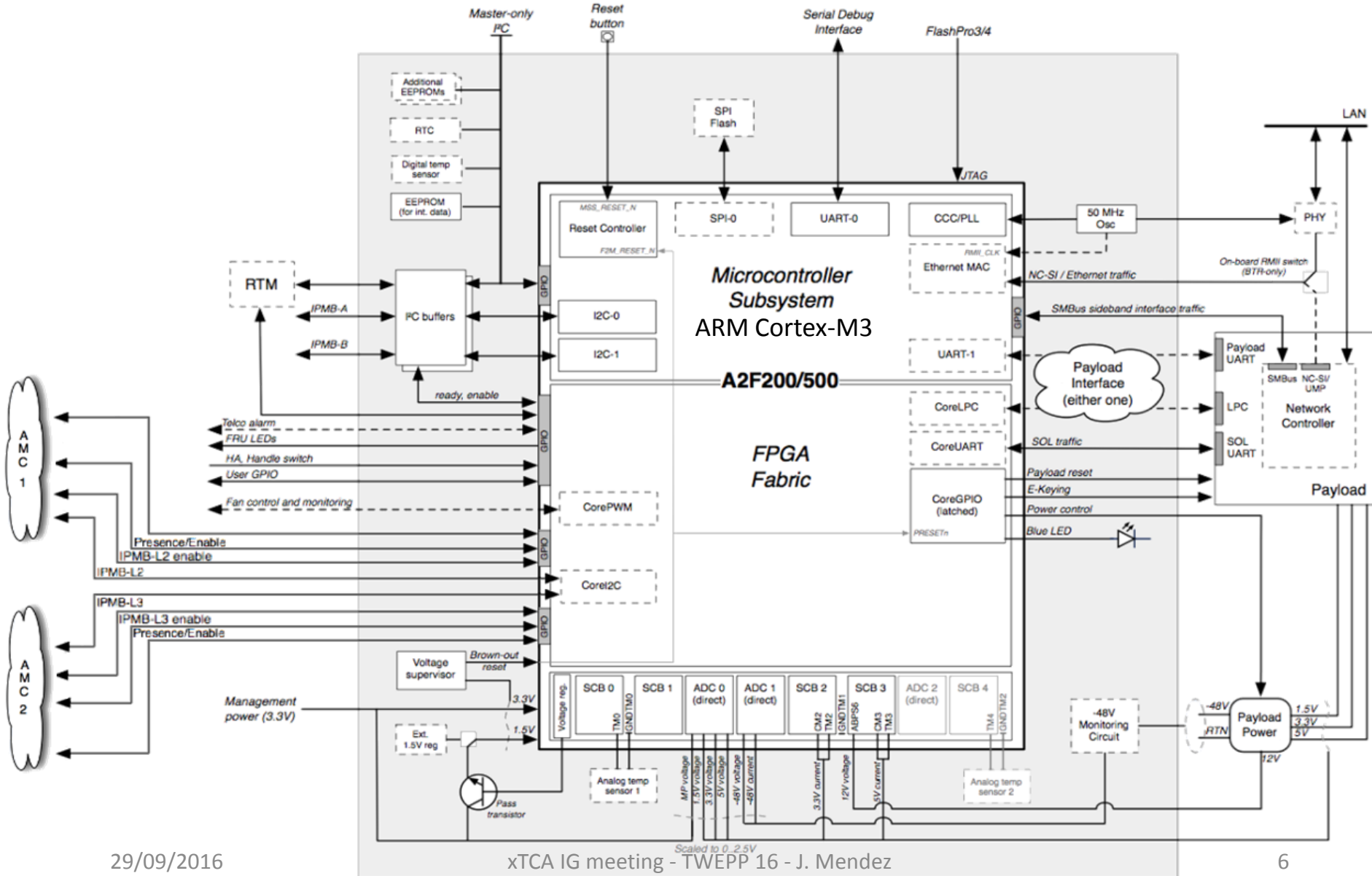
- ❑ Part of the Pentair group
- ❑ Provide solutions for the Hardware Platform Management modules:
  - Module Management Controller (MMC)
  - Intelligent Platform Management Controller (IPMC)
  - Shelf Manager (ShMM)
- ❑ Pigeon Point shelf manager is used by almost all of the shelf manufacturers
- ❑ A license for the IPMC solution was acquired by CERN EP-ESE-BE. It includes:
  - Documentation
  - Development tools
  - Hardware, firmware and software reference designs



- IPMC solution is based on the Smart Fusion A2F200/500 FPGA

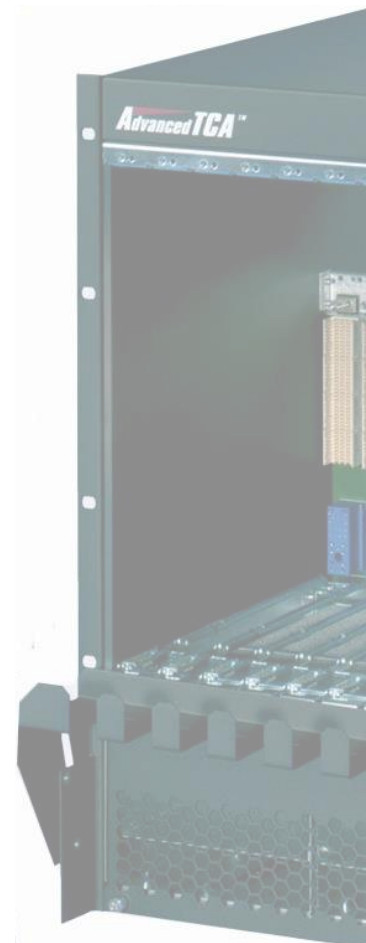


❑ IPMC solution is based on the Smart Fusion A2F200/500 FPGA



# Specifications

- ❑ Supports the following features:
  - ATCA and AMC management (up to 10)
    - Hot swap
    - FRU/SDR info
    - Sensor monitoring
    - Event management
  - IPMI over Ethernet (HPM.2 and HPM.3)
  - RTM and intelligent-RTM
  - Remote upgrade via the IPMB bus (HPM.1)
  - UART interface for SOL and debug
  - User I/Os and ADCs



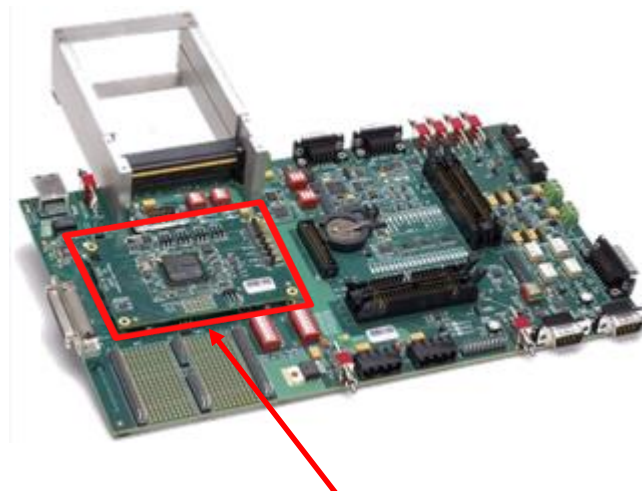
# Evaluation

## ❑ Pigeon solution was evaluated in 2015 using:

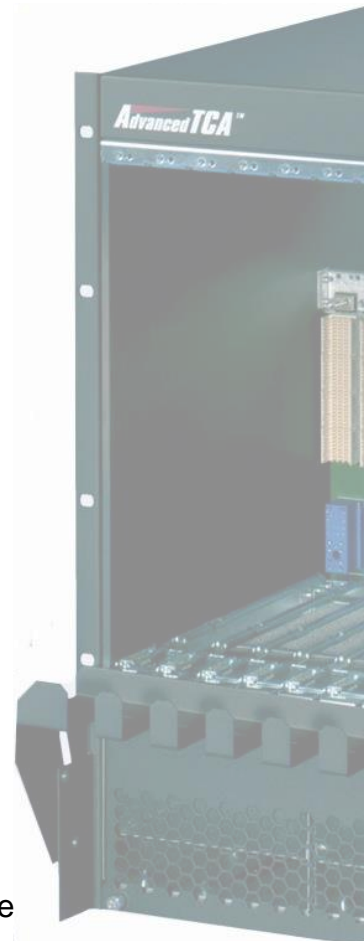
- The starter kit IPMC mezzanine card
- An Adapter card (CERN) to use the mezzanine with existing ATCA blade

## ❑ Evaluation outcomes:

- ✓ Standard compliance (Polaris tester)
- ✓ Management of the AdvancedTCA blade
- ✓ Management of up to 4 AMCs
- ✓ E-Keying and Clock configuration
- ✓ OEM commands
- ✓ Non-intelligent RTM
- ✓ Ethernet interface
- ✓ Remote upgrade (HPM.1)

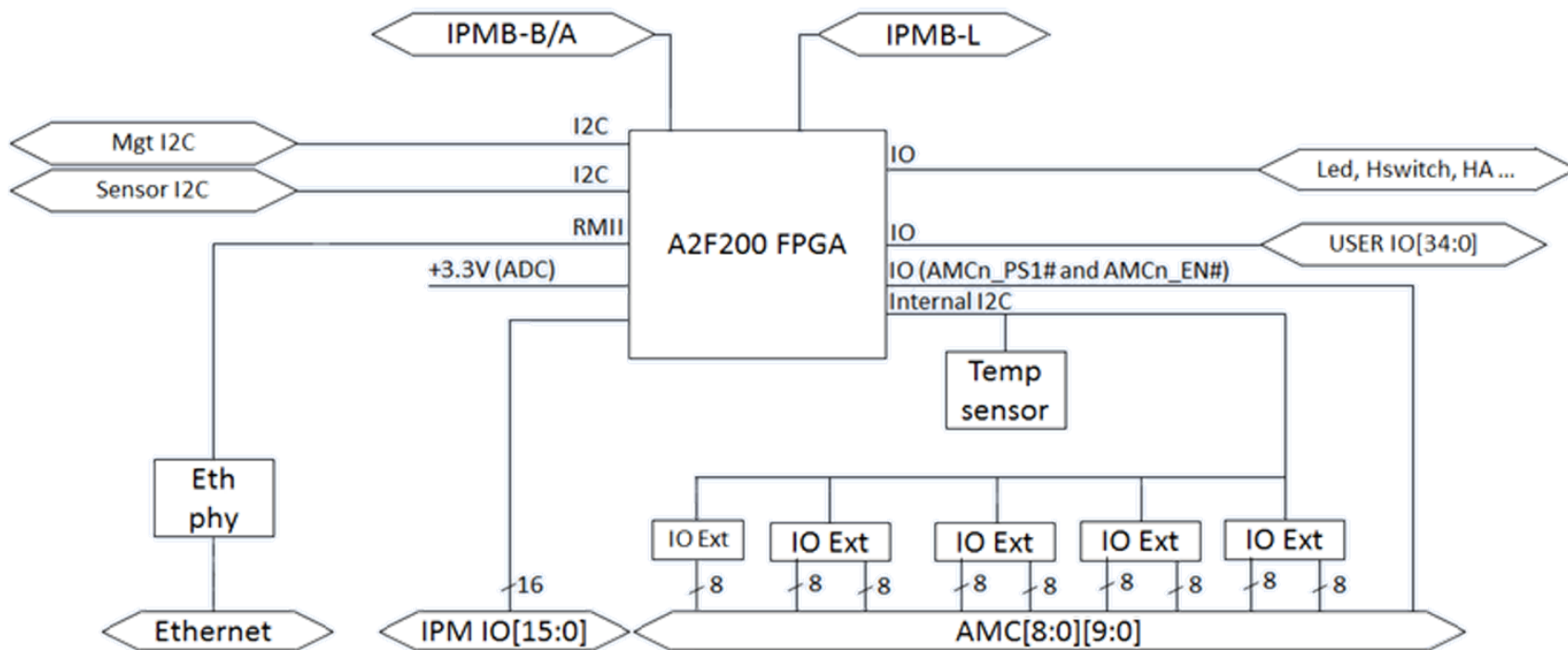


Pigeon Point IPMC mezzanine



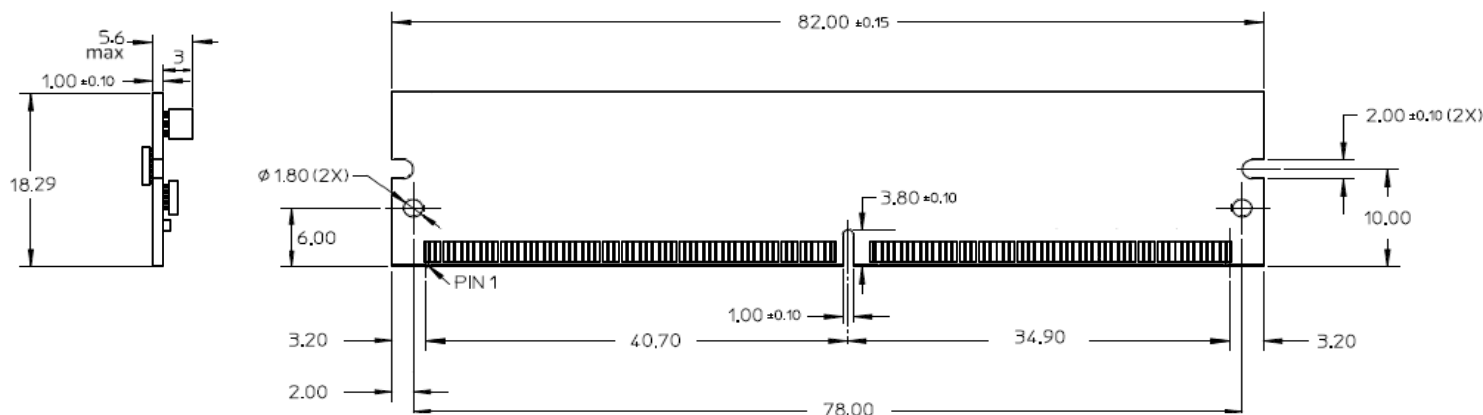


## Functional bloc diagram

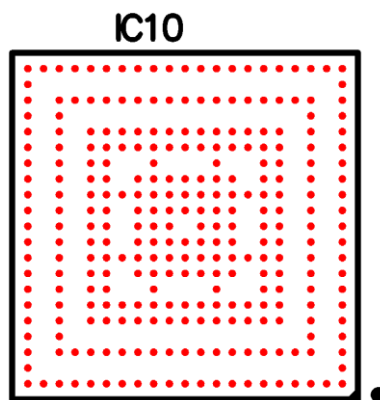
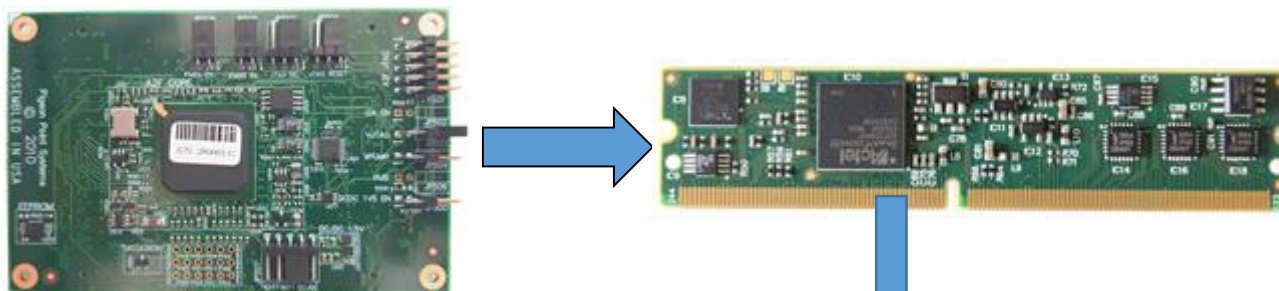


## Form factor

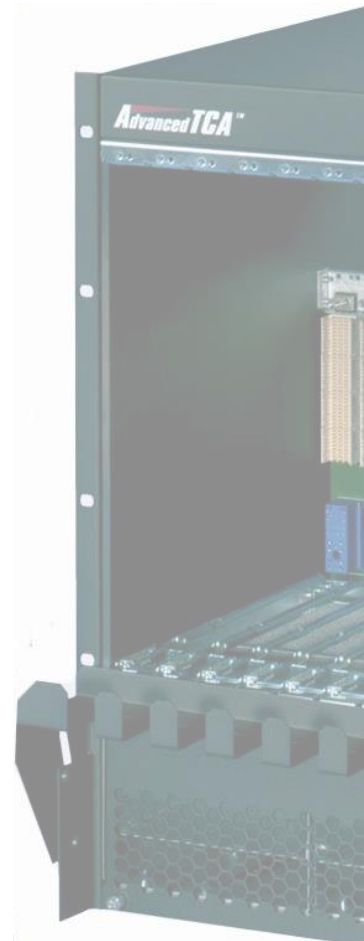
- ❑ Vertical format to save place on ATCA blades
- ❑ Maximum component height (ATCA standard): 21.33mm
  - Connector height: 3mm
  - IPMC height: 18.3mm



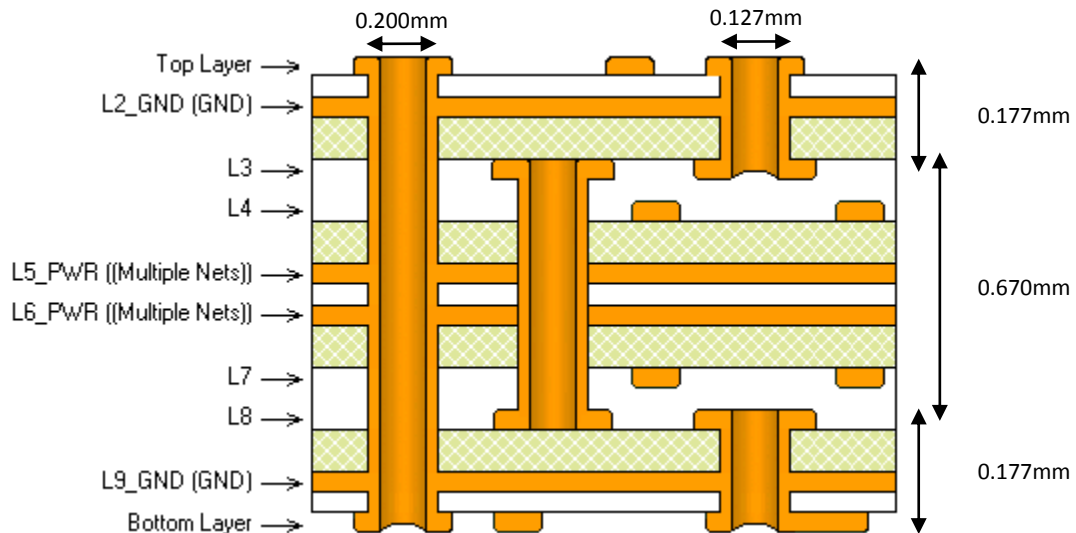
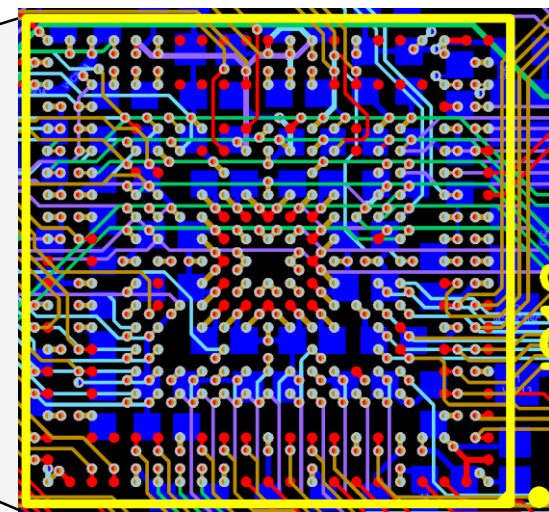
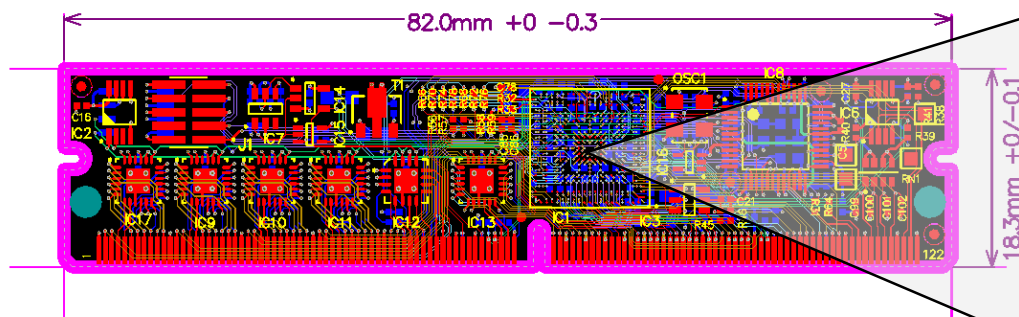
## FPGA selection



- A2F200 FPGA was selected
- CS288 package:
  - Dimensions: 11x11mm
  - Ball pitch: 0.5mm



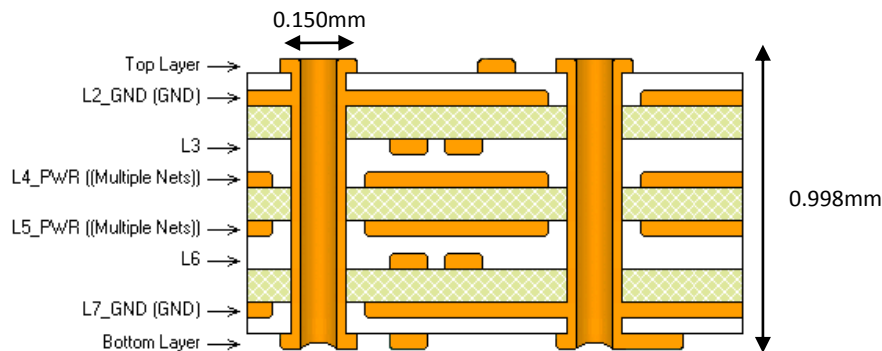
## Design of the first prototype



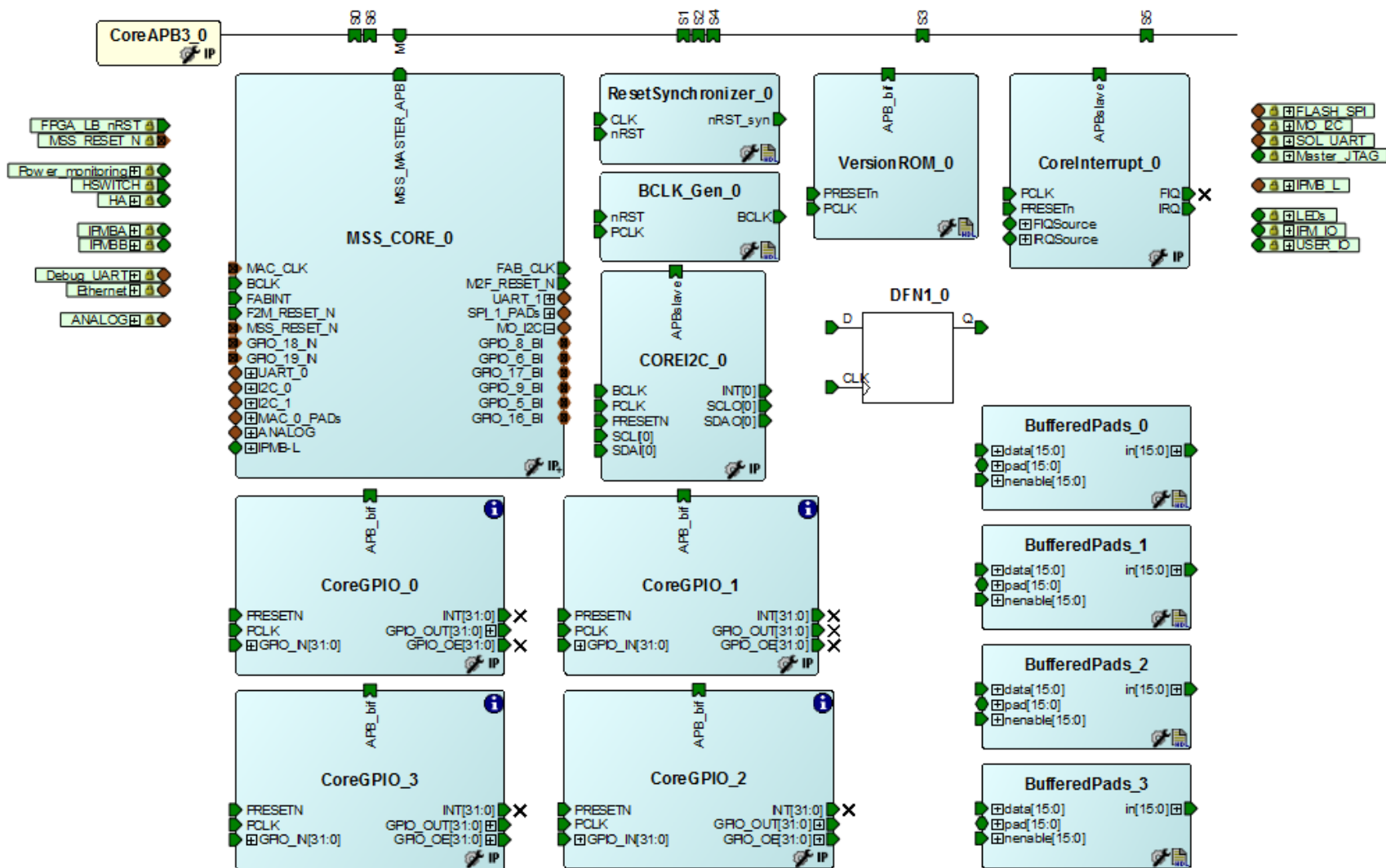
**Manufacturing issues with buried and blind vias resulting in a low yield and high cost**

## Design of the second prototype

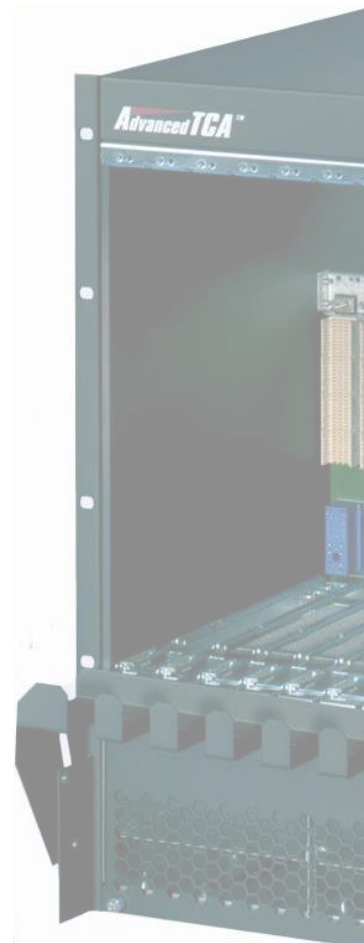
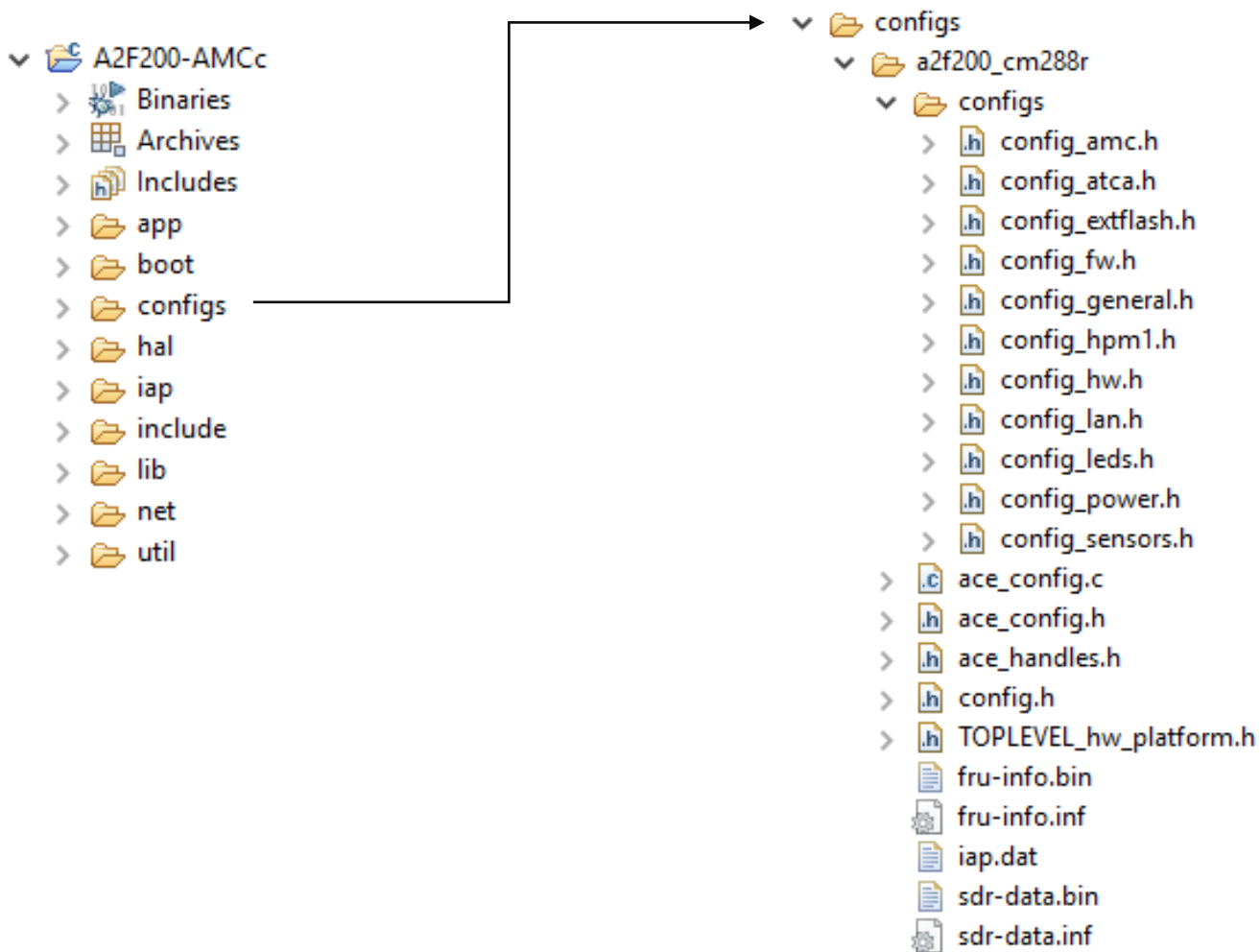
- ❑ PCB layout modified to reduce cost and increase yield/reliability
  - Buried and blind vias were replaced by thru-hole vias
  - Trace/clearance sizes were reduced in accordance with manufacturer rules



## FPGA Firmware



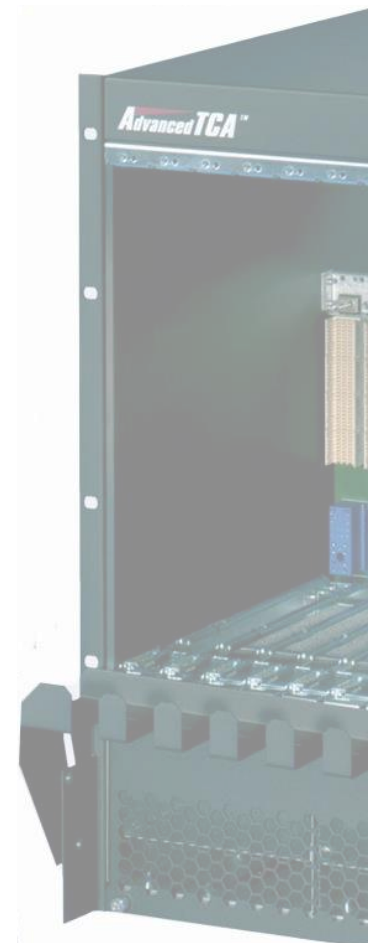
## Software architecture





# Tests results

- Standard compliance
  - ✓ Polaris tester
- Management of the ATCA blade
  - ✓ ATCA management (hotswap, power sequences ...)
  - ✓ IPMB buses (IPMB-A / IPMB-B)
  - ✓ SDR/FRU information
  - ✓ Sensor monitoring (implementation, events ...)
  - ✓ RTMs
- Management of up to 4 AMCs
  - ✓ IPMB bus (IPMB-L)
  - ✓ AMC management (hotswap, power sequences ...)
  - ✓ Sensor monitoring (detection, events ...)
- Additional features
  - ✓ Ethernet interface (RMCP)
  - ✓ Remote upgrade using HPM.1 (IPMI commands)
  - ✓ OEM commands (user specific)
  - ✓ JTAG master





# Development status and next steps

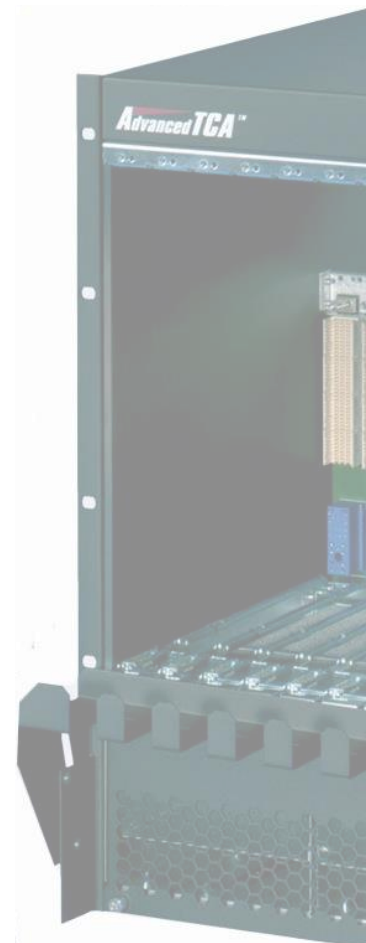
## ❑ Status

- Hardware is ready for production
- We are interested in collaborating with early users (beta tests)
  - Few IPMCs already available for evaluation

## ❑ Next steps

- Test the remaining features.
  - RTM
  - JTAG Master
- Launch production.
- Setup the development environment for the users.
- Develop a test bench for IPMC.
- Provide user guide.

- ❑ The CERN IPMC kit, **including the Pigeon Point license**, will be available for use early 2017 – Q1/Q2 (price estimation: 200 CHF).



# Thank you

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