CERN-IPMC: Update status

xTCA Team Meeting

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General overview

• New hardware designed in 2019 (vers. 4)
  • **Compliant with original connector specification**
  • Add a third UART interface on pins 58 (Tx) / 61 (Rx)
  • Frame contract established and qualified
  • Up to 1000 modules can be produced until end 2022
  • Produced and qualified in Q4 2020 via the frame contract

• Software moved to the latest version from Pigeon Point
  • Porting from version 1.2 to 1.3
Hardware vers. 4

- Improve SoC <-> IPMC connectivity
  - Communication to get IPMC info and status to the SoC
  - Based on UART interface – Payload Interface
  - Allows getting blade position in a crate (used for HPM.3)

- 3 UART interfaces:
  - Original UART port remains on pin 57 (Tx)/60 (Rx)
  - Additional UART interface located on GPIO can be routed to:
    - User I/O [0:1]
    - User I/O [24:26]
  - New UART interface on pins 58 (Tx) /61 (Rx)
  - Allow enabling all of the UART features:
    - Serial Debug Interface (SDI)
    - Serial Over LAN (SOL)
    - Payload Interface (PI)
  - Configuration is made in XML configuration file (static)

- Compliant with original connector specification
  - Pin 58/61 were non-connected on previous versions
  - Connectivity to new pins can be can be removed by taking off the 0 Ohm resistors
Typical use of the CERN-IPMC

- **HPM.3**: Ethernet configuration via the IPMC.
  - IP address depending on the blade position in the system and not on a MAC address

- **HPM.2**: IPMI on LAN
  - Allows getting the supervision system (e.g.: DCS) fully redundant.
  - No need to handle differently communication via Ethernet or IPMB buses.
  - Implement Serial Over LAN to redirect UART to Ethernet. A nice to have to communicate with a S.o.C.

- **HPM.1**: Upgrade via IPMI
  - Ensure stable configuration with image checker
  - Implements automatic/manual rollbacks
  - Keep of non volatile parameters
    - E.g.: thresholds modified during a run are not updated by a reconfiguration.
Software porting to v.1.3

- Based on latest version of the Pigeon Point solution:
  - Fixes IPMB-0 bus instabilities that were observed by the L1Calo team
  - Adds support for HPM.2 R1.1 and HPM.3 R2.0
  - Stability improvement (e.g.: sensor interface updated, HPM.1 on power cycle issue…)

- V.1.2 to v.1.3 “How to”:
  - New configurations: UART, Non volatiles parameters (e.g.: sensor thresholds)
  - Release note and how-to: https://gitlab.cern.ch/ep-ese-be-xtca/ipmc-project/-/tags/v.1.3
Software porting to v.1.3

**Extensive tests performed:**

- Active test ran for all of the interfaces during several hours/days
- Allowed finding conflicts on IPMB-L bus detected (issue was found on our MMC configuration)
- HPM.1 stability [Upgrades in a loop] (watchdog reset detection issue was fixed)
- Non-volatile parameters issue on HPM.1 upgrade (e.g.: IP address not reset to default)
- Compilation errors depending on UART configuration were solved by fixing the code
- TCP/IP issue on extensive use and add Linux support
- Tested with Polaris Tester:
  - Number of tests: 123
  - Passed: 86
  - Failed: 2
    - As the iRTM is emulated, it cannot be accessed by the Polaris tester without configuring the setup. This was tested manually
  - Skipped: 35
    - AMC not implemented, e-keying not set
Software porting to v.1.3

• **Status**
  • Test performed locally with the CERN-IPMC tester
  • Test performed by the ATLAS L1Calo team in real environment
  • Additional test for sensor integration are on-going with the CMS DTH team
  • Release note, including a guide for the software migration, was written

• **Plans (coming weeks)**
  • Accelerated aging using climatic chamber
  • Fully populated crate using the tester
    • Extensive polling of a large number of sensors
    • ATCA Insertion/extraction emulation
    • AMC/iRTM insertion/extraction emulation
CERN-IPMC DevKit vers. 4

- New development kit available
  - ATCA form factor compliant (features a zone 1 connector)
  - Powered from the backplane input
  - Local control based on a raspberry pi

Can be used on a desk as well as in an ATCA shelf

Block diagram available in backup slides
CERN-IPMC DevKit vers. 4

- New features available
  - Run on local Raspberry pi
  - Based on Raspbian distribution (Linux)
  - Need Ethernet and USB connectivity to the Ethernet and Management ports
CERN-IPMC DevKit vers. 4

- **JTAG Player**
  - Used to reset the CERN-IPMC to CERN default firmware
  - Can be used to flash firmware upgrade according to the CERN-IPMC support team
  - Only one command in raspberry terminal: jtag_player –reset

- **DevKit control**
  - Allows configuring the test setup via the command line interface of the raspberry pi
  - One command per action - e.g.: devkit_ctrl -a SETHA -v 0x43
  - Implements all of the actions supported by the devkit controller

- **IPMC Tester**
  - Allows running a full hardware test for a CERN-IPMC
  - Using it reconfigures the module with the CERN default firmware
  - Generates a report and a log file, which can help debugging a module
CERN-IPMC DevKIT vers. 4

- IPMB Analyser
  - Captures IPMB-A, IPMB-B or IPMB-L packet and format them for Wireshark
  - Only one command in raspberry terminal: `ipmb_sniffer -p <port> -o <output file>`
CERN-IPMC DevKit vers. 4

- IPMC Tester
  - Testing improvement: automatic module flashing via raspberry pi interface
    - Was originally done manually
    - Avoid operator intervention and make the test fully automatic
  - Reports automatically generated
  - Test can be executed externally (allow user to test their own hardware)
CERN-IPMC Distribution

**IPMC SELLING**

**Stock:**
- V3: 63
- V4: 64
Summary

• New hardware version
  • Produced using a frame contract allowing the production of up to 1000 IPMCs until end 2022
  • First modules produced in November 2020
  • Can be ordered on https://cern-ipmc.web.cern.ch/order
    • need of V4 shall be specified as V3 are also still available

• Software upgrade:
  • Porting to the latest version of the Pigeon Point solution
  • Improve stability and has been extensively tested
  • Released and documented
  • Available through remote compilation since January

• New development kit available
  • ATCA standard compliant for in-crate use
  • Adds functionality based on raspberry pi controller
  • First prototype arrived at CERN in November
  • Final version received in March and successfully tested
  • Available for purchase (1500 CHF)
  • Currently used in 3 institutes