

DESY MMC V1.0

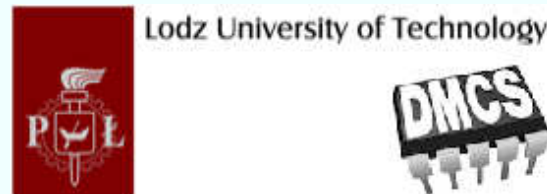
Standardized Solution of Management Controller for MTCA.4

Michael Fenner, Dariusz Makowski

Progress on MMC V1.00

Management Controller for MTCA.4

Hamburg, 11.12.2014



Introduction

> Agenda:

- Repetition of MMC features
 - Improvements in 2014
 - Demonstration
-
- > DESY MMC V1.0 is a set of hardware and software building blocks, created by DESY and its partners
 - > Management is the most difficult part, almost all interoperability issues are based on management
 - > Idea: Create one proven feature-rich standard solution and share it with the partners
 - > Bases on Atmel ATxmega128A1
 - > Over 5 man-years of design work put into it
 - > Great improvements during the last year



Overview of Building Blocks – Starter Kit

Commonly used Blocks

> IPMI Communication

- Intensively tested with NAT and Vadatech

> Power Management

- Sequencing and safety shutdown

> FPGA Management

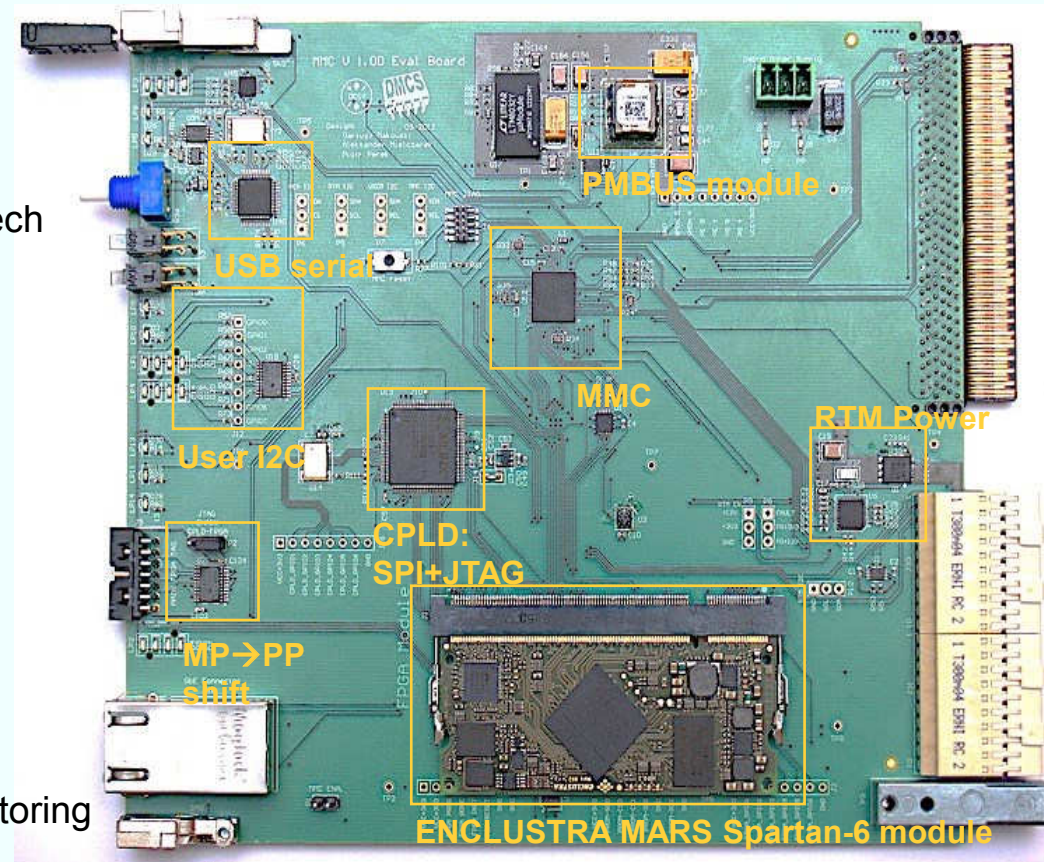
- DONE, INIT, PROG, RESET over IPMI

> HPM.1 MMC and FPGA upgrade

- Redundant SPI Flashes

> RTM Management

- RTM Inrush current control
- Temperature, voltage and current monitoring



Design: Dariusz Makowski, DMCS

> CPLD for JTAG and Flash Control (optional!)

- Allows to program “dead board”; Redundant Flash selection

> Debug UART

> PMBUS control

Progress

State of Last Year: “Basic” functionality (Development Version)

- IPMI Communication
- Power Management, Temperature Monitoring
- FPGA Management
- Static CPLD for JTAG and Flash Control
- AMC FRU generator



Lodz University of Technology



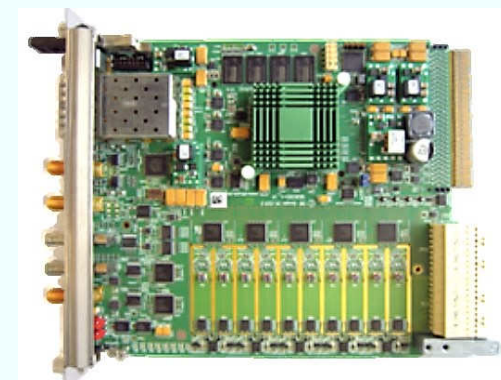
Great Improvements in 2014 (25.000 lines of code added)

- Architecture change: Full separation IPMI/user logic
- Vadatech compatibility: IW25, IW26
- HPM.1 Support (8KB Boot loader) → MMC, SPI
- MMC and CPLD register control with IPMItool
- Temperature Events (Fan speed increase)
- Automation tools (program.bat, bin2hpm)



Reference Customers

- > DESY MMC V1.00 is running on DESY Boards
 - DAMC-FMC20, DAMC-FMC25, DAMC-TCK7
- > In 2014 we won partners – very good feedback
 - CAENels
 - Michigan State University
 - NRF Korea
 - *Micro-Research Finland*
 - *Interface Concept*
 - In negotiation with SLAC
- > Success story: Struck SIS8300L2
 - Spend two days together for MMC schematic change
 - Spend one day for Code-Porting
 - Full set of new features: Remote MMC and Flash Upgrade, redundant FPGA Flash Memories, RTM inrush current control, Temperature Alerts, FPGA and RTM supervision



Demonstration

- > Sensor Information
- > HPM file generation
- > IPMI Upgrade
- > Production Programming



Bin2hpm – in Bitfile mode

```
D:\bin2hpm llrf_ctrl_sis83001_acc1_r908.bit /bit /compress
BIN-to-HPM file converter. Version: 1.0
Written by Michael Fenner (C) DESY 2014;
with compression based on UPackBits (C) Michael Dipperstein (LGPL) and
with MD5 algorithm from Alexander Peslyak (public domain)

Reading file                : llrf_ctrl_sis83001_acc1_r908.bit
File Length is             : 5465076 bytes
Bit File mode. Header check ok.
a-Section detected. Design info : ENT_SIS8300L_TOP.ncd;UserID=0xFFFFFFFF
b-Section detected. Part name   : 6v1x130tff1156
c-Section detected. File date   : 2014/11/27
d-Section detected. File time   : 01:58:26
e-Section detected. Image size  : 0x0053638C (5336KB)
BIT header successfully parsed.
Generating HPM header...
Device ID                  : 0x00
Manufacturer ID            : 0x0000000
Product ID                 : 0x0000
Time value                 : 0x54886D64
Component ID               : 0x01
Firmware revision          : 0x0000
Firmware revision auxiliary information : 0x00000000
Generating header checksum  : 0xF0
Generating upgrade action checksum (prepare) : 0xFE
Generating upgrade action checksum (upload)  : 0xFD
Information: Output will be compressed with RLE
Reading 5464972 Bytes from file...
Largest RLE block is       : 128 bytes
Compression Ratio is       : 32.9%
16-bit Checksum of data is : 0xBDB3.
Begin of data stream is    : 9EFF810004BB1122004486FF04AA995566208100...
End of data stream is      : 00208100022000000002081000020810002200000.
Testing MD5 checksum       : E5546C065678FBF39CE2CC5FC2F8F32A
Output data length is      : 1796463 bytes
Overhead (header+MD5) size is : 99 bytes
Writing file               : llrf_ctrl_sis83001_acc1_r908.rle.hpm
Bytes actually written     : 1796463
All done.
```

Demonstration

PICMG HPM.1 Upgrade Agent 1.0.2:

-----Target Information-----

Device Id : 0x0
Device Revision : 0x80
Product Id : 0x0002
Manufacturer Id : 0x053f (Unknown (0x53F))

```
-----
| ID | Name          | Versions |
|   |               | Active| Backup|
-----
| 0 | MMCV100 HPM | 2.00 | --.-- |
-----
```

```
mskcpu hvf1@mskcpu hvf1:~$ ipmitool -H mskmch hvf1 -P "" -t 0x76 hpm upgrade SIS8300L2.hpm
```

PICMG HPM.1 Upgrade Agent 1.0.2:

Validating firmware image integrity...OK

Performing preparation stage...OK

Performing upgrade stage:

```
-----
| ID | Name          | Versions | Upload Progress | Upload| Image | | | | |
|   |               | Active| Backup| File | 0%      50%      100%| Time | Size |
|---|-----|-----|-----|-----|-----+-----+-----|-----|-----|
| 0 | MMCV100 HPM | 2.00 | --.-- | 0.01 | |.....| | 00.33 | 18cec |
-----
```

Firmware upgrade procedure successful

show_sensorinfo

```
nat> show_sensorinfo 9
```

```
Sensor Information for FRU 9 / AMC5
```

=====							
#	SDRType	Sensor Entity	Inst	Value	State	Name	

0	MDewLoc		0xc1	0x65		SI3830DL2 AMC	
0	Full	0xf2	0xc1	0x65	0x01	Hot Swap	
1	Full	Voltage	0xc1	0x65	12.1 V	ok	12V PP
2	Full	Voltage	0xc1	0x65	3.30 V	ok	3.3V HP
3	Full	Voltage	0xc1	0x65	0.97 V	ok	1.0V CORE
4	Full	Voltage	0xc1	0x65	2.48 V	ok	2.5V
5	Full	Voltage	0xc1	0x65	1.80 V	ok	1.8V
6	Full	Voltage	0xc1	0x65	1.49 V	ok	1.5V DDR3
7	Full	Current	0xc1	0x65	0.240 A	ok	RTH PP Current
8	Full	Current	0xc1	0x65	0.017 A	ok	RTH HP Current
9	Full	Temp	0xc1	0x65	35.5 C	ok	Inlet
10	Full	Temp	0xc1	0x65	39.5 C	ok	Outlet
11	Full	Temp	0xc1	0x65	47.0 C	ok	Middle
12	Full	Temp	0xc1	0x65	40.0 C	ok	FPGA PCB
13	Full	Temp	0xc1	0x65	49.0 C	ok	FPGA DIE
14	Compact	0x0b	0xc1	0x65	0x00	0x00 FPGA Done	
15	Compact	0x0b	0xc1	0x65	0x00	0x00 FPGA Init	
16	Compact	0x0b	0xc1	0x65	0x00	0x00 RTH OC Fault	
17	Compact	0x0b	0xc1	0x65	0x00	0x00 ID:0004A3D16829	

```
nat> SEL: 1970/01/01 01:40:00 alive
```

Licensing

- > Licensor needs to sign an NDA and a Software License Agreement
- > Free of Charge for collaboration projects
- > Licensing Items
 - Altium Designer Files as Templates for AMC and RTM
 - C Source Code
 - AMC FRU Generator
 - Command-Line HPM Generator

