

# Mechanism to Speed-up Development of FPGAs in MTCA Systems



**Innovation Communication**

Home Products Services How to buy About N.A.T. News Search

### The brain of your MTCA.4 system

Higher bandwidth for Physics: the new NAT-MCH-PHYS80

**Key features**

- x16 PCIe Gen3 uplink at front panel
- 128Gbps link to local CPU/IO complex
- special low latency and low jitter CLK module
- fully user accessible quad core Intel® Core i7
- new RTM for LLP backplane
- complete product law

Let Your **Application** benefit

The brain of your MTCA system [read more ...](#)

**Accelerate Media Processing** [read more ...](#)

**The brain of your MTCA system** [read more ...](#)

**The QortQ-Family** [read more ...](#)

**Board Level Products**

**System Solutions**

**Upcoming Events**

- **MTCA Workshop at DESY** Dec 9th-10th, 2015, Hamburg, Australia
- **IBIC 2015** Sept. 13-17th, Melbourne, Australia
- **Mobile World Congress** Mar 2nd-5th, 2015, booth 6B40

**Latest News**

- **New product NAT-JSM** Open JTAG switch module in AMC form factor
- **ANC module NAMC-DDSP** New Media Acceleration Engine based on 8x OCT2224M DSPs
- **NAT-MCH firmware v2.17 and NATView v2.18** New versions of firmware and GUI available
- **MicroTCA Concept** Version IV now available

Imprint | Terms & Conditions | Privacy Statement | Sitemap | Glossary | FAQ | © 2015

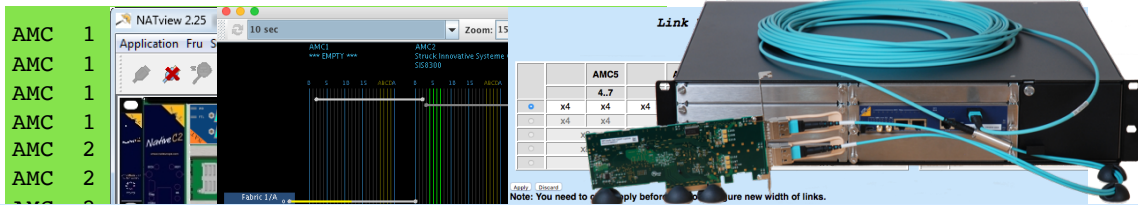
slide 1 | © 2017 N.A.T. GmbH | All trademarks and logos are property of their respective holders

## Known Products of N.A.T.

- NATIVE-R9-NWR
- NAT-MCH-PHYS
- NAT-MCH-PHYS80
- NAT-LLRF-Backplane
- NAT-MCH-RTM-BM-FPGA
- NAMC-psTimer
- NAMC-TCK7
- NAT-PM-AC1000

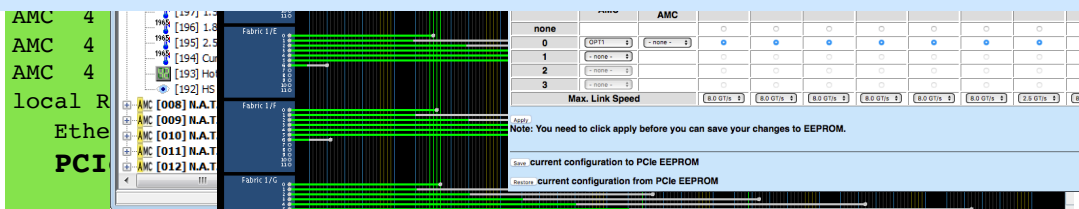
# Easy to Used Management Tools

## NAT-MCH



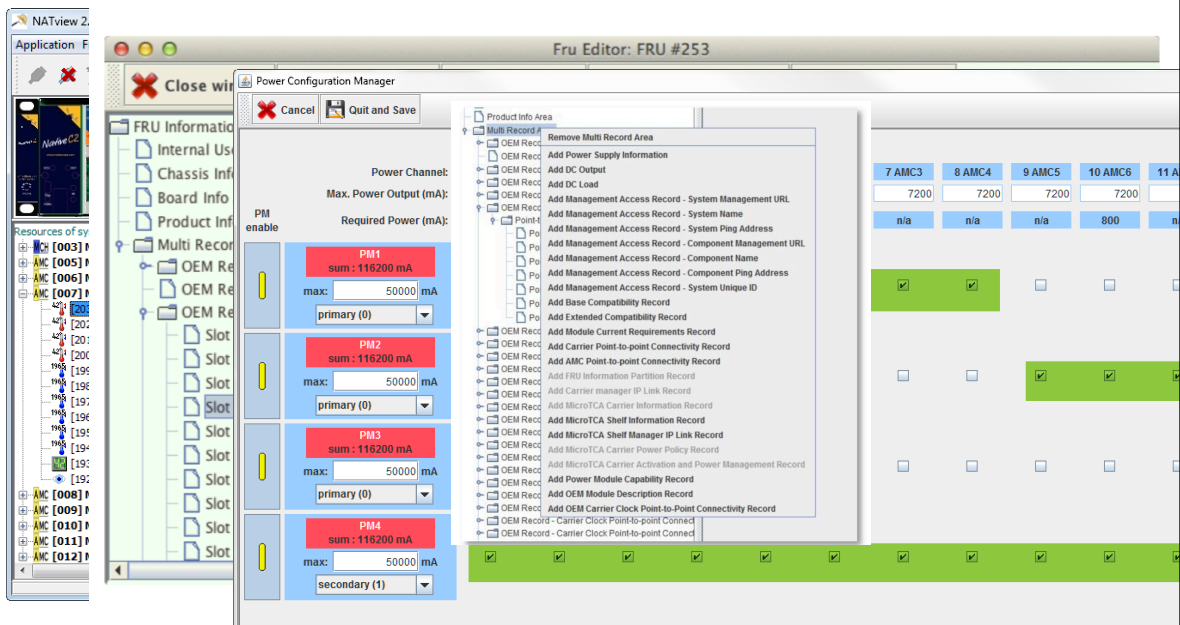
PCIe Link Status Menu

	AMC1		AMC2		AMC3		AMC4		AMC5		AMC6	
	4..7	8..11	4..7	8..11	4..7	8..11	4..7	8..11	4..7	8..11	4..7	8..11
Link Speed	x4	-	-	-	x1	-	x1	-	-	-	x1	-
	2.5 GT/s	-	-	-	2.5 GT/s	-	2.5 GT/s	-	-	-	2.5 GT/s	-



# Easy to Used Management Tools

## NAT-MCH



## What's next

### Mechanism to Speed-up Development of FPGAs in MTCA Systems



- Infrastructure Solved
  - Easy Configuration and Maintenance
- Payload
  - CPU -> Linux ->done
  - IO-Boards
    - all kind of drivers -> see talk ChimeraTK
  - **FPGA**
    - **setup -> time consuming**
    - **FPGA Mezzanine Card -> flexible IO**
- **How to use improvement of modern development tools e.g. Xilinx Vivado and Intel Avalon even further**

slide 5 | © 2017 N.A.T. GmbH | All trademarks and logos are property of their respective holders

## Vision

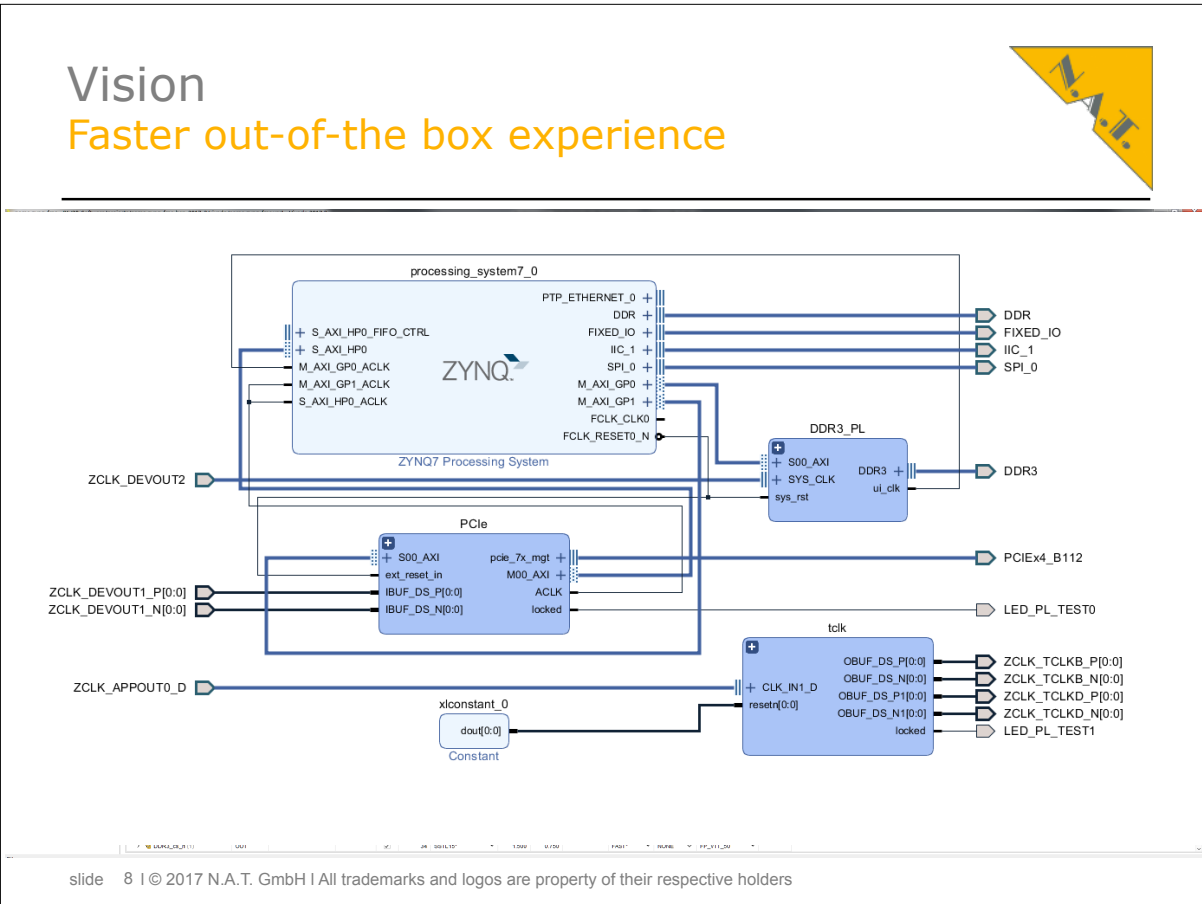
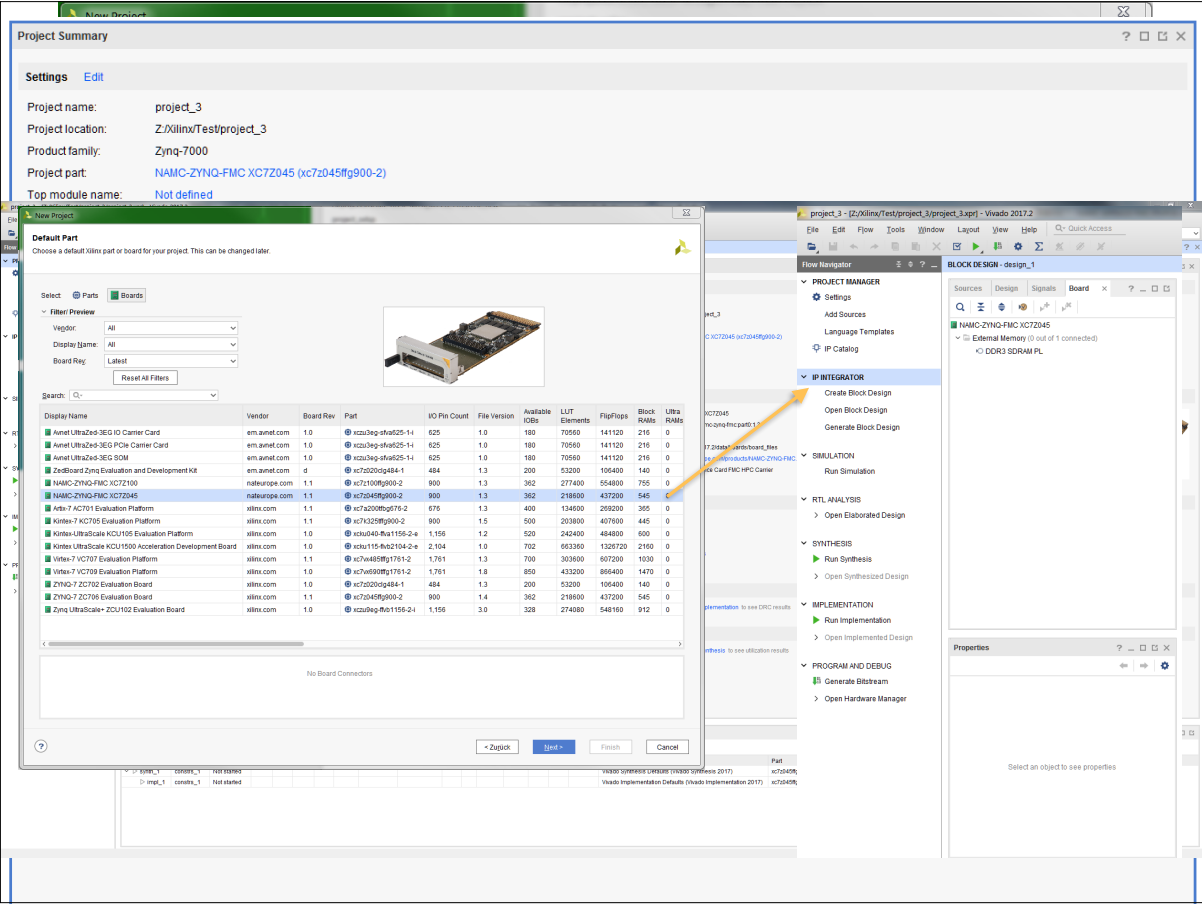
### Port the Easy Handling of MCH to Handling of FPGA



#### **Faster out-of-the box experience**

- Faster Board configuration via Web Interface
  - e.g. configuration of PLLs and Clock Multiplexers
- **FMC EEPROM Editor similar to FRU-Editor of NATview**
- **Easier Debugging including Remote Debugging via JTAG**
- **Easier Maintenance**
  - **Read out of temperature, voltage and other sensors of FMC via MCH tools**
- Build in function tests
  - AMC Board-Hardware Self Test / Control of Control LEDs
  - FMC Test
  - for selected FMC Modulen start of Demo applications, by loading binaries from the SD card to FPGA flash memory
- **GOAL: Quick development results**

slide 6 | © 2017 N.A.T. GmbH | All trademarks and logos are property of their respective holders





## Vision

### Port the Easy Handling of MCH to FPGA



- **Faster out-of-the box experience**
- Faster Board configuration via Web Interface
  - e.g. configuration of PLLs and Clock Multiplexers
- **FMC EEPROM Editor similar to FRU-Editor of NATview**
- **Easier Debugging including Remote Debugging via JTAG**
- **Easier Maintenance**
  - **Read out of temperature, voltage and other sensors of FMC via MCH tools**
- Build in function tests
  - AMC Board-Hardware Self Test / Control of Control LEDs
  - FMC Test
  - for selected FMC Modulen start of Demo applications, by loading binaries from the SD card to FPGA flash memory

slide 9 | © 2017 N.A.T. GmbH | All trademarks and logos are property of their respective holders

## Vision

### FMC EEPROM Editor

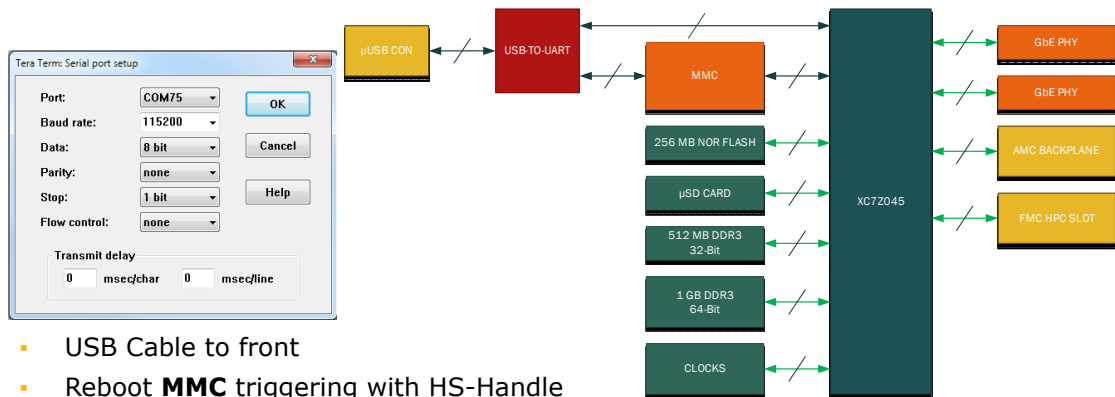


- FMC with EEPROM content
  - Per default the carrier will try to parse the FMC FRU records from the modules EEPROM contents to set the carriers power supply and clock direction.
- FMC **without** records in EEPROM
  - Skip FMC EEPROM parsing with setting SW2-4 to ON.
    - Warning: In this case a default VADJ voltage of 1.8V gets applied to the FMC module. Please check the capabilities of your FMC in this case.
  - Generate and program the records with the carrier

slide 10 | © 2017 N.A.T. GmbH | All trademarks and logos are property of their respective holders

# FMC EEPROM Editor

## Generate and Program the Records



- USB Cable to front
- Reboot **MMC** triggering with HS-Handle
- Console Output:
  - Press any key to generate FMC FRU file ...
  - Wizard starts
    - step by step setting of FMC records
    - at the end program FMC EEPROM

# Animation bzw. Video FMC-EEPROM Programming



```

COM103 - Tera Term VT
File Edit Setup Control Window Help
Press any key to generate FMC FRU file ... 0.0

Edit Board Area ? (RET=n): y
Manufacturer: Unknown Manufacturer
Product Name: Unknown FMC
Serial Number: 0000000001
Part Number: FMC0815
FRU file ID:

Edit subtype0 record ? (RET=n):
Edit DC_LOAD(0), (VADJ) ? (RET=n):
Edit DC_LOAD(1), (3P3V) ? (RET=n):
Edit DC_LOAD(2), (12P0V) ? (RET=n):
Edit DC_OUT(3), (VIO_B_M2C) ? (RET=n):
Edit DC_OUT(4), (VREF_A_M2C) ? (RET=n):
Edit DC_OUT(5), (VREF_B_M2C) ? (RET=n):
    
```

# Animation bzw. Video FMC-EEPROM Programming



COM103 - Tera Term VT

File Edit Setup Control Window Help

```
HPS boot source is: QSPI
FPGA configuration mode is: AS(x4)
```

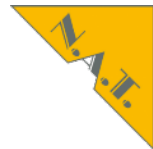
```
*** FMC information ***
```

```
Board area:
```

```
Manufacturer: N.A.T GmbH
Product Name: N.A.T FMC01
Serial Number: 0000000001
Part Number: NFMC0815
FRU file ID:
```

## Vision

### Port the Easy Handling of MCH to FPGA

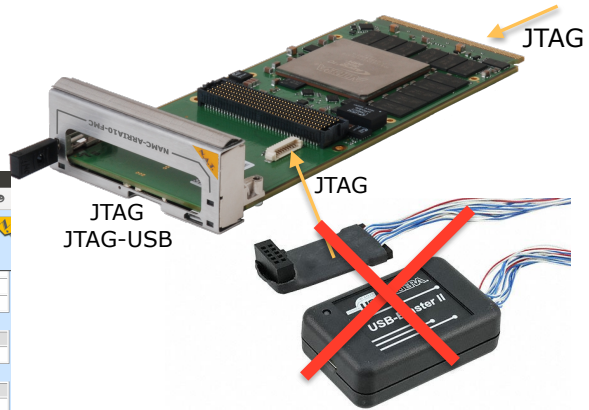
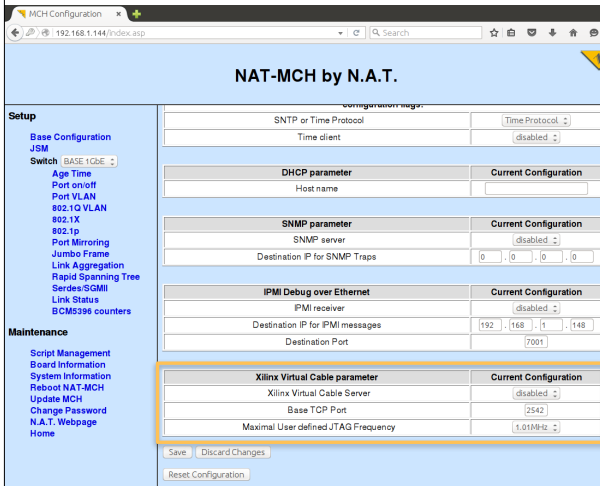


- **Faster out-of-the box experience**
- Faster Board configuration via Web Interface
  - e.g. configuration of PLLs and Clock Multiplexers
- **FMC EEPROM Editor similar to FRU-Editor of NATview**
- **Easier Debugging including Remote Debugging via JTAG**
- **Easier Maintenance**
  - **Read out of temperature, voltage and other sensors of FMC via MCH tools**
- Build in function tests
  - AMC Board-Hardware Self Test / Control of Control LEDs
  - FMC Test
  - for selected FMC Modulen start of Demo applications, by loading binaries from the SD card to FPGA flash memory

# Easier Debugging/Remote Debugging Web Interface



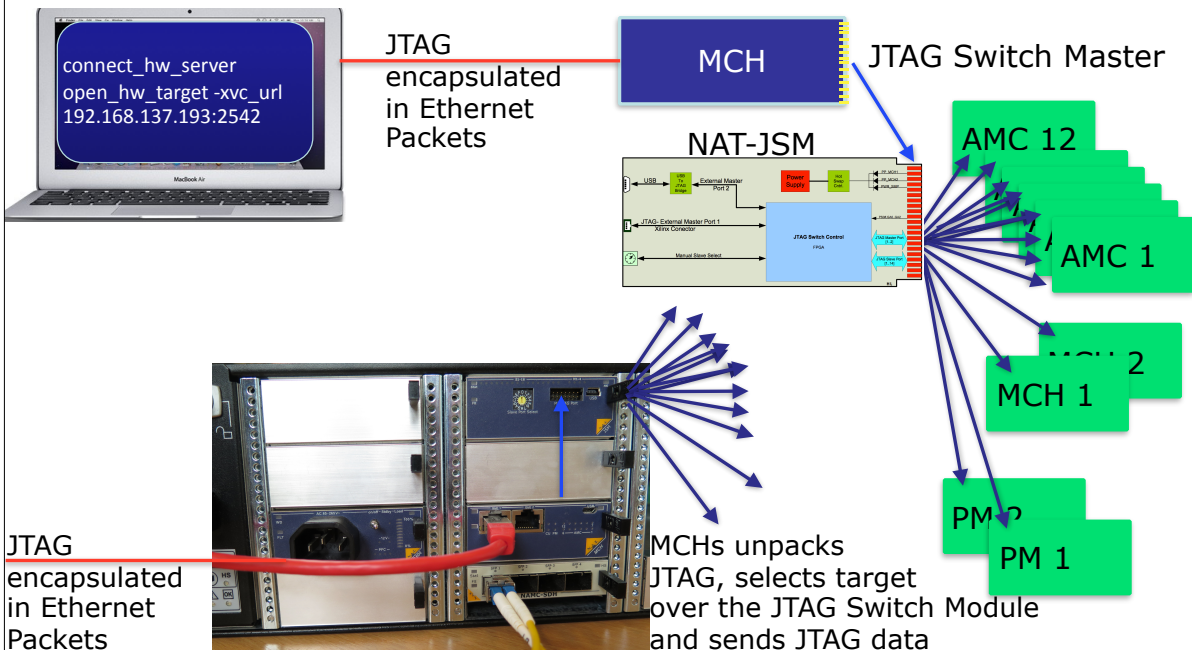
- No need for JTAG-Adapter
- Multiple FPGA debugging at the same time



slide 15 | © 2017 N.A.T. GmbH | All trademarks and logos are property of their respective holders

# FPGA Development Tool: Vivado

`connect_hw_server`  
`open_hw_target -xvc_url`  
`192.168.137.193:2542`



JTAG encapsulated in Ethernet Packets

MCHs unpacks JTAG, selects target over the JTAG Switch Module and sends JTAG data

slide 16 | © 2017 N.A.T. GmbH | All trademarks and logos are property of their respective holders

# Vision

## Port the Easy Handling of MCH to FPGA



- **Faster out-of-the box experience**
- Faster Board configuration via Web Interface
  - e.g. configuration of PLLs and Clock Multiplexers
- **FMC EEPROM Editor similar to FRU-Editor of NATview**
- **Easier Debugging including Remote Debugging via JTAG**
- **Easier Maintenance**
  - **Read out of temperature, voltage and other sensors of FMC via MCH tools**
- Build in function tests
  - AMC Board-Hardware Self Test / Control of Control LEDs
  - FMC Test
  - for selected FMC Modulen start of Demo applications, by loading binaries from the SD card to FPGA flash memory

# Maintenance

## show\_fru, show\_sensorinfo



- Inventory      show\_fru
- Sensors        show\_sensorinfo
- Power budget   show\_pm

### FRU Information:

FRU	Device	State	Name
0	MCH	M4	NMCH-CM
3	mcmc1	M4	NAT-MCH-MCMC
5	AMC1	M4	CCT AM 913/312
7	AMC3	M4	TAMC220-10
8	AMC4	M4	NAMC-ZYNQ-FMC
9	AMC5	M4	NAMC-ARRIA10-FMC
10	AMC6	M1	DAMC-FMC25
40	CU1	M4	Schroff uTCA CU
50	PM1	M4	NAT-PM-AC600D
60	Clock1	M4	MCH-Clock
61	HubMod1	M4	MCH-PCIE
64	MCH1-RTM	M4	MCH-RTM-ComEx
92	AMC3-RTM	M4	TAMC220-RTM
113	AMC4-FMC	M4	FMC ADC3110
114	AMC5-FMC	M4	FMC ADC3110

```
PM1: - online, primary(fru 50) : budget 50.0 A (alloc 24.6 A
avail 25.4 A)
PM2: - unknown
PM3: - unknown
PM4: - unknown
```

chan	FRU	FruId	primPM	secPM	PS1	POn	ENA	MP	PP	Amps
1	MCH1	3	1	-	Y	Y	Y	Y	Y	6.0
2	MCH2	4	-	-	-	-	-	-	-	-
3	CU1	40	1	-	Y	-	Y	Y	Y	4.0
4	CU2	41	-	-	-	-	-	-	-	-
5	AMC1	5	1	-	Y	-	Y	Y	Y	5.6
6	AMC2	6	1	-	-	-	-	-	-	-
7	AMC3	7	1	-	Y	-	Y	Y	Y	4.0
8	AMC4	8	1	-	v	-	v	v	v	5.0
9	AMC5	9	1	-	Y	-	Y	Y	Y	5.0
10	AMC6	10	1	-	Y	-	Y	Y	Y	5.5
11	AMC7	11	-	-	-	-	-	-	-	-
12	AMC8	12	-	-	-	-	-	-	-	-
13	AMC9	13	-	-	-	-	-	-	-	-
14	AMC10	14	-	-	-	-	-	-	-	-
15	AMC11	15	-	-	-	-	-	-	-	-
16	AMC12	16	-	-	-	-	-	-	-	-



## Summary

### Port the Easy Handling of MCH to FPGA



- **Faster out-of-the box experience**
- Faster Board configuration via Web Interface
  - e.g. configuration of PLLs and Clock Multiplexers
- **FMC EEPROM Editor similar to FRU-Editor of NATview**
- **Easier Debugging including Remote Debugging via JTAG**
- **Easier Maintenance**
  - **Read out of temperature, voltage and other sensors of FMC via MCH tools**
- Build in function tests
  - AMC Board-Hardware Self Test / Control of Control LEDs
  - FMC Test
  - for selected FMC Modulen start of Demo applications, by loading binaries from the SD card to FPGA flash memory

slide 19 | © 2017 N.A.T. GmbH | All trademarks and logos are property of their respective holders

## Thank you!



Let Your **Application** benefit

[www.nateurope.com](http://www.nateurope.com)