

MTCA Tutorial: Use of Management Functions

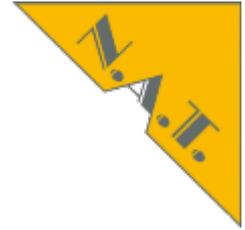
Follow on of “How to setting up Tutorial” of 1st Workshop
Follow on of “Configuring and Maintaining” of 2nd Workshop

ONE TECHNOLOGY MULTIPLE SOLUTIONS

Dipl. Ing. Vollrath Dirksen
vollrath@nateurope.com

Tutorial about MicroTCA.4

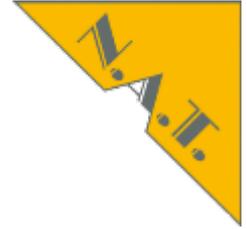
Agenda



- About N.A.T.
- MicroTCA.4 standard and Webpage mtca.eu
- System start of MicroTCA.4 system
- Analysis remotely: inventory, current, revision
 - Command Line Interface
 - NATView
 - Web interface
- Configuration
- Firmware update
- PCIexpress
 - Clustering
 - Hot Plug (hand over to next presentation)

About N.A.T.

Network and Automation Technology



- Founded in 1990, privately owned
- Hard- and Software design and manufacturing
- Focus on **innovation in communication**
- international and worldwide operations
- Headquarters

Konrad-Zuse-Platz 9

53227 Bonn

Germany

- Instructors:
 - Dipl. Ing. Vollrath Dirksen, vollrath@nateurope.com
 - Dipl. Phys. Heiko Körte, heiko@nateurope.com



Innovation N.A.T. Communication

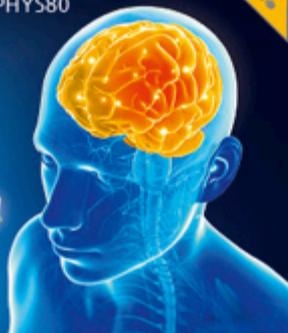

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[News](#)
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The brain of your MTCA.4 system

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

Key features

- x16 PCIe Gen3 uplink at front panel
- 128Gbps link to local CPU/root complex
- special low latency and low jitter CLK module
- fully user accessible quad core Intel (R) Core i7
- new RTM for LLRF backplane
- complete product line



Let Your **Application** benefit

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



The power of
your MTCA
system

[read more ...](#)



The brain of
your MTCA
system

[read more ...](#)



The QorIQ-
Family

[read more ...](#)

Board Level Products



System Solutions



Upcoming Events

▶ **MTCA Workshop at DESY**
Dec. 10th - 11th, 2014,
Hamburg

▶ **Embedded Software
Engineering Congress**
Dec. 1st - 5th, 2014

▶ **IEEE RTC 2014**
May 25th - 30th, Nara, Japan

Latest News

▶ **HARTING Plug for
AMC/MCH stays available**
ITB takes over product line
from HARTING

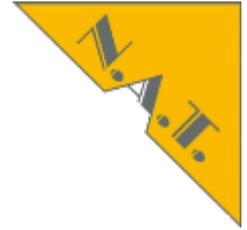
▶ **NAT-MCH firmware v2.15
and NATview v2.13**
New versions of firmware and
GUI available

▶ **NAT-MCH-PHYS80**
New MCH for Physics with
special CLK and new PCIe Gen3
switch

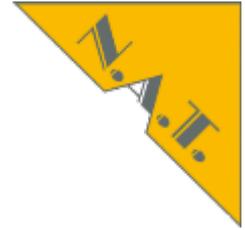
▶ **N.A.T. acquired assets of
former MicroBlade**
New home for MicroBlade
technology

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Search this site

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- About PICMG
- Membership
- Resources
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PICMG Specifications

- [Advanced Mezzanine](#)
- [AdvancedTCA®](#)
- [ASI SIG](#)
- [COM Express®](#)
- [CompactPCI®](#)
- [CompactPCI® Express](#)
- [CompactPCI® PlusI](#)
- [CompactPCI® Serial](#)
- [e-PCI-X](#)
- [HPM](#)
- [MicroTCA®](#)
- [PCI-ISA](#)
- [SHB Express](#)
- [System Fabric Plane](#)
- [All Specifications](#)

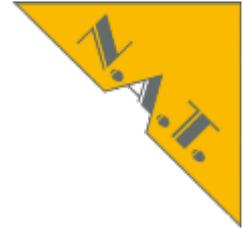
Bus: Advanced Mezzanine Card™					
PICMG – No.	Name	Revision ECN	Date	Status	Description
AMC.0	AdvancedMC™ Mezzanine Module	Rev 2.0	15-Nov-06	Adopted	Defines a mezzanine block approach for crucial functions on 3.0 carrier cards. number of third
		Rev 1.0	1/3/05	Obsolete	Replaced by Re
		R1 ECN 001	26-Jun-06	Obsolete	Incorporated in
		R1 ECN 002	15-Nov-06	Obsolete	Incorporated in

Medical
Test and Measurement
Communication
Control
Automation
Aerospace
Accelerator
Transportation



Let Your **Application** benefit

www.nateurope.com



The screenshot shows the homepage of the MTCA website. The header features the DESY logo on the left, the title "MTCA.4 for Industry and Research" in the center, and the HELMHOLTZ ASSOCIATION logo on the right. Below the header is a navigation menu with links for Home, Community, Components, Support, Resources, Events, News, and Contact. The main content area is titled "Broad Alliance for MTCA in Research and Industry" and includes a section for the "3rd MTCA Workshop for Industry and Research" held in Hamburg, Germany. There is also an "About MTCA" section with an image of a server rack and text explaining the MicroTCA standard. A sidebar on the right contains a search bar and a "Latest News" section with several news items dated from 2013 to 2014.

MTCA.4 for Industry and Research

DESY HELMHOLTZ ASSOCIATION

Home Community Components Support Resources Events News Contact

Broad Alliance for MTCA in Research and Industry

3rd MTCA Workshop for Industry and Research

The 3rd MTCA Workshop for Industry and Research will be held from 9th December to 11th December 2014 in Hamburg, Germany. [More ...](#)

About MTCA



MTCA (Micro Telecommunications Computing Architecture), also known as MicroTCA™ and μ TCA™, has rapidly evolved to become a viable standard for demanding applications in large-scale research facilities of the high-energy physics and photon science community. Originally derived from AdvancedTCA™ or ATCA™ (Advanced Telecommunications Computing Architecture), the MTCA standard has gained popularity as a compact, versatile and cost-efficient alternative wherever ultra-high speed analog and digital signal processing is required.

MicroTCA is a standard defined by the PICMG (<http://www.picmg.org>). MTCA.4 is an MicroTCA enhancement for rear I/O and precision timing. It was developed by several institutes and industry and published in October 2011 by PICMG.

A broad alliance of developers, users, module manufacturers and system integrators has formed to develop new boards, refine the specification of the backplane and resolve any interoperability issues that may arise from applications in the field.

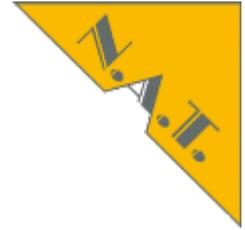
DESY Develops MTCA.4 Components for Beam Control at Particle Accelerators

The operation of particle accelerators requires high-performance electronics for beam diagnostics, data acquisition and machine control. DESY's ambitious standards regarding signal processing performance, redundancy options, remote management capabilities and timing stability called for the development of an entirely new generation of modules based on the latest MTCA.4 standard: High-Frequency Down-Converters, Low-level RF-Controllers, Analog/Digital Converters have been developed with a view to meet the unprecedented demands of the European XFEL, a multi-national free-electron laser X-ray facility currently under construction in Northern Germany.



mtca.eu

Support: mtca-helpdesk@desy.de



Support

Resource

MTCA Basics

MTCA Helpdesk

Training

Borrow and Rent

FAQ

Acronyms

Glossary

MTCA Helpdesk

You have an MTCA development or application issue that:

- cannot be solved using [FAQ](#) and other [Resources](#)?
- inhibits the implementation of MTCA systems at your organization?
- requires the immediate attention of an MTCA expert?

The [MTCA consortium](#) operates a **helpdesk** that can be contacted by [email](#).

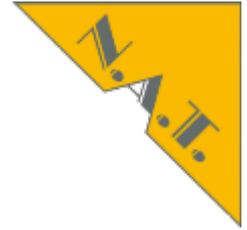
When you request support, please provide:

- your contact data (organization name, email address, telephone number),
- the full list of MTCA hardware you have in use (including hardware and software version/revision number),
- a detailed description of the problem at hand.

We will contact you as soon as possible.

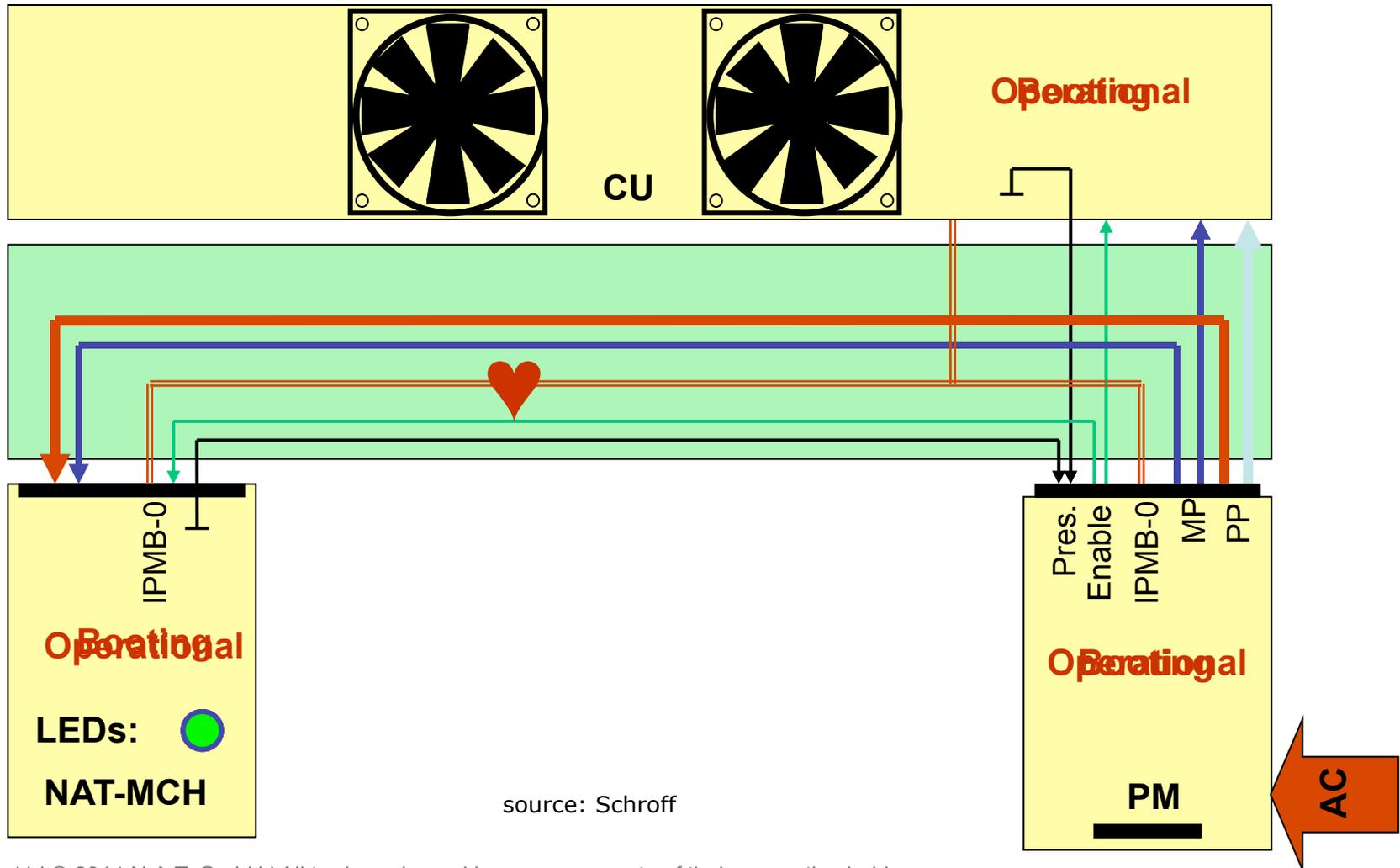
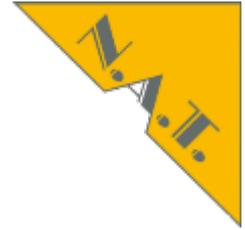
Tutorial about MicroTCA.4

Agenda

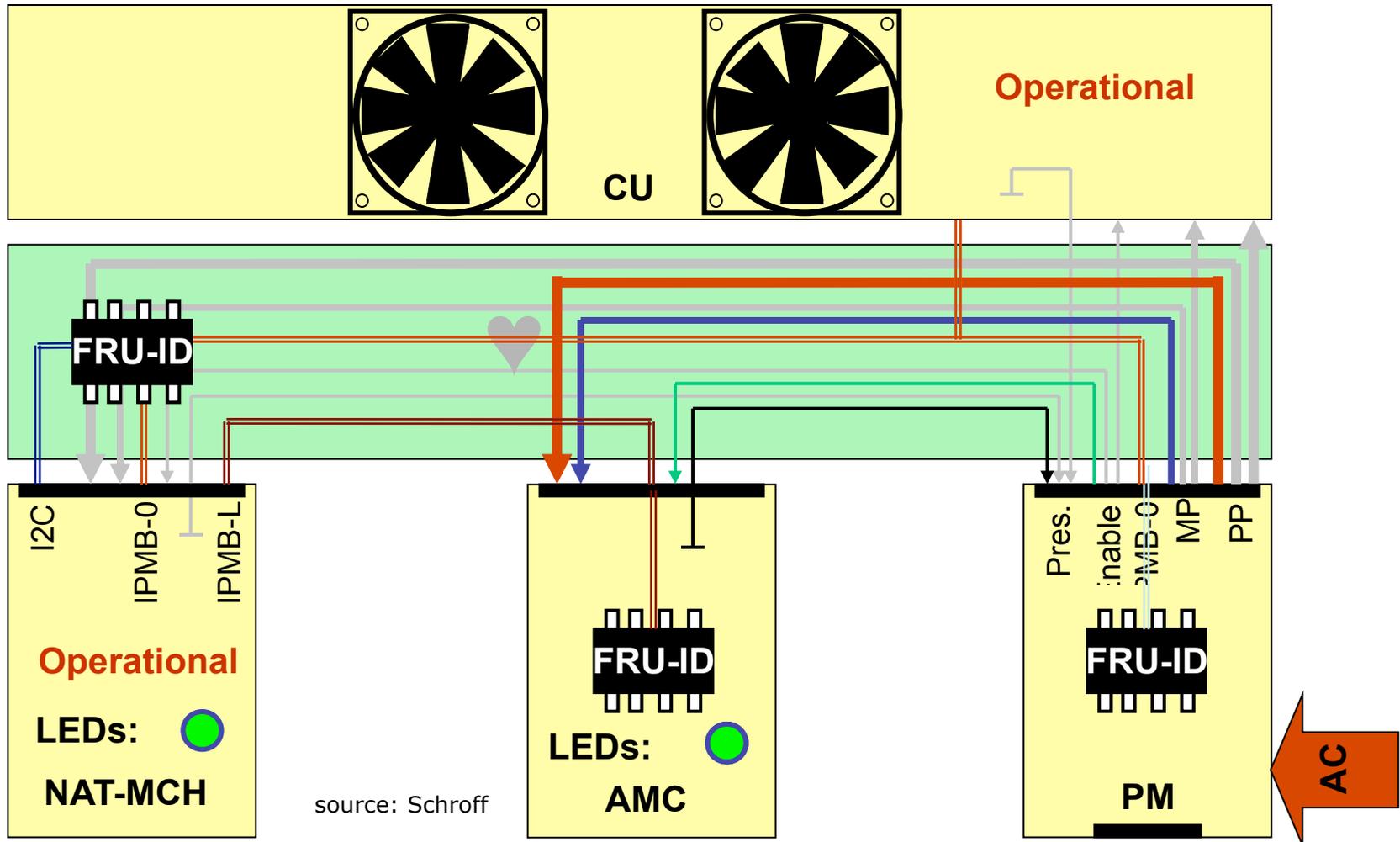
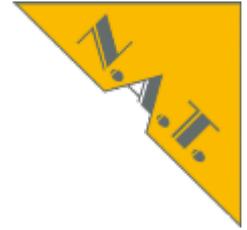


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MTCA Tutorial: Configuring and Maintaining Enabling the Management Plane

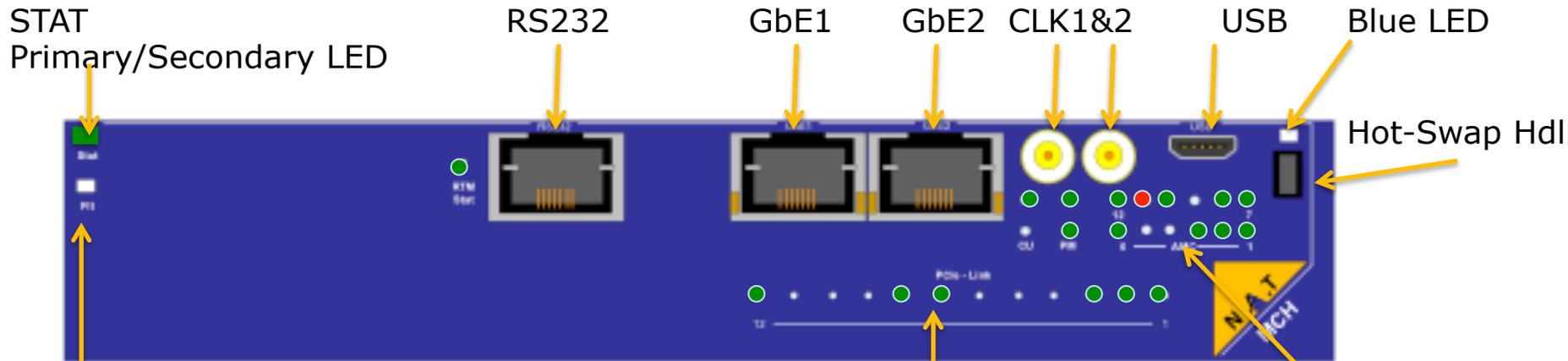
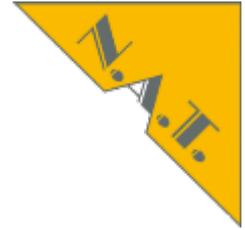


MTCA Tutorial: Configuring and Maintaining Enabling the Management Plane



MCH MicroTCA Carrier Hub

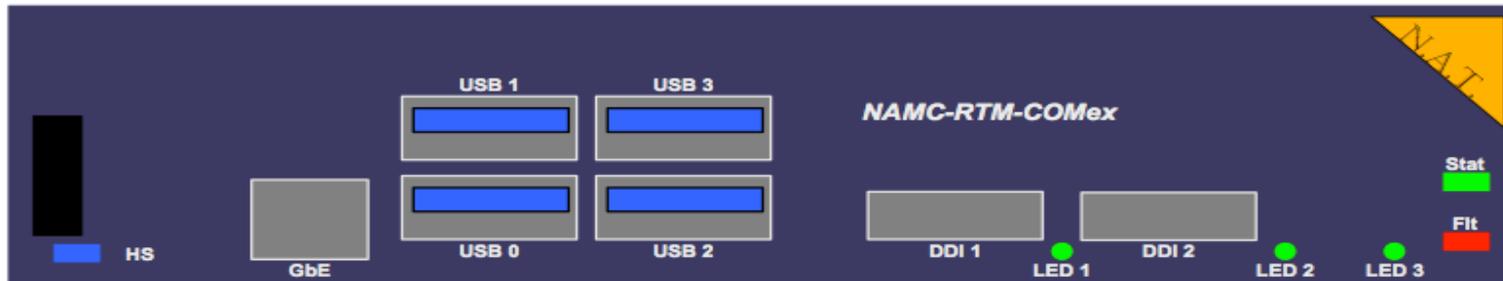
NAT-MCH-PHYS

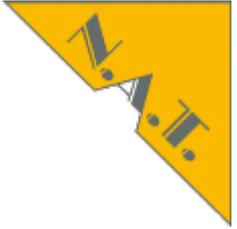


FLT
Red LED = Fault

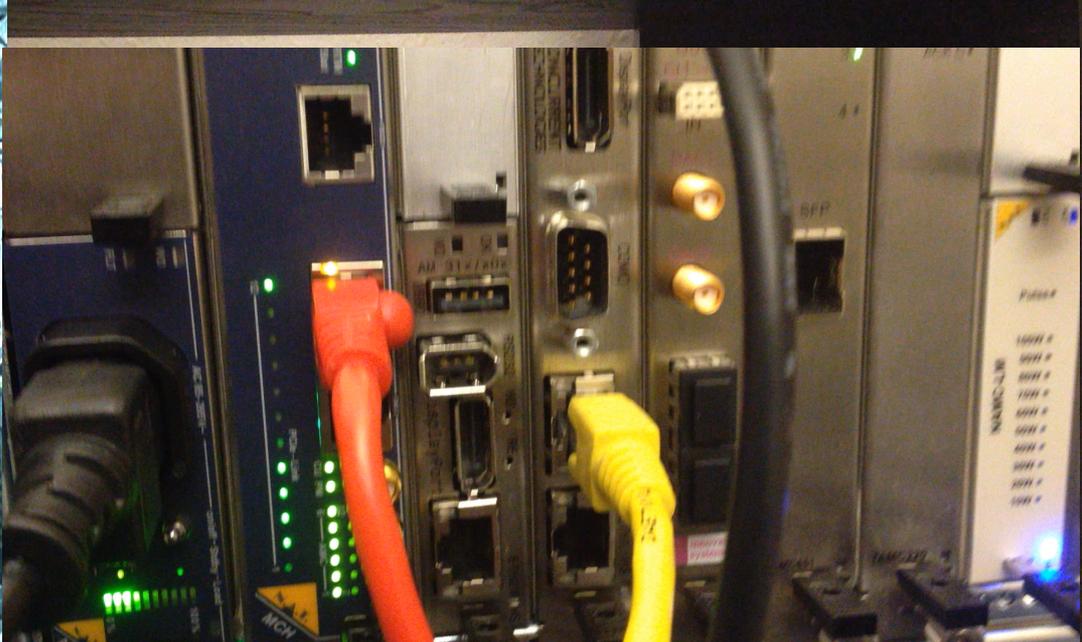
PCIexpress Status and Speed LEDs:
 off no PCIe link active
 on PCIe-Gen3 link active
 fast flashing PCIe-Gen2 link active
 slow flashing PCIe-Gen1 link active

FRU Status LEDs:
 AMC 1-12
 CU 1, 2
 PM 1, 2



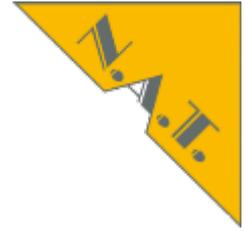


Monitoring and Maintaining Management Plane



IPMI-Bus (IPMB) in MTCA:

Technical Concept - Management



IPMB-L

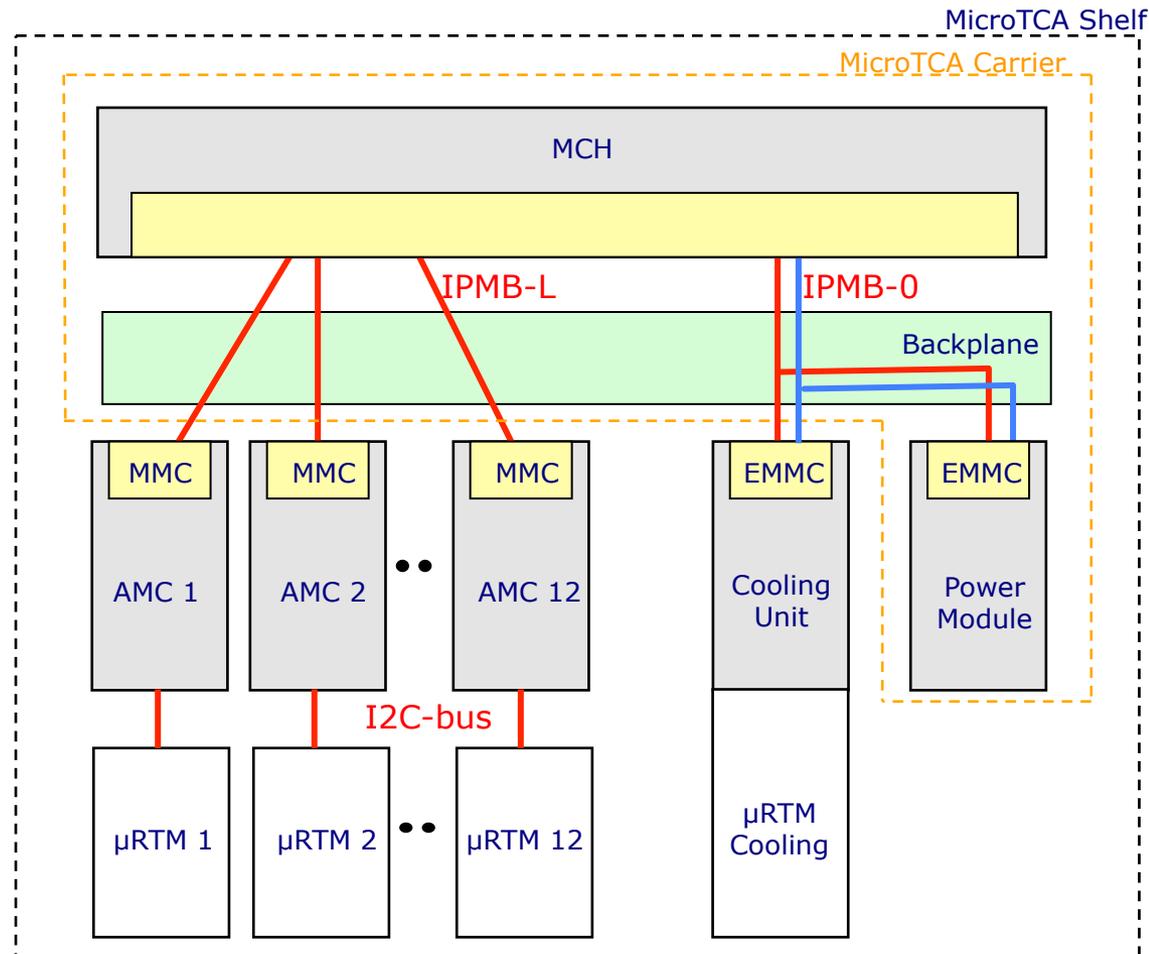
- Intelligent Platform Management Bus Local
- Connects the MCMC on the MCH to the MMC on the AMC Modules
- Radial architecture

IPMB-0

- IPMB-0, divided into redundant IPMB-A and IPMB-B
- Connects the MCMC on the MCH to the EMMC on the PM and CU
- Bused architecture

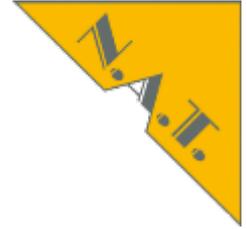
I2C-bus

- Connects the AMC to the μ RTM
- The μ RTM is treated as managed FRU of the AMC



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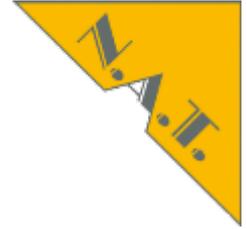
Your Maintenance Tools

NAT-MCH-CLI, Web-Interface, NATView, ipmitool



- **Examples of command line interface (CLI) commands:**

- `idb_info` - Print IPMI data base information
- `imsg_info` - IPMI message information
- `lshm_info` - Print local ShM information
- `sdrrep_info` - SDR repository information
- `sel_info` - System Event Log information
- `session_info` - Status of currently active Sessions
- **`show_ekey`** - **Show all activated connections**
- **`show_fru`** - **Show all FRUs**
- **`show_fruinfo`** - **fru_id FRU contents**
- **`show_cu`** - **Show cooling unit**
- **`show_pm`** - **Power Module Status**
- `show_sensorinfo` - Show sensors for FRU
- `version` - Print firmware version information
- `ni` - Print network configuration
- **`history`**



Login into Remote System

- Ethernet

- ssh to CPU

```
VollrathsAir10:~ vd$ ssh nat@192.168.178.47  
nat@NAT-MCH-RTM-I7:~$ telnet 192.168.178.26
```

or

```
VollrathsAir10:~ vd$ ssh nat@NAT-MCH-RTM-I7  
nat@NAT-MCH-RTM-I7:~$ telnet MTCA4TRAINING  
nat> show_fru
```

Or

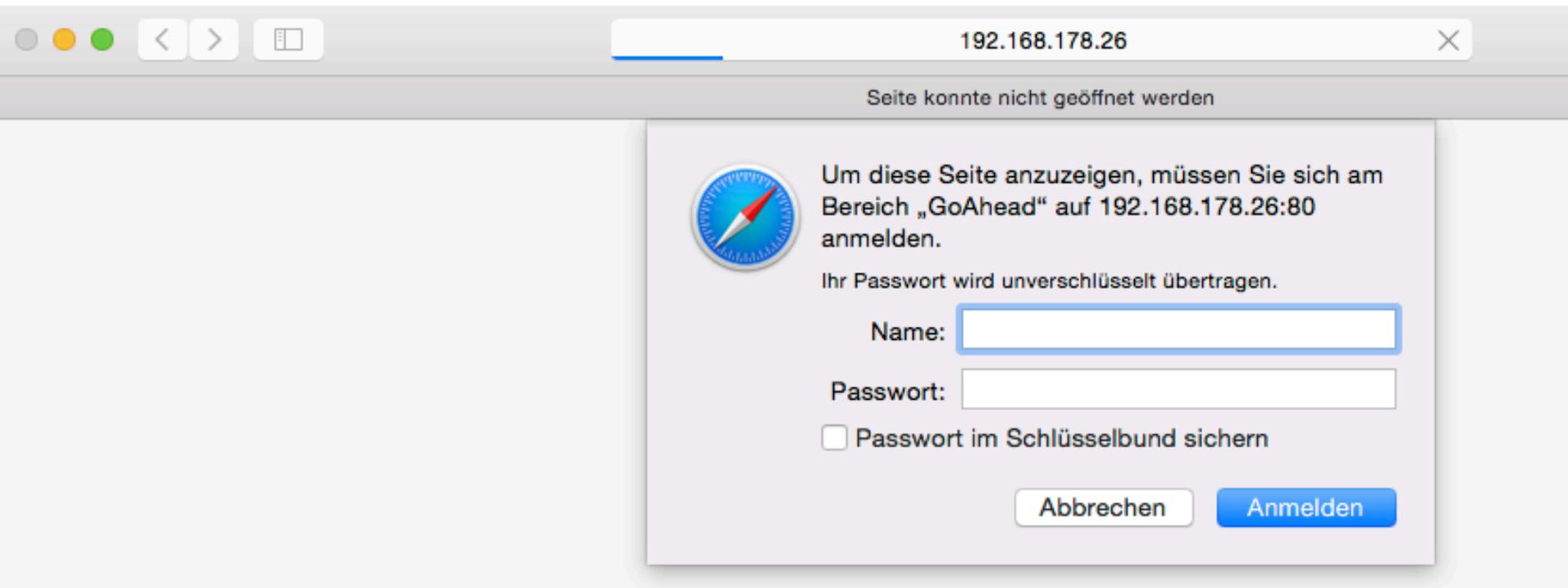
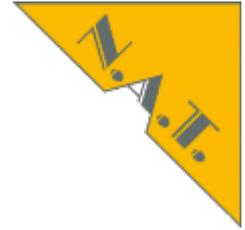
- telnet to MCH

```
VollrathsAir10:~ vd$ telnet MTCA4TRAINING  
nat> show_fru
```

- Webbrowser
 - to MCH

```
VollrathsAir10:~ vd$ safari MTCA4TRAINING
```

Login into Remote System



- Webbrowser
 - to MCH



NAT-MCH by N.A.T.



Setup

Base Configuration

Switch

- Age Time
- Port on/off
- Port VLAN
- 802.1Q VLAN
- 802.1X
- 802.1p
- Port Mirroring
- Jumbo Frame
- Link Aggregation
- Rapid Spanning Tree
- Link Status
- BCM5396 counters
- Configure PCIe Virtual Switches

Maintenance

- Board Information
- System Information
- Reboot NAT-MCH
- Update MCH
- Change Password
- N.A.T. Webpage
- Home

Welcome to the HTML based NAT-MCH configuration tool.

Setup Functions:

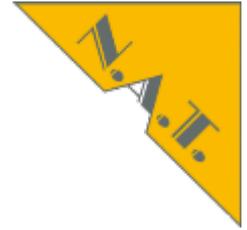
- Base Configuration:** - Changes Base Configuration.
- Age Time:** - MAC Table setup: set the aging of the MAC Table Entries.
- Port VLAN:** - Port based VLAN setup and port enable/disable.
- 802.1Q VLAN:** - 802.1Q VLAN setup.
- 802.1X:** - 802.1X security setup.
- 802.1p:** - 802.1p Quality of Service setup.
- Port Mirroring:** - Mirroring of the inbound and outbound traffic on a port
- Jumbo frames:** - Support of the Jumbo frames on a port
- Link Aggregation:** - Support of up to four the Link Aggregation groups
- Rapid Spanning** - Support of the Rapid Spanning Tree by 1GbE-Switch
- IGMP Snooping** - Support of the IGMP Snooping by 10GbE-Switch (FM4000 only)
- Link Status:** - Show the current status of the Ethernet links
- Counter Statistic:** - Show the counter statistic of the Ethernet switch

Maintenance Functions:

- Script Management:** - Backup/Restore settings to/from flash memory or file.
- Board Information:** - Provides hardware information of this NAT-MCH.
- System Information:** - Collect hardware information of this system.
- Reboot NAT-MCH:** - Allows rebooting over the Web-Interface.
- Update MCH:** - Allows updating several components over the Web-Interface.
- Change/Reset Password:** - Allows changing or resetting of the MCH Password over the Web-Interface.
- N.A.T. Webpage:** - Opens the N.A.T. webpage in a new browser window.
- Home:** - Shows this page.

Tutorial about MicroTCA.4

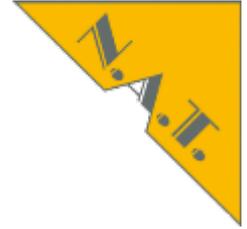
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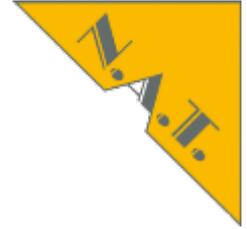
NAT-MCH:

Command Line Interface



- **show_ekey** - Show all activated connections
- **show_fru** - Show all FRUs
- **show_fruinfo** - fru_id **FRU** contents
- **show_cu** - Show cooling unit
- **show_pm** - Power Module Status
- **show_sensorinfo** fru_id - Show sensors for FRU

MTCA.4 Debugging Inventory

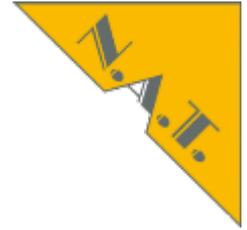


- show_fru

FRU	Device	State	Name
0	MCH	M4	NMCH-CM
3	mcmc1	M4	NAT-MCH-MCMC
5	AMC1	M4	SIS8300
6	AMC2	M4	SIS8300
7	AMC3	M4	SIS8300
8	AMC4	M4	TAMC900-10
40	CU1	M4	Cooling Unit
50	PM1	M4	PDM
60	Clk1	M4	MCH-Clock
61	Hub1	M4	MCH-PCIE
64	RTM1	M4	MCH-RTM-ComEx

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NATview 2.17

Version 2.17
(built Thu Nov 13 09:44:54 CET 2014)

Licensed options:

- FRU Editor
- Backplane Viewer
- HPM Update
- MCH Scanner
- System Dump
- Event Log

License holder: Vollrath Dirksen, NAT

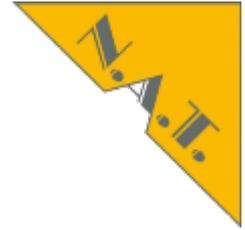
Check our FTP server <ftp.nateurope.com>
for updates (User: natmch, Password: natmch)!

(c) 2007 - 2014
by
N.A.T. GmbH,
Bonn,
Germany.

Close window

NATView

Find MTCA Systems in the Network

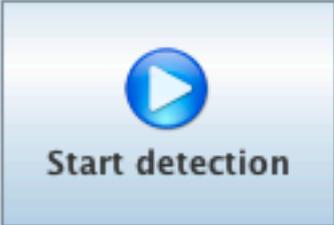


MCH Scanner

IP Address Range

Start address:

End address:

 Start detection

Detected systems

Select	IP Address	Carrier Manager...	Firmware Version	MCH	Chassis
<input checked="" type="checkbox"/>	192.168.178.26	0x6c78/0x0b23	2.16	N.A.T. GmbH - ...	Schroff GmbH-...



Auto Update 5 seconds ▾

Resources

Connect

Please enter the IP address of the N.A.T. MCH you want to connect to:

192.168.1.100	●	06.12.2014 16:17:18
192.168.1.152	●	06.12.2014 16:17:18
192.168.1.101	●	06.12.2014 16:17:18
192.168.178.26	●	06.12.2014 16:17:18
192.168.137.175	●	06.12.2014 16:17:18
192.168.137.143	●	06.12.2014 16:17:18
192.168.1.1	●	06.12.2014 16:17:18

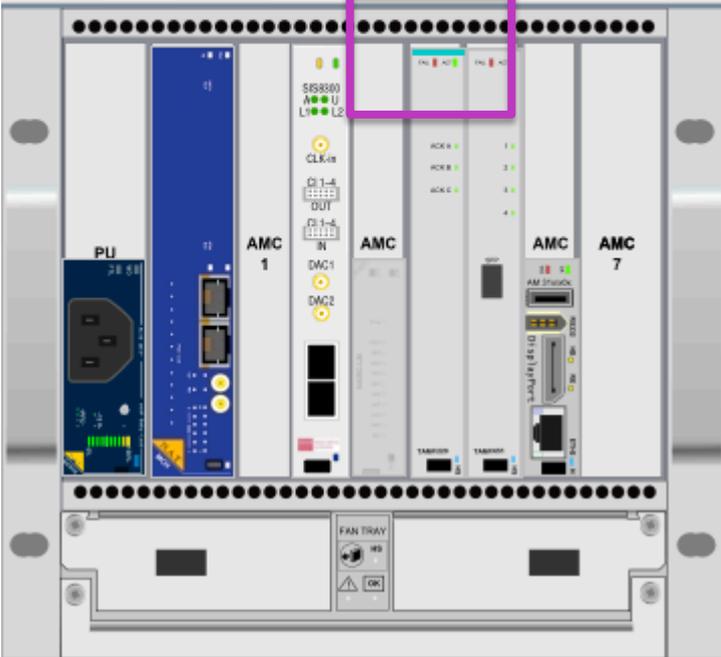
Options

Scan for MicroTCA resources

Connect
Cancel



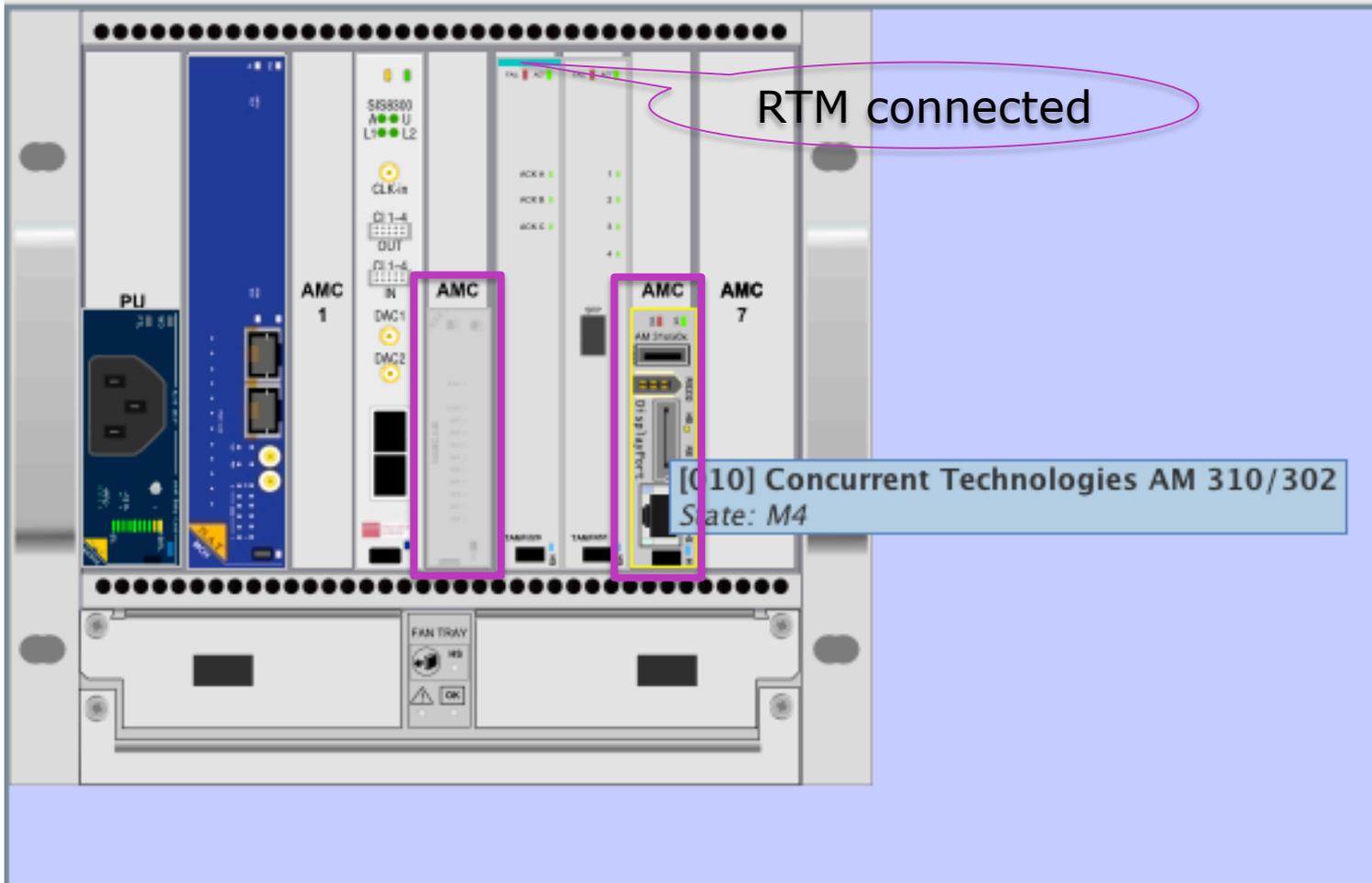
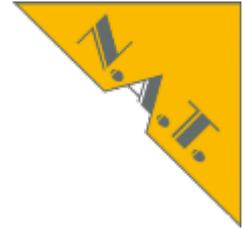
Auto Update 5 seconds



- Resources
- MCH [003] N.A.T. GmbH - Germany NAT-MCH
- AMC [006] Struck Innovative Systeme GmbH SIS8300
- AMC [007] N.A.T. GmbH - Germany NAMC-LM
- AMC [008] TEWS TECHNOLOGIES GmbH TAMC220
- AMC [009] TEWS TECHNOLOGIES GmbH TAMC651
- AMC [010] Concurrent Technologies AM 310/302
- [040] Schrott GmbH uTCA Cooling
- [050] N.A.T. GmbH NAT-PM-AC600
- [060] MCH-Clock
- [061] MCH-PCIe
- MCH [064] N.A.T. GmbH - Germany NAT-MCH-RTM-ComExpress
- RTM [093-> 008] TAMC220-RTM**
- [253] Schrott GmbH Schrott MicroTCA Backplane
- [254] Schrott GmbH Schrott MicroTCA Backplane

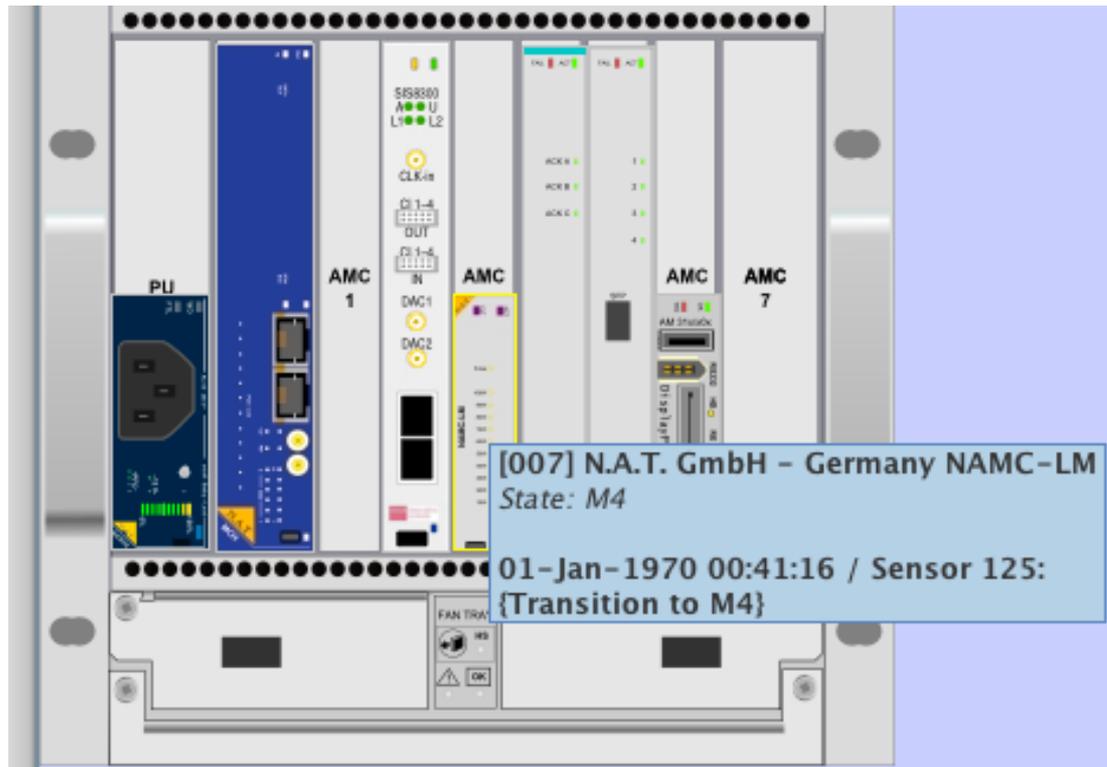
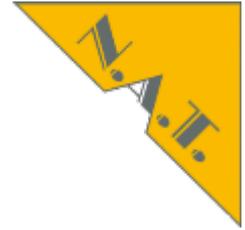
NATView

M-State, Inventory, Sensors, Events



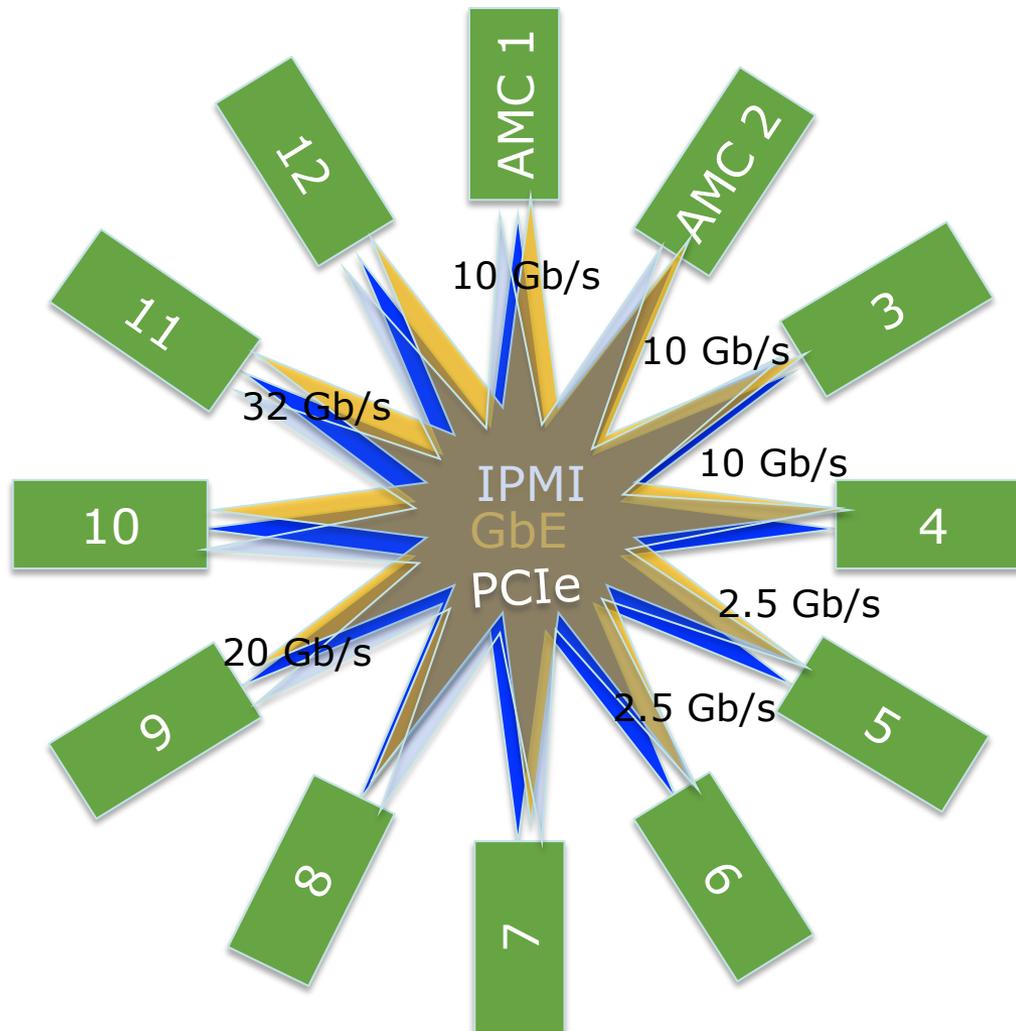
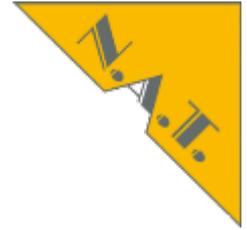
NATView

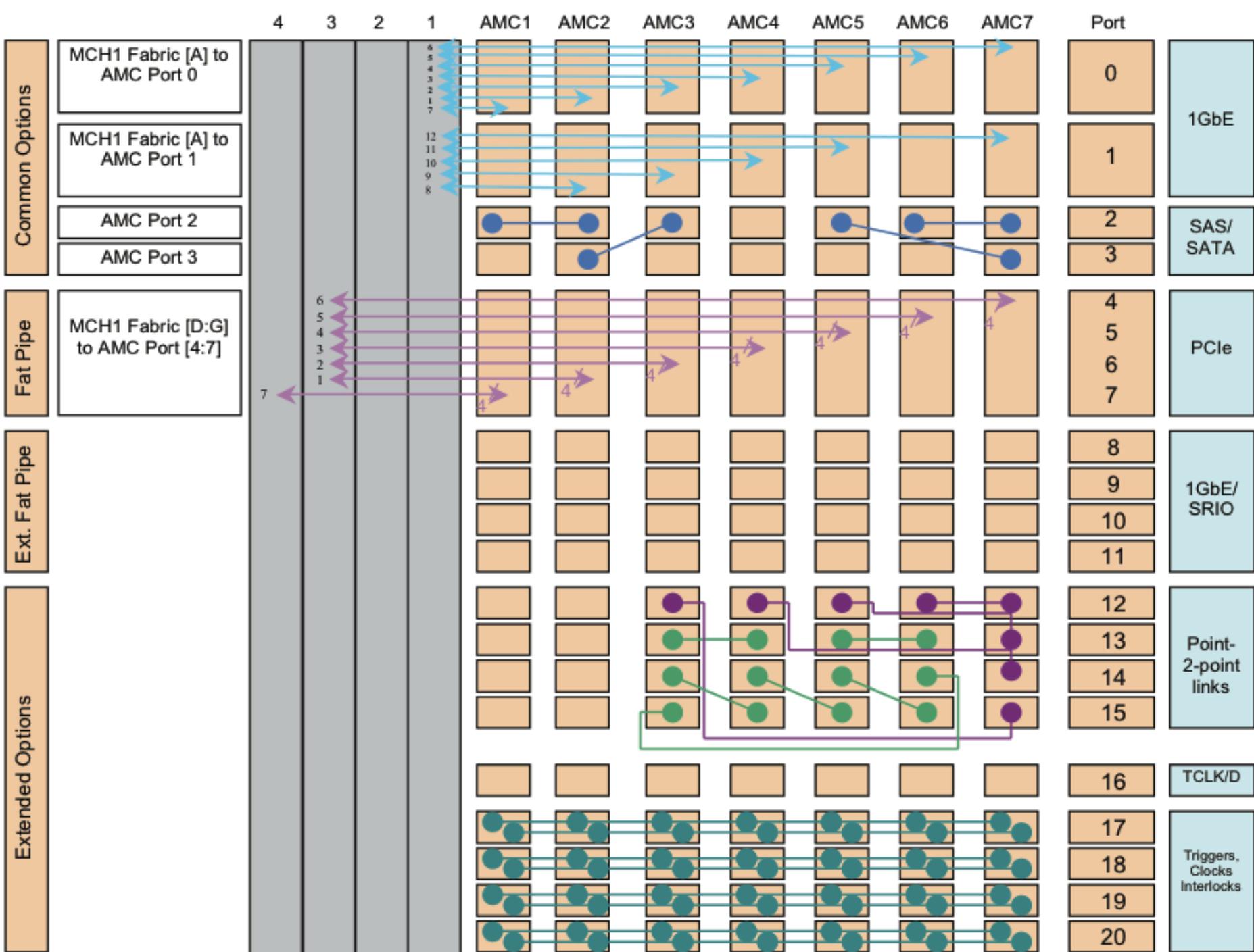
M-State Change



MTCA.4 Tutorial

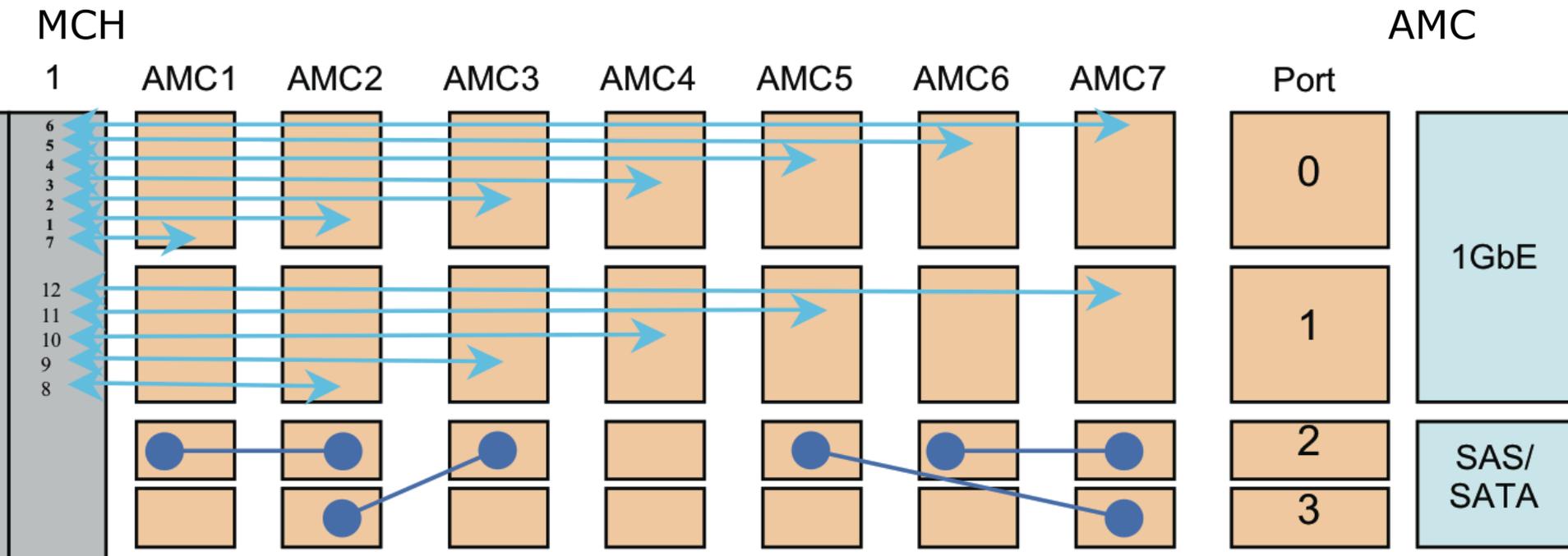
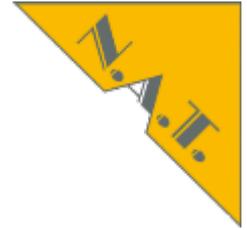
Star Topology: IPMI, PCIe (SRIO, XAUI), GbE

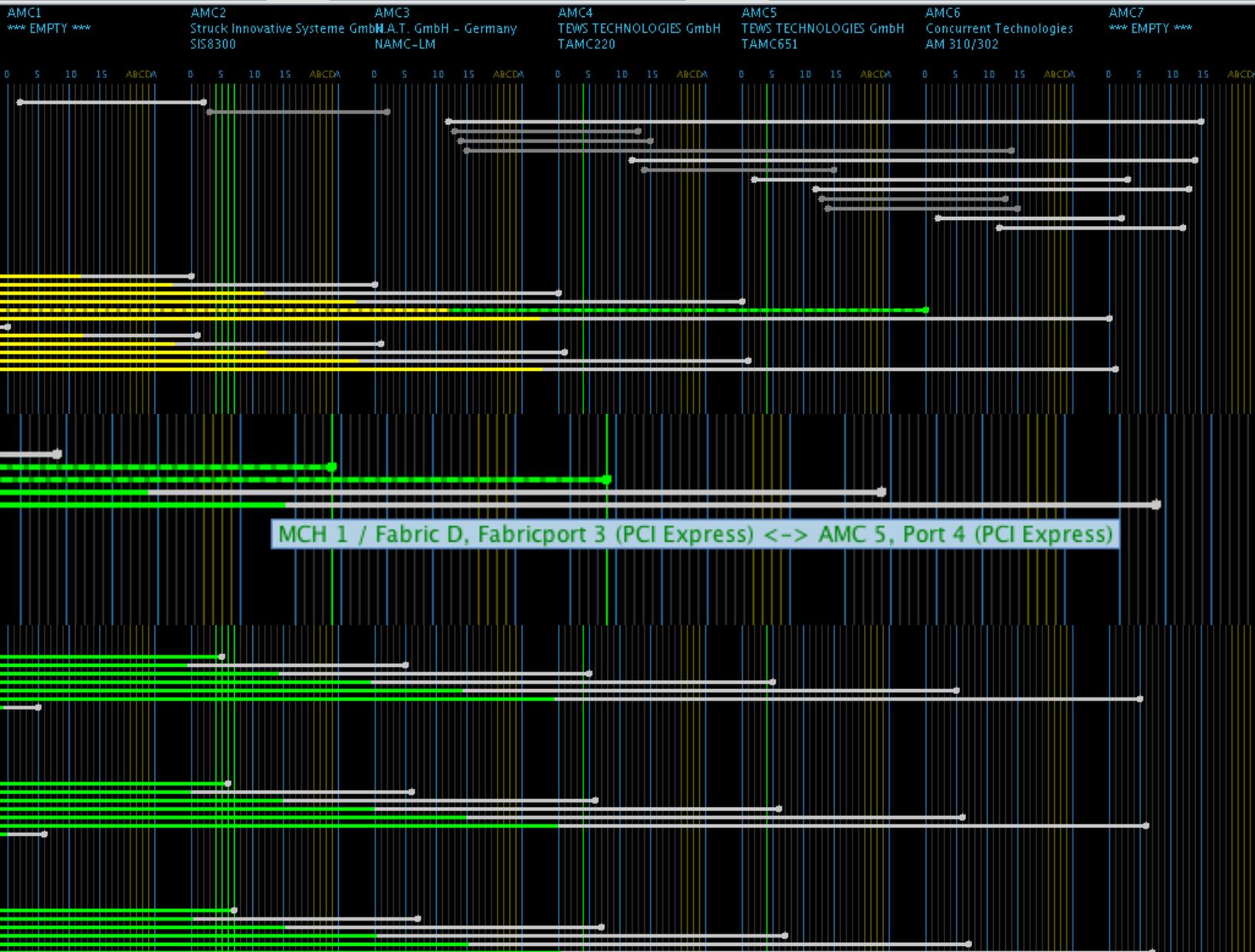




Backplane Topology MTCA.4

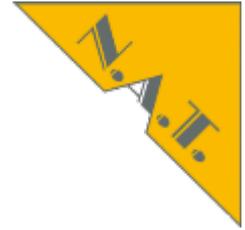
Multiple differential Connections & Transfers





NATView

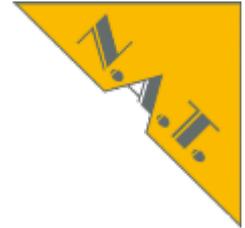
All Events



Category	Rec #	Date Time	FRU-ID/i2c Fru Name	Sens#/LUN/Name Sensortype	Optional Data Description
INFO	1	01-Jan-1970 00:39:12	007 / 0x20 NAMC-LM	125 / 0 "HotSwap" OEM reserved (0xf0)	0xa2 0x1 0x0 {Transition to M2}
INFO	2	01-Jan-1970 00:39:12	007 / 0x20 NAMC-LM	125 / 0 "HotSwap" OEM reserved (0xf0)	0xa3 0x2 0x0 {Transition to M3}
WARN	3	01-Jan-1970 00:39:12	007 / 0x20 NAMC-LM	2 / 0 "???" OEM reserved (0xf3)	0xa1 0x1b 0x7
INFO	4	01-Jan-1970 00:39:13	007 / 0x20 NAMC-LM	125 / 0 "HotSwap" OEM reserved (0xf0)	0xa4 0x3 0x0 {Transition to M4}
INFO	1	01-Jan-1970 00:39:23	007 / 0x20 NAMC-LM	125 / 0 "HotSwap" OEM reserved (0xf0)	0xa5 0x4 0x0 {Transition to M5}
INFO	2	01-Jan-1970 00:39:23	007 / 0x20 NAMC-LM	125 / 0 "HotSwap" OEM reserved (0xf0)	0xa6 0x5 0x0 {Transition to M6}
INFO	3	01-Jan-1970 00:39:23	007 / 0x20 NAMC-LM	2 / 0 "???" OEM reserved (0xf3)	0xa1 0xb 0x7
INFO	4	01-Jan-1970 00:39:23	007 / 0x20 NAMC-LM	125 / 0 "???" OEM reserved (0xf0)	0xa1 0x6 0x0 {Transition to M1}
INFO	1	01-Jan-1970 00:41:15	007 / 0x20 NAMC-LM	125 / 0 "???" OEM reserved (0xf0)	0xa2 0x1 0x0 {Transition to M2}
INFO	2	01-Jan-1970 00:41:15	007 / 0x20 NAMC-LM	125 / 0 "???" OEM reserved (0xf0)	0xa3 0x2 0x0 {Transition to M3}
WARN	3	01-Jan-1970 00:41:15	007 / 0x20 NAMC-LM	2 / 0 "???" OEM reserved (0xf3)	0xa1 0x1b 0x7
INFO	4	01-Jan-1970 00:41:16	007 / 0x20 NAMC-LM	125 / 0 "???" OEM reserved (0xf0)	0xa4 0x3 0x0 {Transition to M4}

NATView

Set Event Filter



Set Event Filter

Fru Filter

FRU 3 FRU 4 FRU 5 FRU 6 FRU 7 FRU 8
 FRU 9 FRU 10 FRU 11 FRU 12 FRU 13 FRU 14
 FRU 40 FRU 41 FRU 42 FRU 43 FRU 50 FRU 51 FRU 60 FRU 61

Sensor Filter (as read by N.A.T. MCH)

Select	FRU ID	Sensor LUN	Sensor Nr.	Sensor Name
<input type="checkbox"/>	3	0	162	Temp CPU
<input type="checkbox"/>	3	0	161	Temp I/O
<input type="checkbox"/>	3	0	160	HotSwap
<input type="checkbox"/>	3	0	159	Version Change
<input type="checkbox"/>	3	0	158	Base 1.2V
<input type="checkbox"/>	3	0	157	Base 1.5V
<input type="checkbox"/>	3	0	156	Base 1.8V
<input type="checkbox"/>	3	0	155	Base 2.5V
<input type="checkbox"/>	2	0	154	Base 3.2V

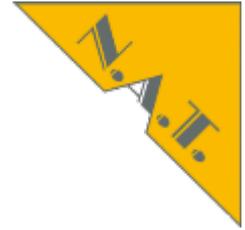
Event Category Filter

Non-recoverable Critical Warning Informational

Clear all filters OK Cancel

NATView

Filtered Events



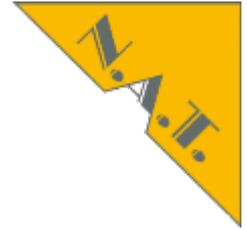
EventViewer

Layout: **Two lines per event** Filter: FRU,Event-Category **Modify filter** **Save...**

Category	Rec #	Date Time	FRU-ID/i2c Fru Name	Sens#/LUN/Name Sensortype	Optional Data Description
WARN	3	01-Jan-1970 00:39:12	007 / 0x20 NAMC-LM	2 / 0 "???" OEM reserved (0xf3)	0xa1 0x1b 0x7
WARN	3	01-Jan-1970 00:41:15	007 / 0x20 NAMC-LM	2 / 0 "???" OEM reserved (0xf3)	0xa1 0x1b 0x7
WARN	3	06-Dec-2014 15:40:50	007 / 0x20 NAMC-LM	2 / 0 "???" OEM reserved (0xf3)	0xa1 0x1b 0x7
WARN	3	06-Dec-2014 15:42:38	007 / 0x20 NAMC-LM	2 / 0 "???" OEM reserved (0xf3)	0xa1 0x1b 0x7

Tutorial about MicroTCA.4

Agenda



- About N.A.T.
- MicroTCA.4 standard and Webpage mtca.eu
- System start of MicroTCA.4 system
- Analysis remotely: inventory, current, revision
 - Command Line Interface
 - NATView
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- Configuration
- Firmware update
- PCIexpress
 - Clustering
 - Hot Plug (hand over to next presentation)



NAT-MCH by N.A.T.

Setup

Base Configuration

Switch

[Age Time](#)

[Port on/off](#)

[Port VLAN](#)

[802.1Q VLAN](#)

[802.1X](#)

[802.1p](#)

[Port Mirroring](#)

[Jumbo Frame](#)

[Link Aggregation](#)

[Rapid Spanning Tree](#)

[Link Status](#)

[BCM5396 counters](#)

[Configure PCIe Virtual](#)

[Switches](#)

Maintenance

[Board Information](#)

[System Information](#)

[Reboot NAT-MCH](#)

[Update MCH](#)

[Change Password](#)

[N.A.T. Webpage](#)

[Home](#)

Board Information

MCH Information

Type of Information	Value
Firmware Version	V2.16 RC (18:40:09 Nov 26 2014)
FPGA Version	V1.9
Microcontroller Version	V1.2
Assembly Option	0x3d - SMA CLK, SRAM, HS Ctrl, 2nd FRT ETH, LED MOD
Board Serial Number	113513-0109
Board Revision	130927
PCB Version	V1.3
Attached SATA	
Management IEEE Address	00:40:42:22:00:6d
Management IP Address	192.168.200.140
Management Subnet Mask	255.255.255.0
Management Broadcast Address	192.168.200.255

Clock Module Information

Type of Information	Value
Clock Module Version	V1.0
Microcontroller Version	V1.3
FPGA Version	V1.15
Assembly Option	HCSL buffer PCIe Clock Gen
Board Serial Number	0145
Board Revision	130829

Setup

Base Configuration

Switch

Age Time

Port on/off

Port VLAN

802.1Q VLAN

802.1X

802.1p

Port Mirroring

Jumbo Frame

Link Aggregation

Rapid Spanning Tree

Link Status

BCM5396 counters

Configure PCIe Virtual
Switches

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NAT-MCH System Information

collecting information about your system
please wait . . .

Please download file(s) below and attach them to your support request!

[nat_mch_sysinfo.txt](#)

Web Interface Release: V1.30 Final (11:35:34 Nov 26 2014)

System Information



Setup

Base Configuration

Switch

- Age Time
- Port on/off
- Port VLAN
- 802.1Q VLAN
- 802.1X
- 802.1p
- Port Mirroring
- Jumbo Frame
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Maintenance

- Board Information
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- Reboot NAT-MCH
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- Home

```
***** Begin of History Buffer *****
ory Buffer *****
formation *****
```

```
*****
*** MCH CM/ShM Firmware V2.16 RC (18:40:09 Nov 26 2014) ***
*****
```

```
NAT-MCH-PHYS HW: M4 PCB V1.3 Rev 130927 FPGA V1.9 AVR 1.2 - sn: 113513-0109 - Rel:130927
      AOPT: 0x3d - SMA CLK, SRAM, HS Ctrl, 2nd FRT ETH, LED MOD
CLK MOD: for Physics PCB V1.0 MC V1.3 FPGA V1.15 (assembly option: HCSL buffer PCIe Clock Gen) - sn: 0145 - Rel:130829
HUB MOD: PCB PCIe-x48 V2.3 MC V1.9 FPGA V1.5 (assembly option -X48 LOSC) - sn: 1066 - Rel:121112 - ChipRev: ba
RTM MOD: ComExpress PCB V1.1 MC V1.0 FPGA V1.1 - sn: 0015 - Rel:121102 - ComEx Name: BC6L14C7Z2ZPAW03
```

```
BSP V1.17 Final (11:35:19 Nov 26 2014)
CM/ShM interface
Diagnose software
TCP/IP V1.1 Final (11:34:59 Nov 26 2014)
Telnet daemon support
compiled with GCC 2.95
instruction cache enabled
data cache enabled
```

```
CPU: Coldfire MCF 54450
DRAM size: 32 MB
```

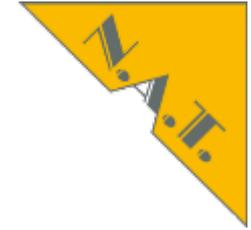
```
***** Board Information *****
```

```
Board Configuration Information:
```

```
-----
Board Identifier: 113513-0109
Serial Number   : 109
Manufacturer ID : 01
Board Code      : 1135
Layout Version  : 1.3
Revision Code   : 130927
CPU             : Coldfire / 200 MHz
DRAM           : 32 MB
SRAM           : 32 KB
EEPROM         : 32 MB
SIO            : 19200 baud (0 default)
IEEE Address    : 00-40-42-22-00-6d
-----
```

```
TCP/IP Configuration:
```

```
nat0 interface configuration:
  IP Address   : 192.168.200.140
  IP Net Mask  : 255.255.255.0
  IP Broadcast : 192.168.200.255
  IP Gateway   : 192.168.178.1
  Port Status  : 0-0-0-0-0-0
```



Ethernet Link Status

Setup

Base Configuration

Switch **BASE 1GbE**

- Age Time
- Port on/off
- Port VLAN
- 802.1Q VLAN
- 802.1X
- 802.1p
- Port Mirroring
- Jumbo Frame
- Link Aggregation
- Rapid Spanning Tree
- Link Status**
- BCM5396 counters
- Configure PCIe Virtual Switches

Maintenance

- Board Information
- System Information
- Reboot NAT-MCH
- Update MCH
- Change Password
- N.A.T. Webpage
- Home

Link States of Ethernet Connections

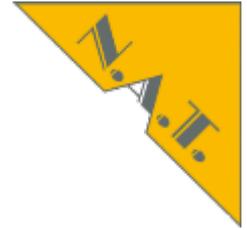
Slot	A M C 1	A M C 2	A M C 2	A M C 3	A M C 3	A M C 4	A M C 4	A M C 5	A M C 5	A M C 6	A M C 7	A M C 7	F R T 1	F R T 2	U P D B	R T M B	C P U 1
Port	0	0	1	0	1	0	1	0	1	0	0	1	-	-	-	-	-
Links	EN	DIS	EN	EN	EN												

	- Link is up
	- Link is down
"EN"	- Interface is enabled
"DIS"	- Interface is disabled

Web Interface Release: V1.30 Final (11:35:34 Nov 26 2014)

Tutorial about MicroTCA.4

Agenda



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NAT-MCH by N.A.T.



Setup

Base Configuration

Switch

- Age Time
- Port on/off
- Port VLAN
- 802.1Q VLAN
- 802.1X
- 802.1p
- Port Mirroring
- Jumbo Frame
- Link Aggregation
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- BCM5396 counters
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Maintenance

- Board Information
- System Information
- Reboot NAT-MCH
- Update MCH
- Change Password
- N.A.T. Webpage
- Home

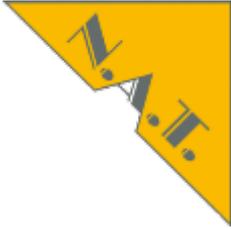
Welcome to the HTML based NAT-MCH configuration tool.

Setup Functions:

- Base Configuration:** - Changes Base Configuration.
- Age Time:** - MAC Table setup: set the aging of the MAC Table Entries.
- Port VLAN:** - Port based VLAN setup and port enable/disable.
- 802.1Q VLAN:** - 802.1Q VLAN setup.
- 802.1X:** - 802.1X security setup.
- 802.1p:** - 802.1p Quality of Service setup.
- Port Mirroring:** - Mirroring of the inbound and outbound traffic on a port
- Jumbo frames:** - Support of the Jumbo frames on a port
- Link Aggregation:** - Support of up to four the Link Aggregation groups
- Rapid Spanning** - Support of the Rapid Spanning Tree by 1GbE-Switch
- IGMP Snooping** - Support of the IGMP Snooping by 10GbE-Switch (FM4000 only)
- Link Status:** - Show the current status of the Ethernet links
- Counter Statistic:** - Show the counter statistic of the Ethernet switch

Maintenance Functions:

- Script Management:** - Backup/Restore settings to/from flash memory or file.
- Board Information:** - Provides hardware information of this NAT-MCH.
- System Information:** - Collect hardware information of this system.
- Reboot NAT-MCH:** - Allows rebooting over the Web-Interface.
- Update MCH:** - Allows updating several components over the Web-Interface.
- Change/Reset Password:** - Allows changing or resetting of the MCH Password over the Web-Interface.
- N.A.T. Webpage:** - Opens the N.A.T. webpage in a new browser window.
- Home:** - Shows this page.



NAT-MCH by N.A.T.

Setup

Set generic MCH Password

Base Configuration

- Switch BASE 1GbE
- Age Time
- Port on/off
- Port VLAN
- 802.1Q VLAN
- 802.1X
- 802.1p
- Port Mirroring
- Jumbo Frame
- Link Aggregation
- Rapid Spanning Tree
- Link Status
- BCM5396 counters
- Configure PCIe Virtual Switches

i The Changing of the MCH password has effect on the login of the telnet session.

Current Password Reset MCH Password to default (user: root password: nat)

New Password

Confirm New Password

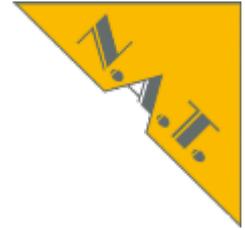
Web Interface Release: V1.30 Final (11:35:34 Nov 26 2014)

Maintenance

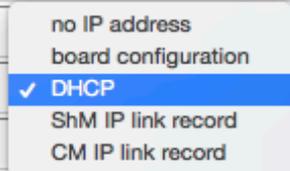
- Board Information
- System Information
- Reboot NAT-MCH
- Update MCH
- Change Password**
- N.A.T. Webpage
- Home

Web Interface

Source of IP address

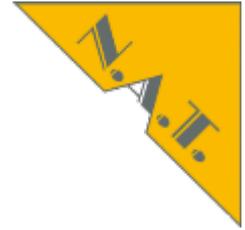


Change MCH Configuration

MCH global parameter	Configuration
remote interfaces:	
Management interface at GbE port	disabled
RMCP access	enabled
telnet access	enabled
WEB access	enabled
IP address source for management port	 <ul style="list-style-type: none">no IP addressboard configuration✓ DHCPShM IP link recordCM IP link record
IP address source for GbE port	
RMCP session activity timeout minutes	<input type="text" value="0"/> min
RMCP session activity timeout seconds	<input type="text" value="60"/> sec
default fan level	<input type="text" value="30"/> percent
MCH configuration flags:	
enable backward compatibility V2.4	no
Enable alternative cooling scheme	no
Control rear transition module fans	yes
PM Assignment strategy	strict

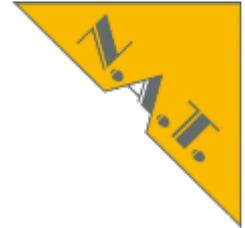
Emergency Shutdown

Only switch of the faulty FRU

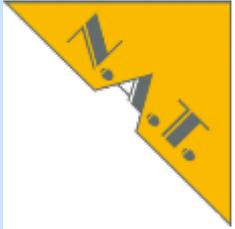


Shelf manager parameter	Configuration
configuration flags:	
allow shelf FRU invalid	yes <input type="button" value="v"/>
temperature management	disabled FRU on critical event
emergency shutdown	✓ FRU on non recoverable event <input type="button" value="v"/> SYSTEM on critical event
Send SEND_MSG confirmation to SMS	SYSTEM on non recoverable event
use external shelf manager	no <input type="button" value="v"/>

Set E-keying Debug Flag AMC in Slot 2 (FRU-ID 6)



Carrier manager parameter	Configuration
carrier number default	0
quiesced event timeout	10 SEC
configuration flags:	
allow carrier FRU invalid	yes
overrule carrier FRU	no
shutdown system if MCH goes down	no
enable Clock E-keying	no
debug flags:	
IPMI	disabled
FRU	disabled
E-keying	disabled
sensor	disabled
event	disabled
power module	disabled
cooling unit	disabled
CM/ShM interface	disabled
FRU communication to debug (0=all)	6

**Ethernet switch parameter****Configuration**

configuration source

no configuration
load from FLASH

Ignore Backplane FRU Info

Clock module parameter**Configuration**

configuration source

no configuration

PCIe parameter**Current Configuration****configuration flags:**

upstream slot power up delay

15 sec

PCIe hot plug delay for AMCs

0 sec

hot plug support

enabled

PCIe early ekey (before payload)

disabled

Use PCIe on MCH-RTM(disable AMC12)

yes

Time Protocol/SNTP parameter**Current Configuration**

Time server IP

195 . 145 . 119 . 188

'Check for Time' delay minutes

0 min

'Check for Time' delay hours

0 h

local time offset

1 h

configuration flags:

SNTP or Time Protocol

Time Protocol

Time client

enabled

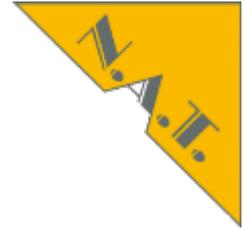
DHCP parameter**Current Configuration**

Host name

MTCA4TRAINING

Ethernet Analysis with Wireshark

Mirroring inside GbE Port to Front GbE



NAT-MCH by N.A.T.



Setup

Base Configuration

- Switch BASE 1GbE
- Age Time
- Port on/off
- Port VLAN
- 802.1Q VLAN
- 802.1X
- 802.1p
- Port Mirroring**
- Jumbo Frame
- Link Aggregation
- Rapid Spanning Tree
- Link Status
- BCM5396 counters
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Maintenance

- Board Information
- System Information
- Reboot NAT-MCH
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- Home

Port Mirroring Configuration

FRT_1 Capture port

Slot	A M C 1	A M C 2	A M C 2	A M C 3	A M C 3	A M C 4	A M C 4	A M C 5	A M C 5	A M C 6	A M C 7	A M C 7	F R T 1	F R T 2	U P D B	R T M B	C P U 1
Port	0	0	1	0	1	0	1	0	1	0	0	1	-	-	-	-	-
Ingress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>										
Egress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Apply Discard

Deactivate

Web Interface Release: V1.30 Final (11:35:34 Nov 26 2014)



NAT-MCH by N.A.T.

Setup

Base Configuration

Switch **BASE 1GbE**

- Age Time
- Port on/off
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Maintenance

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- Reboot NAT-MCH
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Change MCH Configuration

MCH global parameter	Configuration
remote interfaces:	
Management interface at GbE port	disabled
RMCP access	enabled
telnet access	enabled
WEB access	enabled
IP address source for management port	DHCP
IP address source for GbE port	no IP address
RMCP session activity timeout minutes	0 min
RMCP session activity timeout seconds	60 sec
default fan level	30 percent
MCH configuration flags:	
enable backward compatibility V2.4	no
Enable alternative cooling scheme	no
Control rear transition module fans	yes
PM Assignment strategy	strict

Shelf manager parameter	Configuration
configuration flags:	
allow shelf FRU invalid	yes
temperature management	enabled
emergency shutdown	FRU on non recoverable event
Send SEND_MSG confirmation to SMS	disabled
use external shelf manager	no

Carrier manager parameter	Configuration
---------------------------	---------------

NAT-MCH by N.A.T.



Setup

Base Configuration

Switch **BASE 1GbE**

- Age Time
- Port on/off
- Port VLAN
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Maintenance

- Board Information
- System Information
- Reboot NAT-MCH
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- Home

Ethernet switch parameter	Configuration
configuration source	no configuration
Ignore Backplane FRU Info	no

Clock module parameter	Configuration
configuration source	no configuration

PCIe parameter	Current Configuration
configuration flags:	
upstream slot power up delay	15 sec
PCIe hot plug delay for AMCs	0 sec
hot plug support	enabled
PCIe early ekey (before payload)	disabled
Use PCIe on MCH-RTM(disable AMC12)	yes

Time Protocol/SNTP parameter	Current Configuration
Time server IP	195 . 145 . 119 . 188
'Check for Time' delay minutes	0 min
'Check for Time' delay hours	0 h
local time offset	248 h
configuration flags:	
SNTP or Time Protocol	Time Protocol
Time client	enabled

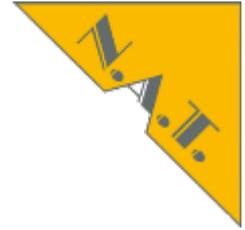
DHCP parameter	Current Configuration
Host name	MTCA4TRAINING

Save

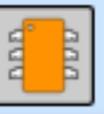
Discard Changes

MCH Configuration

Save, Restore, Extend



Import configuration from a local file to the MCH flash memory.



Export current running configuration to a local file on your computer.



Export saved configuration on the MCH flash memory to a local file on your computer.



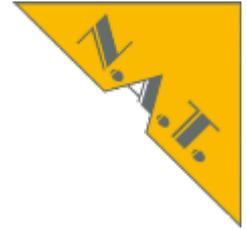
Save current running configuration to the MCH flash memory



Delete saved configuration on the MCH flash memory.

Tutorial about MicroTCA.4

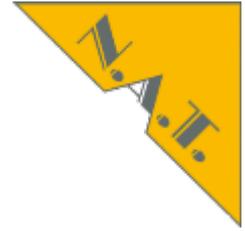
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- Firmware update
- PCIexpress
 - Clustering
 - Hot Plug (hand over to next presentation)

Firmware Update

NAT-MCH: Download latest firmware



Server: ftp.nateurope.co Benutzernamen: natmch Passwort: Port: Verbinden

Antwort: 150 Here comes the directory listing.
Antwort: 226 Directory send OK.
Status: Berechne Zeitonenabweichung des Servers...
Befehl: MDTM MCH-M4 LUFA USBtoSerial.zip
Antwort: 213 20140320150605
Status: Zeitonenabweichungen: Server: 0 Sekunden. Lokal: 7200 Sekunden. Differenz: 7200 Sekunden.
Status: Anzeigen des Verzeichnisinhalts abgeschlossen

Lokal: /Users/vd/Documents/NAT/NAT Software/NAT-MCH-Firmware/

- NAT-MCH-Firmware
 - MCH CLI Kommandos
 - MCH Diagemenu
 - bin
 - mc_fw_2143
 - mch_fw_V215
- NAT-MCH-PHYS-SW

Server: /

Dateiname	Dateigröße	Dateityp	Zuletzt geändert
..			
MCH CLI Kommandos		Verzeichnis	13.01.2012 17:55:00
MCH Diagemenu		Verzeichnis	25.08.2010 14:39:53
bin		Verzeichnis	01.07.2014 15:02:30
mc_fw_2143		Verzeichnis	28.05.2014 09:47:32
mch_fw_V215		Verzeichnis	14.07.2014 10:50:09
.DS_Store	15364	Datei	12.08.2014 08:47:04
mch_fw_V214_1.zip	10245497	PC ZIP Archive	05.08.2013 12:09:41
mch_fw_V215.zip	12039834	PC ZIP Archive	01.07.2014 16:22:38
nat-mch_man_base_HWv34_v28.pdf	523343	Portable Docume...	28.04.2014 14:30:39

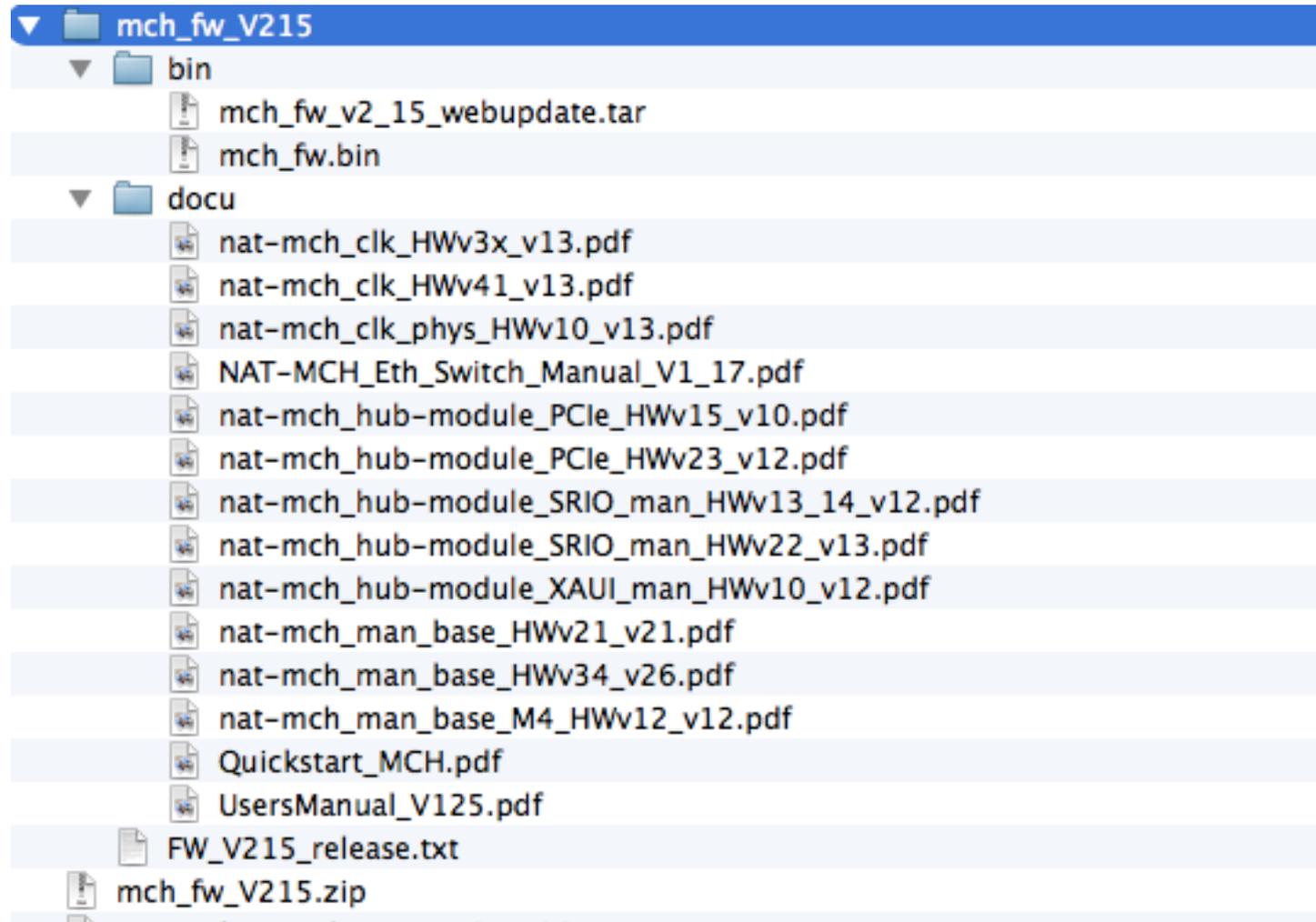
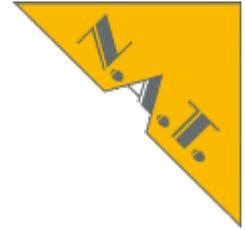
4 Dateien und 5 Verzeichnisse. Gesamtgröße: 22824038 Bytes

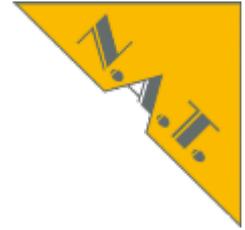
Dateiname	Dateigröße	Dateityp	Zuletzt geändert
..			
natview_V2.16.zip	7107267	PC ZIP Arc...	31.07.2014 1...
natview_V2.13.zip	6509000	PC ZIP Arc...	24.07.2014 1...
nat_mch_usb_32+64bit_windrv.zip	782536	PC ZIP Arc...	18.03.2014 1...
mch_fw_V215.zip	12039834	PC ZIP Arc...	01.07.2014 1...
mch_bl_V26.zip	127104	PC ZIP Arc...	26.03.2013
README_FIRST.txt	627	ASCII Text	26.03.2013
Quickstart_MCH.pdf	243818	Portable ...	08.04.2014 1...
NATVIEW_Readme.txt	268	ASCII Text	24.07.2014 1...
MCH-M4 LUFA USBtoSerial.zip	1222	PC ZIP Arc...	20.03.2014 1...

1 Datei ausgewählt. Gesamtgröße: 12039834 Bytes

Firmware Update

NAT-MCH: Unzip firmware (Password!)





Firmware Update

NAT-MCH via Command Line Interface

- bs
 - boot string
 - loads .bin file from a tftp server
 - recommended for compatibility check or quick tests
 - *example see during training*
- update_firmware
 - update firmware in flash
 - loads .bin file, which can be downloaded from NAT FTP-Server

```
nat> update_firmware

Update firmware into FLASH at offset 0x00100000:

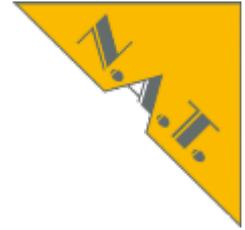
-----
Enter host and file name [IP:FILENAME]:
firmware> 192.168.1.225:ftp_folder/mch_fw_215.bin
```

- update_fpga
 - update FPGA firmware (only on request of NAT engineering, NAT engineering provides files)

HINT: Ensure file protections on the TFTP server are set correctly and firewalls do not prevent the MCH from downloading the image.

MCH Firmware Update

Web Interface



Setup

Base Configuration

Switch

Age Time

Port on/off

Port VLAN

802.1Q VLAN

802.1X

802.1p

Port Mirroring

Jumbo Frame

Link Aggregation

Rapid Spanning Tree

Link Status

BCM5396 counters

Configure PCIe Virtual

Switches

Maintenance

Board Information

System Information

Reboot NAT-MCH

Update MCH

Change Password

N.A.T. Webpage

Home

Firmware Update for NAT-MCH

• Upload TAR archive for NAT-MCH:

Select file:

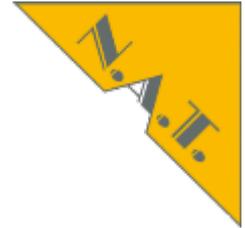
Notes:

Select only a .tar-file here, do not select a .zip or .bin file.

After clicking Upload you can select the components to be updated.

MCH Firmware Update

Web Interface



Firmware Update for NAT-MCH

Device	Current FW version	Update FW version	Update this device?
Base board			
Firmware	V2.16	V2.16	<input type="checkbox"/>
Clock module			
Hub module			
PCIe Atmel	V1.9	V1.9	<input type="checkbox"/>
PCIe HUB Module FPGA	V1.5	V1.5	<input type="checkbox"/>

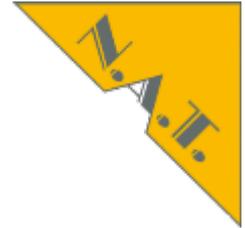


**DO NOT POWER-OFF OR RESTART
THE DEVICE DURING UPDATE.**
When Update is complete, a power cycle has to be done.
Are you sure, that you want to continue?

Update

MCH Firmware Update

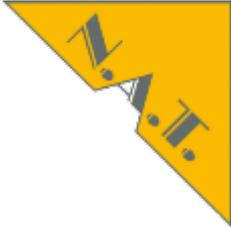
Web Interface



Device	Current FW version	Update FW version	Update this device?
Base board			
Firmware	V2.15	V2.16	<input checked="" type="checkbox"/>
Clock module			
Hub module			
PCIe Atmel	V1.9	V1.9	<input type="checkbox"/>
PCIe HUB Module FPGA	V1.5	V1.5	<input type="checkbox"/>

DO NOT POWER-OFF OR RESTART THE DEVICE DURING UPDATE.

When Update is complete, a power cycle has to be done.



MCH Firmware Update

Web Interface & Command Line Interface

```

CoolTerm_0.stc
New Open Save Connect Disconnect Clear Data Options View Hex Help
ee_sErase: erasing sector 17 of bank 0
ee_sErase: erasing sector 18 of bank 0
ee_sErase: erasing sector 19 of bank 0
ee_sErase: erasing sector 1a of bank 0
ee_sErase: erasing sector 1b of bank 0
ee_sErase: erasing sector 1c of bank 0
ee_sErase: erasing sector 1d of bank 0
ee_sErase: erasing sector 1e of bank 0
ee_sErase: erasing sector 1f of bank 0
ee_sErase: erasing sector 20 of bank 0
ee_sErase: erasing sector 21 of bank 0
ee_sErase: erasing sector 22 of bank 0
ee_sErase: erasing sector 23 of bank 0
ee_sErase: erasing sector 24 of bank 0
ee_sErase: erasing sector 25 of bank 0
ee_sErase: erasing sector 26 of bank 0
ee_sErase: erasing sector 27 of bank 0
ee_sErase: erasing sector 28 of bank 0
ee_sErase: erasing sector 29 of bank 0
ee_sErase: erasing sector 2a of bank 0
ee_sErase: erasing sector 2b of bank 0
ee_sErase: erasing sector 2c of bank 0
ee_sErase: erasing sector 2d of bank 0
ee_sErase: erasing sector 2e of bank 0
ee_sErase: erasing sector 2f of bank 0
ee_sErase: erasing sector 30 of bank 0
ee_sErase: erasing sector 31 of bank 0
ee_sErase: erasing sector 32 of bank 0
ee_sErase: erasing sector 33 of bank 0
ee_sErase: erasing sector 34 of bank 0
ee_sErase: erasing sector 35 of bank 0
ee_sErase: erasing sector 36 of bank 0
ee_sErase: erasing sector 37 of bank 0
ee_sErase: erasing sector 38 of bank 0
ee_sErase: erasing sector 39 of bank 0
ee_sErase: erasing sector 3a of bank 0
ee_sErase: erasing sector 3b of bank 0
ee_sErase: erasing sector 3c of bank 0
ee_sErase: erasing sector 3d of bank 0
program EEPROM 0xd0100000-0xd03df7d0 ...
ee_wProm(addr=0xd0100000, buffer=0x40c5ca04, size=3012560) ... 100 %
verify EEPROM 0xd0100000-0xd03df7d0 ... passed
.....
usbmodem1421 / 19200 8-N-1
Connected 00:06:52

```

Firmware Update for NAT-MCH

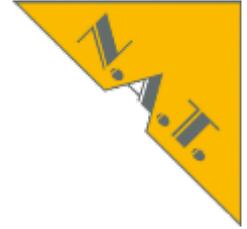
**DO NOT POWER-OFF OR RESTART THE MCH
UNTIL AN UPDATE STATUS IS DISPLAYED FOR EACH DEVICE
THIS MAY TAKE UP TO 5 MINUTES**

Device	Update Status
MCH Firmware	Updated MCH Firmware successfully

All components updated successfully. You should power cycle the system now to restart all components.

HPM

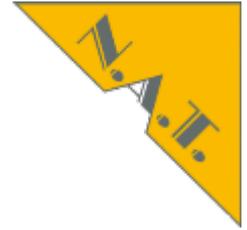
Overview



- What is HPM?
 - HPM = Hardware Platform Management
 - PICMG (PCI Industrial Computer Manufacturers Group)
 - HPM.1: basic update protocol
 - HPM.2: extended update
- Purpose
 - Remote Firmware Update
 - Automated
 - Reliable
 - Safe

HPM

Implementations



- **Ipmitool**

- Swiss Army Knife
- Complicated to use
- Requires a lot of background knowledge



- Example: Firmware update of NAMC-LM in AMC slot 3:
I2C 0x76 = FRU7 = AMC3

- ipmitool 1.6

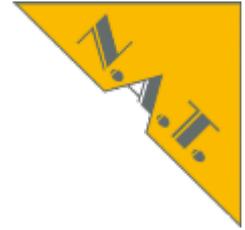
```
➤ ipmitool.exe -H 192.168.1.254 -A none -B 0 -b 7 -T 0x82 -t  
0x76 hpm upgrade .\namc_lm.hpm
```

- ipmitool 1.8

```
➤ ipmitool -H 192.168.1.41 -A none 7 hpm upgrade .\namc_lm.hpm
```

Powermodule Update

FRU update

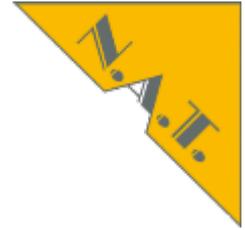


- NATview

The screenshot displays the NATview application interface. The main window is titled 'HPM Update' and shows 'Step 1: Choose your HPM File'. A 'Browse...' button is visible. An 'Open HPM file' dialog box is open, showing a file list with columns for 'Name' and 'Date Modified'. The file 'pm_ac600_V11.hpm' is selected. Below the main window, a 'GENERAL' information panel is visible, showing details for the selected file. A 'Check Result' window is partially visible on the right.

Name	Date Modified
namc_lm.hpm	Mittwoch, 4. Dezember 2013 12:46
pm_ac600_V11.hpm	Donnerstag, 30. Januar 2014 14:53

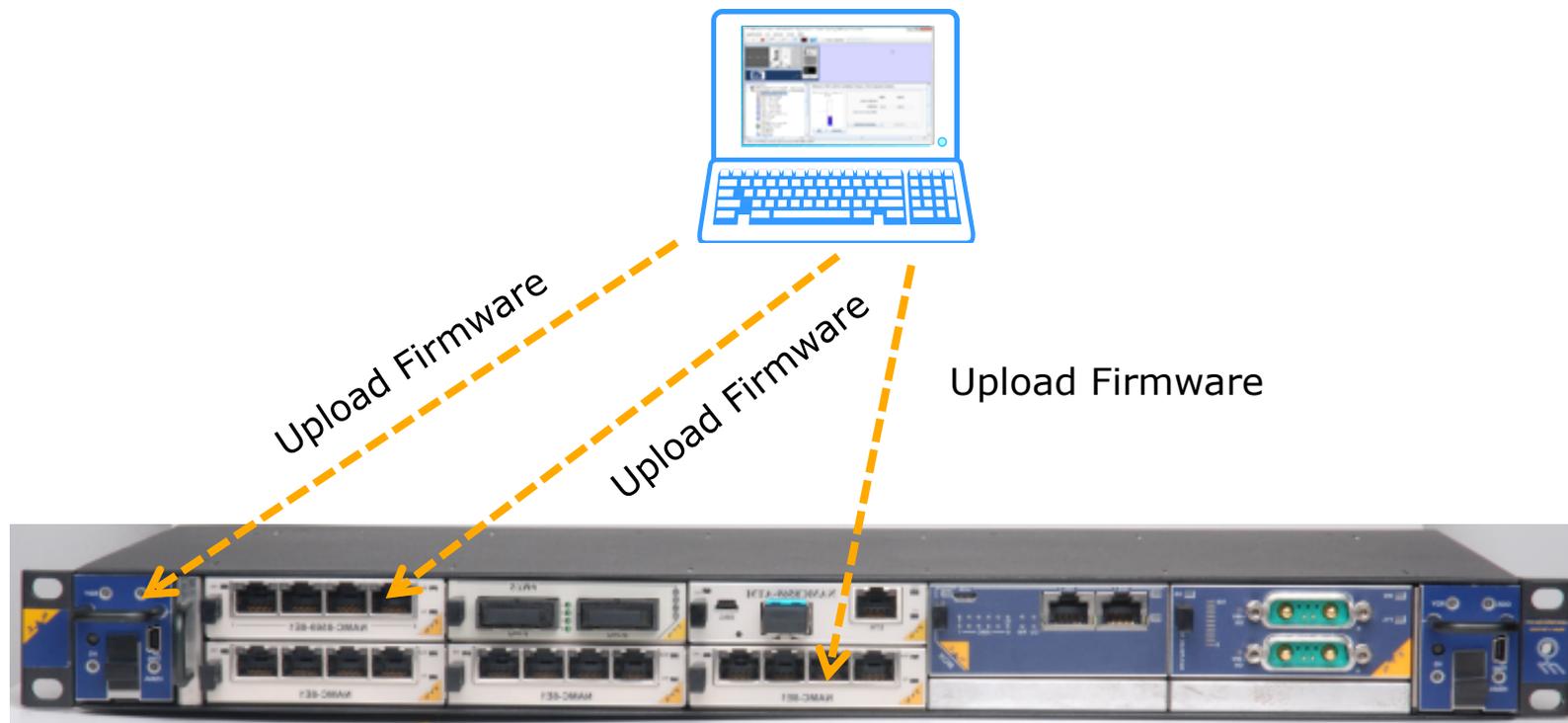
GENERAL	
Creation date/time:	Thu Jan 01 01:00:00 CET 1970
Image file valid?	yes
Read MD5 digest	afce41c7ab485debae3a4524d8bcbcd8
Signature valid?	yes
Device ID	0x0
Manufacturer ID	0x6c78
Product ID	0xc08
Earliest comp. revision	0.01
Firmware revision	1.00
OEM data length	0



HPM with NATview

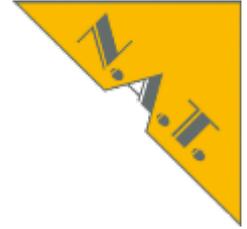
Multiple Card Update (1/2)

- 1. Transfer firmware to all selected targets,
 - one by one.

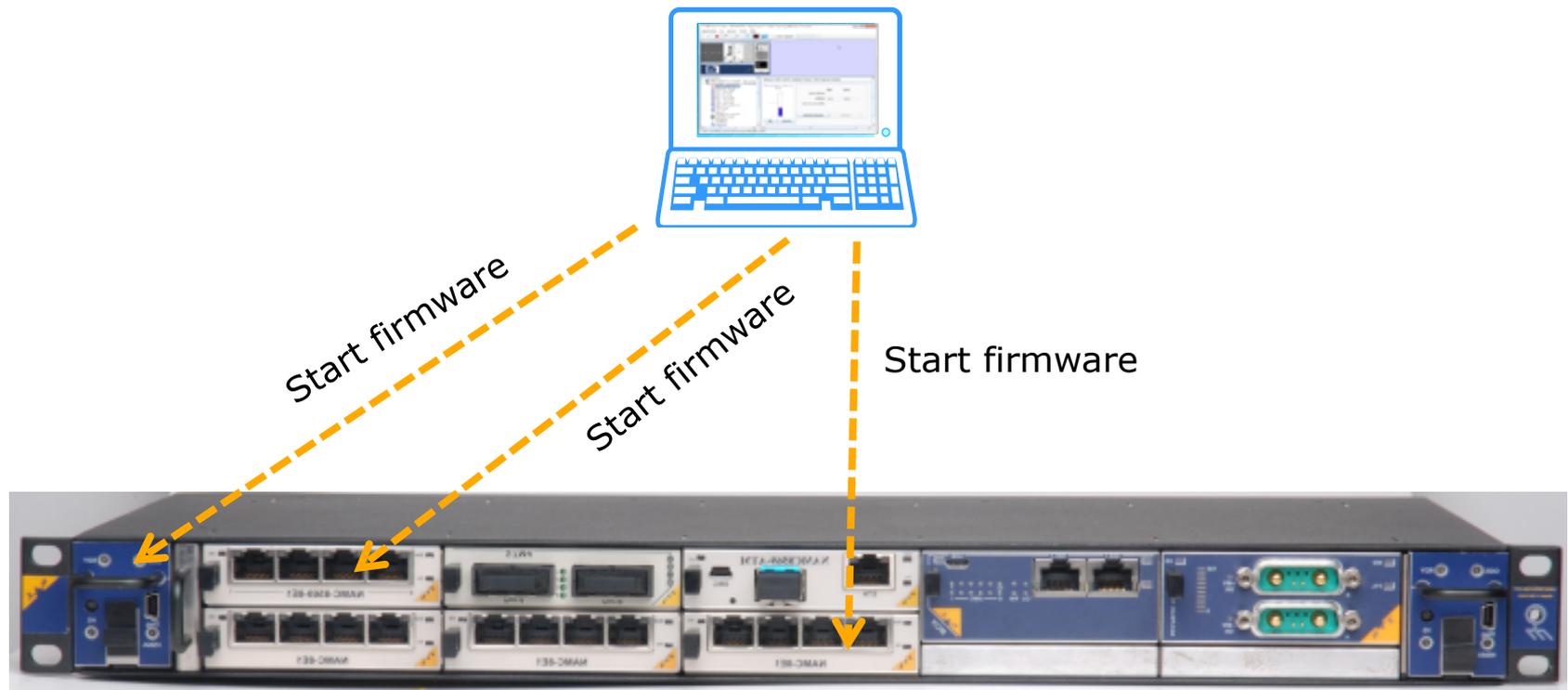


HPM with NATview

Multiple Card Update (2/2)



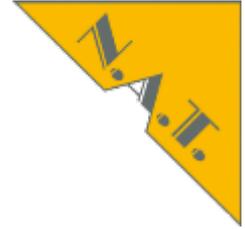
- 2. Start firmware together



=> Minimizes overall system downtime

Backplane Update

FRU update



- Command Line Interface: diag

```
nat> diag
FPGA already initialized
[ 0 ] : no action (unsupported)
[ 1 ] : (submenu) INFO menu
[ 2 ] : (submenu) UPDATE menu
[ 3 ] : (submenu) I2C menu
DIAG (RET=0/0x0): 2
[ 0 ] : no action (unsupported)
[ 1 ] : FPGA update menu
[ 2 ] : show backplane EEPROM content
[ 3 ] : update backplane EEPROM
[ 4 ] : update FRU DATA
[ q ] : q: quit submenu
```

- ipmitool for FRU 253

```
ipmitool -H 192.168.1.41 -P "" fru write 253 11850011ACBIN-carrier_8A.img
```

- NATview
 - see next slide

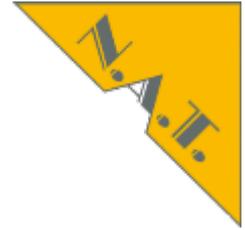
Resources



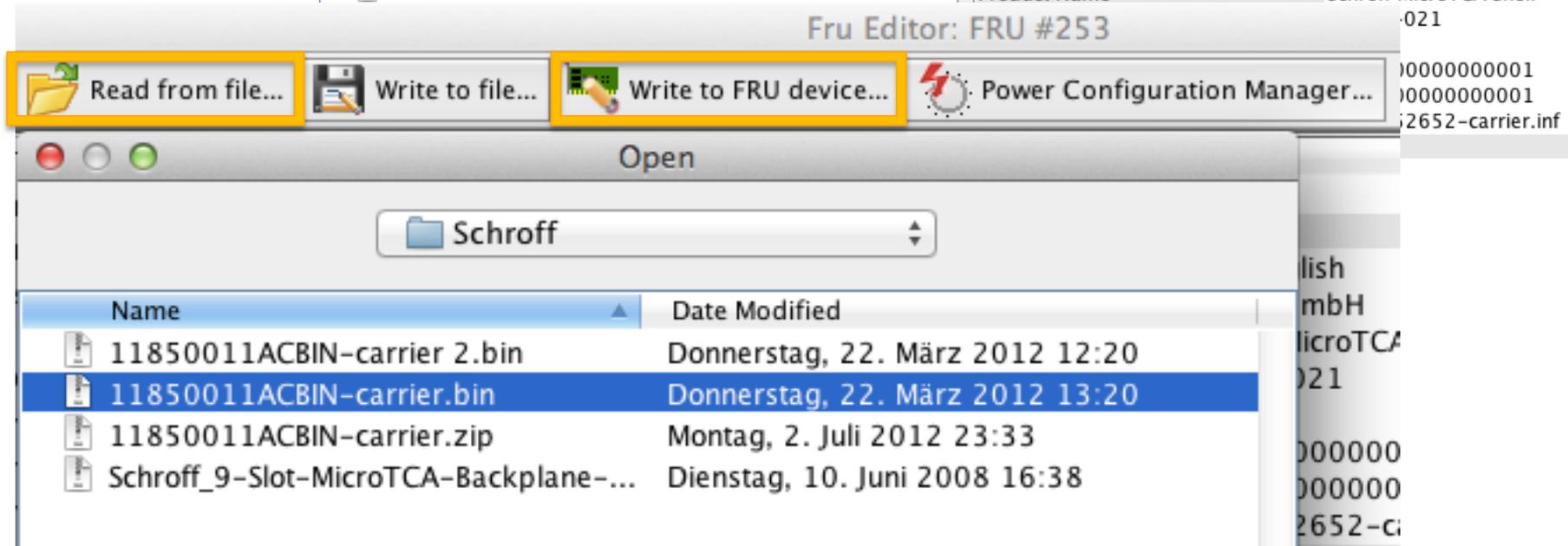
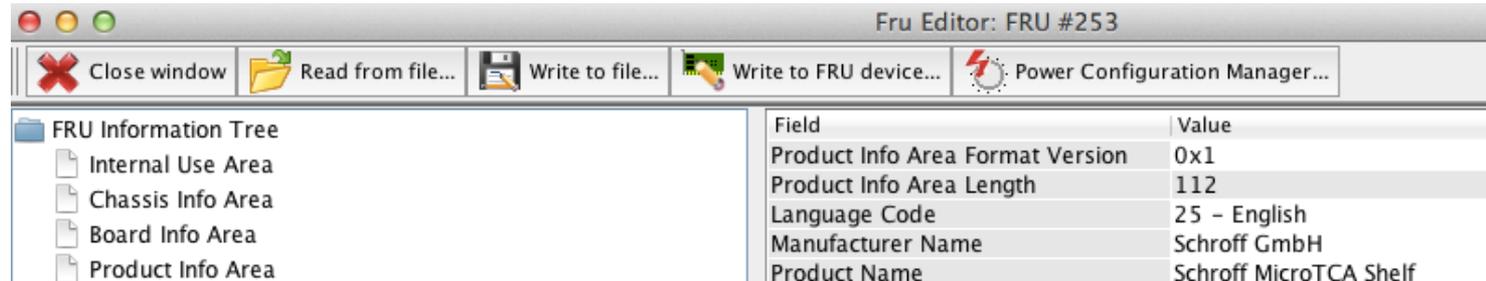
[253] Schroff GmbH Schroff MicroTCA Backplane

Backplane Update

FRU update

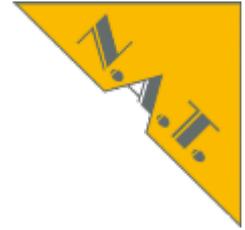


- Command Line Interface: diag
- ipmitool
- NATview



Maintenance: Backplane

Power Configuration Management



- Start for FRU 253 (Backplane) the NATview FRU-Editor
- Klick on Power Configuration Manager

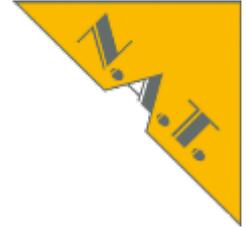
Resources

[253] Schroff GmbH Schroff MicroTCA Backplane

Field	Value
Product Info Area Format Version	0x1
Product Info Area Length	112
Language Code	25 - English
Manufacturer Name	Schroff GmbH
Product Name	Schroff MicroTCA Shelf
Product Part Model Number	11850-021
Product Version	01
Product Serial Number	0000000000000001
Asset Tag	0000000000000001
Fru File ID	6399852652-carrier.inf
Product Info Area Checksum (zero ...	0xa3

Tutorial about MicroTCA.4

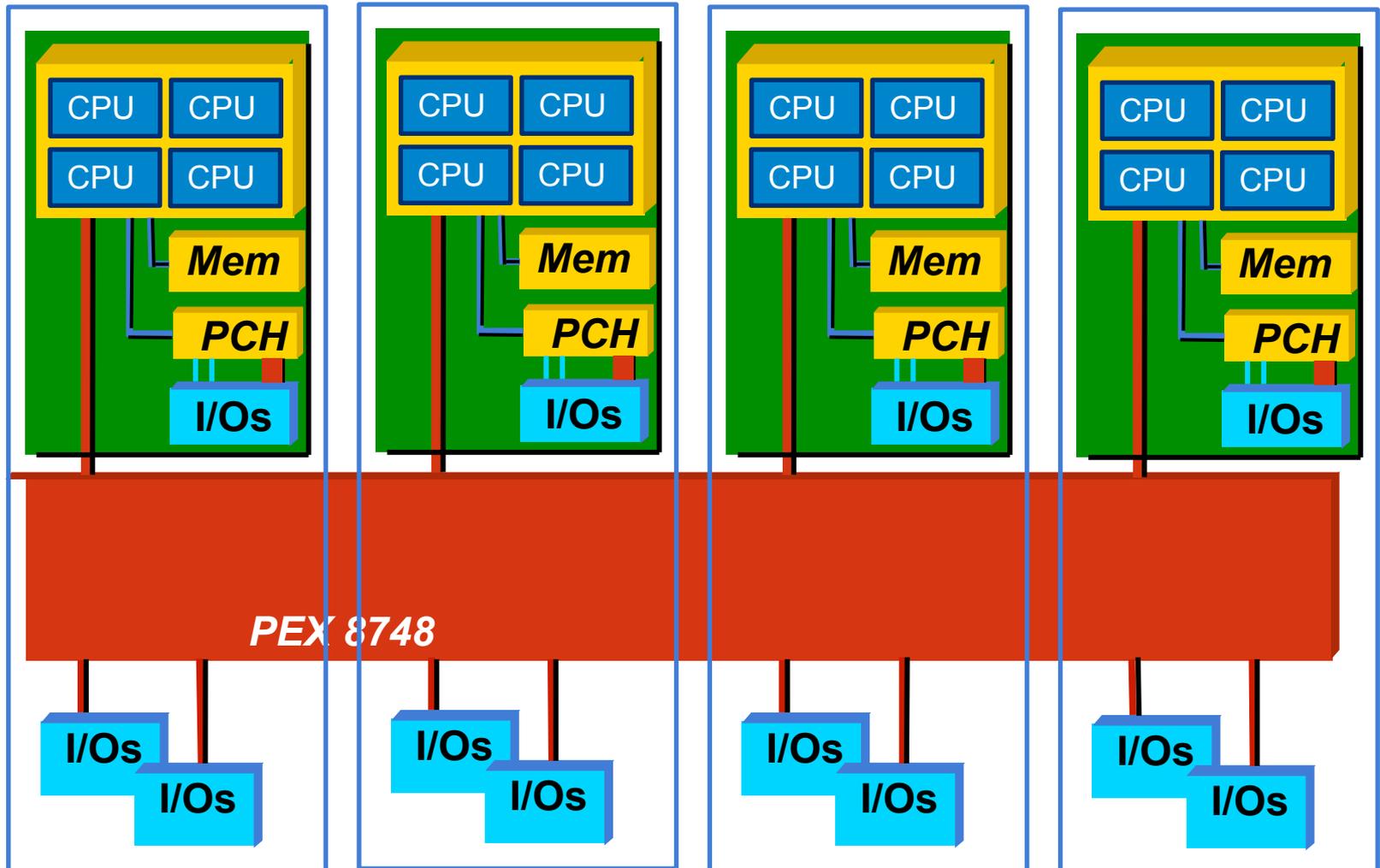
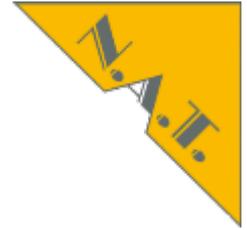
Agenda



- About N.A.T.
- MicroTCA.4 standard and Webpage mtca.eu
- System start of MicroTCA.4 system
- Analysis remotely: inventory, current, revision
 - Command Line Interface
 - NATView
 - Web interface
- Configuration
- Firmware update
- PCIexpress
 - Clustering
 - Hot Plug (hand over to next presentation)

PEX8748

Multi-Host Configuration: up to 6 Cluster





NAT-MCH by N.A.T.

Setup

Base Configuration

Switch **BASE 1GbE**

Age Time

Port on/off

Port VLAN

802.1Q VLAN

802.1X

802.1p

Port Mirroring

Jumbo Frame

Link Aggregation

Rapid Spanning Tree

Link Status

BCM5396 counters

Configure PCIe Virtual Switches

Maintenance

Board Information

System Information

Reboot NAT-MCH

Update MCH

Change Password

N.A.T. Webpage

Home

PCIe Virtual Switch configuration

Select Host AMCs (Upstream) for each virtual switch that shall be enabled first.

Select Host AMCs (Non-Transparent Upstream) for each virtual switch that shall be enabled afterwards.

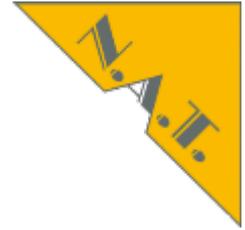
Select which AMCs shall be connected to each virtual switch as downstream in the end.

Virtual Switch	Upstream AMC	NT- Upstream AMC	A M C 1 4..7	A M C 2 4..7	A M C 3 4..7	A M C 4 4..7	A M C 5 4..7	A M C 6 4..7	A M C 7 4..7
none			<input type="radio"/>						
Virtual Switch 0	RTM	- none -	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>				
Virtual Switch 1	AMC 6_4		<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>				
Virtual Switch 2	- none -		<input type="radio"/>						
Virtual Switch 3	- none -		<input type="radio"/>						
Virtual Switch 4	- none -		<input type="radio"/>						
Virtual Switch 5	- none -		<input type="radio"/>						
Max. Link Speed			8.0 GT/s						

Apply

Note: You need to click apply before you can save your changes to EEPROM.

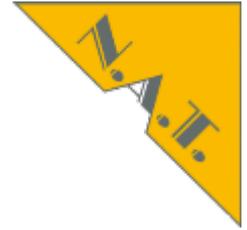
PCIexpress Configuration Command Line Interface



```
nat> mchcfg
MCH CFG: configuration modes
  [ 2] reset to defaults
  [ 9] modify PCIe configuration
Enter configuration mode (RET=0/0x0): 9
PCIe parameter:
-----
PCIe Virtual Switch configuration
change via web-interface
  VS # | Host      | NT-Host | Members
    0  | RTM      | none    | AMC01_4 AMC02_4 AMC03_4 AMC04_4 AMC05_4 AMC06_4
    1  | AMC06_4  |         | AMC06_4
Upstream slot power up delay:          15 sec
PCIe hot plug delay for AMCs:          0 sec
PCIe configuration flags:
  hot plug support:                     enabled
  PCIe early ekey (before payload):     disabled
  'no ekey' for PCIe:                   disabled
  PCIe clustering:                       enabled
  Use PCIe on MCH-RTM(disable AMC12):   yes
```

Tutorial about MicroTCA.4

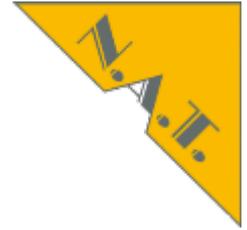
Agenda



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PCIexpress

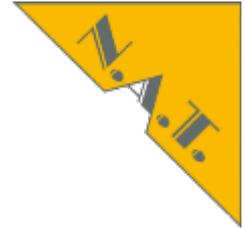
Hot Plug not Hotswap Solution



- Provide three important capabilities:
 - a method of replacing failed expansions cards without turning the system off
 - keeping the OS and other services running during the repair
 - shutting down and restarting software associated with the failed device
- The base sequence of the HotPlug procedures are:
 - monitoring of the PCIe slot events (e.g. card removal or Attention Button/Module Latch Handel pressing) and reports these events to software via interrupts
 - selectively turns on or off the Power and Attention Indicators associated with a specific card connector to draw the user's attention to the connector and advertise whether power is applied to the slot
 - system software then prepares the card, slot and processes associated with the current device for the card's removal or insertion
 - remove or apply power to the card connector

MTCA.4 Debugging

E-Keying



- show_ekey

```
EKeying information - activated Links:
```

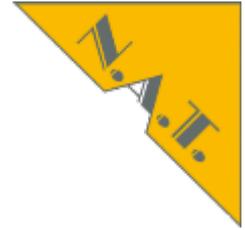
```
-----  
  AMC FRU State Channel Type Port  
=====
```

AMC1	5	M4	0	PCIe	4	<->	MCH1	Fabric D	downstream	Gen 1,	no SSC
					5	<->	MCH1	Fabric E	downstream	Gen 1,	no SSC
					6	<->	MCH1	Fabric F	downstream	Gen 1,	no SSC
					7	<->	MCH1	Fabric G	downstream	Gen 1,	no SSC
AMC2	6	M4	0	PCIe	4	<->	MCH1	Fabric D	downstream	Gen 1,	no SSC
					5	<->	MCH1	Fabric E	downstream	Gen 1,	no SSC
					6	<->	MCH1	Fabric F	downstream	Gen 1,	no SSC
					7	<->	MCH1	Fabric G	downstream	Gen 1,	no SSC
AMC3	7	M4	0	PCIe	4	<->	MCH1	Fabric D	downstream	Gen 1,	no SSC
					5	<->	MCH1	Fabric E	downstream	Gen 1,	no SSC
					6	<->	MCH1	Fabric F	downstream	Gen 1,	no SSC
					7	<->	MCH1	Fabric G	downstream	Gen 1,	no SSC

```
.....
```

MTCA.4 Debugging

Result of PCIexpress Training

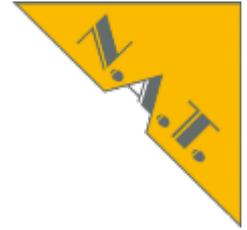


- `show_link_state`

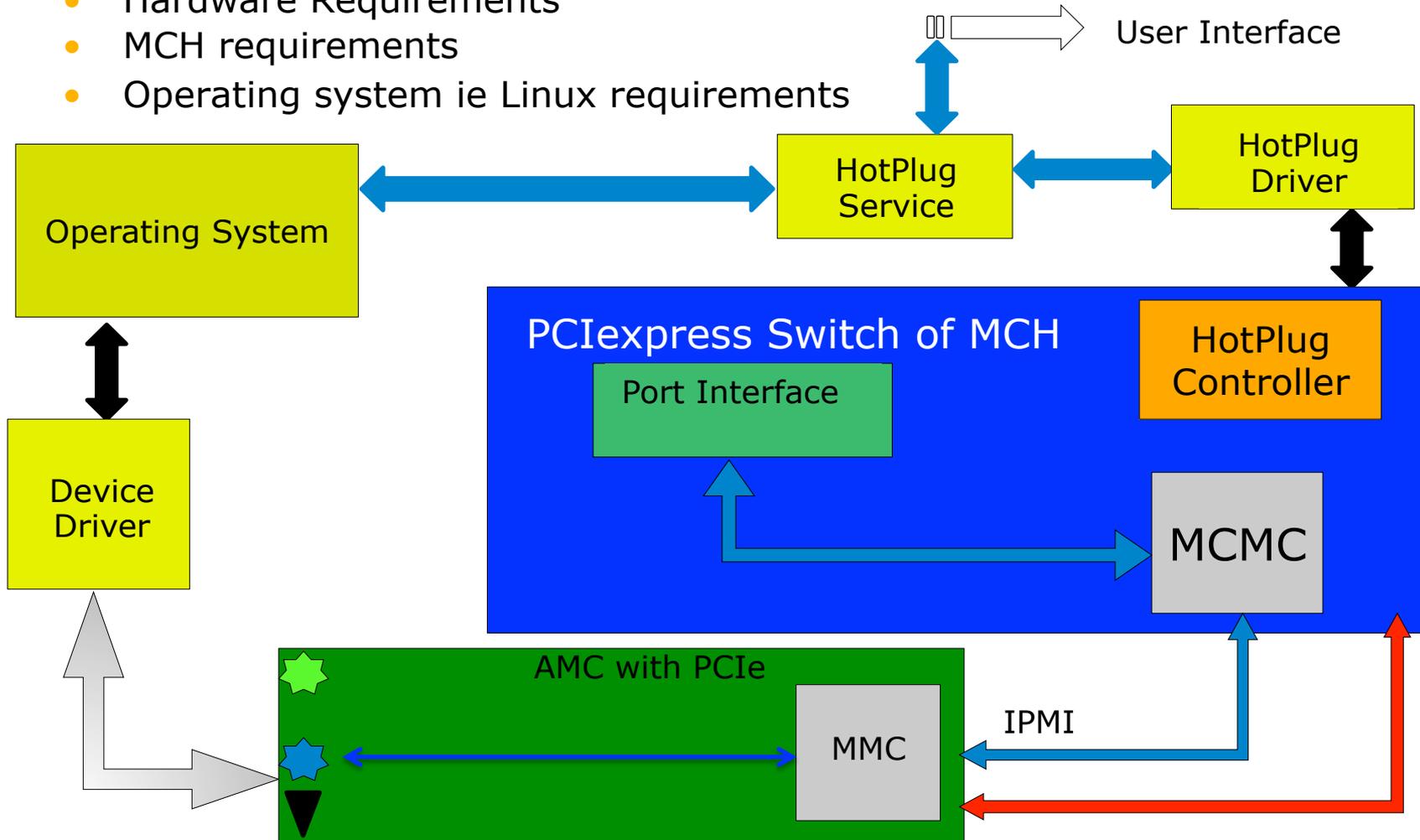
```
AMC 1 Port 4 is PCIe - x4 - 2,5 GT/s
AMC 1 Port 5 is PCIe - x4 - 2,5 GT/s
AMC 1 Port 6 is PCIe - x4 - 2,5 GT/s
AMC 1 Port 7 is PCIe - x4 - 2,5 GT/s
AMC 2 Port 4 is PCIe - x4 - 2,5 GT/s
AMC 2 Port 5 is PCIe - x4 - 2,5 GT/s
AMC 2 Port 6 is PCIe - x4 - 2,5 GT/s
AMC 2 Port 7 is PCIe - x4 - 2,5 GT/s
AMC 3 Port 4 is PCIe - x4 - 2,5 GT/s
AMC 3 Port 5 is PCIe - x4 - 2,5 GT/s
AMC 3 Port 6 is PCIe - x4 - 2,5 GT/s
AMC 3 Port 7 is PCIe - x4 - 2,5 GT/s
AMC 4 Port 4 is PCIe - x4 - 2,5 GT/s
AMC 4 Port 5 is PCIe - x4 - 2,5 GT/s
AMC 4 Port 6 is PCIe - x4 - 2,5 GT/s
AMC 4 Port 7 is PCIe - x4 - 2,5 GT/s
local RTM link status:
  Ethernet - 1000Base-BX
  PCIe - x4 - 8 GT/s
```

PCIexpress Requirements

Hot Plug and not Hotswap Solution

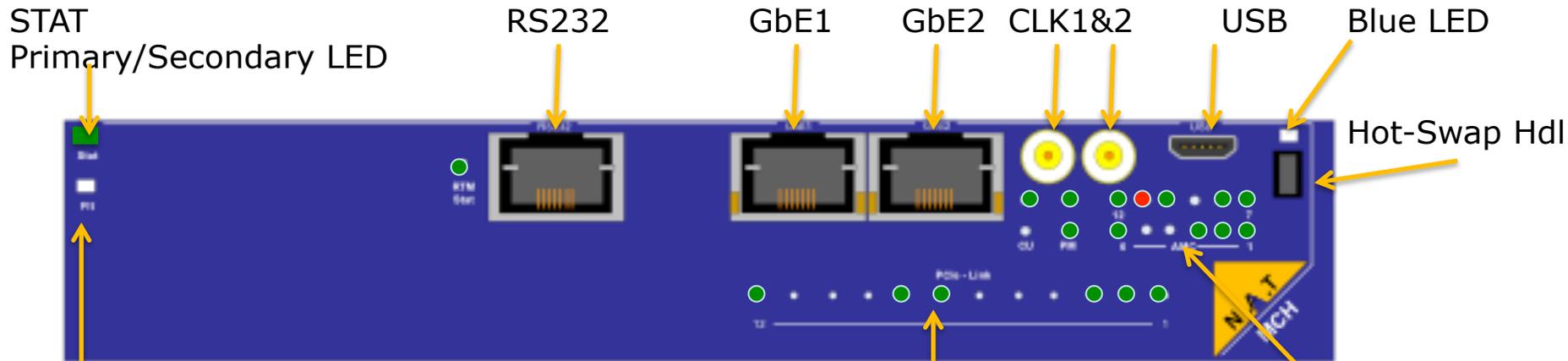
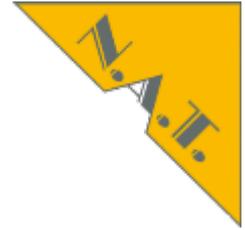


- Hardware Requirements
- MCH requirements
- Operating system ie Linux requirements



MCH demanded by SLAC and Desy

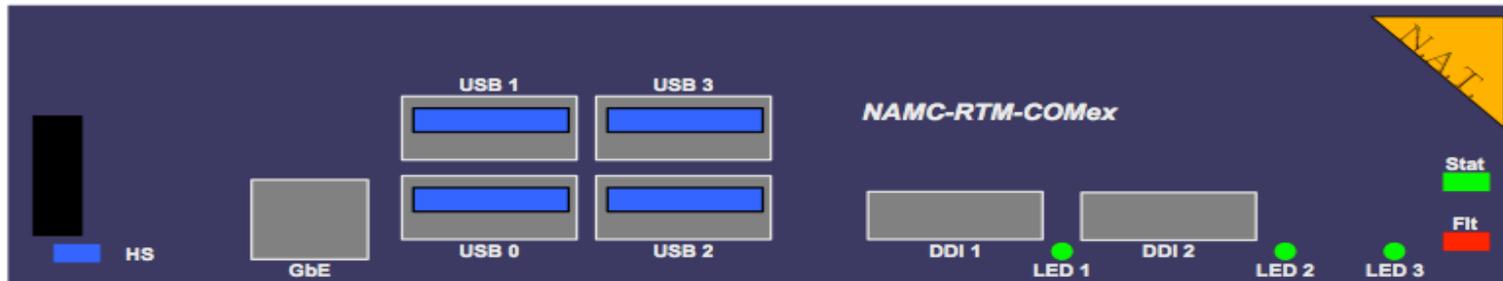
NAT-MCH-PHYS, NAT-MCH-PHYS80



FLT
Red LED = Fault

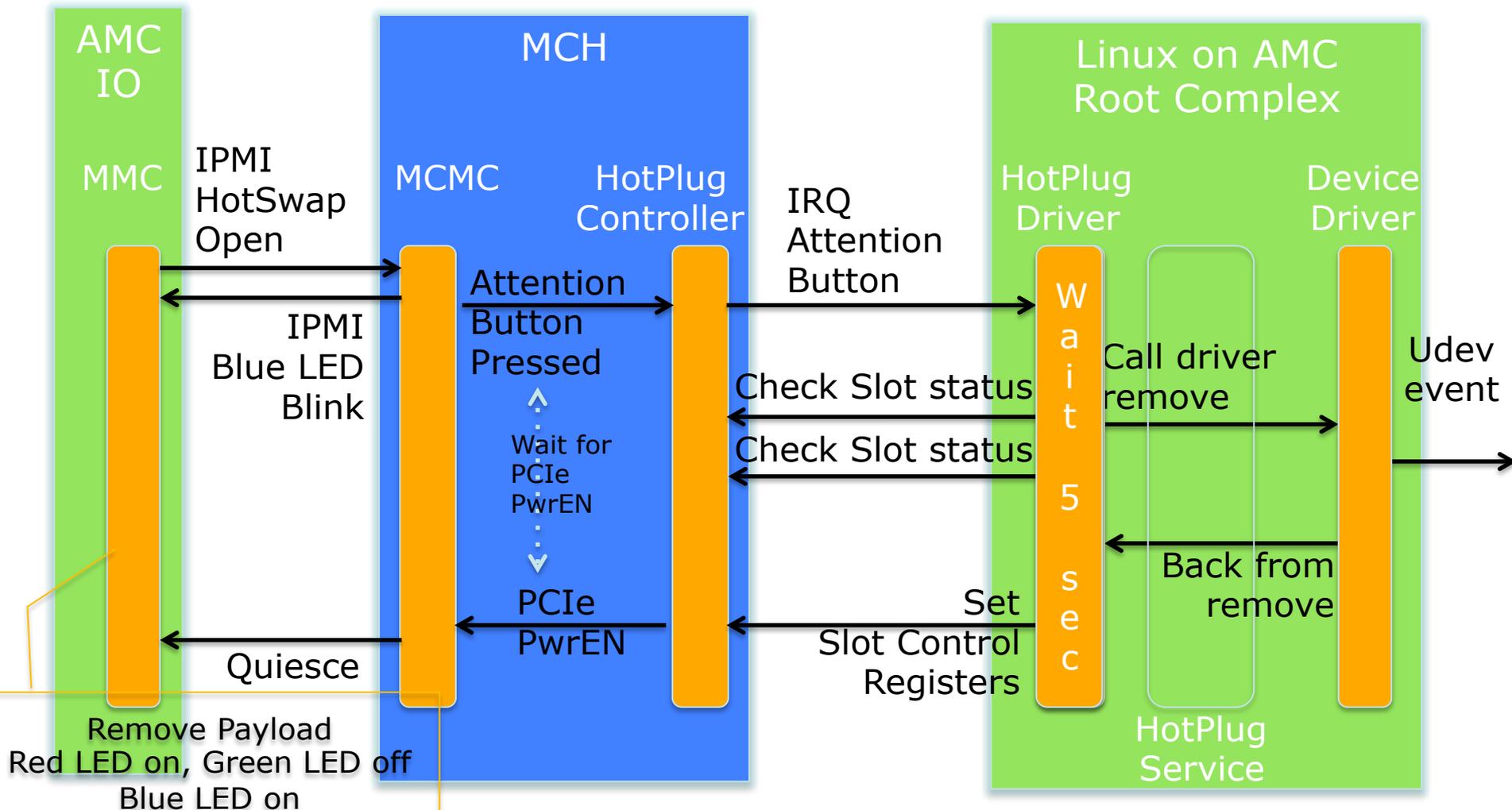
PCIexpress Status and Speed LEDs:
 off no PCIe link active
 on PCIe-Gen3 link active
 fast flashing PCIe-Gen2 link active
 slow flashing PCIe-Gen1 link active

FRU Status LEDs:
 AMC 1-12
 CU 1, 2
 PM 1, 2



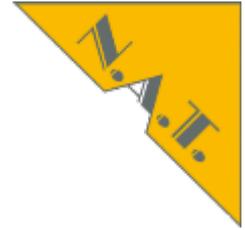
Hot Removal of AMC with PCIe

Hotswap handle pulled out: standard procedure



Tutorial about MicroTCA.4

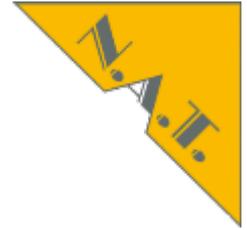
Agenda



- About N.A.T.
- MicroTCA.4 standard and Webpage mtca.eu
- System start of MicroTCA.4 system
- Analysis remotely: inventory, current, revision
 - Command Line Interface
 - NATView
 - Web interface
- Configuration
- Firmware update
- PCIexpress
 - Clustering
 - Hot Plug -> See next, how this is seen on Linux side

Thank you very much!

Questions?



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MTCA.4 Training:

mtca.desy.de/support/training

**2015:
PowerBridge
N.A.T.**