

MTCA.4 Tutorial



Let Your **Application** benefit

www.nateurope.com

MicroTCA.4

Configuration and Maintenance



- Motivation
- Configuration Tools
 - Command Line Interface
 - Java-App
 - Web interface
- Examples of Configurations
 - Ethernet and PCIexpress Configurations
 - Emergency Configuration
- Maintenance Tools
 - Analysis locally: LEDs
 - Analysis remotely: inventory, current, revision
 - Firmware update

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

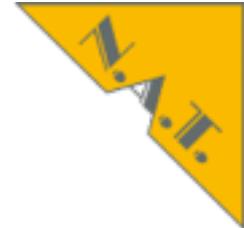


- Instructors:
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 - Dipl. Phys. Heiko Körte, heiko@nateurope.com



About N.A.T.

Network and Automation Technology



Innovation E Communication

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The brain of your MTCA.4 system

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

Key features

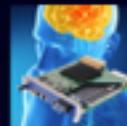
- x16 PCIe Gen3 uplink at front panel
- 128Gbps link to local CPU/host complex
- special low latency and low jitter CLK module
- fully user accessible quad-core Intel® Core i7
- new RTM for LRU backplane
- complete product line



Let Your **Application** benefit



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



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



The QorIQ®
Family
[read more ...](#)

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

Board Level Products



System Solutions

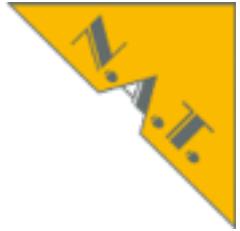


Upcoming Events

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

Latest News

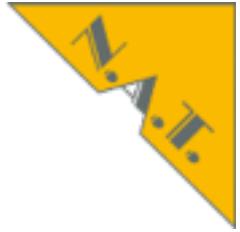
- **New product NAT-JSM**
Open JTAG switch module in AMC form factor
- **AMC module NAMC-ODSP**
New Media Acceleration Engine based on six OCT2224H DSPs
- **NAT-MCH Firmware v2.17 and NATview v2.18**
New versions of firmware and GUI available
- **MicroTCA Concept**
Version IV now available



MicroTCA.4

Configuration and Maintenance

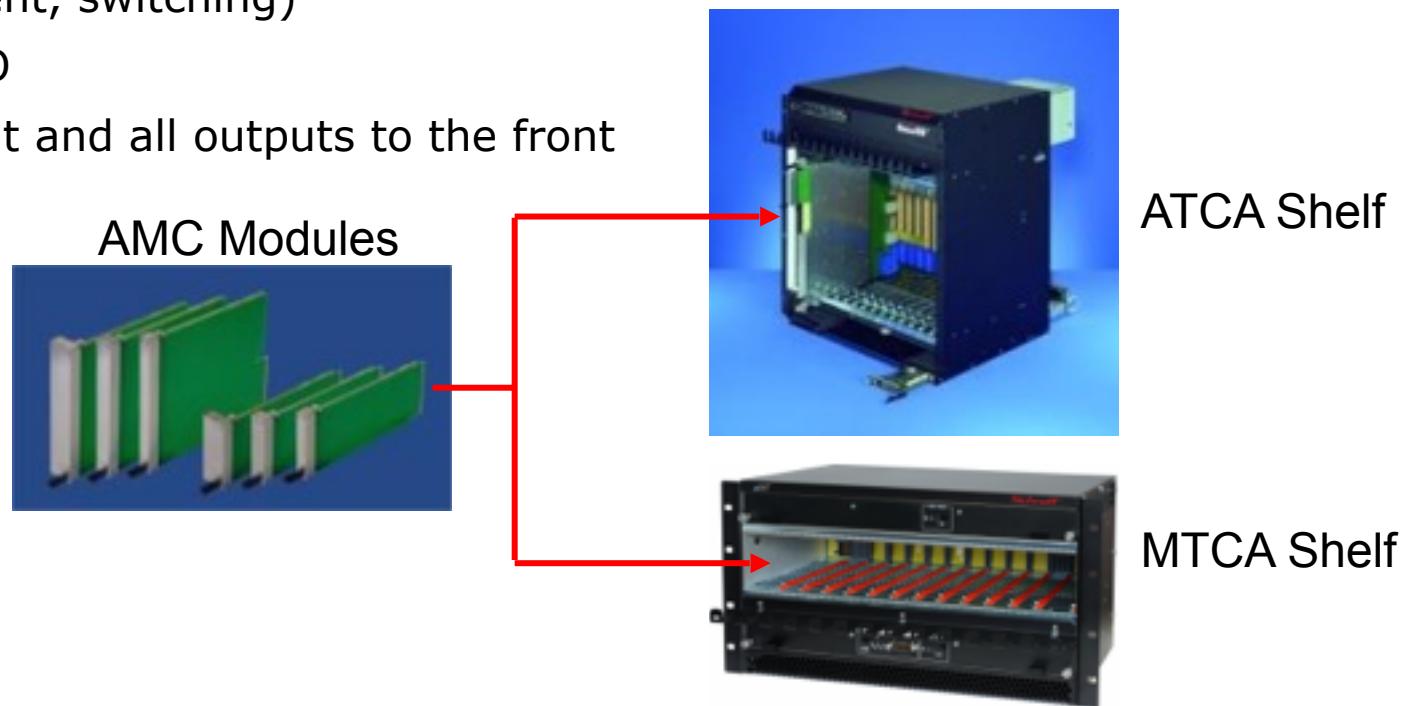
- About N.A.T.
- Comparison of Standards
- Configuration Tools
 - Command Line Interface
 - NATView
 - Web interface
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AMC

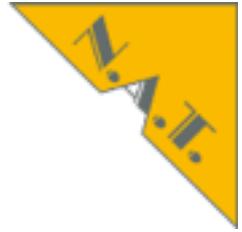
Pluggable in ATCA and MTCA Shelf

- The basic idea of MTCA is to have a shelf that contains just AMC modules
- Backplane directly accepts AMC modules
- AMCs are interchangeable between ATCA and MTCA
- The infrastructure of a ATCA Carrier was adapted into the MTCA shelf (power, management, switching)
- No rear I/O
- power input and all outputs to the front



Comparison of Standards

Differences in latest specs



	VPX	ATCA	MTCA
Common size	3U, 6U	2U, 3U, 12U	1U, 2U, 3U, 5U, 9U
Backplane	passive, switched	passive, switched	passive, switched
topologies	<i>single star, dual star (1/2 switch), full mesh, daisy-chain, ring</i>	<i>dual star, dual-dual star, full meshed</i>	<i>single star, dual star</i>
profiles	yes	no	no
Voltages	<i>MP: 3.3V PP: 3.3V, 5.0V, 12.0V optional: ±3.0V, ±12.0V</i>	<i>MP: 3.3V PP: 48.0V</i>	<i>MP: 3.3V PP: 12.0V</i>
Slot budget (PP)	115W@5V, 384W@12V 768W@48V	400W@48V	80W@12V
Pins per slot	<i>728 (6U), 168 (3U)</i>	<i>234/414</i>	<i>170 (AMC) 260(AMC+RTM)</i>
Link speed (Gbaud)	1.25, 2.5, 5, 6.25, 8.0	1.25, 2.5, 5, 6.25, 8.0	1.25, 2.5, 5, 6.25, 8.0
Link width	<i>x1, x2, x4, x8</i>	<i>x1, x2, x4, x8</i>	<i>x1, x2, x4, x8</i>
Fabrics	GbE, XAUI, PCIe, SRIO	GbE, XAUI , PCIe, SRIO	GbE, XAUI, PCIe, SRIO
Markets	<i>Mil, Aerospace</i>	<i>Mil, Aerospace, core Net</i>	<i>all</i>

Comparison of Standards

Results



- Results:
 - VPX targeting at one vertical market
 - ➡ limited volumes
 - ➡ industry develops for this market only
 - ATCA has its strength in bandwidth
 - ➡ limited use cases due to cost/function
- ➡ MTCA combines strengths and flexibility



Architectural features - I/II

- simple backplane architecture
 - ✓ reduces costs and risks, is re-useable in future
- all signals at same signal level (MLVDS)
 - ✓ no electrical clash
- switched connections
 - ✓ no blocking transfer
 - ✓ type of backplane connection depends on kind of switch
- all slots managed and controlled
 - ✓ detection of incompatibilities and faults
 - ✓ health management and fault isolation
 - ✓ hot-swap and hot-plug



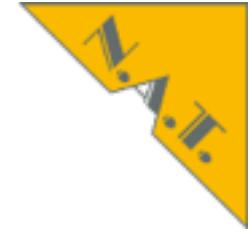
MicroTCA

Architectural features - II/II

- all data transfer are
 - independent
 - simultaneous
 - bidirectional
- data connections determined by one switch card:
 - **base/common options** fabric: GbE
 - **storage** fabric: SATA
 - **fat pipe** fabric: PCIe or XAUI or SRIO
 - **extended fat pipe** fabric: XAUI or SRIO

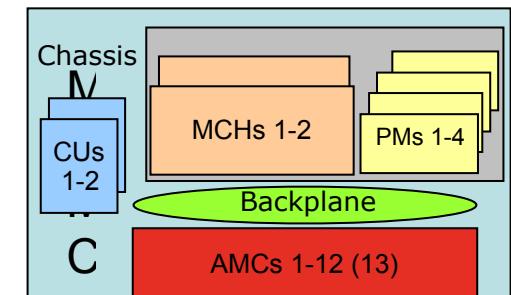
MicroTCA Architecture

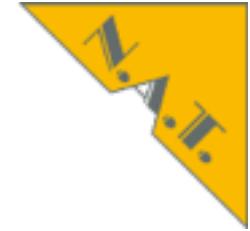
Advanced Mezzanine Cards (AMCs)



- AMC eco system

- single and multi-core CPUs (Intel, Freescale, ARM, etc.)
- single and multi-core PP and NPUs
- line interfaces (E1/T1, SDH, ATM, 3G/4G/5G)
- antenna interfaces
- FPGAs (Xilinx, Altera, etc.)
- DSPs (TI, Freescale, Octasic, etc.)
- analogue and digital IO
- industrial busses (EtherCAT, Profibus, CANbus etc.)
- ADCs and DACs
- SSD and HDD storage
- GPUs





MicroTCA.4

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NAT-MCH by N.A.T.

Setup

[Base Configuration](#)
[Switch](#) BASE 1GbE

[Port on/off](#)
[Port VLAN](#)
[802.1Q VLAN](#)
[802.1X](#)
[802.1p](#)
[Port Mirroring](#)
[Jumbo Frame](#)
[Link Aggregation](#)
[Rapid Spanning Tree](#)
[Link Status](#)
[PCME200 Counter](#)
[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:

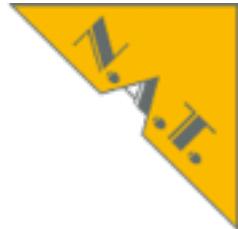
- Base Configuration:** - Changes Base Configuration.
- Age Time:** - MAC Table setup: set the aging of the MAC Table Entries.
- Port VLAN:** - Port based VLAN setup and port enable/disable.
- 802.1Q VLAN:** - 802.1Q VLAN setup.
- 802.1X:** - 802.1X security setup.
- 802.1p:** - 802.1p Quality of Service 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**
- IGMP Snooping**
- 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.

JAVA Tool

OS independent



NATview

2.20

(c) 2007 - 2015
N.A.T. GmbH,
Bonn, Germany.

Version 2.20 Developers Build
(Revision #12071, built 16.10.15 16:15:00)

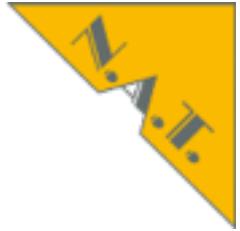
Licensed options:

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

License holder: (unregistered)

Check our FTP server [ftp.nateurope.com](ftp://ftp.nateurope.com)
for updates (User: natmch, Password: natmch)!

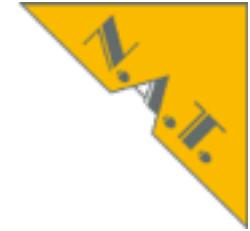
[Close window](#)



Your Maintenance Tools

Examples of command line interface (CLI)

- **sdrrep_info** – SDR repository information
- **sel_info** – System Event Log information
- **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**



MicroTCA.4

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Web Interface

Source of IP address



Change MCH Configuration

MCH global parameter	Configuration
remote interfaces:	
Management interface at GbE port	disabled <input type="button" value="▼"/>
RMCP access	enabled <input type="button" value="▼"/>
telnet access	enabled <input type="button" value="▼"/>
WEB access	
IP address source for management port	<input type="button" value="no IP address"/> <input type="button" value="board configuration"/> <input checked="" type="button" value="DHCP"/> <input type="button" value="ShM IP link record"/> <input type="button" value="CM IP link record"/>
IP address source for GbE port	
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 <input type="button" value="▼"/>
Enable alternative cooling scheme	no <input type="button" value="▼"/>
Control rear transition module fans	yes <input type="button" value="▼"/>
PM Assignment strategy	strict <input type="button" value="▼"/>

Emergency Shutdown

Only switch off the faulty FRU



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



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

Link Aggregation

Rapid spanning tree Link Status

Link Status

BCM5396 counters Configure PCIe Virt

Configure Switches

SWITCHES

Maintenance

Board Information

System Information

Reboot NAT-MCH

Update MCH

Change Password

N.A.T. Webpage

Port on/off (enable/disable)

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	-	-	-	-	-
Enable	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>												

Apply **Discard**

You need to click apply to save your changes.

The following table will be reloaded by clicking apply.

Port based VLAN Configuration

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

configuration source

 no configuration

load from FLASH

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

1 h

configuration flags:

SNTP or Time Protocol

Time Protocol

Time client

enabled

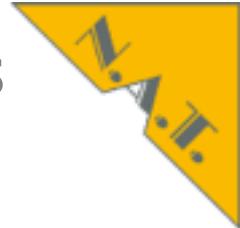
DHCP parameter**Current Configuration**

Host name

MTCA4TRAINING

Configuration and Setting of Multiple MCHs

Backup Settings

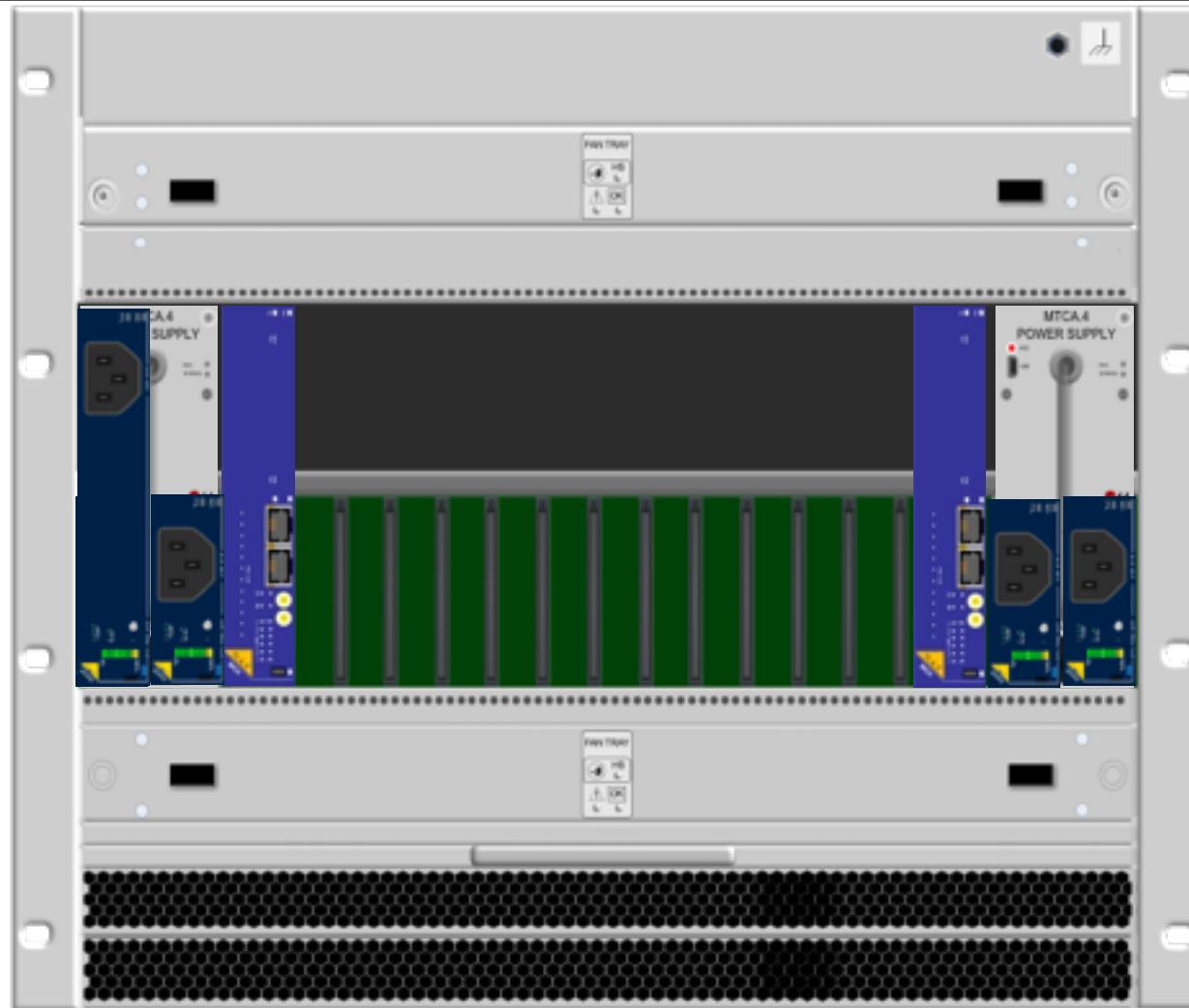


Backup current configuration settings to the onboard FLASH or an external file, or load settings from the onboard FLASH or an external file.

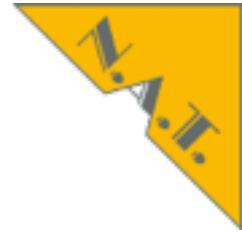
- Save
- Restore
- Generate
- Upload
- Verify

The screenshot shows the 'NAT-MCH Configuration Backup' interface. On the left, a sidebar menu includes 'Show MCH Configuration', 'Change MCH Configuration', 'Switch BCM5396 1Gb', and several network-related options like 'General settings', 'Port VLAN', etc. Below this is a 'Maintenance' section with 'Backup Settings' highlighted by a yellow box. Other options in this section include 'Board Information', 'System Information', 'Reboot NAT-MCH', 'Update MCH', 'Change Password', 'N.A.T. Webpage', and 'Home'. The main right panel is titled 'NAT-MCH Configuration Backup'. It displays the 'Running Configuration: nat_mch_cfg.txt' (which is also highlighted with a yellow box). Below this, there are sections for 'Restore the Running Configuration from the Startup Configuration' (with a 'Restore' button), 'Save the Running Configuration' (with radio buttons for 'to FLASH and load on Startup' and 'to FLASH only', and a 'Save' button), 'Upload configuration file:' (with a 'Datei auswählen' button, a note 'Keine Datei ausgewählt', and checkboxes for 'load on startup' and 'save to FLASH', followed by an 'Upload' button), and 'Verify configuration file with the Startup Configuration:' (with a 'Select file:' dropdown, a note 'Keine Datei ausgewählt', and a 'Verify' button).

Backplanes with 4 Power Module Sites 1, 2, 3, 4 PMs: Redundancy, Load Sharing



Maintenance Backplane Power Configuration Management

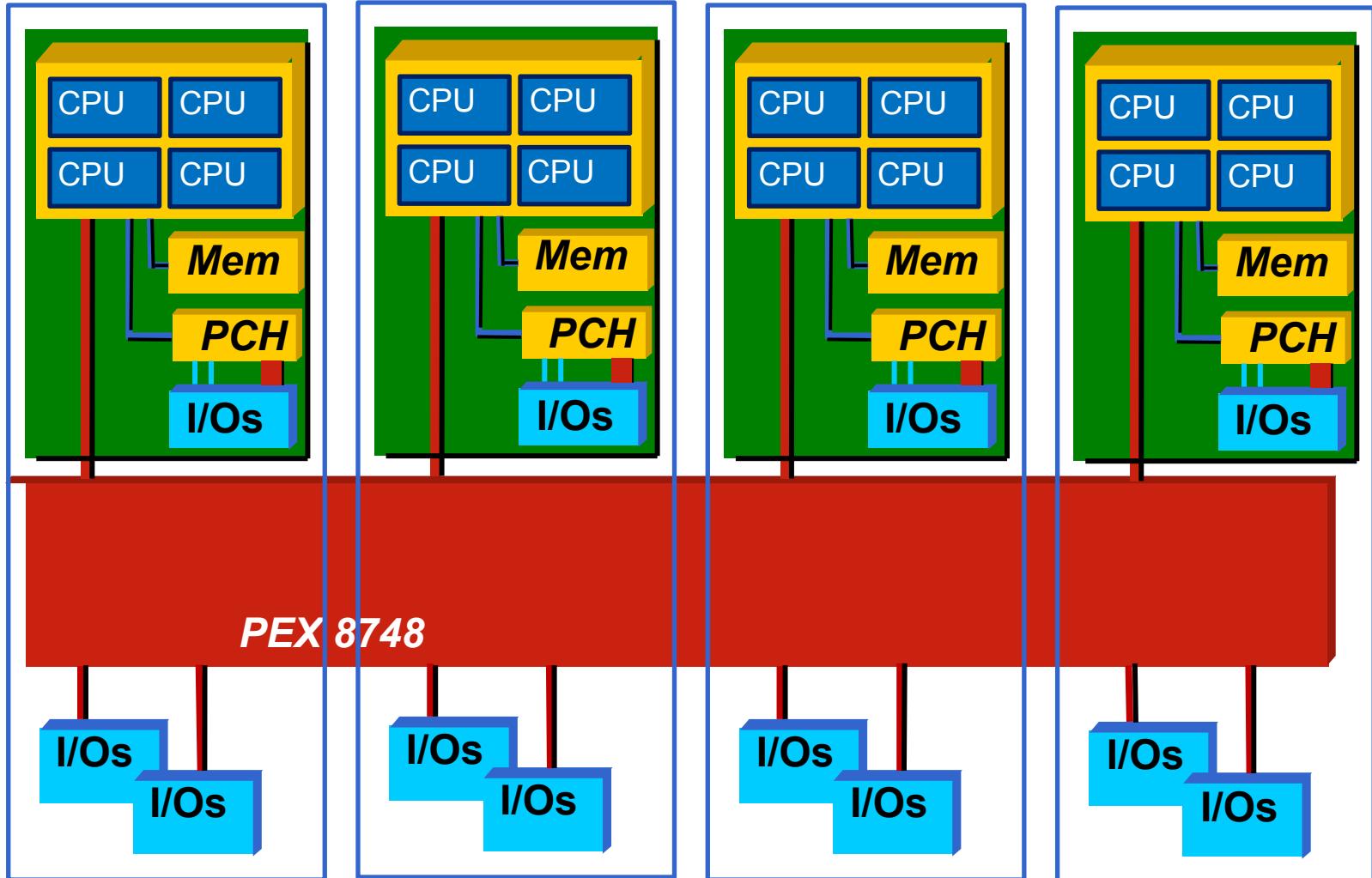


- Example: full redundancy, n+1 redundancy

Status: OK																
PM enable	Power Channel:															
	1 MCH1	2 MCH2	3 CU1	4 CU2	5 AMC1	6 AMC2	7 AMC3	8 AMC4	9 AMC5	10 AMC6	11 AMC7	12 AMC8	13 AMC9	14 AMC10	15 AMC11	16 AMC12
	Max. Power Output (mA):	10000	0	10000	0	10000	10000	10000	10000	0	0	0	0	0	0	0
	Required Power (mA):	3500	n/a	2000	n/a	n/a	7200	n/a	2000	5000	n/a	n/a	n/a	n/a	n/a	n/a
	PM1	sum : 70000 mA														
	max:	50000 mA	<input checked="" type="checkbox"/>													
	primary (0)															
	PM2	sum : 70000 mA														
	max:	0 mA	<input checked="" type="checkbox"/>													
	primary (0)															
	PM3	sum : 70000 mA														
	max:	0 mA	<input type="checkbox"/>													
	primary (0)															
	PM4	sum : 70000 mA														
	max:	0 mA	<input checked="" type="checkbox"/>													
	secondary (1)															
Status: OK																
PM enable	Power Channel:															
	1 MCH1	2 MCH2	3 CU1	4 CU2	5 AMC1	6 AMC2	7 AMC3	8 AMC4	9 AMC5	10 AMC6	11 AMC7	12 AMC8	13 AMC9	14 AMC10	15 AMC11	16 AMC12
	Max. Power Output (mA):	10000	0	10000	0	10000	10000	10000	10000	0	0	0	0	0	0	0
	Required Power (mA):	3500	n/a	2000	n/a	n/a	7200	n/a	2000	5000	n/a	n/a	n/a	n/a	n/a	n/a
	PM1	sum : 70000 mA														
	max:	50000 mA	<input type="checkbox"/>													
	primary (0)															
	PM2	sum : 70000 mA														
	max:	0 mA	<input type="checkbox"/>													
	primary (0)															
	PM3	sum : 70000 mA														
	max:	0 mA	<input type="checkbox"/>													
	primary (0)															
	PM4	sum : 70000 mA														
	max:	0 mA	<input checked="" type="checkbox"/>													
	secondary (1)															

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"/>						
Virtual Switch 1	AMC 6..4		<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

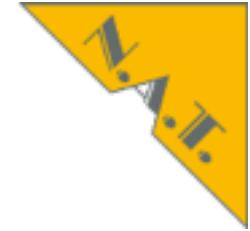
Note: You need to click apply before you can save your changes to EEPROM.



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  AMC07_4  AMC12_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
```

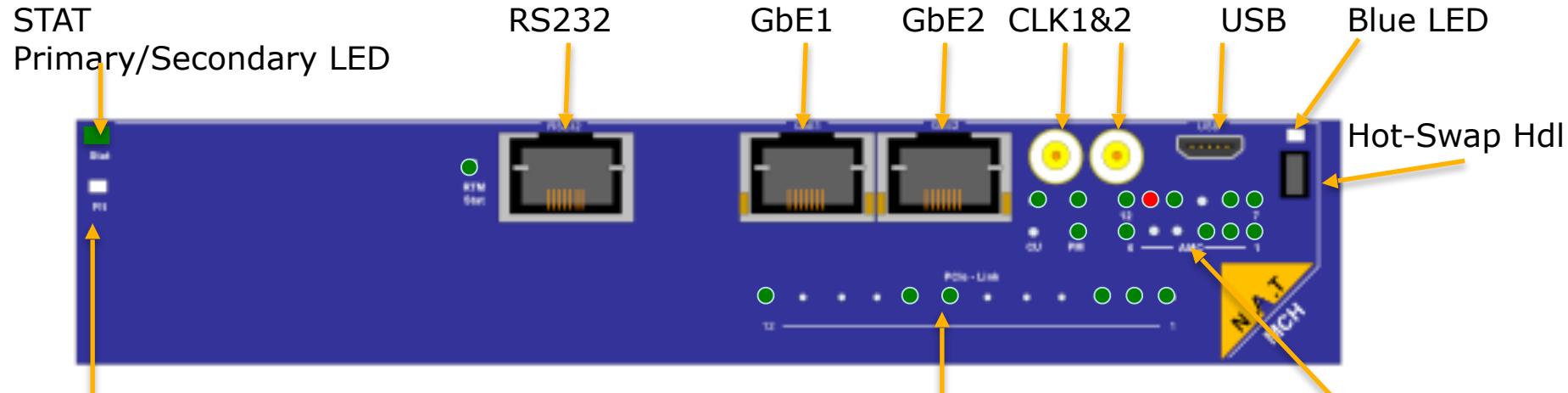
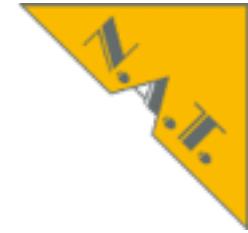


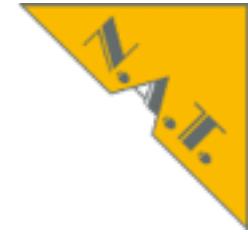
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 - Analysis remotely: inventory, current, revision
 - Firmware update

Analysis locally LEDs





Analysis remotely: Webinterface Complete Systeminformation in seconds

- Complete System Information output of the following commands collected in text file:
 - history, version, bi, mch, show_pm, show_sensor_info for all FRU-IDs
 - show_fruinfo 253 (backplane)
 - show_ekey, show_link_state,

Setup

- Show MCH Configuration
- Change MCH Configuration
- Switch** **BCM5396 1Gb**
 - General settings
 - 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

- Backup Settings
- Board Information
- System Information**
- KEDOO! NAT-MCH
- Update MCH
- Change Password
- N.A.T. Webpage
- Home

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: V1.27 Final (12:41:58 Jun 26 2014)

***** End of History Buffer *****

***** Version Information *****

*** MCH CM/SHM Firmware V2.15 Final (12:36:15 Jun 26 2014) ***

IAT-MCH-PHYS HW: M4 PCB V1.3 Rev 130927 FPGA V1.9 AVR 1.2 - sn: 113513-0109 - Re
ADPT: 8x3d - SMA CLK, SRAM, HS Ctrl, 2nd FRT ETH, LED MOD
SATA 8 attached

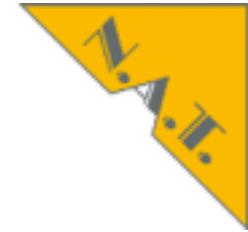
CLK MOD: for Physics PCB V1.0 MC V1.3 FPGA V1.15 assembly option: HCSL buffer
HUB MOD: PCB PCIe-x48 V2.3 MC V1.6 FPGA V1.4 (assembly option -X48 LOSC) - sn: 1

ITM MOD: ComExpress PCB V1.1 MC V1.0 FPGA V1.1 - sn: 0015 - Rel:121102 - ComEx N

ISP V1.15 Final (12:41:13 Jun 26 2014)
CM/SHM interface
Diagnose software
TCP/IP V1.1 Engineering (12:40:01 Jun 26 2014)
felnet daemon support
compiled with GCC 2.95
instruction cache enabled
data cache enabled

CPU: Coldfire MCF 5445B
RAM size: 32 MB

***** Board Information *****



Analysis remotely 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

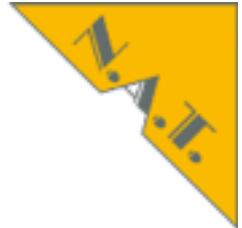
Slot	A M C 1	A M C 2	A M C 2	A M C 3	A M C 3	A M C 4	A M C 4	A M C 5	A M C 5	A M C 6	A M C 7	A M C 7	F R T 1	F R T 2	U P D B	R T M B	C P U 1
Port	0	0	1	0	1	0	1	0	1	0	0	1	-	-	-	-	-
Links	EN	DIS	EN	EN	EN												

	- 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)

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
Configure PCIe Virtual Switches

Maintenance

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

Port Mirroring Configuration

Capture port FRT_1

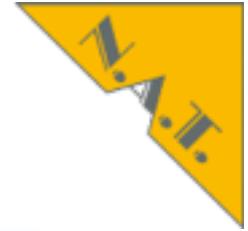
Slot	A M C 1	A M C 2	A M C 2	A M C 3	A M C 3	A M C 4	A M C 4	A M C 5	A M C 5	A M C 6	A M C 7	A M C 7	F R T 1	F R T 2	U P D B	R T M B	C P U 1
Port	0	0	1	0	1	0	1	0	1	0	0	1	-	-	-	-	-
Ingress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>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

Ethernet Analysis with Wireshark

Mirroring IPMI Traffic



NAT-MCH by N.A.T.

Setup

- Base Configuration
- JSM
- 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
 - Serdes/SGMII
 - Link Status
 - BCM5396 counters

Maintenance

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

DHCP parameter

	Current Configuration
Host name	

SNMP parameter

	Current Configuration
SNMP server	disabled
Destination IP for SNMP Traps	0 . 0 . 0 . 0

Xilinx Virtual Cable parameter

	Current Configuration
Xilinx Virtual Cable Server	disabled
Base TCP Port	2542
Maximal User defined JTAG Frequency	1.01MHz

IPMI monitor over ethernet

	Current Configuration
IPMI Monitor	enabled
Target IP Address	192 . 168 . 100 . 58
Target UDP Port	623

Save Discard Changes

Reset Configuration

Reth2 (net_icmp) [Wireshark 1.10.6 (v1.10.6 from master-1.10)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Info
4	0.008556000	192.168.100.119	192.168.100.58	IPMI/ATCI	68	// Rsp, [uTCA] Get Power Channel Status, seq 0x29
5	1.000041000	192.168.100.119	192.168.100.58	IPMI/ATCI	68	Req, [uTCA] PM Heartbeat, seq 0x2a
6	1.003484000	192.168.100.119	192.168.100.58	IPMI/ATCI	65	Rsp, [uTCA] PM Heartbeat, seq 0x2a
7	1.003901000	192.168.100.119	192.168.100.58	IPMI/ATCI	66	Req, [uTCA] Get Power Channel Status, seq 0x2b
8	1.008938000	192.168.100.119	192.168.100.58	IPMI/ATCI	77	Rsp, [uTCA] Get Power Channel Status, seq 0x2b
9	1.409981000	192.168.100.119	192.168.100.58	IPMI/ATCI	63	Req, Get Device ID, seq 0x2c
10	1.414250000	192.168.100.119	192.168.100.58	IPMI/ATCI	75	Rsp, Get Device ID, seq 0x2c
11	1.990204000	192.168.100.119	192.168.100.58	IPMI/ATCI	65	Req, [ATCA] Get Fan Level, seq 0x2d
12	1.993717000	192.168.100.119	192.168.100.58	IPMI/ATCI	68	Rsp, [ATCA] Get Fan Level, seq 0x2d
13	2.000615000	192.168.100.119	192.168.100.58	IPMI/ATCI	66	Req, [uTCA] PM Heartbeat, seq 0x2e
14	2.004040000	192.168.100.119	192.168.100.58	IPMI/ATCI	65	Rsp, [uTCA] PM Heartbeat, seq 0x2e
15	2.004433000	192.168.100.119	192.168.100.58	IPMI/ATCI	66	Req, [uTCA] Get Power Channel Status, seq 0x2f

Frame 12: 68 bytes on wire (544 bits), 68 bytes captured (544 bits) on interface 0

Ethernet II, Src: NAT_0b:0c:51 (00:40:42:0b:0c:51), Dst: DigitalD_3f:68:96 (00:11:6b:3f:68:96)

Internet Protocol Version 4, Src: 192.168.100.119 (192.168.100.119), Dst: 192.168.100.58 (192.168.100.58)

User Datagram Protocol, Src Port: 49154 (49154), Dst Port: asf-rmc (623)

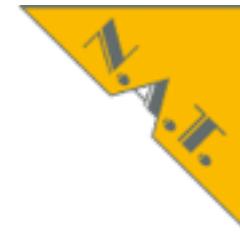
Remote Management Control Protocol, Class: IPMI

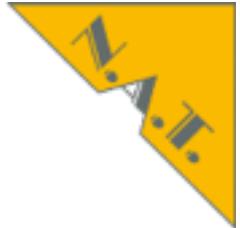
- Version: 0x06
- Sequence: 0x1f
- > Type: Normal RMCP, Class: IPMI
- IPMI v1.5 Session Wrapper, session ID 0x0
- Authentication Type: NONE (0x00)
- Session Sequence Number: 0x00000000
- Session ID: 0x00000000
- Message Length: 12
- Intelligent Platform Management Interface
- Response to: 111
- [Responded in: 0.003513000 seconds]
- > Header: [ATCA] Get Fan Level (Response) from 0xa8 to 0x20
- Target Address: 0x20
- > Target LUN: 0x03, NetFN: PICMG (Group) Response (0x2d)
- Header checksum: 0x29 (correct)
- Source Address: 0xa8
- > Source LUN: 0x00, SeqNo: 0x2d
- Command: [ATCA] Get Fan Level (0x16)
- Completion code: Command Completed Normally (0x00)
- Signature: 00 (PICMG (Group))
- Data
- Override Fan Level: 5
- Local Control Fan Level: 15
- Local Control Enable State: Disabled (0x00)
- Data checksum: 0x7a (correct)

Frame (Frame), 68 bytes

Packets: 16 - Displayed: 16 (100.0%)

Profile: Default





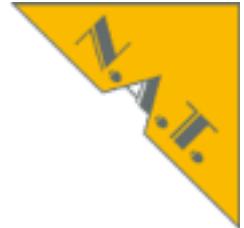
More Debug Information

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	<input checked="" type="checkbox"/> disabled <input type="checkbox"/> enabled
sensor	disabled
event	disabled
power module	disabled
cooling unit	disabled
CM/ShM interface	disabled
FRU communication to debug (0=all)	6

Analysis Remotely: CLI

inventory, max. current, actual power consumption



- **show_fru**

FRU Information:

FRU	Device	State	Name
0	MCH	M4	NMCH-CM
3	mcmc1	M4	NAT-MCH-MCMC
6	AMC2	M4	SIS8300
7	AMC3	M1	NAMC-LM
8	AMC4	M4	TAMC220-10
9	AMC5	M4	TAMC651
10	AMC6	M1	CCT AM 310/302
40	CU1	M4	Schroff uTCA CU
50	PM1	M4	NAT-PM-AC600
60	Clk1	M4	MCH-Clock
61	Hub1	M4	MCH-PCIe
64	RTM1	M4	MCH-RTM-ComEx
93	RTM4	M1	TAMC220-RTM

- **show_pm**

- **show_sensorinfo 50**

```
nat> show_pm
```

```
-----  
PM1: - online, primary(fru 50) : budget 50.0 A (alloc 23.5 A  
avail 26.5 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	5.5
2	MCH2	4	-	-						
3	CU1	40	1	-	Y	-	Y	Y	Y	4.5
4	CU2	41	-	-						
5	AMC1	5	1	-	-	-	-	-	-	-
6	AMC2	6	1	-	Y	-	Y	Y	Y	5.0
7	AMC3	7	1	-	Y	-	Y	Y	-	(overcurrent)
8	AMC4	8	1	-	Y	-	Y	Y	Y	-..
9	AMC5	9	1	-	Y	-	Y	Y	Y	4.5
10	AMC6	10	1	-	Y	-	Y	Y	-	
11	AMC7	11	-	-						
12	AMC8	12	-	-						
13	AMC9	13	-	-						
14	AMC10	14	-	-						
15	AMC11	15	-	-						
16	AMC12	16	-	-						

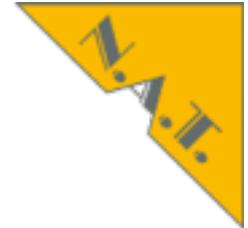
nat> show_sensorinfo 50

Sensor Information for FRU 50 / PM1

#	SDRTYPE	Sensor	Entity	Inst	Value	State	Name
<hr/>							
30	MDevLoc		0x0a	0x61			NAT-PM-AC600
1	Full	Temp	0x0a	0x61	33 C	ok	T_CPU
2	Full	Temp	0x0a	0x61	48 C	ok	T_Xfrm
3	Full	Temp	0x0a	0x61	35 C	ok	T-PSB
4	Full	Temp	0x0a	0x61	54 C	ok	T-PFC1
5	Full	Temp	0x0a	0x61	49 C	ok	T-REC
6	Full	Voltage	0x0a	0x61	264 V	ok	VINAC
7	Full	Voltage	0x0a	0x61	444 V	ok	VINDC
8	Full	Voltage	0x0a	0x61	12.4 V	ok	12V
9	Full	Voltage	0x0a	0x61	3.4 V	ok	3.3V
10	Full	Current	0x0a	0x61	5.50 A	ok	I_Sum
11	Compact	Current	0x0a	0x61	2.20 A	ok	I_CH01
12	Compact	Current	0x0a	0x61	0.00 A	ok	I_CH02
13	Compact	Current	0x0a	0x61	0.50 A	ok	I_CH03
14	Compact	Current	0x0a	0x61	0.00 A	ok	I_CH04
15	Compact	Current	0x0a	0x61	0.00 A	ok	I_CH05
16	Compact	Current	0x0a	0x61	2.20 A	ok	I_CH06
17	Compact	Current	0x0a	0x61	0.00 A	ok	I_CH07
18	Compact	Current	0x0a	0x61	0.30 A	ok	I_CH08
19	Compact	Current	0x0a	0x61	0.30 A	ok	I_CH09
20	Compact	Current	0x0a	0x61	0.00 A	ok	I_CH10
21	Compact	Current	0x0a	0x61	0.00 A	ok	I_CH11
22	Compact	Current	0x0a	0x61	0.00 A	ok	I_CH12

MTCA.4 Debugging

E-Keying



- `show_ekey`

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

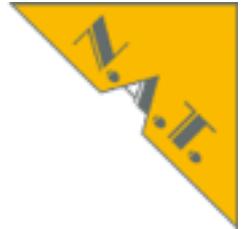
```
-----  
AMC FRU State Channel Type Port  
=====
```

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

```
.....
```

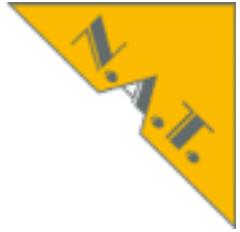
MTCA.4 Debugging

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 - x16 - 8 GT/s
```



Firmware Update of all System Components Easy with NATview Firmware-Update-Function

NATview 2.17 (2014/11/11) - Registered for Vollrath Dirksen, NAT Build date: Thu Nov 13 09:44:54 CET 2014

Application Fru Sensor Tools Help

Auto Update 5 seconds

The screenshot shows the NATview software interface. At the top, there's a menu bar with Application, Fru, Sensor, Tools, and Help. Below the menu is a toolbar with various icons. A specific icon, which appears to be a gear or update symbol, is highlighted with a magenta square. To its right is a dropdown menu labeled "Auto Update" with a value of "5 seconds". The main area displays a rack diagram of a system. On the left side of the rack, there's a "Resources" tree view containing a list of components. One item in the list, "[050] N.A.T. GmbH NAT-PM-AC600", is also highlighted with a magenta square. On the right side of the screen, there's a detailed view of "FRU Device #50: N.A.T. GmbH NAT-PM-AC600". This view provides specific information about the component, including its Manufacturer ID (0x6c78), Product ID (0x0c08), Type (PM), Site number (01), Site type (11), Slot number (01), Tier number (02), Number of sensors (27), and Firmware release (1.4). At the bottom of the software window, there's a status message: "Newly successfully connected host 192.168.128.26 added to the systems list".

Resources

- ① [003] N.A.T. GmbH - Germany NAT-MCH
- ② [006] Struck Innovative Systeme GmbH SIS8300
- ③ [007] N.A.T. GmbH - Germany NAMC-LM
- ④ [008] TEWS TECHNOLOGIES GmbH TAMC220
- ⑤ [009] TEWS TECHNOLOGIES GmbH TAMC651
- ⑥ [010] Concurrent Technologies AM 310/302
- ⑦ [040] Schröff GmbH uTCA Cooling
- ⑧ [050] N.A.T. GmbH NAT-PM-AC600
- ⑨ [060] MCH-Clock
- ⑩ [061] MCH-PCIe
- ⑪ [064] N.A.T. GmbH - Germany NAT-MCH-RTM-ComExpress
- ⑫ [093->008] TAMC220-RTM
- ⑬ [253] Schröff GmbH Schröff MicroTCA Backplane
- ⑭ [254] Schröff GmbH Schröff MicroTCA Backplane

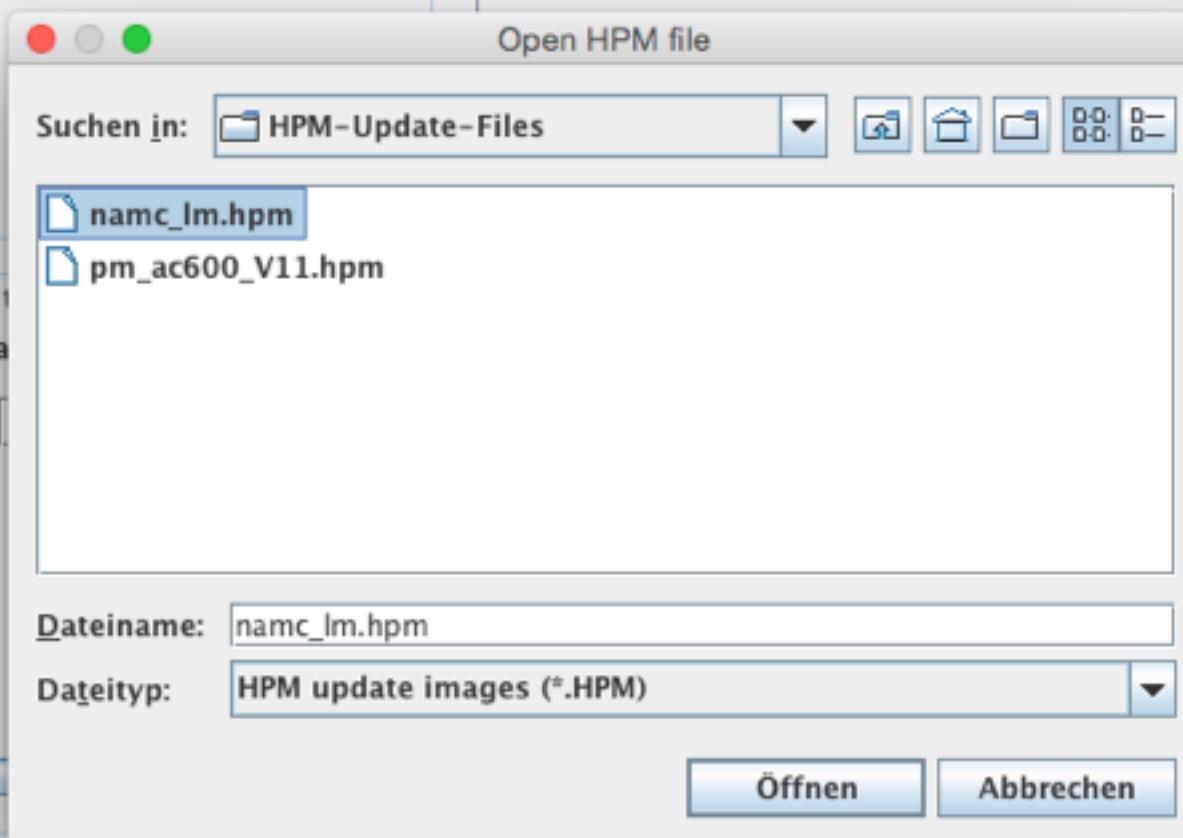
FRU Device #50: N.A.T. GmbH NAT-PM-AC600

Manufacturer ID:	0x6c78 (N.A.T. GmbH)
Product ID:	0x0c08 (NAT-PM-AC600)
Type:	PM
Site number:	01
Site type:	11
Slot number:	01
Tier number:	02
Number of sensors:	27
Firmware release:	1.4

slide 4

Newly successfully connected host 192.168.128.26 added to the systems list

Step 1: Choose your HPM File



Step 2: Choose devies

 Show only compa

Step 3: Start HPM Action

HPM Update

Step 1: Choose your HPM File

Browse...

/Users/vd/Documents/NAT/NAT Präsentationen/NAT-Schulungen/HPM-Update-Files/namc_lm.hpm

GENERAL	
Creation date/time:	Thu Jan 01 01:00:00 CET 1970
Image file valid?	yes
Read MD5 digest	69bbba87d97d1f17df68201a96ccfa3e
Signature valid?	yes
Device ID	0x0
Manufacturer ID	0x6c78
Product ID	0xc07
Earliest comp. revision	0.1
Firmware revision	1.0
OEM data length	0

Step 2: Choose devies to update

Show only compatible FRUs

Update	Start	FRU ID	Manufacturer/Product	Status	Last Compl. Code	Firmware Rel.	Compatibility Check Result	Additional Info
<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	N.A.T. GmbH - Germany/NAMC-LM	● undefined (0)	-	1.5	-ok-	n/a

Step 3: Start HPM Action

Update Devices

Scan for devices that are potential update candidates:

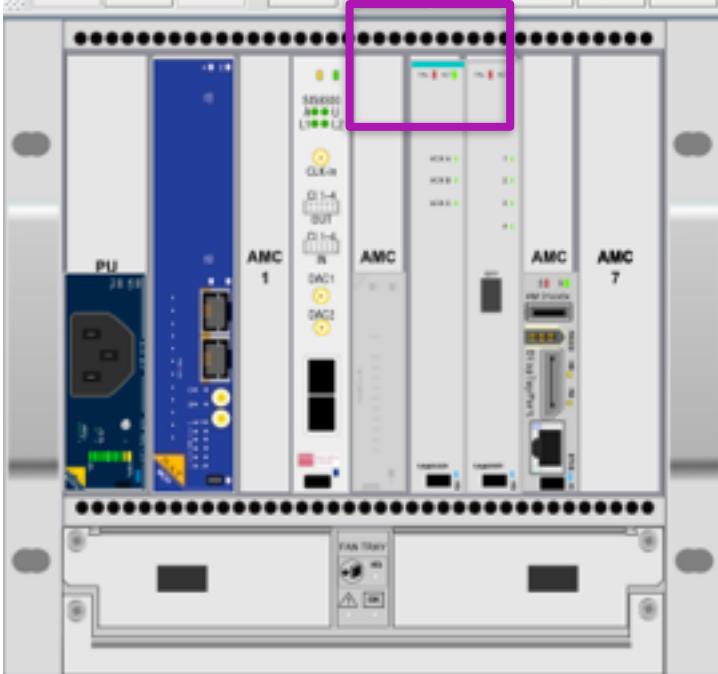
>> [007] N.A.T. GmbH - Germany NAMC-LM

checkCompatibleComponents: FRU #7 seems to have all necessary capabilities

Scan done.

Application **Eru** **Sensor** **Tools** **Help** Auto Update

5 seconds

 Resources

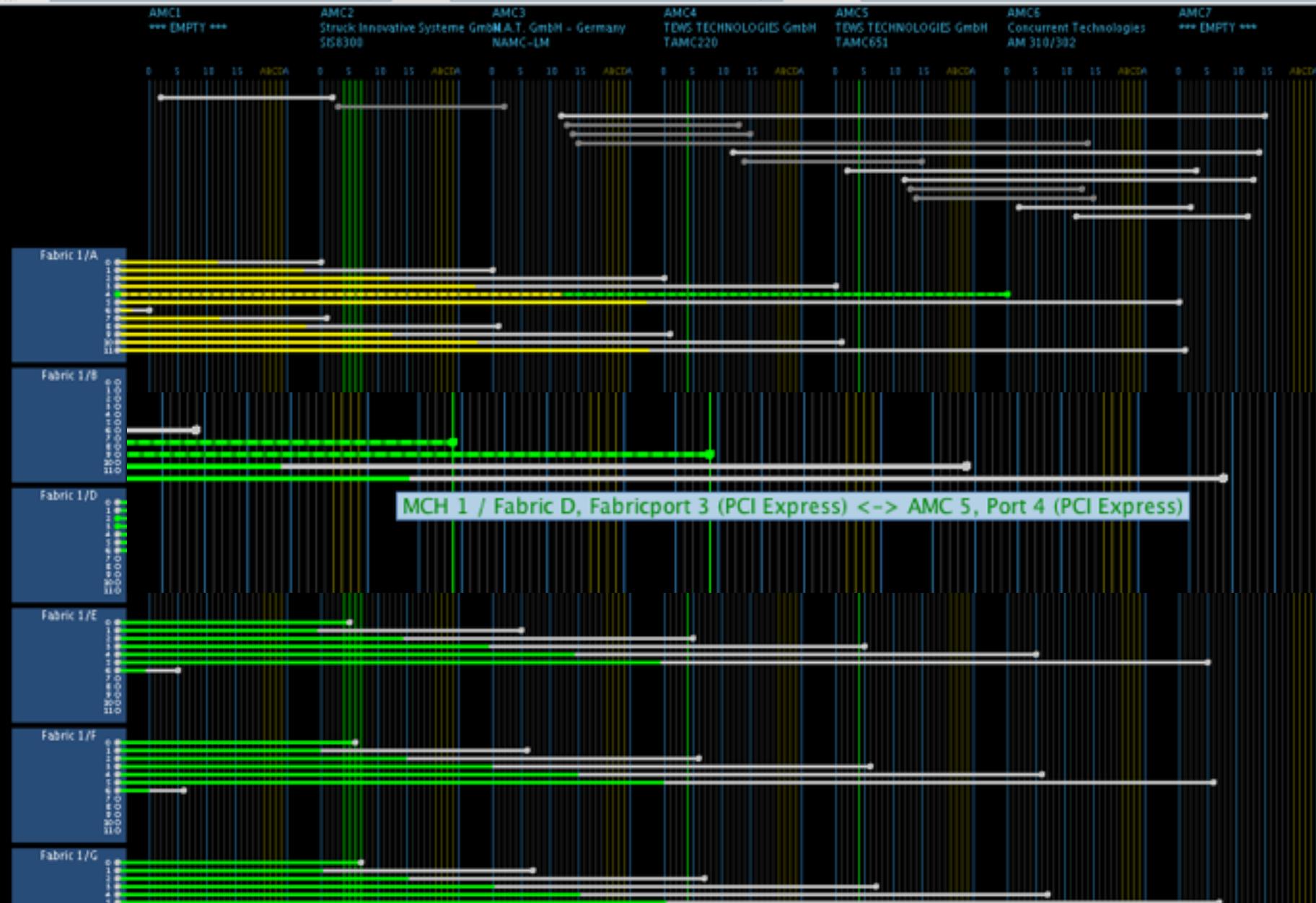
- MCH [003] N.A.T. GmbH - Germany NAT-MCH
- AMC [006] Struck Innovative Systeme GmbH SIS8300
- AMC [007] N.A.T. GmbH - Germany NAMC-LM
- AMC [008] TEWS TECHNOLOGIES GmbH TAMC220
- AMC [009] TEWS TECHNOLOGIES GmbH TAMC651
- AMC [010] Concurrent Technologies AM 310/302
- [040] Schroff GmbH uTCA Cooling
- [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] Schroff GmbH Schroff MicroTCA Backplane
- [254] Schroff GmbH MicroTCA Backplane

Newly successfully connected host 192.168.178.26 added to the systems list.

10 sec

Zoom: 150 %

Linetype: Resource type colors, half/half



Set Event Filter



Set Event Filter

Fru Filter

<input type="checkbox"/> FRU 3	<input type="checkbox"/> FRU 4	<input type="checkbox"/> FRU 5	<input type="checkbox"/> FRU 6	<input checked="" type="checkbox"/> FRU 7	<input type="checkbox"/> FRU 8
<input type="checkbox"/> FRU 9	<input type="checkbox"/> FRU 10	<input type="checkbox"/> FRU 11	<input type="checkbox"/> FRU 12	<input type="checkbox"/> FRU 13	<input type="checkbox"/> FRU 14
<input type="checkbox"/> FRU 40	<input type="checkbox"/> FRU 41	<input type="checkbox"/> FRU 42	<input type="checkbox"/> FRU 43	<input type="checkbox"/> FRU 50	<input type="checkbox"/> FRU 51
				<input type="checkbox"/> FRU 60	<input type="checkbox"/> FRU 61

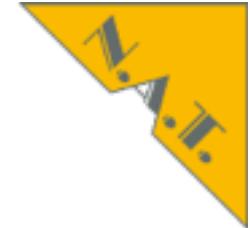
Sensor Filter (as read by N.A.T. MCH)

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 2.2V

Event Category Filter

Non-recoverable Critical Warning Informational

Buttons: Clear all filters, OK, Cancel



Firmware Update

NAT-MCH: Unzip firmware (Password!)

The image shows a file tree structure for the 'mch_fw_V215' folder. The root folder contains several subfolders and files:

- mch_fw_V215**: The root folder.
- bin**: Contains two files:
 - mch_fw_v2_15_webupdate.tar
 - mch_fw.bin
- docu**: Contains 14 PDF files:
 - nat-mch_clk_HWv3x_v13.pdf
 - nat-mch_clk_HWv41_v13.pdf
 - nat-mch_clk_phys_HWv10_v13.pdf
 - NAT-MCH_Eth_Switch_Manual_V1_17.pdf
 - nat-mch_hub-module_PCIE_HWv15_v10.pdf
 - nat-mch_hub-module_PCIE_HWv23_v12.pdf
 - nat-mch_hub-module_SRIO_man_HWv13_14_v12.pdf
 - nat-mch_hub-module_SRIO_man_HWv22_v13.pdf
 - nat-mch_hub-module_XAUI_man_HWv10_v12.pdf
 - nat-mch_man_base_HWv21_v21.pdf
 - nat-mch_man_base_HWv34_v26.pdf
 - nat-mch_man_base_M4_HWv12_v12.pdf
 - Quickstart_MCH.pdf
 - UsersManual_V125.pdf
- FW_V215_release.txt**: A text file.
- mch_fw_V215.zip**: The compressed archive file.

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:

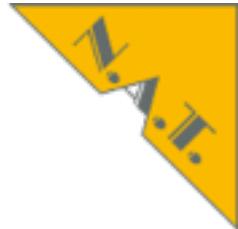
Select file:

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.

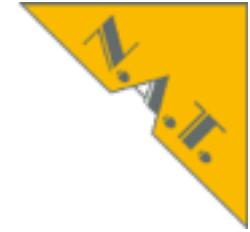
MCH Firmware Update Web Interface



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.

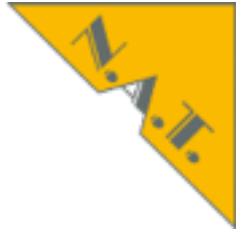
When Update is complete, a power cycle has to be done.



MicroTCA.4

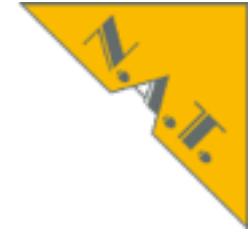
Configuration and Maintenance

- About N.A.T.
- Comparison of Standards
- Configuration Tools
 - Command Line Interface
 - Java-App
 - Web interface
- Examples of Configurations
 - Ethernet and PCIexpress Configurations
 - Emergency Configuration
- Maintenance Tools
 - Analysis locally: LEDs
 - Analysis remotely: inventory, current, revision
 - Firmware update



Thank you very much!

Questions?



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mtca.desy.de/support/training