

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

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53227 Bonn

Germany

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



About N.A.T.

Network and Automation Technology



Innovation Communication

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

The brain of your MTCA.4 system

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

Key Features

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



Let Your **Application** benefit

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



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



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



The QoriQ-
Family
[read more ...](#)

Board Level Products



System Solutions



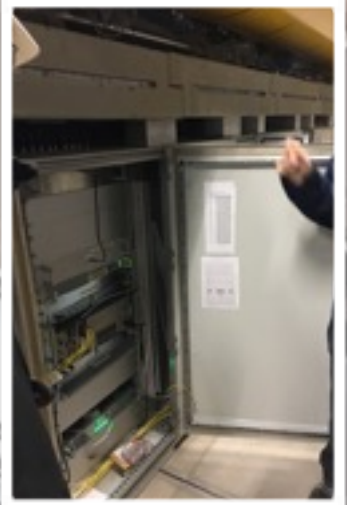
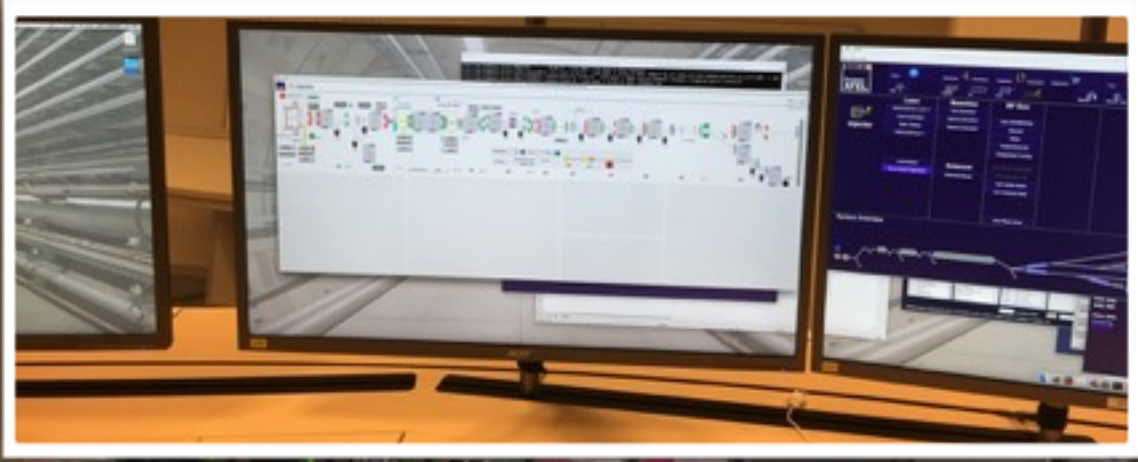
Upcoming Events

- ▶ **MTCA Workshop at DESY**
Dec 9th-10th, 2015, Hamburg
- ▶ **IBIC 2015**
Sept. 13-17th, Melbourne,
Australia
- ▶ **Mobile World Congress**
Mar 2nd-5th, 2015, booth 6840

Latest News

- ▶ **New product NAT-J5H**
Open JTAG switch module in
AMC form factor
- ▶ **NAT-MCH firmware v2.17
and NATview v2.18**
New versions of firmware and
GUI available
- ▶ **AMC module NAMC-ODSP**
New Media Acceleration Engine
based on 8x OCT2224M DSPs
- ▶ **MicroTCA Concept**
Version IV now available

N.A.T. at and in DESY XFEL





Technical specifications and configuration details for the network device, including port settings and performance metrics.

12 11 10 9 8 7 6 5 4 3 2 1



MicroTCA.4

Configuration and Maintenance



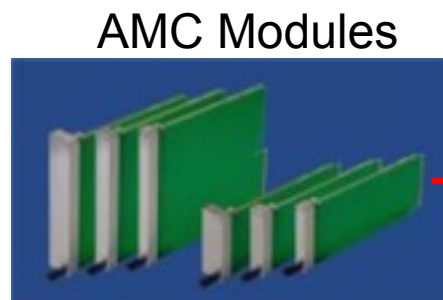
- About N.A.T.
- Comparison of Standards
- Configuration Tools
 - Command Line Interface
 - NATView
 - Web interface
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AMC

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



ATCA Shelf



MTCA Shelf

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	single star, dual star (1/2 switch), full mesh, daisy-chain, ring	dual star, dual-dual star, full meshed	single star, dual star
profiles	yes	no	no
Voltages	MP: 3.3V PP: 3,3V, 5.0V, 12.0V optional: ±3.0V, ±12.0V	MP: 3,3V PP: 48.0V	MP: 3.3V PP: 12.0V
Slot budget (PP)	115W@5V, 384W@12V 768W@48V	400W@48V	80W@12V
Pins per slot	728 (6U), 168 (3U)	234/414	170 (AMC) 260(AMC+RTM)
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	x1, x2, x4, x8	x1, x2, x4, x8	x1, x2, x4, x8
Fabrics	GbE, XAUI, PCIe, SRIO	GbE, XAUI , PCIe, SRIO	GbE, XAUI, PCIe, SRIO
Markets	Mil, Aerospace	Mil, Aerospace, core Net	all

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

MicroTCA

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



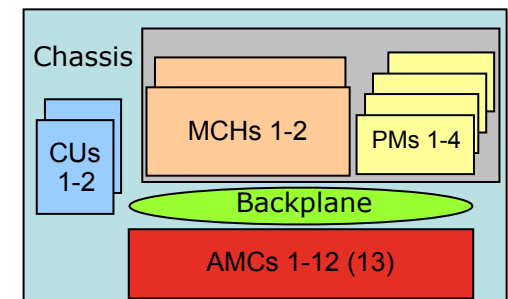
- all data transfer are
 - independent
 - simultaneous
 - bidirectional
- data connections determined by one switch card:
 - **base/common options** fabric: GbE
 - **storage** fabric: SATA
 - **fat pipe** fabric: PCIe or XAUI or SRIO
 - **extended fat pipe** fabric: XAUI or SRIO

MicroTCA Architecture

Advanced Mezzanine Cards (AMCs)



- AMC eco system
 - single and multi-core CPUs (Intel, Freescale, ARM, etc.)
 - single and multi-core PP and NPU
 - 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
- PCME2006 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.

JAVA Tool OS independent



The screenshot displays the NATview 2.25 application window. The main area shows a rack of server hardware with various sensors highlighted. A detailed view of 'Sensor # 203 / LUN 0: Temp CPU = 40.0 degree Celsius (n/a -- n/a)' is shown on the right. The sensor details include a temperature gauge and a table of thresholds:

	MIN	MAX
non-critical	8.0	75.0
critical	4.0	80.0
non-recoverable	2.0	110.0

On the left side of the interface, a list of 'Resources of system 192.168.137.185' is visible, including various sensors and hardware components. A blue sidebar on the left contains a magnifying glass icon and a list of 'Licensed options' with radio buttons:

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

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`

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Web Interface

Source of IP address



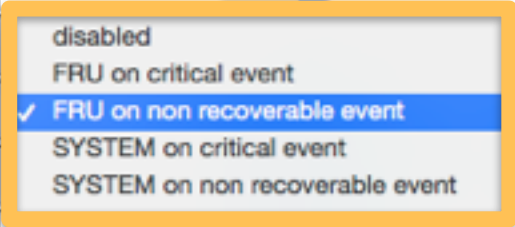
Change MCH Configuration

MCH global parameter	Configuration
remote interfaces:	
Management interface at GbE port	disabled
RMCP access	enabled
telnet access	enabled
WEB access	
IP address source for management port	<ul style="list-style-type: none">no IP addressboard configuration<input checked="" type="checkbox"/> DHCPShM IP link recordCM 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
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
temperature management	 <ul style="list-style-type: none">disabledFRU on critical event<input checked="" type="checkbox"/> FRU on non recoverable eventSYSTEM on critical eventSYSTEM on non recoverable event
emergency shutdown	
Send SEND_MSG confirmation to SMS	
use external shelf manager	no



Ethernet switch parameter	Configuration
configuration source	<input checked="" type="checkbox"/> no configuration <input type="checkbox"/> 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

Configuration and Setting of Multiple MCHs

Backup Settings



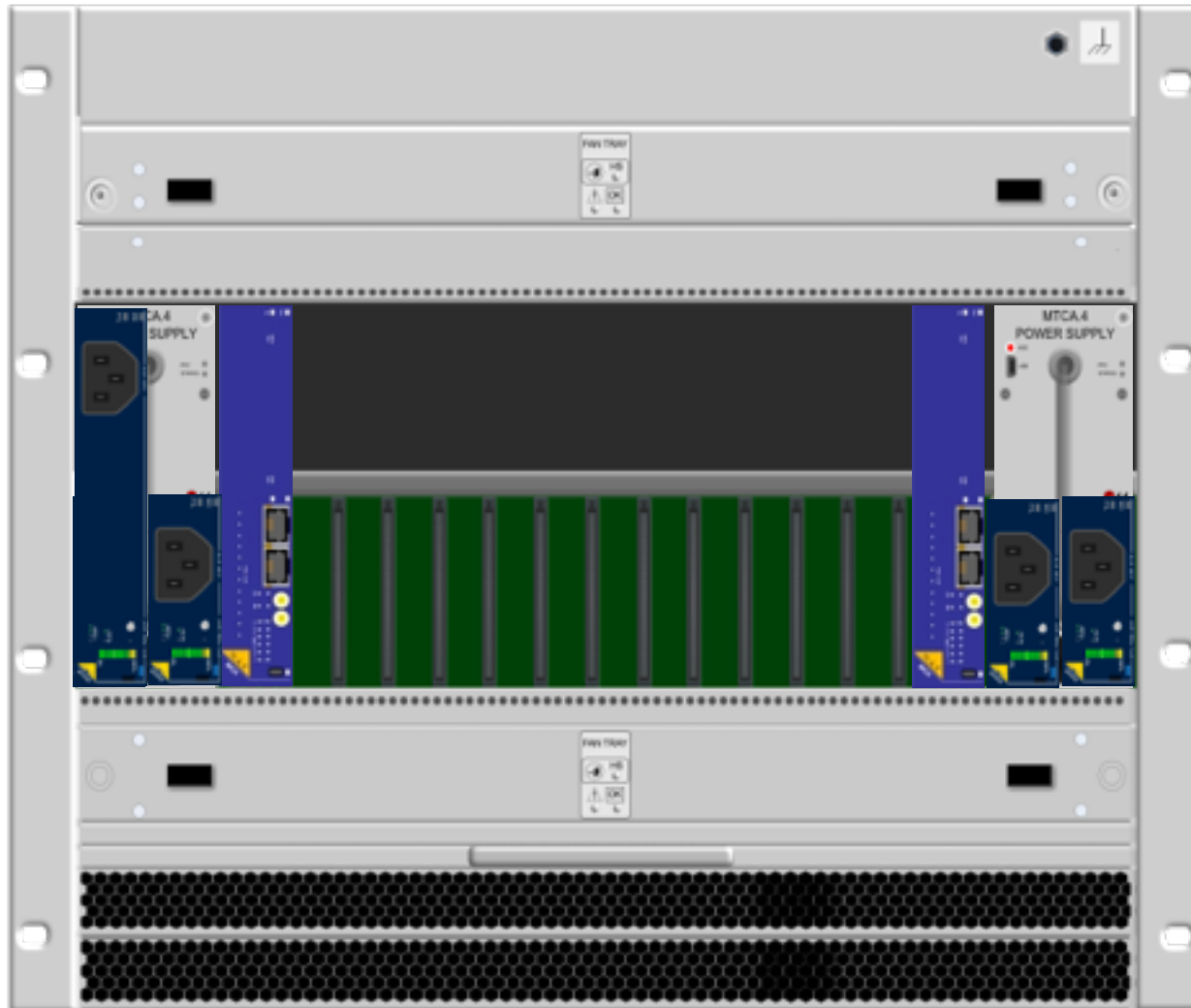
Backup current configuration settings to the onboard FLASH or an external file, or load settings from the onboard FLASH or an external file.

- Save
- Restore
- Generate
- Upload
- Verify

The screenshot shows the 'NAT-MCH Configuration Backup' web interface. On the left, there is a 'Setup' menu with options like 'Show MCH Configuration', 'Change MCH Configuration', and 'Switch' (set to 'BCM5396 1Gb'). Below that is a 'Maintenance' menu where 'Backup Settings' is highlighted with an orange box. The main content area is titled 'NAT-MCH Configuration Backup' and contains several sections: 'Running Configuration: nat_mch_cfg.txt' (highlighted with an orange box), '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, 'Keine Datei ausgewählt' text, checked boxes for 'load on startup' and 'save to FLASH', and an 'Upload' button), and 'Verify configuration file with the Startup Configuration:' (with a 'Select file:' label, a 'Datei auswählen' button, 'Keine Datei ausgewählt' text, and a 'Verify' button).

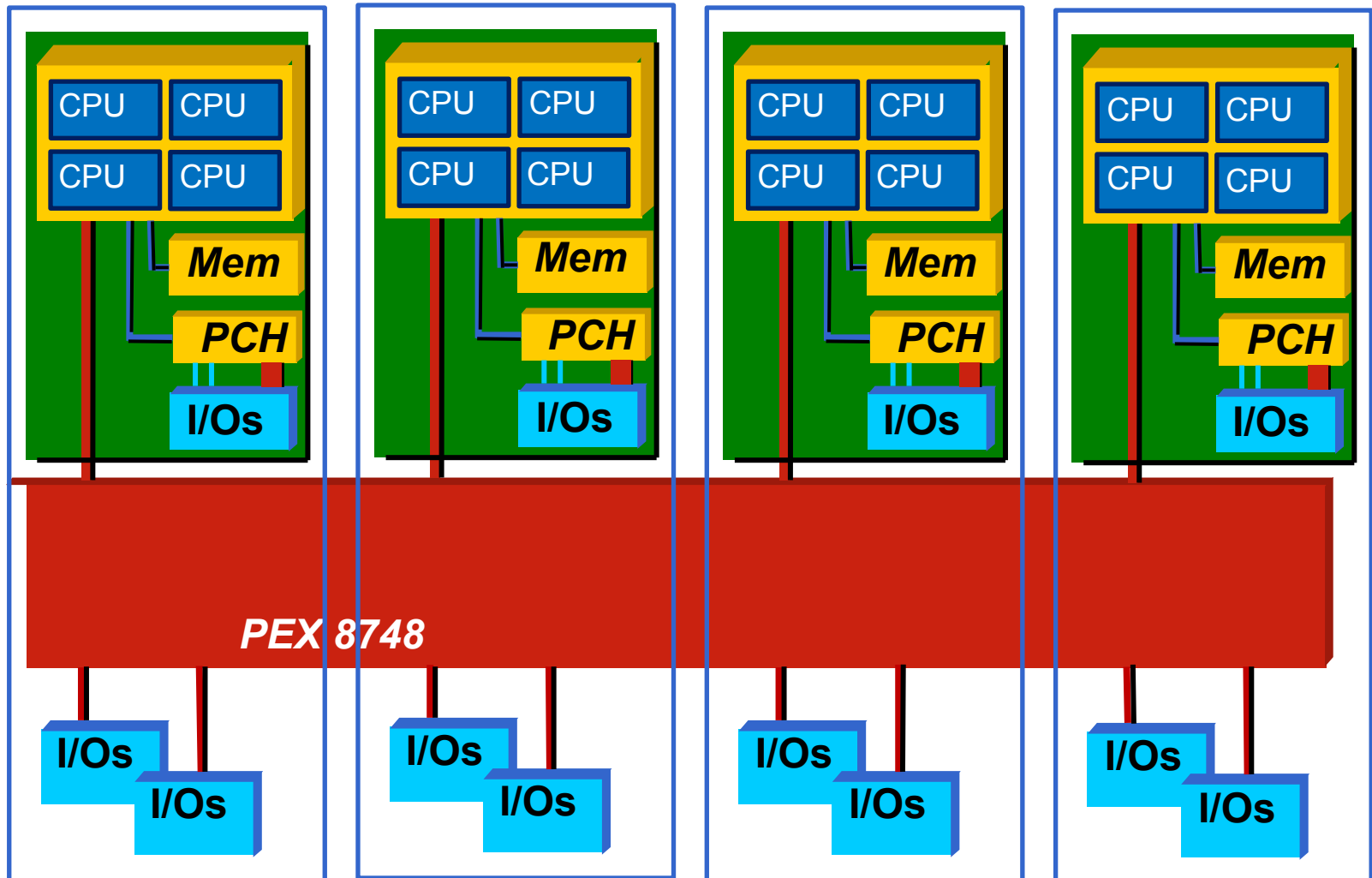
Backplanes with 4 Power Module Sites

1, 2, 3, 4 PMs: Redundancy, Load Sharing



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 AMC's (Upstream) for each virtual switch that shall be enabled first.

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

Select which AMC's shall be connected to each virtual switch as downstream in the end.

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



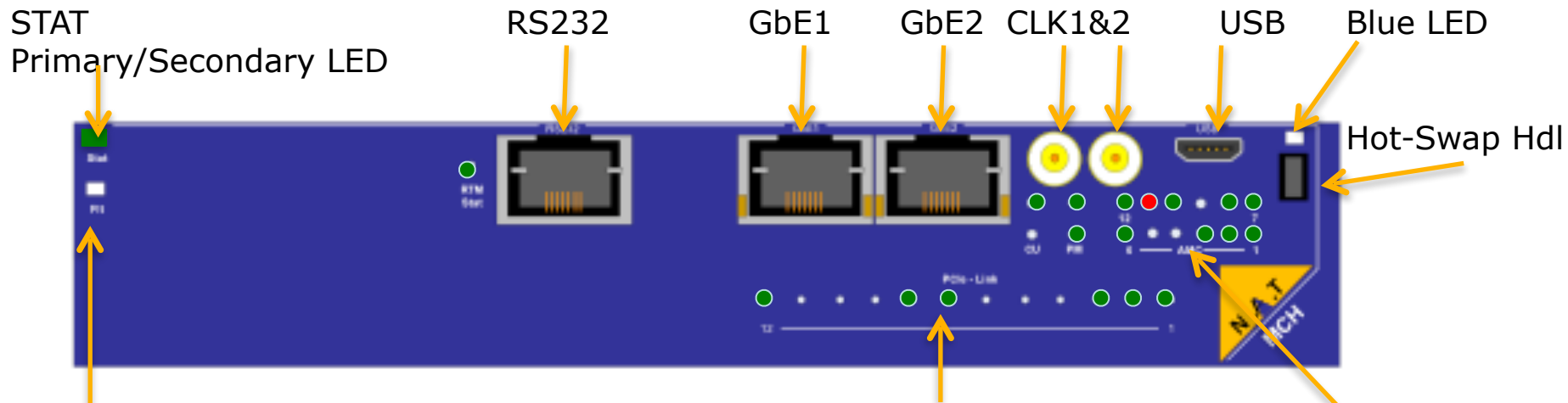
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Analysis locally

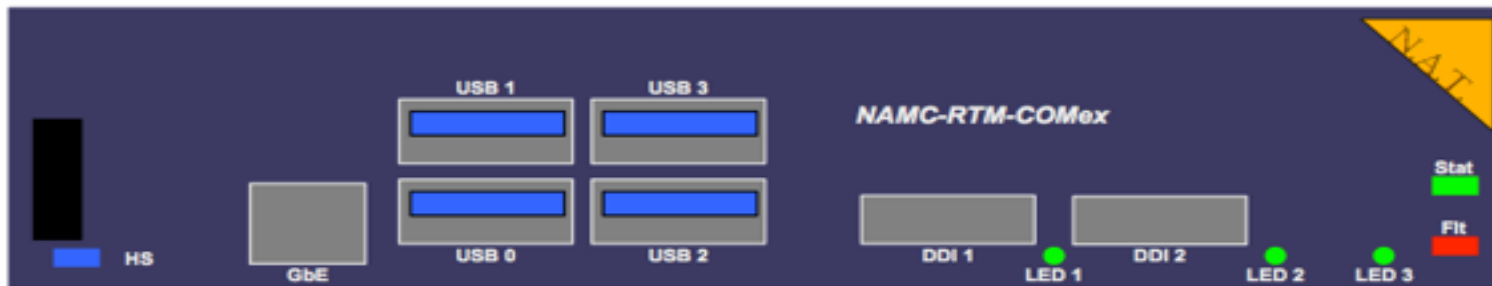
LEDs



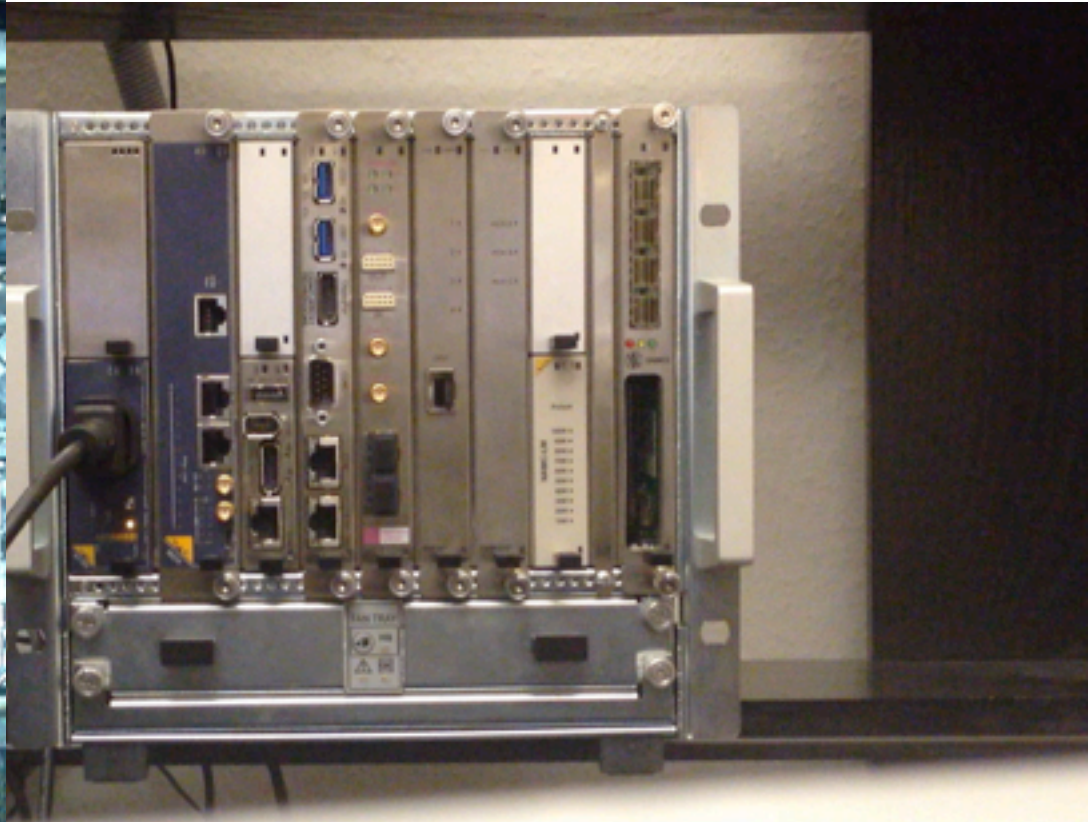
FLT
Red LED = Fault

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



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,

The screenshot shows the NAT-MCH System Information web interface. On the left, there are navigation menus for 'Setup' and 'Maintenance'. The 'System Information' link is highlighted. The main content area displays 'NAT-MCH System Information' with a status message 'collecting information about your system please wait ...' and a download link for 'nat_mch_sysinfo.txt'. A terminal window on the right shows the output of the 'show_fruinfo 253' command, providing detailed hardware and software information.

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
- System Information
- 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) ***

*****

NAT-MCH-PHYS Hw: M4 PCB V1.3 Rev 130927  FPGA V1.9  AVR 1.2 - sn: 113513-0109 - Re
ADPT: 0x3d - SMA CLK, SRAM, HS Ctrl, 2nd FRT ETH, LED MOD
SATA 0 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 L05C) - sn: 1
ITH MOD: ConExpress PCB V1.1  MC V1.0  FPGA V1.1 - sn: 0015 - Rel:121102 - ConEx 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)
telnet daemon support
compiled with GCC 2.95
instruction cache enabled
data cache enabled

CPU: Coldfire MCF 54450
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	EN	EN	EN	EN	EN	EN	EN	EN	EN	EN	EN	EN	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

Port Mirroring Configuration

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

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Configure PCIe Virtual

Switches

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"/>	<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"/>
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)

Maintenance

Board Information

System Information

Reboot NAT-MCH

Update MCH

Change Password

N.A.T. Webpage

Home

Ethernet Analysis with Wireshark

Mirroring IPMI Traffic



The screenshot shows a web browser window titled "MCH Configuration - Chromium" with the address bar displaying "192.168.100.119/index.asp". The main heading is "NAT-MCH by N.A.T.". On the left, there are two menu sections: "Setup" and "Maintenance". The "Setup" menu includes "Base Configuration", "JSM", "Switch" (set to "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", and "BCM5396 counters". The "Maintenance" menu includes "Script Management", "Board Information", "System Information", "Reboot NAT-MCH", "Update MCH", "Change Password", "N.A.T. Webpage", and "Home".

The main content area contains four configuration tables, each with a "Current Configuration" column:

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

At the bottom, there are buttons for "Save", "Discard Changes", and "Reset Configuration".

eth2 (not 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	0.008750000	192.168.100.119	192.168.100.58	IPMI/ATCI	77	Rsp, [uTCA] Get Power Channel Status, seq 0x29
5	1.000041000	192.168.100.119	192.168.100.58	IPMI/ATCI	66	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-racp (623)
- Remote Management Control Protocol, Class: IPMI
 - Version: 0x06
 - Sequence: 0xff
 - > 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: 11]
 - [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
override 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

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    5.0  |  
| 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
---	---------	--------	--------	------	-------	-------	------

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



The screenshot shows the NATview 2.17 software interface. The title bar reads "NATview 2.17 (2014/11/11) - Registered for Vollrath Dirksen, NAT Build date: Thu Nov 13 09:44:54 CET 2014". The menu bar includes "Application", "Eru", "Sensor", "Tools", and "Help". A toolbar contains various icons, with a green icon representing the firmware update function highlighted by a purple box. To the right of the toolbar is an "Auto Update" checkbox and a "5 seconds" dropdown menu. The main area displays a rack of server components, including a blue backplane and several white modules labeled "AMC 1", "AMC 2", and "AMC 7". Below the rack view is a "Resources" list with the following entries:

- [003] N.A.T. GmbH - Germany NAT-MCH
- [006] Struck Innovative Systeme GmbH SIS8300
- [007] N.A.T. GmbH - Germany NAMC-LM
- [008] TEWS TECHNOLOGIES GmbH TAMC220
- [009] TEWS TECHNOLOGIES GmbH TAMC651
- [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
- [064] N.A.T. GmbH - Germany NAT-MCH-RTM-ComExpress
- [093->008] TAMC220-RTM
- [253] Schroff GmbH Schroff MicroTCA Backplane
- [254] Schroff GmbH Schroff MicroTCA Backplane

On the right side, a detailed view for "FRU Device #50: N.A.T. GmbH NAT-PM-AC600" is shown:

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



At the bottom of the window, a status bar reads: "Newly successfully connected host 192.168.178.26 added to the systems list".

Step 1: Choose your HPM File

Browse...

Open HPM file

Suchen in:  HPM-Update-Files

-  namc_lm.hpm
-  pm_ac600_V11.hpm

Dateiname: Dateityp:

Öffnen

Abbrechen

Step 2: Choose devices

 Show only compatible

Update Start FRU ID

Check Result Addition

Step 3: Start HPM Action

Update Devices

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 MDS 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

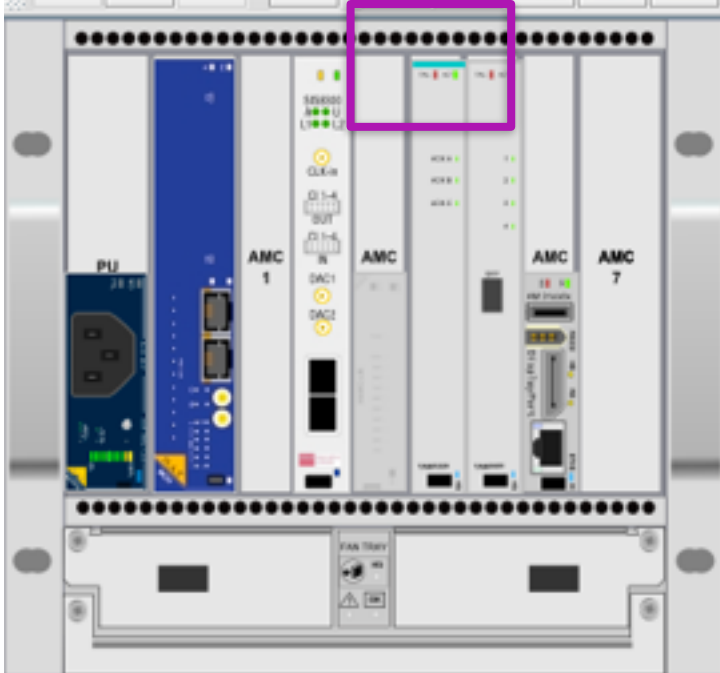
Show only compatible FRUs

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 candiates:  
>> [007] N.A.T. GmbH - Germany NAMC-LM  
checkCompatibleComponents: FRU #7 seems to have all necessary capabilities  
Scan done.
```



- 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

AMC1 *** EMPTY *** AMC2 Struck Innovative Systeme GmbH N.A.T. GmbH - Germany S58300 AMC3 TEWS TECHNOLOGIES GmbH NAMC-LM AMC4 TEWS TECHNOLOGIES GmbH TAMC220 AMC5 TEWS TECHNOLOGIES GmbH TAMC651 AMC6 Concurrent Technologies AM 310/302 AMC7 *** EMPTY ***

0 5 10 15 ANCA 0 5 10 15 ANCA 0 5 10 15 ANCA 0 5 10 15 ANCA 0 5 10 15 ANCA 0 5 10 15 ANCA 0 5 10 15 ANCA

Fabric 1/A
Fabric 1/B
Fabric 1/D
Fabric 1/E
Fabric 1/F
Fabric 1/G

MCH 1 / Fabric D, Fabricport 3 (PCI Express) <-> AMC 5, Port 4 (PCI Express)

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 3.3V

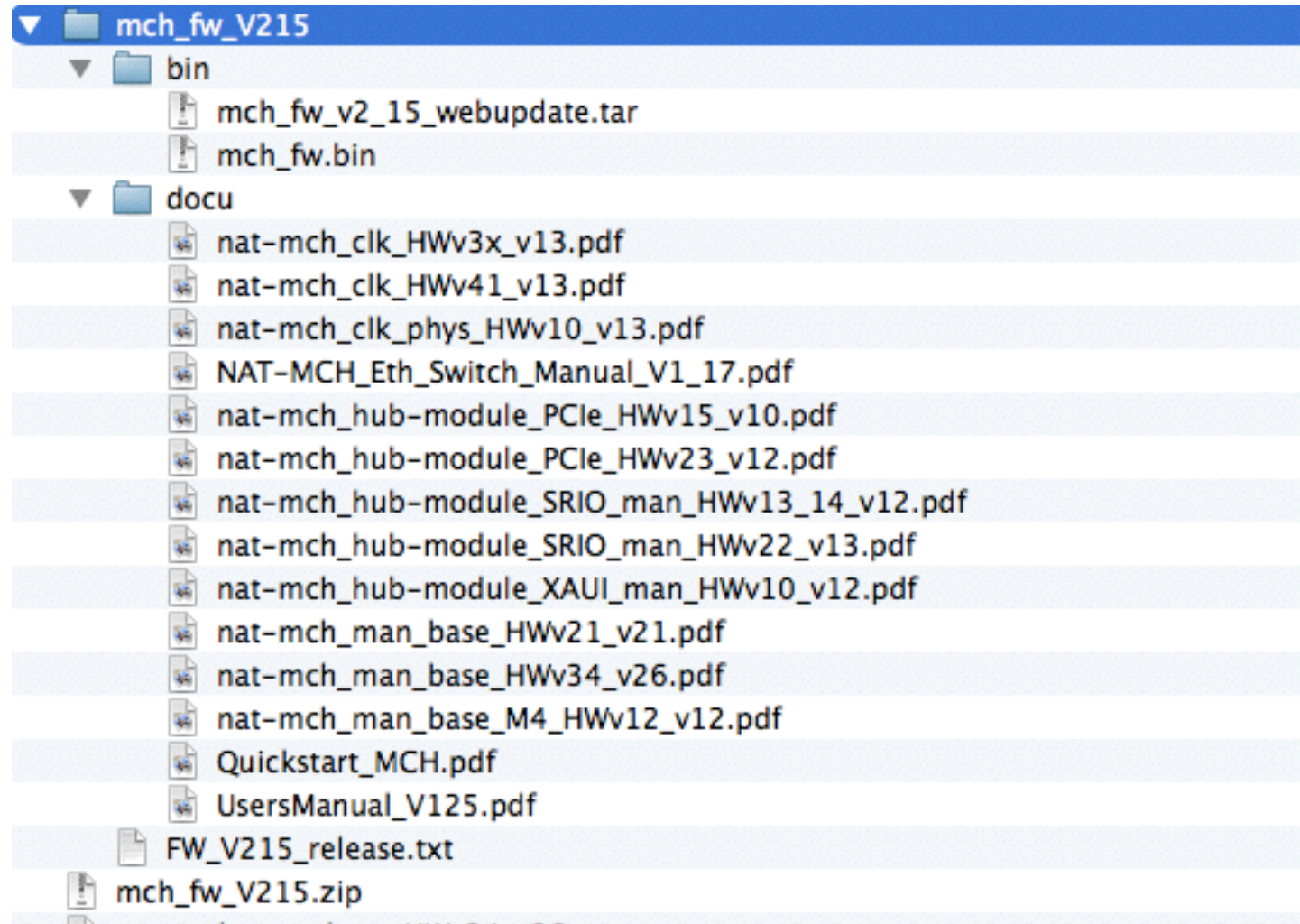
Event Category Filter

Non-recoverable Critical Warning Informational

Clear all filters OK Cancel

Firmware Update

NAT-MCH: Unzip firmware (Password!)



MCH Firmware Update

Web Interface



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

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"/>

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

It is time ... to change your Computing Platform!



Thank you very much!

Questions?



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www.nateurope.com

MTCA.4 Training:

mtca.desy.de/support/training

www.nateurope.com/services/support.html