Tutorial 2: MCH and power unit (system basics)

9th Virtual MicroTCA Workshop for Industry and Research

December, 1st, 2020

Heiko Koerte

1

Welcome to my 20 minutes "learn-and-relax" tutorial

Hot topic of today: MCH and power unit

2

About N.A.T. – who we are

- Gesellschaft für **N**etzwerk- und **A**utomatisierungs-**T**echnologie mit beschränkter Haftung => **N.A.T.**
- proud to provide quality "made in Germany"
  - since more than 30 years by 25 highly professional employees
- privately owned and owner lead business
- own purpose-built building of more than 1,600m² (17,222ft²) with on-site centers for
  - hardware and software design
  - pre-manufacturing and test + repair
- ISO 9001:2015 certified

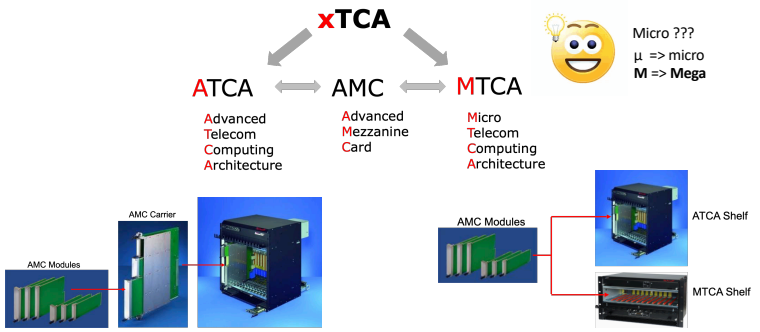
3

Agenda

- **PART 0 - About N.A.T.**
- **PART I - Open Standards**
  - Why they are needed and how to benefit from them
  - In a nutshell: the open platform MicroTCA
- **PART II – NAT wireless product line**
  - Introduction
    - Reasons for FPGA based products and goals to achieve
  - Hardware
    - NAT-AMC-ZYNQUP-FMC, NAT-FMC-SDR-x and NAT-AMC-ZYNQUP-SDR
    - NAT-SDR-FLEX-x
    - Packaging
  - Software
    - Generic SDR package
    - Basestation package
- **PART III – SDR Applications**
  - NAT-AMC-ZYNQUP-SDR and NAT-SDR-FLEX-x
  - Use Cases vs. Features
  - Analysis on use case
    - SDR: jamming, direction finding, generic test platform
    - Base station for Campus networks
- **Part IV - Live Demo on Phase Synchronization**
  - Introduction
  - Demonstration

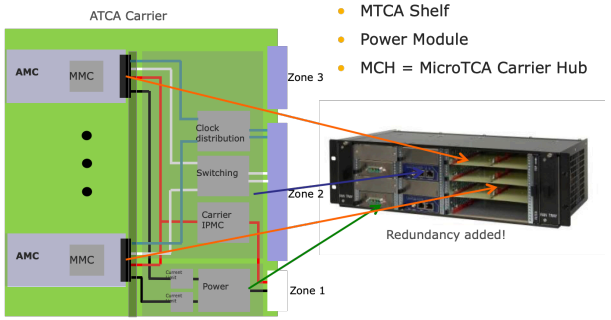
4

The xTCA family: AdvancedTCA and MicroTCA



5

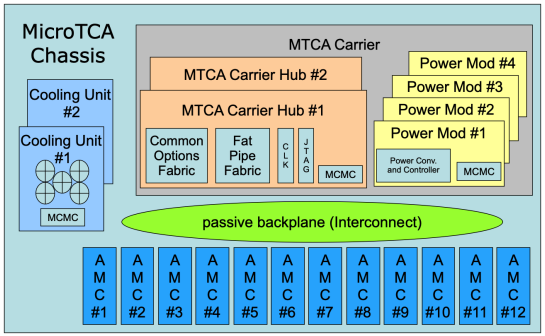
The xTCA family: AdvancedTCA and MicroTCA



- MTCA Shelf
- Power Module
- MCH = MicroTCA Carrier Hub

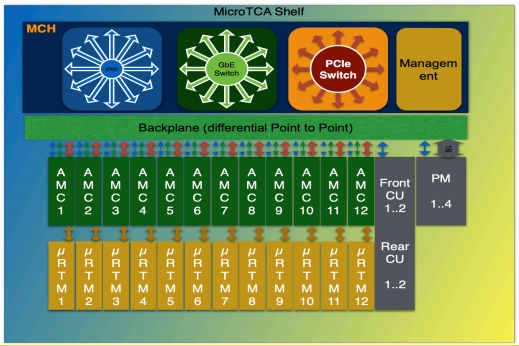
6

MicroTCA System Architecture: MTCA.0



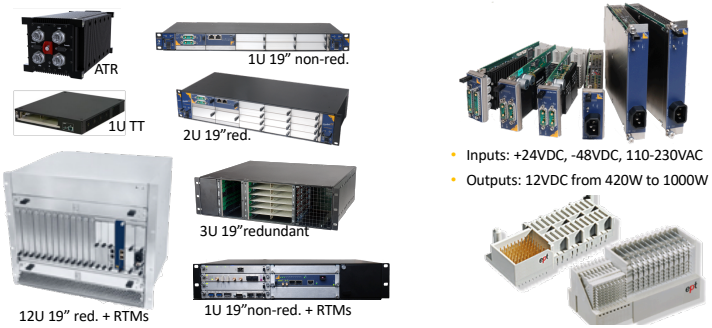
8

MicroTCA System Architecture: MTCA.4



9

MicroTCA building blocks: chassis and power modules



- Inputs: +24VDC, -48VDC, 110-230VAC
- Outputs: 12VDC from 420W to 1000W

10

MicroTCA building blocks: backplane and MCH

Backplane

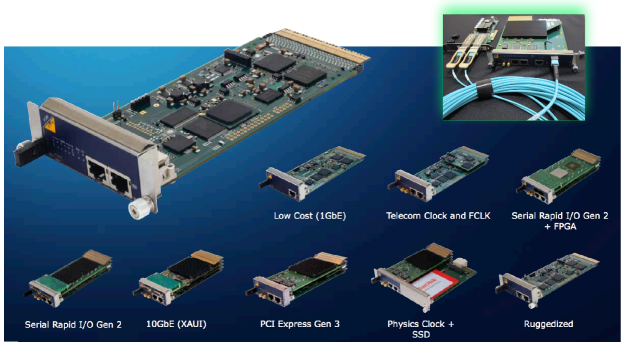
- Passive with star or dual-star topology
- All data transfers are
  - Independent
  - Simultaneous
  - Bi-directional
- Data connections organized in **Fabrics**:
  - Base Fabric:
    - GbE (10GbE with MTCA-NG)
  - Fat Pipe Fabric:
    - PCIe Gen3 (MTCA-NG: Gen5)
    - 1GbE, 10GbE, 40GbE (MTCA-NG: 100GbE)
    - SRIO Gen2

MCH

- Modular concept based on several PCBs with different functionality
  => Flexible adoption to any communication and performance requirements

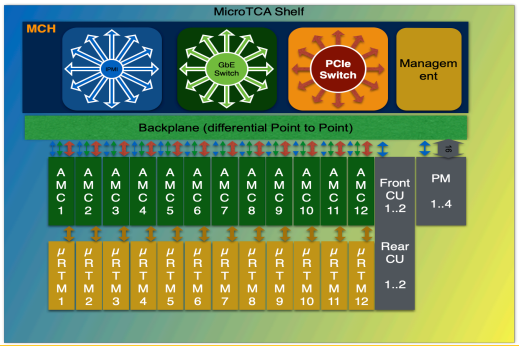
11

MicroTCA building blocks: MCH



12

MicroTCA System Architecture: MTCA.4



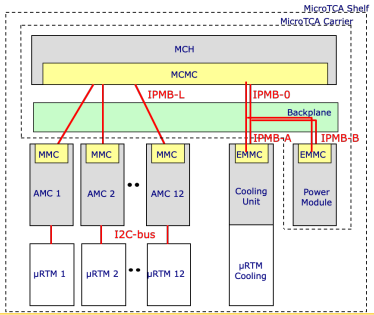
13

MicroTCA System Management: IPMI and I²C

IPMB-L
- connects the MCMC on the MCH to the MMC on the AMC Modules
- radial architecture

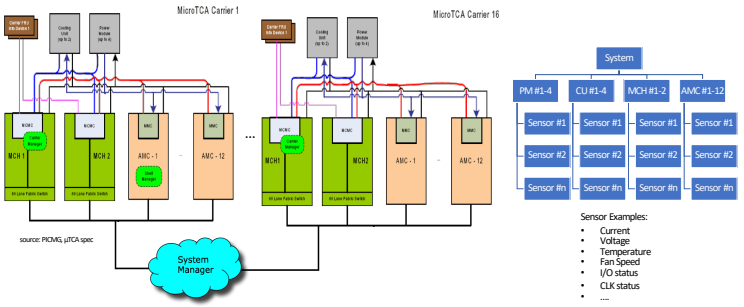
IPMB-0 .1
- connects the MCMC on the MCH to the EMMC on the PMs and CUs
- bussed architecture

I2C-bus
- connects the AMC to its µRTM
- the µRTM is treated as managed FRU of the AMC



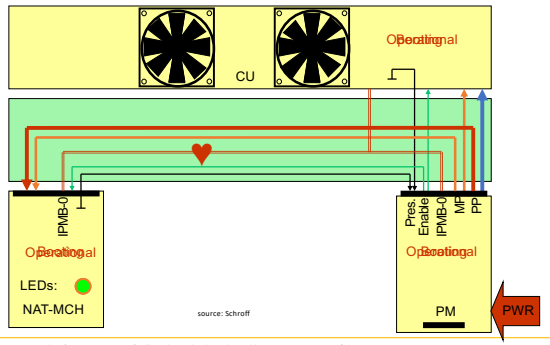
14

MicroTCA System Management: what you can do



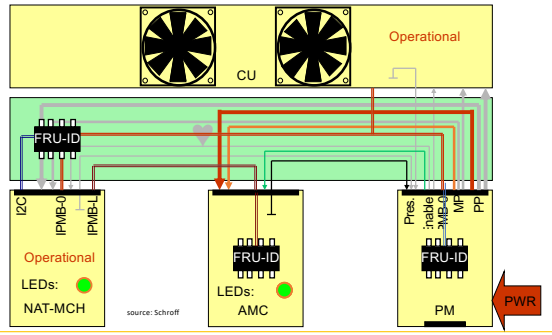
15

MicroTCA System Management: turn on power!



16

MicroTCA System Management: boot up your payload!



17

Almost the last slide …

That's all MicroTCA is about …

I know, you have heard what was said …

… but …

… I am not sure if this was what was meant …

18

Time to change your platform!

19