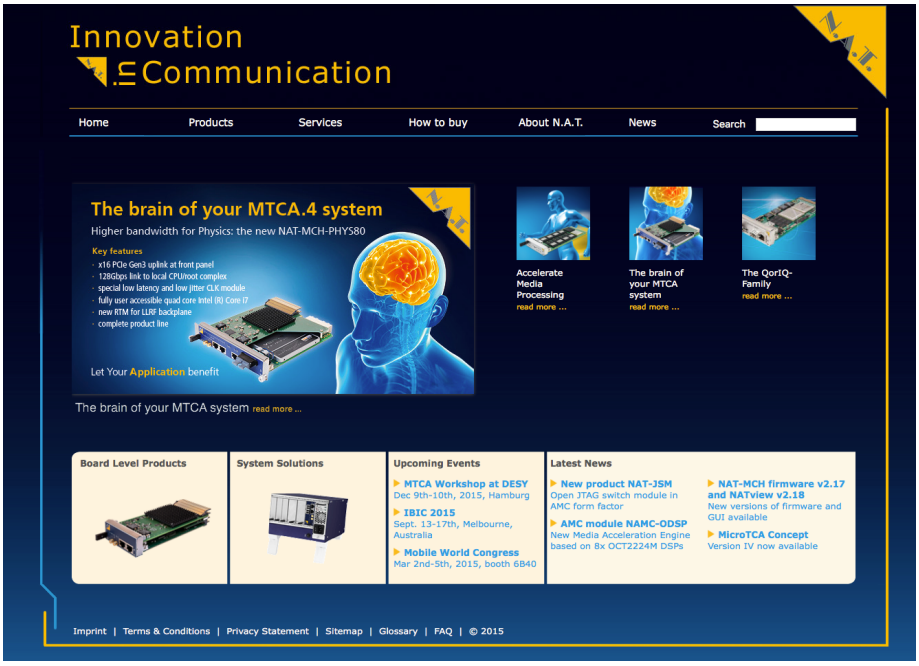
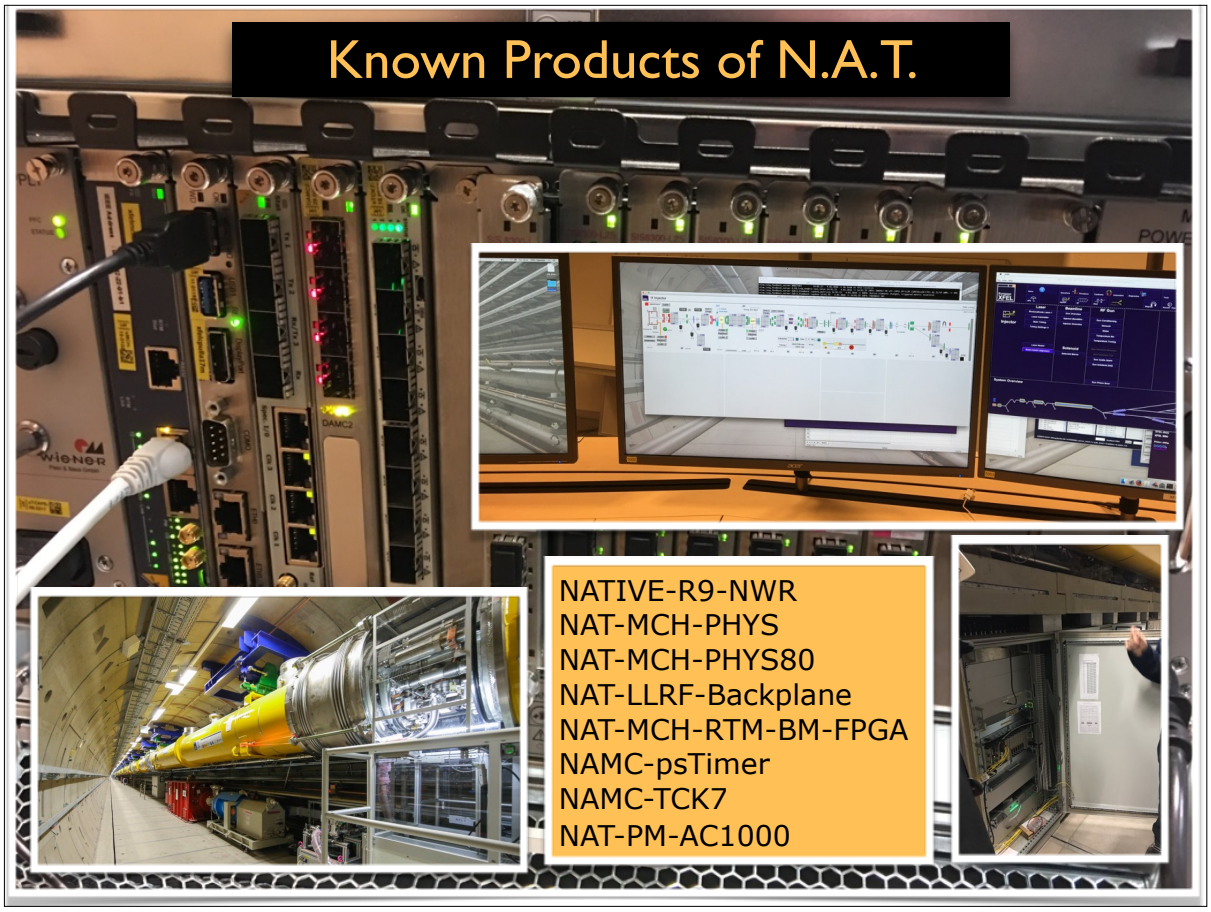
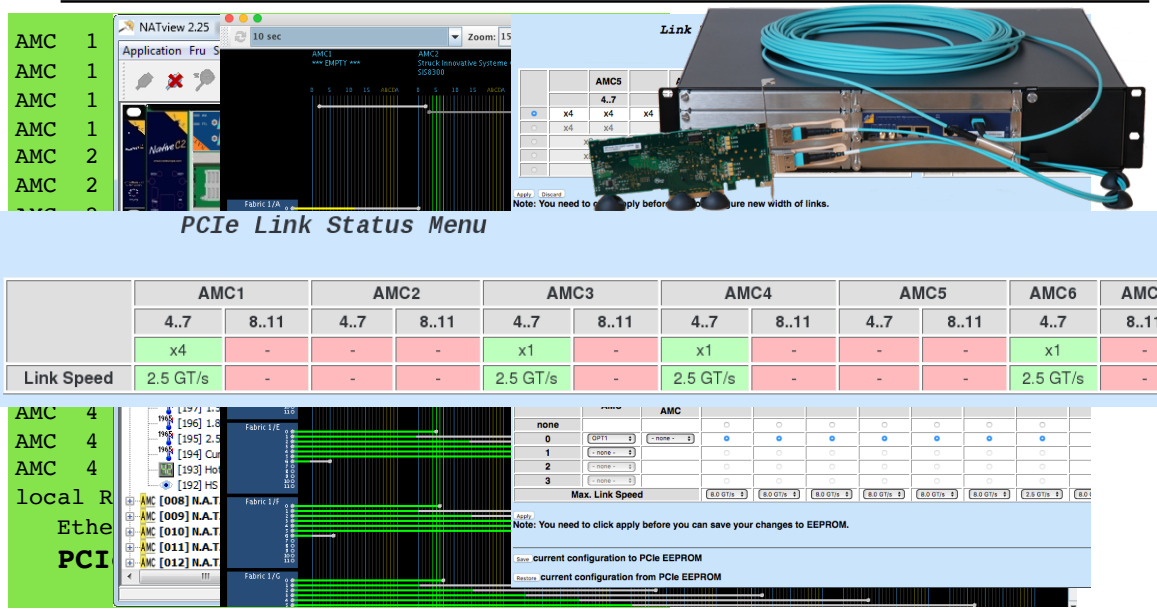
MicroTCA Workshop 2017 - Vollrath Dirksen, N.A.T.

Mechanism to Speed-up Development of FPGAs in MTCA Systems





Easy to Used Management Tools
NAT-MCH



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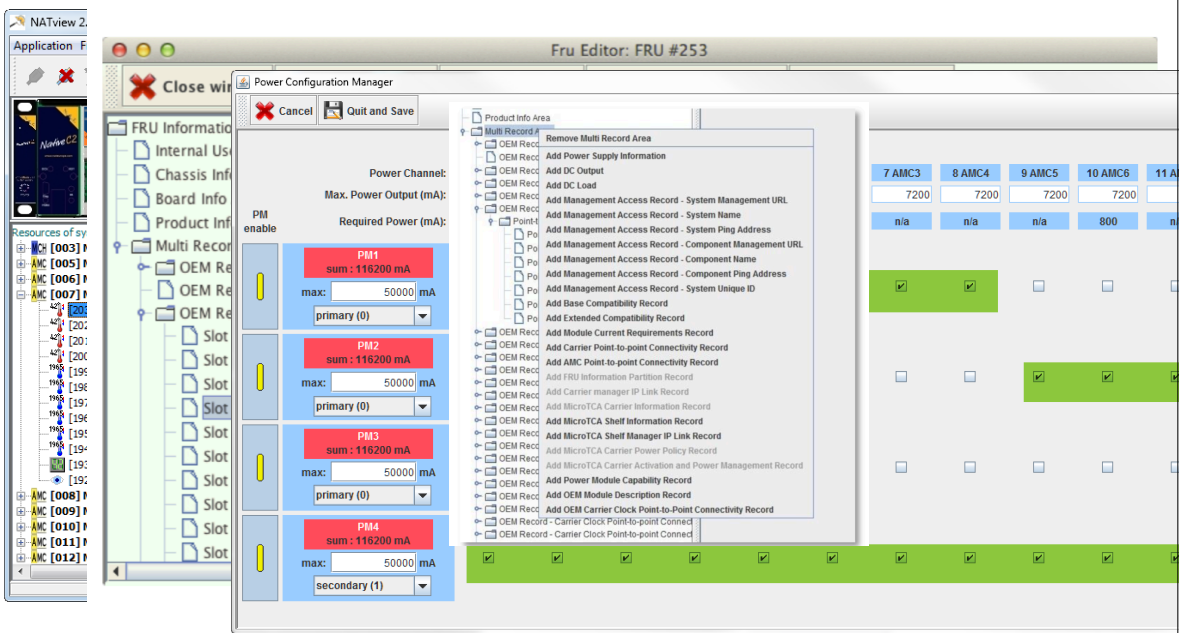


What's next
Mechanism to Speed-up Development of FPGAs in MTCA Systems

- Infrastructure Solved
  - Easy Configuration and Maintenance
- Payload
  - CPU -> Linux ->done
  - IO-Boards
    - all kind of drivers -> see talk ChimeraTK
  - **FPGA**
    - **setup -> time consuming**
    - **FPGA Mezzanine Card -> flexible IO**

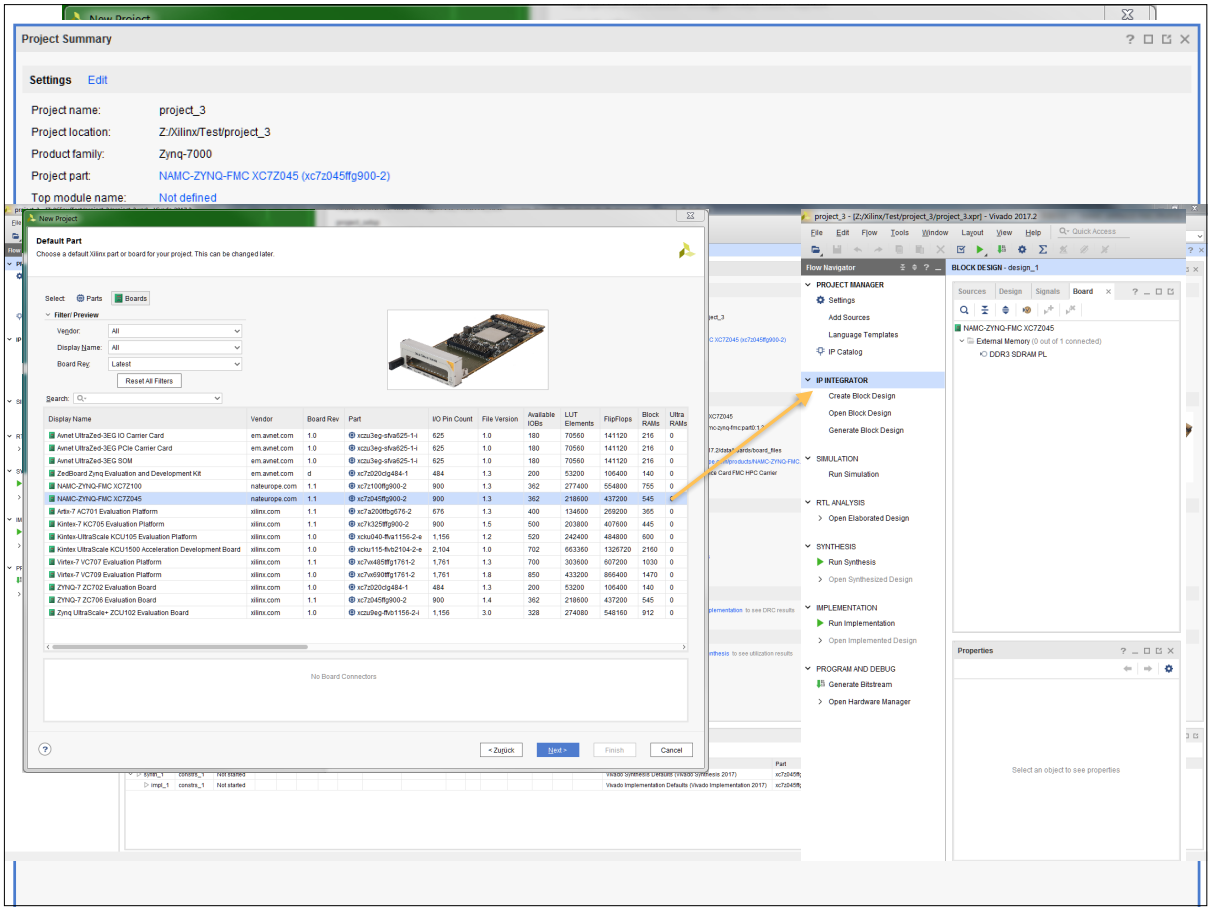
    - **How to use improvement of modern development tools e.g. Xilinx Vivado and Intel Avalon even further**

Vision
Port the Easy Handling of MCH to Handling of FPGA

Faster out-of-the box experience

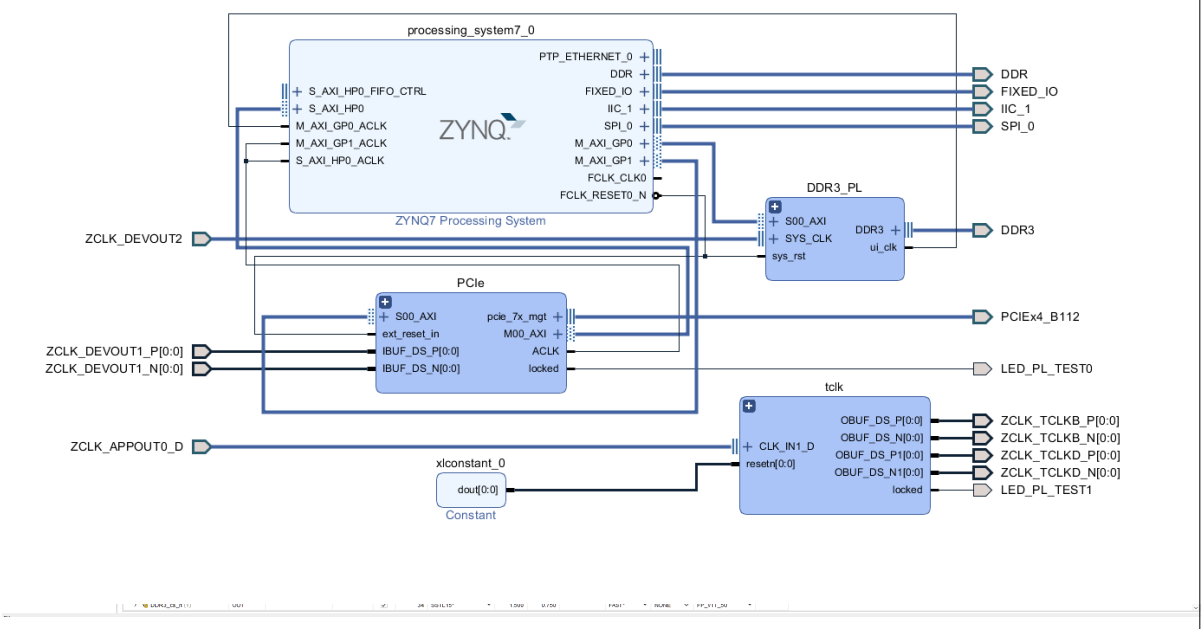
- Faster Board configuration via Web Interface
  - e.g. configuration of PLLs and Clock Multiplexers
- **FMC EEPROM Editor similar to FRU-Editor of NATview**
- **Easier Debugging including Remote Debugging via JTAG**
- **Easier Maintenance**
  - **Read out of temperature, voltage and other sensors of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

- **GOAL: Quick development results**



Vision

Faster out-of-the box experience



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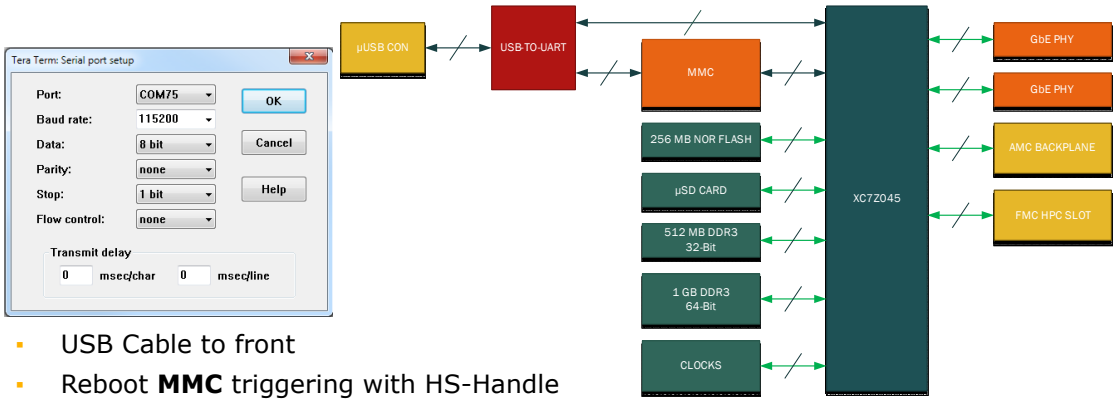
Vision
FMC EEPROM Editor

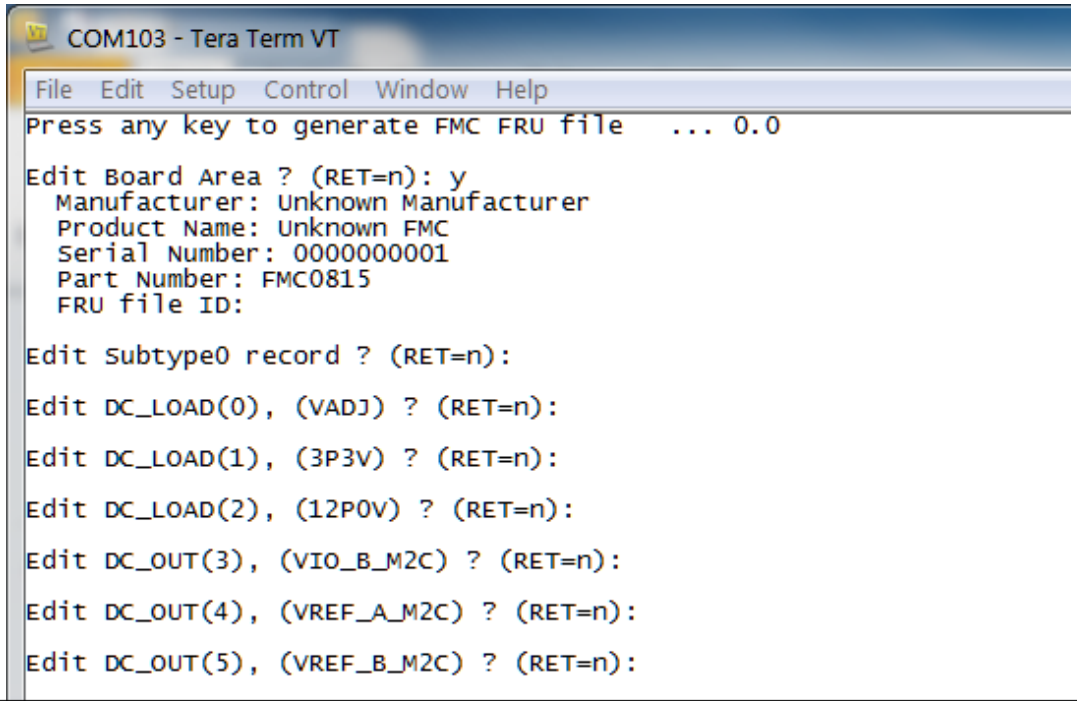
- FMC with EEPROM content
  - Per default the carrier will try to parse the FMC FRU records from the modules EEPROM contents to set the carriers power supply and clock direction.
- FMC **without** records in EEPROM
  - Skip FMC EEPROM parsing with setting SW2-4 to ON.
    - Warning: In this case a default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

FMC EEPROM Editor
Generate and Program the Records



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

Animation bzw. Video FMC-EEPROM Programming



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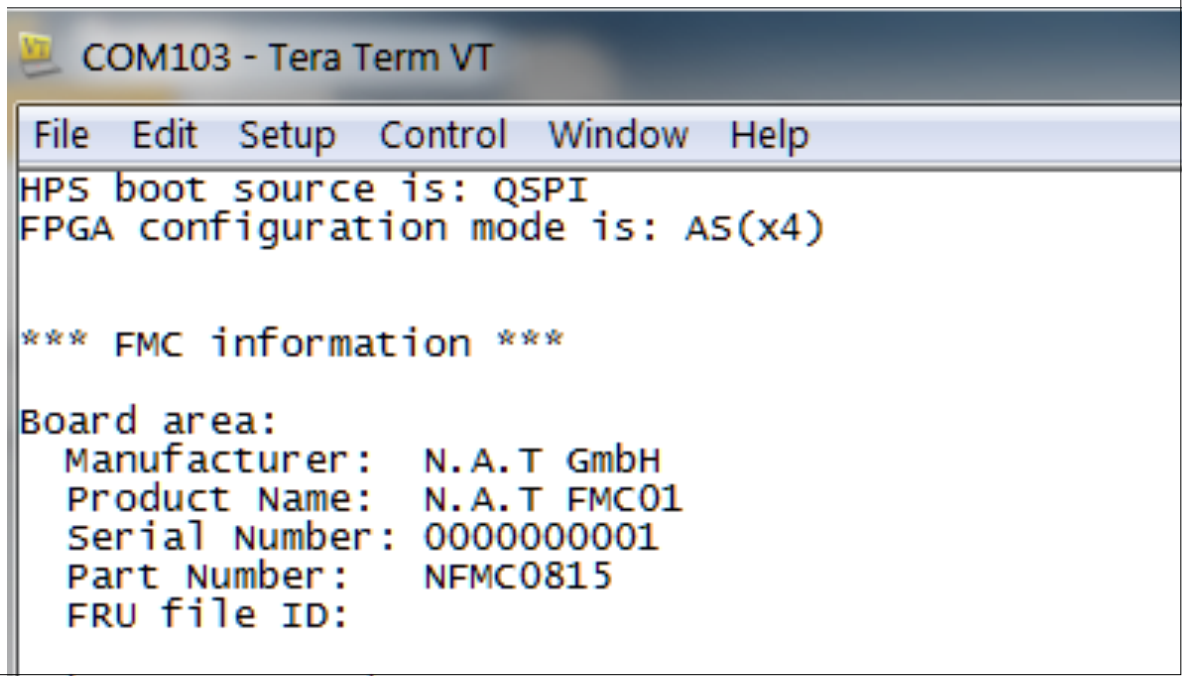

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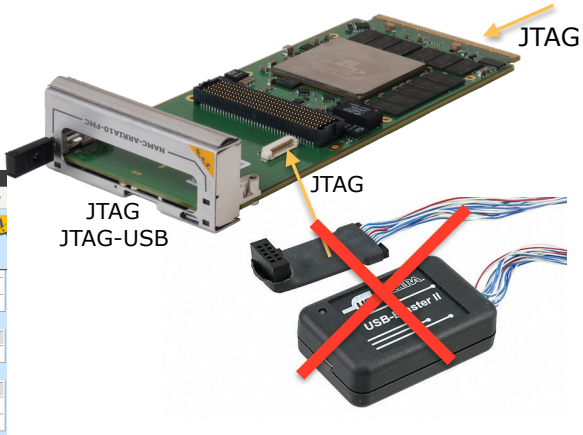
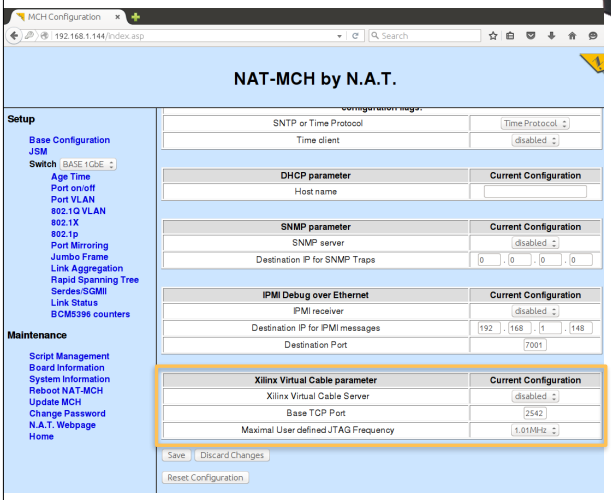
Easier Debugging/Remote Debugging
Web Interface

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





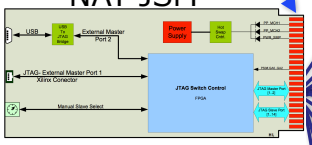
FPGA Development Tool: Vivado
connect_hw_server
open_hw_target -xvc_url 192.168.137.193:2542

JTAG encapsulated in Ethernet Packets

MCH

JTAG Switch Master

NAT-JSM



AMC 12

AMC 1

MCH 1

PM 1

JTAG encapsulated in Ethernet Packets

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

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Maintenance
show_fru, show_sensorinfo

- Inventory show_fru
- Sensors show_sensorinfo
- Power budget show_pm

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

```
-------------------------------------------------------------
PM1: - online, primary(fru 50)    : budget 50.0 A (alloc 24.6 A
avail 25.4 A)
PM2: - unknown
PM3: - unknown
PM4: - unknown
|-----------------------------------------------------------|
|chan  FRU FruId  primPM  secPM  PS1  POn  ENA   MP  PP  Amps |
|-----------------------------------------------------------|
  1   MCH1     3   1       -      y    y    y    y   y   6.0
  2   MCH2     4   -       -
  3    CU1    40   1       -      y    -    y    y   y   4.0
  4    CU2    41   -       -
  5   AMC1     5   1       -      y    -    y    y   y   5.6
  6   AMC2     6   1       -      -    -    -    -   -
  7   AMC3     7   1       -      y    -    y    y   y   4.0
  8   AMC4     8   1       -      y    -    y    y   y   5.0
  9   AMC5     9   1       -      y    -    y    y   y   5.0
 10   AMC6    10   1       -      y    -    y    y   y   5.5
 11   AMC7    11   -       -
 12   AMC8    12   -       -
 13   AMC9    13   -       -
 14  AMC10    14   -       -
 15  AMC11    15   -       -
 16  AMC12    16   -       -
|-----------------------------------------------------------|
```


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