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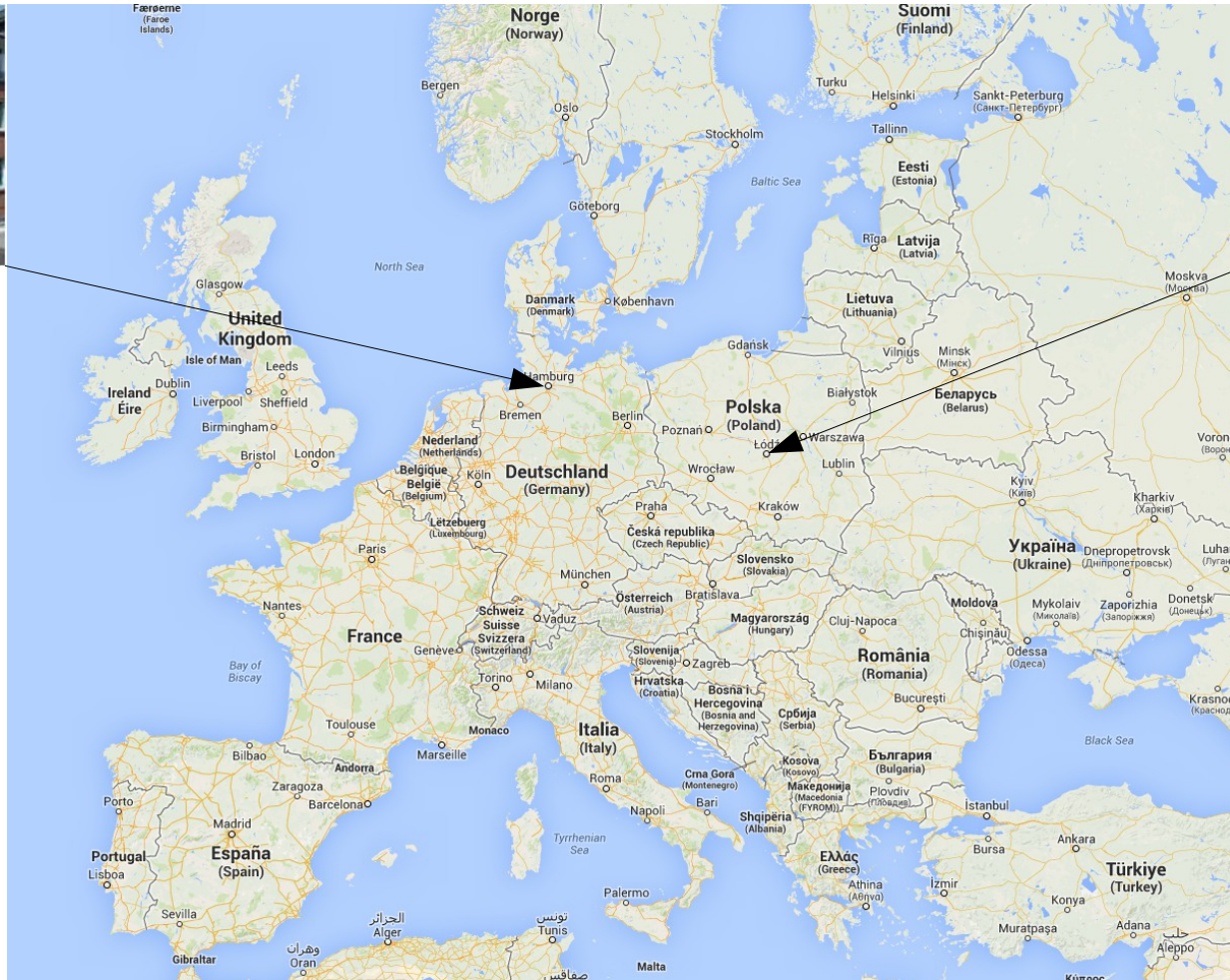
# Scalable Readout Systems based on ATCA

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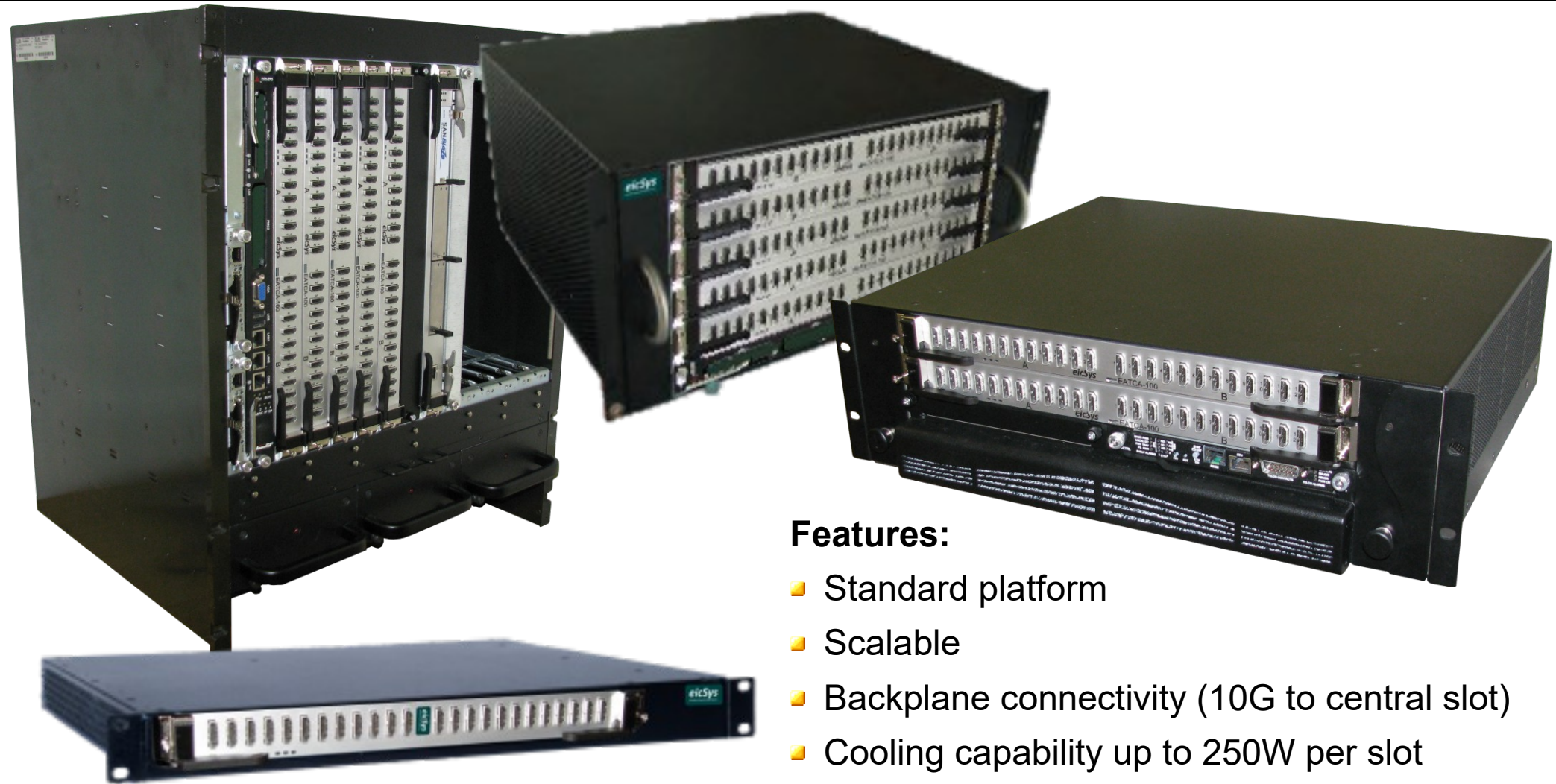
# Outlook

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- SRS-ATCA elements / status
- System architecture
- Software / firmware development



# Scalable Readout Systems based on ATCA



## Features:

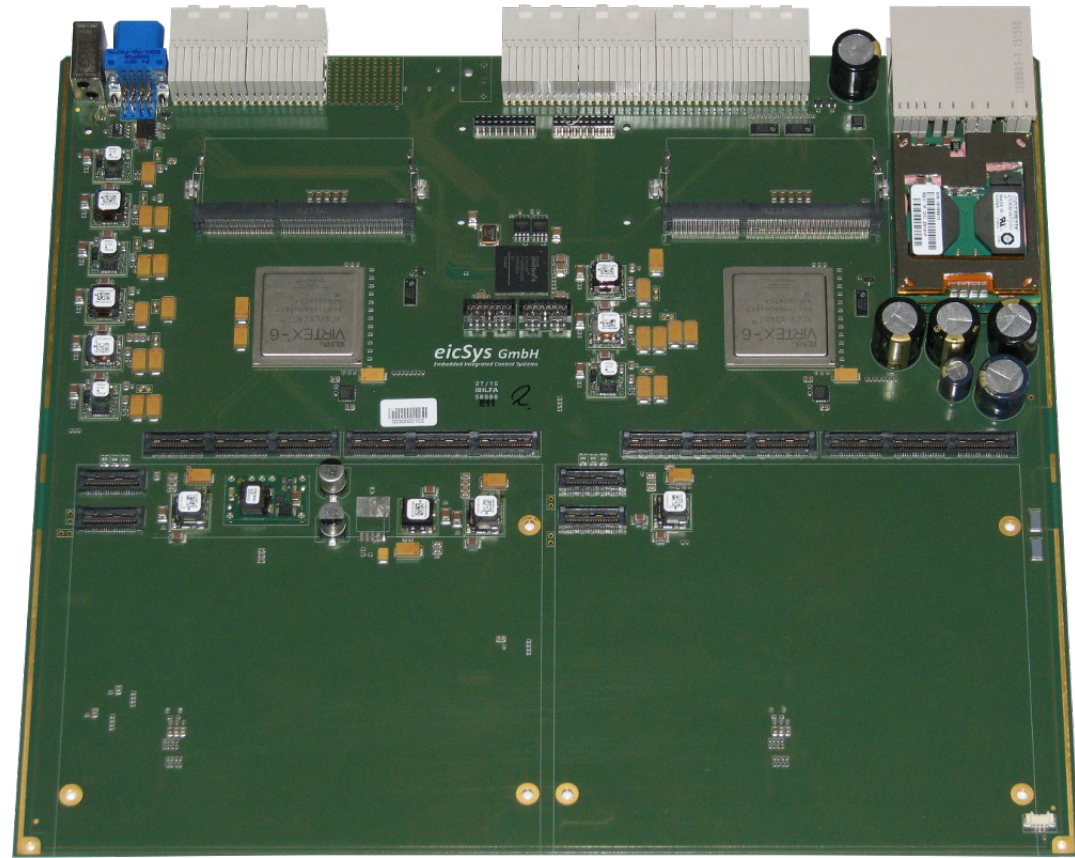
- Standard platform
- Scalable
- Backplane connectivity (10G to central slot)
- Cooling capability up to 250W per slot
- Chassis management

# SRS – ATCA – Hardware

## EATCA-100/101

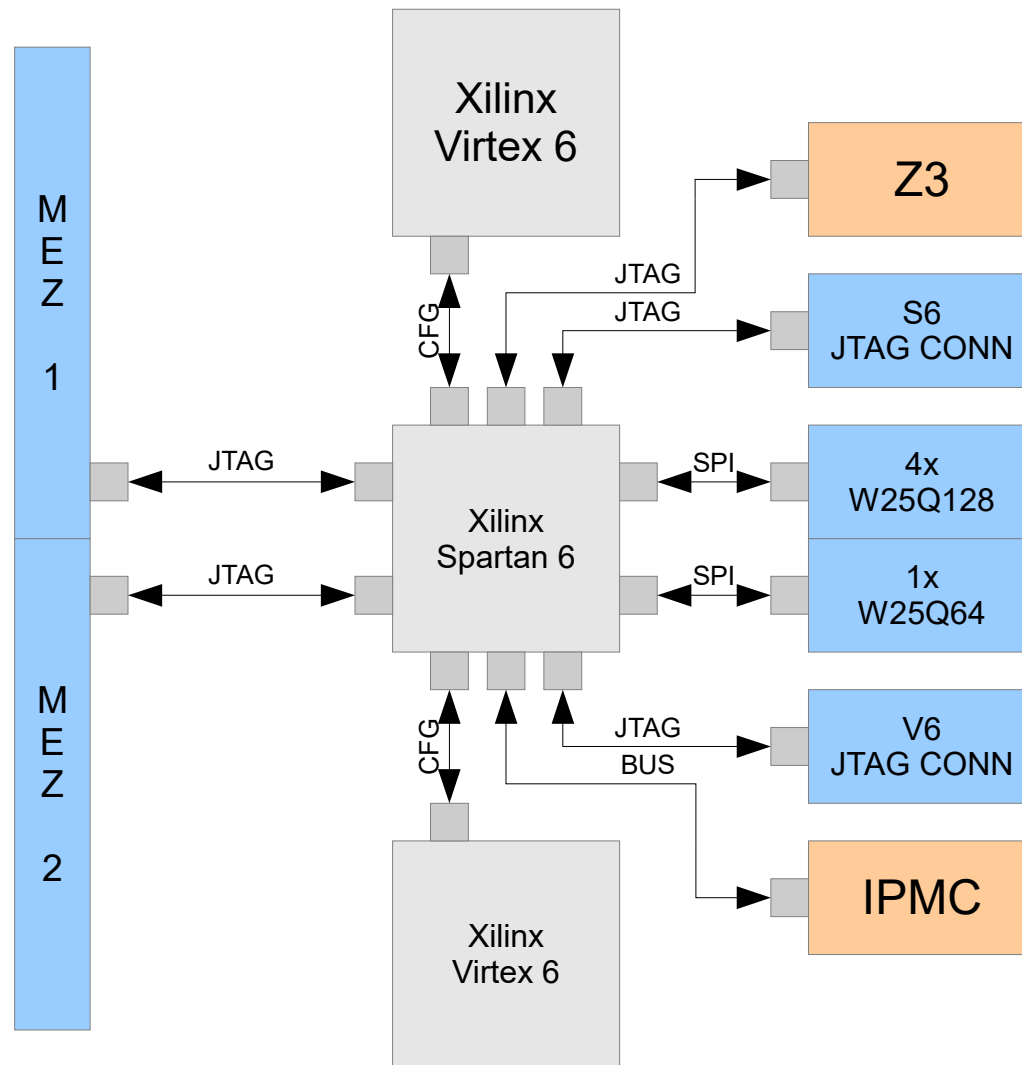
EATCA-100 replaced by EATCA-101

- Changes in power supply
  - additional power for mezzanine (DC/DC from mezzanine moved to the carrier)
- Changes in clock distribution



# SRS – ATCA – Hardware

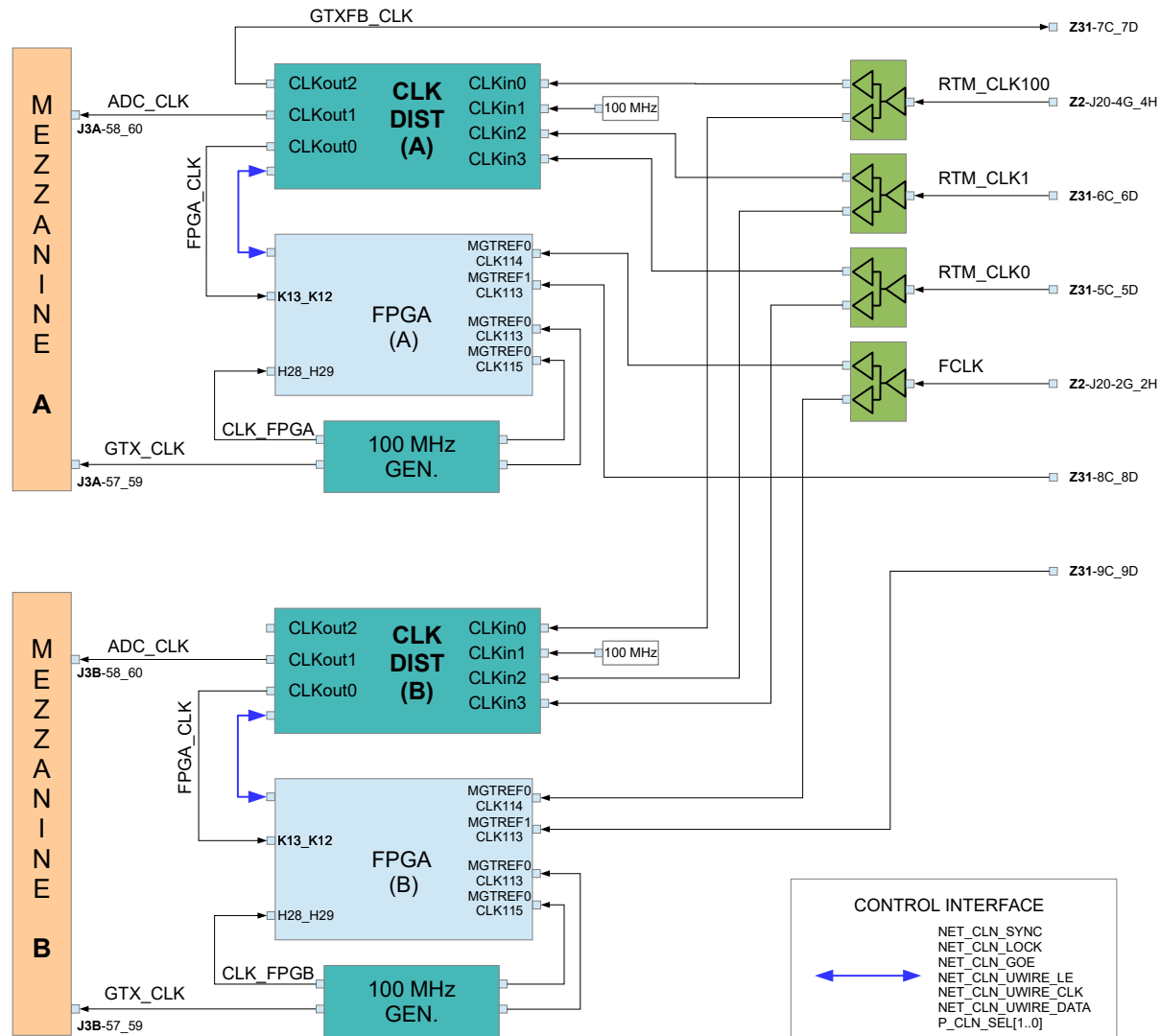
## EATCA-101 - Board Configuration





# SRS – ATCA – Hardware

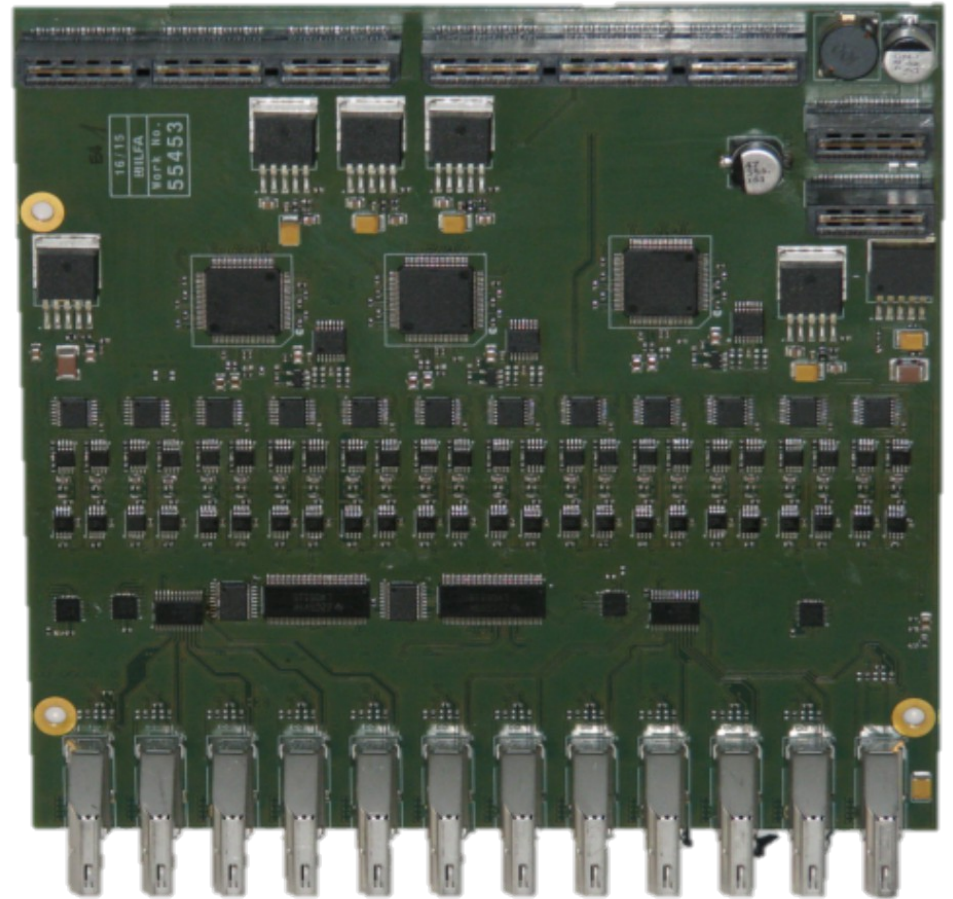
## EATCA-101 – clock distribution



# SRS – ATCA – Hardware EAD-M1

24 analog channels  
12 x HDMI connectors

- Changes in power supply (no more DC/DC on the module), additional power for hybrids
- Simplified hybrids control





# SRS – ATCA – Hardware

## ERTM-100

- 14 x SFP+ (up to 5 Gbps each)
- 2 x RJ 45 DTC link
- CLK and TRG inputs
  - Bugs corrected



# SRS – ATCA – Hardware

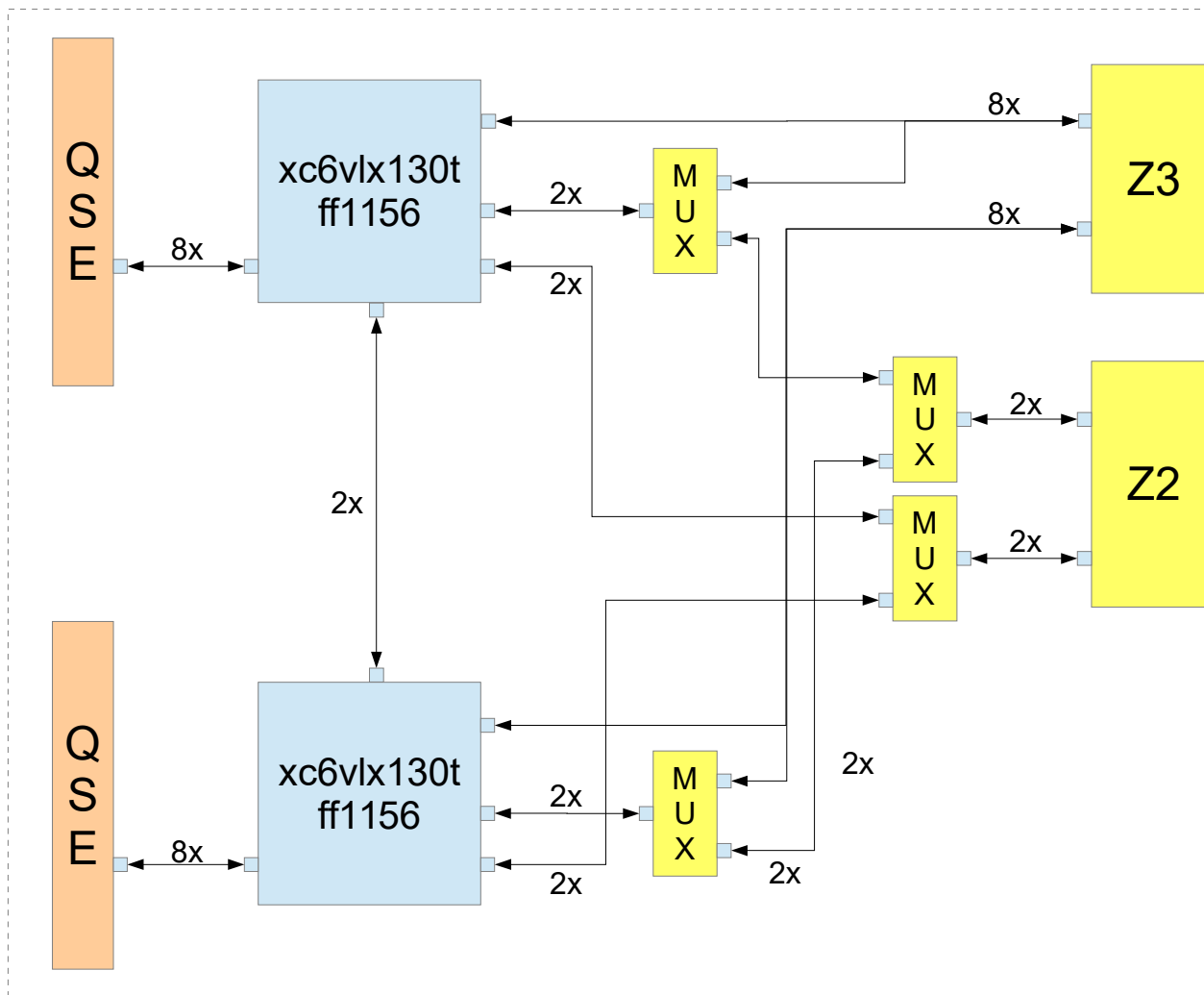
## ERTM-101

2 x 10G Eth  
8 x SFP+ (up to 5 Gbps each)  
2 x DTC links on RJ45 or HDMI  
CLK and TRG inputs



# SRS – ATCA

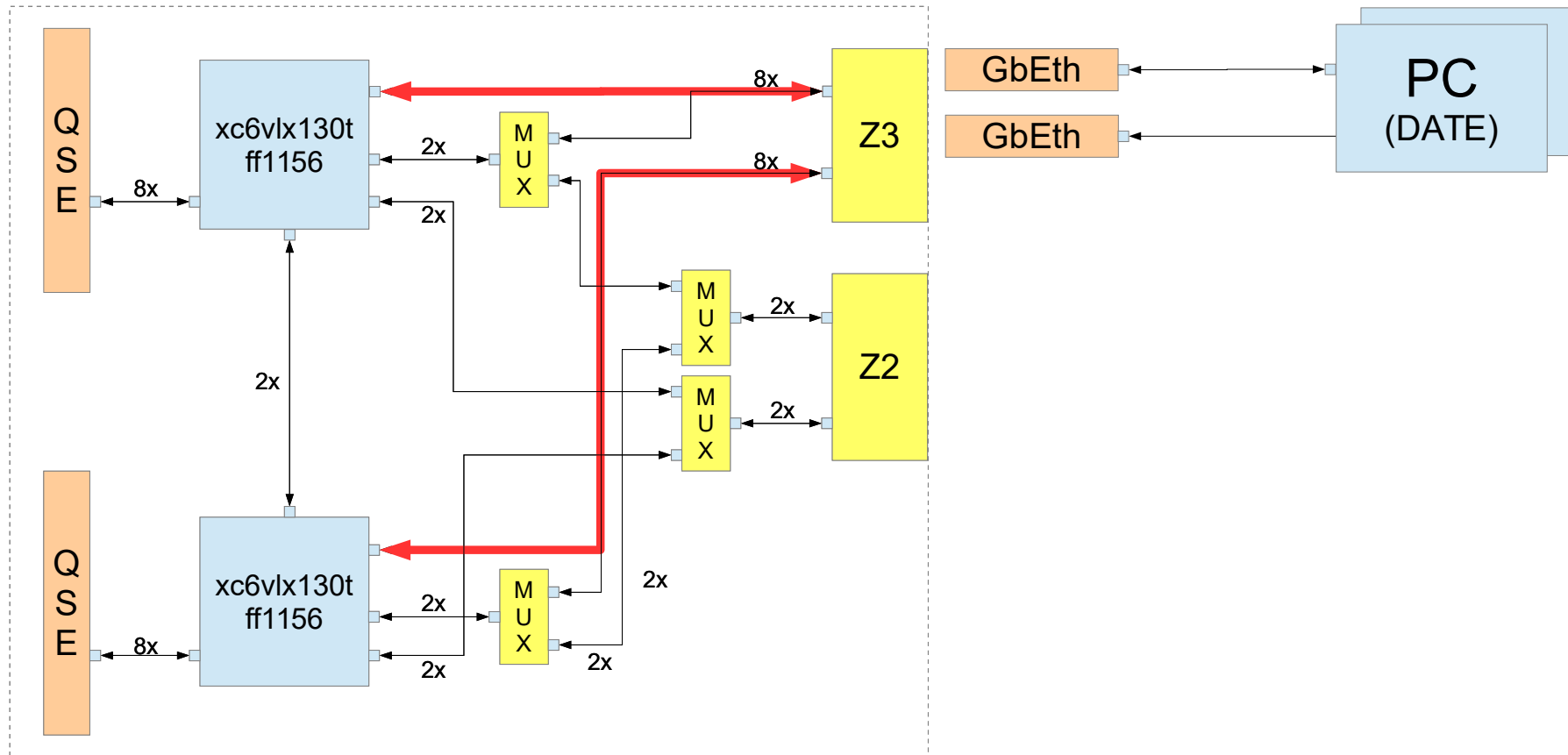
## EATCA-101 - communication links





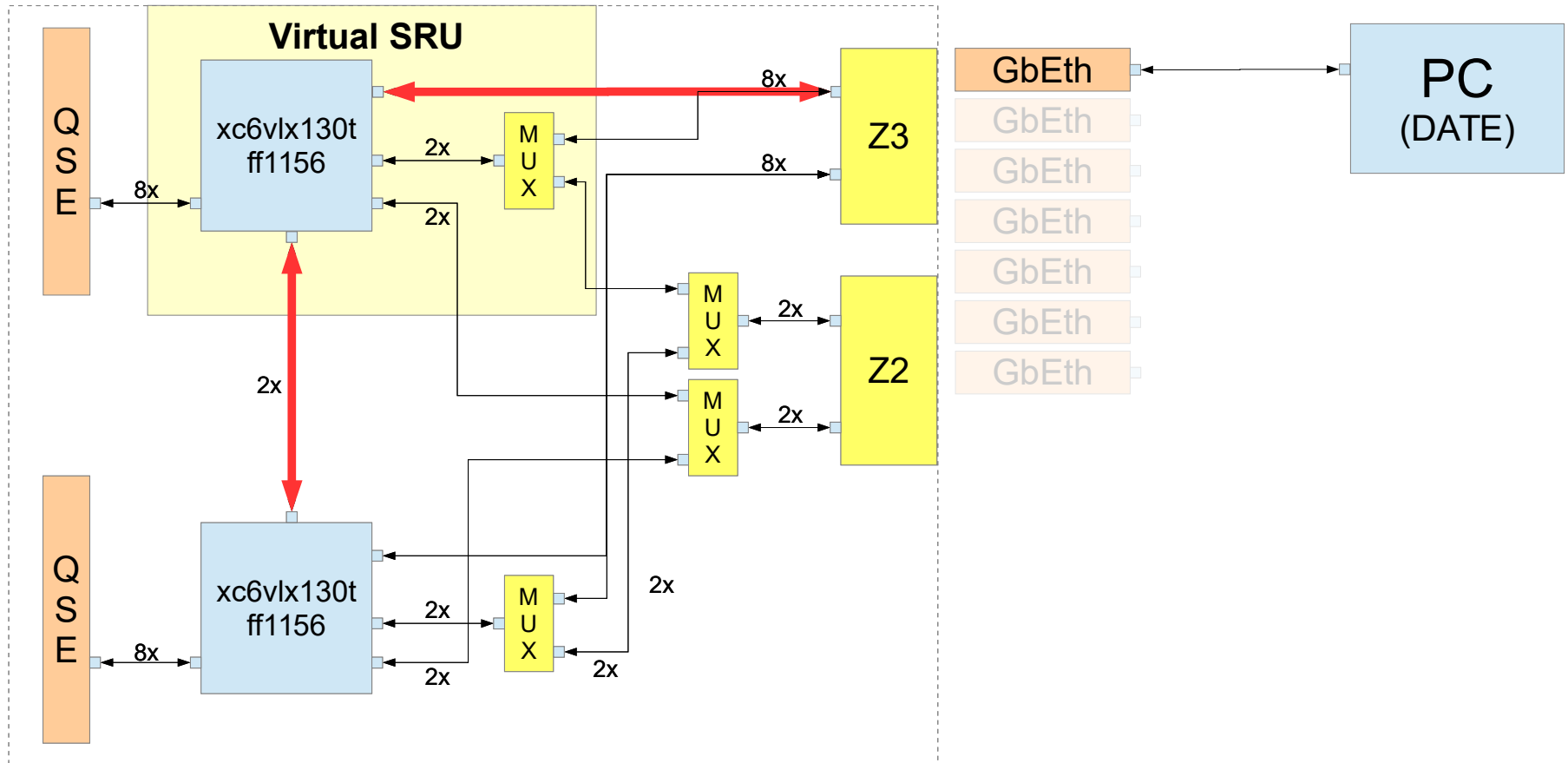
# SRS – ATCA

## System Architecture

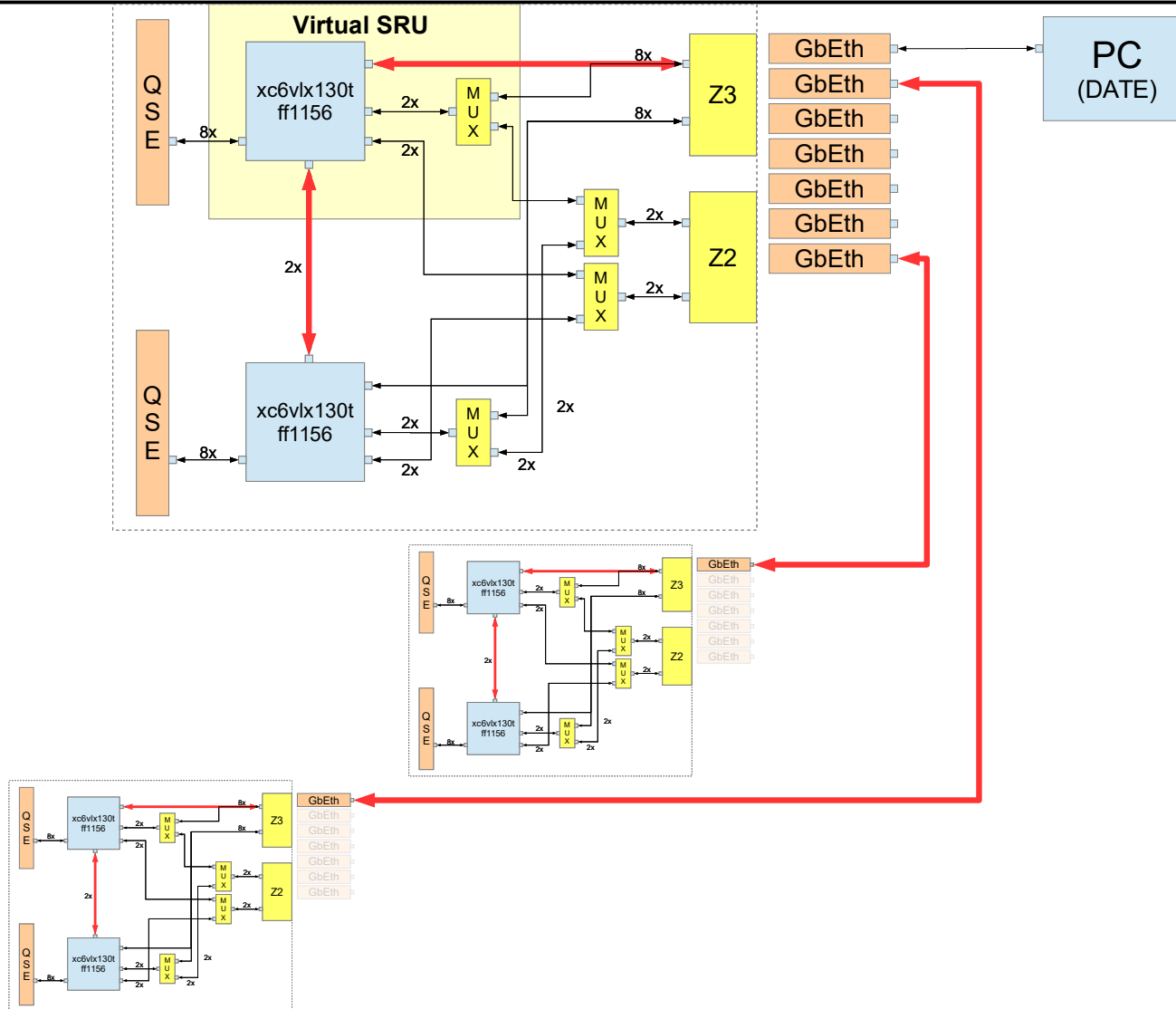


# SRS – ATCA

## System Architecture



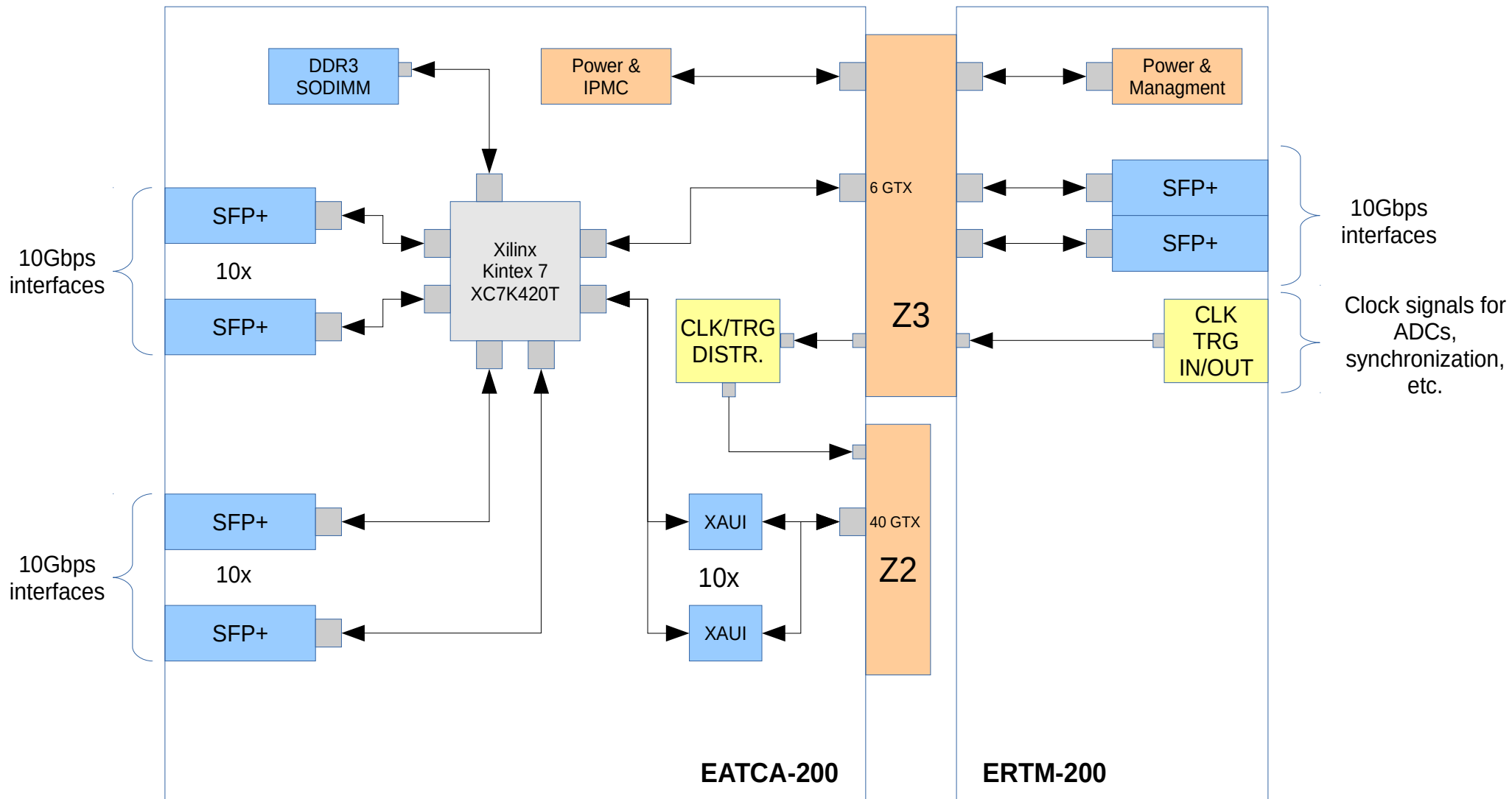
# SRS – ATCA System Architecture





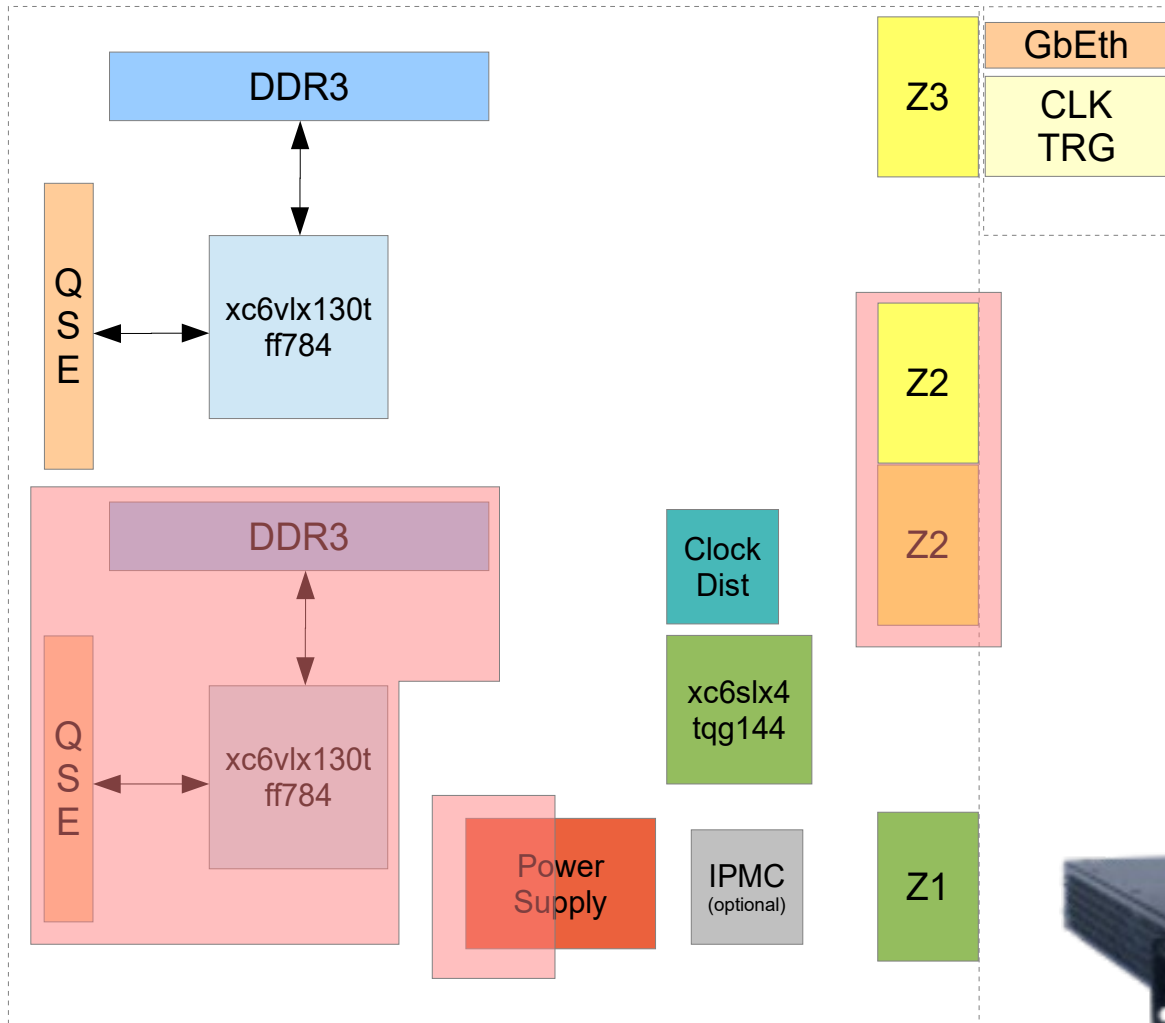
# SRS – ATCA – SRU

## EATCA-200 (concept)



# SRS – ATCA

## Low Cost Version



### 1U chassis

- Power supply
- Fans
- PCB fixed to the chassis
  - Simplify management (remote switch on/off, fans control, temperature monitoring)

### Hardware

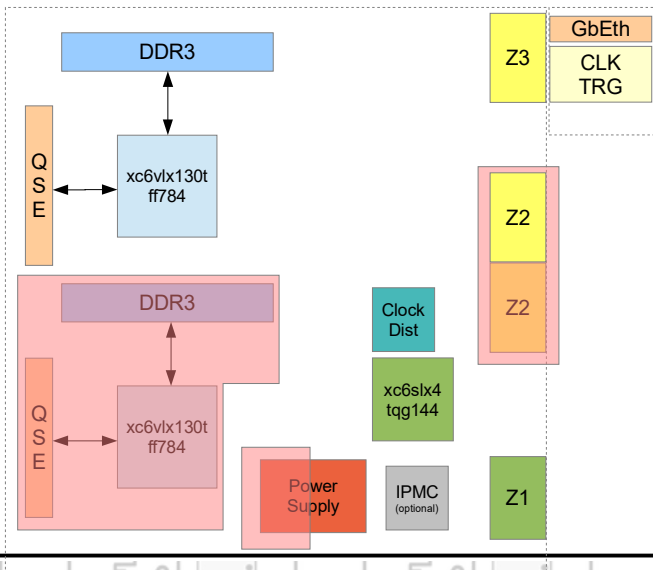
- EATCA-101 half assembled
- EAD-M1
- Adapter for interfaces to Z3



# SRS – ATCA

## Low Cost Version

- The same firmware/software as on any other SRS-ATCA
- 24 hybrids (master+slave)
- Ethernet to PC
- System price - 24 hybrids (12 HDMI) ~ 5.6 k€ (1.5 FEC equivalent)
- System price - 48 hybrids (24 HDMI) ~ 8.4 k€ (3 FEC equivalent)





# SRS – ATCA

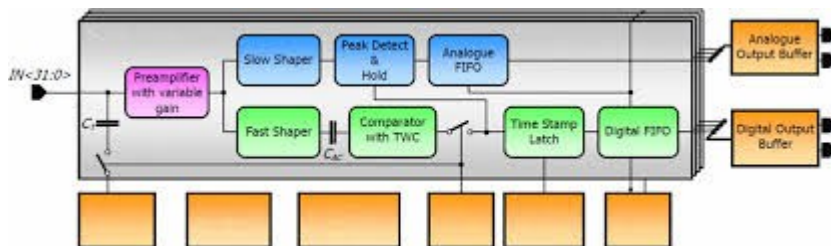
## Future hardware

### Project *GEMROC*:

- Hybrid
- Readout boards
- Support for firmware
- No export restrictions

One full system permanently at CERN/GDD

The system will be shared with interested users (in contact with CERN/GDD, AGH or eicSys GmbH – Priority on RD51 members) as a demo, temporary loan.



AKADEMIA GÓRNICZO-HUTNICZA  
IM. STANISŁAWA STASZICA  
W KRAKOWIE

# SRS – ATCA

## Firmware

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Porting of the standard FEC firmware:

- Based on Sorin porting for previous system version
- Tested clocking
- Slow Controls
- DAQ transmission
- Hybrid configuration
- Hybrid readout

# SRS – ATCA

## Firmware

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### **Possible improvements:**

- More channels to on FPGA
- Memory module
- Backplane links
- DTCC over MGT (input needed)
- Custom protocols over SFPs



# SRS – ATCA Firmware

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## Virtual SRU:

- One ETH link to read more than one blade
- Clock and trigger distribution over backplane
- No additional hardware needed

## Plans for future:

- Zero suppression implementation
- Pixel remapping functionality (buffering of data)

## Other functions requested by users

We want to takeover responsibility for ATCA-SRS firmware and provide support to all users.

# SRS – ATCA

## Firmware – Problems/Discussion

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- Licensing problem – who can get the firmware ?
- SVN access – where to keep project ?
- Adding our IPs to the project – how to do that in a right way ?

**Use Cases from users ?**

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Thank you