Scalable Readout Systems based on ATCA

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Outlook

- 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

Xilinx Virtex 6

Z3

S6 JTAG CONN

4x W25Q128

1x W25Q64

V6 JTAG CONN

IPMC

MEZ 1

MEZ 2

JTAG

JTAG

SPI

SPI

JTAG

JTAG

SPI

SPI

BUS

mounted configuration
SRS – ATCA – Hardware
EATCA-101 – clock distribution

CONTROL INTERFACE
NET_CLN_SYNC
NET_CLN_LOCK
NET_CLN_RED
NET_CLN_UWIRE_LE
NET_CLN_UWIRE_CLK
NET_CLN_UWIRE_DATA
P_CDN_SEQ[1:0]
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 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 – SRU
EATCA-200 (concept)

10Gbps interfaces

10Gbps interfaces

10Gbps interfaces

Clock signals for ADCs, synchronization, etc.
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) \(\sim 5.6 \text{ k€} \) (1.5 FEC equivalent)
- System price - 48 hybrids (24 HDMI) \(\sim 8.4 \text{ k€} \) (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.
Porting of the standard FEC firmware:
- Based on Sorin porting for previous system version
- Tested clocking
- Slow Controls
- DAQ transmission
- Hybrid configuration
- Hybrid readout
Possible improvements:

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

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

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

- 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?
Thank you