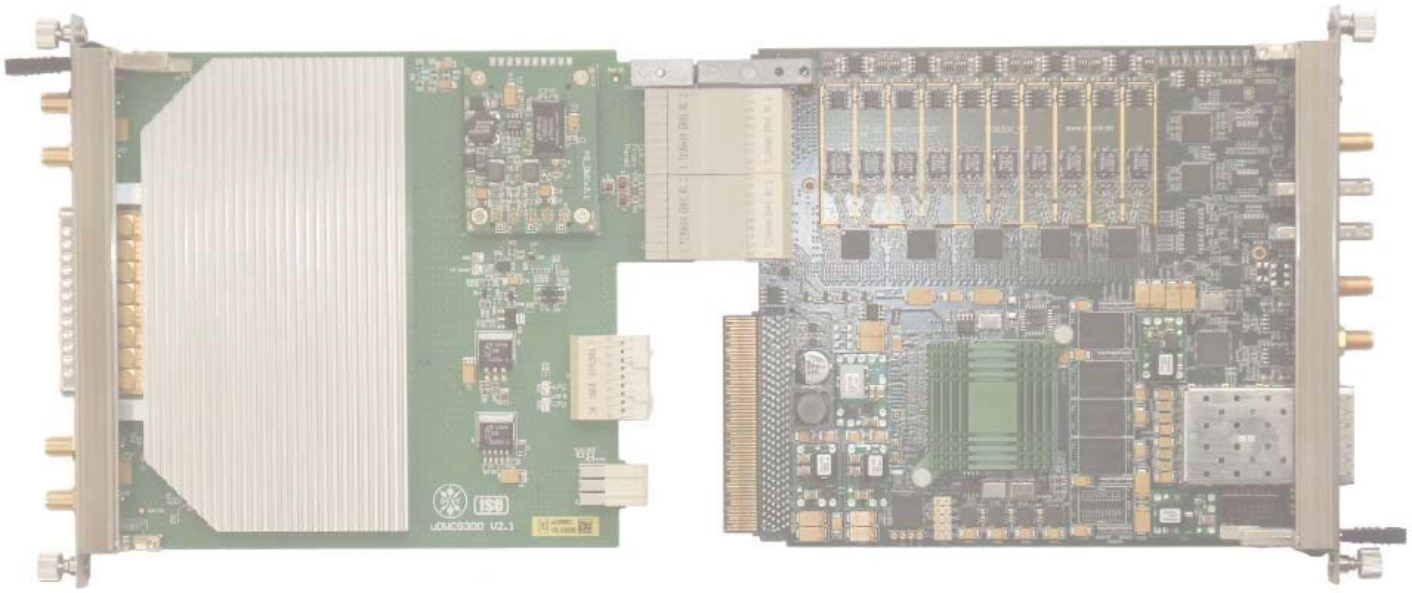
Book of Abstracts



Hosted by
DESY, Hamburg, Germany

For more information please visit: http://mtcaws.desy.de

11-12th December 2013, DESY Hamburg/ Germany
2nd MTCA Workshop for Industry and Research

Welcome to the MTCA Workshop for Industry and Research

Venue DESY Lecture Hall, Building 5
Deutsches Elektronen-Synchrotron
Notkestraße 85, 22607 Hamburg

Advisory Committee

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The following abstracts were reviewed by the Advisory Committee and approved for presentation at the MTCA Workshop for Industry and Research.

General Information

Registration The registration will be start on December 11th from 8:15 in the foyer of the DESY Lecture Hall.

W-LAN Please select the WLAN ”MTCA” and enter the WPA/WPA2-PSK pre-shared key at "Network key". Click the "Connect" button to activate the wireless network connection.
WPA/WPA2-PSK: CP!Nm4V9
If you are a member of an institution (e.g. a university), which is a member of the "eduroam" community, you can use the wireless network "eduroam".

Social Events The workshop dinner will take place at 19:30 on Tuesday, December 11th in the DESY Canteen (Building 9) .

Meals *Breakfast:*
If you stay at the Mercure Hotel Hamburg am Volkspark, breakfast will be provided there. You can also have breakfast at the DESY cafeteria (building 9, open from 7:00 – 17:00) at your own expenses
Lunch:
We will offer you lunch in the foyer of the DESY Lecture Hall.

Restaurants *Restaurant Don Quichotte* http://www.osdorfermuehle.de/ Osdorfer Landstrasse 162 a, open 11:00 –24:00. International food served all day. From main gate at Notkestrasse take bus no. 1, direction Schenefelder Holt, S Blankenese, Sieversstücken, exit "Knabeweg”

Lambert Restaurant & Sushi Bar http://www.lambert-hamburg.de/cms/ Osdorfer Landstrasse 239, open Tue-Fri (Mondays closed) 6:00 –10:30 and 12:00 –2:30. International food and Sushi. From main gate at Notkestrasse take bus no. 1, direction Schenefelder Holt, S Blankenese, Sieversstücken, exit “Langelohstrasse (Nord)”.

Restaurant Jim Block http://www.jim-block.de/restaurants/othmarschen/ Statthalterplatz 5, open 11:30 – 22:00. Trendy Hamburger-Restaurant. From main gate at Notkestrasse take bus no. 1, direction S-Othmarschen, Altona, exit “S-Othmarschen”.

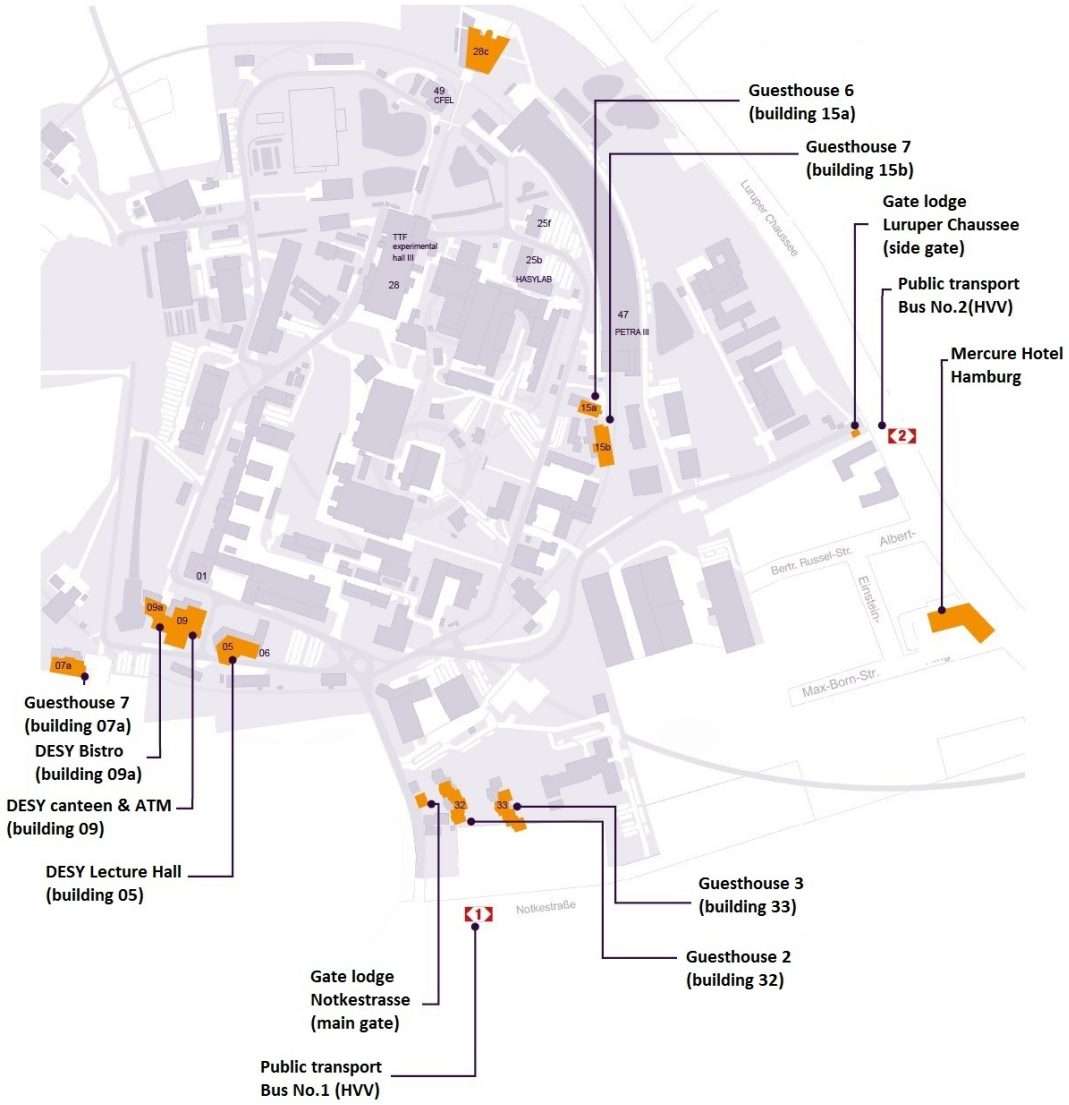
Restaurant Le Jardin (Mercure Hotel Hamburg am Volkspark) Regional and international food served all day.

Other useful information

Shopping at the Elbe Einkaufszentrum:
Shopping mall with more than 170 shops, opening hours 8:00 – 20:00. From main gate at Notkestrasse bus no. 1, direction Schenefelder Holt, S Blankenese, *Sieversstücken, exit "Elbe Einkaufszentrum"*
Supermarkets in the vicinity:
LIDL: from main gate at Notkestrasse turn right and walk some 700-800 m down Notkestrasse, LIDL will be clearly visible on the left side of the street at the next junction.
PENNY: from main gate at Notkestrasse walk straight down the small street (zum Hühnengrab) to the bottom, there you will find Penny supermarket on the right side of the street.

Cash point / ATM:
You will find an ATM at the DESY canteen entrance area in building 9.

DESY Campus in Hamburg-Bahrenfeld



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MTCA.4 Tutorial Basics

Dietmar Mann
Schroff GmbH

Abstract ID 26

This tutorial covers the basics of MTCA.4. It begins with background information on why the existing MicroTCA and AMC standards did not satisfy the needs of the Physics community and what new features were required.

The physical features of MTCA.4 like board sizes, connector definitions, module insertion/extraction and also the management interface between the RTM and the Front board are explained. Then it gives an overview of management features which have been added in MTCA.4 to manage the RTM and the Cooling Unit.

MTCA - Hardware Platform Management Systems Basics

Dr. Dariusz Makowski
TUL/DMCS

Abstract ID 19

High availability, serviceability and reliability are among the most desirable features of control systems in modern High-Energy Physics (HEPs) and other big-scale scientific experiments. One of the recent developments that have influenced this field was the emergence of the xTCA standards (Advanced and Micro-Telecommunications Computing Architecture). The standards developed for telecommunication industry have been successfully applied in other domains such as accelerator control systems.
The Intelligent Platform Management Interface (IPMI) with PICMG extension was applied in xTCA to enhance the availability of the system and simplify hardware diagnostics. The IPMI standard was initially developed to manage computer systems and monitor its operation. In case of xTCA, it provides useful features for shelf management, monitoring of crucial parameters, like: temperature, voltages, supply currents and fan speed. The system manages power, cooling and interconnect resource in the shelf via e-keying mechanism.

The tutorial introduces the basics of hardware platform management in MTCA systems. The presentation provides information concerning IPMI basics with PICMG extension and hardware required for shelf management. Finally, the example implementation of Management Controller for Advanced Mezzanine Card (MMC) and Rear Transition Module (RMC) will be presented.

Bring up a MTCA.4 System

Vollrath Dirksen, Heiko Körte
N.A.T. GmbH

Abstract ID 3

This 60 minute presentation shows, which hardware and software tools reduce the time to bring up a MicroTCA.4 system with minimal risk The presentation integrates a life demo which shows typical situations, how to quickly identify issues and how to solve them.

The attendees learn how the key differences of the MicroTCA standard compared to other open standards make the installation and maintenance of systems in the lab and in the field easier and quicker.

After the selection of the hardware components (CPU, storage, FPGA, IO) and software (Operating System, drivers, etc) the integration into a MicroTCA system starts. The standard MicroTCA and therefore also MicroTCA.4 defines the implementation for example electronic keying, inventory and sensor and alarms.

The presentation explains how to use these mandatory functions to the users benefit to bring up a MicroTCA system more easily and reliable. The question will be answered what tools reduce the time to identify configuration errors, incompatibilities, mismatches and other issues.

The life demo shows by integrating components in a MicroTCA.4 system step by step some typical and some critical issues, which sometimes in other standard are only discovered in the field.

MTCA market development and progress

Thomas Holzapfel
powerBridge Computer

Abstract ID 5
Session 1: Capabilities of MTCA.4

This presentation will compare the past and present situation of MTCA. It will highlight some trends and will show some real applications.

Precision analog measurements in high speed MTCA.4 crates

Dr. Frank Ludwig
DESY

Abstract ID 30
Session 1: Capabilities of MTCA.4

One of the major benefit of an MTCA.4 system is to combine high-speed digital data processing AMC boards with high precision analog signal conditioning RTM boards. In this presentation we show high precision measurements using different grounding configurations, particularly for AMC and RTM Z3 ac-coupled differential signal transmission for the detection and regulation of high frequency signals, sampling of pulsed signals and broadband dc-coupled signal conditioning on the RTM. Concepts and sources of distortions for measurements below -80dB will be discussed.

Upgrade from MTCA to ATCA

Friedrich Fix
Elma electronic GmbH

Abstract ID 28
Session 1: Capabilities of MTCA.4

Use a high performance small System in MTCA.4 Form factor and build a network with one internal or external system manager.

Start from 6 Slot MTCA.4 to 12 Slot MTCA.4 System and increase to ATCA 2 Slots up to 14 Slots. See special applications in the ATLAS, ALICE and NEXT Project at CERN. They planning to use a 2 Slot ATCA System with 10240 Detector readout channels.

A second example is the MTCA.0 System customized with 18 slots in 19" Chassis.

PICMG xTCA for Physics Collaboration

Raymond Larsen
SLAC

Abstract ID 45
Session 1: Capabilities of MTCA.4

Development of new standards is a constant evolution necessary to keep up with beneficial technology developments. Standards strive to benefit all users (customers) and providers (vendors) by eliminating needless duplication of private platforms which are costly to all parties and prevent interchangeability. Standards also need champions on both sides who will continue to collaborate on efficiently adapting to new applications as they emerge. This talk briefly describes the PICMG committee structure that facilitates xTCA for Physics extensions and the commitments needed to continue growth.

Connectivity in MTCA Crates

Dr. Tomasz Jezynski
DESY

Abstract ID 40
Session 1: Capabilities of MTCA.4

This paper provides an overview of available backplanes in different MTCA crates, focusing on possible connectivity and data transport layer. Differences, advantages and disadvantages of different backplanes for given applications are presented and discussed. This paper also offers a basic information about backplane topology available from different vendors.

MicroTCA Evaluation and Developments in the CERN PH-ESE Group

Dr. Stefan Haas
CERN

Abstract ID 22
Session 2: Use of MTCA in Large Scale Facilities

The PH-ESE group at CERN provides support for the electronic systems of the experiments. As part of this mandate a project was launched to evaluate μTCA infrastructure components, in particular shelves, power supplies and MicroTCA Carrier Hub (MCH) modules. Commercial equipment from different vendors has been acquired, evaluated and interoperability tests have been performed. In addition some custom μTCA hardware was also developed as part of the project. For instance an Advanced Mezzanine Card (AMC) load board and its associated load rear transition module (RTM) have been developed in order to be able to fully characterize the power supply and cooling performance of μTCA shelves. The design of a Module Management Controller (MMC) mezzanine card has been finalized in collaboration with an external institute and made available to interested users. A test AMC for the MMC mezzanine has also been developed.

A related development is the Gigabit Link Interface Board (GLIB), which is an FPGA-based double width AMC designed for users of high speed optical links in high energy physics experiments. It is targeted at the evaluation of optical links in the laboratory as well as for small triggering and/or data acquisition system in beam or irradiation tests. The card can be extended through two FPGA Mezzanine Card (FMC) sockets providing application specific connectivity. Some FMC extension modules, for example for interfacing to the LHC Timing, Trigger and Control (TTC) system, have also been developed.

Based on our experience from the μTCA system evaluation and AMC boards design, we have acquired a good overview of the benefits and challenges associated with the μTCA platform. In this presentation we will present details about the various in-house developments as well as results from the evaluation project.

MTCA - a High Data Rate Solution for FAIR Beam Instrumentation

Tobias Hoffmann, Harald Braeuning
Helmholtzzentrum für Schwerionenforschung GSI GmbH

Abstract ID 9
Session 2: Use of MTCA in Large Scale Facilities

Currently, GSI Beam Instrumentation Department accomplishes the detailed specifications for all FAIR beam instrumentation data acquisition (DAQ) systems. With respect to the large number and variety of diagnostic systems, a choice of three different form factors for the DAQ systems was made. Beneath PICMG 1.3 Industry-PC solutions and the well-established VMEBUS standard, the MTCA form factor will be supported, contingent on the requirements as e.g. for high data rates. A brief status of the FAIR project and plans for possible MTCA solutions at the various accelerators and storage rings of the FAIR facility are presented.

xTCA based Instrumentation and Control Systems for ITER

Dr. Stefan Simrock
ITER

Abstract ID 23
Session 2: Use of MTCA in Large Scale Facilities

The operation of the ITER (International Thermonuclear Experimental Reactor) tokamak imposes significant demands on the instrumentation and control (I&C) section of its 160 plant systems which are representative for many large scale physics applications. The plant I&C systems must support the operational needs for machine protection, plasma operation and physics exploitation. The most stringent requirements are found in the more than 50 diagnostics measurement systems in terms of high performance data acquisition, data processing and real-time data streaming from distributed sources to the plasma control system as well as large amounts of raw data streaming to scientific archiving.

The mandatory communication protocols are PCI-Express and Gigabit Ethernet while the CODAC supported form-factor are xTCA and PXIe. Presented will be the I&C requirements, example designs for diagnostics use cases using commercial components, challenges during implementation, and the remaining issues which can be most efficiently resolved with contributions from industry and research institutes.

Electronic platform harmonization strategy at ESS

Anders J. Johansson
European Spallation Source

Abstract ID 46
Session 2: Use of MTCA in Large Scale Facilities

The European Spallation Source is a green field facility that will start the construction phase in 2013. The absence of any legacy systems opens the possibility to share hardware between different systems. The talk will present the strategy to make the most out of this opportunity.

MicroTCA system used at KEK

Dr. Shinichiro Michizono
KEK

Abstract ID 39
Session 2: Use of MTCA in Large Scale Facilities

Micro-TCA boards have been developed for cERL in KEK. One is the AD/DA board having 16bit 4ch ADCs and 4ch DACs. This has been used for the digital feedback of superconducting cavities at STF and will be used at cERL. The other is fast ADC board having high speed (~300 MHz) ADCs for the direct sampling (without downconverters). These boards will be also used for superKEKB LLRF system and beam position monitors. These results and developments will be summarized.

MicroTCA at XFEL and FLASH

Kay Rehlich
DESY

Abstract ID 33
Session 2: Use of MTCA in Large Scale Facilities

For the European XFEL it was decided to use MTCA.4 for the fast beam related controls. The talk will give an overview of the status and developments based on MicroTCA.

Overview of the MTCA.4 and ATCA based data acquisition electronics and concepts for photon beamlines and experiments at the European XFEL

Dr. Patrick Gessler
European XFEL

Abstract ID 29
Session 2: Use of MTCA in Large Scale Facilities

The European X-Ray Free Electron Laser, currently under construction in northern Germany, will provide up to 2700 less than 100fs short x-ray pulses with wavelengths between 0.05 and 6 nm at a repetition rate of 4.5MHz at several beamlines. It allows in-depth research in various scientific fields.

In order to set-up the beam, position the sample and capture the measured variables, information from the accelerator, diagnostic devices and detectors have to be digitized, converted, processed, transferred, concentrated, distributed, reorganized, controlled and saved. Boundary conditions like the high data rate and amount, frequently changing processing algorithms in FPGAs, low-latency FPGA-to-FPGA control loops and limited access to hardware reduces the choice of products and standards available. Adopting the MTCA.4 and ATCA standards for the fast DAQ system provided a suitable solution for these requirements. In collaboration with industry and other labs an almost complete framework of hardware components became available. Furthermore, the detector and data acquisition electronics group develops a modular high-level firmware programming environment, which provides an easy-to-use and flexible framework for processing algorithms for the used MTCA.4 and ATCA modules.

MicroTCA Developments for Low Level RF and Beam Position Monitors for LCLS-II at SLAC

Raymond Larsen, Dr. Zheqiao Geng
SLAC National Accelerator Laboratory

Abstract ID 37
Session 2: Use of MTCA in Large Scale Facilities

A team at SLAC has successfully launched the first MicroTCA developments for the new 4th generation light source at SLAC, the Linac Coherent Light Source LCLS-II. This is the second of three machines ultimately to be built, each using one third of the 3km linac.

Both Low Level RF (LLRF) and Beam Position Monitoring (BPMs) pose special problems: The LLRF must obtain short term phase stability of 30 femtoseconds RMS or less, and the BPMs must measure a 250 picoCoulomb (pC) bunch to an accuracy of 5 microns and a 1 PC bunch to 1 mm, both single shot. Also the BPM must support two single bunches within the 1.5 usec envelope of the high power RF pulse.

The LLRF application has been prototyped and run successfully on-beam, the first instrumentation at SLAC to use intra-pulse feedback to improve phase stability of the electron beam before it enters the undulators to produce the high energy X-Rays for experiments. The BPM is also prototyped successfully and is being prepared for an on-beam test of three BPMs during December 2012.

This presentation describes the system hardware and software architectures, design advantages of the new approaches, industry support, overall plans and progress to date. Both systems need to be installed in LCLS-II klystron gallery by end of 2013 and operational in 2014. A third team is developing xTCA hardware-firmware software infrastructure to support the new platform and integrate all applications into the high level control system under EPICS.

Schroff MTCA.4 product presentation

Dietmar Mann
Schroff GmbH

Abstract ID 27
Session 3: MTCA Product Presentations

Schroff is one of the companies working on the development of the MTCA.4 PICMG standard.
The presentation shows the range of Schroff products which comply with MTCA.4:

- 12 Slot MTCA.4 chassis with redundant Cooling Units in a push-pull configuration.
- 7-Slot MTCA.4 chassis for laboratory use.
- 5-Slot MTCA.4 chassis with 2U chassis height and horizontal AMC Module mounting.
- MTCA.4 compliant Filler / Blocker Modules for unused Slots

System solutions for MTCA.4

Aksel Saltuklar
ELMA

Abstract ID 38
Session 3: MTCA Product Presentations

The presentation will show different crate solutions and accessories for MTCA.4 platforms.

MTCA.4 digitizers, RTMs and applications

Dr. Matthias Kirsch
Struck Innovative Systeme GmbH

Abstract ID 10
Session 3: MTCA Product Presentations

The 100 MSPS 16-bit SIS8300 digitizer was one of the first MTCA.4 products on the market. The card and its evolution, examples of matching RTMs and applications will be highlighted. The outlook will focus on new GSPS sampling speed developments in the Helmholtz Validation Fund framework.

MTCA.4 - Increasing configuration choices

Ian Shearer
VadaTech Ltd

Abstract ID 8
Session 3: MTCA Product Presentations

This presentation will look at how the growing ecosystem provides flexible solutions for MTCA.4, and discuss some practical considerations when integrating real-life systems.

MTCA SP Devices Digitizers designed for high speed applications in Physics

Laurent Weber
Signal Processing Devices AB

Abstract ID 15
Session 3: MTCA Product Presentations

Signal Processing Devices DAQ MTCA.4 offering for demanding applications in Physics is focussed on:

- high vertical resolution/ high speed digitizers needs
- extended real time data processing
- high channel count timing synchronization requirements

Kontron's MicroTCA/AMC portfolio

Irene Hahner
Kontron Europe GmbH

Abstract ID 16
Session 3: MTCA Product Presentations

Kontron is a global leader in embedded computing technology. With more than 30% of its employees in R&D, Kontron creates many of the standards that drive the world’s embedded computing platforms. Kontron’s product longevity, local engineering, support, and value-added services helps to create a sustainable and viable embedded solution for OEMs and system integrators.

One of these various standards supported by Kontron is MicroTCA/AdvancedMC. As one of the vendors with the broadest portfolio in this PCIMG standard, Kontron offers all key components for building powerful and flexible MicroTCA platforms - from the MCH (MicroTCA Controller Hub) the central management and data switching device in a MicroTCA system to processor AMCs with the latest x86 processor technology (3rd generation Intel) and Power architecture (Freescale QorIQ P5020, P4080, P2020) to network processing, and IO AMCs. Kontron also offers a huge variety on MicroTCA platforms which can be configured to the customer application needs. The Kontron know how in system design and system integration is available globally and will be supported through local teams.

powerBridge contribution new product introduction

Kay Klockmann
powerBridge Computer

Abstract ID 6
Session 3: MTCA Product Presentations

Realization of new products for MicroTCA and MTCA.4 applications:

- custom crates
- low-noise PM
- CPU module development
- FPGA HW & SW development
- I/O development (A/D, D/A, DIO, Fieldbus, motor controller etc.)

uLOG-Carrier eRTM Module

Tony Rohlev[1], Uros Mavric[2]
1-TSR Engineering, 2-DESY

Abstract ID 13
Session 3: MTCA Product Presentations

The uLOG-Carrier board is a eRTM card that provides the primary function of fan-out and distribution of the LO, REF, CAL, and Clock signals from the uLOG-RF module. Furthermore, it will provide high quality (low noise) DC power, up to 3 thermo-electric (TEC) controllers, and the mechanical support, with RF shielding, for the uLOG-RF module. The Carrier will also incorporate a micro-controller with Ethernet and multiple diagnostic measurements. The uLOG-Carrier is mixed signal (analog/digital/RF) card that also houses switch-mode DC/DC convertors and must perform all functions with less than 5 fs [10 Hz - 1 MHz @ 1.3 GHz] added noise to the RF signals. For this reason great care must be taken in maintaining signal integrity and separation. Therefore even though the function of the uLOG-Carrier is straight forward, the implementation is quite challenging.

Libera Spectra

Elvis Janezic, Borut Baricevic, Silvan Bucik
Instrumentation Technologies d.d.

Abstract ID 14
Session 3: MTCA Product Presentations

Libera Spectra is a high-performance digital pulse processor (DPP) intended for spectroscopy experiments. Besides the good resolution that is standard for this kind of instruments, the main benefits are high count rate processing, scalability and the possibility to add custom algorithms and applications. On the SW side this was achieved with the Libera BASE SW platform, while on the HW side MTCA standard was chosen.

Combining up to 10 Libera Spectra instruments in one MTCA crate, the user gets a 40 input channel system. Transferring the huge amount of processed data form the instrument to the AMC CPU in the crate and then over Gb Ethernet to the control system is a challenging task.

Power Supply and Intelligent Power Adapter for MTCA.4 crates

Thomas Berner
WIENER Plein + Baus GmbH

Abstract ID 25
Session 3: MTCA Product Presentations

The use of MTCA.4 standard crates for physics experiments demands a low noise and stable crate power supply. A new solution based on the latest switching type power supply technology is presented. The units are designed according to specifications from DESY for enhanced DAQ performance and deliver 800W DC power (AC-Type) resp. 2000W DC power (Power Adapter).

Single Cavity RF controls based on MTCA.4

Dr. Matthias Hoffmann[1], Igor Rutkowski[2], Dominik Sikora[2], Jan Piekarski[2], Robert Meyer[1], Hans-Thomas Duhme[1], Dr. Konrad Przygoda[3], Samer Bou Habib[2]

1-DESY, 2-ISE / Warsaw University of Technology, 3-DMCS / Technical University of Lodz

Abstract ID 36
Session 4: MTCA applications in research and industry

In the framework of the European XFEL project, hardware, firmware and software has been developed for high-precision RF controls. It is cost optimized for the processing of a large number of superconducting RF cavities operated at frequencies of 1.3GHz or 3.9GHz.

We present here cost and performance optimized MTCA.4 LLRF system architectures dedicated for single NRF/SRF cavity controls covering the frequency band from 500 MHz up to 6 GHz.

Supplementary MTCA.4 modules such as RTM piezo drivers, AMC frequency tuner motors, high-order cavity mode processing AMC and water control units complete the LLRF portfolio and provide a compact, reliable and user-friendly fully MTCA embedded LLRF system of moderate cost and outstanding performance.

RTM Module based on DRS-4 waveform digitizing chip

Alexander Menshikov, Matthias Balzer, Dr. Matthias Kleifges
KIT

Abstract ID 34
Session 4: MTCA applications in research and industry

Many experiments require a digitization of short signals. The DRS-4 chip provides 9 capacitive pipelines of 1000 cells each for sampling analog signals with a frequency of up to 5 GHz. Upon a trigger the pipelines are digitized at lower frequency. We are currently designing a 16-channels waveform digitizing module based on four DRS-4 chips. Two pipelines are reserved per input channel to minimize the dead time. Sampled signals are digitized with 12-bit multichannel ADCs at 40MHz. Every channel is equipped with a comparator for self-triggering and external trigger is possible as well. The module is built as RTM module according to MTCA.4 specifications.

MTCA development in France

Patrick Le Du[1], Jean Pierre Cachemiche[2]
1-IPN LYON, 2-CPPM Marseille

Abstract ID 35
Session 4: MTCA applications in research and industry

This presentation will survey the various developments in progress in France laboratories, particularly for LHC upgrades, GANIL and T2K experiments as well as for medical applications. Ths talk will be given on behalf of the french IN2P3 MTCA group.

Video Acquisition Solution for High-Speed Imaging Based on MicroTCA

Aleksander Mielczarek, Dr. Dariusz Makowski, Dr. Mariusz Orlikowski, Dr. Grzegorz Jablonski, Piotr Perek
Technical University of Lodz

Abstract ID 32
Session 4: MTCA applications in research and industry

High-speed low-latency cameras are used in various physics experiments and industrial processes. The imaging devices provide vast amount of data, that may be used for diagnostics, control and interlock systems. The highest speed video cameras require high bandwidth for data transmission and are usually equipped with Camera Link interface. Single imaging device can generate streams reaching up to 7.14 Gbps. The maximal throughput for raw image data for standard compliant devices is 5.44 Gbps and can be further extended to 6.80 Gbps with vendor-specific extensions.

The presentation outlines a system designed for image acquisition and streaming in the MTCA infrastructure. The video is captured from the ultra-fast camera, capable of capturing up to 180,000 frames per second. The data stream is transferred using the Full mode of Camera Link interface and captured using custom made deserializer board, designed according to FMC standard. The board is fitted on a commercial AMC module with Virtex-5 FPGA.

Data from frame grabber are send via PCIe x4 communication interface to CPU module using high performance DMA transfers. The resulting video stream is then sent for further processing and archiving. For diagnostic purposes, the stream may be also displayed with simple GUI application.

Neutron and Gamma Radiation Monitoring Module for MTCA Applications

Tomasz Kozak, Dariusz Makowski
TUL/DMCS

Abstract ID 18
Session 4: MTCA applications in research and industry

The MTCA.4 is a new standard for control and monitoring systems which gains popularity in many leading High Energy Physics (HEP) experiments around the world. It has been chosen as a new architecture standard for upcoming European X-Ray Free Electron Laser (E-XFEL). The part of control electronics of the new accelerator will be situated next to the main beam pipe and exposed to parasitic gamma and neutron radiation fields generated by the machine. Therefore, knowledge of radiation doses absorbed by electronics is needed. A dedicated for MTCA.4, radiation monitoring module capable of measuring both types of radiation has been designed as a FPGA Mezzanine Card (FMC). It is based on Commercial Off-The-Shelf components and can be applied in any MTCA based system which provides FMC compliant connectivity. For gamma monitoring the RadFET detector was used and neutron fluence measurement is based on SRAM Single Event Upset (SEU) counter method. More detailed information about the module, selected dosimeters methods and obtained results will be presented during the workshop.

Universal firmware/software framework for MTCA.4 data acquisition boards

Dr. Wojciech Jalmuzna
eicSys

Abstract ID 20
Session 3: MTCA Product Presentations

Data acquisition is one of the most common tasks performed by electronic systems used by HEP experiments. Existing systems vary in terms of used hardware and software components, but their high level functionality is the same. Universal framework introduces additional abstraction layers to create hardware/software independent interfaces. This allows to reuse the same firmware and software components, which are independent on type of used hardware. The solution is dedicated for MTCA.4 and AMC digitizer boards and currently supports several products available on the market.

EMI challenges for a mixed mode usage of MTCA.4

Dr. Peter Goettlicher
DESY

Abstract ID 24
Session 5: Intercompatibility / Further Standard Development

The xTCA standard is a crate standard for high speed digital processing and data transfers. In MTCA.4, extended MTCA for research, also analogue circuits are installed into the same crate. By that it will be a mixed mode design without closed shielding to the different regions. The difference of modern differential digital and of analogue signal transfers and the sensitivity of analogue circuits needs additional care about grounding, power-supplies, DC/DC-converters, return-currents, and externally forced currents. The talk will point out the critical issues and present techniques to handle them.

More IO slots in MTCA.4 chassis, optimized usage of MCH slot(s)

Vollrath Dirksen
N.A.T. GmbH

Abstract ID 4
Session 5: Intercompatibility / Further Standard Development

This presentation shows how to optimize the space in MTCA.4 chassis by saving up to 6 AMC slots. This solution maximizes the number of available IO slots up to 12 slots.

Even so rear transition modules are defined in MTCA.4 standard the number of AMC slots is limited to 12 AMC slots plus 12 µRTM slots.

So far some AMC slots are used for CPU, SATA storage and graphic boards. In redundant system there are up to 6 AMC slots occupied leaving only 6 AMC slots free for IO.

But there is unused space around the MCH slots in MTCA.4 chassis. Standard MCHs are available as single, full-size boards. This leaves space above the MCH slots and in several MTCA.4 chassis also on the rear side of the MCH slot.

By the effective usage of this space around the MCH slots by using the NAT-MCH-PHYS and NAT-MCH-RTM-COMex-i7, all 12 AMC slots can be made available for IO. The CPU, storage (SSD) and graphic interfaces are all in the MCH slots together with the full blown functionality of a MCH.

The presentation also explains how the NAT-MCH-CLK-PHYS solves the specific Clock requirements like stability and jitter less than 5 ns.

Recommendation for ZONE3 classes to achieve enhanced AMC-RTM modularity

Dr. Frank Ludwig
DESY

Abstract ID 31
Session 5: Intercompatibility / Further Standard Development

To improve the compatibility and modularity of AMC and RTM boards we present a classification recommendation of the undefined Z3 connector pin assignment in the MTCA.4 standard for analog and digital applications. This implies a zone description, electrical specification, electrical protection sequence, E-keying and grounding and shielding options.

RF Backplane for MTCA.4 Based Control System

Dr. Krzysztof Czuba
ISE, Warsaw University of Technology

Abstract ID 12
Session 5: Intercompatibility / Further Standard Development

Modern accelerator control systems take advantages of the MTCA.4 platform to implement parallel processing of tens of RF signals within one crate. The analog front-end electronics require distribution of many high-frequency signals (like phase reference and Local Oscillator (LO)) to all cards located in the crate. This can be realized by coaxial cables but it reduces system reliability, maintainability and performance. To reduce limitations of RF cabling network an unique RF Backplane (uRFB) for RTM cards was developed. This backplane is used for distribution of high-performance LO, RF and low-jitter clock signals together with low-noise analog power supply to analog RTM cards in the system. The concept allows also for using of up to four extended-RTMs (eRTMs) and up to two rear power modules in the area behind the front power modules, usually not used by the MTCA.4 standard.

The rear system hardware platform management was developed as an extension of existing management system. The presented RF backplane concept is a powerful extension of the MTCA.4 capabilities and it does not collide with standard solutions.

µRTM Design for MTCA.4 FPGA Modules

Niels Koll
TEWS Technologies GmbH

Abstract ID 11
Session 5: Intercompatibility / Further Standard Development

FPGA AMCs compliant to MTCA.4 are very generic modules that are available in a broad range of computing capabilities. To adapt them to different applications, an application-specific µRTM is needed.
For a successful µRTM design, several aspects have to be observed which will be discussed in detail.

IPMI – a huge bouquet of possibilities to choose from

Irene Hahner
Kontron Europe GmbH

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Session 5: Intercompatibility / Further Standard Development

The Intelligent Platform Management Interface (IPMI) offers a lot of data about a system and/or board. This data provide information like voltages, temperatures, fan speed on system level and many others.

The questions that arise are:

- How can we get access to this data?
- How can we make use of this data?
- How can applications benefit from the available information?

The presentation will give answers on these questions.