Drivers and Software for MicroTCA.4.

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MicroTCA.4 Technology
Based on Advanced Telecommunications Computing Architecture (ATCA)
Wide use in telecommunications since 2005
- High speed serial bus technology
- High modularity due to Advanced Mezzanine Cards (AMCs)
- High availability due to redundancy
- Reduced down-time due to hot-swap capability

MicroTCA.4 Enhancements for Rear I/O and Precision Timing
- Definition of Micro Rear Transition Modules (μRTMs)
- Definition of AMC-μRTM connection
- Radial clock lines for precision timing
- Low latency point to point serial I/O
- Advanced shelf management
- High signal integrity by separation of analog and digital processing

MicroTCA.4 Enhancements for Rear I/O since 2005
- Radial clock lines for precision timing
- AMC-μRTM connection
- Advanced shelf management
- Radial clock lines for precision timing

Widespread use in telecommunications
- Based on Advanced Telecommunications Computing Architecture (ATCA)
- Used at the European XFEL and FLASH

Use Case
Low Level Radio Frequency Control at the European XFEL and FLASH
- Superconducting accelerators provide multi-Gev electron beams for Free Electron Lasers (FELs)
  - Digital low level radio frequency (LLRF) control based on MicroTCA.4
  - Pulsed operation (10 Hz)

The DESY MicroTCA.4 User Tool Kit (MTCA4U)
- Firmware Board Support Package
- Driver and Basic Tools
  - Extensible universal driver
  - Register mapping library
  - C++ device API
  - Language bindings to Matlab and Python
- GUI for convenient register monitoring
- Device Specific Applications
  - Example: Low Level Radio Frequency (LLRF) control application for accelerators

Device Specific Applications
- Low Level Radio Frequency (LLRF) control application for accelerators

Device Library
- Adapter Variable Pair "TEMPERATURE"
- Use "VOLTAGE"
- Control System Variable "VOLTAGE"

Control System
- Update "TEMPERATURE"
- Use "VOLTAGE" update "TEMPERATURE"

Device Library
- Adapter Variable Pair "VOLTAGE"
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Control System Adapter
- Task
  - Keep the application code (device library) independent from the control system
  - Minimise device-dependent code on the control system side
- Requirements
  - Thread safety
  - Real-time capability
  - Do not copy large data objects

Subversion Repository: https://svnsrv.desy.de/public/mtca4u

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