# Controls Infrastructure and ICS Support for WS

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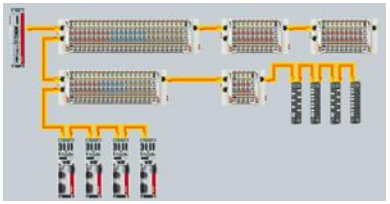
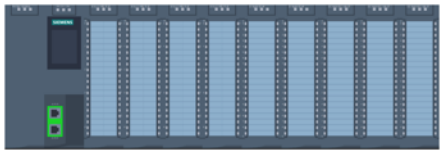
# Overview

- Introduction
  - ICS Hardware Standards
  - MTCA Platform Components
- Current status
  - Digital Platforms integration
  - Issues and solutions
- Wire Scanner Integration
- Support for upcoming vertical tests
- Summary

# ICS Hardware Standards

- **Fast real-time processing, FPGAs**
  - MTCA.4
  - Use only where needed (high cost, specialization)
  - Extensively use FMC (Vita-57) mezzanine cards
- **Real-time industrial-type I/O**
  - EtherCAT, on IOC
  - Low cost, distributed, good real-time performance
  - Moderate speed (e.g. up to 100 kSPS A/D conversion)
- **Process I/O with no tight synchronization requirements**
  - PLCs (Siemens)
- **In addition, prepare integration of off-the-shelf devices**
  - Serial and LAN interfaces





# MTCA Platform Components


3U, 6-slot crate

- 4 slots with place for rear transition module
- CPU, EVR in remaining slots

9U, 12-slot crate

- 12 slots with place for rear transition module
- 2 MCH slots (redundancy)
- 4 PSU slots

# Current status – IOxOS integration

- Integration of IFC1410
  - **IFC1410 + ADC3110/ADC3111 FMC**: Generic analog acquisition firmware (“Scope”), 8 analog inputs @ 250 MSPS – 16 bits;
  - **IFC1410 + ADC3117 FMC:** Scope firmware, 20 analog inputs @ 5 MSPS – 16 bits;
  - Kernel driver provided by IOxOS – limited functionalities;
  - EPICS Device Support based on NDS3;

- Integration of IFC1420
  - 10 analog inputs @ 250 MSPS – 16 bits
  - Vertical test (Firmware – driver – EPICS) not tested yet;
  - Firmware and analog characterization recently released;

# Current status – issues

- Kernel driver with limited functionalities;
- PCIe root complex functionality;
- Migrate from NDS3 to areaDetector;
- Official support for PPC64 on EEE;
- Limited resources on ICS;

# Current status – solutions

- Kernel driver with limited functionalities;
  - **New kernel driver recently released by PSI;**
  - **Currently under debug/test by ICS;**
- PCIe root complex functionality;
  - **Run IOCs on CPU card and access IFC14xx using backplane PCIe;**
  - **Long term: PCIe enumeration done by MCH;**
- Migrate from NDS3 to areaDetector;
  - **Allocate ICS resources and prioritize this development;**
- Official support for PPC64 on EEE;
  - **New EEE release soon: E3**
- Limited resources on ICS;
  - **New line manager starting soon; New positions for integrators;**

# Current status – Timing System

- Timing System
  - Improvements: new firmware and EPICS support;
  - MRFIOC2 synchronized with community releases;
  - Backplane triggering and clock distribution tested and working;

# Current status: EPICS Environment

- EEE was heavily built by consultants – hard to mantain and upgrade;
- Core componentes needs to be fully under ICS control;
- **E3** - Main improvements:
  - Support for more architectures and dev. environments;
  - New directory structure;
- Main concept is the same: dinamic loading;
  - Sync with PSI version of ”require”;
  - Long term vision is to use only EPICS standard build system;
- Deployment strategy depends on Software Group;
- Current IOCs/modules ”almost” won’t be affected – same startup script;
- Latest versions of MRFIOC2 and EtherCAT modules;
- To be released soon...

# Migration plan for Wire Scanner

- ICS can support Struck until IOxOS is mature enough;
  - No special firmware needed;
  - Soft transition for the current system, since it is EPICS;
- Ideal would be IFC1420
  - Needs more time for full EPICS integration;
- Can be done in short term with IFC1410 + ADC3111
  - Concurrent CPU running IOC for timing and EtherCAT;
  - ICS needs stronger engagement on WS project;
- areaDetector standard driver to be done by ICS;
  - Should work for Struck or IOxOS;

# ICS support for the vertical test

- ICS should engage in this activity;
  - Regular video calls with Elettra team ?
  - Replicate system in ICS lab ?
- Installation of the infrastructure: MTCA crates, cards, network;
- PLC to emulate MPSID interface;
- Timing system: EVG + EVR;
- Control Systems Services: archiving;
- ICS should help Elettra to upgrade EEE, timing system, etc..;

# Summary

- ICS support for WS needs to improve;
- ICS is working hard to resolve all issues and provide a reliable high performance MTCA system;
- Work together with BI to achieve optimal results;
- areaDetector standard support for digitizers is a high priority task;
- ICS will support the upcoming vertical tests for WS;
- New deliveries from ICS must be as much transparent as possible – no overhead;

Grazie mille!

Thank you!

Tack!

**Muito obrigado!**