

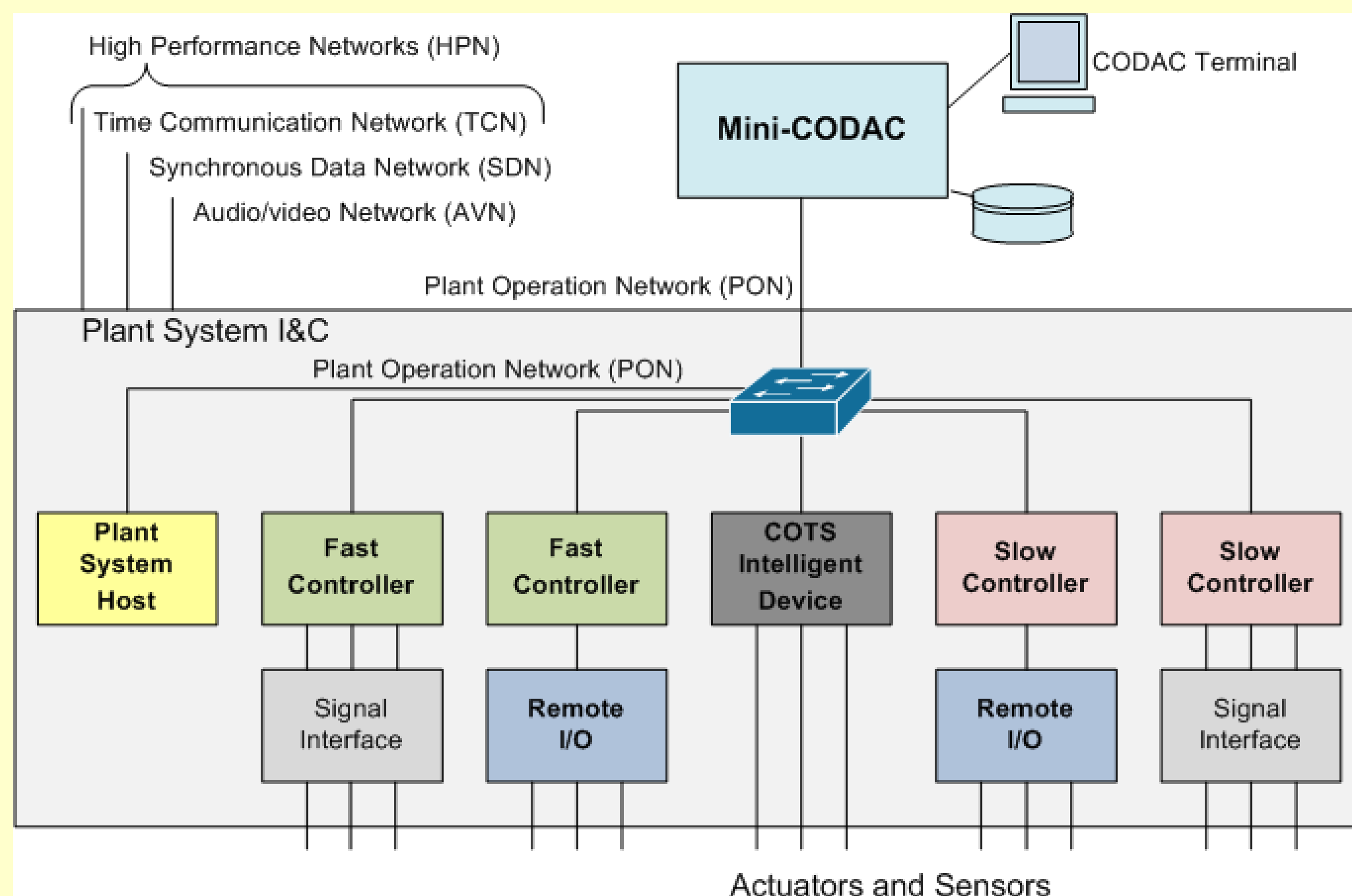
THE CODAC SOFTWARE DISTRIBUTION FOR THE ITER PLANT SYSTEMS

Abstract

Most of the systems that constitutes the ITER plant will be built and supplied by the seven ITER domestic agencies. These plant systems will require their own Instrumentation and Control (I&C) that will be procured by the various suppliers. For improving the homogeneity of these plant system I&C, the CODAC group, that is in charge of the ITER control system, is promoting standardized solutions at project level and makes available, as a support for these standards, the software for the development and tests of the plant system I&C. The CODAC Core System is built by the ITER Organization and distributed to all ITER partners. It includes the ITER standard operating system, RHEL, and the ITER standard control framework, EPICS, as well as some ITER specific tools, mostly for configuration management, and ITER specific software modules, such as drivers for standard I/O boards. A process for the distribution and support is in place since the first release, in February 2010, and has been continuously improved to support the development and distribution of the following versions.

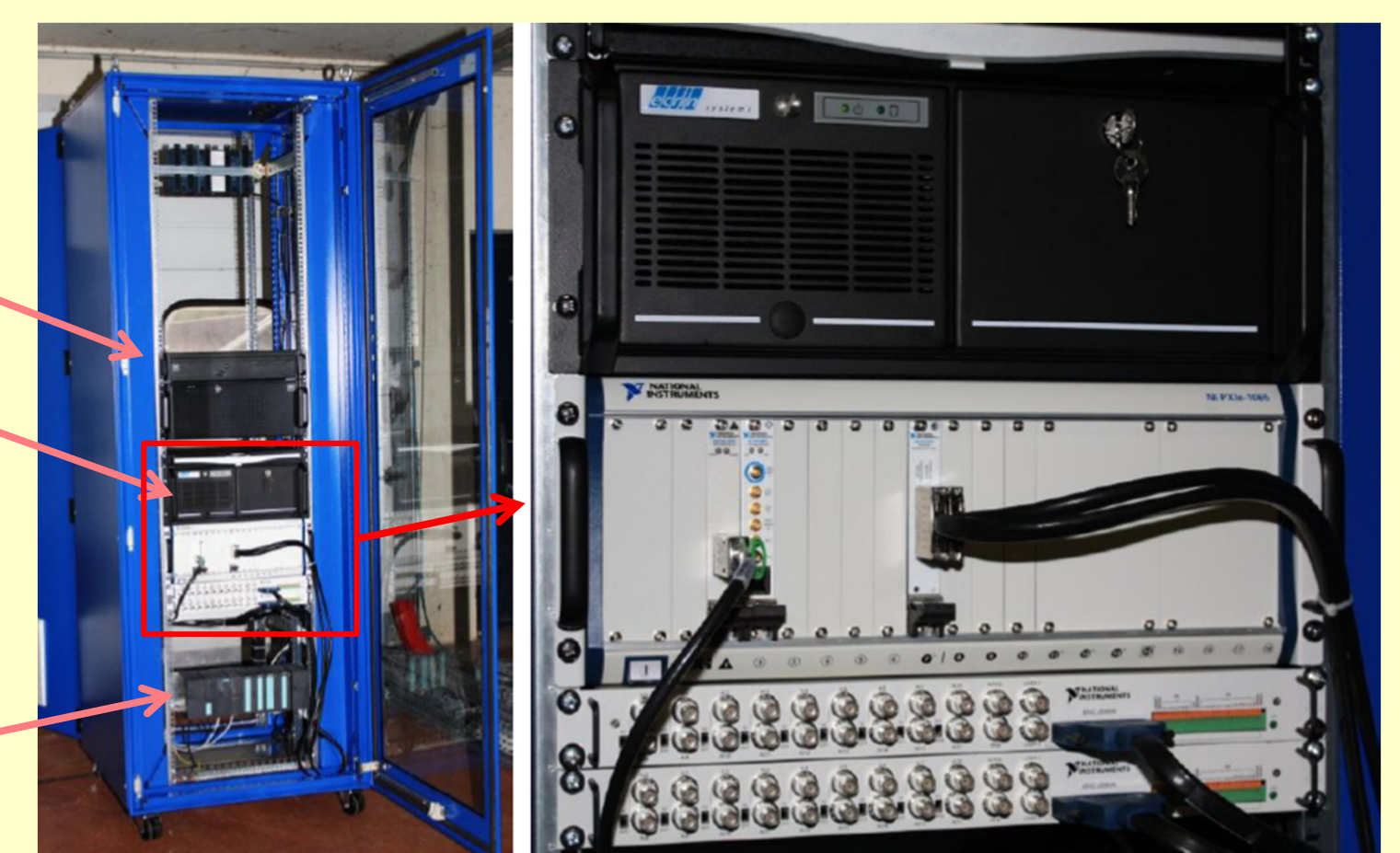
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Hardware



- **Mini-CODAC:** Desktop PC or rack-mounted PC connected to the plant I&C.
 - Replace central servers before the plant systems are integrated with the central ITER infrastructure,
 - Implement the central services such as alarm handling and archiving, with reduced functions and/or performances,
 - Replace a control room workstation for the execution of operator software.

- **Plant System Host (PSH):** industrial PC without specific I/O.
 - Implements standard CODAC services, such as operating state management or health monitoring.
 - Gateway to communicate with the Siemens PLCs.
- **Fast controllers:** PICMG 1.3 compliant industrial PCs controlling PXI/PXIe/cPCI I/O chassis over a PCIe link (xTCA under development)
 - Red Hat Enterprise Linux (RHEL)
 - optionally with real-time extensions (RHEL MRG-R)
- **Slow controllers :** Siemens PLC (S7/400 and S7/300)



Software

Mini-CODAC

RHEL (6.1)

EPICS

CSS
control system studio

- Alarms (BEAST)
- Displays (BOY)
- Archives (BEAUTY)

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- Configuration Tools (SDD)
- Build tools
- Samples

PSH

RHEL (6.1)

EPICS

PSI
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- S7 PLC communications

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- System monitoring
- Operating states handling

Fast Controller

RHEL (6.1)

RHEL MRG R

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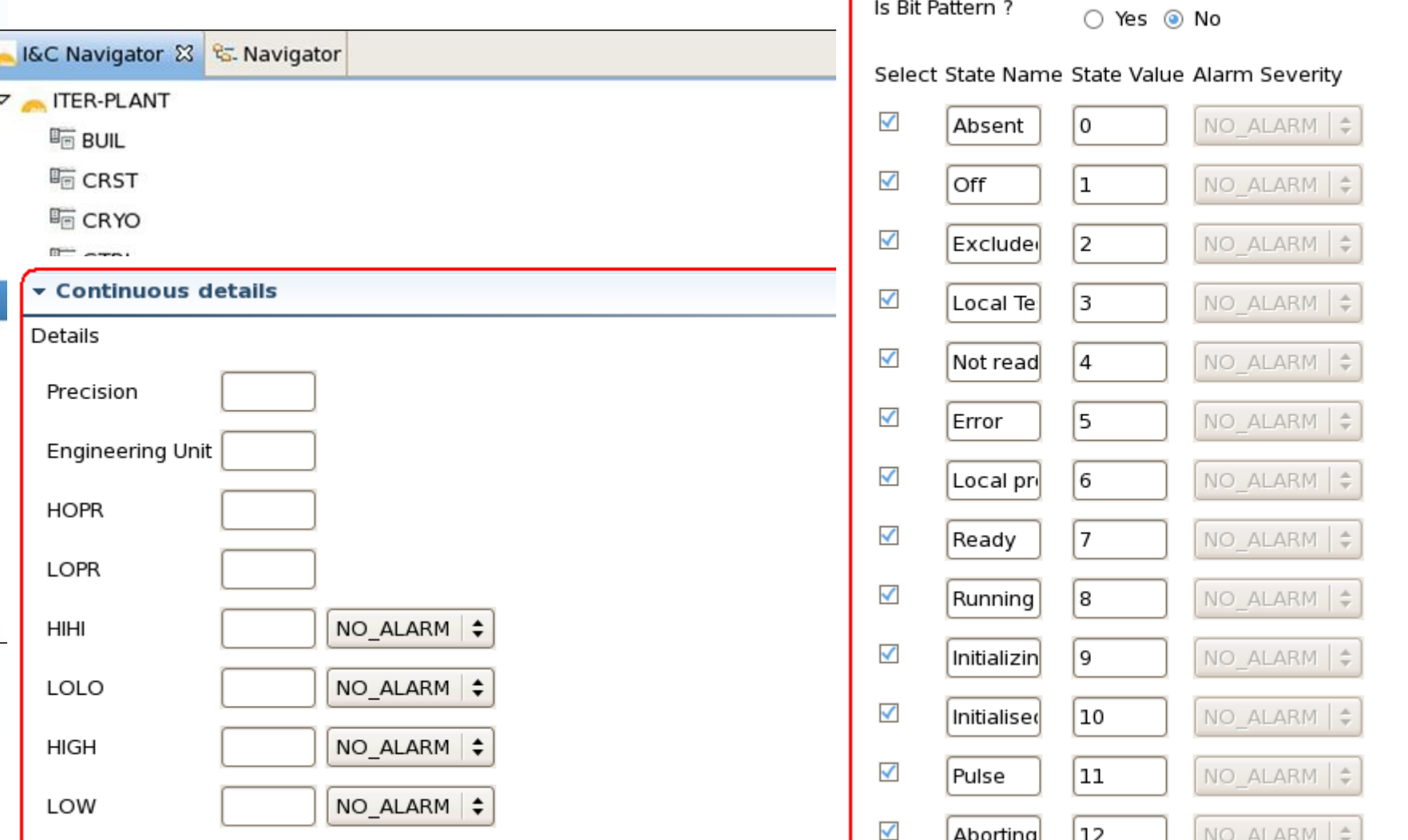
- Linux drivers for I/O boards
- EPICS support for I/O boards

Supported I/O boards 2011-2012

- ✓ **NI PXI-6259:** multi-function data acquisition board (16 analog input, 4 analog output, 32 digital I/O).
- ✓ **NI PXI-6682:** synchronization and timing board (IEEE-1588)
- **NI PXIe-6368:** higher performance multi-function data acquisition board (16 simultaneous analog inputs at 2 MS/s)
- **NI PXI-6528:** a digital I/O board (24 input, 24 output, optically isolated)
- **NI FlexRIO** boards (FPGA) with adapter boards: PXI-7951R with 6581 (digital) and 5781 (analog) adapters.

Self-Description Data (SDD)

- ❖ A local database is configured on each Mini-CODAC, to store/retrieve the plant system I&C definitions.
- ❖ The **SDD editor** allows the creation/editing of the plant system I&C into the local database..
- ❖ **SDD translator** generates all specific files:
 - build files (makefile, scripts...),
 - EPICS configuration files (record databases, IOC scripts...),
 - Control System Studio (CSS) configuration files for alarms and archiving,
 - the variables declaration for the PLCs.
- The local databases are initialized with data from the central database and will be synchronized with it to update local copies or to commit new definitions.



Development workflow on Mini-CODAC

