

The logo features a large, solid orange semi-circle. The word "iter" is written in white, lowercase, sans-serif font, centered within the semi-circle.

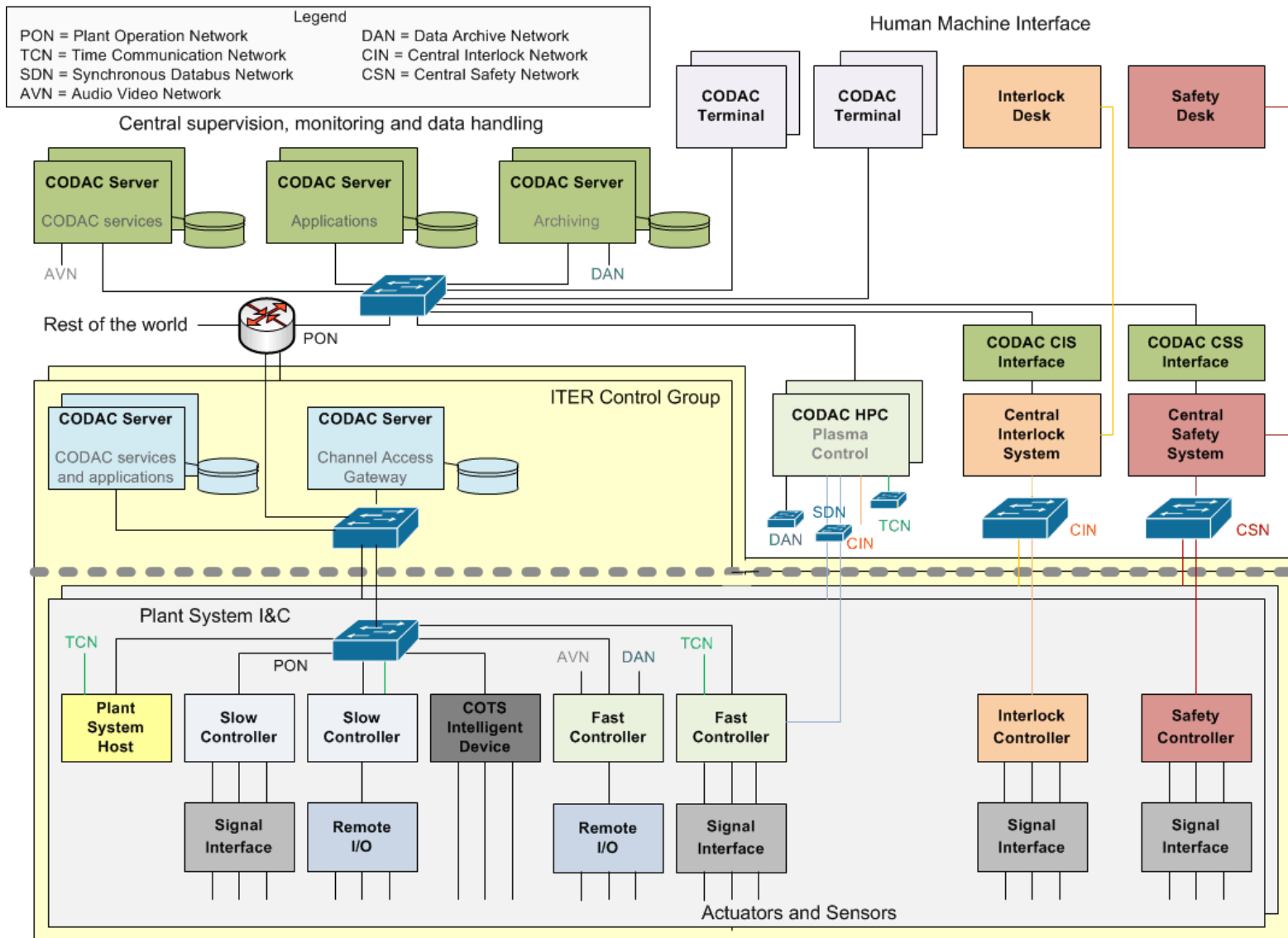
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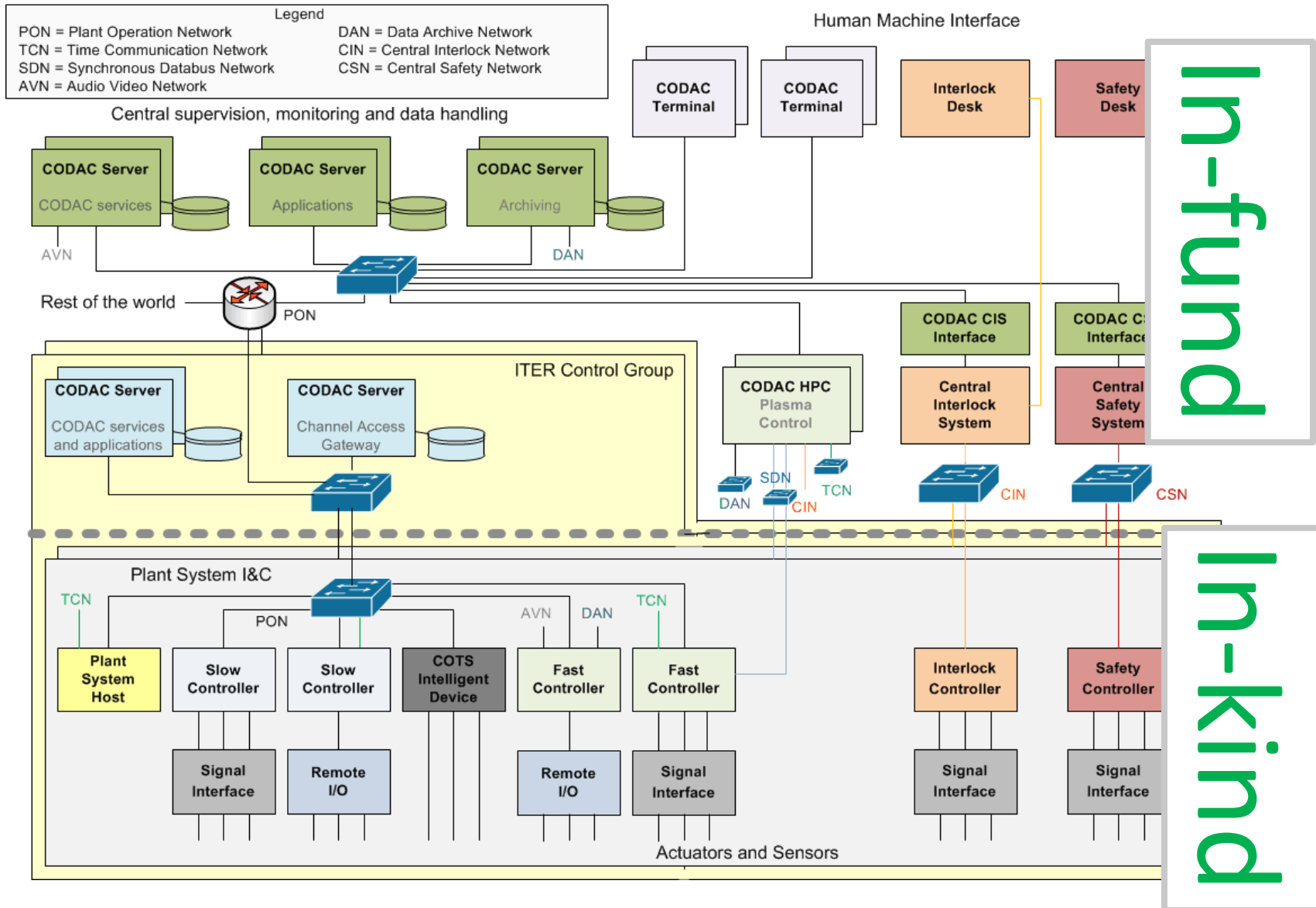
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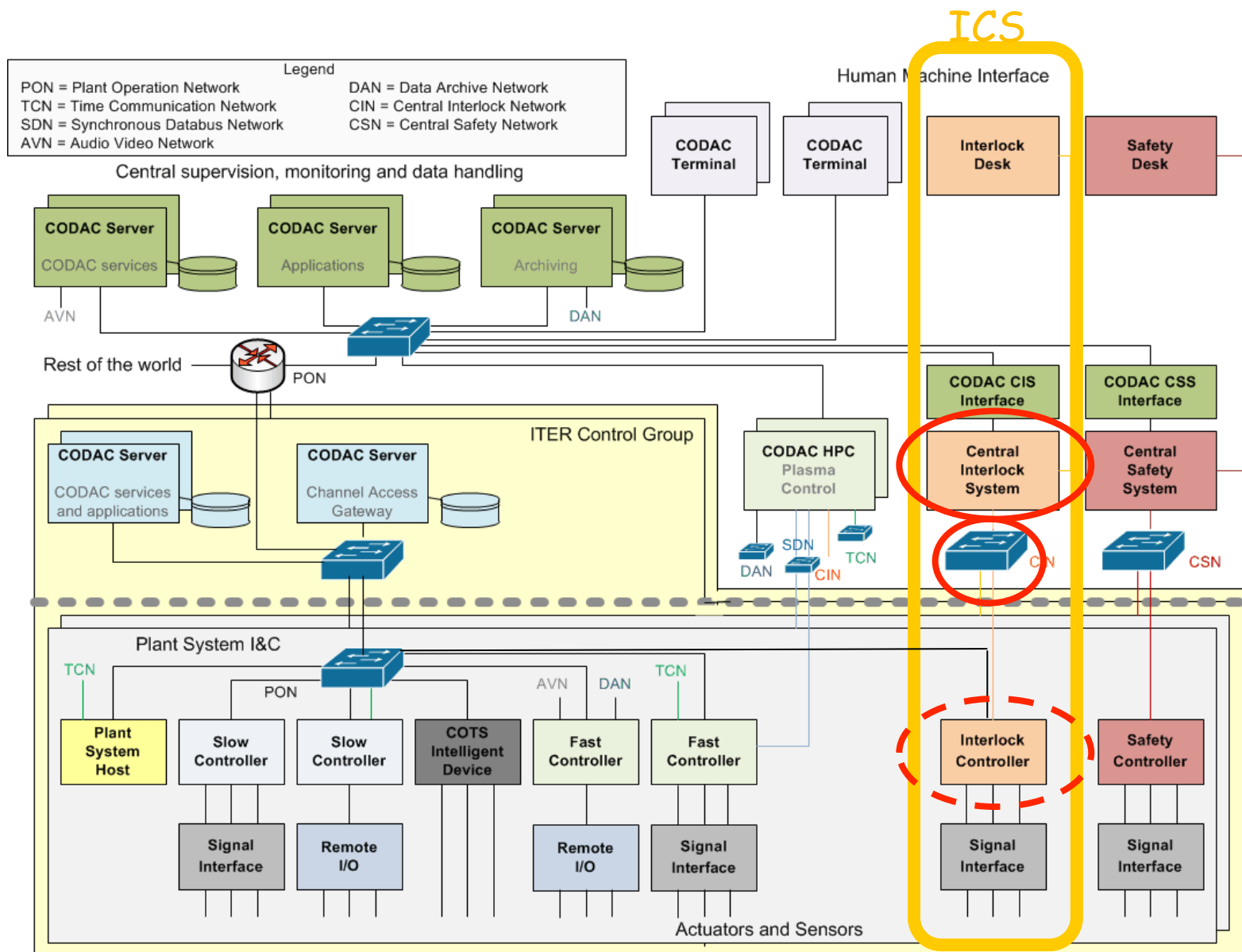
The background of the slide is a photograph of a modern building with a distinctive green roof. The building's facade is composed of vertical, ribbed panels. The roof is covered with various green plants. The sky above is a deep blue with some light clouds. The text is overlaid on a dark blue rectangular box in the center of the image.

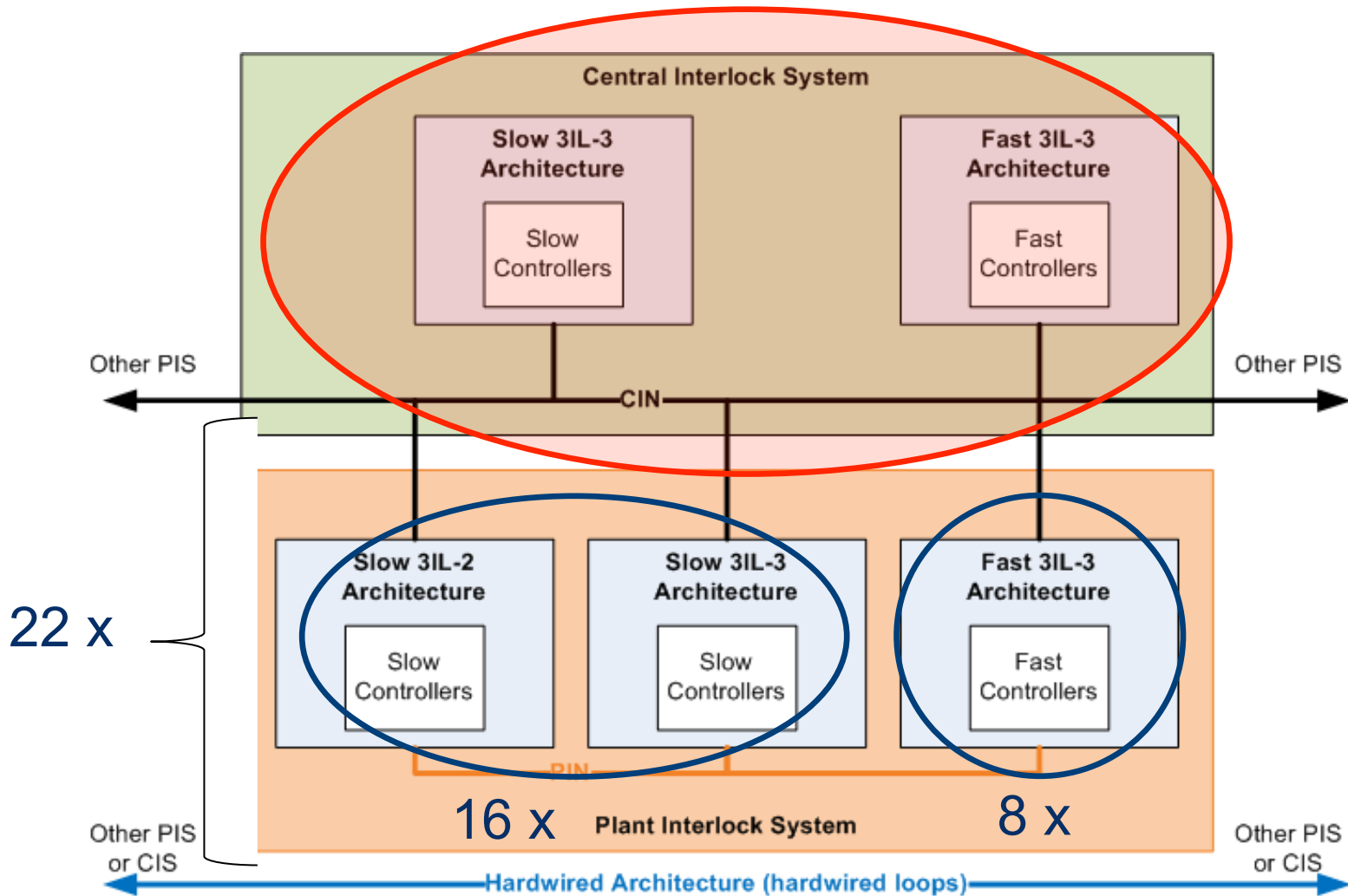
PLC workshop at ESS 29-30 August 2013 ITER Machine Protection & Interlocks

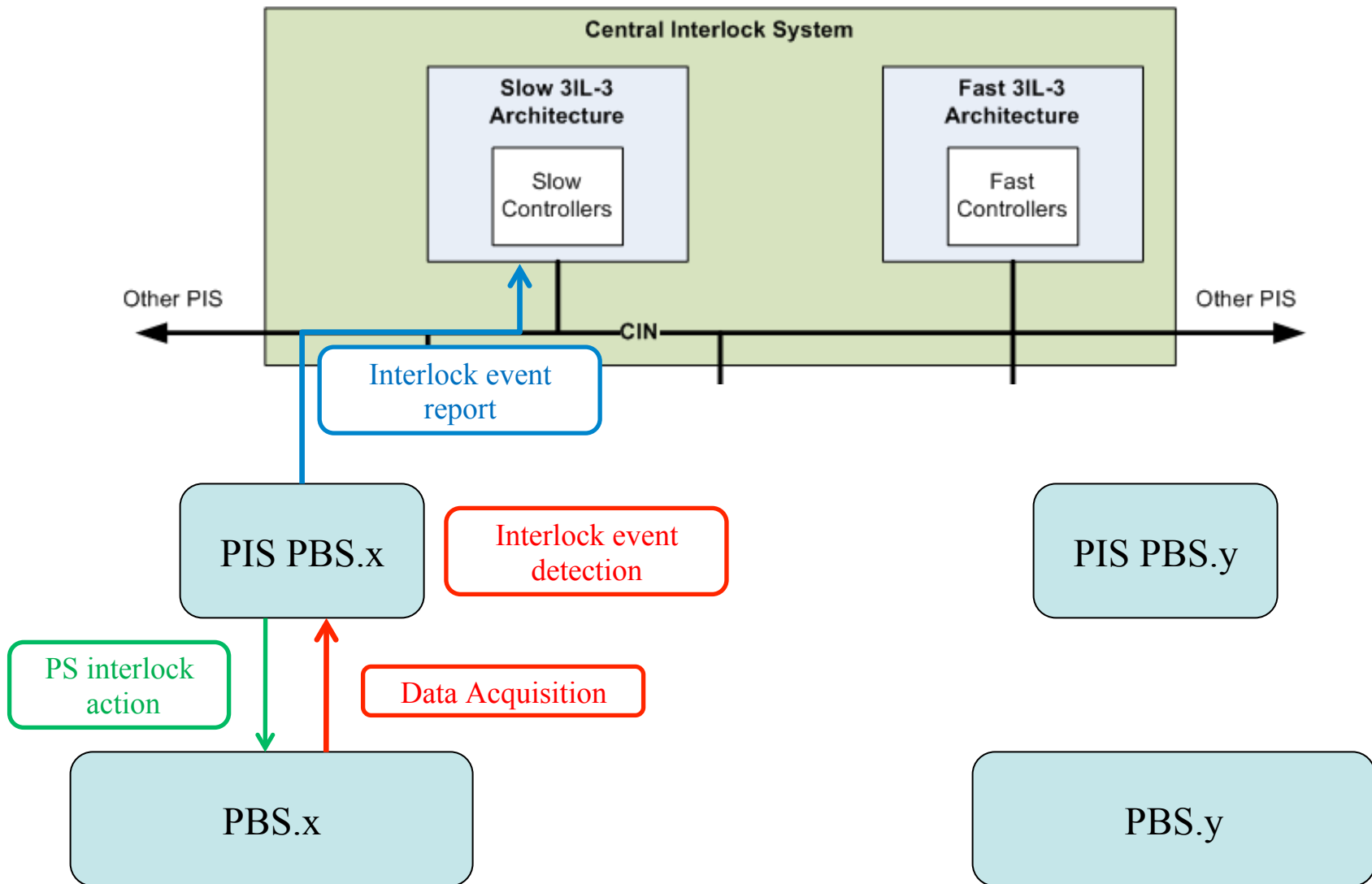
Alvaro Marqueta – IFMIF
Antonio Vergara – ITER

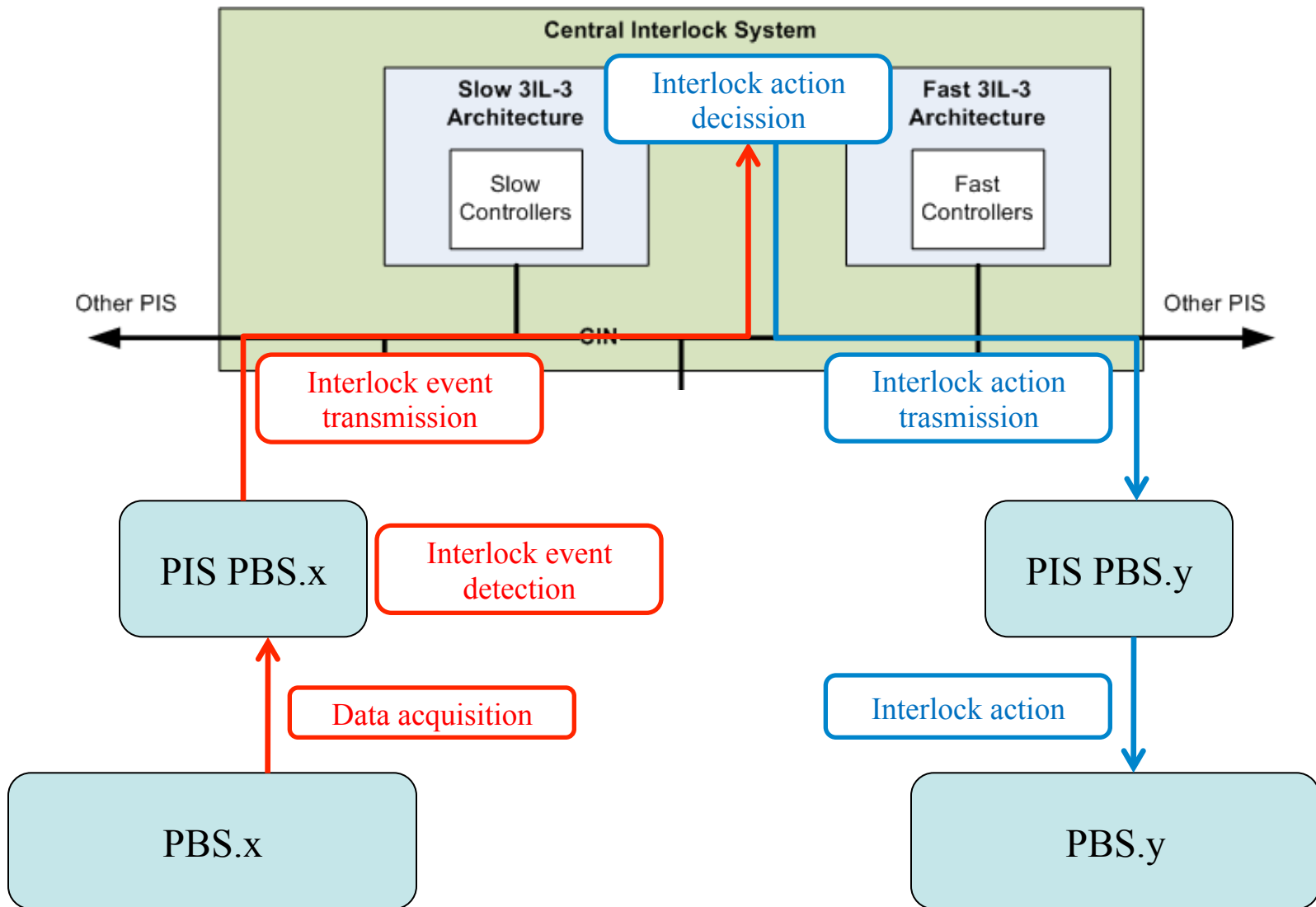










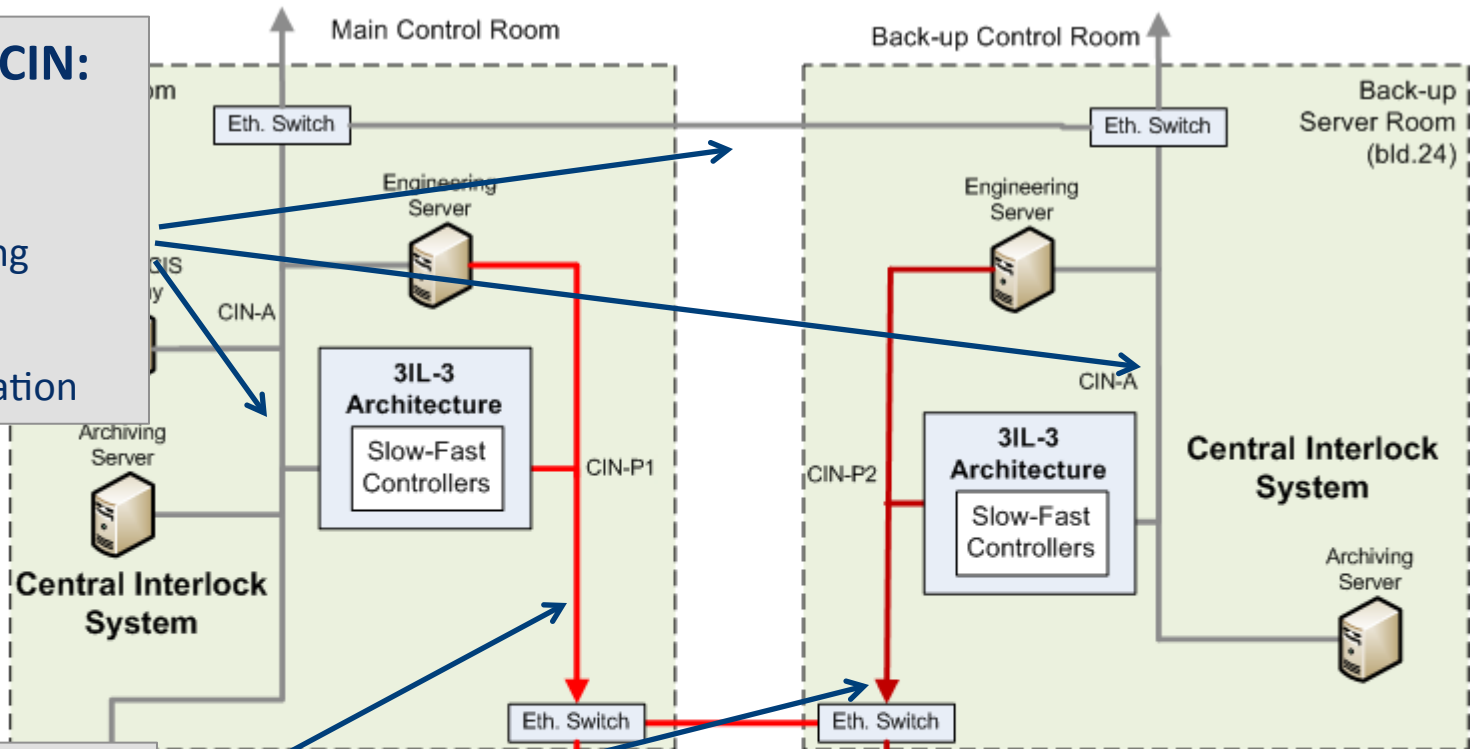


System requirements, in different domains:

- Design: “the criteria in the IEC 61508 apply for the design of the CIS”
- Architecture: “one or more units of central redundant control logic”
- Network: “dedicated redundant communication network”
- Dependability:
 - 99.9% inherent availability
 - 99.6% overall reliability, over two 8h-shifts
- Maintainability:
 - “The CIS shall be designed with sufficient built-in redundancy to allow the maintenance without removal of the entire system from service.
- Operability:
 - The CIS shall be designed to be continuously operational 24h/24h
 - “dedicated engineering console for its internal monitoring”

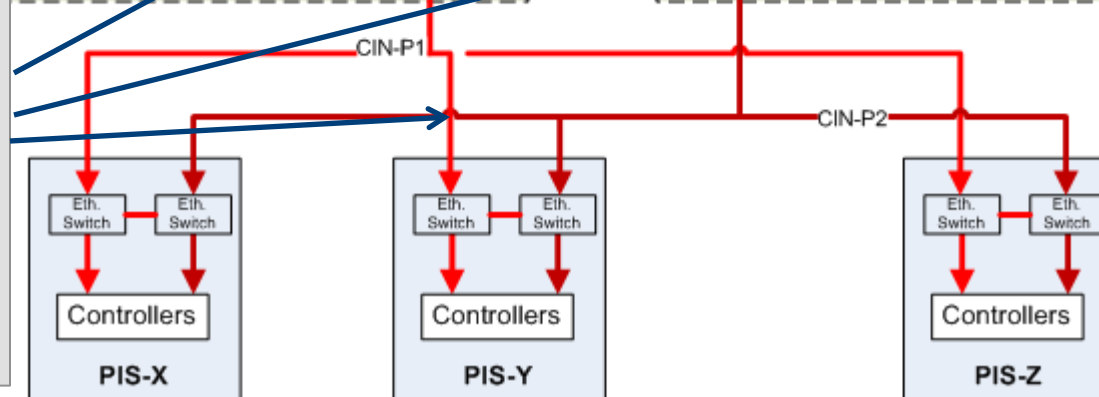
Administrative CIN:

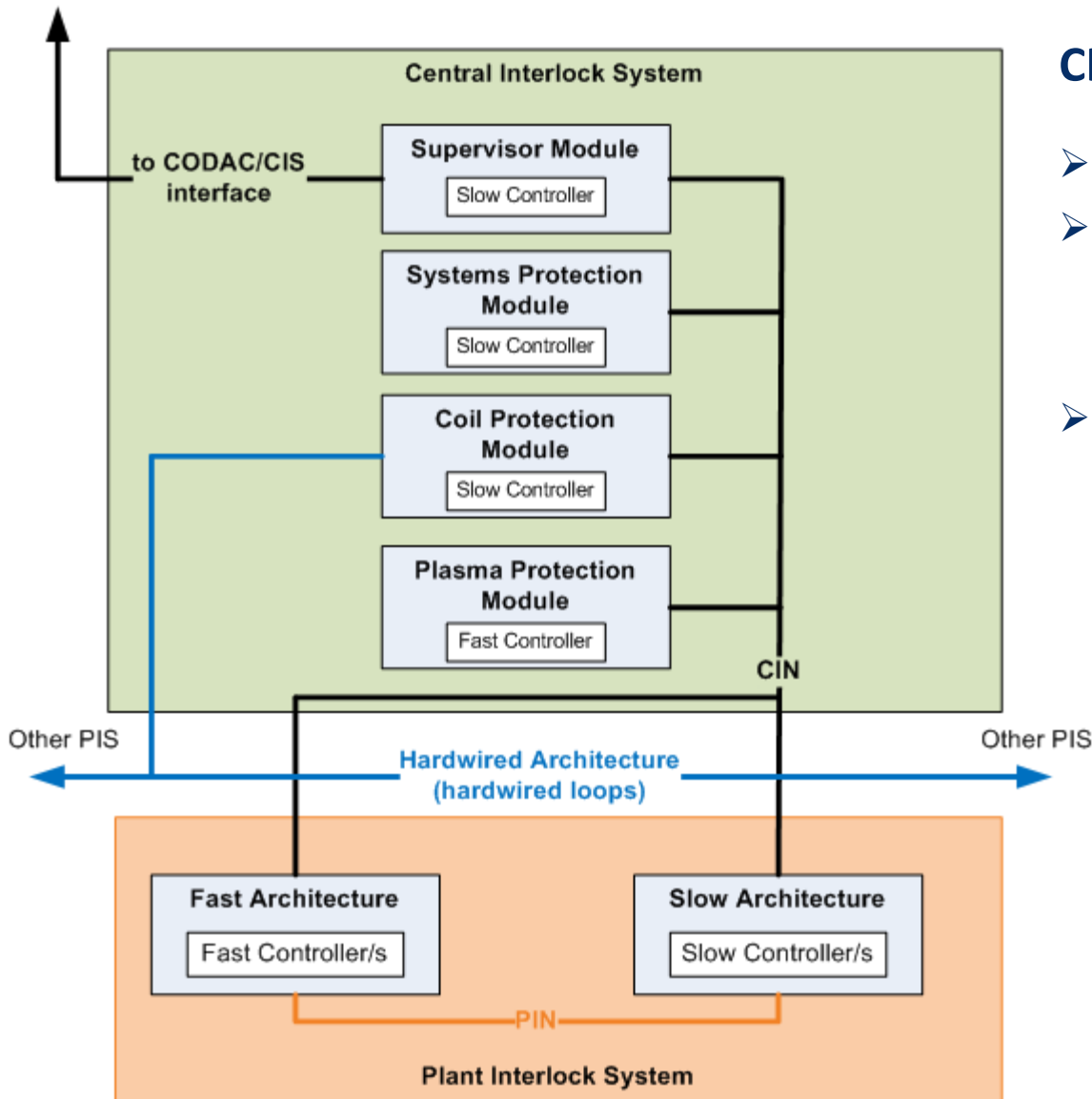
- For non critical communications
- System monitoring
- Data archiving
- Module configuration



Process CIN:

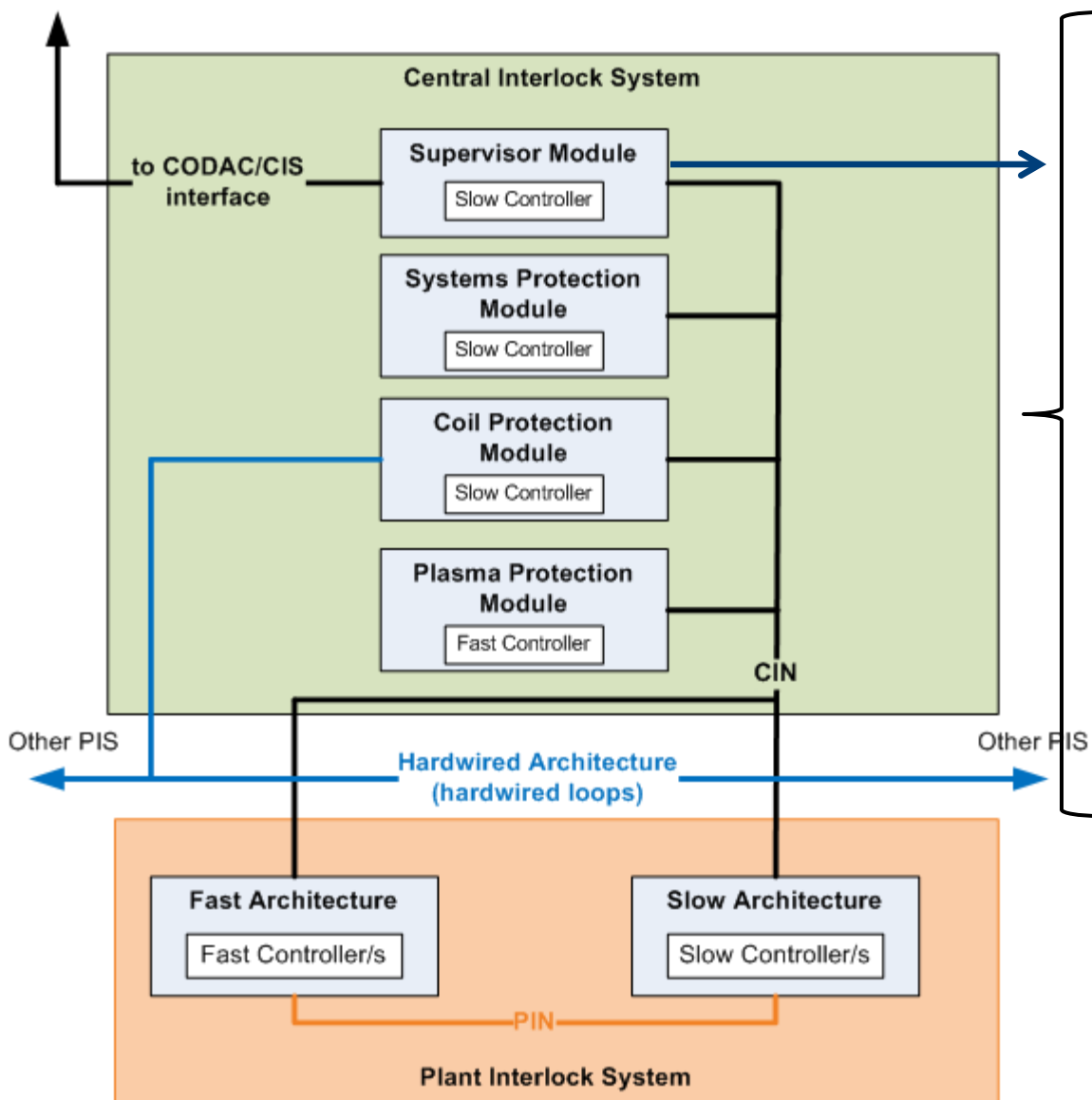
- Critical communications
- Redundant (loop closed at PIS level)
- CIS-PIS interlock events/actions





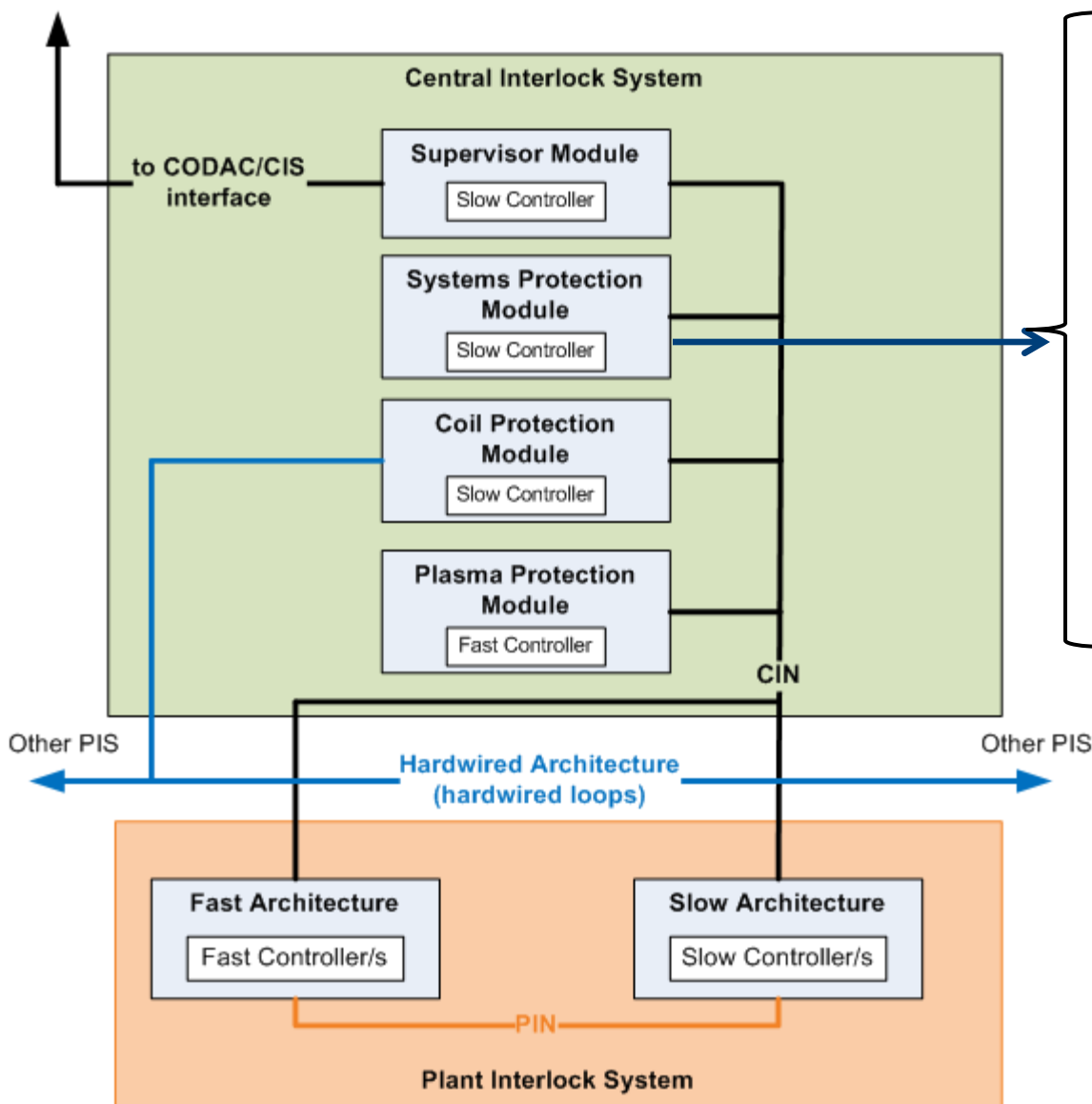
CIS architecture based on modules:

- List of interlock functions as input
- Division between
 - Interlock functions
 - System functions
- Main criteria met:
 - Installation
 - Operation and maintenance
 - Performance requirements
 - Integrity requirements



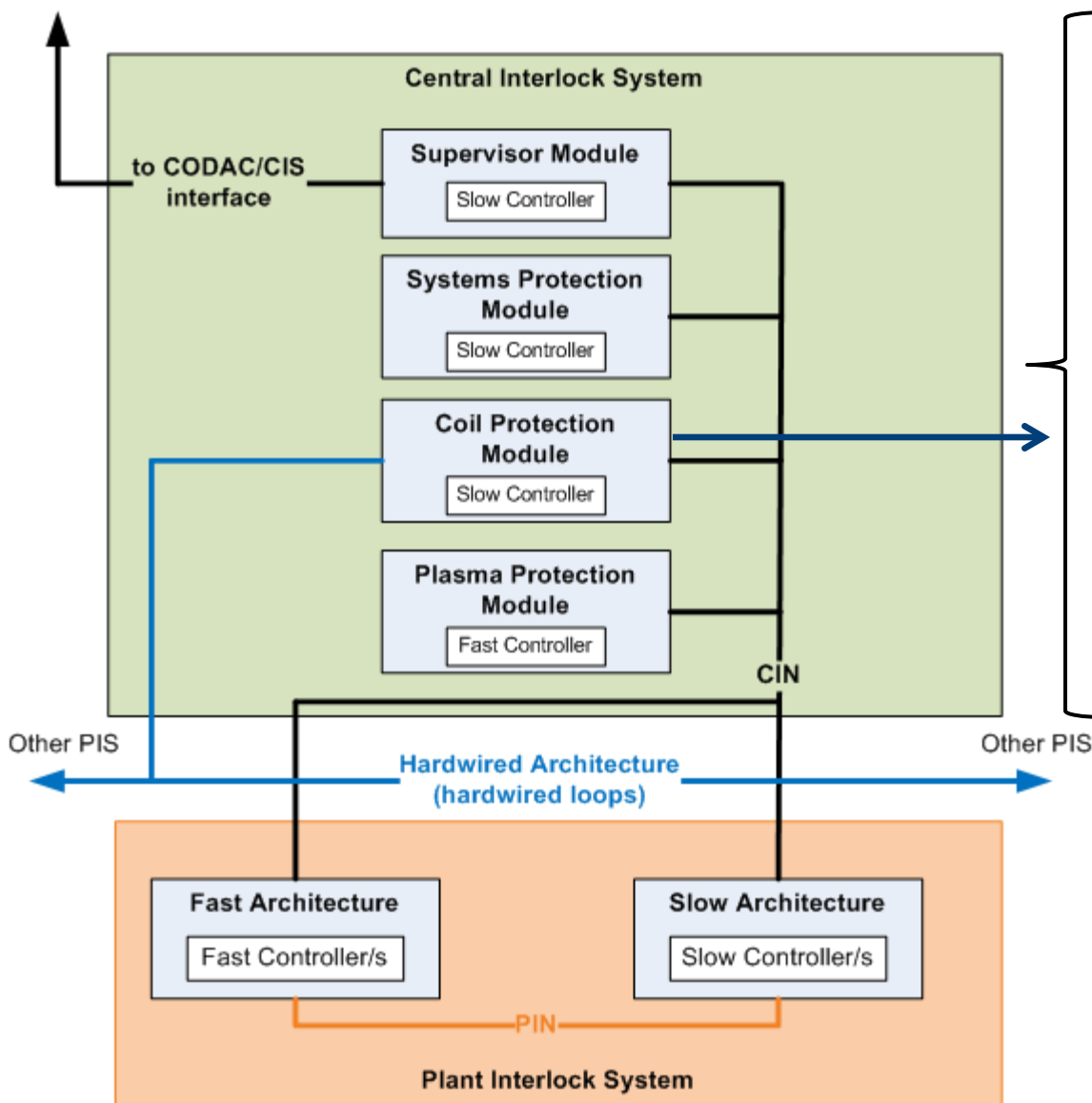
Supervisor module:

- In charge of CIS functions & “administrative” tasks
- Interface with CODAC
- Management of the operating state within CIS
- Interface with Critical Logging server
- Alarm management
- Centralized management of masking or bypasses of signals/functions
- Time signal propagation



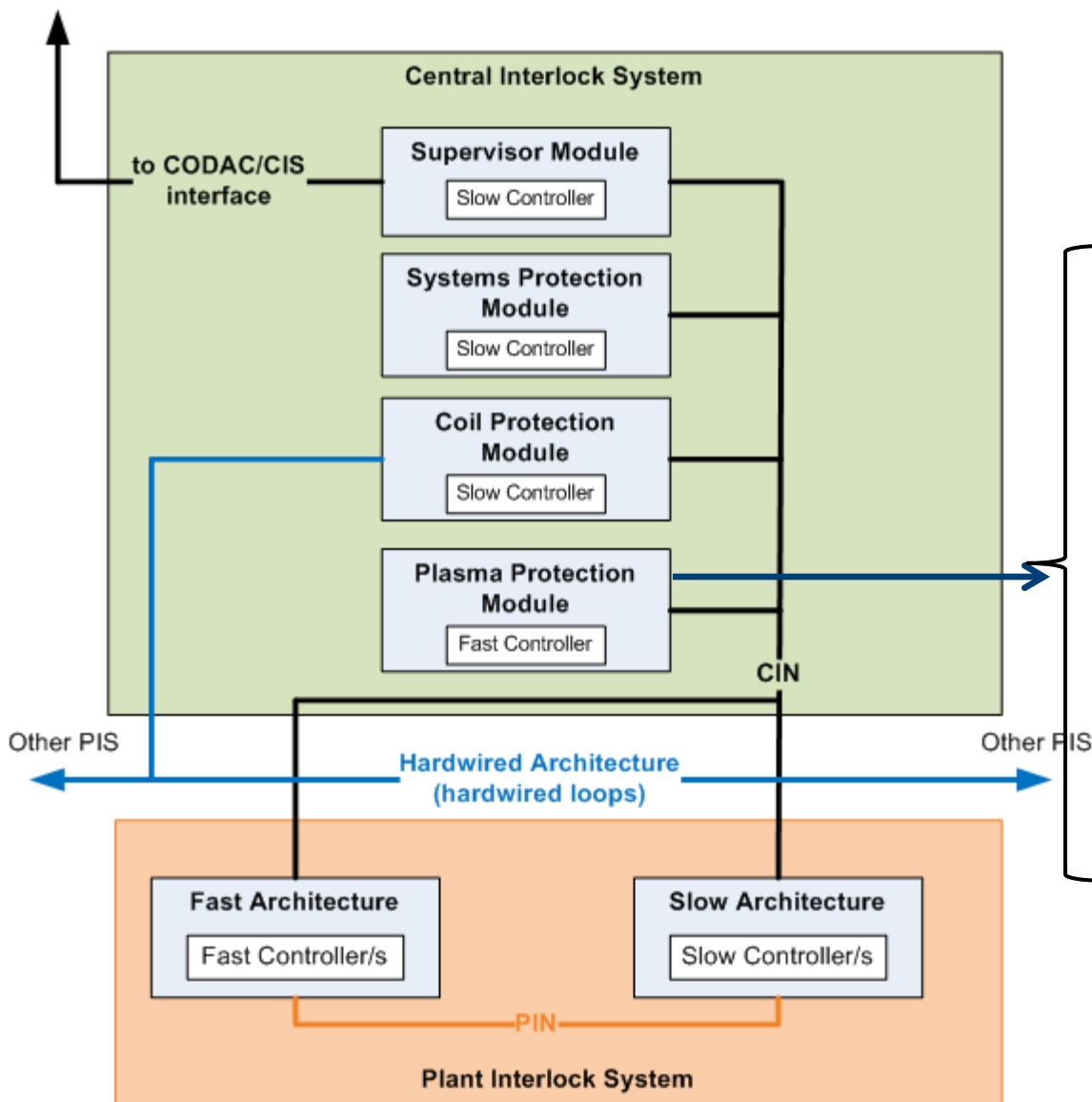
Systems Protection module:

- In charge of interlock functions related to utilities
 - electrical power
 - vacuum...
- Required during all ITER operating phases
- Incorporated already in first version of CIS



Coil Protection module:

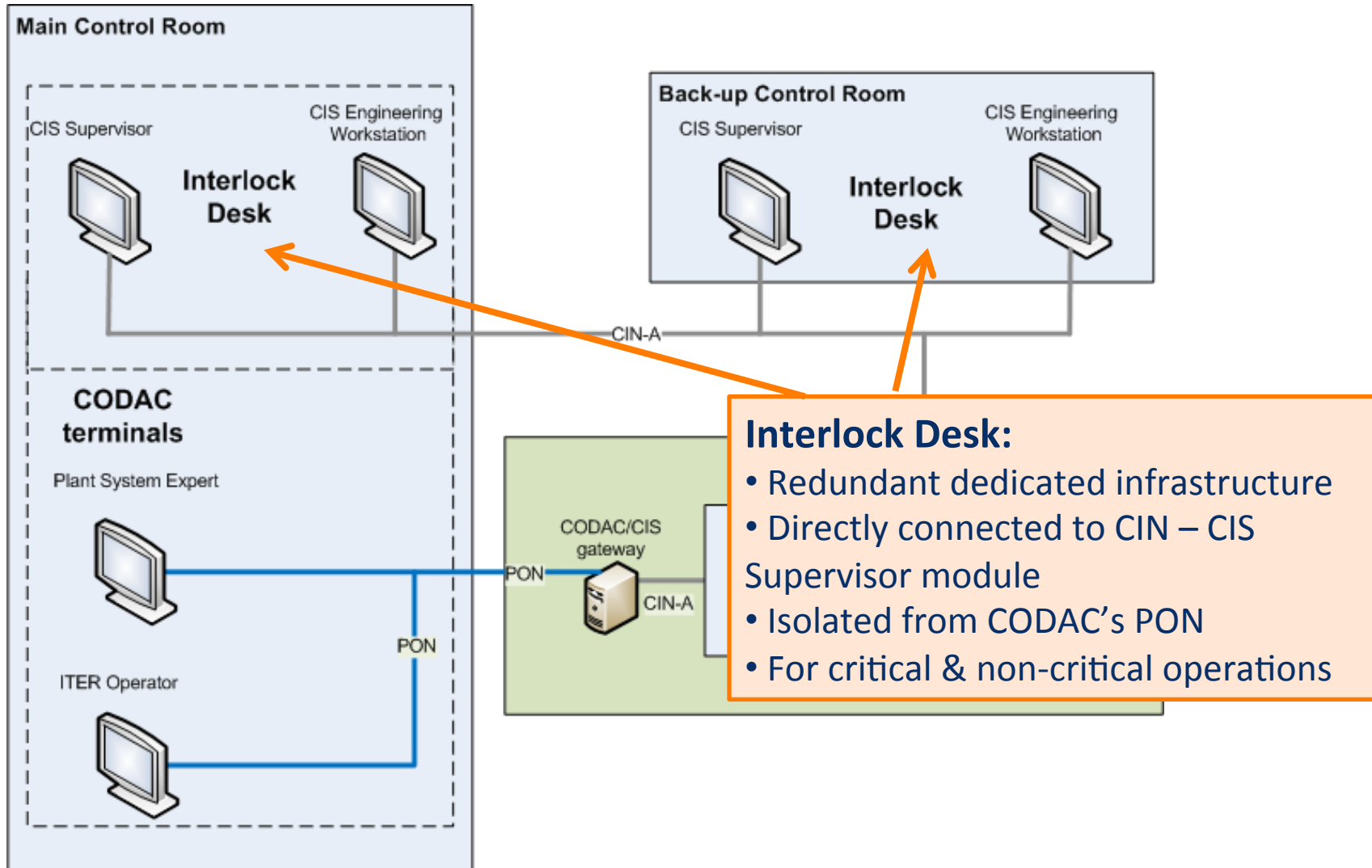
- Implements all magnet protection functions
 - including interface with hardwired loop (open/close + monitoring)
 - via profibus + remote I/O
- Plus all functions required outside maintenance phases (i.e. during powering)
- Will allow its disconnection during STM/LTM



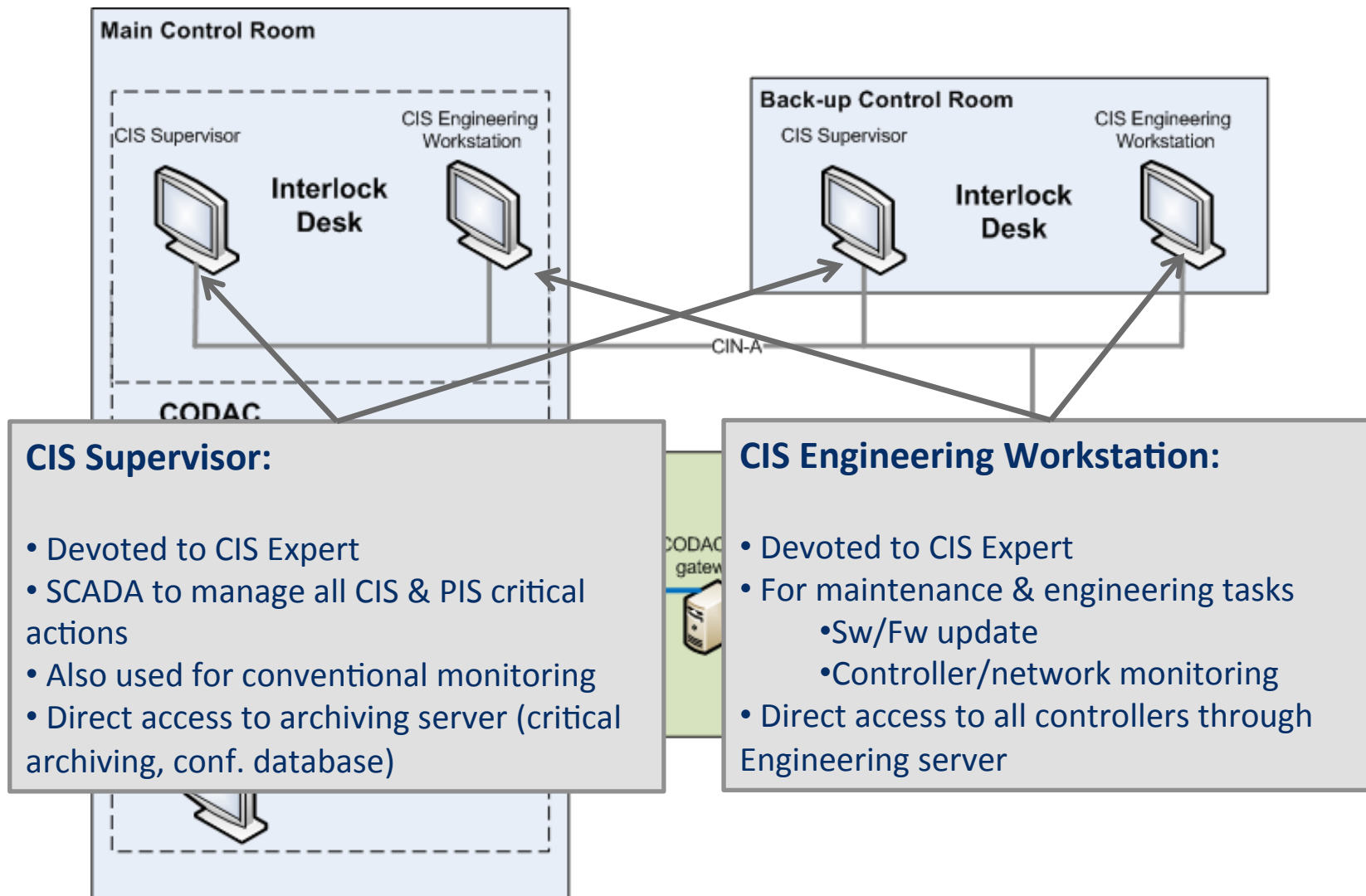
Plasma Protection module:

- Only module implemented in fast architecture
- Implements all fast interlock functions required during POS + TCS
- Implements interface with PCS
- Will allow its disconnection during STM/LTM

CIS Operation Infrastructure:



CIS Operation Infrastructure:



CODAC Gateway:

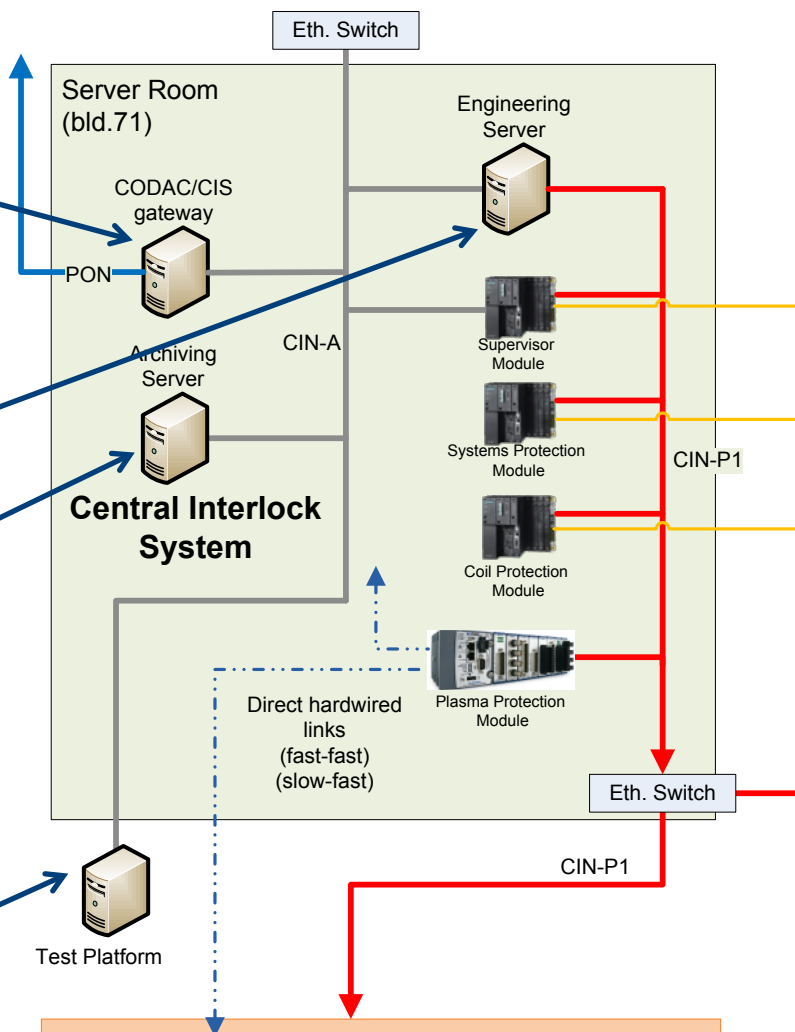
- For non critical communications
- System monitoring
- Convert CIS variables to PVs

Engineering Server:

- Implements critical configuration & updates in controllers
- Some configs. may be read from archiving server
- Managed from Eng.Workstation via remote terminal

Test Platform:

- Independent from CIS, used to test new developments
- Will implement some CVS solution for CIS SW versioning
- Engineering server will get CIS updated from this platform



Central Interlock System:

➤ Architecture ready to host interlock functions:

- Flexibility for operation & maintenance
- Assures overall process capacity & timing requirements

➤ Availability, Reliability and Integrity requisites met

- Presentation tomorrow...

