



Call for Nomination

Design Integration ITER Control Systems

Ref. IO/16/CFT/70000249/BGD

Purpose

The purpose of this Contract is to provide the technical services required for the design and integration of ITER control systems. Services may include the design and integration of plant system Instrumentation and Control (I&C) with central I&C systems. All services rendered by the contractor are within the scope of the Plant Control Design Handbook (PCDH) [RD1] and satellite documents.

Background

ITER (“The Way” in Latin) is one of the most ambitious energy projects in the world today. 35 nations are collaborating to build the world’s largest tokamak, a magnetic fusion device that has been designed to prove the feasibility of fusion as a large-scale and carbon-free source of energy based on the same principle that powers our Sun and stars.

For more information on the ITER project: <http://www.iter.org/proj/>

The ITER Instrumentation and Control (I&C) System is the term encompassing all hardware and software required to operate the ITER machine. The ITER I&C System has two levels of hierarchy; the Central I&C Systems and the Plant Systems I&C represented in *Figure 1*. The Central I&C Systems are “in-fund”, i.e. procured by the ITER Organization. The Plant Systems I&C are “in-kind”, i.e. procured by the seven ITER Domestic Agencies (DAs). The current estimate is for 207 Plant Systems with associated sensors and actuators.

The primary goal of the ITER I&C system is to provide the fully integrated control of the ITER machine. Standardization of Plant System I&C is the primary goal of the ITER Control System Division. Mandatory requirements and recommendations for the system development lifecycle and component selections are documented in the PCDH and the PCDH satellite documents; see *Figure 2*. The standards and guidelines of the PCDH are required to be met as referenced in the domestic agency procurement arrangements.

To complement and to enforce the standards, the IO has developed a software and hardware tool kit called the CODAC Core System. This tool kit is used to interface and support the development of every ITER plant system.

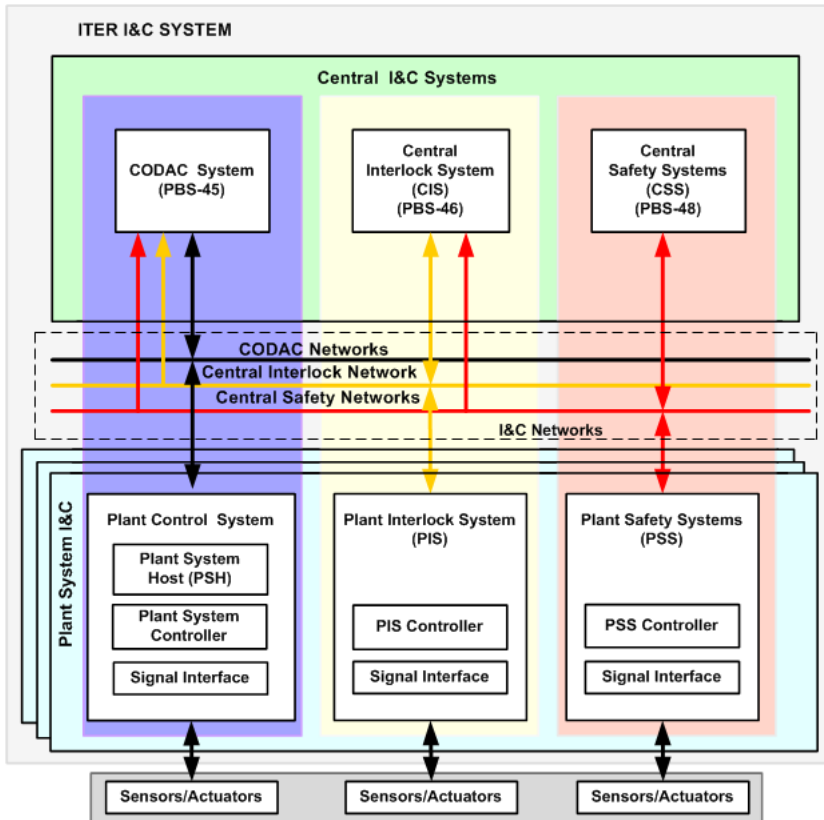


Figure 1: ITER Instrumentation and Control System

The PCDH document has satellite documents giving in-depth guidelines for plant system I&C. These satellite documents present certified catalogues of hardware items which are compatible with the CODAC Core System components.

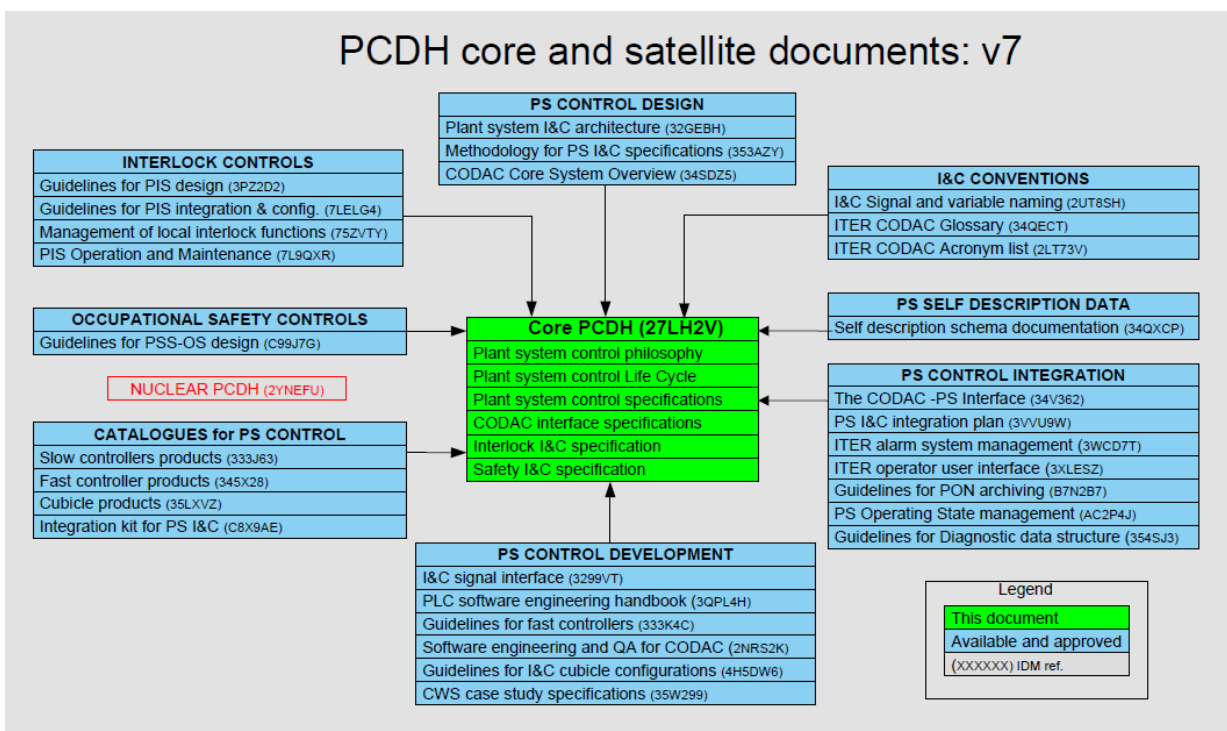


Figure 2: PCDH Satellite Documents

The CODAC Core System architecture is illustrated in **Figure 3**. This figure demonstrates the position of different components that will be addressed within the framework of the Contract. Each plant system belongs to one of the ITER machine subsystems. Each ITER subsystem is composed of the one or more Plant Systems I&C and dedicated CODAC servers and network equipment.

Each Plant System I&C contains an industrial network switch, a Plant System Host (PSH), one or more Slow Controllers, one or more Fast Controllers and other components which are beyond the scope of this document.

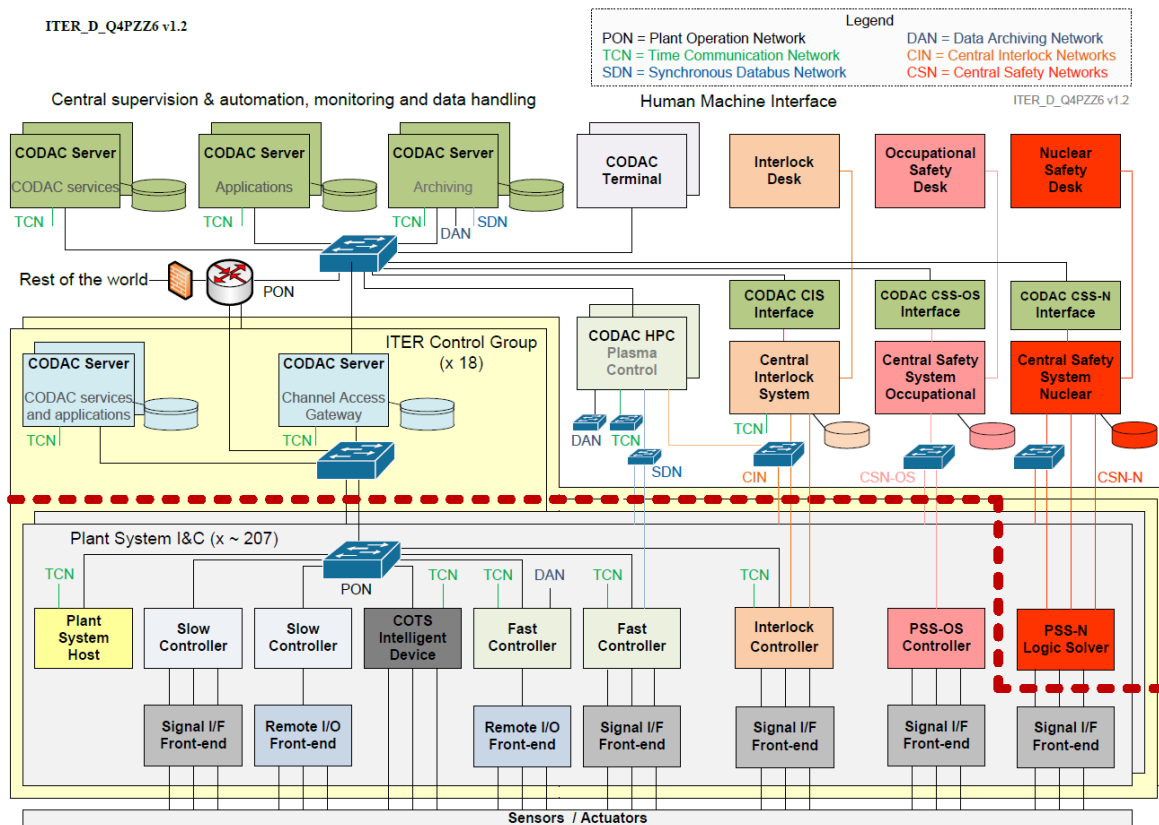


Figure 2: Physical architecture of Central I&C Systems and Plant System I&C

Slow Controllers are Siemens Simatic S7 Series PLC devices. Fast Controllers can be PCI Express based industrial or telecommunication computers, or standalone FPGA systems providing faster I/O control cycles than the PLC devices. Plant System Host (PSH) is an EPICS gateway between the Plant System and the CODAC system. Notably it controls the configuration and operational aspects of the PLC devices. It controls also the EPICS based configuration and some operational aspects of the Fast Controllers.

Slow controllers, fast controllers and PSH will be integrated in the Local Control Cubicle (LCC). The slow and fast controllers will be interfaced to the sensors and actuators through signal interfaces. All these components and those required for additional services (monitoring, power supplies) will be integrated in Local Control Cubicles (LCC) and Signal Conditioning Cubicles (SCC). This contract targets this component integration.

For information on the current status of the ITER I&C system and its technologies is available at <http://www.iter.org/mach/codac>

Experience

The Contractor shall have adequate experience for the work and activities as detailed below.

- Design of complex industrial control systems
- Integration of large scale industrial control systems
- Verification and validation of control system requirements
- Process development and continuous improvement
- I&C tool development and maintenance

Work description

This summary covers the technical services to be provided to IO along the development life cycle of the plant system control systems. The service scope covers the conventional controls, interlock controls and safety controls

These services cover the following topics:

1. Prepare the plant system control systems I&C technical specifications during the different stages of the plant system development life cycle. Develop control system libraries for the standardization of control system development. These services will be provided as needed by the plant systems.
2. Review the plant system control systems I&C technical specifications during the different stages of the plant system development life cycle. Provide review reports detailing the design maturity and adherence to ITER requirements for I&C systems, including PCDH requirements.
3. Attend and review factory acceptance testing (FAT) at DA or DA supplier premises. Provide or review FAT requirements and procedures. Review I&C performance and functionality during testing. Check the conformity of the procured plant system to the approved design. Assist in the investigation and resolution of failures that occur during FAT.
4. Attend and review site acceptance testing (SAT). Provide or review SAT requirements and procedures. Ensure that plant system functions not tested during FAT are tested during SAT. Review I&C performance and functionality during testing. Check the readiness of the plant system I&C for integration with central control systems.
5. Provide I&C integration services for the connection of components to systems and systems to central infrastructure. Develop the integration processes to assemble, verify and validate and transition to the next hierarchical level of design. Review that all interfacing plant systems have been integrated and tested. Provide necessary documentation for the commissioning of systems following integration testing.
6. Maintain central control system and plant system development tools. Provide technical services for the maintenance of operational plant system I&C and central control systems.

Duration of services

The Contract will be carried out over an initial firm period of four (4) years and an optional period of two (2) years. The Contract is scheduled to come into force in April 2017.

Timetable

The tentative timetable is as follows:

Call for Nomination	August 2016
Release of Prequalification	September 2016
Prequalification results	October 2016
Release of Call for Tender	November 2016
Tender submission date	January 2017
MAC Approval (written submission)	March 2017
Indicative award date	April 2017
Indicative Contract signature	April 2017
Indicative Contract start date	April 2017

Candidature

Participation is open to all legal persons participating either individually or in a grouping (consortium) which is established in an ITER Member State. A legal person cannot participate individually or as a consortium partner in more than one application or tender. A consortium may be a permanent, legally-established grouping or a grouping, which has been constituted informally for a specific tender procedure. All members of a consortium (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization. The consortium cannot be modified later without the approval of the ITER Organization.

Legal entities belonging to the same legal grouping are allowed to participate separately if they are able to demonstrate independent technical and financial capacities. Bidders' (individual or consortium) must comply with the selection criteria. IO reserves the right to disregard duplicated references and may exclude such legal entities from the tender procedure.

Reference

Further information on the ITER Organization procurement can be found at:

<http://www.iter.org/org/team/adm/proc/overview>