Cyber Security Assessment of DDCS of Prototype Fast Breeder Reactor (PFBR) against cyber threats

Principal Investigator: Dr.Sandip Dutta (BIT Mesra) and Dr. Prashant Pranav (BIT, Mesra)

I. Introduction

Distributed Digital Control System (DDCS) is the design architecture adopted for Instrumentation & Control (I & C) of PFBR. DDCS is implemented using three-tier architecture wherein bottom-most tier consists of control nodes; middle tier comprises of process computers and top tier constitutes the display stations. The control nodes are geographically distributed and networked together with process computer and display stations. Commercially available items like Ethernet Switches, Operating Systems, Databases etc are used for the design & development of DDCS of PFBR. As a result, newer dimensions of cyber security related issues need to be addressed. Therefore, there is a stringent requirement for assessment, monitoring and mitigation of the risks of systems in DDCS networks. Adding to that, components of DDCS have rigorous requirements on safety, timeliness, and availability. Therefore, there is a need to assess the cyber security risk in the system in the operational context of the DDCS which may not be identical to the ones done for other IT/Office networks. For example, various failure modes and security related issues in a distributed control system PFBR can be totally different and threat sources and attributes of impact may vary to other risks prevalent in organizations and industries.

Hence, a collaborative project is proposed to develop framework to assess the cyber security of Distributed Digital Control System for PFBR.

II. Objectives

The objectives of this collaborative project are two-fold and are as follows:

- To identify a Framework to assess the vulnerabilities in proprietary solution architecture of DDCS in PFBR.
- Applying the framework to Distributed Digital Control System for PFBR to assess the cyber security resilience of DDCS

III. Scope

Process Computer is the most critical component in DDCS Architecture as it is used to realize safety related functions of DDCS. Scope of this project is to evaluate the Process Computer's resilience against cyber security risks. This involves identification of security gaps in the system, design & development of security test bed and testing the process computer in the test bed.