EPICS BASED CONTROL SYSTEM FOR BARC-TIFR LINAC BOOSTER

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Introduction

The Superconducting Booster LINAC (Linear Accelerator) at Pelletron facility at TIFR has been developed for accelerating Heavy Ions particles [1]. A distributed control system controls which was developed in JAVA is working satisfactorily [2]. Recently, the control system s augmentation has been done using EPICS . In future it is planned to upgrade the control system using EPICS . EPICS (Experimental Physics and Industrial Control System) which is a set of open source tools which are very useful for integrated operation of large number of devices through a distributed control system [3]. This paper describes experience gained while integrating number of components to the EPICS platform and up gradation plan of control system.

Up-gradation Plan

LINAC control system is a distributed system following geographical and systematic distribution[4][5]. The control system will be up-graded in two In phase 1 all beam line devices including Magnets, Faraday cups , Beam profile monitors , Steerres will be up- graded using EPICS SCADA . In next phase RF control system will be transported to EPICS. The node to control Beam line devices is termed as BLS (Beam line Station), The nodes to control RF superconducting accelerator are known as RF LCS (RF local control station).

BLS is consists of Dynfisik Magnet power supplies , In house developed micro-controller based systems to control current monitors and beam profile monitors and slit controllers, There are steerars units . These devices are remotely control on serial (RS232) interface or Ethernet LAN interface.

RF LCS consists of CAMAC based system with Ethernet based CAMAC controllers and in house developed micro-controller based devices for the operation of Tuners and couplers.

Beam Line Systems

Beam line devices are either on RS 232 interface or Ethernet interface all RS 232 devices are connected to serial to Ethernet converter module. Figure 1.These can be remotely controlled using serial interface and proprietary command-response based protocol [4]. The EPICS base provides tools useful for setting up a channel access (CA) server consisting of number of process values (PVs). The ASYN tool is provided as addition support module of EPICS and it has drivers for communicating with devices through various serial buses. An additional driver is required to parse the communication protocol. Stream Driver is an EPICS tool for parsing string. An example of using this driver for another device was available. It has been modified as per the Danfysik protocol and successfully used for parsing the strings from the Danfysik system, and in-house developed systems . The driver uses a .proto file to implement the string parsing functions.

EPICS Qt tool will be used for developing a user interface for controlling the power supply through Process Values (PVs) set up using the EPICS Channel Access Server. User interface will preserve the same look & feel and all

features of present system . The flow of data has been represented diagrammatically in Fig. 1.

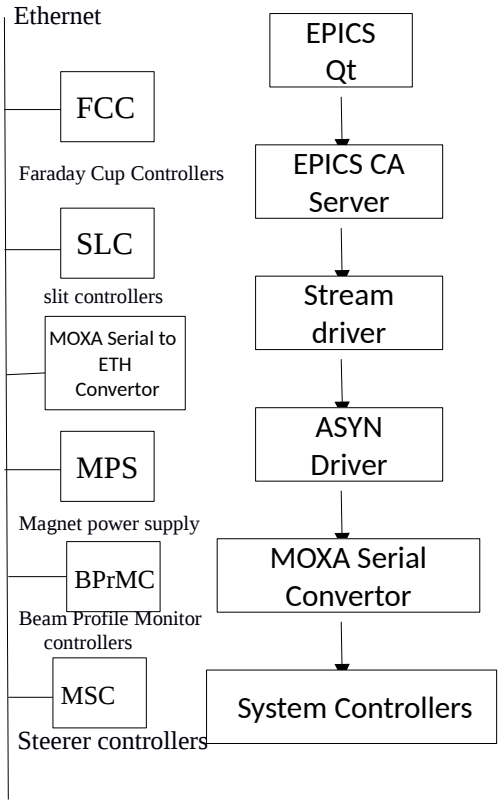

Figure 1 BLS architecture and Flow of data

Presently Standalone system is tested for Magnet powers supplies , standalone system for slit controllers and and RF coupler and RF tuner is in operation complete system integration will l be completed in mid of year 2017.

RF LCS

RF LCS will be ported to EPICS by porting the JAVA based software in C, for which the already existing crate controller driver will be used. There are two options to port it to EPICS either by developing mod-bus over TCP/IP interface for crate controller and interfacing it with EPICS by using ASNC Mod bus module or by developing EPICS device interface for crate controller. Both options are open and final decision will be made after porting BLS to EPICS.

Operator interface for RF control will be ported from JAVA to EPICS QT.

Conclusion

The present system is working satisfactorily for more than a decade, but keeping in mind the future up-gradation and long term sustainability of the system and future development for particle accelerator it has been decided to port the existing system to EPICS. Already LEHIPA control system is commissioned in EPICS and Operator interface is developed in EPICS QT. With the existing knowledge and experience available in EPICS it will be easily possible to port the LINAC control system in EPICS , which will give us more freedom in terms of future extensibility to the system.

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