EPICS CA GATEWAY EMPLOYMENT IN THE BEPCII NETWORK

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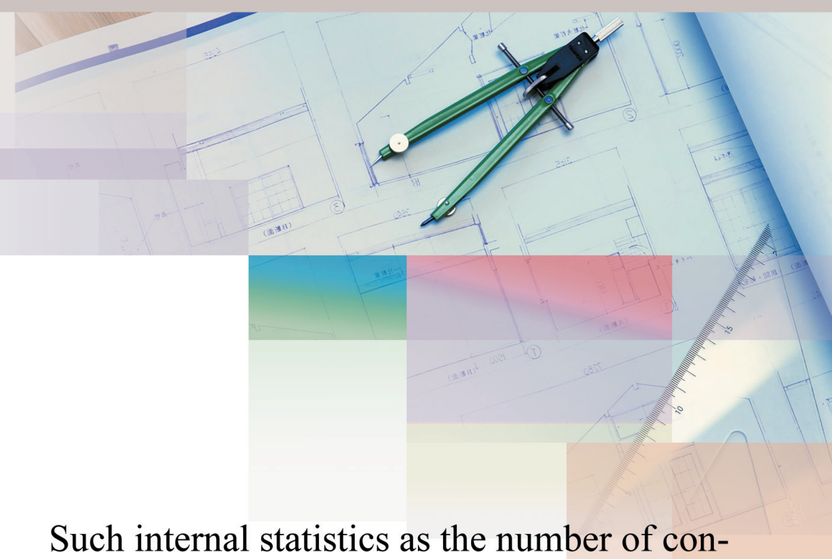
The Upgrade Project of Beijing Electron Positron Collider (BEPCII)



Introduction

The EPICS Process Variable Gateway has become a stable, high-performance application that provides access to process variables and implementing additional access security. The control network of the BEPCII is divided into two separate different subnets in the control network. In order to access IOC PVs between the separate subnets, EPICS CA gateway has been employed in the BEPCII network. This paper introduces the Gateways application in the BEPCII control network and describes the procedures of the Gateway setup.

Overview

BEPCII control system has been put into the commissioning and running since October 2006. Since BEPCII control network is divided into two separate subnets, PVs in different subnet IOCs couldn't be shared and accessed. So, EPICS CA Gateway was chosen for the BEPCII different subnet PVs exchange. The EPICS Process Variable Gateway is both a Channel Access Server and Channel Access Client. This allows many clients to access a process variable while making only one connection to the remote server, thus reducing the load on critical IOCs or other servers. Read accesses from clients are answered from the data cache. There will be no traffic on the network that has the real PVs for read accesses. In addition, it provides convenient access from one subnet to another and provides extensive additional access security. It also has the capability to provide aliases or renaming for process variables. This may be useful for testing database structures or limiting the IOC load for popular channels (like beam current, lifetime).
In addition to providing access to process variables in other servers, the Gateway publishes its own process variables, which allow it to be controlled and monitored using EPICS tools, such as EDM and StripTool.

BEPCII Gateways

The BEPCII has two separate control subnets, where most of the IOCs and other servers are located. In addition, there are several subnets serving office areas used by the BEPCII personnel, including scientists and engineers.
The requirements are to provide read access to the process variables for the BEPCII personnel and the experimental groups and in some cases write access for control engineers as well.

There is currently a further requirement to provide an aliasing or renaming capability for a particular set of process variables, so they may be accessed by some users. Finally, there is a requirement to make the internal process variables of the Gateways themselves available so that they can be managed from a central control room.
In order to better management and control of broadcast activity, The BEPCII control network divide into Linac subnet and Ring subnet.
There are three gateways as shown in the figure 1, the two gateways between Lianc and Ring are for connecting the Linac subnet and Ring subnet. In this case PVs in different subnet IOCs can be shared and accessed by any clients within the control network. The last one is for connecting the control network and campus network. This Gateway answers all access requests from office subnets to the process variables of control network. In this case, users in the campus network can access PVs in the control network.

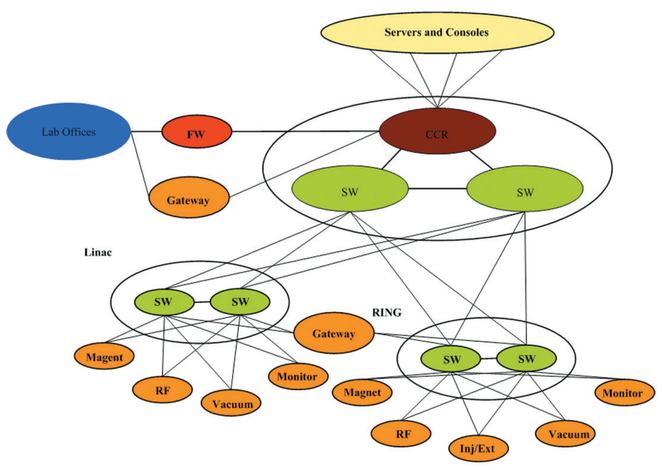


Figure 1: Topology of the BEPCII control network

Monitoring and Control

Every Gateway workstation is equipped with the two network adaptors and running Linux. The BEPCII Gateways are running on several different workstations on different subnets. EPICS base3.14.8 and CA_Gateway 2.0.0.has been installed on these computers.
Logging into each of them to start, stop, monitor, and make changes is inconvenient. Some panels are crated using EDM for the monitoring and controlling of the Gateways as shown in the figure 2. The reason the Gateways can be monitored and controlled by EDM panels is that the Gateway has internal process variables that describe its state and others that can be used to make reports, reread the access security files, and stop it.

Such internal statistics as the number of connected, active, inactive, and dead process variables; the number of virtual connections; and the number of client process variables are shown on the screen in the figure. 2, along with several event rates and the CPU usage. The EDM control panel has items to set the internal process variables that stop the Gateways, reread the access security, and make various reports.

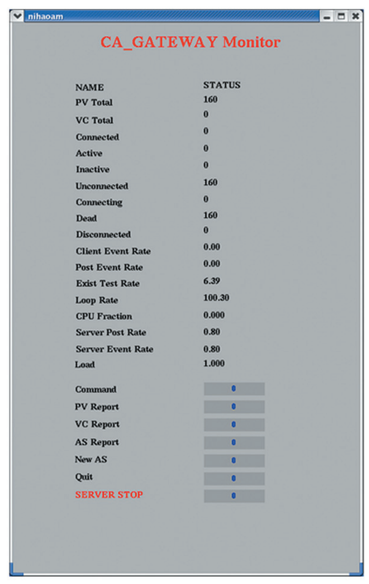


Figure 2: monitors and controls of BEPCII Gateways.

Future Work

Up to now, CA_Gateways have been put into testing and working for one month without restart. Detail PVs access security rules should be done next step. PVs management functions should also be improved.

Conclusion

So far, these gateways has put into the testing and working for one month without restart. Through this period of testing, the current version of the Gateway has been found to be quite stable and capable of handling a large number of process variables along with high update rates. The results of these tests laid the robust foundation for the future CSNS control network construction. It will become an important part of the BEPCII Control System

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