cannot operate the device manually. On the contrary, the vacuum valve can be operated. The status of vacuum valve is return by digital input interface and will display in CSS interface. The schematic is shown in Fig. 2.

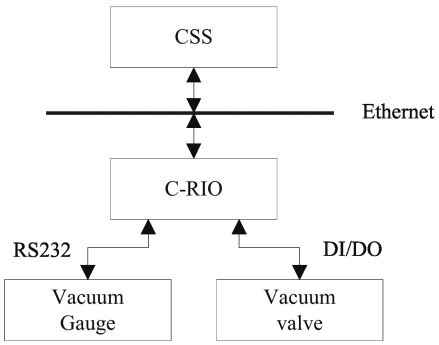


Fig. 1 The Control Architecture.

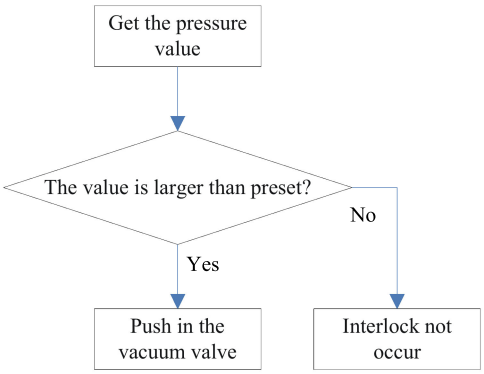


Fig. 2 Interlock schematic.

The interlock in SSC-Linac vacuum devices worked stably and it protect the machine from damage. This interlock is a little part in the whole control system and we will complete other interlocks soon.

### Reference

[1] S. Kato, K. Kanazawa, Y. Suetsugu, Applied Surface Science, 169-170(2001)732.

## 5 - 29 Establishment of HIRFL Control Network Monitoring Platform

Yue Min, Gou Shizhe, Wang Yongping and Ma Yuan

There are a lot of equipments in HIRFL such as faraday cups, view screens power supplies, RF (radio frequency) equipment, vacuum equipment, and so on. A growing number of equipment support network interface in these years. Thus the control network system of HIRFL has become more and more big and complicated. So it is very important to ensure that each device is online. We built a network monitoring platform. There are three functions. The first is monitoring the online or offline state of each switch. Second, the devices in the control network belong to different subsystem and are managed by subsystem managers. We cannot guarantee that each device is not dropped, but we can have a warning system which can warn device manager once the device dropped. Third, if some ports are abnormal, the information can be immediately reported to the administrator. Therefore, the control network monitoring platform has three subsystems, switch monitoring system, equipment offline warning system and switch log analysis system, as shown in Fig. 1.

We have finished the switch monitoring system using asp.net and flash technology. The monitor system displays the network topology and the online/offline state of all switches. Refreshed every 20 s, it ensures the effectiveness of the state. The link monitoring diagram is shown in Fig. 2. The green line means the link from switch A to switch B is ok. In contrast, the red line means the link fails.

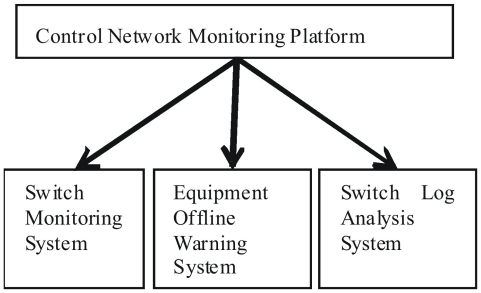


Fig. 1 Network monitoring platform structure.

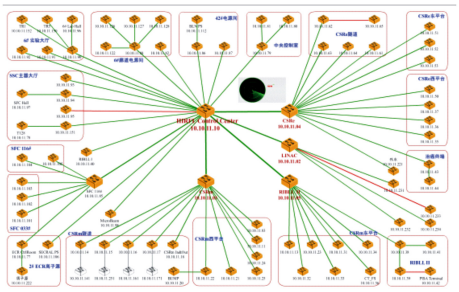

Fig. 2 (color online) Link monitoring diagram.

We also set up equipment offline warning system which shows warning information when any equipment is offline. At present, the alarm message is presented to the user in table. So it requires the user to take the initiative to go

to query messages. The current equipment offline warning table is realized by Java program. In the next year, we will update the system in order to realize its initiative to send messages to the user via mobile phone short message or email.

In order to monitor switch port, especially the abnormal situation on some ports, we have designed a switch information collection and analysis system named network event analysis system. The log server plays an important role in the system that collects all the information from switches which have been configured info-center log host channel. The information includes system information, error messages, the debug information, *etc.* All the information will be analyzed, extracted and then reported to network manager.

## 5 - 30 Establishment of Interface Communication between Terminal System and the Treatment Planning System

Li Guihua, Yang Wenjing, Zhao Wuyuan, Ma Jinzhong and Wang Rongrong

Treatment of terminal system is mainly through the interface communication protocol for treatment planning system to achieve the control of various kinds of medical equipments, including primary collimator, range shifter, scatterer, ridge type filter, multi-leaf collimator, *etc.* TPS was based on the radioactive source and the patient modeling to simulate the plan implementation of radiotherapy. The basic structure of block diagram is shown in Fig. 1.

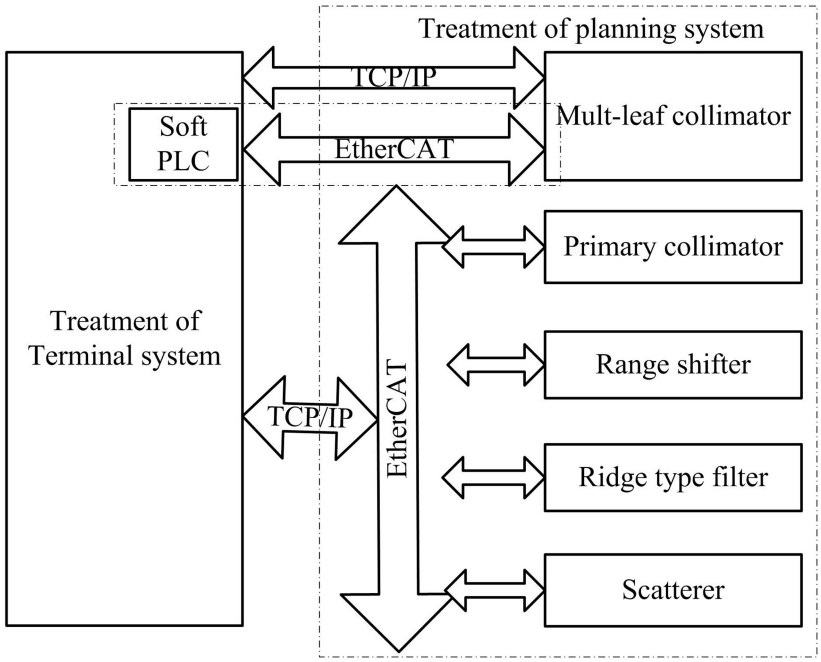


Fig. 1 The basic structure of block diagram.

It is well-known that interface can be divided into the hardware interface and software interface. Usually a cable can be implemented on hardware connection of the controlled object, while the realization of the software interface is through the physical communication protocol. EtherCAT is a kind of open real-time Ethernet communication protocol which extends the IEEE 802.3 Ethernet standard and makes the data in transmitting predictability and characteristics such as high precision synchronization. In the way of NI OPC Server, the control of terminal system for primary collimator, range shifter, ridge type filter and scatterer use EtherCAT communication protocol. The control of Mult-leaf collimator also can directly use EtherCAT in place of TCP/IP. It only needs to install a soft PLC in control system. Due to some limitations we still adopt the TCP/IP at present. All the control implementation is done in Labview.