§6. Upgrade of LHD-LAN to Gigabit Network

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1) Upgrade of LHD-LAN to Gigabit network system

LHD-LAN has been developed and provided for LHD experiment. According to LHD experimental progress, a large number of computers have been connected to LHD-LAN and a large amount of data has been stored in them, which leads to request of high-performance data transfer environments. In order to realize the high-performance network environments, the Gigabit network system has been introduced last of FY 2000. Step by step, the Gigabit network system has been installed as new LHD-LAN in FY 2001. Mainly, it consists of 3 Gigabits routing switches and 32 Gigabit switching-hubs. The Gigabit routing switches provide a wire-speed, the packet-by-packet routing throughput of greater than 37 million packets per second. These Gigabit routing switches are adopted for three sub-clusters of Analysis, Data Acquisition, and Remote Participation for LHD experiment. These Gigabit routing switches act as backbone of new LHD-LAN. These are connected with 4-trunk Gigabit lines based on OSPF routing protocol in order to realize high performance data transfer among 3 sub-clusters. One of them is connected to NIFS-LAN with 2-trunk Gigabit lines. High performance network environments between NIFS-LAN and new LHD-LAN have been provided. Then, researchers get the network environment that large experimental data can be handled easily from their own offices. Data transfer without AppleTalk between new LHD-LAN and early LHD-LAN that has not been upgraded to Gigabit is done directly by a router in Analysis-LAN.

A sub LAN for Remote Participation of LHD experiment has been established as one part of the new LHD-LAN. For network security, Remote Participation LAN has been protected not only by NIFS Firewall but also by packet filtering in a Gigabit routing switch. The block diagram of new LHD-LAN is shown in Fig.1.

There are 32 Gigabit switching-hubs, which are quite helpful for high-performance data transfer. They consist of 6 type of Gigabit switching-hub. First of them consists 6 switches with 2 1000BASE-SX ports and 40 10/100BASE-TX ports, second of them consists 12 switches with 1 1000BASE-LX port and 24 10/100BASE-TX ports, third of them consists 6 switches with 1 1000BASE-SX port and 24 10/100BASE-TX ports, fourth of them consists 2 switches with 2 1000BASE-SX ports and 24 10/100BASE-TX ports, fifth of them consists 4 switches with 2 1000BASE-LX ports and 24 10/100BASE-TX ports, sixth of them consists 2 switches with 2 1000BASE-LX ports and 6 100/1000BASE-T ports. The Gigabit switching-hubs with 2 Gigabit ports have been operated by Spanning Tree Protocol for redundantly connection. Some of Gigabit switching-hubs have been operated by Tag-VLAN, which is the technology for create logically separate LANs on a physical switching-hub.

2) Additional of Optical Fiber Cables

Many Optical Fiber Cables has been provided for LHD experiment. They are used for networking or transmission of LHD operational information. In FY 2001, 100 Optical Fiber Cables has been added and constructed between LHD building and LHD control building.

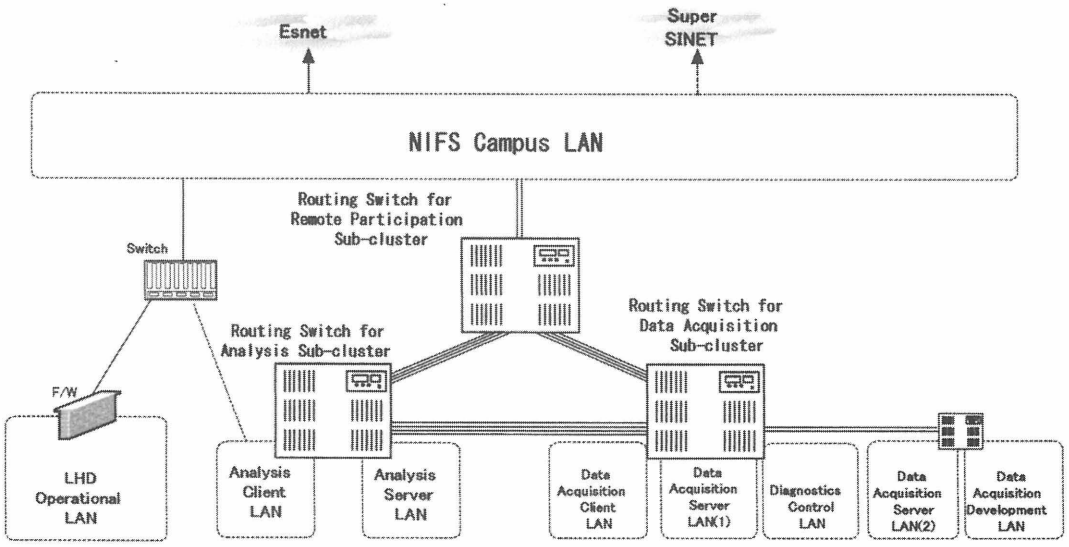

Fig. 1 Block diagram of new LHD-LAN