Simultaneous data transfer on ATM network

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1 Introduction

Research Center for Nuclear Physics (RCNP) is now introducing a new computer and network system. It will provide very high performance for data analysis and theoretical calculations. A part of this system is expected to be used also as an on-line data acquisition system for present experiments at the RING cyclotron.

A networked data acquisition system using a commercially available ATM network is now considered at many laboratories in the world. It is one of applications the new computer and network system is designed for. The new system has a good capability to test the feasibility and performance of the ATM based networked data processing system.

2 Computing facility

The computing facility of RCNP is composed of the central computer complex used for data analysis of the experimental data and theoretical calculations, the super computer system located at Osaka University computation center for the large scale scientific calculations, and various computer subsystems. Some computers are dedicated for data acquisition system. Some computers are dedicated for the accelerator control system.

Those computers can be accessed from personal computers, X terminals and workstations in RCNP through the site-wide network. They can be also accessed by research collaborators around the world through the world wide network.

3 Network system

The RCNP network consists of "Nuclear science network", "Accelerator science network", "Computing network" and "General purpose network" for connecting the former three networks. The nuclear science network is mainly used for the data acquisition at cyclotron facility. The accelerator science network is mainly used for the accelerator control and monitoring. The computing network connects computers in the RCNP central computer system. The general purpose network is used for connecting PCs, X terminals and workstations mainly in offices.

The server computers in the central computer system and 20 workstations are linked with ATM network. Four DEC GIGAswitch/ATM switches located at the computer room, the cyclotron laboratory, the experiment area and the main office building are connected with 622Mbps optical fiber links. It integrates many computer systems as a single powerful computing facility.

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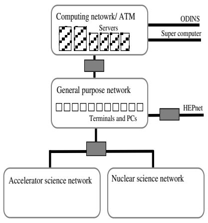

Fig. 1. RCNP network system

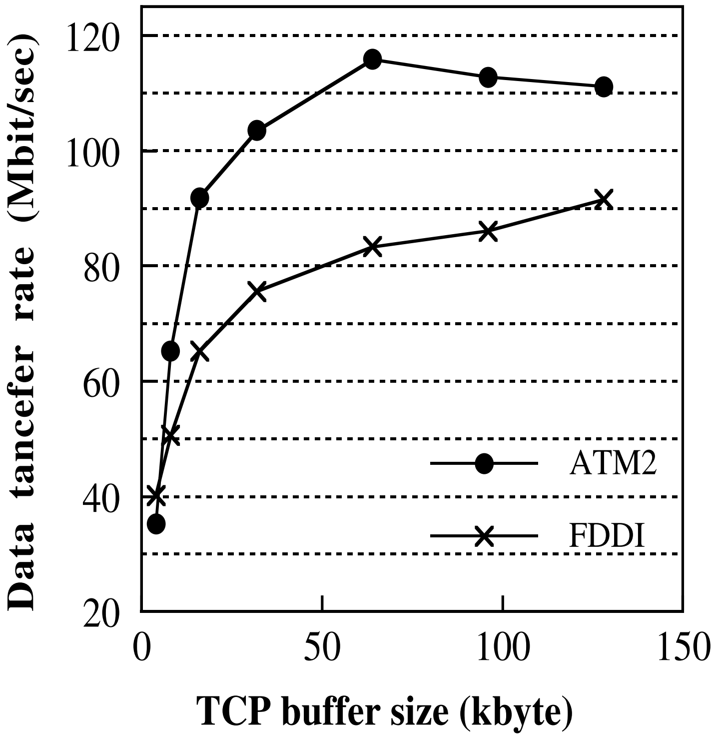

Fig. 2. Data transfer speed of ATM and FDDI

A Memory Channel hub connects server machines in the central computer system. It reduces communication latency and overhead and expands available bandwidth.

4 Central computer system

The central computer system is used for various research activities in the laboratory. It comprises 6 SMP (Symmetric Multi Processor) servers and 5 tape library systems with the total capacity of 12.9TB. Two of 6 SMP servers are Alpha server 8400 5/440. Each of them has 12 Alpha CPUs, 4GB Memory, a Memory Channel interface and a 622 Mbps ATM interface. The computing performance of one server is 751.88 SPECfp92, 209958 SPECrate_fp92. They are used for general data processing and computing. The other four sub-servers are Alpha server 4100 5/400. Each of them has 4 Alpha CPUs, 1GB Memory, a Memory Channel interface and a 156 Mbps ATM interface. The computing

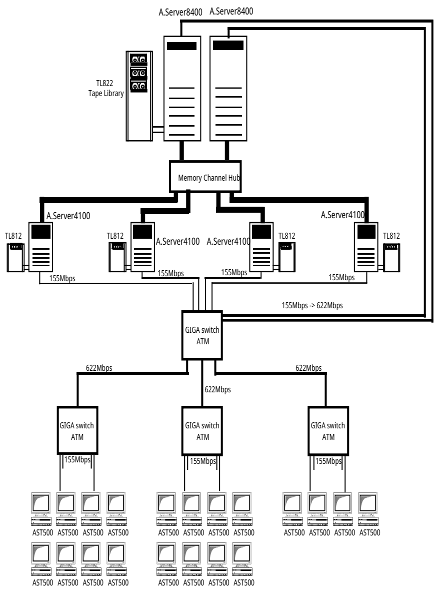

Fig. 3. GIGAswitch network in RCNP

performance of one server is 656 SPECfp92, 61037 SPECrate_fp92. They will be used for dedicated data processing such as real time data acquisition system.

Total amount of 600GB RAID-5 disk provides large and reliable storage area to the users.

One TL822 automated tape library provides up to 7.3 TB of data storage with three TZ88 drives. Featuring 264 media slots, the 3-drive TL822 library provides a sustained transfer rate of up to 6.3 MB per second. Four TL812 automated tape libraries connected to sub-servers provide up to 1.4 TB of data storage with 4 TZ88 drives. Featuring 48 data media slots and 4 I/O slots, the 4-drive TL812 library provides a sustained transfer rate of up to 8.4 MB per second. These values are obtained assuming 1.4:1 compression rate on the contents.

5 Summary

The development of next generation data aquisition system is one of the project of RCNP. As a part of this project, a study of ATM network is now in progress. The new computer and network system at RCNP may provide unique environment to develop such networked data aquisition system.