§6. Multi-Streaming of Massive Data

Takase, Y., Ejiri, A., Torii, Y., Tojo, H., Oosako, T.
(Frontier Sci., Univ. Tokyo),
Emoto, M., Nagayama, Y.

Many universities and research institutions all over Japan are participating in experiments on the Large Helical Device (LHD). Numerous collaborators participate in experiments, set up diagnostic devices, and analyze data from their home institutions using the internet. Under this collaboration, the following investigations for sending massive data from the National Institute for Fusion Science were performed, in order to distribute information on the current status of the experiment in real time.

Presently, a service to enable viewing of the main display panel in the control room through a web browser is provided using Epiphan's VGA2WEB (Fig.1). However, the maximum capture speed of this system is less than 3 frames per second, and it further deteriorates as the number of connected clients increases. This limit is caused by the increased load on the web server as the number of clients increases. In contrast, IP multicast is suited for a system to provide simultaneous distribution information to many researchers, because the load on the server does not depend on the number of clients. Therefore, a system to transfer images using IP multicast was constructed (Fig.2). This system captures the PC output for the main display in the control room using Epiphan''s capturing device called VGA2WEB, and distributes movie images using the Video LAN Client (VLC). VNC has the ability to transmit by IP multicast, and can deal with the increased number of clients using IP multicast.

On the other hand, over ten PC's are arranged at the center of the control room to display data and analysis results from the most recent shot. These PC's display the screens of other analysis PC's using VNC, a remote desktop display software. Collaborators would be able to
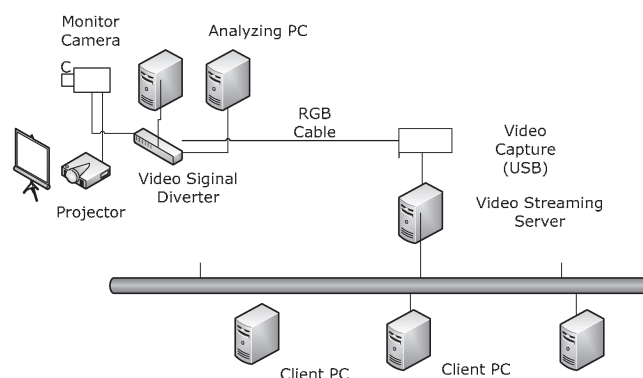

Fig. 2.   System schematic.

monitor the progress of the experiment much better if these PC screens could be viewed from a remote site. Although it is possible to send the output of VNC to multiple PC's, it is difficult to connect to many PC's because the load on the server is proportional to the number of clients. On the other hand, it would become possible to send images to multiple sites by using software such as MultiVNC which allows efficient image transmission to multiple PC's, or VNCReflector which distributes screen outputs using IP multicast.

IP multicast is a requisite technology for either system, but presently IP multicast cannot be used between NIFS and the University of Tokyo. This is because the IP multicast transmission capability of the network node equipment being used is too low, and because Super SINET, the communication infrastructure in use, does not formally support IP multicast. For this reason, it was not possible to test communication between NIFS and Kashiwa Campus of the University of Tokyo using IP multicast. In 2008, Super SINET will be replaced by SINET3, and IP multicast will be formally supported under SINET3. Development towards practical application will be carried out after the completion of SINET3 and installation of appropriate network equipment.

Fig. 1.   Remote desktop can be viewed through a web browser using VGA2WEB.