

3. MEASUREMENT AND COMPUTATION COMPLEX

Work within the theme was focused on two main activities:

operation and modernization of equipment and software of the spectrometer measurement and control systems, as well as design of new data acquisition systems based on electronics in VME standard;

- development of local computing network.

Data acquisition systems. In 1997, trouble-free operation of the experiment automation systems on the spectrometers of the Scientific Department of Nuclear Physics (SD NP) at the IBR-30+LUE-40 complex and of the Scientific Department of Condensed Matter Physics (SD CMP) at the IBR-2 reactor was afforded. In addition, at the majority of spectrometers, work to modernize specific subsystems (detector electronics – DN-12, NERA-PR, SPN, UGRA, the setup with polarized nuclei, etc.; control over executive mechanisms – HRFD, SKAT, SPN, KOLHIDA; temperature regulators – HRFD, NERA-PR; data acquisition and accumulation – PARUS, ROMASHKA, EPSILON, etc.) was completed.

The studies of the annular PSD at the YuMO spectrometer have been completed. The amplitude and position spectra were measured with new detector electronics. A set of electronic blocks for all 8 wires of the detector was manufactured and is to be adjusted.

In 1997, experience in using VME-based data acquisition systems at the NSVR, SKAT and NERA-PR spectrometers was gained. The debugging of the software for the VME-system at HRFD is nearing completion. All blocks of the unified electronics for the DN-2 spectrometer were constructed (block for receiving data from PSD; processor block and histogram memory block). The analogous electronics is being constructed for the SPN, DN-12 and YuMO spectrometers.

Network and computer infrastructure. In 1997, new communication equipment of the CISCO firm was installed and put into operation in the FLNP local computing network (LCN). This made it possible to switch over to data-transfer rates of up to 100 Mbits/s in the FLNP network. The proposed LCN structure for 1997-2000 is presented in Fig.1. It is based on the Switch technology, which allows different LCN standards to be used in one network.

The Workgroup Switch Catalyst 5000 is the central element of the network. For connections inside the central segment (computer center (CC)) the 10/100TX commutated ports with the data transfer via twisted pairs are used, and for connections between the segments (buildings) up to twelve 100FX (Fast Ethernet) ports with the data transfer via fibre-optic communication lines are employed. The Catalyst 2800 commutator, which has one 100FX port and sixteen 10TX ports, has been chosen as a peripheral communication node in the segments. The end users are connected to the network via HUBs using mainly the 10XT standard.

At present, two Catalyst 2800 commutators (for the experimental setups of IBR-2 and offices of the Scientific Department of Nuclear Physics) are available. In the near future two more commutators (for IBR-2 and offices of the Scientific Department of Condensed Matter Physics) will be purchased.

A separate workstation with the SUN Net Manager software and the CiscoWorks package integrated with it, is used to control LCN and computers of the SUN-cluster. These means allow one to promptly change the network configuration and its load, to obtain dynamic and statistical

analysis of the traffic for the commutator ports, to block access to certain ports for all users except for the specified ones, to limit unauthorized access to the network, etc.

The installation of new network equipment and software has made it possible to sharply reduce the number of collisions in the network and the load onto the Backbone when exchanging large data arrays.

In 1997, the optic communication line between the buildings of CC and IBR-2 was assembled and put into service. The technical project for switching over the network in the Laboratory and SD CMP buildings to twisted pairs was worked out.

The radical reconstruction of the network provides new possibilities in the development of information service. An example is the information system for the users of the IBR-2 reactor. This system allows the users (including external users) to obtain information in real time on the current state of the reactor and its most important parameters from the FLNP Web-server. The data are presented in the form of tables and graphs. The system provides for automatic renewal of information and generation of HTML-pages as the data coming from the measuring complex located at the reactor are updated. The core of the system is the data processing server, which operates on the basis of the PV-Wave commercial package intended for analysis and visualization of data. The programs of the server are written in the built-in programming language of the mentioned package. The server provides for reading, coping and processing of data, as well as for generation of HTML-pages and graphic files to present information to the users on request from the program-clients. The use of the WWW technology results from the desire to make information available for as many users as possible, and to avoid designing applications on a large number of platforms used in the Laboratory.

In the near future the outdated file-servers, SUN SPARCstation 10 and 2 will be replaced by Enterprise 3000, and all machines of the SUN-cluster will be changed to the Solaris 2.6 operating system. The fast commutator by the New Bridge firm is to be installed to connect FLNP LCN with the JINR backbone network. This will provide access to the centralized resources of the Institute at the rate of 100 Mbits/s. On completion of this work, in the Laboratory a new network infrastructure will be created, which will meet modern requirements as to reliability, transfer rate, potentialities and computational resources.

The controllability of the network and the possibility to dynamically distribute resources and priorities create optimum conditions for using LCN in carrying out experiments on the Laboratory base installations.

In 1997, the International Workshop on Data Acquisition Systems for Neutron Experimental Facilities (DANEF'97, June 2-4, 1997, Dubna) was held, twenty five papers were published and one dissertation thesis was defended.