



MODERN TELECOMMUNICATION TECHNOLOGY
AND HIGHER EDUCATION IN RUSSIA

by

Alexei P. Platonov
Russian Institute for Public Networks
Moscow, Russia

The Twenty-first International Conference on the Unity of the Sciences
Washington, D.C. November 24-30, 1997

© 1997, International Conference on the Unity of the Sciences

MODERN TELECOMMUNICATION TECHNOLOGY AND HIGHER EDUCATION IN RUSSIA

Alexei P. Platonov

Russian Institute for Public Networks (RosNIROS)

It can be stated that in Russia, especially during "post- reconstruction" period, telecommunication systems are playing the outstanding role in Higher Education. It is closely associated with the following reasons:

- (a) Large distances in geographical sense. In this case, telecommunications will help students to attend virtually the lectures of prominent scientists on the distances of thousands of kilometers, to get materials for training from the distance learning centers in short time, etc.
- (b) General tendency of decentralization. Russia is quickly moving now to the real federation of regions each having its own infrastructure, more or less independent economics, some cultural differences. Telecommunications become one of the real mechanisms that help to integrate the existing regional systems of Higher Education, to exchange knowledge and experience.
- (c) Lack of budget funding. This leads to many consequences, among them:
 - Migration of the high-qualified staff from the Higher School system to business. As a result, it is very important to use effectively the knowledge of remaining specialists in as many Universities and colleges as possible through distance learning courses and direct contacts via Internet.
 - Lack of the printed textbooks. As a result, it is very important to have virtual libraries connected to telecommunication infrastructure for easy access through network (by all means including Telnet, FTP, WWW and E-mail).

(d) Urgent need for integration in the global information infrastructure to provide future progress in economics and culture. It is a paradox of "post-reconstruction" period that in some cases it is sometimes more difficult for Russian scientists, teachers, students to attend various international meetings, to participate directly in the processes of cultural, scientific, education development. This is again due to the lack of budget funding and some organizational difficulties. Telecommunications help to solve many of these problems and to provide reliable and constant connections between people in various countries.

During several last years the Ministry for General and Professional Education together with other state agencies has made much efforts to develop the foundation for system of distance learning (DL). Some specialized programs of DL are being developed, experimental groups of students are studying in several Universities. Some of these groups study on the base of DL courses of such Universities as SUNY, Delpht University and some others. In order to coordinate this activity, the International Association of Distance Learning has been established in Russia a couple of years ago. A number of conferences on this topic have been held in Moscow and some other cities of Russia.

These new tendencies in Higher Education are based on the computer networking infrastructure which uses Internet technology. The development of this infrastructure has started at the beginning of 90-ies and was based mainly on commercial and non-profit networks. The pioneer role in this process has been played by the RELCOM - the non-profit computer network which has developed as a result of experience of Computer Center of Kurchatov Institute which started its activity from campus-wide area networking. RELCOM as a nation-wide network grew first of all in the form of e-mail system, and then migrated to full Internet access. RELCOM node hosts are distributed over almost all large cities of Russia (about 150). A lot of Research & Education institutions used RELCOM services before more or less divercified academic networks developed. The latter appeared either as a result of single independent initiatives (for example, FREEnet - as the networking project of Chemical Department of Academy of Sciences) or within specialized internationally funded projects (RSSI - space research, Radio-MSU - high energy physics, etc). At present, these networks receive additional support through some national programs and develop more or less successfully. Nevertheless some organizations from R&E sector continue to get service from commercial and non-profit networks. Even more - large academic networks with

nation-wide infrastructure migrate now to non-profit form, and it is quite an obvious tendency.

There were also some attempts to coordinate this process of creating information infrastructure for R&E. One of the most successful examples is the establishment of RELARN (Russian ELectronic Academic & Research Network) Association which joined a large number of non-commercial organizations (Universities, schools, research centers, libraries, cultural and medicine institutions) being the active customers of computer networks, first of all those that provide public access to Internet. To this moment the number of the members of this association is more than 900 and it continues to grow. Now RELARN has its own non-commercial IP-network called RELARN-IP. RELARN Association has financial support from Ministry of Education, Ministry of Science. It also uses sponsorship from some commercial networks - RELCOM, DEMOS, some regional networks (total sum of sponsorship is about \$15,000 per month in the form of network services).

Beginning from 1995 the development of Russian R&E Internet became much more coordinated. The base for this progress is provided by the National Program of Russian Internet which has been established just at this time. This Program is supported by all principal State Departments being responsible for R&E - Ministry of Science, Ministry of Education, Russian Academy of Sciences, Russian Foundation for Fundamental Research. From the organizational point of view the Program is based upon the two bodies - Supervising and Technical Councils, which include the leading specialists in the field of computer networking. The Program has several sections - basic infrastructure, regional networking, information infrastructure and databases, applied topics. The approximate amount of funding to be distributed through this program is about \$30,000,000 per year during the period 1996-1998.

The core of the telecommunication system to be build in the framework of the Program is the National backbone for R&E - RBnet (Russian Backbone Network), which provides the inter-regional connectivity for local Internet service-providers. In its turn, the regional R&E networks connect end users and provide information support for them.

RBnet is a hierarchical system which consists now of two levels - inter-regional network access points (NAPs) of the level 1 and regional NAPs of level 2. Level 1 NAPs (North-west region - Petersburg, Central region - Moscow, Volga region - Samara, South region - Rostov-on-Don, Ural

region - Ekaterinburg, West Siberia - Novosibirsk, East Siberia - Irkutsk, Far East - Khabarovsk) are interconnected by means of high-speed links which will be upgraded according to the scheme 2Mbps - 4Mbps - 8Mbps - 34Mbps within the next two years. The communication base for RBnet is provided mainly by terrestrial fiber-optic and microwave links - well known trans-Siberian Main Line being under construction by Rostelecom (principal Russian telecommunication operator). Level 2 NAPs are connected to level 1 by the links with the capacity that is defined by the size and growth of corresponding regional networks.

The "very high speed" (VHS) core network based on ATM technology is under construction now: it will include segments in Moscow and Petersburg that are to be connected with 34Mbps link. This VHS core network will provide service to supercomputers and multimedia centers. The RBnet technical support center is operated by Russian Institute for Public Networks and is located in the Computer Center of Kurchatov Institute.

Connection to Internet of the end users (Universities, schools, R&E centers, individual customers) is provided by regional (local) Internet service-providers, both academic and commercial. The Program envisages the limited creation of local high-speed backbones which interconnect the RBnet NAP with the main user access points in the region. Such regional backbones are under construction in Moscow (so called Moscow Backbone Network), Petersburg, Samara, Ekaterinburg and some other cities. The technical base for these regional core networks are 100 and 155 Mbps technologies (ATM, FDDI, Fast Ethernet).

The significant role for development of the telecommunication system for Higher Education is played by the University Internet Centers (UIC) Program, supported by Soros Foundation and Russian Government (according to Chernomyrdin - Soros agreement). As a result of this program, 33 Russian "provincial" Universities will be connected to Internet with the links of 256Kbps (for start). Within this program, Open Society Institute acting on behalf of Soros Foundation, provides equipment and software for UICs, while the Russian side provides connection of every UIC to Internet through RBnet NAPs. The costs for connection and monthly fees for links are paid by the Ministry of Science through the Program of Russian Internet.

As far as the Net is fastly growing, the need for high-speed reliable connection to global Internet

also grows. At a moment it is provided by multiple links of several academic Internet service-providers (total sum is about 8 Mbps for the whole R&E community). Taking into account the needs for new information technologies, this connection is to be upgraded to 34Mbps to the middle of 1998. There is also the project of providing direct connection of VHS core network to experimental high-speed vBNS network (USA, Chicago Star Tap as an access point) by means of NSF grant from American side and special funding within the Program of Russian Internet, from the Russian side.

At the present moment, the priority in the Program of Russian Internet is given to infrastructure of the Net. It's quite clear that within some short period of time (about a year) the main tendencies will change with regard for information service, including on-line textbooks, distance learning, etc. As a result, when these two components (infrastructure plus information) are provided, the effective information infrastructure for Higher School in Russia will become a reality.