Telecommunication infrastructure of Russian Education

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The goal of this paper is to describe state and trends in telecommunication infrastructure and technologies in the sphere of education in Russia.

Last years in Russia are characterized by large changes in telecommunication possibilities for educational enterprises. Some federal programs were adopted on governmental level with substantial parts devoted to development of telecommunications and information technologies in education. One of these programs is "Electronic Russia", another – "Development of Unified Educational Information Environment". It is expected that due to these programs all Russian educational enterprises will have Internet connectivity and access to the information educational resources to the end of 2005 year.

The most known research and educational networks in Russia are RUNNet and RBNet. The latter was designed by the efforts and under guidance of Ministry of Education, Ministry of Science, Industry and Technology and Russian Academy of Sciences, the former – is a network supported entirely by Ministry of Education. This paper mainly covers RUNNet features and RUNNet development. RUNNet goal is not only maintaining an Internet connectivity for universities. RUNNet is an element in a whole picture in design of unified information environment for the system of education including regional resources data centers, electronic libraries, educational Internet portals etc.

One of the main characteristics of any national telecommunication network is its connectivity to global Internet. RUNNet now has 155Mb/s link to NORDUnet. Connectivity with Nordic Internet highway to research and education network allows Russian users to participate in scientific and educational projects. This channel is used as RBNet backup too. Some other networks of science and education such as MSUnet, Radio-MSU, RELARN/IP, FREEnet use this channel too. It is planned to increase capacity of RUNNet international channel up to 622 Mb/s in 2003.

RUNNet has 30 regional centers (POPs) in Moscow, Saint-Petersburg, Rostov, Ekaterinburg, Tomsk, Krasnoiarsk, Irkutsk, Vladivostok and other large cities all around Russia. Connectivity between these centers and central POPs of RUNNet in Moscow and Saint-Petersburg is supported by leasing channels from main Russian channel operators: Rostelecom, Transtelecom and some others. In Moscow and Saint-Petersburg RUNNet has internal traffic exchange with more than 100 other telecommunication operators. It is interesting that approximately 70% of the traffic is an internal Russian information exchange. This figure has been near 10% recently. This is due to rapid development of national information resources large part of which is educational and scientific. Regional centers organized in main universities are

not only last mile operators for educational enterprises in their regions but at the same time they plays important role as information resources centers for distance learning, training and retraining of teachers and as educational information data stores etc.

RUNNet is the largest research and educational network in Russia. More then 500 universities, colleges and scientific enterprises use its telecommunication infrastructure and information resources. Number of RUNNet users can be estimated as 500000.

Russia has a vast territory including rural areas with lack or absence of any telecommunication infrastructure at all. This factor provides high ranking perspective for satellite telecommunications in Russia. RUNNet itself was founded as a satellite network and now we can see a new life of satellite-type telecommunications in Russia. In 2003 more than 10000 rural schools will have satellite Internet connection based on DVB-S or DVB-S/DVB-RSC technology. Some of them will use dialup-IP back channel, but substantial part of satellite terminals will have ability of two-directional satellite telecommunication. The cost of this two directional hardware drop tremendously for 4-5 last years. The current technologies can provide law cost possibilities which guarantee up to 2Mb/s from user and 8 Mb/s to user flow in C, Ku and Ka bands. DVB-S/DVB-RSC technology allows to transfer MPEG video which is rather important for education TV projects.

RUNNet tries to be in pace with new telecommunication technologies and use them in everyday practice. RUNnet is a participant of IPv6 project in Russia and plans to establish IPv6 RUNNet – NORDUnet connection in 2003. More than 35 supercomputer centers with common throughput above 830 mips is included now in RUNNet/RBNet structure.

10 educational Internet portal will begin functioning in 2003. One of them, Federal Educational Portal, is being creating by RUNNet operator – State Institute of Information Technologies and Telecommunication. Other portals are subject-oriented (accumulate educational information devoted to different disciplines, grouped in clusters) or play special role in reformation process of education system in Russia (portals on unified school examination, state testing system etc.). All these portals are hosted in RUNNet infrastructure.

RUNNet channels is used by Ministry of Education of Russia for multicast videoconferencing with participation of Minister of Education, heads of education departments in regional governments, university rectors, school teachers.

Main tasks for RUNNet in nearest future are maintenance of telecommunication access to national educational resources for all educational enterprises in Russia, ensuring quality of service complying with up-to-date demands, improvement of connectivity within Russia, implementation of IPv6 and other modern telecommunication technologies, participation in international projects directed to implementation of telecommunication and information technologies in education and science.