

## DEVELOPMENT OF INTERNET INFRASTRUCTURE FOR HIGHER EDUCATION IN DONETSK REGION OF THE UKRAINE

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**Abstract**  $\frac{3}{4}$  *Ukrainian Research and Academic Network URAN is the joint initiative of the Ministry of Education and the National Science Academy. The initiative was supported by NATO Research Program and some other funds and organizations. In 2000 the URAN infrastructure was represented by 6 regional centers, DonSTU being one of them. Intensive development of research and academic networks in the Donetsk Region (Donbass) will make it possible to solve a complex of regional educational problems on the way of European integration. The highly urbanized industrial Donbass could be the test region for the whole Ukraine in this sphere.*

**Index Terms**  $\frac{3}{4}$  *distance education, educational networks, internet education.*

The creation of modern high-speed informational and educational infrastructure of Internet in the Donetsk Region is one of the most topical tasks which the regional higher education establishments face. It is connected to the fact that in the nearest future the international community will not recognize the people who did not have the access to the Internet resources during their training as specialists with proper education.

The Donbass Region academic infrastructure started its development in 1995 when the first marked channel joined the Institute of Cybernetics of the National Science Academy of the Ukraine and Donetsk Physical and Technical Institute. Donetsk State Technical University and the Regional Library were the first to be on line within the regional Internet network which was being formed then. This, in fact, initiated the formation of the Donbass Academic and Research Network (DARN) which is the component of the Ukrainian Academic and Research Network UARNet and comprised a number of Donetsk institutes of the National Science Academy of the Ukraine and some of higher education establishments of Donetsk. However, the low-grade connection provided rather adequate access only to the E-mail service at that stage.

The formation of the Ukrainian Research and Academic Network URAN [1] being the joint initiative of the Ministry of Education and the National Science Academy was the next stage in the development of the educational Internet in the Ukraine in 1998 [2]. The initiative was supported by a number of foreign funds and organizations – the NATO Research Program and the German Research Network in particular. In fact, the project Ukrainian Academic and Research Data Network, Part 1 (UARDN-1) implemented by the NTUU Kiev Polytechnic Institute in partnership with a number of leading universities (including DonSTU) and research institutes of the Ukraine in 1998-1999 was the network's beginning. The NATO Research Program (grant NIG-97-1779) supported it [3].

In 2000 the URAN infrastructure was represented by 6 regional centers, DonSTU being one of them (Figure 1). The intensive coordinated development of the regional research and academic infrastructure of the Internet is to be the next stage.

The modern stage of informatization of the educational space of the Donetsk Region requires creation of high-speed universities network aimed to solve the problems they face in a corporate way. There should be three stages in formation of this type of the regional informational and educational network including joint with Ukrtelecom development of the Eastern node URAN. They are as follows:

**Stage 1.** Creation of the base digital infrastructure based on backbone with the capacity of 2-100 Mb/s. and peripheral lines (64-128 Kb/s.) covering the leading educational establishments of the region (2001-2002). This stage's activities should be implemented in the following way: The first stage of the University Informational Ring ("University Ring", Figure 2) which provides for the backbone logging out (100 Mb/s.) to the node of the Donetsk directorate of Ukrtelecom. Besides, it provides for the digital lines to the central node of the network URAN in Kiev for Donetsk State Technical University (DonSTU) and Donetsk National University (DonNU).

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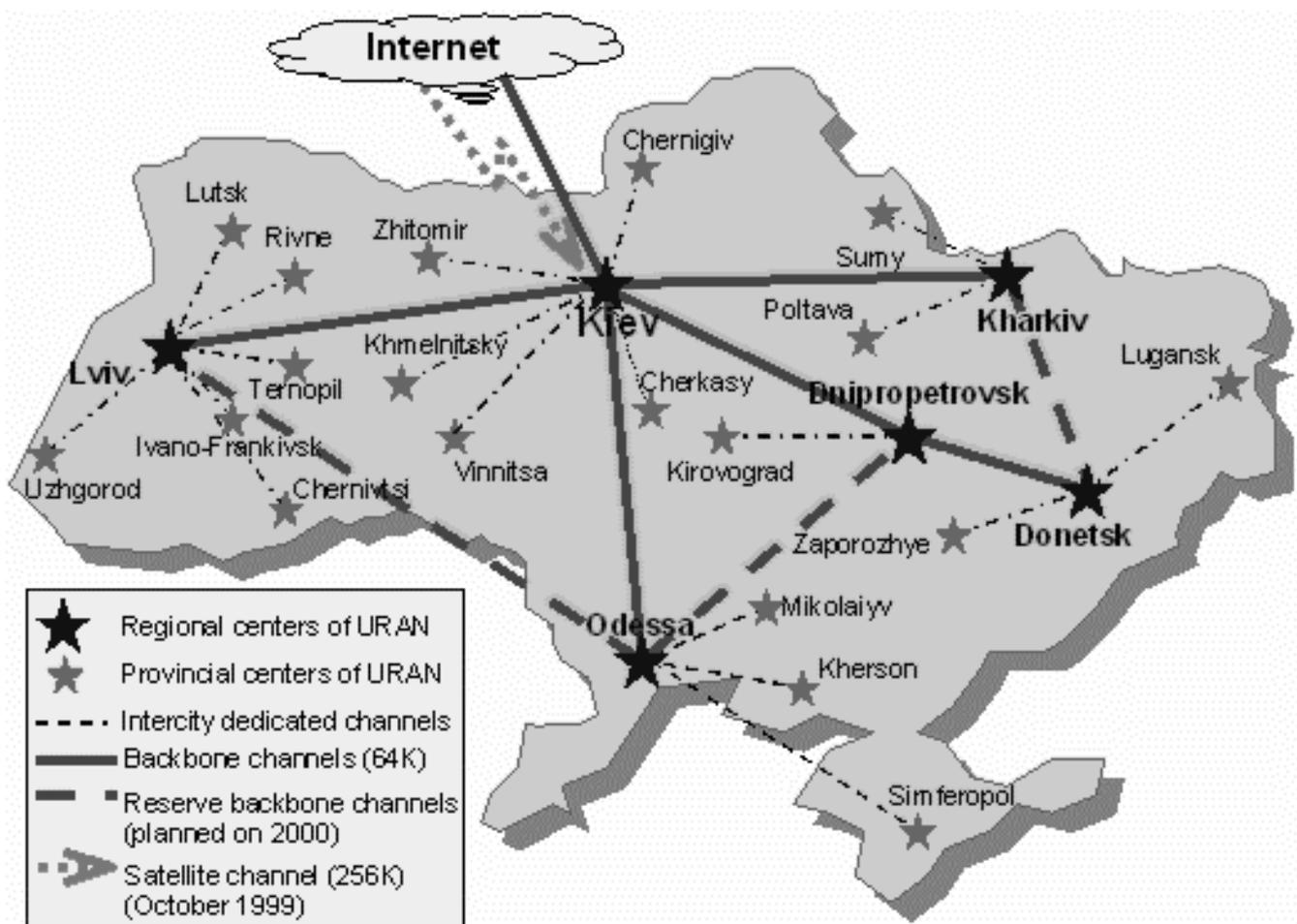


FIGURE 1  
UKRAINIAN RESEARCH AND ACADEMIC NETWORK (URAN): INITIAL 6 REGIONAL CENTERS (2000)

The work started at the end of 2000. The main structure based on fiber communication circuit had been formed by now. It is supposed to be fully introduced into service in the first half of 2002.

The second stage of the University Informational Ring which provides Donetsk State Management Academy for the digital backbone lines and the main channel enabling Kiev line.

**Stage 2.** Creation of the main network which comprises the majority of the higher education establishments of the region (2002-2003). The creation of the high-speed digital infrastructure with the maximum capacity of 100Mb/s. for the biggest part of the establishments is supposed. It should provide for the wide-ranging connection of high schools.

**Stage 3.** Creation of the high-speed digital infrastructure with the capacity of 1Gb (STM-16 based) in 2003-2005. Provision for the wide-ranging integration into European

networks and projects. Different forms of blocking and development of the present content to form informational filling of the educational network are supported.

The above mentioned stages implementation will make it possible to overcome the Donbass region lacking behind as to the development of the university telecommunication networks if to be compared with the leading world countries. It will allow to apply modern informational technologies to the training process.

The informational and educational network will solve the following problems which the regional higher education establishments face.

**Access to the resources of the integral library.**

A book was, is, and will be one of the main symbols of cognition. Today only a few libraries can afford themselves

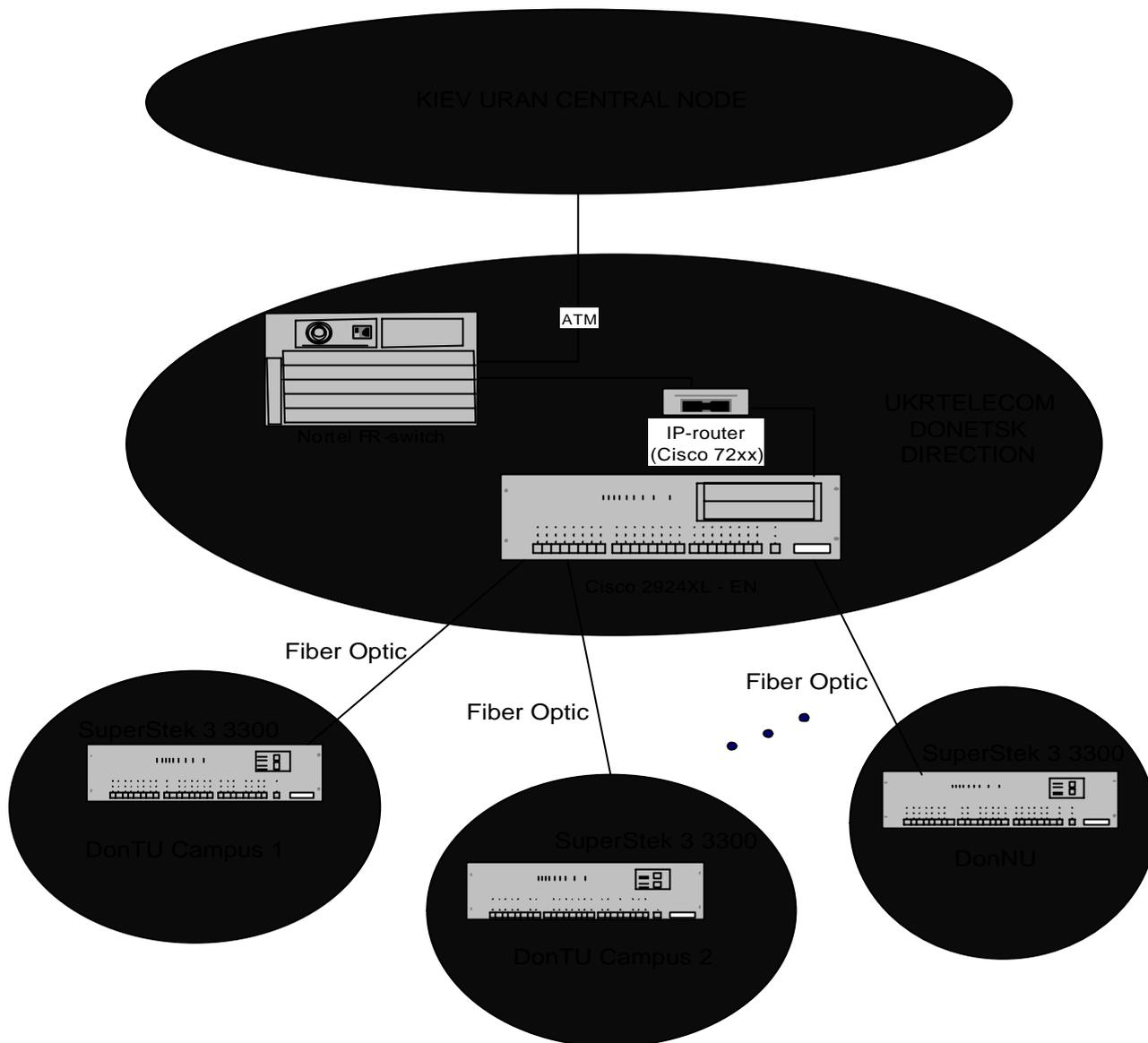


FIGURE 2  
 STRUKTURE OF REGIONAL “UNIVERSITY RING” (DONETSK, 2002)

to purchase and contain at least half of the books published in the world. Only a small number of people who really need the books have access to these libraries. As far as the Ukraine is concerned the situation here is worsened not only by detachment from what was published in the West but also by the libraries and some scientists pauperization. If to take into account the traditionally high level of the population education against a background of extremely limited financial resources it can be said that the Internet informational and educational possibilities will be evaluated as a very precious and timely gift here in the Ukraine.

The electronic library has some advantages if to be compared with the ordinary one. They are as follows: practically unlimited capacity, the volumes disparate safety and accessibility, unbelievable low prices for copying and sending etc. Besides, they contain principally new editions issued with taking into account computer technologies for special publication within the network. It is practically impossible to publish such materials as ordinary books and journals. That is the library’s potential can be fully actualized only by way of virtual literature. Textbooks as one of the types of the most important hypermedia editions

can be and should be accessible through the network. It is quite possible that in the nearest future none of the types of virtual literature will have deeper background and more detailed thrashing out as the textbooks distributed through the network.

### **Electronic congresses.**

The necessity of having more electronic congresses which do not require gathering of all participants at one place should be emphasized. They officially have all attributes of common research conferences: the selection stage (with considerably reduced number of limitations as to the number of participants and size of publications), the conference active period when all presentations are made and discussed (with the authors' reaction to the comments and answering questions). There also exists the stage when the presentations and discussions materials are fixed to be kept which does not exclude some new comments and remarks but does exclude any changes of the published materials. Such form of the conferences could be one of the main forms of participation of the majority of Ukrainian students and researchers in the international forums in the nearest future. As to the traditional conferences this form of participation can have a status of a desk presentation. The main reason of the existence of this type of participation is a financial problem. Everybody knows that to take part at the international event one should spend about one thousand American dollars, which makes up only a small part of the month's salary of a professor in Western Europe or the USA. This sum corresponds to merely six months' salary of a Ukrainian academic.

### **Distributed computing P2P.**

The Internet possibilities can be used most efficiently under the distributed computing when there is a chance to use computer resources of not only some distant computer but to make complex modeling of some complicated system with application of various network resources from any working place. Donetsk State Technical University and Stuttgart, Magderburg, and Leipzig Universities (Germany) are carrying out some research work in the area.

### **Distant learning.**

Distant learning is to solve the triune task of getting education at the place and time which is convenient to public. Probably the distant learning will replace the education process forms which are widely spread now. The distant learning development in its modern (telecommunication) meaning is restrained by two factors: absence of legislation and guideline basis, and low level of informatizing of the population of the Ukraine.

The distance learning in the region is pushed forward by DonSTU, which is the regional representative of the

Ukrainian Centre of Distant Learning, DonNU, and Donetsk State Institute of Artificial Brain, which is the science and methodology center of new educational technologies. The creation of the regional informational and educational network will allow to accumulate the experience as to the distant learning organization and be ready to introduce it into the training process.

Thus, intensive development of the informational and academic network of educational establishments of the Donetsk Region will make it possible to solve a complex of problems as to the education development in the region and make it agreeable to the world standards within a short period of time. The Donetsk Region which is highly urbanized and industrially replete could be the so-called test ground for the whole Ukraine in this sphere.

## **Conclusion**

A meeting of the NATO-Ukraine Working Group on Scientific and Environmental Cooperation took place on 22 May 2002 at NATO Headquarters. Co-chaired by Mr. Andriy Hurzhiy, First Deputy State Secretary of the Ministry of Education and Science of Ukraine, and Mr. Jean Fournet, NATO Assistant Secretary General for Scientific and Environmental Affairs, the meeting consolidated the friendly relations and the good cooperation already underway in the areas of science and environment between NATO and Ukraine. Ten Computer Networking Infrastructure Grants have been made to develop networking infrastructure for the academic community of Ukraine, for a total amount of ?638,100. The main focus of the grants has been on development of the "Ukrainian Academic and Research Data Network", to create the information infrastructure for research and education in Ukraine. The network is coordinated by the Kyiv Polytechnical Institute, and involves amongst others several institutes in Kyiv, the Mining Academy of Ukraine (Dnepropetrovsk), the Donetsk State Technical University, and the Odessa and Kharkiv State Polytechnic Universities [4].

## **REFERENCES**

- [1] URAN - Ukraine Academic and Research Network (<http://www.uran.net.ua:8101/en/index.htm>).
- [2] Data Network for Academic and Research Institutions in Ukraine (UARDN) and Connection to Western European Networks. Kiev, NTUU-KPI, 23 - 27 April 1997 (<http://www.uran.net.ua:8101/history/workshop/report.htm>).
- [3] Ukraine Academic and Research Network Ready for New Users. NATO Science & Society Newsletter. Issue No. 53, February 2000 (<http://www.nato.int/science/e/newsletter/000102.htm#7>).
- [4] NATO-Ukraine Working Group on Scientific and Environmental Cooperation (<http://www.nato.int/science/e/country-un.htm>).