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An overview of East and Central European networking activities

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RIPE

1. Introduction

This paper is based on work of the RIPE Connectivity Working Group. It summarises the main issues of international connectivity of East and Central European countries (ECE). It is based on reports and information gathered by network representatives of these countries, who have been present at the meetings or contacted on other occasions.

Thanks are due to all those who helped us to gather the information. Some countries however, are not represented in this report, due to lack of information. Please contact the author if you have amendments or suggestions.

This report contains lists of people who are responsible for international networking in each of their countries and a map of the current situation in IP networking in the those countries. The map doesn't show all existing international lines of those countries but it seeks to be complete for IP lines and other leased lines without usage restrictions for the academic and research communities.

This report has been written by Milan Sterba <Milan.Sterba@vse.cs> and it does not necessarily reflect the opinions of the authors of the national reports nor those of the RIPE community.

2. Present situation

This chapter gives as detailed as possible description of the various network activities in the East and Central European countries. The sections for particular countries will be subject to regular amendments or changes.

Considerable progress has been made during the last year in IP connectivity of ECE countries. Czechoslovakia and Poland have today, several hundreds of connected hosts each and are the most advanced ECE countries with respect to IP connectivity.

Bulgaria, Estonia and Hungary do also have IP connectivity today and have several tens of connected hosts each. By the end of 1992 IP connectivity will probably also reach Latvia an d Lithuania through NORDUnet and maybe also Romania and one of the CIS republics.

In all the connected countries the initial capacity of international lines has rapidly become insufficient and it has been sought to upgrade existing lines and set up reasonable backup solutions. Internetworking is rapidly spreading and good IP connectivity is considered as the first priority by the national academic network organisations.

All the countries considered have at the present time some (often more than one) connection to international networks. Certain countries have only a dial-up e-mail connectivity, others have low or medium speed leased lines. The present state of international leased lines to ECE countries is represented on the map in Appendix A.

RIPE broadly contributes to this rapid evolution by technical advice and by coordination efforts.

2.1 Albania

An electronic mail connection used to exist between the University of Tirana and the Internet. The gateway and relay function resided at CNUCE, Peso, Italy. This connection seems not be operational any more.

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- Maxim Raco <maksi@dinf.uniti.al>- University of Tirana
- Francesco Gennai <francesco.gennai@cnuce.cnr.it> - CNUCE, Pisa, Italy

2.2 Baltic countries

All three Baltic countries have a plan to develop Research and Education Networks, called respectively ESTNET, LATNET and LITNET and the Baltic backbone BALTBONE should link them together (Kaunas, Vilnius, Riga, Tartu, Tallinn) and to the global Internet via NORDUnet. A LISTSERV mailing list exists for this purpose (NORDBALT@searn.sunet.se).

2.2.1 Estonia

Estonia works in close co-operation with NORDUnet in setting up external IP links. Currently a 64 kbits/s IP satellite link is operational between Tallinn and Stockholm, and between Tartu and Stockholm. These lines connect the Baltic backbone network (BaltNet) to the rest of the Internet. Another 64 kbit/s IP line is operational between Tallinn and Helsinki.

Inside Estonia IP links are currently planned between the Institute of Cybernetics and the University of Technology in Tallinn and the Tartu University.

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2.2.2 Latvia

An international 14.4 kbit/s IP line connects the Institute of Informatics and Computer Science of Latvian University in Riga to the Institute of Cybernetics in Tallinn, Estonia. This line is part of the Baltic backbone network (BaltNet). Other networks active in Latvia have only dial-up connections (FidoNet to Tallinn and Helsinki, RELCOM to Moskow).

Inside Latvia X25 services are available from the public X25 network Latpak and Sprint, UUCP services are available from JET, Versia and Robosoft, the latvian partners of RELCOM-EUnet. FidoNet also is very active.

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- Ugis Berzins <ugis@fidogate.riga.lv> - BaltNet
- Alexander Kirpa <ank@robosoft.riga.lv> - Robosoft Ltd.
- Sergei Rotanov <rotanov@lumii.lat.su> - Institute of Electronics
- Dmitry Sazonov <dima@jet.riga.lv> - JET (RELCOM Riga)
- Janis Sudnieks <john@versia.riga.lv> - Versia Ltd.

2.2.3 Lithuania

A dial-up EUnet connection exists between Vilnius and Helsinki (Finland). A 9.6 kbit/s X.25 link, used for X.400 electronic mail and sponsored by Norwegian Telecom, exists between Vilnius and Oslo (Norway).

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2.3 Bulgaria

A switched international X.25 connection connects the Bulgarian EARN node in Sofia to Linz (Austria). A dial-up connection over public X.25 connects the Bulgarian EUnet via the backbone node in Varna to the Internet via the EUnet node in Heraklion (Greece). This connection will be converted to IP/X25 and will be the first IP connection in Bulgaria. Coordination between both projects, resulting in a shared fixed IP connection, is under study.

Several tens of EUnet sites are now connected over dial-up links to the national EUnet backbone. A public X25 service is available to a limited extent. EARN services have been opened recently at Sophia University but no gateway exists between the two services yet.

Contact persons:

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- Anton Velichkov <vam@bgearn.bitnet> - EARN president for Bulgaria
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2.4 Commonwealth of Independent States.

Dial-up connections between Helsinki (Finland) and Amsterdam (Netherlands) on the one hand, and Moscow on the other hand connect the RELCOM network in Russia and a few other former USSR republics to the Internet. Currently the services consist of electronic mail and Network News. A medium speed IP line to Amsterdam is planned in the near future. Recently another 14.4 kbit/s IP link has been put between Moskow and AlterNet (USA). On this link only SMTP traffic is allowed. A 4.8 kbit/s leased line between Moscow and DESY, Hamburg (Germany), supporting IP, delivers HEPnet services to two research institutes in Moscow. Low speed links between Moscow and ESOC (Germany) and CNES (France) serve the space physics community. All existing IP links to CIS have full connectivity only to the European part of Internet. The 9.6 kbit/s leased line from Moscow to Copenhagen (Denmark) which used to connected the EARN node in Moscow to the EARN/BITNET network has been replaced by a dial-up link to Stockholm due to funding problems.

A considerable effort undertaken by the RELCOM networking organization has brought e-mail connectivity to several thousands of sites all over the former Soviet Union. The growth of the network was several 100% a year. RELCOM has been operating some IP links in the Moskow and St. Petersbourg areas and some other places (Novosibirsk, Barnaul in Altai). Other national IP connections are expected to connect Ukraina, Siberia, St. Petersbourg, Far East and other regions in order to setup a kernel of a nation wide IP backbone. The whole network has some 60 regional centres, some of which connect more than 500 sites. RELCOM's international traffic is split over two dial-up lines, one to the Finish EUnet backbone and one the central EUnet node in Amsterdam. Both operate as gateways on application level. The rapidly growing volume of international mail traffic makes the need for a medium speed IP channel to Europe an urgency. Part of the international traffic is carried by the filtered IP line to AlterNet.

The first EARN node started its operation in Moscow late in 1991, but the spreading of EARN services is still expected. An e-mail gateway now exists between RELCOM DEMOS and SUEARN. SUEARN also provides the international mail relay services for FREENET, a national research IP network which interconnects some 45 institutes of the Academy of Sciences mostly in the Moskow area with international connections to Jaroslavl and Baku.

The current situation has been badly affected by the split of RELCOM into two independent entities (RELCOM RelTeam Ltd. and RELCOM DEMOS). Each of them holds a part of CIS network users and part of international connectivity. While RELCOM RelTeam Ltd. has inherited the RELCOM's membership in EUnet, RELCOM DEMOS seems to position itself as a partner of AlterNet in CIS. Negotiations are still underway to find a cooperative approach to national and international connectivity.

In July 1992 an official decision has been taken by the Ministry of Science and Higher Education, the Academy of Sciences and the Russian Scientific Center (Kurchatov Institute) to form the Russian Electronic Academic and Research Network (RELARN) which will use RELCOM as transport infrastructure.

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- Igor Sviridov <sia@lot.cs.kiev.ua> - EUnet - Ukraine contact.
- Oleg Tabarovsky <olg@ussr.eu.net> - EUnet - RELCOM
- Dima Volodin <dvv@hq.demos.su> - EUnet - RELCOM Demos

2.5 Czechoslovakia

A 64 kbit/s IP link between Prague and Linz (Austria) is operational today. The line is full IP carrying general IP, EARN and czech EUnet traffic. A second link, 19.2 kbit/s between Bratislava and Vienna is shared between EUnet traffic and general IP traffic and IXI. The upgrade of this link to 64 kbit/s is planned for the near future. Both links connect into the upcoming national academic backbone networks CESNET (Czech Educational and Scientific Network) and SANET (Slovak Academic Network). Both networks are interconnected with IP links with the aggregate capacity of 28.8 kbit/s (19.2 kbit/s IP link between Prague and Bansha Bystrica and 9.6 kbit/s Prague-Bratislava). Another 64 kbit/s link should connect CESNET and SANET to IXI and the future EMPB. This line, financed by EC PHARE project for one year, will connect Prague to Amsterdam.

Both CESNET and SANET are now setting up national backbone infrastructures connecting major academic towns in the country. 64 kbit/s lines are used wherever available and considered necessary, 19.2 kbit/s on all other links. The first protocol supported is IP. Connected to the backbones are appearing metropolitan networks in major cities.

The major coordinating bodies are CESNET and SANET where universities as well as Academy of Sciences, EARN and EUnet are represented. A good cooperation exists between both separately funded projects as well as good cooperation with ACOnet, EARN, EUnet, WIN, INRIA France and others.

Contact persons:

- Jaroslav Bobovsky <bobovsky@csearn.bitnet> - SANET
- Gejza Buechler <gejza@mff.uniba.cs> - EUnet backbone manager CS
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- Vladimir Kassa <kassa@iaccs.cs> - SANET
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- Peter Pronay <peter@mff.uniba.cs> - president of EUnet Czechoslovakia
- Pavel Rosendorf <prf@csearn.bitnet> - contact for .CS top level domain
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- Milan Sterba <Milan.Sterba@vse.cs> - author of this report, CESNET

2.6 Hungary

Hungary is connected to EARN by a 9.6 kbit/s IP line between Budapest and Linz (Austria). For the time being the same line is used also for the Internet and EUnet connection. It is planned to upgrade this line to 64 kbit/s in 1992. The High Energy Physics community has access to HEPnet services via a 9.6 kbit/s leased line between Budapest and CERN, Geneva (Switzerland) which is now running IP.

Hungary has a good operational public X25 network which is the base of Wide Area Networking between small and medium sized sites. Currently there are about 250 X.25 access points in the country. A high speed national IP backbone (called HBONE) will come into production in 1993 to provide a country wide IP connectivity and access to EBONE services.

In Hungary a national program under the title “R&D Information Infrastructure Program (IIF)” is responsible for the research net- working. The "HUNGARNET" co-ordinates the networking activities of different user groups, such as "HUNINET" (Universities and high schools), "AKANET" (academic research institutes), and the user group of public collections (libraries, museums), meanwhile part of the funding goes through IIF.

Contact persons:

- Peter Bakonyi <h25bak@ella.hu> - President of IIF Exec Com.
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- Balazs Martos <martos@sztaki.hu> - HBONE project manager
- Ferenc Telbisz <telbisz@iif.kfki.hu> - HEPnet
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- Laszlo Zombory <h340zom@ella.hu>- EARN president, chairman of HUNINET

2.7 Poland

The main external connection consists of a 64 kbit/s satellite link between Warsaw and Stockholm (Sweden). The link is an IP one and carries all Internet, EARN and EUnet traffic. A new 64 kbit/s IP link is being set between Warsaw and Vienna with the objective to set up an Ebone Boundary System in Warsaw. A 9.6 kbit/s IP connection is in place between Kracow and CERN, Geneva (Switzerland) for HEPnet services.

Public X25 services have only started in 1992. Thus connections at national level can only be implemented on switched or leased lines. The country already has an infrastructure of leased lines, shared between EARN and IP traffic operating at speeds between 9.6-64 kbit/s.

The Polish network is coordinated by an organization called NASK (National Academic and Research Network) which also includes the Polish part of EARN. Realistic plans exist to substantially extend IP connectivity over the territory in 1992 using 64 kbit/s lines on their national backbones wherever possible and economically viable. A National Network Operation and Monitoring Center has been set up in early 1992 which operates the whole national and international infrastructure. A system of network user training and support has also been put in place.

Contact persons:

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- Krzystof Heller <heller@ii.uj.edu.pl> - contact for PL domain
- Tomasz Hofmokl <fdl50@plearn.bitnet> - EARN director for Poland
- Rafal Pietrak <rafal@fuw.edu.pl>- IP within NASK
- Jerzy Zenkiewicz <jezenk@pltumk.bitnet> - Polish academic network (NASK)
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2.8 Romania

International connectivity is now provided by a switched X25 link to EARN in Austria. A 9.6 kbit/s leased line is planned before end 1992 between Bucarest and Linz (Austria). This line will be able to carry both IP and EARN/NJE/BSC traffic.

Romania has poor internal networking infrastructure. A government project of building a public X25 network is under commercial negotiations and should start to offer some services in 1993.

In Romania the emerging networking activities seem to be coordinated by the National Council for Informatics and the Polytechnic Institute of Bucharest.

Contact persons:

- Florin Paunescu <florin@imag.fr> - National Council for Informatics
- Paul Dan Cristea <pdcristea@pi-bucuresti.th-darmstadt.de>- Polytechnic Institute of Bucharest

2.9 Slovenia

Slovenia is connected over a 64 kbit/s IXI access point in Ljubljana to the IXI backbone. Over this connection an IP link via NIKHEF, Amsterdam (Netherlands) provides Internet connectivity. A PSDN X25 connection connects the main EUnet node in Ljubljana to EUnet. Another IXI access point, also located in Ljubljana, connects Croatia, Bosnia and

Herzegovina to IXI over the JUPAK PPSDN.

Currently Slovenia have achieved a good degree of capillarityof their national networks due to the existence of a wide spread public X25 network. There exists a well developed X400 service. In Slovenia the Academic and Research Network of Slovenia (ARNES) is coordinating network activities. In Croatia the coordinating organization is CARNet and both organizations cooperate.

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- Marko Bonac <marko.bonac@ijs.si> – ARNES Executive Director
- Denis Trcek <denis.trcek@ijs.si> – IJSE5net – J.Stefan Institute

2.10 Serbia and Montenegro

Serbia has had a 9.6 kbit/s leased line between Beograd and Linz to carry EARN traffic. Currently this line is cut according to a decision of the Austrian government about the UN embargo of new Yugoslavia.

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2.11 Macedonia

The University of Skopje, Macedonia was recently appointed by the Ministry for Science and Technology to start the networking activities in the country. They joined CEEC and they are planning soon an IP connection.

Currently Macedonia have achieved a good degree of capillarity of their national network (DECNET) due to the existence of the public X25 network which is a part of JUPAK PPSDN.

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- Ministry for Science and Technology, Skopje

3. Evolution

All the ECE countries are very interested in European as well as world wide IP connectivity. In Czechoslovakia, Hungary and Poland there has been rapid growth of connected IP networks and hosts in the academic community. Their existing international leased lines infrastructure is now shared by EARN, EUnet and raw IP services. Linz University and ACONET in general (Austria) has become an important concentrating point for Bulgaria, Czechoslovakia, Hungary as well as Poland and Romania.

The financial resources dedicated to networking in these countries are limited. The sharing of the existing national and international leased lines between EARN, EUnet and other IP traffic as well as between academic and starting commercial traffic is thus a very important issue. Lightweight but robust IP gateway solutions (over dial-up lines, leased serial lines or X25 networks) are of great concern in this respect and are continuously studied and further developed (e.g. COPERNICUS).

By the end of this year the Budapest-ACONET link at least will be operating at 64 kbit/s. It is probable that new IP lines will be operational at this time (Bratislava-Vienna, Moskow-Amsterdam).

In the same time the national infrastructure of the countries will also evolve. We can expect an increase in national coverage in countries with working public X25 networks and in Czechoslovakia and Poland as well as strong increase in IP connectivity in the CIS.

4. International Initiatives

Several international support initiatives have been launched in the past by different bodies to improve international network connectivity of the Central and Eastern European countries. The following list presents some of them:

The Ebone 92 consortium has shown itself very supportive during 1992 by allowing traffic of ECE countries to pass freely over the Ebone and letting so the ECE countries traffic cross Europe. This situation will change in 1993 when Ebone will use a more formal financial model.

RIPE and the RIPE NCC have widely contributed to the rapid integration of new ECE networks into the global Internet. RIPE has acted as an initiator of a common coordination effort of academic networking organizations in Bulgaria, Czechoslovakia, Hungary and Poland. A first
coordination meeting has been held in Prague in february 1992 and a successful cooperation has started since, continued on 3rd Joint European Networking Conference in Innsbruck, where RARE has proposed to be the coordinating place on ECE integration to european academic networking and another meeting in Prague in August. CEEC@RARE.NL is now the focusing mailing list on common ECE networking issues.

Also both EARN and EUnet have widely contributed to the successful start of international networking in ECE countries, by placing the first network nodes to these countries, supporting the activity of these nodes both financially and by extensive know-how transfer.

Despite this expressed cooperation willingness (RARE, RIPE, EARN, EUnet etc.) we can see uncoordinated support efforts which sometimes lead to wasting of poor disposable resources. An EC PHARE project dedicated to extend the former COSINE IXI project to Bulgaria, Czechoslovakia, Hungary, Poland and Romania has started this year. Medium speed 64 kbit/s lines have been ordered between Amsterdam-Prague-Budapest-Bern and between Aarhus-Warsaw-Bern. These lines initially financed by the EC should provide connectivity from ECE countries to the planned European Multiprotocol Backbone (EMPB). It should provide access points to X25 as well as IP services. Unfortunately the coordination with RIPE and Ebone as well as with the academic networking organizations in the countries involved has been up to now very poor resulting in uncoordinated doubling of parts of the scarce infrastructure in ECE countries.

Austria is the major relay point between ECE countries and Western Europe (and further). The Austrian government is very supportive and either covers fully or participates in a significant manner to costs of international connections to these countries. In february 1992 ACONET has made an even larger proposal, offering these countries (Bulgaria, Czechoslovakia, Hungary and Poland) double connectivity to both Vienna and Linz. Each of these countries should have one link to both places, thus permitting line backup. The Vienna-CERN line has been upgraded in october 1992 to 256 kbit/s and the Linz-CERN line (64 kbit/s) is being replaced by a Linz-Amsterdam line (128 kbit/s) in order to accommodate traffic increase from these countries and offer a real backed-up connectivity to Ebone. The ACONET proposal for Ebone 93 to place an EBS to Austria seems well justified from the point of view of ECE countries connectivity.

CERN plays also an important role in the IP connectivity of the new countries. It houses actually a 9.6 kbit/s line from Krakow and another HEPnet 9.6 kbit/s line from Budapest. Due to lack of resources CERN prefers not to house a lot of low rate lines from every country but rather to house a higher rate line concentrating traffic from several countries. This is in fact in perfect conformance with the ACONET proposal.

The German DFN network has launched several regional initiatives to connect sites in geographical proximity of Germany (e.g. Dreilaendereck project connecting Liberec in Czechoslovakia, Wroclaw in Poland and Zittau in Germany using leased links based on X25 with further connectivity to DFN). DFN also provides X400/SMTP gateway for Slovenia.

The Italian government has financed in 1990 and 1992 successful network workshops (NetSchool) to which about 50 network specialists from ECE countries have attended. A second extended edition of NetSchool has taken place in April 1992 with participation of network specialists from RIPE and attendees from ECE countries, some South American, Asian and African countries.

A similar event has been organized by NORDUnet for network users and operators from the Baltic states.

The French government has expressed its willingness to help the integration of new countries to the world of academic networking by launching in cooperation with INRIA a project called Copernicus, which aims to improve network connectivity of several Eastern European Countries. One of the first results of this project has been the cooperation on design and implementation of the academic IP backbone CESNET-SANET (Prague - Brno - Bratislava, Banska Bystrica - Kosice) in Czechoslovakia. The project consists of network management and administration know-how transfer, common development of tools and some software and hardware donations. A similar activity is now starting with Romania.

IBM is also present in these countries with its academic initiative in which IBM mainframes have been offered to Czechoslovakia, Hungary and Poland. IBM and EASInet act also as sponsors for the T1 US link usage for academic networks in Czechoslovakia, Hungary, Poland and Slovenia.
Strong support to ECE countries integration into the global network also comes from the United states. NSF has always been very supportive to academic networks in ECE countries promptly helping them to solve the global connectivity problems. Many projects aiming at improving local, national and international infrastructure, know-how transfer and mission oriented network applications are now in progress.

The assistance of countries with developed networking shouldn't be uniquely oriented to basic network connectivity. A lot of work is to be done in the ECE countries to offer and improve higher level network services like e-mail, teleconferencing, archive services, online databases and library catalogues etc., as well as in basic network concepts, user information services and advanced networking know-how transfer. That's why new EC projects proposals are now oriented not only on infrastructure but also on higher level services (e-mail, electronic directory, user information and training). Lack of funds is extremely disadvantageous and the exchange rates still make it difficult for ECE network experts to attend international network events.

5. Technical issues

As already mentioned, distributing international network access over the local territory is a major problem for the countries considered. While it is relatively easy and cheap to set up a local TCP/IP network it is more difficult to connect it to the national access point. Generic router solutions are rather expensive on one side and not completely free of administrative exportation problems for all countries involved.

The solution to these problems are software routers based on PC's or workstations and public domain or easily available software.

A low cost capillarity of networks being of great importance to ECE countries, good dial-up IP solutions both industrial and public domain, which are under study and evaluation in EUnet, RIPE, Copernique, NetSchool and others, are of great interest as well as low cost IP solutions on synchronous lines (X25 or PPP) and low cost solutions for network monitoring and management.

The technical speed limitations for international leased lines seem now to become less restrictive than in the past. For Czechoslovakia, Hungary and Poland, international links up to 2 Mbit/s are now feasible.

With the basic connectivity problems being progressively solved the network services are now becoming major issues in the most advanced ECE countries. PC's remain the most spread technical basis, thus network solutions based on this platform (routers, mail, news, archive and information servers and clients) either Unix or MS DOS oriented are of major concern today.

6. Organizational issues

The starting period in international networking is often characterized by a fuzziness in the organizational structure together with a lack of information about the people actually responsible and working in the area. The situation is nearly stabilized in Croatia, Czechoslovakia, Hungary, Poland and Slovenia, where national academic networking groups have been founded and are coordinated with EARN/EUnet activities, and a coordinated effort tends to build nation wide multiprotocol academic network infrastructures. A similar effort is underway in Bulgaria (UNIKOM, EARN and EUnet Bulgaria). These countries seem also to have found a stabilized position in international network organizations (EARN, EUnet, RARE, RIPE). The situation is more complicated in other countries where also international contacts are for various reasons much more scarce.