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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@inria.fr> and it does not necessarily reflect the opinions of the authors of the national reports nor those of the RIPE community.

2. Present situation - External networking

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. Poland has today, several hundreds of connected hosts, the most advanced ECE country with respect to IP connectivity.

Czechoslovakia and Hungary have several tens of connected hosts each, and all other ECE countries have realistic plans to achieve IP connectivity in 1992.

All three countries have rapidly judged the initial capacity of their international lines as insufficient and sought to upgrade their 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 (Appendix B).

In 1992 the Baltic republics have also achieved IP connectivity through NORDUnet. We can expect during 1992 some of the former Soviet Union republics, Bulgaria and possibly Romania, to achieve some kind of IP connectivity, at least to Europe.

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 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

Curently an electronic mail connection exists between the University of Tirana and the Internet. The gateway and relay function resides at CNUCE, Pisa, Italy.

Contact Persons:

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

2.2 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 Tallin and Helsinki (Finland), and between Tartu and Helsinki. These will eventually connect the planned Baltic backbone network (BaltNet) to the rest of the Internet.

Contact persons:

- Ants Work <ants@ioc.ew.su> - Institute of Cybernetics, Tallin

2.3 Latvia

A dial-up EUnet connection exists between Riga and Helsinki (Finland). A 64 kbit/s IP satellite link between Riga and Helsinki (Finland) is planned for later this year. This link will eventually connect to the planned Baltic backbone network (BaltNet).

Contact persons:

- Sergei Rotanov <rotanov@lumii.lat.su> - Institute of Electronics,
- Riga Sergeijs Dmitrijevs <dmit%lynx.riga.lv@relay.ussr.eu.net> - candidate for Latvian EUnet backbone (now RELCOM Riga)

2.4 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 betwee n Vilnius and Oslo (Norway).

Contact persons:

- Laimutis Telksnys <telksnys@ma-mii.lt.su> - Institute for Mathematics, Vilnius

2.5 Bulgaria

A dial-up connection over X.25 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). Coordination between both projects, resulting in a shared fixed IP connection, is under study.

Contact persons:

- Daniel Kalchev <daniel@danbo.bg> - EUnet backbone manager BG, contact for BG. top level domain

2.6 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 9.6 kbit/s leased line from Moscow to Copenhagen (Denmark) connects the EARN nodes in the CIS to the EARN/BITNET network. 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.

Contact persons:

- Dima Volodin <dvv@hq.demos.su> - EUnet backbone manager SU
- Misha Popov <popov@kiae.su> - EUnet - RELCOM
- Nickolay M.Saukh <nms@kiae.su> - EUnet - RELCOM
- Valery Bardin <fox@kiae.su> - EUnet - RELCOM
- Andrej Mendkovich <mend@suearn2.bitnet> - CIS EARN director
- Igor Sviridov <sia%lot.cs.kiev.ua@relay.ussr.eu.net> - EUnet - Ukraine contact.

2.7 Czechoslovakia

A 19.2 kbit/s IP link between Prague and Linz (Austria) is operational today. The line is multiplexed and carries EARN and general IP services. An upgrade till 64 kbit/s is foreseen for June 1992. A second link, 9.6 kbit/s IP between Bratislava and Vienna (Austria), is shared between EUnet traffic and general IP traffic. Both links connect into the upcoming academic backbone network, FESnet.

Contact persons:

- Jan Gruntorad <tkjg@csearn.bitnet> - EARN director for Czechoslovakia and FESNET coordinator
- Ivo Smejkal <ivo@vse.cs> - FESNET and CS NIC
- Pavel Rosendorf <prf@csearn.bitnet> - contact for .CS top level domain
- Jiri Orsag <ors@vscht.cs> - contact for .CS top level domain and EUnet Prague
- Peter Pronay <peter@mff.uniba.cs> - president of EUnet Czechoslovakia
- Gejza Buechler <gejza@mff.uniba.cs> - EUnet backbone manager CS
- Vladimir Kassa <kassa@iaccs.cs> - SANET (Slovak Academ. Netw. Org.)
- Jaroslav Bobovsky <bobovsky@csearn.bitnet> - SANET
- Milan Sterba <Milan.Sterba@inria.fr> - author of this report, FESNET

2.7 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.

Contact persons:

- Nandor Horvath <horvath@sztaki.hu> - EUnet backbone manager, domain contact for HU
- Laszlo Zombory <h340zom@ella.hu> - EARN president, chairman of HUNINET
- Laszlo Csaba <ib006csa@huearn.bitnet> - EARN director for Hungary
- Istvan Tetenyi <ib006tet@huearn.bitnet> - EARN deputy director
- Peter Bakonyi <h25bak@ella.hu> - President of IIF Exec Com.
- Geza Turchanyi <h2064tur@ella.hu> - HUNGARNET CRIP
- Piroska Giese <giese@rmk530.rmki.kfki.hu> HEPnet
- Ferenc Telbisz <telbisz@iif.kfki.hu> - HEPnet

2.8 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. Another 9.6 kbit/s IP connection is in place between Krakow and CERN, Geneva (Switzerland) for HEPnet services.

Contact persons:

- Tomasz Hofmokl <fdl50@plearn.bitnet> - EARN director for PL
- Rafal Pietrak <rafaup@plearn.bitnet> - Warsaw - Copenhagen con nection
- Krzystof Heller<uiheller@plkrcy11.bitnet> - contact for PL top level domain
- Daniel J.Bem <bem@plwrtu11.bitnet> - Polish academic network (NASK)
- Jerzy Gorazinski <Gorazi@plearn.bitnet> - Polish State Committee for Scientific Research

2.9 Romania

Romania doesn't have any international connectivity yet. A 9.6 kbit/s leased line will be put in before June 1992 between Bucarest and Linz (Austria). This line will be able to carry both IP and EARN/NJE/BSC traffic.

Contact persons:

- Florin Paunescu <florin@imag.fr> - National Council for Informatics

2.10 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 YUPAK PPSDN.

Contact persons:

- Leon Mlakar <leon@ninurta.fer.yu> - EUnet backbone manager YU
- Borka Jerman-Blazic <jerman-blazic@ijs.ac.mail.yu> - YUNAC
- Marko Bonac <marko.bonac@ijs.ac.mail.yu> - ARNES Executive Director
- Denis Trcek <denis.trcek@ijs.ac.mail.yu> - ARNES

2.11 Serbia and Montenegro

Serbia has a 9.6 kbit/s leased line between Beograd and Linz to carry EARN traffic. This line should also carry TCP/IP over SNA.

Contact persons:

- Jagos Puric <xpmfd01@yubgss21.bitnet> - EARN director for YU

3. Present situation - Internal networking

While the situation may seem to be quite similar with regard to international connectivity, there are major differences in the national capacity of the networks and in the number of nodes.

Currently Serbia and Slovenia have achieved a good degree of capillarity of their national networks due to the existence of a wide spread public X25 network.

In Bulgaria several tens of EUnet sites are 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.

In the CIS a considerable effort undertaken by the RELKOM networking organization has brought e-mail connectivity to several thousands of sites all over the former USSR. The growth of the network is several 100% a year. RELKOM operates now an IP backbone which goes from St. Petersbourg to Novosibirsk. The whole network has some 60 regional centres, some of which connect more than 500 sites. All RELKOM's international traffic transits to the world over the Finish EUnet backbone, which operates as a gateway on application level. The rapidly growing volume of international mail traffic makes the need for a medium speed IP channel to Europe an urgency.

Recently the first EARN node started its operation in Moscow and rapid spreading of EARN services can be expected. Negotiations are underway to set up an e-mail gateway between both networks.

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 leased line backbone is foreseen for connecting large sites in the near future.

In Czechoslovakia and Poland public X25 services are only starting and the main towns should be connected in 1992. Thus connections at national level can only be implemented on switched or leased lines. Both countries already have an infrastructure of leased lines, shared between EARN and IP traffic. International as well as national leased lines can be normally be used at rates up to 19.2 kbit/s. Higher speed lines are occasionally available.

Both countries have good coordination in national academic networking with clear plans to substantially extend IP connectivity over their territories in 1992 using 64 kbit lines on their national backbones wherever possible and economically viable.

Romania has no internal networking infrastructure at all. A government project of building a public X25 network is under commercial negotiations and should start to offer some services in early 1993.

4. 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 (Austria) has becomme an important concentrating point for Czechoslovakia, Hungary and in the future for Bulgaria and Romania.

The financial resources dedicated to networking in these countries are quite limited. The sharing of the existing national and international leased lines between EARN and IP traffic is thus a very important issue. The technical aspects of this problem have been extensively tackled at the 9th RIPE meeting and cheap short term solutions avoiding the necessity of using relatively expensive dedicated IP routers are now under operation, as are further study and development.

By the end of this year the Prague-Linz, Budapest-Linz IP links at least will be operating at 64 kbit/s. It is probable that new IP lines will be operational at this time (Bucarest-Linz, Sophia-Linz, Varna-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.

5. 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 :

An EEC PHARE project is dedicated to extend the COSINE IXI project to Bulgaria, Czechoslovakia, Hungary, Poland and Romania. This project suggests placing a 64 kbit/s link running X25 to each country starting from the IXI backbone or to a network already connected to IXI. This national access point should provide OSI as well as IP services. Support should be given also to provide for internal OSI and IP services within each country over an X25 infrastructure. The primary goal of the project (improve regional A&R computer communications) is very laudable, but the imposed technical realisation should take into account the actual needs of the countries as expressed in their national academic network plans and the European A&R networking experience. Otherwise the important financial sums engaged (2.5 Mecu) risk dominating technically sound solutions.

Austria is a real candidate for a major relay point between ECE countries and Western Europe (and further). The Austrian government is aware of this and supports certain international connections to these countries (e.g. the connection between Bratislava and Technical University of Viena). 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 Linz-CERN line should be replaced by a Linz-Amsterdam line and both Austrian lines should be upgraded in order to accomodate traffic increase from these countries and offer a real backed-up connectivity to EBONE 92. With relation to the Ebone 92 initiative the idea of setting up an EBS for ECE countries in Austria is well justified.

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. Dreilaender- eck project connecting Liberec in Czechoslovakia, Wroclaw in Poland and Zittau in Germany using leased links based on X25 with further connectivity to DFN). There is also strong cooperation of the Slovanian academic network with DFN within the scope of the COSINE project.

The Italian government has financed in 1990 and 1992 successfull 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 co-operation with INRIA a project called Copernique, which aims to improve network connectivity of several Eastern European Countries. One of the first result sof this project has been the co-operation on design and implementation of an academic IP backbone FESnet (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 and Hungary.

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, on-line databases and library catalogues etc., as well as in basic network concepts, user information services and advanced networking know-how transfer. Lack of funds is extremely disadvantegeous and the exchange rates make it very difficult for ECE network experts to attend international network events

6. 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)

The international connectivity possibilities seem to be technically limited to 64 kbit/s for most of the countries in 1992, but important investments are being made with important international help to improve this situation.

7. 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 peopleactually responsible and working in the area. The situation is nearly stabilized in Czechoslovakia, Hungary and Poland, 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). Due to current RARE membership and country representation regulations these fully empowered organizations are unfortunately not well represented in RARE if represented at all.

RIPE has acted as an initiator of a common coordination effort of academic networking organizations in Bulgaria, Czechoslovakia, Hungary and Poland. A first co-ordination meeting has been held in Prague in february 1992. A memorandum has been published as a first result of this co-operation (Appendix B)

EARN as well as EUnet are active in all of the countries considered.

The Baltic states are coordinated within the BaltNet body which plans to build a backbone connecting Baltic states with NORDUnet. A LISTSERV mailing list exists for this purpose (NORDBALT@searn.sunet.se).

In Czechoslovakia a federal body responsible for academic networking has been founded (FESnet). It has a Czech and a Slovak part (SANET) and EARN as well as EUnet, universities as well as the Academy of Sciences are represented.

In Hungary a national program under the title “R&D Information Infrastructure Program (IIF)” is responsible for the research networking. 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.

The Polish network is coordinated by an organization called NASK (National Academic and Research Network) which also includes the Polish part of EARN.

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

Yugoslavian academic networking activities have been coordinated by the National Academic Networking Organization YUNAC. Beside this both EARN and EUnet are present in Slovenia and Serbia. YUNAC is now applying for international membership in RARE and works to reorganize itself in a NORDUnet-like way. In Slovenia the Academic and Research Network of Slovenia (ARNES) is coordinating network activities.

APPENDIX B

On February 14, 1992 representatives of national R&D networking initiatives from Bulgaria, Czechoslovakia, Hungary and Poland met in Prague to discuss the possibilities of cooperation and coordination in the area of R&D networking at a Eastern and Central European scale. Major academic network initiatives from each country have been represented.

The meeting has also been attended by network specialists from other countries and numerous national and international network initiatives (NSF, RIPE, ACOnet, DFN). The full list of participants is given in the attachment.

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The representatives from Bulgaria, Czechoslovakia, Hungary and Poland have agreed on the following memorandum.

Memorandum on cooperation in R&D networking version 1

On February 14, 1992 representatives of national R&D networking initiatives from Bulgaria (UNIKOM), Czechoslovakia (FESNET), Hungary (HUNGARNET) and Poland (NASK) met in Prague and agreed on the following:

- they need and appreciate assistance which is and will be brought to R&D networking in their countries and to their international connectivity by numerous individuals, companies, national and international networking organizations and other bodies;

- this assistance must suit the interest of R&D communities in their countries as expressed by their national R&D network organizations and expressed in their existing national R&D networking and international connectivity projects;

- they express their willingness to cooperate on their network strategies and international connectionsm, network education and training programs, network management and administration and user services among themselves and within the global network;

- they are willing to share the networking expertise accumulated in existing international and national R&D networks in order to achieve a high level of networking services as quickly as possible;

- the driving force in their efforts is user needs and they will be guided in choosing the technology primarily according to those needs;

- they need as their first priority a high speed backed up and reliable connectivity to Internet as soon as possible and they will use their best efforts to achieve their goals;

- here is also a need on a country by country basis for OSI network services and other network services.

RIPE

List of participants of the Prague meeting

Austria - ACOnet

Wilfried Woeber <woeber@access.can.ac.at>	ACOnet
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Czechoslovakia - FESnet

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Hungary - HUNGARNET

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