host: sri.com
directory: netinfo
file: internet-access-providers-non-us.txt
date: June 1993

* *
This file is Chapter 6 (formerly Chapter 7) of the book "Internet: Getting Started," a book that tells what the Internet is and how to join it. "Internet: Getting Started" (ISBN 0-13-327933-2) is published by Prentice-Hall. It can be ordered directly from Prentice-Hall by calling 515-284-6751, and is also available in many bookstores.
* *

CHAPTER 6
NON-U.S. SITES

The Internet, having originated in the United States, is not surprisingly strongest and most diverse in that country. However, the Internet is a worldwide enterprise and there are many networks in many countries that are full and active Internet participants. Larry Landweber of the University of Wisconsin maintains a file describing international connectivity that covers not only IP connectivity, but BITNET, UUCP, FidoNet, and OSI connectivity as well. According to the April 15, 1993 version of this file, there are 127 entities (mostly countries) with international connectivity. A slightly earlier version of this file is included in Appendix VIII.

This chapter describes some of these networks. These descriptions are provided so that if you are in one of these countries and would like to connect to the Internet, you can contact the resource listed for your country and get started.

However, what if you are in a country that is not listed here? How would you go about joining the Internet? This can be a challenge if there is currently no Internet presence in your country, but here are some ideas about how to get started.

First, determine whether the top-level domain for your country has been delegated by the Internic Registration Service. That is, does InterNIC Registration Services list an administrative contact for that domain? You can find this out by contacting InterNIC:

Network Solutions, Inc.
InterNIC Registration Services
505 Huntmar Park Drive
Herndon, VA 22070
800 444 4345
+1 703 742 4777
+1 619 455 4600
hostmaster@rs.internic.net

If the InterNIC does list someone, contact that person. He or she is probably knowledgeable about networking in your country and can help you get started. You will need to register your domain name with him as well.

If your country's domain has not been delegated, there is probably no connection to the Internet based on the TCP/IP protocols. However, there may be at least electronic mail access based on other protocols. You may

wish to check books that have lists of networks. For example, !%@:: A Directory of Electronic Mail Addressing and Networks by Donnalyn Frey and Rick Adams [1], The Matrix by John Quarterman [2], and Users' Directory of Computer Networks by Tracy LaQuey [4] have network listings that are much more extensive than those provided here. In addition, there are a couple of newsletters that often discuss the international aspects of networking. One is the Internet Society News [5], whose first volume was issued in January 1992; another is Matrix News [6], offered by Matrix Information and Directory Services, Inc. More information about each of these newsletters can be found in Chapter 12.

If you can find no established networking presence in your country, you will have to start from scratch by contacting possible providers and seeing what they can do for you. Some good places to start are:

- The commercial service providers listed in Chapter 4. As they are in the business of providing Internet connections, they are very motivated to help. Some of them already have connections from the U.S. to other countries. These particular providers are repeated in Section 6.39. However, some of their non-U.S. connections may be due to special project affiliations or some other arrangement that might make it difficult for these sites to help some other organization even within the same country to join the Internet.

- InterNIC Information Services The InterNIC is very knowledgeable about connections to the Internet from other countries and can be helpful in suggesting contacts or strategies.

- The BITNET Network Information Center (BITNIC) (see Section 10.5.5). Although BITNET access is not full Internet access, it can be used for electronic mail. BITNET has a strong sister network in Europe called EARN (see Section 6.1.1.2).

- In Europe, the RIPE Network Coordination Center (NCC) supports the network providers in the member countries. They may know of some activity in IP networking in your area and be able to refer you to a local contact (see Section 6.1.1.6).

The following sections provide information about specific countries or areas. We are grateful to the contacts in these countries who have supplied this information for us. If you are a provider of Internet access in your country and do not see your information reflected in the following sections, please feel free to send it to us at SRI via the contact information provided in the Overview. Most notably we regret the comparative lack of information regarding networking activities in South America and Africa. The newsletters mentioned above are a good source of current information for networking in these, as well as other, areas.

6.1. Europe

Internetworking in Europe is quite strong in many countries--in many more countries, in fact, than we include here. As mentioned in the introduction to this chapter, there are several books whose purpose it is to list networks, but that is not the primary purpose of this book. If you cannot gain access to any of the books mentioned, a network information center (such as the InterNIC can provide information for you about what they contain.

Europe is the home of the OSI protocols, so networking based on these protocols is much more extensive there than in the U.S. Networking based

on TCP/IP, however, is also strong, as shown by the influence of the RIPE group (see Section 10.1.6). In addition, the goal of communicating between networks based on each of these suites of protocols is given very high priority in Europe.

However, in some individual countries, there is some conflict between which suite of protocols should be used for national networking. There may also be some uncertainty regarding which agency or site will coordinate a national networking effort. This makes it more confusing both for those trying to gain access to the network world and for those trying to ascertain service provider referrals.

This section provides two general types of information. First, several groups are working in Europe at coordinating networking efforts in individual countries into internets that serve larger areas. These groups are introduced in the following subsections. Second, thanks to input from the RARE Information Services and User Support Working Group (ISUS), we list contacts in Section 6.1.2 for many European networks taken from the first RARE Technical Report. This section includes contacts for some networks about which we have more extensive information elsewhere in this Chapter, as well as contacts for some networks for which we have yet not gathered further descriptions.

6.1.1. Pan-European Cooperation

There are several efforts being made toward uniting networking efforts in individual countries into a pan-European cooperation. EUnet currently provides a framework for uniting many national networks. The EBONE project is a new effort at a pan-European, multi-protocol backbone. In addition, the EARN and HEPnet networks have existed across Europe for some time. The RIPE Network Coordination Center is a relatively new group tasked to provide support to the RIPE member networks. Each of these widespread European efforts is described briefly in this subsection. However, as yet, there is no one organization we can point to if you are in a country not listed here and wish to join the Internet.

6.1.1.1. EUnet

SRI thanks Alessandro Berni for forwarding this information about EUnet.

EUnet is the largest subscription-funded research-oriented network in Europe, serving users from Iceland to Russia, and as far South as Tunisia. Operating since 1982, EUnet connects over four thousand sites and networks, with gateways to major research networks around the world including NSFnet and the Internet.

EUnet is constituted as a service by and for the members of EurOpen, the European Forum for Open Systems. Founded in 1977, EurOpen is a non-profit association of Open Systems users, organized into National User Groups in Europe and beyond. At present EurOpen has more than 6000 members. The close association of EUnet with EurOpen provides a continuing source of user input.

EUnet is a pan-European cooperative network made up of national networks located across Europe. Each EUnet National Network (or NalNet) operates in conjunction with their respective national EurOpen User Group. Each NalNet operates its own National Network Operations Center (National NOC), which provides user support in the local languages. Technical problems and requests for services at the national level should be addressed to postmaster@<country>.eu.net. Many NalNets provide unique services. Please contact your NalNet for additional information.

Each EUnet NalNet connects to the European Network Operations Center (or NOC) in Amsterdam. From Amsterdam, EUnet connects to every major R & D network in Europe, and, via a 128kb leased line, to UUNET and the NSFNET in the United States. Technical problems at the European level should be addressed to postmaster@eu.net. Users interested in information on how to obtain an EUnet subscription should contact glenn@eu.net or their National EUnet Network.

EUnet services include electronic mail, network news, InterEUnet (TCP/IP based networking services), UUCP, the EUnet Archive, and user support services.

EUnet connects to every major research network in Europe, and most research networks around the world. Peer international networks include EARN, HEPnet, NORDUnet, NSFNET. EUnet is also a member of EBONE (European Backbone), and the Commercial Internet Exchange (CIX) Association. Several EUnet NalNets are users of IXI, the X.25 service.

EUnet has a social-technical mission to provide services to a wide range of users, from the one-person software development organizations to research centers of large, multinational corporations. EUnet has a special focus on helping to make networking available to as many members of the R & D community, in as many countries, as is possible. Accordingly, should EUnet develop a budgetary surplus, it is to be used for grants to networks in developing countries.

For more information about EUnet, contact:

EUnet
c/o NIKHEF
Postbus 41882
1009 DB Amsterdam
NETHERLANDS
glenn@eu.net
+31 20 592 5109
FAX: +31 20 592 5155

6.1.1.2. EARN

We would like to acknowledge and thank Nadine Grange of the EARN Office in France for the following information.

EARN, the European Academic Research Network, is the first general purpose computer network dedicated to universities and research institutions throughout Europe, the Middle East and Africa.

The network is widely used for scientific, educational, academic and research purposes. Commercial and political use is not allowed, either directly or indirectly.

EARN is made up of nearly 500 institutions including universities, European research centers (e.g., CERN, the European Space Agency, and the European Molecular Biology Laboratory), and national research centers and laboratories such as CNRS (France); Rutherford Appleton Laboratory (UK); CNR, INFN, and CINECA (Italy); DESY, GSI, DFLVR and the Max Planck Institute (Germany).

EARN also has links to 27 countries including Yugoslavia, Turkey, Algeria, Morocco, Tunisia, and Egypt, Iceland, and Luxembourg, to name a few.

EARN is an integral part of BITNET (see Section 1.5.4), in that it is based on the same protocols and shares the same name space. Through BITNET, EARN members have access to equivalent facilities in Argentina, Brazil, Canada, Chile, Japan, South Korea, Mexico, Singapore, Taiwan and the United States.

Most of the academic networks in the world can be accessed through EARN including EUnet, HEPnet, NSFNET, national European networks such as DFN in Germany and JANET in the UK, as well as a regional European Network such as NORDUnet, which links all the Nordic countries (see Section 6.28).

One of EARN's major objectives is to stimulate cooperative research, support the day-to-day exchange of research information, and the execution of joint projects and publications. Like BITNET, EARN supports mail, mailing lists, and a type of file transfer. It provides the LISTSERV mailing list function. Its facilities also allow users access to remote applications, databases, and libraries.

EARN is also an international member of RARE (Reseaux Associes pour la Recherche Europeenne) and cooperates actively with RARE and COSINE (Cooperation for Open Systems Interconnection Networking in Europe) on OSI for the research community. RARE and COSINE are more fully described in Sections 10.1.5 and 10.1.7.

For information about access to EARN, how to become a member organization or member country, or any other general information, contact your country's EARN representative or:

European Academic Research Network
BP 167
F-91403 Orsay CEDEX
FRANCE
BITNET/EARN/NetNorth: grange@frors12
Internet: grange%frors12.bitnet@mitvma.mit.edu
+33 1 69 82 39 73
FAX: +33 1 69 28 52 73

6.1.1.3. HEPnet

HEPnet is a worldwide network used by researchers in the field of High Energy Physics; however, the European portion of the network is very prominent. It is mentioned here because HEPnet was one of the first pan-European internets. In Europe, HEPnet is coordinated by a committee chaired by a CERN (Organisation Europeenne pour la Recherche Nuclearie) representative.

For information about HEPnet, contact:

Denise Heagerty
DD Division
CERN
CH-1211 Geneve 23
SWITZERLAND
denise@priam.cern
denise%priam.cern@cwl.nl

+41 022 83 49 75
TELEX: 419000 CER CH

6.1.1.4. EBONE

EBONE (E1 Backbone) is an effort aimed at filling the need for a well-managed pan-European multi-protocol backbone service in Europe. An initial meeting to delineate the technical and operational aspects of such a backbone was held in September 1991, so this effort is very new. An EBONE task force has recommended a two-step approach to implementing this backbone:

- During 1992, create a kernel backbone by combining and enhancing existing facilities.

- In 1993, merge the 92 backbone into the planned RARE Operational Unit.

The target group for EBONE is all the national and international networks and international research institutions that provide network services for users at higher education and research sites. In principal, the EBONE will have no restrictions on traffic. It will be up to participating networks to restrict traffic according to their own norms.

In September 1992, it was announced that the the final link of the initially defined EBONE, the London-Montpellier link, was put in place. The EBONE is now complete as a resilient pan-European IP backbone.

The RARE Secretariat has the responsibility for maintaining information regarding EBONE. They are the contact point for organizations planning to contribute and/or connect to the EBONE.

RARE Secretariat
Singel 466-468
NL-1017 AW
AMSTERDAM
+31 20 639 1131
FAX: +31 20 639 3289
raresec@rare.nl

6.1.1.5. RARE

RARE, the Reseaux Associes pour la Recherche Europeenne, is described more fully in Section 10.1.5, but briefly it is an association of European networking organizations. Its purpose is to promote network services for the European research community, and especially to promote international interconnections of such services. Please also refer to Section 10.1.6 for information regarding the RARE-sponsored organization RIPE (see Section 10.1.6).

For more information, contact:

RARE Secretariat
Singel 466-468
NL-1017 AW
AMSTERDAM
+31 20 639 1131
FAX: +31 20 639 3289
raresec@rare.nl

6.1.1.6. The RIPE Network Coordination Center (NCC)

The RIPE NCC began operation on April 1, 1992 with the mission of supporting the networking organizations that cooperate in RIPE (see Section 10.1.6 for information about RIPE). The RIPE Network Coordination Center (NCC) supports all those RIPE activities that cannot be effectively performed by volunteers from the participating organizations. Besides supporting RIPE activities in general, the NCC provides the following services to network operators:

- Network Management Database containing information about IP networks, DNS domains, IP routing policies, and contact information

- Delegated Internet registry, a clearing house distributing IP network numbers

- Coordinated network statistics gathering

- Domain Name System (DNS) coordination

- Graphical maps of IP networks (planned)

- Repository for network operations software

- RIPE document store

- Interactive information service

The RIPE NCC provides services to the networking organizations that cooperate in RIPE. It does not provide direct services to end users.

The RIPE NCC currently has 3 permanent staff members. The RARE association provides the formal framework for the NCC. Funding for the first year of operation of the NCC is provided by the national members of RARE and EARN.

The RIPE NCC will function as a "Delegated Registry" for IP addresses in Europe, as anticipated and defined in RFC 1174. The NCC keeps the registry of IP (Internet Protocol) numbers and AS (Autonomous System) numbers for the RIPE member organizations. This will mean that the NCC allocates blocks of numbers to local registrars in Europe. It remains the responsibility of the NCC to collect information regarding how the local registrars allocate IP addresses and make such information available globally. The local registries are set up by RIPE member organizations as appropriate. Particular requests that can not be handled by local registries will be handled by the NCC.

To contact the RIPE NCC:

RIPE NCC
c/o NIKHEF
Kruislaan 409
NL-1098 SJ Amsterdam
THE NETHERLANDS
+31 20 592 5065
FAX: +31 20 592 5155
ncc@ripe.net

6.1.2. European Network Contacts List

We are indebted to the RARE Information Services and User Support Working Group for the information contained in this section. It is taken from

RARE Technical Report 1, User Support and Information Services In Europe: A Status Report [32]. This report aims to provide guidance regarding the numerous networks and the information found on them, specifically focusing on the answer to the questions "Who should I ask about a network?" and "Where can I find the 'signposts' to this information?" It is an excellent introduction to networking efforts in Europe, from which we have extracted only contact information to help you get started. The document also contains information about what services each network offers and how they may be accessed, as well as information about how the survey was conducted and background information about RARE, the Information Services and User Support working group, and various network servers from which information can be obtained online.

To obtain this document, send a message to the Mailbase server. The address is mailbase@mailbase.ac.uk. In X.400 format, the address is C=gb; ADMD= ; PRMD=uk.ac; O=mailbase; S=mailbase;. In the text of your message, type send rare-wg3-usis rtr-usis-92.

Some of these contacts are repeated in information elsewhere in this chapter, with more extensive descriptions of their networks. They are included again for completeness in representing the RARE information. The other contacts are included as a starting point for people in their countries, even though we have not yet collected more extensive descriptions of their networks.

Contacts for the networks reported on in the RARE WG3 Technical Report are listed next. For each network listed, entries follow this format:

```
Network Name
Contact person(s)
Postal address
Telephone number
E-Mail address in RFC 822 format
E-Mail address in X.400 format
```

Austria

ACONET

Austrian Scientific Data Network
Florian Schnabel
ACONET-Verein
Gusshausstrasse 25
A-1040 Wien
AUSTRIA
+43 222 58801 3605
schnabel@edvz.tu-graz.ada.at
schnabel@fstgss01.tu-graz.ac.at
C=at; ADMD=ada; PRMD=tu-graz; O=edvz; S=schnabel

Belgium

Future Belgian National Academic Network

P. Van Binst
R. Vandenbroucke
ULB
CP 230, Bd du Triomphe
1050 Bruxelles
BELGIUM

+32 2 641 32 11
vanbinst@helios.iihe.rtt.be
C=be; ADMD=rtt; PRMD=iihe; O=helios; S=vanbinst;

Denmark

DENet
Jan.P.Sorensen
Jan.P.Sorensen@uni-c.dk
Building 305, DTH, DK-2800, Lyngby
DENMARK
+45 45 93 83 55
C=dk; ADMD=DENET; O=UNI-C; OU=NET; S=SORENSEN;

France (EARN)

EARN-France
Dominique Dumas
950 re de St. Priest
F-34000 Montpellier
FRANCE
+33 67 14 14 14
BITNET: bruch@frmop11
Internet: bruch@frmop53.cnusc.fr

RED400
Serge Aumont
CICB
Campus de Beaulieu
35042 Rennes
FRANCE
or
Paul-Andre Pays
INRIA
Domaine De Voluceau
Rocquencourt
BP 105
78150 Le Chesnay Cedex
FRANCE
+33 1 39 63 54 58
contact-red@cicb.fr
C=FR; ADMD=atlas; PRMD=cicb; S=contact-red;

Germany

DFN/WIN
DFN-Verein
Pariser Str. 44
D-1000 Berlin 15
GERMANY
+49 30 88 42 99 20
dfn-verein@dfn.dbp.de
C=de; ADMD=dbp; PRMD=dfn; S=dfn-verein;

Greece

ARIADNE
Yannis Corovesis
NRCPS Demokritos, 153 10 Athens
GREECE
+30 1 6513392
ycor@isosun.ariadne-t.gr
C=gr; ADMD= ; PRMD=ariadne-t; OU=iosun; S=corovesis; G=yannis;

Hungary

HUNGARNET
Istvan Tetenyi
Computer and Automation Institute
H-1132 Budapest
18-22 Victory Hugo
HUNGARY
+36 11497352
postmaster@ella.hu

Iceland

ISnet
Marius Olafsson
c/o SURIS
University of Iceland
Dunhaga 5
107 Reykjavik
ICELAND
+354 1 694747
marius@rhi.hi.is
C=is; ADMD=0; PRMD=isaneet; O=hi; OU=rhi; S=marius

Ireland

HEANET
Higher Education Authority Network
Peter Flynn
Computer Centre, University College,
Cork IRELAND
+353 21 276871 x2609
cbts8001@iruccvax.ucc.ie

Italy

GARR Gianfranco Turso
Tecnoplois CSATA Novus Ortus
SP. Casamassima Km. 3
I-70010 Valenzano (BA)
ITALY

+39 80 877011 Gianfranco Turso
turso@vm.csata.it

Luxembourg

RESTENA
Antoine Barthel
6 Rue Coudenhove Kalergi
L-1359 Luxembourg
+352 424409
admin@restena.lu
C=lu; ADMD=pt; PRMD=restena; O=restena; S=admin

The Netherlands

SURFnet
Maria Heijne
P.O.Box 19035
3501 DA Utrecht,
THE NETHERLANDS
+31 30310290
info@surfnet.nl
C=nl; ADMD=400net; PRMD=surf; O=surfnet; S=info;

Norway

UNINETT
Petter Kongshaug
SINTEF DELAB
7034 Trondheim
NORWAY
+47 7 592980
Petter.Kongshaug@delab.sintef.no
C=no; ADMD= ; PRMD=uninett; O=sintef; OU=delab; S=kongshaug; G=petter;

Portugal

RCCN Vasco Freitas
Dr. Vasco Freitas
CCES
Universidade do Minho
Largo do Paco
P-4719 Braga Codex
PORTUGAL
+351 53 612257
vf@ce.fccn.pt
C=pt; ADMD= ; PRMD=fccn; O=ce; S=Freitas; G=Vasco;

Slovenia

ARNES
Marko Bonac
ARNES Network
Jamova 39, Ljubljana
SLOVENIA
+38 61 159199
bonac@ijs.si
C=si; ADMD=mail; PRMD=ac; O=ijs; S=bonac

Spain

RedIRIS
Fundesco/RedIRIS
Alcala, 61
E-28014 Madrid
SPAIN
+34 1 4351214
info@iris-dcp.es
C=ES; ADMD=mensatex; PRMD=iris; O=iris-dcp; S=info;

Sweden

SUNET
Anders Gillner
KTH,100 44, Stockholm
SWEDEN
+46 8 7906502
postmaster@sunic.sunet.se

Switzerland

SWITCH
Thomas Lenggenhager
SWITCH Head Office
Limmatquai 138
CH-8001 Zuerich
SWITZERLAND
+41 1 261 8178
postmaster@switch.ch
C=CH; ADMD=arCom; PRMD=SWITCH; O=SWITCH; S=postmaster;

Turkey

TUVAKA
Esra Delen
Ege Universitesi
Bilgisayar Arastirma ve Uygulama Merkezi
Bornova, Izmir 35100
TURKEY
+90 51 887228
Esra@ege.edu.tr
Esra@trearn.bitnet

United Kingdom

JANET
Joint Academic Network
JANET Liaison Desk
c/o Rutherford Appleton Laboratory
Chilton
Didcot
Oxon
OX11 OQX
UNITED KINGDOM
+44 235 5517
JANET-LIAISON-DESK@jnt.ac.uk
O=GB; ADMD= ; PRMD=uk.ac; O=jnt; G=JANET-LIAISON-DESK;

Regional Networks

Both NORDUnet and YUNAC are discussed more fully elsewhere in this chapter.

NORDUnet
Peter Villemoes
UNI-C,
Build. 305, DTH
DK-2800 Lyngby
DENMARK
+45 45 938355
Peter.Villemoes@uni-c.dk

YUNAC
Avgust Jauk
Jozef Stefan Institute
Jamova 39, Ljubljana,
SLOVENIA
+38 61 159199
postmaster@ijs.ac.mail.yu
C=yu; ADMD=mail; PRMD=ac; O=ijs; S=postmaster

6.1.3. Eastern and Central Europe

The following information is taken from a report by Milan Sterba published as Ripe 74, Version 5, November 1992 [33]. At the time of this writing, it was available from host ftp.ripe.net as ripe/docs/ripe-drafts/ripe-draft-ece.v5.txt. The report in more complete than the information we include here. Again, we are primarily concerned with providing contacts from whom you can gain more detailed information. Some of the countries mentioned in this section may be listed elsewhere in the chapter as well.

The report begins by noting that "considerable progress has been made during the last year in IP connectivity of ECE [Eastern and Central European] countries." He notes that all connected countries have rapidly challenged the initial capacity of their international lines and are seeking to upgrade the existing lines and establish fallback solutions.

"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."

In this section, for each country discussed, we reproduce the points of contact given in the report.

Albania

Maksim Raco
maksi@dinf.uniti.al
University of Tirana

Francesco Gennai
francesco.gennai@cnuce.cnr.it
CNUCE, Pisa, Italy

Estonia

Ants Work ants@ioc.ew.su
Institute of Cybernetics, Tallinn

Latvia

Guntis Barzdins
gbarzdin@cs.lu.riga.lv
BaltNet

Ugis Berzins
ugis@fidogate.riga.lv
BaltNet

Sergei Rotanov
rotanov@lumii.lat.su
Institute of Electronics

Sergey Dmitrijev
dmit@lynx.riga.lv
JET (RELCOM Riga)

Lithuania

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

Algirdas Pakstas
Algirdas.Pakstas@idt.unit.no
Institute for Mathematics, Vilnius

Bulgaria

Daniel Kalchev
daniel@danbo.bg
EUnet backbone manager BG and contact for top level domain BG

Anton Velichkov
vam@bgearn.bitnet
EARN president for Bulgaria

Alexander Simeonov
sasho@bgearn.bitnet
Center for Informatics, Sofia

Commonwealth of Independent States

Valery Bardin
fox@ussr.eu.net
EUnet - RELCOM

Misha Popov
popov@hq.demos.su
EUnet - RELCOM Demos

Andrej Mendkovich
mend@suearn2.bitnet
CIS EARN director

Nickolay M.Saukh
nms@ussr.eu.net
EUnet - RELCOM

Igor Sviridov
sia%lot.cs.kiev.ua@relay.ussr.eu.net
EUnet - Ukraine contact

Oleg Tabarovsky
olg@ussr.eu.net
EUnet - RELCOM

Dima Volodin
dvv@hq.demos.su
EUnet - RELCOM Demos

Czechoslovakia

Jaroslav Bobovsky
bobovsky@csearn.bitnet
SANET

Gejza Buechler
gejza@mff.uniba.cs
EUnet backbone manager CS

Karol Fabian
Karol.Fabian@uakom.cs
SANET

Jan Gruntorad
tkjg@csearn.bitnet
EARN director for Czechoslovakia
and CESNET coordinator

Vladimir Kassa
kassa@iaccs.cs
SANET

Jiri Orsag
ors@vscht.cs
CS NIC and EUnet Prague

Peter Pronay
peter@mff.uniba.cs
President of EUnet Czechoslovakia

Pavel Rosendorf
prf@csearn.bitnet
Contact for .CS top level domain

Ivo Smejkal
ivo@vse.cs
CESNET - user services

Milan Sterba
Milan.Sterba@vse.cs
Author of this report, CESNET

Hungary

Peter Bakonyi
h25bak@ella.hu
President of IIF Exec Com.

Laszlo Csaba
ib006csa@huearn.bitnet
EARN director for Hungary

Piroska Giese
giese@rmk530.rmki.kfki.hu
HEPnet

Nandor Horvath
horvath@sztaki.hu
EUnet backbone manager,
domain contact for HU

Balazs Martos
martos@sztaki.hu
HBONE project manager

Ferenc Telbisz
telbisz@iif.kfki.hu
HEPnet

Istvan Tetenyi
ib006tet@huearn.bitnet
EARN deputy director

Geza Turchanyi
h2064tur@ella.hu
HUNGARNET CRIP

Laszlo Zombory
h340zom@ella.hu
EARN president, chairman of HUNINET

Poland

Daniel J.Bem
bem@plwrtu11.bitnet
Polish academic network (NASK)

Jerzy Gorazinski
Gorazi@plearn.bitnet
Polish State Committee for
Scientific Research

Krzystof Heller
uiheller@plkrcy11.bitnet
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)

Andrzej Zienkiewicz
osk03@plearn.bitnet
Polish academic network (NASK)

Romania

Florin Paunescu
florin@imag.fr
National Council for Informatics

Paul Dan Cristea
pdcristea@pi-bucuresti.th-darmstadt.d
Polytechnic Institute of Bucharest

Slovenia

Leon Mlakar
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EUnet backbone manager YU

Borka Jerman-Blazic
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Marko Bonac
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ARNES Executive Director

Denis Trcek
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ARNES

Serbia and Montenegro

Jagos Puric
xpmfd01@yubgss21.bitnet
EARN director for YU

Macedonia

Marjan Gusev
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or gusev@lut.ac.uk
Faculty for Natural Sciences,
Gazibaba, Skopje

Aspazija Hadzisce
rkntriasp%nubsk@uni-lj.ac.mail.yu
Ministery for Science and Technology,

6.2. Canada

UUNET Canada

UUNET Canada serves all of Canada and offers international connectivity to the Internet via UUCP, Telnet, IP connections, and a corporate WAN service. This provider offers all the AlterNet services as well. It is a member of the CIX, and serves both the research and commercial communities.

For more information about UUNET Canada, contact:

UUNET Canada Inc.
1 Yonge Street
Suite 1801
Toronto, Ontario
M5E 1W7
CANADA
+1 416 368 6621
FAX: +1 416 369 0515
info@uunet.ca

CA*net

SRI thanks Eugene Siciunas of the University of Toronto for much of the information we present about CA*net.

Canada began implementation of its national research and academic network, called CA*net, in the summer of 1990. It is intended to interconnect the existing and emerging Canadian regional networks, and thereby to support data communications related to the research, academic, and technology transfer needs of Canada.

Following is information about CA*net and its ten member regional networks.

CA*net

CA*net Information Centre
Computing Services
University of Toronto
4 Bancroft Ave., Rm 116
Toronto, Ontario
CANADA, M5S 1A1
Attn: Eugene Siciunas
416 978 5058
FAX: 416 978 6620
info@CAnet.ca
eugene@vm.utcs.utoronto.ca

Quebec

RISQ Reseau Interordinateurs Scientifique Quebecois
Centre de Recherche Informatique de Montreal (CRIM)
3744, Jean-Brillant, Suite 500
Montreal, Quebec
CANADA, H3T 1P1
Attn: Bernard Turcotte
514 340 5700
FAX: 514 340 5777
turcotte@crim.ca

Ontario

ONet ONet Computing Services
University of Toronto
4 Bancroft Avenue, Rm 116
Toronto, Ontario,
CANADA, M5S 1A1
Attn: Eugene Siciunas
416 978 5058
FAX: 416 978 6620
eugene@vm.utcs.utoronto.ca

Manitoba

MBnet
Director, Computing Services
University of Manitoba
603 Engineering Building
Winnipeg, Manitoba

CANADA, R3T 2N2
Attn: Gerry Miller
204 474 8230
FAX: 204 275 5420
miller@ccm.UManitoba.ca

Saskatchewan

SASK#net
Computing Services
56 Physics
University of Saskatchewan
Saskatoon, Saskatchewan
CANADA, S7N 0W0
Dean Jones
306 966 4860
FAX: 306 966 4938
jonesdc@admin.usask.ca

Alberta

ARnet
Alberta Research Network
Director of Information Systems
Alberta Research Council
Box 8330, Station F
Edmonton, Alberta
CANADA, T6H 5X2
Attn: Walter Neilson
403 450 5188
FAX: 403 461 2651
neilson@TITAN.arc.ab.ca

British Columbia

BCnet
BCnet Headquarters
Room 419 - 6356 Agricultural Road
University of British Columbia
Vancouver, B.C.
CANADA, V6T 1W5
Attn: Mike Patterson
604 822 3932
FAX: 604 822 5116
Mike_Patterson@mtsg.ubc.ca

Newfoundland

NLnet
Newfoundland and Labrador Network
Director, Computing and Communications
Memorial University of Newfoundland
St. John's, Newfoundland
CANADA, A1C 5S7
Attn: Wilf Bussey
709 737 8329

FAX: 709 737 4569
wilf@kean.ucs.mun.ca

Nova Scotia

NSTN Nova Scotia Technology Network
General Manager, NSTN Inc.
900 Windmill Road, Suite 107
Dartmouth, Nova Scotia
CANADA, B3B 1P7
Attn: Mike Martineau
902 468 6786
FAX: 902 468 3679
martinea@hawk.nstn.ns.ca

Prince Edward Island

Prince Edward Island Network
University of Prince Edward Island
Computer Services
550 University Avenue
Charlottetown, P.E.I.
CANADA, C1A 4P3
Attn: Jim Hancock
902 566 0450
FAX: 902 566 0958
hancock@upei.ca

New Brunswick

NBnet
Director, Computing Services
University of New Brunswick
Fredericton, New Brunswick
CANADA, E3B 5A3
Attn: David Macneil
506 453 4573
FAX: 506 453 3590
DGM@unb.ca

In addition, Mr. John Demco of the Computer Science Department of the University of British Columbia acts as the registrar for the CA domain (CA is the ISO 3166 two-letter country code designation for Canada). Mr. Demco can provide information to those sites interested in becoming a subdomain of CA.

For those already connected to the Internet, online information is available by anonymous FTP from host ftp.cdnnet.ca in the ca-domain directory. Included is an introduction to the domain, an application form, several indices, and a registration file for each organizational subdomain.

The information is also available via e-mail from the archive server at archive-server@cdnnet.ca.

If you're not connected, but would like additional information about the CA domain or sites currently registered under CA contact:

John Demco
Computer Science Dept.
University of British Columbia
Vancouver, B.C.
CANADA V6T 1Z2
demco@cs.ubc.ca
604 822 6724
FAX: 604 822 5485

6.3. Australia

connect.com.au Pty Ltd.

connect.com.au Pty Ltd. provides local access to users in Melbourne and Sidney. Some of the services provided include SLIP, PPP, ISDN, UUCP, ftp, Telnet, NTP, and FTPmail. For further information contact:

connect.com.au Pty Ltd.
29 Fitzgibbon Crescent
Caufield, Victoria 3161
AUSTRALIA
+61 3 5282239
FAX: +1 61 3 5285887
connect@connect.com.au

AARNet

The Australian Academic and Research Network (AARNet) is a multi-protocol national network serving the Australian academic and research community. Our thanks to Geoff Huston for providing this information.

The network provides Internet services to the national academic and research sector as it's primary objective, and also provides Internet services to any other organization with compatible interests to this sector on a fee for service basis.

AARNet was commissioned in May 1990, and currently uses 2 megabit capacity links across the major trunk routes interconnecting Adelaide, Melbourne, Canberra, Sydney and Brisbane.

AARNet is connected to the U.S. Internet via a dedicated 512 kbps circuit to the United States, and also provides an Internet mail delivery service to Papua New Guinea and Thailand.

TCP/IP is the major supported protocol within AARNet. A national DECnet Phase IV network is supported, but it should be noted that there is no DECnet interconnection between this DECnet network and the HEP/SPAN DECnet. X.25 is also supported on a regional basis, and an interconnection to the public X.400 mail service is also supported.

Further information regarding AARNet (including maps, a more detailed

description of the network, a list of connected institutions and organizations and an Australian network resource guide) is available via anonymous ftp from the host aarnet.edu.au. The Australian resource guide is also published in the Internet as a WAIS service. The guide itself is maintained by Geoff Huston, G.Huston@aarnet.edu.au.

For additional information regarding AARNet contact:

Geoff Huston
The Australian Academic and Research Network
GPO Box 1142
Canberra ACT 2601
AUSTRALIA
+61 6 249 3385
G.Huston@aarnet.edu.au

PRO-NET

PRO-NET is a user-friendly communications system, fully menu-driven at all levels, providing a comprehensive Australia-wide and International communications and resource network. Computers, terminals and work-stations connect easily to PRO-NET by modem. PRO-NET is wholly Australian-owned, and provides Australia-wide and International E-Mail(electronic-mail) by modem dial-up from anywhere in Australia, together with software archives, Australia-wide and international forums, real-time discussion lounges, database storage and retrieval.

For more information contact:

Phone: +61 3 349-2266
Fax: +61 3 349-1257.
Mail: sysop@tanus.oz.au

Pro-Net Australia
P.O Box 186
North Carlton, Vic., 3054
Melbourne, Australia

6.4. Czechoslovakia

SRI thanks Pavel Rosendorf for providing this information.

In Czechoslovakia, public X.25 networking services have been provided by the PTT only very recently, so the majority of connections are dial-up lines. There is a great effort now being undertaken to build a national backbone based on 64 kbps lines, running the set of TCP/IP protocols via cisco routers. There is a project underway, launched by INRIA (Institut National de Recherche en Informatique et Automatique), and supported by the French government, which will assist with the tasks of building this national backbone and improving overall IP connectivity of some Eastern Europen countries.

Czechoslovakia is connected to two international networks - EUnet and EARN. Connection to the EUnet is realized by a 9600 kbps leased line between Bratislava and Vienna, Austria. The protocol currently in use is UUCP, but tests are being performed to switch to the TCP/IP protocols as soon as possible.

The connection to EARN is via a 19200 kbps leased line between the cities of Prague, Czechoslovakia and Linz, Austria. The current protocol for this connection is TCP/IP via cisco routers. There is also a test TCP/IP connection between Praha and Linz using SLIP implemented on PC. E-Mail and news services are currently available to all users and remote login and file transfer services are available on the test line.

There are two networking organizations in Czechoslovakia - the Czechoslovakian part of EUnet (CSUUG) and the Czechoslovakian part of EARN (CSERN).

There are also plans underway by the government of Czechoslovakia to establish a federal organization for networking in the country.

For additional information about networking in Czechoslovakia or administration of the top-level domain CS, contact:

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University of Wisconsin
Dept of Chemical Engineering
1415 Johnson Drive
Madison, Wisconsin 53706
U.S.A.
+1 608 263 6592
FAX: +1 608 262 0832
rosendorf@chera1.che.wisc.edu

6.5. Hungary

SRI thanks Balazs Martos for this information about networking in Hungary.

The IIF network center, operated by the Academic Computer Infrastructure Division of the Computer and Automation Institute (MTA-SZTAKI/ASZI), provides many types of services to a large Hungarian user community. This community includes people from education, research and development, government, healthcare, libraries and museums, etc. Services for these nonprofit organizations are free of charge, financed by the "Information Infrastructure Program" of the government. Commercial users pay a modest contribution to cover a part of the service costs.

Network services are provided mainly over the large X.25 network in Hungary, but leased lines running IP are also connected to the center. UUCP and PAD based services (mail, file transfer, news) are accessable for dial-up users as well. The IIF network center runs the EUnet and EARN national node, so also provides services to the Hungarian EUnet and EARN nodes.

Tens of thousands of people are using the most popular mail service. Internet services like FTP and Telnet are becoming more and more a dominant part of the international bandwidth.

Services include:

- Line mode terminal access (XXX)
- 327x full screen service

- Central e-mail service (called ELLA) with gateways to the Internet and BITNET, and with a built-in directory system
- Central file server
- Central bulletin board
- Databases
- BITNET Listserv
- NetNews

IP services include:

- Domain Name Server
- Anonymous FTP
- Electronic mail
- Remote login

For more information, contact:

Balazs Martos
Head of the Academic Computer Infrastructure Division
Computer & Automation Institute
Hungarian Academy of Sciences (MTA-SZTAKI/ASZI)
Budapest, XIII
Victor Hugo u. 18-22
HUNGARY
martos@sztaki.hu
+361 1497532
FAX: +361 1297866

6.6. Bulgaria

BGnet

SRI thanks Daniel Kalchev for this information on networking in Bulgaria.

BGnet in Bulgaria is presently very small, but is growing more stable.

At present, sites in Bulgaria connect over UUCP dialup links or using the national X.25 network to the national backbone in Varna. The backbone is connected to two other EUnet backbones - the Greek national backbone in Heraklion, Crete, and the European EUnet backbone in Amsterdam, The Netherlands. Both links are over the X.25 network, with dialup connections in reserve when the X.25 network is not operational.

The following additional background information is taken from a draft of the paper Implementing Internationally Connected Computer Networks in Bulgaria by Daniel Kalchev [31].

Danbo BBS, the first Bulletin Board System in Bulgaria, started in Varna in November 1989.

Shortly after that, Danbo BBS became member of FidoNet. Having connected to FidoNet, the BBS could offer international e-mail, which was affordable and reachable for anyone with a computer and modem. This had a significant social effect and shortly thereafter many other BBSs opened all around the country.

Many Bulgarian users, mostly researchers, desired wider connectivity and services. Many alternatives for acquiring such services were considered, but the final choice was EUnet. In December 1990, a Bulgarian site (danbo.uucp) connected to EUnet.

As the demand for networking services was high, EUnet installed a national backbone in Bulgaria. Other sites connected in September 1991, and the EUnet network in Bulgaria started operation.

EUnet offered not only e-mail, but also News and InterEUnet (worldwide IP connectivity). To ease the future connection of the national network to the Internet, it was necessary to register the national top-level domain; Bulgaria's top-level domain BG was registered in November 1991.

Several other groups in Bulgaria began attempts to establish international connections with other networks, most notably with EARN. An EARN node was installed in Sofia.

There is a public X.25 network in Bulgaria called BULPAC. When the EUnet backbone connects to BULPAC, the other sites can dial a local access number, login to BULPAC and then connect to the backbone.

Here is some numerical data about the Bulgarian EUnet network. This data reflects the state of the network on 1 May 1992.

Number of operational sites: 12

Number of sites by type:

Companies	6
Universities	2
Public Institutions	2
Research	1
Government	1

The majority of these sites are in Varna or Sofia, although Burgas, Plovdiv, Blagoevrgad, and Rousse each have at least one site.

For more information about BGnet, contact:

BGnet
Daniel Kalchev
c/o Digital Systems
Neofit Bozveli 6
Varna - 9000
Bulgaria
Voice and FAX: +359 52 234540
postmaster@Bulgaria.EU.net

6.7. Romania

SRI thanks Florin Paunescu for this information about Romania.

Currently, Romania has no operational country-wide academic (or other)

network. Romania is not connected to any international network either, except for an end-user connection from the Polytecnical Institute of Bucharest (IPB) to the Technical University of Darmstadt in Germany. The only service provided is e-mail for a group of people from IPB.

A connection to EARN is planned by July 1992. It will be connected to the University of Linz, Austria. Although there are still problems with obtaining export licenses for both this node and TCP/IP routers, it is planned that the services available will be those currently offered by EARN.

The first users connected to this EARN node will be the Research Institute for Informatics in Bucharest (ICI), which is also hosting the node; the Research Institute for Atomic Physics (IFA); and IPB. There is a Romanian EARN Board.

To obtain a country-wide academic network in Romania, a TCP/IP backbone network is planned. The project is supported by the National Commission of Informatics (CNI), which is an interministerial governmental body whose main role is to propose to the Government strategies and policies for information in Romania.

For more information about networking in Romania, contact:

Florin Paunescu
Commission Nationale d'Iformatique
Piata VICTORIEI Nr.1
71 201 Bucarest, ROUMANIE
Tel.: +19 400 12 12 18
Fax.: +19 400 12 12 19
e-mail: florin@imag.fr

6.8. Ukraine

SRI thanks Igor Sviridov for this information about networking in Ukraine.

Most hosts in the Ukraine today started as part of the Relcom network, which was created in the USSR in 1990. Services offered there today include mail feeds, access to news via a news-to-mail server, and news feeds.

These hosts are usually 386 PCs connected via dialup lines and UUCP. They provide users with access to e-mail (which is routed outside Relcom through Moscow, then to the host fuug.fi in Finland), as well as to Usenet news and Relcom news. There is also quite a young ukr.* news hierarchy. Users usually are equipped with DOS PC's, 2400 baud modems and UUCP flavors. There are more than 300 nodes in Ukraine and more than 10 hosts providing news feeds. There are also some direct UUCP connections to West, though for now the Relcom link from Moscow to Finland is the most reliable.

A networking issue in the Ukraine is the registration of the UA domain. Currently, UA is resolved only within Relcom, so traffic from outside Relcom must be routed through the host ussr.eu.net. For example, a user's address would be in the form:

```
user%domain.subdomain.ua@ussr.eu.net
```

Soon the administration of the UA domain will move from Moscow to a site in the Ukraine, although which organization will be assuming the responsibility is still unclear.

The Ukraine Unix Users Group (UUUG) was recently formed, and is now officially registered both in Ukraine and EuNet.

For more information about networking in the Ukraine, contact:

Igor Sviridov
App. 72, Prospekt 40 liet Oktyabrya, 108/2, 252127
Kiev, Ukraine
postmaster%cs.kiev.ua@ussr.eu.net
+7 044 2638770

6.9. Baltic Countries

BALTBONE

SRI thanks Ants Work for this information about networking in the Baltic countries.

The BALTBONE project is a joint project of Estonia, Latvia, and Lithuania to build a 64 Kbps TCP/IP network backbone as soon as possible between Tartu, Tallinn, Riga, Vilnius, and Kaunas, and to link the backbone to NORDUnet and the rest of the world via the current Tallinn to Helsinki connection. Cisco Systems AGS routers will be used as soon as export licenses have bee acquired.

A digital microwave link of 34 Mbps between Tallinn and Helsinki is in operation, and one 64 Kbps channel has been leased for the BALTBONE connection. As of May, 1992, the Point-to-Point Protocol (PPP) runs on SUN 3/80. The 64K channel from Tallinn to Tartu is ready, and was built on 12-group analog voice channels. The digital 64K link from Vilnius to Kaunas is in operation (temporarily on X.25). The next difficult problem is to make the Vilnius-Riga-Tallinn connection.

Research and Education Networks in Estonia, Latvia and Lithuania are called respectively ESTNET, LATNET and LITNET, and they will use BALTBONE for international connectivity.

For more information about the BALTBONE project, contact:

Ants Work
Deputy Director
Institute of Cybernetics
Estonian Academy of Sciences
Akadeemie tee 21
EE 0108 Tallinn
ESTONIA
ants@ioc.ee
+007 0142 525622
FAX: +007 0142 527901

6.10. Russia

Relcom

SRI thanks Dimitry (Dima) Volodin for this information about Relcom.

Demos provides UUCP access to the RELCOM network. The standard services are e-mail, Usenet and RELCOM news, archive service. Demos connects to the Internet via dial-up IP link to Alternet (UUNET). The immediate plans are to start interactive (BBS and "public access Unix") dial-up services, UUCP and interactive services via X.25, dial-up IP and IP-over-X.25 services, fax-telex-e-mail gateways, fax box service. We plan to switch to a full-time leased line link to Alternet to make the access to the Internet faster and easier for our customers.

Demos provides e-mail access not only to the RELCOM network, but to the Internet as a whole. TCP/IP access to Internet (Alternet-CIX-etc.) for users is planned for the near future.

For more information about Relcom or Demos, contact:

Demos
6 Ovchinnikovskaya nab.
113035 Moscow
Russia
postmaster@hq.demos.su
info@hq.demos.su
+7 095 231 2129
+7 095 231 6395
FAX: +7 095 233 5016

6.11. Former Yugoslavia

SRI thanks Borka Jerman-Blazic for this information regarding networking in what was formerly Yugoslavia.

Yugoslav Academic and Research Network (YUNAC)

The Yugoslav Academic and Research Network (YUNAC) was formed in 1990. After the political events in Yugoslavia in 1991, YUNAC reorganized itself as an international organization following the example of NORDUNET. YUNAC is an international member of RARE. New countries appeared on the territory of former Yugoslavia and new networking organizations formed within those countries.

In general all these networks provide a similar choice of services and are using the international IXI line that was granted to YUNAC Services include:

- Electronic mail (DECnet and X.400)
- Computer conferencing
- Remote login
- Connection via gateways (IXIgate of DFN) to the international

networks EARN/BITNET, EUNET/USENET, and Internet.

Slovenia

The academic and research network of Slovenia is called ARNES. The infrastructure of ARNES is the following: PPSDN in the country, some leased lines, and one international 64 Kb line (the line granted to YUNAC) to IXI. ARNES is organized as a public institution and is governed by the body appointed by the Ministery of Science and Technology of Slovenia. ARNES is a member of RARE. The backbone of the Yugoslav part of EUnet is located in Slovenia. They use mainly UUCP protocol. Recently some new networks based on the TCP/IP suite became operational and provide international connectivity. They are members of RIPE.

Croatia

The academic and research network of Croatia is called CARNET. The infrastructure used by CARNET is similar to that used by ARNES; i.e using a PPSDN with DECnet on top of it. CARNET is the YUNAC line to IXI for international traffic. CARNET is also a member of RARE.

Bosnia and Herzegovina

At the time of this writing, there is no networking activity in this part of former Yugoslavia.

Serbia and Montenegro

Serbia was connected with a leased line to Linz, and the University of Belgrad was a member of EARN. After the sanctions adopted by U.N., this connection was cut off. Serbia can be reached by international public packet switched networks. The part of PPSDN - JUPAK is still operational, as is the DECnet network within the country.

Macedonia

The part of the PPSDN in this former republic of Yugoslavia is also operational. The e-mail service is provided through the University of Ljubljana node and DECnet network. The academic and research networking organization is called MARNET. MARNET is currently seeking for direct connection to Internet and EARN.

For further general information about YUNAC and networking in these countries, contact:

Borka Jerman-Blazic
IJS E-5NET
Jamova 39
61000 Ljubljana
SLOVENIA
+38 61 159 199
FAX: +38 61 161 029
jerman-blazic@ijs.si

E-mail addresses for points of contact for other networks mentioned in this section are:

ARNES: marco.bonac@ijs.si
EUnet: leon@ninurta.fer.yu
CARNET: p.pale@uni-zg.ac.mail.yu
MARNET: pmfmarj%nubsk@uni-lj.yu
EARN in Serbia: xpmfdo1@yubgss21.bitnet

6.12. France

EARN-France

EARN-France is the French portion of EARN/BITNET.

For more information about EARN-France, contact:

Dominique Dumas
EARN-France
950 rue de Saint Priest
34184 Montpellier Cedex 4
France
BRUCH@FRMOP11.BITNET
or
BRUCH%FRMOP11.BITNET@pucc.Princeton.EDU
+33 67 14 14 14
FAX: +33 67 52 57 63

Fnet

SRI thanks Annie Renard for this information about Fnet.

Fnet is the French part of EUnet, and INRIA (located near Versailles) is the organization that manages the Fnet backbone.

EUnet-FR is open to members of AFUU (French Unix users group), which is affiliated with EurOpen. One also needs to subscribe to the Fnet association to benefit from its services.

Fnet supports usage of TCP/IP over Transpac, leased lines, and telephone, with ISDN support coming soon. A service called InterEUnet (Internet for EUnet subscribers) is also provided, which allow these subscribers to get access to all authorized parts of the European and US Internet. ("Authorized" meaning that the NSFNET might be inaccessible to a commercial company, but a US commercial network could well be accessible to that site.) In addition, dialup IP access over a telephone ("DIP") is available on a pay per use basis.

Incoming calls to Fnet are supported at 1200 (V.22) (although this usage is discouraged now), 2400 (V.22-bis), 9600 (V.32), 14400 (V.32-bis) and other multiprotocol modems.

In addition, X.25 access is supported over PSDN public network Transpac, and ISDN access is supported over ECMA 102 adaptors (which makes those adaptors look like 19200 full-duplex asynchronous modems).

For more information about Fnet, contact:

Sylvain Langlois
FNET Association
11 rue Carnot
94270 Le Kemlin-Bicetre
FRANCE
contact@fnet.fr
+33 1 45 21 02 04
FAX: +33 1 46 58 94 20

6.13. Spain

RedIRIS

SRI thanks the Secretaria RedIRIS for this information about the RedIRIS network.

Since 1991, Higher Education and Research funding bodies in Spain have sponsored RedIRIS as the National Research and Academic Network organization. RedIRIS provides services for universities and research centers in Spain. The network is managed by Fundesco, a non-profit organization dealing with Information Technology and Telecommunication activities.

The number of RedIRIS user organizations has grown to 108, most of them belonging to the Higher Education and Public Research sectors. RedIRIS is the National Member representing Spain in the RARE Association, and participates in the COSINE Project.

RedIRIS services are supported on a private 64 Kbps X.25 backbone called ARTIX, which links the main Research and Development sites, and connection to the PPSDN is also provided. An IP network service is tunneled over the common backbone as well. In a similar way a CLNS (ISO IP) service is provided, currently for experimental purposes. The ARTIX backbone expanded in the first half of 1992 to 9 regional nodes. Presently 50 RedIRIS member organizations (all mainly universities and research institutes in Spain) hold at least one access link to ARTIX. For 1993 plans are to upgrade the ARTIX infrastructure to 2 Mbps.

International communications are established through the COSINE IXI network for X.25 traffic and through EBONE for IP and CLNS services. Present international bandwitdh is 2 x 64 Kbps. A new 64 Kbps digital link Madrid-Amsterdam was added in May as part of the EBONE infrastructure to supplement the former IXI (X.25) access point which was used for some time to carry all traffic types. Now the IXI line is used for X.25-based traffic (X.400, XXX, DECNET) whereas the EBONE tail link is kept for IP and CLNS traffic.

In June 1992, 40 RedIRIS member organizations reached full IP connectivity. Within the RedIRIS Autonomous System, there are now 57 IP connected networks (18 class B, 39 class C). More networks are in the process of getting IP connectivity.

Several user support and information services are now being implemented to provide users with available information and adequate tools. A principal aim is to help local managers at RedIRIS organizations run their own network services at each specific site. Anonymous ftp and an X.500 Directory are ready available for that purpose. Other user-friendly interfaces such as WAIS and Gopher are under consideration.

For more information about RedIRIS, contact:

Secretaria RedIRIS
RedIRIS
Fundesco
Alcala 61
28014 Madrid
+34 1 435 1214
FAX: +34 1 578 1773
secretaria@rediris.es
C=es;ADMD=mensatex;PRMD=iris;O=rediris;S=secretaria;

6.14. Germany

DFN

SRI thanks Martin Wilhelm for this information about the services provided by DFN.

The DFN (Deutsches Forschungsnetz) association provides a broad variety of communication services to its members and other interested parties. Consultancy services, manuals, and special software are provided to support the use of communication services. The association further supports projects for the development of data communication and encourages experiments with new applications. Special emphasis is put on the development of services at higher speeds (> 2 Mbps).

Communication within DFN is realized through a packet switched X.25 network using powerful and advanced technologies to provide access speeds of currently up to 2 Mbps. As of September 1992, WIN comprises 184 access points with 9.6 kbps, 164 access points with 64 kbps, and 17 access points with 2 Mbps.

International connectivity is established by connections to European backbone infrastructures and a high bandwidth connection to the US internets.

Provision of additional value added services is another major concern of DFN. Gateway and relay services for electronic mail exchange between X.400, SMTP, and BSMTP are provided. Currently, approximately half a million messages are handled monthly. Via the services of DFN, all the German universities, research institutes, Max-Planck-Society, Fraunhofer Society, database providers, libraries, and several research oriented departments of industry can be reached.

For additional information about the DFN Association, contact:

DFN-Verein e. V.
Geschaeftsstelle
Pariser Strasse 44

D - 1000 Berlin 15
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6.15. Japan

The Widely Integrated Distributed Environment (WIDE) project was initiated in July 1987 by a group of researchers led by Professor Jun Murai, of Keio University. The project was designed to provide a testbed for the development of large-scale distributed systems technologies, and was initially constructed by interconnecting several campus networks. The WIDE Internet has since provided a basis for Japanese computer science researchers to gain practical experience in advanced networking. The WIDE project operates as a non-government network with funding support from about 25 private companies.

The WIDE project sponsors a consortium to study various computer issues including protocols, operating systems, computer security, ISDN technologies, home computing, mobile computing, satellite data communications, distributed applications and internationalization of computer software. Their research results are annually published by the project and the resulting software is also distributed.

The WIDE Internet is composed of a variety of links, including voice grade leased lines, 64K kbps and 192 kbps digital leased lines, and ISDN. Currently, 52 user organizations, including universities and private companies are connected to six operation centers through 64 kbps to 192 kbps leased lines. The backbone also passes traffic of other research networks, such as JUNET (Japan University Network), which is now JAIN (Japan Academic Inter-university Network), and which does not have long-haul nationwide connectivity. The WIDE project has been providing connectivity to other networks, such as the University of Tokyo International Science Network (TISN), NACSIS Science Information Network (SINET), and BITNET-JAPAN. The WIDE Internet supports TCP/IP as its basic protocol suite.

WIDE operates in conjunction with the Pacific Communications Network (PACCOM) project to provide international links for Japanese researchers using 192 kbps under-sea cable via the University of Hawaii to NASA Ames in Mountain View, CA.

WIDE Project contact:

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6.16. Taiwan

TANet

SRI thanks Lui Zi-Di for this information about TANet.

TANet, The Taiwan Academic Network, is a pilot project undertaken by the Ministry of Education and Universities Computer Center to establish a common national academic network infrastructure.

To support research and academic institutions in Taiwan, TANet will provide access to unique resources and opportunities for collaborative work. TANet will be composed of most of the Taiwan Internet community, including industry networks such as SEEDNet (Software Engineering Environment Development Network).

The management structure of TANet is a two-layer hierarchy. The TANet network service center (TANSC) is to be responsible for the national backbone network and management of international links. Within each regional area, a regional network service center (RNSC) will provide necessary services and support connections to the TANet backbone from the local-area network/campus network of each university/institution. At present, TANSC is run by the Ministry of Education computer center, and each RNSC is run by a major local university.

The network protocols will initially focus on TCP/IP on the TANet backbone. Regional networks may support multiple protocols and additional facilities (including X.25 transport or dial-up services) on a local basis in accordance with regional requirements. Support for OSI (CLNS) routing will be introduced in the near future. Existing Taiwan BITNET and ifNET (information NETwork) applications (including electronic mail delivery, NetNEWS, and file transfer) will be supported over TANet via IP connections.

A 256 kbps link will be installed from the Ministry of Education Computer Center to Princeton University in the end of 1992. This link will couple TANet to both JvNCnet and NSFNET.

For more information about TANet, contact:

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6.17. Israel

ILAN, or Israeli Academic Network, is a network owned and operated by Machba - the Israeli Interuniversity Computer Center. ILAN was formed in November 1988 as an outgrowth of the BITNET network that existed in Israel. The initial network, established in 1984, grants Internet connectivity to institutes of higher education, cultural and academic organizations, as well as organizations involved in Research and Development.

There are two international links to sites outside of Israel. One starts at the Weizmann Institute of Science and ends in the United States within

the NSF regional network called NYSERnet. The physical connection terminates in New York City. This link is a 64 kbps satellite link. The second connection is from Tel-Aviv University to CERN in Geneva, Switzerland. This is also a 64 kbps link via an undersea fiber-optic cable called EMOS. The fiber-optic link is faster for Telnet connections since it does not suffer from satellite delays. Both these links are paid for and owned by Machba.

The ILAN network currently handles routing for IP, DECnet, and Appletalk between various universities.

For additional information about ILAN contact:

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6.18. Italy

GARR

Our thanks to Antonio Blasco Bonito of CNUCE for the following information.

In Italy, The Ministry of University and Scientific Research supports and finances the GARR network. GARR is the acronym for "Group for the Harmonization of Research Networks" (Gruppo Armonizzazione delle Reti per la Ricerca). The aim of GARR is to interconnect the Italian research and academic networks and coordinate intercountry connections. GARR is currently composed of CNR (CNRnet), ENEA (ENET), INFN (INFNet), CILEA, CINECA, CSATA, and government research organizations. GARR is publicly financed and only allows research institutions to connect to it. IUnet in Italy (described below) is a non-profit institution and is open to the general public.

GARR provides the following facilities: electronic mail, file transfer, remote login, database access, remote job entry, remote terminal access, and USENET news.

All computers on GARR use Internet-style domain addresses for electronic mail.

Recognized vehicles of mail traffic are IP/SMTP and X.400. The electronic-mail GARR task force (named GARR-PE) has adopted the policy of having every Italian domain registered through the DNS to be directly reachable through the Internet or indirectly through an SMTP/other protocol mail gateway. Another mail path is through the COSINE X.400 WEPS.

GARR has recently decided to organize a Network Information Service (NIS) which will act as the Italian Registration authority for IP addresses and Internet domains under IT. The GARR NIS will also provide support for managers of "GARR-regional" networks. The GARR NIS will be in direct

contact with the other major network information services, such as the InterNIC, and RIPE-NCC. The GARR-NIS, located in Pisa, will run the IT top-level domain name server and the c=IT X.500 DSA.

The backbone of the GARR network provides four TDM channels over 2 mbps lines, carrying IP, DECnet, SNA and X.25 (IXI). There are seven primary sites on the network backbone: they are located in Milano, Pisa, Bologna, Roma, Frascati, and Bari. Sites on GARR employ a combination of protocols, including TCP/IP, X.25, SNA, DECnet, UUCP, and others.

The backbone, built up by the original seven primary sites, is gradually being extended as funds are made available. Many new sites are in the process of being added on the backbone. Other sites will be connected as secondaries attached to the primary sites at their own expenses.

GARR is composed by the interconnection of member networks, and is well connected to IUnet, the Italian part of EUnet/InterEUnet. GARR will also maintain connections to the major international research networks, including RIPE/EASInet/Internet, EARN/BITNET, EUnet/UUnet, HEPnet, and others.

For additional information about GARR contact:

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IUnet

The Italian UNIX Systems User Group (I2U), a non-profit association of hardware manufacturers, software houses, universities and research centers that share an interest for the diffusion of the UNIX operating system (as well as open systems), began in 1986 as a UUCP network. Totally reorganized in 1988, this network, subsequently named IUnet, has grown to become an important reality in the Italian networking landscape.

IUnet is the Italian segment of EUnet and today connects more than 80 sites in the Italian R&D community (both academic and industrial/commercial). While the IUnet NIC is hosted at the Computer Science Department of the University of Genoa (one of the founders of the I2U), IUnet receives no kind of government funding. All costs for the operation and improvement of the network infrastructure are covered by the user's fees.

IUnet is gradually evolving to become a TCP/IP network (about 30% of its sites have switched to the InterEUnet service, that is, have full access to the whole "European Internet"). EUnet is a participant to the CIX initiative. There are no limitations to the type of traffic that crosses IUnet, EUnet or any other of the CIX networks. For this reason, unlike GARR, IUnet is ready to connect commercial/industrial enterprises, thus making possible a vital information exchange between academic research institutions and industry. IUnet members can also qualify for NSFNET access, provided they meet the requirements of the NSFNET Acceptable Use Policy.

TCP/IP access to IUnet is possible via leased lines, public X.25 and dial-up, both SLIP and PPP (Points of Presence in Genoa, Milan, Turin, Rome - activation of the Bologna POP in 1993). International connectivity is via a leased line to INRIA in Sophia Antipolis, France. European and U.S. access is via the EUnet infrastructure.

IUnet offers UUCP mail, news, and archives via dialup and public X.25; offers access to the Internet via dialup, public X.25, and leased lines; offers a mailbox service, and database access to UNIX software and an electronic newsletter. IUnet plans to offer MHS X.400 services in 1993. The network operates the anonymous FTP archive host ftp.iunet.it.

For additional information about IUnet contact:

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6.19. The Netherlands

SURFnet

Our thanks to Peter Kokosky Deforchaux for the following information.

SURFnet bv is the Dutch national organization for the provision of information and communication services for research and higher education including industrial research. It is a private not-for-profit company. The owners are the SURF Foundation (51%), representing the user community, and the Dutch PTT (49%).

The main services of SURFnet are:

- Megabit multi-protocol backbone services (IP and X.25) with IP rates up to 1.5 Mbps; CLNS will follow in 1992;
- E-Mail, file transfer and remote access, both TCP/IP and OSI, including gateway services;
- Open Library Network in cooperation with the national organization for library automation Pica;
- File services and a variety of other information services e.g. NEWS (in cooperation with NLnet, the Dutch part of EUnet). In The Netherlands, SURFnet is responsible for EARN/NJE and HEPnet services.

The SURFnet services are managed in a one-stop shopping approach where total administrative and technical (e.g. help-desk), support is provided by SURFnet personnel. Operational management tasks are subcontracted with SURFnet retaining the overall service provision responsibility vis a vis

its customers.

The 1991 turnover was 7 M$. The 120 connected institutions and companies pay 5.5 M$ for operational services via volume independent tariffs. The remaining 1.5 M$ are related to forthcoming innovative services (i.e. pilots, development projects) and are financed by the government funded SURF Foundation.

SURFnet's activities are restricted to universities, colleges, research institutions including industrial research, scientific and public libraries and academic hospitals.

SURFnet is strongly focussed on international cooperation, both in operational and in innovative activities. International connectivity is presently achieved via the EBONE initiative and via IXI. SURFnet's employees are active in several international bodies and programs (i.e. RARE, Internet, COSINE).

Current development activities include:

- The development of an Open Library Network based on the VTP protocol;
- The connection of student work places at home via the TV cable infrastructure;
- Enhancement of the Megabit multi-protocol backbone in terms of topology (resiliency), introduction CLNS, introduction 34 Mbps trunks, upgrade of international connectivity, investigation of protocols like Frame Relay, DQDB and ATM and integration of network management;
- Extension of the pilot X.500 directory service with full scale data management tests and interworking tests;
- Set up of an X.400 1988 extension of the present X.400 1984 infrastructure including interworking tests of new products;
- Set up of a file service based on FTAM and FTP with interworking tests of new products;
- Introduction of security procedures and facilities including the set up of a CERT NL (Computer Emergency Response Team);
- The set up of a pilot Full Image Document Delivery Server in cooperation with scientific libraries and publishers (under preparation).

For more information about SURFnet, contact:

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6.20. Switzerland

SWITCH

SWITCH is the Swiss Academic and Research Network. We thank Thomas Lenggenhager for the information contained in this section.

SWITCH is a foundation, sponsored by the Swiss government and Swiss universities, that provides teleinformatics services to all Swiss universities, technical high schools, and various research institutes by connecting to national and international resources. SWITCH started operation in October 1988.

SWITCHlan is a national backbone network which connects all universities using leased lines with speeds between 128 kbit/s and 2 Mbit/s. Most other organizations are connected via 64 kbit/s. For routing on these national leased lines SWITCH uses cisco routers. The protocols supported are DECnet, TCP/IP, X.25, and ISO CLNS.

The resources connected to SWITCHlan are documented in the SWITCH Resource Guide, a collection similar to the Internet Resource Guide. It is accessible via anonymous FTP on nic.switch.ch [130.59.1.40] in /info_service/SWITCH-resource-guide. The Swiss supercomputer sites and several library catalogs are connected to SWITCHlan.

International connections on the network level went into operation in January 1990. The current state today is:

- Two lines with TCP/IP to CERN each 2 Mbit/s. This gives access to EBONE, the European part of the Internet and via the EASIgate T1 link to the US access to the NSFNET.

- TCP/IP and ISO CLNS connection to Nice, France, with 64 kbit/s, which also acts as the backup route to the Internet/NSFNET.

- A TCP/IP 64 kbit/s line to BelWue, a regional research network in southern Germany.

A 64 kbit/s connection to the COSINE/EMPB private X.25 network has been running since the first quarter of 1990. This infrastructure is mainly used for TCP/IP over X.25 to RedIRIS, DFN and ACOnet. In addition, it is used for X.400 and X.500 traffic as well as for pilot ISO CLNP over X.25 with the European Academic and Research Community.

SWITCHmail is the national X.400 MHS network which connects the universities and research institutes to the ADMD of the Swiss PTT and through COSINE-MHS to research MHS networks in 31 countries. E-Mail gateways to EARN/BITNET, UUCP and Internet are offered by SWITCH too.

SWITCHinfo is an information service accessible either via anonymous FTP to nic.switch.ch [130.59.1.40] or interactively with Telnet to the same host with the login name info; no password required.

On behalf of RARE (Reseaux Associes pour la Recherche Europeenne, European Research Network Organization) SWITCH runs COSINE-MHS, an MHS coordination service spanning 33 research networks in 31 countries. SWITCH is an active partner in other COSINE pilot X.500 Directory Service project and the

COSINE Information Service project.

Any host on the network of a connected organization may access the network, as long the usage complies with the use policy of SWITCH. SWITCH networks can only be used for academic and research traffic.

SWITCH services include

- Mailbox accounts. Offering e-mail connectivity to the X.400, Internet, BITNET, and UUCP world. Dialup to the mailbox account is via modem or XXX (Pad).

- Direct X.400 MTA-MTA connection. This includes gateway services to the same community as for the mailboxes.

- Dialup UUCP.

- Usenet NEWS service.

- Leased line access to the Swiss IP network and the Internet for organizations cooperating with universities on research projects.

- Dialup SLIP access to the Internet has been available since summer 1992, ISDN access is planned for 1993.

- X.500 DSA/DUA access to the international X.500 pilot.

For additional information about the SWITCH network, contact:

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S=Postmaster

6.21. Greece

ARIADNE SRI thanks Yannis Corovesis for the following information.

The ARIADNE Network (ARIADNet) is open to all members of the Research Academic Community in Greece. It is also open to Industrial R&D companies. The ARIADNE Network Operations Center (NOC) is at the Demokritos Research Centre in Attiki.

Most Research Institutes and Universities are connected via a private backbone of more than 20 leased analog circuits (9.6 kbps). Athens (Attiki) is in the center of the network, with the peripheries stretching to Thrace, Macedonia, Ipeiros, Peloponnese, and the Aegean.

Recently, there has been demand for ARIADNE services by a wider community, beyond that currently covered by State and CEC financing, and a study is underway to devise a financial cost/charging scheme to cover operational costs. A study group has been formed to look into the problem of

networking coordination in the Research and Academic sector as the relevant Ministry is restricting funds severely. This exercise brings together pioneering sites in networking as well as newcomers planning to support regional NOCs. A forum of all user sites is to complement the above activity.

The outcome is expected to merge the Greek part of EARN (Crete) and ARIADNE producing a four NOC backbone (University of Crete, CTI at Patra, University of Thessaloniki, and Demokritos at Athens)

The International networks Internet (via ULCC/JANET), COSINE-MHS, IXI/EMPB, BITNET (University of Crete), EUnet (ITE) and the CERN DECnet (Demokritos) may be accessed from ARIADNE.

The ARIADNE Network currently offers the following services:

- Remote login via PAD or Telnet.
- E-Mail (RFC 822, X.400 and gateway RFC 987).
- File transfer via FTP and Kermit, and anonymous FTP to fetch RFCs, FYIs, and UNIX configuration files.
- Dial-up on 5 telephone lines for PC users (1200-9600 bps, MNP error correction), including provision of a mailbox. An order of another 10 lines has been placed with OTE (PTT).
- Pythia, an information server for browsing information on keywords about networks and related topics, currently at an embryonic stage. Also Dialdoc for PC users over dial-up for information and software exchange.
- A supercomputer, CONVEX, currently installed in Demokritos and made available to ARIADNE users for projects in physics, meteorology, environmental pollution, space, and defense.

Plans for the ARIADNE Network include:

- Immediate plans are the upgrade of International connectivity to 64K. Also a leased line running TCP/IP to CERN is being installed. This is to be an EBONE line.
- ARIADNE backbone is to receive 10 cisco Routers (currently being installed, 5 in pilot operation).
- Build an X.400 backbone (10 sites) in 1992-1993 (currently the MTAs of NRCPS, CTI, AUEB, TPCI, HEP are operational)
- Install 10 network servers over the backbone in 1993 (in order from HP)
- A supercomputer, CONVEX, is being installed in Demokritos at this moment and made available to ARIADNE users for projects in physics, meteorology, environmental pollution, space, and defense.
- Mass publish a Network Users Guide fully in Greek, with examples and explanations (certain parts produced using other net's experience)

For additional information about ARIADNE network, contact:

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6.22. Turkey

TUVAKA

SRI thanks Esra Delen for this information about the TUVAKA Network.

TUVAKA stands for "Turkish University and Research Organizations' Network." It was established in 1987 just before Turkey joined EARN. The network initially consisted of 4 nodes running the BSC protocol on 9.6K lines. Now the network consists of 34 nodes affiliated with 29 organizations. The network initially had a star topology with the node TREARN being the center and the main international exit to EARN/BITNET. Now the network mainly runs the SNA protocol over 14.4K lines and is planning to migrate to IP on 64K lines very soon. Also, now the network has begun to lose its star shape as alternate routes and backup links have developed.

The major node and the starting point of the network is at Ege University in Izmir. This node has the id TREARN in the NJE world, and ege.edu.tr in the IP world. It holds the major international link, a 14.4K SNA link. In a very short time this line will be upgraded to a 64K VMNET line. Another international exit from TUVAKA is the Middle East Technical University in Ankara, and this is an IP/X25 line to the Netherlands.

The host ege.edu.tr is the major governing node of the network. Almost all routing, addressing and other modifications are done from there. This node gives the other nodes a lot of technical assistance, and help in all issues. The network mainly consists of IBM VM nodes, and UNIX machines and DEC VAXes. Ege.edu.tr holds two IBM mainframes and two UNIX workstations, all of them are defined in the network as separate nodes.

The technical personnel on the TUVAKA backbone nodes give courses and assistance to the newly connected nodes both nationally and internationally. The network holds several servers and all of them are accessible by mail and via interactive messages. Most nodes in the network have dialup and packet switched access.

For more information about TUVAKA, contact the Network Country Coordinators:

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6.23. Mexico

SRI thanks Ing. Hugo E. Garcia Torres for providing the information about networking in Mexico.

MEXnet

The Mexican Academic network (MEXnet) is one of the participants of Mexico's national academic and research network, SIRACyT (Sistema Nacional de Redes para la Ciencia y la Tecnologia). MEXnet is a not-for-profit organization whose mission is to provide a way to facilitate communication for the faculty and student community of its members in order to promote the exchange of non-commercial information. MEXnet is a fully terrestrial network with links going from 9.6 kbps to 64kbps.The following institutions are MEXnet's members and are already connected and fully operational:

- ITESM System (Instituto Tecnologico y de Estudios Superiores de Monterrey) UDLA (Universidad de las Americas)
- Universidad de Guadalajara
- ITESO (Instituto Tecnologico y de Estudios Superiores de Occidente)
- Colegio de Postgraduados de Chapingo
- CIQA (Centro de Investigacion en Quimica Apliacada)
- CINVESTAV (Centro de Investigaciones Avanzadas)
- ITAM (Instituto Tecnologico Autonomo de Mexico)
- UAC (Universidad Autmnoma de Coahuila)
- IPN (Instituto Politecnico Nacional)
- UAM (Universidad Autmnoma Metropolitana)
- LANIA (Laboratorio Nacional de Informatica Avanzada)
- ITM (Instituto Tecnologico de Mexicali)
- Instituto de Ecologia de Xalapa
- UDEM (Universidad de Monterrey)

At this time the national system of state owned public universities are in the process of being incorporated into MEXnet or with any of the other networks that participate of SIRACyT.

MEXnet has several international connections. ITESM connects with a terrestrial 56kbps link to ANSnet at MCI's POP in Houston, Texas, and also to the University of Texas in San Antonio with three leased lines (3 X 9600 bps). ITM connects with a terrestrial 64kbps link to San Diego State University in San Diego, California.

Other participants of SIRACyT are:

- Red UNAM (Universidad Nacional Autonoma de Mexico) which has an international link to the National Center for Atmospheric Research (NCAR) in Boulder, Colorado, via a 64 kbps satellite connection.

- Red Cicese (Centro de Investigacion Cientifica y Educacion Superior) with an international link to the San Diego

Supercomputer Center in San Diego, California via a 64 kbps satellite connection.

- Red CETyS (Centro de Ensenanza Tecnica y Superior) has a terrestrial 56kbps link to San Diego State University in California.

Following is an overview of the ITESM Network, one of MEXnet's participants.

ITESM

ITESM, Instituto Tecnologico y de Estudios Superiores de Monterrey (Monterrey Technological Institute of Higher Education), is a network of 27 multicampus higher education institutions located in 22 different cities in Mexico. Telecommunications for the whole system are via satellite using 64 kbps full duplex channels for voice and data. The network is arranged using a star topology with the central hub located at the Mexico City campus.

The ITESM network has three international links.

ITESM users have been BITNET members since 1986 and Internet members since 1987. The ITESM network consists of approximately 4000 nodes, with approximately 60% PCs and Macs and 40% workstations, mainframes and minicomputers.

In the near future, ITESM plans to increase the capacity of the link to ANSnet in Texas to a T1, pending all necessary approvals. Also, the ITESM is working to have higher bandwith links to the most important campuses like the one that is already working between the Mexico City campus and the Monterrey campus (2 Mbps digital terrestrial link).

For further details about the ITESM network and MEXnet contact:

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6.24. Dominican Republic

REDID

SRI thanks Daniel Pimienta for this information about networking in the Dominican Republic.

The Dominican Republic has a UUCP node called REDID. The design is of a centralized UUCP based mailing system with access to Puerto Rico via a

national X.25 network and a 9600 bps leased line. Puerto Rico conveys messages between REDID and the Internet.

REDID (Red Dominicana de Intercambio para el Desarrollo or the Dominican Network for Exchanges Toward Development) is the name of a user group formed as the result of an "open, transparent, and participative process directly conducted by future end-users."

For more information about REDID, contact:

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6.25. Caribbean Basin

This Caribbean Basin survey is provided to us courtesy of Daniel Pimienta, who wrote it.

The Caribbean Basin has not been left apart of the ongoing network growth within the region. If the user population, except for Puerto Rico and Costa Rica, is still low, infrastructures are in place which lead us to expect further developments in the coming months.

For several years, Costa Rica has been a key BITNET location and, furthermore, hosts the central UUCP node of a pilot project named HURACAN. HURACAN offers access to various researchers belonging to different Central American countries via their interconnected national X.25 networks. This project is a result of a cooperative effort started by Canadian Agencies and completed by the UNDP.

Bitnet

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Puerto Rico is presenting, as a result of years of investments and technical follow-up, a state-of-the-art network linking all the campuses with each other and with the Internet by high speed lines. It allows

students to operate Telnet functions at fractions of seconds in several terminal areas spread over the country. CRACIN (Corporation for the National Academic Scientific and Research Network) can now concentrate on user support and make available some time to help its neighbors.

Puerto Rico is heading a sub-regional project, named CUNET for Caribbean Universities Network, which has put seeds virtually in all English speaking islands of the Caribbean. CUNET has a star design where UUCP nodes access, by switched connection, into the Puerto Rico network which gateways the traffic to the Internet. The number of users is reported to be steadily growing in various countries, such as Jamaica and Trinidad and Tobago. The project is sponsored by OAS, which pays for the experts to travel and for the dial-up connections to Puerto Rico.

CRACIN and CUNET
Roberto Loran
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Cuba is experiencing a spectacular growth of the network. The island has a traditionally strong science and technology sector, and is in a good position to present user applications and scientific databases. INFO93, a congress planned for May 93 in La Habana, will focus on networking.

Cuba Jesus Martinez
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Surprisingly, the French West Indies have remained outside of the area's growth in networking. There is a RIO (Orstom network) node, but a 1988 plan to have the University (UAG) join EARN-France has not yet been implemented. However, moves are underway to make it a playing actor in network related training.

University of Nicaragua is maintaining a UUCP node.

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FAX: +505 2 673709

Dominican Republic's REDID was born last May. Also, one of the 25 Dominican universities (PUCMM) is maintaining a PC station connected to the CUNET project, and has been planning a BITNET node for some time.

Haiti was targeted to be part of the REDID creation process. The political turmoils jeopardized the process. Other alternatives, such as training a group of researchers outside the countries, are currently under study to start an action. See also Section 6.24 for more information about networking in the Dominican Republic.

REDID

Daniel Pimienta
pimienta!daniel@redid.org.do
+11 809 689 4973

6.26. Argentina

ARNET

SRI thanks Jorge Marcelo Amodio for this information about ARNET.

ARNET, a TCP/IP network connected to the Internet, is the major science and research network of Argentina. It connects approximately three hundred sites, mainly universities and research organizations. ARNET provides electronic mail, USENET News, file server, and electronic mailing list services.

Like other cooperative networks, ARNET has no central planning or central authority. The current international link and the top-level AR domain are managed by the UNDP (United Nations Development Programme) at the Ministry of Foreign Affairs (MREC), together with the Secretariat of Science and Technology (SECYT). For the time being, the top-level subdomains are administered by the UNDP/MREC project.

ARNET is connected to the Internet through a satellite link to SURANet at the University of Maryland.

Most ARNET connections are over the public telephone network or the public packet-switching network, ARPAC, using the UUCP protocol in different environments. USENET news and most electronic mail traffic is brought to ARNET from uunet.uu.net via Internet.

There is a cooperation agreement between the UNDP/MREC project and the SECYT to distribute Internet services in the future. The first stage will be the installation of a couple of Unix boxes at major regional sites, interconnected through the PSN ARPAC and national satellite links using UUCP. The second stage will be the migration from UUCP to TCP/IP. There are under study different ways to distribute Internet services throughout the country, and to upgrade the international link to the Internet.

For more information about ARNET, contact:

UNDP Project ARG-90-012
Ministerio de Relaciones Exteriores y Culto
Reconquista 1088 1er. Piso - Informatica
(1003) Capital Federal
Buenos Aires, Argentina
Attention: Jorge Marcelo Amodio
pete@atina.ar
+541 315 4804
FAX: +541 315 4824

6.27. Bolivia

UnBol/Bolnet

SRI thanks Sam Lanfranco for this information about networking in Bolivia.

Bolivia has electronic mail access to the Internet via a network called called BolNet (in English) or UnBol (in Spanish). The network was originally established with the help of PeaceNet, a network administered by the Institute for Global Communications (IGC) (see section 4.2). IGC provides MX forwarding for the unbo.bo domain.

UnBol is located at the Department of Electronic Engineering of the Universidad Mayor de San Andres in La Paz.

For more information about UnBol, contact:

Prof. Clifford Paravicini
Facultad de Ingenieria Electronica
Univ. Mayor de San Andres
La Paz, Bolivia
clifford@unbol.bo

6.28. Nordic Countries

NORDUnet

NORDUnet is an international network connecting the Nordic countries. It is administered by NORDUNET (note capitalization), a networking program in the Nordic countries funded by the Nordic Council of Ministers. The participating organizations are the Nordic national networks in Norway (UNINETT), Denmark (DENet), Finland (FUNET), Iceland (SURIS), and Sweden (SUNET). The goals of NORDUnet are to provide harmonized network services to Nordic research and development users in cooperation with these national networks and to establish good inter-Nordic relations in networking.

Much of this information regarding NORDUnet was taken from the article Profile: NORDUnet, which appeared in the November 1990 issued of ConneXions: The Interoperability Report [29]. (See Section 12.5 for more information about this journal.)

The NORDUnet idea was born in September 1987 and the network was officially opened in October 1989.

NORDUnet activities focus on provision of services, meaning its goal is to extend the services and interconnectivity to new networks to the benefit of its users. NORDUnet is also planning for an introduction of OSI-based services through pilots and experiments. These include X.500 Directory pilots, the harmonization of e-mail addresses, and development of national e-mail gateways.

NORDUNET also takes an active part in the RARE work and supports the goals of COSINE (see Section 10.1.5).

The NORDUnet transport network is a wide area network based on MAC-level bridges and "network-level" routers. They form a logical Ethernet connection through leased lines provided by the Swedish Telecomm International (STI) and the Scandinavian Telecommunications Services AB (STS). NORDUnet provides, through its interconnections to the U.S. and

central Europe, access to the following networks: The Internet, BITNET/CREN, EUnet, EARN, HEPnet, SPAN and the COSINE/RARE IXI pilot service. The U.S. connection is between The Royal Technical Institute (KTH) in Stockholm, Sweden, and the John von Neumann National Supercomputer Center (JvNC) in Princeton, New Jersey. JvNCnet is an NSFNET mid-level network (see Section 4).

For those already connected to the Internet, NORDUnet provides a common resource via its "NIC" host nic.nordu.net. This host is the first European DNS root server machine and also contains a wealth of information available for anonymous FTP. Information concerning NSF, IETF, NETF (NORDUNET Engineering Task Force), statistics for NORDUnet, EEPG (European Engineering and Planning Group), and EBONE are some examples of information resident on this host.

For additional information about resources available on nic.nordu.net, send mail to hostmaster@nic.nordu.net.

Alternatively, you may use the following address for obtaining more information about the NORDUNET program:

NORDUNET
c/o SICS P.O. Box 1263
S-164 28 Kista
SWEDEN
+46 8 752 1563
FAX: +46 8 751 7230
NORDUNET@sics.se

6.29. Finland

DataNet

SRI thanks Seppo Noppari for this description of the DataNet Service offered by Telecom Finland.

DataNet is a network service for interconnecting LANs. It is mainly targeted for closed corporate networks. Telecom Finland has been running the network since 1990. At present there are several TCP/IP networks, for example SWIPnet and TIPnet in Sweden and PSInet, and Alternet and CERFnet in USA. DataNet network covers the whole country in Finland with its 21 POPs. Currently there are more than 300 CPEs of about 80 customers. The network is still growing fast. DataNet has also international connections through CIX and InfoLAN. DataNet service, like InfoLAN also, has one key feature that separates it from other commercial TCP/IP offerings. DataNet is an end-to-end managed complete network service with wide range of supported protocols.

Backbone technology

In the first phase DataNet network was based on a backbone of leased lines and cisco multiprotocol/multimedia routers. Now it includes also a Stratacom IPX based Frame Relay backbone. Customer LANs are connected with routers (= CPEs) to the nearest backbone routers or IPX Frame relay switches with serial lines. Charging is based on access line speed which varies from 19.2 kbit/s to 2 Mbit/s. Also FDDI connections are available

which means access speed up to 100 Mbit/s. Supported level 3 protocols are TCP/IP, DECnet, ISO CLNP, Novell IPX, AppleTalk and X.25. IBM connectivity is provided by source route bridging of Token Ring LANs and SDLC tunneling. Network management is SNMP based.

Service elements

DataNet is a complete service including customer network planning, implementation and management. The CPEs are usually owned and managed by Telecom Finland and the customer pays a flat rate of the service. For example a typical 64 kbit/s access to the network is $1800/month and this price includes the CPE, local loop, traffic, hardware DataNet is using a wide range of routers and other equipment from cisco.

AGS or AGS+ routers are used mainly in the backbone, but of course also our FDDI customers have AGS+ routers at their sites. Usually customers are connected with an IGS but also CGS and MGS boxes are used for special needs. MSM terminal servers are used for customers who need asynchronous or SLIP services. Per customer X.25 gateways are based on CPT's.

Supported Protocols

Supported protocols are TCP/IP, DECnet Phase IV, SRB, X.25, Novell IPX AppleTalk, ISO CLNP and bridging. AppleTalk, IPX, DECnet and bridging are nowadays implemented over the Frame Relay backbone. Routing protocol is IGRP and the following network interfaces are supported: Ethernet, TokenRing and FDDI. The BGP protocol is used between different AS networks.

International connections

DataNet is currently connected to CIX via a FrameRelay link from NordFrame network. This arrangement allows practically global commercial IP connectivity. Connections to European IP networks have been built via EBS - EBONE Boundary System, built with FrameRelay also. To those customers who want international and closed networks there is a gateway to the InfoLAN network.

For more information about DataNet contact:

Seppo Noppari
Telecom Finland
P.O. Box 228
Rautatienkatu 10
33101 Tampere
Finland
+358 31 243 2242
FAX: +358 31 243 2211
seppo.noppari@tele.fi

6.30. Sweden

TIPnet

SRI thanks Anders Halldin, TIPnet manager, for the following information.

TIPnet is Swedish Telecom's commercial public TCP/IP service. TIPnet is based on a cisco router backbone. TIPnet is a member of EBONE, and has Frame Relay-based connections to Alternet in the US, DataNet in Finland, and INFOnet's router in Stockholm. Access to TIPnet is either via leased lines from 9.6 kBit to 2 Mbit, or via X.25 at 9.6 kBit or 64 kBit.

The TIPnet customer support and Network Control Center services are situated in Gothenburg:

Hakan Hansson
+46 31 7708072
hakan@tipnet.se

Support and NCC:

NRE MUX, TIPnet
403 35 Gothenburg
Sweden
+46 31 7707470
FAX: +46 31 112800
nremux@tipnet.se

The TIPnet technical sales support organization is in Stockholm:

Kjell Simenstad
MegaCom AB
Kjell Simenstad
121 80 Johanneshov
Stockholm
Sweden
+46 8 780 5616
FAX: +46 8 686 0213

SUNET (The Swedish University Network)

SRI thanks Hans Wallberg for this information about SUNET.

SUNET is a network for Swedish universities. SUNET interconnects local and regional networks at all the Swedish universities. Via NORDUnet, SUNET provides international connections to the Internet. SUNET is also connected to the two commercial IP networks--SWIPnet and TIPnet--that operate in Sweden.

SUNET is based on cisco-routers and 2 Mbps lines. It supports TCP/IP and DECnet (plus NJE over IP and DECnet) and is ready to support ISO/IP. There were more than 19,000 IP hosts and 650 DECnet hosts connected to SUNET as of August 1992.

For more information about SUNET,contact:

Hans Wallberg
Hans.Wallberg@umdac.umu.se
or
Bjorn Eriksen
ber@sunet.se
SUNET

UMDAC
S-901 87 Umea
Sweden
+46 90 16 56 45
FAX: +46 90 16 67 62

6.31. Norway

UNINETT

SRI thanks Knut L. Vik for this information about UNINETT, some of which also appears in the Internet Resource Guide.

UNINETT is the Norwegian academic and research data network. Its purpose is to support research and education and collaborative work in and among academic and non-profit research organizations in Norway by providing access to computer networks and network resources. As the Norwegian branch of the Internet, EARN/BITNET, the European academic DECnet, and OSInet/IXI, UNINETT offers a variety of services connecting the Norwegian academic society to the rest of the academic world.

Electronic mail, file transfer, terminal access, directory services, USENET Network News and Gopher information service are among the services available on the UNINETT network.

By August 1992, about 103 academic and research organizations are connected to the UNINETT backbone, giving national and international connection to some 14,500 IP hosts, a few hundred DECnet hosts and X.400 MTAs, and 3 EARN/BITNET nodes.

UNINETT is a member of NORDUnet, which is a cooperative effort of the academic networks in all of the Nordic countries and is connected internationally through the NORDUnet network.

The UNINETT activity is funded by The Norwegian Ministry of Education, Research and Church Affairs; the day-to-day work is organized by a secretariat sited at SINTEF Delab, Trondheim.

UNINETT is a non-commercial network for academic and research traffic only. However, some (25) commercial (and governmental) organizations have gained access to the network, under restrictions that do not allow them to use the network for commercial purposes.

For more information about UNINETT, contact:

UNINETT secretariat
SINTEF Delab
N-7034 Trondheim
Norway
sekr@uninett.no
C=no;P=uninett;O=uninett;S=sekr
+47 7 592980
FAX: +47 7 532586

6.32. Denmark

DENet

SRI thanks Jan P. Sorensen for this information about DENet.

DENet was initiated at the beginning of 1988 with to connect the local networks at various education institutions in Denmark. DENet is almost a star shaped network with the center at the Danish Computing Centre for Research and Education (UNI-C) in Lyngby, which is located about 15 kilometers north of the center of Copenhagen on the campus of the Technical University. As of Spring 1992, DENet contains about 50 connections.

DECnet and LAT protocols are only supported on DENet institutions belonging to the Department of Education. All other institutions are required to use TCP/IP on DENet. This restriction is imposed to reduce the necessary resources for maintenance and development of DENet. Administrative applications are also required to use TCP/IP. The protocol requirement is only enforced on DENet, on the local ethernet segments all protocols may of course be used.

In addition to DENet UNI-C has operated an EARN/RSCS network since the beginning of 1985. Today the network is limited to IBM-compatible computers and contains four connections, two of which are based on VMNET, which enables an RSCS connection to run on top of TCP/IP.

The network is financed by the Danish Computer Board with grants from the Department of Education.

The connected institutions pay a fixed yearly rate, which is graduated according to the size of the institution, and differentiated by whether or not the institution belongs to the Department of Education.

Telnet, FTP, SMTP and domain name service are supported for all DENet users. All UNI-C mainframes support all the above services. In addition, the network supports DECnet and EARN services for some sites.

UNI-C operates mail gateways between SMTP, VMS MAIL, EARN, and X.400. Domain addresses are used throughout the network. For ease of use, the addresses are independent of the various network protocols. Hence, the users do not have to know which protocol is used on a particular computer.

Users without direct access to DENet may use dialup or X.25 connections to mainframes at UNI-C, which have full TCP/IP connections to DENet.

International network connections are based on a 256 kb/s NORDUnet line to Stockholm. This line supports TCP/IP, DECnet, and X.25 and has been in operation since the beginning of 1989. In addition, two international 9.6 kb/s lines are connected to Lyngby: an EARN/RSCS line to Russia, and a combined TCP/IP and EARN/RSCS line to Poland.

For more information about DENet, contact:

DENet, The Danish Network for Research and Education
Jan P. Sorensen

UNI-C, The Danish Computing Centre for Research and Education
Building 305, DTH
DK-2800 Lyngby
DENMARK
Jan.P.Sorensen@uni-c.dk
+45 45 93 83 55
FAX: +45 45 93 02 20

6.33. Finland

FUNET

SRI thanks Petri Ojala for this information about FUNET.

FUNET, the Finnish University and Research Network, is a project established in 1984 by the Ministry of Education. FUNET provides Internet connectivity to the academic and research community. The network is based on cisco multiprotocol routers, and is mostly based on public Frame Relay service. The supported protocols are TCP/IP, NJE, DECNET, and OSI CLNS. In two major cities, FUNET connectivity is provided with single modem fiber FDDI rings. FUNET operates various application level gateways and services, including the largest public archive server in the Internet on the host nic.funet.fi. FUNET uses the Nordic University and Research Network, NORDUnet, for international connectivity.

For more information about FUNET, contact:

FUNET
Finnish University and Research Network
Markus Sadeniemi
PO Box 40
SF-02101 Espoo
Finland
sadeniemi@funet.fi
+358 0 457 2711
FAX: +358 0 457 2302

6.34. Iceland

ISnet

SRI thanks Marius Olafsson for this information about ISnet.

ISnet is a collective term for the Icelandic segments of the EUnet and NORDUnet. The network is run by the Icelandic Association of Research Networks (SURIS). The network operation is contracted to the University of Iceland, Computing Services, where the network equipment is located. ISnet is open to anyone that signs the ISnet Acceptable Use document.

ISnet currently has approximately 50 nodes with more than 800 hosts connected. These nodes are connected via dial-up lines through UUCP; IP via leased lines; IP via dialup lines and IP via X.25 and Ethernet. Connection to NORDUnet and EUnet is via IP over 56 kbit leased satellite link to the NORDUnet hub in Stockholm using Cisco routers.

ISnet provides its members access to standard Internet services, including mail (SMTP), Usenet, file transfer (FTP), remote terminal (Telnet), access to publicly available software and information via FTP and mail based archive servers, access to library catalogues, general information systems and many others. ISnet also participates in the X.500 pilot project (PARADISE).

ISnet does not have a fixed rate schedule, but subscription fees are determined by the size of the organization wishing to join, the type of access, and the access speed.

For further information contact:

SURIS
co Marius Olafsson
Taeknigardi
Dunhaga 5
107 Reykjavik
ICELAND
+354 1 604747
isnet-info@isgate.is

6.35. Pacific Rim

PACCOM

In the Pacific, Australia, Japan, Korea, New Zealand, Hong Kong, and Hawaii have forged a Pacific Communications Network consortium called PACCOM. We thank Torben Nielsen for this information about PACCOM.

Begun in 1989, PACCOM was conceived as a means to develop a regional networking infrastructure in the Pacific Region. The Pacific Rim nations realized they needed Internet access. At the same time, awareness of the need for international network connectivity to serve science groups in the U.S. was also increasing. PACCOM is intended to meet the need for connectivity to scientific groups in the Pacific Region.

PACCOM consists of a variety of links, with bandwidths ranging from 64 kbps to T1. Links have been installed to Melbourne University in Australia, Keio University in Japan, the University of Tokyo in Japan, the University of Waikato in New Zealand, the Korea Advanced Institute for Science and Technology (KAIST) in Korea, and NASA Ames Research Center in the U.S.

The link to Australia connects to the Australian Academic and Research Network (AARNet) and the link to New Zealand connects to the New Zealand University Network (NZUNINET) at the University of Waikato. Two links to Japan have been established. One connects to the University of Tokyo International Science Network (TISN) at the University of Tokyo and the other to the Widely Integrated Distributed Environment (WIDE) at Keio University. Both links are in the Tokyo area, and they are all interconnected within Japan.

The link to NASA Ames Research Center connects to an interconnect network where the various agency networks meet, and it provides connectivity to the agency networks.

For more information about PACCOM contact:

Torben Nielsen
University of Hawaii
Department of ICS
2565 The Mall
Honolulu, HI 96822
U.S.A.
+1 808 949 6395
torben@foralie.ics.hawaii.edu

6.36. South Africa

UNINET-ZA: An Academic and Research Network in Southern Africa

The mission of the UNINET project is the development, implementation and promotion of an academic and research network of computers in southern Africa, where it is required as an essential element of the region's research infrastructure. We thank Vic Shaw for this information regarding networking in South Africa.

The UNINET project started late in 1987 as a result of joint action by the Computer and Network Subcommittees of the Committee of University Principals and the Foundation for Research Development (FRD). The project staff at the FRD gets collaborative support, both academic and technical, from staff of the participating organizations.

UNINET supports electronic mail, computer conferencing, file transfer, newsfeeds, and remote login. Access to overseas networks is now implemented via a TCP/IP link to the Internet.

The UNINET project provides a focal point for the many individual efforts that are being put into network development among the participating organizations, as well as for developing and managing a central information base for the operation of the network. It also operates an information and support service for organizations participating in UNINET, as well as for individual users of the network.

Participation in UNINET is on a voluntary basis and is open to research organizations, tertiary institutions and museums. Participation is formally effected by the organization entering into an agreement with the FRD, which covers matters such as costs and obligations of each party.

The project is financed partly by participating fees from participating organizations, partly from payment for the use of specific data communication channels, and partly from FRD funds.

The first point of approach for information on UNINET should be the computing services section of the interested person's organization.

Contact with the UNINET Office is possible by electronic mail for persons on the network; the UNINET office may also be reached by post, telephone, TELEX or FAX.

The FRD contact persons and address are:

Manager: Mr. Vic Shaw
Technical Assistants:
Mrs. Gwen Heathfield
Miss Annemarie Marais
UNINET Project
Foundation for Research Development
P.O. Box 2600
Pretoria 0001
SOUTH AFRICA
uninet@frd.ac.za
+27 12 841 3542
+27 12 841 2597
FAX: +27 12 804 2679
TELEX: 321312 SA

6.37. Ireland

HEANET

SRI thanks Peter Flynn for this information about HEANET.

HEANET is the Higher Education Authority Network. It is the Irish academic network, and connects all seven Universities via multiprotocol services (TCP/IP, OSI, DECnet). There is a gateway to EARN/BITNET at the University College Dublin, and a gateway to EUnet/UUCP at Trinity College Dublin, as well as connections to IXI and other international networks.

An experimental X.500 directory (Irish Elk) is accessible by Telnet to Paradise (128.86.8.56, login dua). There are moves towards a National Research Network (NRN) which will eventually incorporate other academic and research sites which are currently on EARN/BITNET or EUNET/UUCP nodes.

For more information about HEANET, contact:

John Hayden
Chairman, HEANET Management Committee
Higher Education Authority
Fitzwilliam Square, Dublin
Ireland
jhayden@vax1.tcd.ie
+353 1 761545
FAX: +353 1 610492

6.38. United Kingdom

UKnet

A parallel activity to the development of the JANET IP Service is the IP service offered by the UKnet Backbone. UKnet has been the UK backbone of the worldwide UUCP and USENET news services for more than 10 years. About half its customers are commercial sites. The first site was linked in early March 1991 and more sites were added throughout the rest of the year.

UKnet offers two IP services, firstly over 9.6 or 64 kbps leased lines and secondly over British Telecom "PSS Plus" closed user group X.25 service.

UKnet has worked closely with JANET for many years and this cooperation has continued with IP services. As a direct result of this cooperation, UKnet and JANET IP sites will be able to route datagrams to sites on each other's networks.

For more details regarding UKnet write to:

Uknet Support Group
Computing Laboratory
University of Kent
Canterbury
Kent CT2 7NF
UNITED KINGDOM

PIPEX

A new service called PIPEX has recently been established by Unipalm Ltd. in Cambridge, UK. PIPEX stands for Public IP Exchange, and is a commercial IP access provider for the United Kingdom. PIPEX has no "acceptable use" policy for its network limiting the types of traffic that can be sent. PIPEX is the first non-U.S. member of the Commercial Internet Exchange (CIX) (see 10.1.2 for more information about CIX). PIPEX offers both network connections and dialup IP services.

We thank Richard Nuttal for the information about PIPEX. PIPEX offers a range of connection strategies and prices.

There is an online PIPEX discussion list called pipex-info@pipex.net; to join, send a message to pipex-info-request@pipex.net. The list carries announcements of new services and news of changes to the network.

For more information about PIPEX:

PIPEX
Unipalm Ltd.
Area served: UK
Michael Howes (sales information)
Richard Nuttall (technical information)
+44 223 250120
pipex@pipex.net
FAX: +44 223 250121
Services: Network connections, dialup IP.

PC User Group CONNECT

SRI thanks Alan Jay for this information about CONNECT.

CONNECT is a multi-line Bulletin Board System (BBS) provider offering dial-up e-mail services. The main dial-in number is +44 0 81 863 6646. USENET News and electronic mail services, both for individuals and sites, are available, as is access to the Internet via Telnet, FTP, and other services such as Internet Relay Chat (IRC). The main node is based in the London area. There is an annual charge for the service, with discounts to members of the PC User Group. (Membership in the User Group is not required to use the service.) BBS services for third parties based on

CONNECT's host cluster are also provided. This service is affiliated with the IBM PC User Group (IBMPCUG) in England.

For more information about CONNECT, contact:

Alan Jay
or
Matther Farwell
The IBM PC User Group
PO Box 360,
Harrow HA1 4LQ
ENGLAND
info@ibmpcug.co.uk
+44 0 81 863 1191
FAX: +44 0 81 863 6095

JANET

SRI thanks Bob Day for this information about JANET.

JANET (the Joint Academic NETwork)is a network in the United Kingdom serving its academic community. It runs several different protocols, including the TCP/IP protocols used on the Internet. This latter service (called the JANET IP Service, or JIPS) has only recently been introduced and, although the majority of Universities connected to JANET have opted for TCP/IP access, not all of these have at the time of writing finished the work necessary to be able to offer the service. (See Section 6.38 for more information about JIPS.)

Historically, JANET services have been based on X.25 and a set of protocols specific to the UK academic community. Besides the introduction of services based on TCP/IP, there are now some ISO services becoming available. Because of the different protocols in use, JANET supports a number of gateway services so that users can interwork between the different protocols. The most widely used of these is the electronic mail gateway called nsfnet-relay.ac.uk. Many JANET sites use this to send mail to the Internet, and to receive mail from the Internet. With the advent of the TCP/IP service some sites now mail direct to Internet systems without the use of this gateway. However, Internet users do not need to worry about this because JANET operators make sure that the entries in the Domain Name System (DNS) for all systems on JANET with mail access are kept up to date, regardless of the protocols they use. Consequently, the correct action is taken automatically by Internet mailers to ensure delivery of a message.

File transfer and interactive login may be done directly to many sites on JANET, if the site has TCP/IP access. You can always check whether a site has such access by seeing if the name of the system concerned is known in the DNS. Note that users in the UK often quote the names of systems the opposite way round from those in the US. Thus, if you have been given a name starting with uk.ac -- e.g. uk.ac.janet.news -- you should type it as news.janet.ac.uk to FTP or to Telnet to it. If the site where the system is located has TCP/IP access, the name will be found in the DNS, and you will be able to make an FTP or Telnet connection.

Where direct interactive login with Telnet is not possible, a user on the Internet can make a Telnet connection to a gateway called sun.nsf.ac.uk. When connected, login with the standard username janet, no password. You

are then prompted to type the name of a JANET host, in UK format (i.e. the opposite way round from the US format, as explained above). The program suggests the JANET NEWS host, uk.ac.janet.news, as a starting point.

Where direct file transfer with FTP is not possible, there is a file-transfer gateway called ft-relay.ac.uk available. Currently this only offers a service be used from within JANET, but an extension to allow users on the Internet access is going to beta test at the time of this writing. This will allow a FTP call to be made to it, and files on JANET systems that do not have TCP/IP access will be able to be accessed in this way. In the meantime, there is also a guest FTP service available on sun.nsf.ac.uk, but this is very overloaded.

JANET hosts have information on network addresses, gateways to other networks, instructions for electronic mail, remote login, guides to mailing lists, document collections, and user groups, as well as bulletin boards for technical questions and employment opportunities, libraries, and education projects. There are also extensive files of news of computing-related activities, including minutes of meetings in all parts of the UK, as well as in Europe and the US.

For more information about JANET, contact:

Joint Academic Network
JANET Liaison Desk
c/o Rutherford Appleton Laboratory
Chilton
Didcot
Oxon
OX11 OQX
United Kingdom
+44 235 44 5517
janet-liaison-desk@jnt.ac.uk
O=GB; ADMD= ; PRMD=uk.ac; O=jnt; G=JANET-LIAISON-DESK;

The JANET IP Service (JIPS)

SRI thanks Dr. Bob Day for this information about the JANET IP Service (JIPS).

JIPS is an IP carrier service which runs over the X.25 service provided by JANET. The JIPS has run as an additional service over JANET since the beginning of November 1991.

The JIPS is available to all sites connected to JANET, although joining this additional service is optional. To date approximately 60 of the 150 or so sites connected to JANET have applied to join.

As a major IP network, the JIPS is connected to the rest of the global Internet. In the UK it is connected to UKNET, a public IP network run by GBnet Ltd and subscribed to mainly by commercial organizations, and it will be connected to PIPEX, a similar network recently established by Unipalm Ltd. The JIPS is also connected to many other European IP research networks through the auspices of RIPE Finally, it is connected to the NSFNET, and hence to the regional IP networks in the USA. Connectivity to the Far East is also gained through this route.

The JANET IP Service was introduced as one avenue to provide JANET users

with the services they need. An IP service will increase international connectivity because the predominant protocol set in the research community outside the UK is IP. Many computer manufacturers of interest to the research community are currently providing their highest level of support for IP protocols. Also, new application protocols often become available first over IP networks.

Within JANET, there is a large ongoing commitment to X.25. This de facto situation meant that there was a choice at the JIPS planning stage of whether to run IP over the X.25 infrastructure, or to use physical multiplexing of the raw bandwidth to provide separate channels for X.25 and IP, with each running alongside each other. It was decided to use the technique of encapsulating IP as data over a X.25 virtual circuit (often referred to as "IP tunneling"). The advantages of this were of cost savings, given the existing infrastructure, and of the ability to get effective dynamic bandwidth sharing, as all services running over the X.25 carrier service could then compete on the basis of demand.

The JIPS network is organized as a backbone of eight IP routers, with one connected to each major X.25 switch on the X.25 backbone. Thus the routers appear to be fully interconnected to each other, via the X.25 network.

Of the 60 or so sites that have currently applied to connect, approximately 40 are already connected. As a consequence, traffic through the backbone IP routers is now building up quickly. There is now of the order of 4 Gbytes traffic per day through the JIPS backbone routers. Although not all of this is switched onto the main JANET trunks, there is already a large component due to international connectivity. For example, the IP link to the NSFNET in the USA is now supporting over 1 Gbyte traffic per day.

The other notable trend is the growth of registrations in the Domain Name System (DNS), that is, the set of nameservers used in the IP community to perform name-to-address mapping and some mail routing. The number of registrations of end systems in the academic community part of the namespace (the ac.uk domain) is growing very quickly. It is also noticeable, however, that the commercial side of IP networking (the co.uk domain) is growing, albeit not at the same rate. This latter is no doubt a reflection of the growing interest in that community in connection to IP networks both to interwork with the academic research community, and to gain connectivity with other companies for more directly commercial purposes.

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6.39. U.S. Providers with International Connections

This section lists those providers based in the U.S. who provide access to the Internet internationally. When known, countries to which they currently have connections are listed. Some NSFNET mid-level networks are listed here because there is a node on the NSFNET backbone at their sites to which an international site is connected. For complete information regarding NSFNET's international connections, contact the InterNIC; send a message to info@internic.net.

Advanced Network and Services, Inc. (ANS) and ANS CO+RE
info@ans.net
(800) 456 8267
+1 313 663 2482
Area Served: U.S. and International
Current international connections: Germany, Mexico

CERFnet
California Education and Research Federation Network
help@cerf.net
800 876 2373
+1 619 455 3900
FAX: +1 619 455 3990
Area Served: California and International
Current international connections: Korea, Mexico, Brazil

Compuserve Information System
sam@csi.compuserve.com
+1 614 457 8650
800 848 8990
Area Served: U.S. and International
Current international connections: Switzerland, United Kingdom, Venezuela, Germany

Institute for Global Communications (IGC)
+1 415 442 0220
FAX: +1 415 546 1794
TELEX: 154205417
support@igc.apc.org
Area served: Worldwide
Services: Dialup e-mail; affiliated with PeaceNet, EcoNet, and ConflictNet; member of the Association for Progressive Communications (APC).
Current international connections: shares resources with APC members in Australia, Brazil, Canada, England, Germany, Nicaragua, Russia, Sweden, and Uruguay.

JvNCnet
John von Neumann Center Network
Sergio F. Heker
Allison Pihl
800 358 4437
+1 609 258 2400
market@jvnc.net
Area Served: U.S. and International
Current international connections: Singapore, Taiwan, Tokyo, Venezuela.

NorthWestNet
Northwestern States Network

Eric Hood
+1 206 562 3000
ehood@nwnet.net
Area Served: U.S. and International
Current international connections: Canada

NYSERnet
New York State Education and Research Network
Jim Luckett
+1 315 443 4120
info@nysernet.org
Area Served: New York State and International
Current international connections: Germany, Israel

Performance Systems International, Inc. (PSI)
+1 703 620 6651
800 827 7482
FAX: +1 703 620 4586
info@psi.com
Area Served: U.S. and International
Current international connections: PSI provides connections to an extensive list of countries depending upon the service requested.

Portal Communications, Inc.
+1 408 973 9111
cs@cup.portal.com
Services: Dialup e-mail. Area Served: San Francisco, CA area, and International
Current international connections: Portal is connected to the Public Data Networks (PDNs) of over 70 foreign countries.

SESQUINET
Texas Sesquicentennial Network
Farrell Gerbode
+1 713 527 4988
farrell@rice.edu
Area Served: Texas and International
Current international connections: Mexico

SURAnet
Southeastern Universities Research Association Network
Deborah J. Nunn
+1 301 982 4600
marketing@sura.net
Area Served: Southeastern U.S. (Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia)
Current international connections: Puerto Rico

UUNET Technologies, Inc.
800 488 6383
+1 703 204 8000
info@uunet.uu.net
Area Served: US and International
Services: Network connections, dialup e-mail.

In addition to the above providers, the following two providers concentrate

on offering international connections to the Internet.

Infolan George Abe
abe@infonet.com
+1 310 335 2600
FAX: +1 310 335 2876
Current international connections: Europe, Canada, Hong Kong, Japan, Singapore, and Australia.

Sprint NSFNET ICM
Sprint NSFNET International Connections Manager
Area Served: International
Robert Collet
+1 703 904 2230
rcollet@icm1.icp.net
Current international connections: EBONE (Europe), Japan, France, UK.