Internet Society Newsletter
Volume 1, Number 1
1 January 1992

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Editorial notes to ASCII version
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Editorial Outline not included
Graphs are generally depicted as numeric tables
Tables are generally reduced to lists
Ticklers are offset by long single dashed lines
Articles are offset by long double dashed lines
Paragraphs are separated by double carriage returns
Section captions have not been depicted
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1992 SEEMS TO HAVE ARRIVED EARLY THIS YEAR by Vinton G. Cerf
<vcerf@nri.reston.va.us>

1992 has been a major focus of attention in the European context for several years. Enormous effort has gone into crafting a new framework for cooperation among the Common Market countries. Significant changes must be made to achieve the objectives. In the East, comparably massive restructuring is underway as the old Soviet Union gives way to its still-fluid successor. In the Internet community, similarly powerful forces are at work, demanding radical re-thinking of some of the fundamentals of the Internet Architecture.

The system is growing exponentially by all reasonable metrics (traffic, number of networks, number of users, etc). Commercial services are springing up on a global basis, together with rapid adoption of the technology in the business sector. Penetration in the third-world is palpable and growing. How can we collectively come to appreciate and understand these global phenomena? Where can we find useful international perspectives from which to evaluate different architectural and design choices? How can we find out about available products and services through which the Internet system can be made accessible?

If you wonder what the 21st Century may be like, ask a member of the Internet community who already lives there!

At least one objective of this newsletter is to probe these questions and to provide, in one place, a diverse menu of views, opinions and facts from which to synthesize insight and understanding.

The formation of the Internet Society is, in some sense, simply a formal recognition that an Internet community already exists. The users of the Internet and its technology share a common experience on an international scale. This common thread transcends national boundaries and, perhaps, presages a time when common interests bind groups of people as strongly as geo-political commonality does today. If you wonder what the 21st Century may be like, ask a member of the Internet community who already lives there!

- Vint Cerf

==========
Publisher's Note by Anthony-Michael Rutkowski <amr@cernvax.cern.ch>

This first issue of the Internet Society Newsletter marks the beginning of a remarkable new era as the Internet scales-up exponentially around the globe - providing the fabric, the new architecture for management, collaboration and knowledge development. Truly exciting times!

What is this newsletter? How was it done? Why was it done this way? The answers to these questions are themselves fascinating. At negligible cost, in the span of a few weeks, an entirely virtual global publishing network involving nearly 150 corespondents has been assembled. Coordination, concept development, information transfer, editing were all accomplished through the Internet itself. Such a network in many respects equals the complexity of those of Reuters or Time magazine. The ability to do this with relative ease across the entire globe is itself a profound statement.

The newsletter was conceived as a means of exploring and reporting - on a very timely basis - what the Internet is and what the Internet Community is doing with it. A kind of "snapshot" of the Internet at regular short intervals.

Toward this end, after a few iterations of expanding discovery, a number of major sectors - facets of the Internet - were articulated and fleshed out with subjects and potential regular contributors. This was also a way to assure that the perspective of the newsletter would be genuinely global in scope - both geographically and professionally. The entire outline is found on the last page of the newsletter.

The ISOC Journal will emerge this year as the second major service for Internet Society members. Its focus will be more analytical and thorough - serving as an archival-quality means of describing, exploring, and evolving the Internet and its use.

Like the Internet and its applications, what you see will be constantly evolving - improving in content, organization and format. What you see is just the start. Ideas and contributions are appreciated. For an initial period, the newsletter will be issued quarterly. As the Internet Society continues to grow and flourish, the publishing frequency will no doubt increase.

I convey my sincere appreciation to the many people who helped make this endeavour possible - the individual contributing editors in more than 25 different countries, the other Newsletter Editorial Board Members, Vint Cerf, and especially the intrepid Joyce K. Reynolds. Between Reston, the Marina and Geneva this virtual partnership has made the newsletter a reality.

- amr

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005.01 INTERNATIONAL CONNECTIVITY by Larry Landweber <lhl@cs.wisc.edu>
Version 3 - 3 December 1991

INTERNATIONAL CONNECTIVITY
Version 3 - December 2, 1991

----	AF	Afghanistan (Republic of Afghanistan)
----	AL	Albania (Republic of Albania)

```
----  DZ  Algeria (People's Democratic Republic of Algeria)
----  AS  American Samoa
----  AD  Andorra (Principality of Andorra)
----  AO  Angola (People's Republic of Angola)
----  AI  Anguilla
----* AQ  Antarctica
----  AG  Antigua and Barbuda
BIUF  AR  Argentina (Argentine Republic)
----  AW  Aruba
-IUF  AU  Australia
BIUF  AT  Austria (Republic of Austria)
----  BS  Bahamas (Commonwealth of the Bahamas)
----  BH  Bahrain (State of Bahrain)
----  BD  Bangladesh (People's Republic of Bangladesh)
----  BB  Barbados
BIUF  BE  Belgium (Kingdom of Belgium)
----  BZ  Belize
----  BJ  Benin (Republic of Benin)
----  BM  Bermuda
----  BT  Bhutan (Kingdom of Bhutan)
--u-  BO  Bolivia (Republic of Bolivia)
---f  BW  Botswana (Republic of Botswana)
----  BV  Bouvet Island
BIUF  BR  Brazil (Federative Republic of Brazil)
----  BN  Brunei Darussalam
--UF  BG  Bulgaria (Republic of Bulgaria)
--u-  BF  Burkina Faso (formerly Upper Volta)
----  BI  Burundi (Republic of Burundi)
--uf  BY  Byelorussian SSR (Byelorussian Soviet Socialist Republic)
----* CM  Cameroon (Republic of Cameroon)
BIUF  CA  Canada
----  CV  Cape Verde (Republic of Cape Verde)
----  KY  Cayman Islands
----  CF  Central African Republic
----  TD  Chad (Republic of Chad)
----  IO  Chagos Islands (Indian Ocean)
BIUf  CL  Chile (Republic of Chile)
--u-  CN  China (People's Republic of China)
----  CX  Christmas Island (Indian Ocean)
----  CI  Cote d'Ivoire (Republic of Cote d'Ivoire)
----  CC  Cocos Keeling Islands)
b-u-  CO  Colombia (Republic of Colombia)
----  KM  Comoros (Islamic Federal Republic of the Comoros)
----* CG  Congo (People's Republic of the Congo)
----  CK  Cook Islands
b-u-  CR  Costa Rica (Republic of Costa Rica)
--u-  CU  Cuba (Republic of Cuba)
b-U-  CY  Cyprus (Republic of Cyprus)
BiUF  CS  Czechoslovakia (Czech and Slovak Federal Republic)
BIUF  DK  Denmark (Kingdom of Denmark)
----  DJ  Djibouti (Republic of Djibouti)
----  DM  Dominica (Commonwealth of Dominica)
--u-  DO  Dominican Republic
----  TP  East Timor
b-u-  EC  Ecuador (Republic of Ecuador)
b-u-  EG  Egypt (Arab Republic of Egypt)
----  SV  El Salvador (Republic of El Salvador)
----  GQ  Equatorial Guinea (Republic of Equatorial Guinea)
--UF  EW  Estonia
---f  ET  Ethiopia
----  FK  Falkland Islands (Malvinas)
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----  FO  Faroe Islands
--u-  FJ  Fiji (Republic of Fiji)
BIUF  FI  Finland (Republic of Finland)
BIUF  FR  France (French Republic)
--u-  GF  French Guiana (Department of Guiana)
----* PF  French Polynesia
----  TF  French Southern Territories
----  GA  Gabon (Gabonese Republic)
----  GM  Gambia (Republic of the Gambia)
BIUF  DE  Germany (Federal Republic of Germany)
----  GH  Ghana (Republic of Ghana)
----  GI  Gibraltar
BIUF  GR  Greece (Hellenic Republic)
---f  GL  Greenland
----  GD  Grenada
--u-  GP  Guadeloupe (French Department of Guadeloupe)
----  GU  Guam
--u-  GT  Guatemala (Republic of Guatemala)
----  GN  Guinea (Republic of Guinea)
----  GW  Guinea-Bissau (Republic of Guinea-Bissau)
----  GY  Guyana (Republic of Guyana)
----  HT  Haiti (Republic of Haiti)
----  HM  Heard and McDonald Islands
----  HN  Honduras (Republic of Honduras)
B--F  HK  Hong Kong (Hisiangkang, Xianggang)
biUF  HU  Hungary (Republic of Hungary)
-IUf  IS  Iceland (Republic of Iceland)
bIU-  IN  India (Republic of India)
--u-  ID  Indonesia (Republic of Indonesia)
----  IR  Iran (Islamic Republic of Iran)
----  IQ  Iraq (Republic of Iraq)
BIUF  IE  Ireland
BIuF  IL  Israel (State of Israel)
BIUF  IT  Italy (Italian Republic)
----  JM  Jamaica
BIUF  JP  Japan
----  JO  Jordan (Hashemite Kingdom of Jordan)
----  KH  Kampuchea, Democratic (formerly Cambodia)
----* KE  Kenya (Republic of Kenya)
----  KI  Kiribati (Republic of Kiribati)
----  KP  Korea, Democratic People's Republic of
BIUf  KR  Korea, Republic of Korea
b---  KW  Kuwait (State of Kuwait)
----  LA  Lao People's Democratic Republic
--UF  LV  Latvia
----  LB  Lebanon (Lebanese Republic)
----* LS  Lesotho (Kingdom of Lesotho)
----  LR  Liberia (Republic of Liberia)
----  LY  Libyan Arab Jamahiriya (Socialist Peoples's
          Libyan Arab Jamahiriya)
----  LI  Liechtenstein (Principality of Liechtenstein)
--uF  LT  Lithuania
b-uF  LU  Luxembourg (Grand Duchy of Luxembourg)
---F  MO  Macau (Ao-me'n)
----  MG  Madagascar (Democratic Republic of Madagascar)
----  MW  Malawi (Republic of Malawi)
b-uF  MY  Malaysia
----  MV  Maldives (Republic of Maldives)
--u-  ML  Mali (Republic of Mali)
----  MT  Malta (Republic of Malta)
----  MH  Marshall Islands (Republic of the Marshall Islands)
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--u-  MQ  Martinique (French Department of Martinique)
----  MR  Mauritania (Islamic Republic of Mauritania)
----  MU  Mauritius
BIuf  MX  Mexico (United Mexican States)
----  FM  Micronesia (Federated States of Micronesia)
----  MC  Monaco (Principality of Monaco)
----  MN  Mongolia (Mongolian People's Republic)
----  MS  Montserrat
----  MA  Morocco (Kingdom of Morocco)
----* MZ  Mozambique (Republic of Mozambique)
----  MM  Myanmar (Union of Myanmar)
--u-  NA  Namibia (Republic of Namibia)
----  NR  Nauru (Republic of Nauru)
----  NP  Nepal (Kingdom of Nepal)
BIUF  NL  Netherlands (Kingdom of the Netherlands)
----  AN  Netherlands Antilles
----  NT  Neutral Zone (between Saudi Arabia and Iraq)
--u-  NC  New Caledonia
-IuF  NZ  New Zealand
--u-  NI  Nicaragua (Republic of Nicaragua)
--u-  NE  Niger (Republic of the Niger)
----  NG  Nigeria (Federal Republic of Nigeria)
----  NU  Niue
----  NF  Norfolk Island
----  MP  Northern Mariana Islands (Commonwealth of the Northern
          Mariana Islands)
BIUF  NO  Norway (Kingdom of Norway)
----  OM  Oman (Sultanate of Oman)
----  PK  Pakistan (Islamic Republic of Pakistan)
----  PW  Palau (Republic of Palau)
----  PA  Panama (Republic of Panama)
--u-  PG  Papua New Guinea
--u-  PY  Paraguay (Republic of Paraguay)
x-u-  PE  Peru (Republic of Peru)
--uF  PH  Philippines (Republic of the Philippines)
----  PN  Pitcairn Island
biUF  PL  Poland (Republic of Poland)
bIUF  PT  Portugal (Portuguese Republic)
BIUF  PR  Puerto Rico
----  QA  Qatar (State of Qatar)
----* RE  Re'union (French Department of Re'union)
----* RO  Romania
----  RW  Rwanda (Rwandese Republic)
----  SH  Saint Helena
----  KN  Saint Kitts and Nevis
----  LC  Saint Lucia
----  PM  Saint Pierre and Miquelon (French Department of Saint
          Pierre and Miquelon)
----  VC  Saint Vincent and the Grenadines
----  SM  San Marino (Republic of San Marino)
----  ST  Sao Tome and Principe (Democratic Republic of Sao Tome
          and Principe)
B---  SA  Saudi Arabia (Kingdom of Saudi Arabia)
--u-  SN  Senegal (Republic of Senegal)
--u-  SC  Seychelles (Republic of Seychelles)
-- -  SL  Sierra Leone (Republic of Sierra Leone)
bIuF  SG  Singapore (Republic of Singapore)
----  SB  Solomon Islands
----  SO  Somalia (Somali Democratic Republic)
-IUF  ZA  South Africa (Republic of South Africa)
BIUF  ES  Spain (Kingdom of Spain)
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 --u-  LK  Sri Lanka (Democratic Socialist Republic of Sri Lanka)
 ----  SD  Sudan (Republic of the Sudan)
 ----  SR  Suriname (Republic of Suriname)
 ----  SJ  Svalbard and Jan Mayen Islands
 ----  SZ  Swaziland (Kingdom of Swaziland)
 BIUF  SE  Sweden (Kingdom of Sweden)
 BIUF  CH  Switzerland (Swiss Confederation)
 ----  SY  Syria (Syrian Arab Republic)
 B-uF  TW  Taiwan
 ----  TZ  Tanzania (United Republic of Tanzania)
 --uF  TH  Thailand (Kingdom of Thailand)
 --u-  TG  Togo (Togolese Republic)
 ----  TK  Tokelau
 ----  TO  Tonga (Kingdom of Tonga)
 ----  TT  Trinidad and Tobago (Republic of Trinidad and Tobago)
 bI--  TN  Tunisia
 B---  TR  Turkey (Republic of Turkey)
 ----  TC  Turks and Caicos Islands
 ----  TV  Tuvalu
 b-UF  SU  USSR (Union of Soviet Socialist Republics)
 ----  UG  Uganda (Republic of Uganda)
 --UF  UA  Ukrainian SSR (Ukrainian Soviet Socialist Republic)
 ----  AE  United Arab Emirates
 bIUF  GB  United Kingdom (United Kingdom of Great Britain and
           Northern Ireland)
 BIUF  US  United States (United States of America)
 ----  UM  United States Minor Outlying Islands
 x-uf  UY  Uruguay (Eastern Repuplic of Uruguay)
 ----* VU  Vanuatu (Republic of Vanuatu, formerly New Hebrides)
 ----  VA  Vatican City State
 --u-  VE  Venezuela (Republic of Venezuala)
 ----  VN  Vietnam (Socialist Republic of Vietnam)
 ----  VG  Virgin Islands, British
 ----  VI  Virgin Islands, U.S. (Virgin Islands of the United States)
 ----  WF  Wallis and Futuna Islands
 ----  EH  Western Sahara
 ----  WS  Western Samoa (Independent State of Western Samoa)
 ----  YE  Yemen (Republic of Yemen)
 ----  YD  Yemen, Democratic (People's Democratic Republic of Yemen)
 B-U-  YU  Yugoslavia (Socialist Federal Republic of Yugoslavia)
 ----  ZR  Zaire (Republic of Zaire)
 ----* ZM  Zambia (Republic of Zambia)
 ---f  ZW  Zimbabwe (Republic of Zimbabwe)
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In the following, BITNET is used generically to refer to BITNET plus
similar networks around the world (e.g., EARN, NETNORTH, GULFNET, etc.).
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NUMBER OF ENTITIES WITH INTERNATIONAL NETWORK CONNECTIVITY = 89

BITNET Col. 2  (Entities with international BITNET links.)
  b = minimal    < 5 domestic sites = 18
  B = widespread = 5 domestic sites = 28
  x = uncertain                     = 2
INTERNET Col. 3  (Entities with international IP links.)
  I = operational    = 33
  i = soon available = 3
UUCP Col. 4  (Entities with international UUCP links.)
  u = minimal    < 5 domestic sites = 40
  U = widespread = 5 domestic sites = 38
FIDONET Col. 5  (Entities with international FIDONET links.)
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  f = minimal   < 5 domestic sites = 10
  F = widespread = 5 domestic sites = 43
Col 6 = * = New connections expected in near future.

Please send corrections, information and/or comments to:

Larry Landweber
Computer Sciences Dept.
University of Wisconsin - Madison
1210 W. Dayton St.
Madison, WI 53706
lhl@cs.wisc.edu
FAX 1-608-265-2635

Include details, e.g., on connections, sites, contacts, protocols, etc.

Thanks to the many people from around the world who have provided information.

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Big markets in LANS->big Internet->Internet Society : Preliminary LAN and Workstation/PC Market Data by Bob Hinden <hinden@bbn.com>

The following statistics were recently assembled to analyze the growth potential of the Internet.

FORECAST MARKET FOR MICRO/PC LAN, U.S.
Source: Computer Industry Forcasts 10/91

1991	$6 billion
1992	$6.8 billion
1993	$7.7 billion
1994	$8.3 billion

Average Growth Rate = 11.4%

FORECAST US SHIPMENTS OF LAN-BASED INTEGRATED OFFICE SYSTEMS
Source: IDC (in Computerworld) 3/90

1990	13,000 units
1991	21,000 units
1992	33,000 units

FORECAST US HIGH-SPEED LAN MARKET IN NUMBER OF CONNECTIONS AND VALUE
Source: Info Gatekeepers (in MIS Week) 1/90

Mainframes

1991	4100 units	$78 mil.
1994	14500 units	$143 mil.
1999	120800 units	$389 mil.

Workstations/PCs

1991	162,700 units	$833 mil.
1994	445,000 units	$1.2 bil.
1999	2,137,000 units	$1.8 bil.

FORECAST SHIPMENT REVENUE OF US LAN SERVERS
Source: Forrester (in Computerworld) 1/90

1990	$4.1 billion
1991	$5.5 billion
1992	$7.7 billion
1993	$10.2 billion
1994	$11.7 billion

MARKET FOR LAN NETWORKS
Source: Cowen & Co. 11/90

	1991	Future
Departmental Nets	67%	73%
Sitewide Nets	46%	59%
Organization Wide Nets	38%	60%

FORECAST NUMBER OF WORKSTATIONS RUNNING ON FDDI
Source: Computer Reseller News, 15 Jan 90

1989	5,000
1990	25,000
1991	98,000
1992	210,000
1993	532,000
1994	950,000

Most analysts predict that in the U.S. in 1995, between 29 and 45 million computers will be on LANs. Many, if not most, can be expected to be attached to the Internet.

According to Forrester Research's Network Strategy Reports, The Network Strategy Report: LANs for Free?, November 1991, by the end of 1995, 56% of all PCs installed in the U.S. will be LAN-attached. This is 28 million PCs. Workstations and mini's will add another 1.5 million, providing 29.5 million LAN-attached computers in the U.S. in 1995.

According to Dataquest's North American Market Research Service, Market Statistics: Local Area Networks, May 1991, the U.S. installed base of PCs in business, government and education (not homes) is expected to grow from 40 million in 1991 to 80 million in 1995. Of these, they believe 15 million will be attached to LANs by the end of 1991, rising to 45 million by the end of 1995.

Both Dataquest and Forrester are beginning to allude to the potential effect of laptops and other portable devices on overall market dynamics and volumes, but there haven't been any forecasts done on what this activity means in terms of wiaccommodate them.

==========

010.10 USA NSF Backbone by Eric M. Aupperlee <Eric.M.Aupperle@um.cc.umich.edu>

The National Science Foundation's mid 1980's commitment to expanding the evolving Internet proved a crucial step in it's growth and success. Their vision of simultaneously broadening access to NSF's sponsored supercomputer centers and using this same infrastructure for pervasive education and research institutional networking, and backing their vision with leveraged funding, represented an extraordinarily important seized opportunity.

A second key element of NSF's mid 1980's action process was their insistence on building NSFNET using TCP/IP. Their 1987 solicitation for

the Management and Operation of the NSFNET Backbone Network spelled out this TCP/IP requirement along with the need for to developing a migration path to OSI based data transport protocols.

But certainly their firm TCP/IP commitment significantly contributed to the acceptance of this protocol family by many networking product and service focused organizations both within the US, and perhaps even more importantly internationally. One result of this is the quickening growth of TCP/IP router and related networking products as is, for example, evidenced by the rapidly rising attendance and equipment introductions at the annual INTEROP conference.

More directly NSF's funding actions created much of the USA's regional networking infrastructure, the evolving backbone, and even portions of the Internet's international data circuits. One measure of the demonstrated benefit of this interconnectivity among many networking organizations is the phenomenal backbone traffic growth reported by Merit.

Over the past four year period the number of packets transported per month increased a hundredfold from 100 million packets per month to 10 billion. There is no apparent reason to expect that if adequate transport capacity is available in the future for this growth rate to be any less. Indeed arguments can be made for why the rate may even be greater.

A second measure of note is the number of backbone announced networks. This measure grew from the order of 100 to over 3000 during the same four year period, a factor of 30. Over 1000 of these networks are outside of the USA. This increase reflects the expanding penetration of the Internet on a worldwide basis. As with the packet rate, this measure exhibits continued growth. The greater than unity ratio of transported packets to announced networks leads to the further conclusion that as the Internet expands individual networks served by it are increasingly generating more traffic.

Over the past four year period...packets transported per month increased a hundredfold from 100 million...to 10 billion. There is no apparent reason to expect...in the future for this growth rate to be any less. Indeed arguments can be made for why the rate may even be greater.

Other information known about the backbone's traffic adds insight to how its used. On a volume basis (measured in bytes) approximately half of the traffic serves to exchange files. Second at about 20 percent is the exchange of e-mail followed by remote logon access to servers at less than 10 percent. The remaining 20 percent is split among a variety of other uses. These percentages are remarkably stable from month to month, but indeed are slowing changing. Most notable is the relative decrease in remote logon and e-mail usage and the increase of newer services such as X-Windows.

These usage patterns help support the conclusion that the backbone serves to aggregate traffic of a very large user population rather than serving the specialized needs of a few. Further its users primarily continue to rely on the more traditional services. The likely pattern is for the transition of traditional to newer services to slowly evolve.

As observed above NSF's involvement and support of NSFNET's regional and backbone development during the last six years have been pivotal elements in the Internet's history. Their stewardship will continue as was recently announced.

==========

010.20 USA Regional Nets by Richard Mandelbaum <rma@tsar.cc.rochester.edu>

In early 1988 the National Science Foundation signed a cooperative agreement with a consortium consisting of IBM, MCI and Merit, Inc,. to upgrade and operate the NSFNET national backbone. That agreement is due to expire in October of 1992. This past summer, under the auspices of FARNET, the Federation of American Research Networks, a workshop was held in Big Sky, Montana to formulate recommendations to the NSF about what to do as a follow up to that agreement. The primary scenarios discussed at that meeting were:

(1) Recompete the backbone agreement;

(2) Fund regional networks directly and have them make appropriate arrangements for backbone services; and

(3) Fund end-user organizations directly in order to enable them to buy network services.

After much discussion, FARNET recommended that the NSF must both continue its support for top-level backbone services and ensure that mid-level networks have some degree of choice in picking a backbone provider. In November, the National Science Board accepted NSFUs recommendation that the backbone contract be recompeted with AT LEAST 2 AWARDEES.

This coming winter, FARNET will convene a Task Force to recommend to NSF how best to implement a multi-provider backbone.

At the same time, as the NSF pondered how to provide backbone services for the IINREN (Interim Interagency National Research and Education Network as the US Internet is now called), other Federal Agencies such as NASA and DOE raised the cry of "the regional networks must be hardened." FARNETUs November meeting, held in conjunction with the IETF, in Santa Fe on November 18 and 19, was devoted to that topic.

The hardest problem seems to be in deciding what "hardening the regionals" means. A major part of such a concept seems to be the insuring of end-to-end reliability of services. In addition the importance of NIC services and even User services was stressed. The problem of how to achieve such hardening was not solved. The February meeting of FARNET in Orlando will be devoted to discussing how coordination between the regionals and new NOC tools can be used to at least partially "harden" the regionals.

The past decade saw exponential growth in institutional connectivity to the Internet and in traffic carried by the Internet and the North American mid-level networks concentrated primarily on furthering such quantitative growth. The coming decade will see increased emphasis on "qualitative growth" and in 1992 we will see a tremendous amount of mid-level effort devoted to understanding how to achieve this new goal.

==========

010.50 Canada-CDNnet by Dave Brent <brent@cdnnet.ca>

Overview. CDNnet is a national application-level network linking Canadian researchers, developers and educators. Where possible, CDNnet offers services based on the Open System Interconnection (OSI) model.

CDNnet Headquarters is located in the Department of Computer Science at the University of British Columbia.

CDNnet operates as a "modified star" network, using a combination of public X.25 networks, TCP/IP networks and dialup lines. Members are encouraged to form direct connections when traffic warrants it.

Services. CDNnet offers its members a reliable electronic mail and file transfer service to other CDNnet organizations, as well as to other OSI networks around the world. In addition, it provides gateways to other international networks including the Internet, BITNET and UUCP.

CDNnet operates the primary nameserver for the CA section of the global DNS tree. In addition, CDNnet Headquarters coordinates development and maintenance of the Ean X.400 software, which was originally developed at UBC.

Status. CDNnet currently has 29 member institutions. Of these, 16 are educational members, 11 are government/non-profit and 2 are commercial. One of the educational members is a consortium of 12 B.C. colleges. Membership has decreased slightly over the last two years.

An increasing number of our members are joining the regional TCP/IP networks, which have been deployed over the last few years. When possible we have been moving CDNnet traffic from public X.25 networks to these networks.

We are in the progress of replacing our central hub with a newer machine with more capacity. Once this is done, we can embark on some new initiatives, which include an X.500 directory pilot.

Contact Information.

CDNnet Headquarters
University of British Columbia
#333 - 6356 Agricultural Road
Vancouver, B.C.
Canada V6T 1Z2
Internet: hq@CDNnet.CA
X.400: C=ca/ADMD=telecom.canada/ PRMD=cdn/O=CDNnet/S=HQ
Phone: +1 604 822 6537
Fax: +1 604 822 5485

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010.55 Canada-CA*Net by Peter Jones <PJONES@ac.dal.ca>

CA*net, pronounced "C-A-net", and normally written with the Canadian maple leaf replacing the asterisk, is a national Canadian backbone network linking regional networks in all provinces of Canada. CA*net exists to provide data communications in support of the research, education and technology transfer missions of its member networks and their member institutions and corporations.

Research networking in Canada began in the early 1980s. The creation in 1984 of NetNorth, the Canadian equivalent of the American BITNET organization, was a pivotal event and many of the foundational principles that now underlie CA*net were established during the early years of NetNorth. By 1988, regional networks using the TCP/IP protocol suite had been created in several provinces and bilateral links between some of these were in place in 1989.

In parallel with these developments, the National Research Council of Canada (NRC) was promoting the establishment of a higher speed national research network. This lead to the creation of CA*net which received a $2M (Canadian) grant from NRC towards its first three years' development and operating costs. The University of Toronto Computing Services department, in collaboration with IBM and Insinc, won the contract to run the network operations centre and the installation of CA*net data links began in May 1990. The network was brought fully into service in time for its official inauguration in October 1990.

CA*net is a backbone network which interconnects ten provincial regional networks and has three links to NSFnet in the USA. The topology of the network ensures that each regional network has two paths to the rest of Canada. Currently, the internal links all operate at 56 kbps. There are three connections to NSFnet: the ones from Montreal and Vancouver currently operate at 112 kbps and the one from Toronto at 224 kbps. The bandwidth of all these US connections and several of the internal links will be increased in the near future.

CA*net is owned and managed by CA*net Networking Incorporated, a non-profit, non-share corporation. The members of CA*net Inc. are the regional networks and each member nominates a representative to vote at CA*net general meetings which are held at least once a year. The affairs of the corporation are managed by a board of directors consisting of 10 voting directors, one from each Canadian province. The voting board member for a particular province is selected by the member regional network(s) whose geographical area(s) consist of, or include, all or part of the province. At the moment there is a one-one correspondence between provinces and regional networks but this situation could change.

In addition to the voting directors, there are four non-voting directors representing the National Research Council, the CA*net network operator, NetNorth and CdnNet.

CA*net is a great success due to the excellent collaborative efforts of all concerned with its formation and operation. Its major shortcoming is its low bandwidth, caused by the high cost of data lines and the large distances between centres of population in Canada. However, the board is actively seeking ways of enhancing the network and is currently working on a new three year strategic plan. More on this next time.

*Peter Jones, Chair, CA*net Board of Directors

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011.10 Latin American and Caribbean by Daniel Pimienta* <ulat-dp%frmop11. bitnet@vtvm2.cc.vt.edu>

For the first edition, we offer a brief perspective of the region network developments since the origins, and some forecasted trends.

First Stage Development: before 1988

There are three distinct directions:

Bottom-up: some BITNET nodes based on mainframes or minis in Mexico, Chile and Brazil.

Bottom-up: some USENET distributed nodes based on PCs, principally in Argentina.

Top-down: a project in Venezuela, under the National Science and Technology Research Council leadership, targeting a global national solution.

Second Stage Development: 1988-1991

consolidation of existing networks in the first countries.

significant relative growth of USENET solutions, both in terms of user's figures, and of start-up solution for new countries.

introduction of International Organizations in the playground as contributors to the current or projected developments: (UNDP, BID, EEC, UNESCO, OAS, PAHO, UNION LATINA,...).

Situation at the end of 1991

Users using the network

Costa Rica, Mexico, Puerto Rico	>40%
Argentina, Chile	>25%
Brasil, Venezuela	>10%
Remaining	<10%

Most countries will have at least a few network users.

It is estimated that there are 20,000 network users for the whole region, which represents some 10% coverage of the total estimated potential user population.

More than 80% of the international outgoing links of the Region goes to the USA. USENET user's figure growths faster than BITNET's. INTERNET nodes are beginning to appear.

Some regional or sub regional projects are in the planning or implementation stage (REDALC, HURACAN, CUNET, SCARNET).

Near-term trends

Growing consciousness of the need for integration between the countries: the First Interamerican Networking Workshop held in Rio de Janeiro in October 1991 allowed a high percentage of the region network representatives (more than 100 people from national, regional or international initiatives) to meet and start the first exchanges toward regional integration. A Regional Committee was elected.

Creation of national associations involving all the players (universities, NGO's linked to research, Science and Technology Councils, States Departments linked to research). REDMEX of Mexico is the first "success story" and Red Cientifica Peruana is the first attempt to start from scratch with that model.

Start of the integration of industrial research domains within the networks.

Negotiation with Telecommunication Authorities as a way to get tariff advantages and participate to the development of national X.25 networks (Bolivia, Colombia, Dominican Republic, Peru, Venezuela).

Regionalization of the international link topology as a step toward a regional backbone.

The Next Stage: a 1992-1995 forecast

A connected user level of the order of magnitude of 100,000 is expected. The following developments will mature:

Generalization of the associative model for user administration.

Rationalization of the international links and the gateway accesses.

Generalization of the special tariff pattern for national X25 usage.

Emergence of new original tariffs schemes were billing additional services allow some level of autofinancing.

Consolidation of the organizational entity representing the networkers of the Region (something "a la RARE" especially adapted to the Regional particularities).

Generalization of the TCP-IP protocol, at least for the international links.

More involvement of Science and Technology Councils and, as a consequence, a more controlled/planned network growth at national and regional levels.

Emergence of a regional backbone, probably based on satellite technology, with substantial international funding.

Emerging Long-Term Trends

Important shift toward the end-user (workstations, interfaces, applications and support).

Integration of the transport network with information networks and scientific data bases (the Region have already good provision of them, as a result of national and international politics).

Skill merging between the "telematics" and the "documentalists", as a result of market need and specific education plans.

First large-scale implementation based on the OSI model application layers (X.400, X.500, FTAM...).

* Science Advisor, REDALC Project Director, Union Latina, Santo Domingo, Dominican Republic

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011.20 Chile by Florencio I. Utreras <futreras%uchdci01.bitnet@vtvm2.cc.vt.edu>

REUNA: The Chilean Academic and Research Network

REUNA: Red Universitaria Nacional Chilena is a computer network developed by the Chilean universities, headed by the University of Chile. Its main goal is to promote the development of cooperation among the different universities through the exchange of non-commercial information between their researchers, students and teachers. Another important goal of the network is to facilitate the interaction between Chilean researchers and their colleagues in Europe, the US and other countries, specially other Latin American countries.

The network has been built using existing research computing equipment and vendor networking software: SNA, DECNET, UUCP; and recently: TCP/IP. Additionally, in order to ensure connectivity among different pieces of the network, some software has been developed at the Computer Center (CEC) of the University of Chile which acts as center of the network.

REUNA is composed of three pieces. One connecting IBM mainframes is using SNA software and uses leased phone lines to ensure a 24 hour service. Its services include mail, file transfer, on-line messages and remote login. The second piece connects Digital equipment using DECNET software over leased lines and virtual X.25 links. Its services are the same as those of the SNA portion of the network. Finally the third piece connects minis and micros using UUCP software over dial-up connections. This part of the network supports only mail and file transfer services (using encoding and packaging).

The three pieces are joined together at the Computer Center of the University of Chile where two gateways using TCP/IP software are supported. The gateway machines are an IBM mainframe and two Digital minis running simultaneously their native vendor communications software and TCP/IP. Finally, a dedicated satellite link to Maryland (USA) connects REUNA to BITNET where it has been accepted as a cooperative network.

The full list of universities affiliated with REUNA is the following:

Universidad de Chile
Universidad Catlica de Chile
Universidad de Concepcin
Universidad de Santiago
Universidad Catlica de Valparaso
Universidad Federico Santa Mara
Universidad de Tarapac
Universidad de Antofagasta
Universidad de La Serena
Universidad Austral de Chile
Universidad de Talca

The number of nodes at each university is variable running from 20 at the U. of Chile to 1 at Tarapac or Antofagasta. Not all the universities have an internal network so that several of them use the gateways of REUNA to interconnect their machines of different type.

The network has agreed to evolve to TCP/IP protocols. In particular thanks to the support of the National Commission for Science and Technology (CONICYT), the network is now connected to the Internet through SURANET in Maryland. A new administration scheme is being developed so that CONICYT will take the lead in the administrative part and other Operation Centers will join the University of Chile to improve the operational sites of the network.

Other interesting features of the Chilean Network is that the National Bibliographic Service (RENIB) is connected to the network giving Bibliographic research services through the network. Of special interest is also BITNIS a project funded by the PAHO (Pan American Health Organization) allowing to selected users of the network to use the National Library of Medicine (US). This use is done through a gateway designed and installed by the University of Chile in the NIH (US) seat of NLM.

For information on REUNA contact: CONICYT, Santiago, Chile

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011.30 Brazil by Eduardo Tadao Takahashi <tadao%ethos1.ansp.br@uicvm.uic.edu>

Brazil was incredibly late to get plugged into the academic networking world. The first networking efforts in the country started in the early 80's, led by LARC, a consortium formed by major universities and research centers for the exclusive purpose of advancing such activities.

However, these efforts were severely undermined by many problems, not the least of which was the restriction that the telecommunications law in Brazil imposed until recently upon data communication services: in a strict interpretation, they were a monopoly of the union.

It was only in 1988 that two BITNET connections to the US were established from Brazil, one by FAPESP (Sao Paulo State Research Funding Agency) and another by LNCC (National Laboratory for Scientific Computation), while a favorable interpretation of the law allowed interested academic institutions to get connected to either of the two pioneering gateways. Within two years, most universities and research institutions managed to get connected to what became a national network. A third connection to the US was set up at about the same time by UFRJ (Federal University of Rio de Janeiro), but it would be used mostly for UFRJ alone, offering BITNET and HEPNET services to Brazilian researchers at negligible cost to end user institutions.

While the academic community gathered around FAPESP and LNCC, a non-governmental organization in Rio, IBASE, obtained support from UNDP to set up a node of services at its site and through an UUCP connection to IGC in San Francisco.

In 1989, the Brazilian Research Network (RNP) was formally launched by the Ministry of Science and Technology, having as its main purpose:

in the short-term, to integrate the then scattered networking efforts of the academic community in Brazil;

in the medium-term, to plan and direct the consolidation of an academic network in the country, interconnecting regional networks and individual institutions, and providing direct connections to major networks in the US, Europe, and neighboring countries in Latin America.

in the long-term, to help devise and implement a national strategy for the deployment of informatics resources in education and research, ranging from high-performance computing to K-12 education.

The RNP initiative was organized as a project under the direct coordination of the National Research Council (CNPq), which has financed most activities since its inception.

As of 1991, RNP approaches the conclusion of its first main objective, that is, the installation of a nationwide 9.6 - 64 Kbps backbone with points-of-presence in twelve major cities in the country, supporting multiple protocols and running TCP/IP as its lingua franca.

As the backbone starts to operate, most institutions are expected to deactivate their current connections (which are too low speed and badly engineered as a rule) and seek a link to the nearest point-of-presence.

In February, a National Operations Center (NOC) will start working at FAPESP, taking responsibility for the management of the national backbone and its connection to other networks abroad. At the same time, a National Informations Center (NIC) will start to operate at LNCC, dedicated in the beginning to the preparation and dissemination of training materials.

The NIC and the NOC are being organized with the partial support of IBM, ORACLE and INTERLEAF, which are donating hardware, software, and services.

Complementing the efforts of RNP at the national level, several states in the country (most notably Rio de Janeiro, Rio Grande do Sul, and Sao Paulo) have been pursuing their statewide networks, which are integrated through the national backbone. Thus, by the end of 1992, one expects to have in Brazil a two-level network composed by some 100 nodes, mostly supporting INTERNET services, while some remaining as BITNET/BITNET-II installations.

In 1992, RNP will start to deal with a number of issues, including:

faster connections, as the local public infrastructure gets improved;

integration with existing commercial services (e.g., X.400 messaging) and with other national projects (e.g., library access; copying service; automation of the federal administration along GOSIP lines, etc.) ;

experimentation with low-cost technologies such as packet satellite communications;

systematic experimentation with packages such as ISODE, PP, QUIPU, etc., as a preliminary step to the launching of a concerted effort in topics such as experimental X.500 services.

In future notes, we shall discuss these issues as seen from the Brazilian perspective, which in a way is unique: not many national networking initiatives have to simultaneously cope with first world requirements and wishes and "fourth world" needs and priorities.

* Rede Nacional de Pesquisa - CNPq, Cidade Universitaria, Campinas, Brazil

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011.80 - Mexico by Joseph Choy <choy@ncar.ucar.edu>

TCP/IP networks with national and international access are now coordinated through the RedMex which is the networking infrastructure group for the country of Mexico. The organization supports the formation and development of the network for the participating public and private institutions of investigation, development and education in Mexico. RedMex coordinates its TCP/IP links to the United States with their network infrastructure.

At present, the following institutions participate in the committees:

Centro de Investigacion Cientifica y de Educacion Superior de Ensenada
Centro de Investigacion en Quimica Aplicada
Centro de Investigacion y Estudios Avanzados
Consejo Nacional de Ciencia y Tecnologia
El Colegio de Mexico
Instituto Latinoamericano de Estudios Transnacionales

Instituto Nacional de Estadistica, Geografia e Informatica
Instituto Politicnico Nacional
Instituto Tecnologico Autinomo de Mexico
Instituto Tecnologico y de Estudios Superiores de Monterrey
Instituto Tecnologico y de Estudios Superiores de Occidente
SCT Instituto Mexicano de las Cominicaciones
SECOFI
SEP Consejo del Sistema Nacional de Educacion Techologica
Telefonos de Mexico
UNAM Direccion General de Servicios de Computo Acadomico
UNAM Instituto de Astronmia
Universidad Anahuac
Universidad Autonoma Metropolitana
Universidad de las Americas Pueblas
Universidad Iberoamericana

There are currently three active TCP/IP links between Mexico and the United States. Two are satellite links from the NSFNET backbone node at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado to the UNAM network at Mexico City and the ITESM network at the Estado de Mexico campus. The UNAM and ITESM networks connect a number of their campuses. The third TCP/IP link is between the University of Texas in San Antonio, Texas to the Monterrey Campus of ITESM at 9600 bps. This third link will be replaced with a 56 Kbps link between the Monterrey campus of ITESM and the NSFNET backbone node at Rice University in Houston, Texas. They are also planning for a link between the CICESE in Ensenada and the NSFNET backbone node at the San Diego Supercomputer Center. The Technical Committee of the RedMex is working on coordinating their national network routing and links to the NSFNET to provide reliable links with automatic backup routing.

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011.60 Argentina by John S. Quarterman <jsq@tic.com>

Synopsis of Networks in Argentina

Argentina has connections to all the usual worldwide networks, including the Internet, BITNET, UUCP, and USENET. In addition, there is much use of Delphi and CompuServe. The main language used on all the Argentine networks is Spanish, which may explain the apparent lack of traffic from Argentina on the worldwide networks.

Several names are used for networks within Argentina: RAN (Red Academica Nacional, or National Academic Network), RECYT (Red de Ciencia y Tecnologi'a or Science and Technology Network), Red Argentina de Salud, and ARNET (Argentine Science Network). These are all intertwined, and there appears to be no consensus on the exact distinctions among them.

ARNET, the Argentine Science Network, is a national science and research network connected to the Internet as class B network 140.191. The link is by satellite from the machine <atina.ar> in Buenos Aires through New York City to the University of Maryland, connecting to SURANET, an NSFNET regional. The effective bandwidth is 9600 bps. This link is funded under United Nations Development Programme (UNDP), Project ARG-86-026. Part of the costs are apparently also supported by the U.S. National Science Foundation (NSF). The link is managed by the Ministry of Foreign Affairs (MREC) and the Secretariat of Science and Technology (SECYT).

Most of the internal links for the other networks named above are by UUCP, either over dialups or over the national X.25 network, ARPAC.

There are several BITNET nodes, accessible through a dialup RSCS connection to Chile.

RAN (Red Academica Nacional, or National Academic Network) for the early UUCP star network centered around host <dcfcen> at the Departamento de Computacion de la Facultad de Ciencias Exactas y Naturales.

RECYT is a name used by SECYT, the Secretariat of Science and Technology, or Secretari'a de Ciencia y Tecnologi'a, for the current UUCP network. For economic reasons, 60% of the machines on the network are MS-DOS machines. Most connections are carried by UUCP over X.25 over ARPAC. UUCP is used for all of UNIX, MS-DOS, and VMS. Effective link speeds vary from 300 bps to 9600 bps.

Red Argentina de Salud is the Argentine Health Net, a UUCP network managed by several organizations, particularly the Children's Hospital of Buenos Aires, Hospital de Ninos ``Dr. Ricardo Gutierrez.'' There are about 160 connected institutions, including hospitals and health centers, faculties of medicine, and government offices. The traffic is about 10 Megabytes per day. All the connections are by dialup telephone, or ARPAC.

There has been some confusion within the country about these different networks. This is changing, as the various historical Argentine networking projects coordinate more closely as they grow. Each has its own goals and political issues, but all are finding ways to cooperate.

*This is a synopsis of an article that appeared in the November 1991 issue of Matrix News, the monthly paper newsletter of Matrix Information and Directory Services, Inc. Copyright © 1991 Matrix, Inc.

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012.10 Nordic National and International Networks by Bernhard Stockman <boss@sunic.sunet.se>

NORDUnet was created during 1988 to interconnect the national academic networks of the five Nordic countries. The network is star-shaped and centered around Stockholm, Sweden, based on bridging technology with dedicated routers for the supported layer three services (TCP/IP, DECNET, NJE and X.25). For connectivity outside the Nordic area there is connections to Amsterdam and to the Cornell University in the USA. The bandwidth was initially 64 Kbps one most of the NORDUnet lines.

The topology has been kept since then but the bandwidth has been upgraded to between 128 and 256 Kbps on the NORDUnet internal and external lines.

Today we see a changes on both technical and organizational levels. National Nordic academic networks and the NORDUnet are changing towards different technologies and higher bandwidths. The reason is that today layer 3 routing technology is capable of providing most of the offered services which was not the case when these networks were originally designed.

The commercialization of IP services has been very significant in the Scandinavian countries. During the recent two years three commercial companies have been formed. The Finnish Datanet together with the two Swedish SWIPnet and TIPnet, has started to provide IP service on the Nordic market. These efforts have been possible due to close collaboration with Nordic carriers.

One consequence of this commercialization for the academic networks is an increased interest in the networking experience and know-how within the academic community. What we now see in the Nordic area is the formations of collaborative agreements between the academic and the commercial networks. Telecom companies provide bandwidth and technology, the academic networks provide competence in running the networks.

This is a rather new situation, there are no well established practices around formation of such agreements and much time is accordingly spent on finding ways and methods for such collaborations.

From the academic networking point of view such collaboration could be very beneficial. Telecommunication tariffs in the Nordic countries, as within most of Europe, are a significant part of the networking budget. A collaboration with the carriers will give possibilities for higher line capacities then else would have been possible.

This does not just concern the NORDUnet but is a very visible trend within the Nordic national networks. For example, the Swedish University Network (SUNET) is now installing an upgrade from 64 Kbps to 1 Mbps on main connections as a consequence of collaboration with one of the Swedish telcos. Another initiative is the planning of a 34 Mbps network interconnecting Swedish super-computer centers. In Norway a 34 Mbps network is being installed as a joint effort between the Norwegian academic network and the telecom company.

This Nordic trend of commercialization has similarities with the situation in the USA and we will probably experience similar problems within the Nordic area. A promising Nordic initiative is the discussions around the creation of a "neutral traffic exchange point". The intention is to provide one single exchange point where commercial and academic networks may interconnect. Interest for similar solutions has been expressed from US and Pacific network representatives. Seen on a broader perspective, the formation of such interconnections at well chosen points in the world could be the cornerstones in a general purpose robust Internet core.

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012.15 Finland by Petri Ojala <ojala@funet.fi> and Harri Salminen <sadeniemi@funet.fi>

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 with redundant leased line topology from 64 kbit/s to 2 Mbit/s which will be replaced by public Frame Relay service during the spring 1992. The supported protocols are TCP/IP, NJE, DECNET and OSI CLNS. In co-operation with Telecom Finland three single mode fiber FDDI rings interconnecting FUNET sites have been installed. FUNET operates various application level gateways and services including the largest public archive server nic.funet.fi in the Internet.

The Finnish Unix Users' Group, FUUG, provides EUnet mail and news access to commercial companies and colleges. The connections are mostly UUCP connections using high-speed dial-up modems and ISDN. InterEUnet TCP/IP services will be available using leased lines and dial-up connections in January 1992. FUUG has an agreement with FUNET to utilize the FUNET IP backbone for national connectivity.

Both FUNET and FUUG use the Nordic University and Research Network, NORDUnet, for their main international connectivity.

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012.25 Ireland by Mike Norris* <mn@dec4ie.ieunet.ie>

The year 1991 saw a major advance for academic and research computing in Ireland, in the form of the HEAnet-2 project. The seven member universities of the Higher Education Authority are now interconnected by a new 64 Kbps multiprotocol switched data network. The major protocols in use are TCP/IP, DECnet, and the U.K. Coloured Book protocols, and these are running successfully between the campus LANs.

HEAnet is connected to the European IP network by means of an IXI link between University College, Dublin, and the NIKHEF router in Amsterdam. NSFnet access is via EASInet and their EASIgate at CERN. The primary domain name server for IE has now been located in Ireland, and name servers for domains in each of the seven universities are now running. Interior and exterior gateway protocols are running on routers at each of the sites. Thus, the Irish universities, and their teaching and research communities, are well placed when it comes to Internet connectivity.

In inter-connecting the campus networks, and in providing access between HEAnet and the wider Internet, we are grateful for the co-operation and guidance of many people, particularly the help of colleagues in RIPE, NSF, EASInet and other bodies. Without their help the HEAnet-2 project could not have been completed on time.

*Computing Services University College Dublin

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012.30 Germany by Klaus Ullmann <ullmann@dfn.dbp.de>

Service Provision for the Research Community in Germany

In Germany the research community is organized on a federal basis, which means that no central funding body for networking exists. As there are no longer any regulatory barriers for service provision from the national PTT, there is more than one organisation in the research network field.

The biggest one is the DFN-Verein, an association of 250 institutional members(all German universities as well as research labs and various industries). Through this organisation the federal ministry for research and technology has funded (amongst other projects) the installation of a national connectivity network with 9.6 kbps, 64 kbps and 2 Mbps access points.

A data volume of about 120 Gbyte per month is being transferred; charges for the access points are based on the capacities used and on a fixed price per access point. On the basis of this connectivity network and to a lesser degree through other means (i.e., leased lines, public X.25 network and ISDN service) the DFN-association, the German branch of EUNET and the Karlsruhe-based XLINK group provide a couple of services, namely OSI-, EARN- and IP-services (DFN) and IP service (EUNET, XLINK). All these services provide (through different means) international connectivity as well.

In future editions of the ISOC newsletter these services will be described in more detail.

012.30.2 Germany-Users by Ruediger Volk <rv@meins.informatik.uni-dortmund.de>

The German User Community

Efforts are underway to keep Internet services up and under control of the best representation of the German Internet user community we can identify. This is driving an effort to create some formal representation of the community at the national level. On 6 December Friday, a meeting will be held in Munich to establish a German Internet users' group, which will be called "Deutsche Interessengemeinschaft Internet" or for short "DIGI".

The invitation to this meeting so far resulted in a quite overwhelming response: more than 100 participants from academia, large and small companies, and even several large and important public sector organizations (several branches of the PTT and the mail service, chambers of commerce, etc - all expecting to become large scale IP users!) signed up for the meeting.

There are three areas of possible activities of DIGI:

helping users (i.e. the administrators of networks connected to the Internet or just using Internet technology) get information; help exchange of experience etc.

funding and caring for a German NIC, housing administration of domain DE, running a delegated registry in close cooperation with RIPE NCC

help to create and maintain a competitive and fair market of IP services with proper interconnectivity for all parties.

Due to the international scope of Internet Society and IETF DIGI will not need to care much for the "developers". Nevertheless DIGI is intended and needs to keep all sectors of the Internet community involved; particular emphasis will be on the users (i.e. network administrators).

DIGI related information is available by anon. ftp on host deins.Informatik.Uni-Dortmund.DE (192.35.64.34) under Directory /DIGI. Of course you will see a lot of German text there; documents of possible interest are: /DIGI/meetings/ziele. ascii and (less interesting) /DIGI/meetings/ einladung-911206.ascii .

The general DIGI mailing list is digi@deins.Informatik.Uni-Dortmund.DE (with digi-request for the list maintainer); most messages will be in German - but you can assume readers to understand English. To get in touch with DIGI please address digi-info@deins.Informatik.Uni-Dortmund.DE .

Parties involved with planning DIGI certainly are used to act cooperatively and have been involved in the global networking community for a considerable time. We hope to spread and extend the spirit of cooperation we enjoy at the global level within our country. Of course we also will care for cooperation with related activities in other countries or on international levels.

*Universitaet Dortmund, Informatik IRB (DE NIC) in Dortmund, Germany.

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012.42 Italy by Stefano Trumpy*
<trumpy%icnucevm.cnuce.cnr.it@uicvm.uic.edu>

Organization. GARR is the Harmonization Group for Research Networks operating under the Ministry of the University, Scientific and Technological Research (MURST). GARR is also the name of the Italian Research Network which is currently conducted by the founder organizations: three public research nationwide Institutions i.e. CNR (National Council for Research), ENEA (National Energy Institute), INFN (High Energy Physics Institute) and by four consortia offering computing resources to Italian universities, i.e, CINECA, CILEA, CSATA and NIC. The aim of GARR is to interconnect the Italian research and academic networks and to coordinate inter country connections.

Architecture. The backbone of the network provides four TDM channels over 2 Mbps lines, carrying IP, DECnet, SNA and X.25 traffic; the latter protocol is carrying the traffic destined to the European backbone IXI activated by the EUREKA-COSINE project.

Addressing. All computers on GARR makes use of the Internet - style domain addresses. The top-level domain is IT for Italy. Information on Italian domains is available on-line at the RIPE NIC; use the command: whois -h nic.eu.net 'domain name'. Queries about mailing to people in Italy could be sent to mail-ita@info.garr.it.

Future plans. The backbone is built up by the original seven primary sites located in Milano (CILEA), Bologna (CINECA and CNAF-INFN), Pisa (CNUCE-CNR), Roma (ENEA and NIC-INFN) and Bari (CSATA). Recently University of Napoli joined the backbone.

The MURST also funded a project to connect all the universities in Italy; the major ones will be extensions of the backbone, while the others will be attached with 64 kbps lines to the primary sites. GARR will continue to maintain connections to the major research networks, including RIPE/EASInet/ Internet, BITNET/EARN, EUnet, HEPnet and other networks.

*CNUCE - Istituto del CNR in Pisa - Italy

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012.43 Spain by Jose Barbera <jose.barbera@iris-dcp.es>

Organization. Established in 1991, *RedIRIS* is the National Research and Academic Network organization sponsored by the Higher Education and Research funding bodies to provide 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. Fundesco has been involved in the definition and implementation of the initial networking program along the preceding years. Operation of various services is done either by Fundesco's Technical Team or else by subcontracting them to a suitable organization.

Policy. In order to create a nation-wide homogeneous networking environment, RedIRIS fosters the use of open communication protocols. OSI standards are preferred when reliable products to implement RedIRIS application services exist. Otherwise, the equivalent TCP/IP services are used. Some OSI services are being introduced by an experimental pilot phase before full-extension is reached. In addition, RedIRIS also takes into account specific needs from user groups for proprietary

protocols, provided they are cost-effective and technically feasible.

Services. All application services are supported on a 64 Kbps. X.25 backbone linking the main R&D sites; connection to the PPSDN is also provided. Over the common backbone infrastructure an IP network service is "tunneled"; thus LAN interconnection is possible on WAN facilities. In a similar way a CLNS (ISO IP) service is provided for experimental purposes at this stage.

Remote terminal service is accomplished by XXX and TELNET; there is also a central XXX/TELNET gateway. MHS X.400 is widely used for electronic mail; RFC 987 conversion and application level mail gateways are provided as well to communicate with non-OSI networks. For file transfer, the File Transfer Protocol (FTP) is extensively used. There is a central FTAM/FTP gateway as part of an FTAM pilot service. The X.500 Directory service is being implemented on an experimental basis. Over the common X.25 backbone, DECNET services (required by the HEP community) as well as NJE/IP services (typical of EARN) are also supported.

All OSI services are managed in coordination with the COSINE Project.

International cooperation. International communications are established through the COSINE IXI network and recently through EASInet. RedIRIS has joined the Ebone 92 initiative for international IP and CLNS services.

RedIRIS (IRIS-Net) has been part of the Internet since 1990. Access to the North-American Internet is done via the UK-US intercontinental fat-pipe. For Internet services in Europe, RedIRIS cooperates with RIPE.

RedIRIS is the National Member representing Spain in the RARE Association and participates in the COSINE Project.

RedIRIS collaborates with other international networks such as EUnet and SPAN through the corresponding national branches. Agreements to share common transport infrastructure have been reached with them.

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012.44 Greece by Kostas Karanassios* <netmgr@grpatvx1.bitnet>

PATRASnet: An Academic & Research Internetwork in the region of Patras

PATRASnet became operational in early November'91 and it is administered by the Network Support Team of the Computer Technology Institute (CTI). The core of PATRASnet is CTInet, the Local Area Network of CTI, which provides connectivity to national and international Academic and Research Networks for about 20 LANs (almost 1000 nodes spread around the Campus of the University of Patras as well as in the region of Patras).

Computer Technology Institute (CTI), is a non-profit academic and research organization which is devoted to research and development (R&D) in the field of Computer Science and Technology. CTI operates in close association with the University of Patras and in particular with the Department of Computer Engineering and Informatics. It also participates in joint projects with many other academic and research institutions around the world. CTI is supervised by the Ministry of National Education and Cults.

During the last 6 years, CTI has played a key role in the Academic and Research Networking in the region of Patras. In order to fulfill the

high demands of users for networking facilities, it has established a highly heterogeneous (Ethernet based) Local Area Network (CTInet) which - for the time being - consists of about 200 nodes, using the TCP/IP protocol suite as the main internetworking solution.

Other protocol families i.e. DECnet, AppleTalk, Novell SPX/IPX are also used to fulfill application and project oriented needs. CTInet is also connected to international academic and research networks such as EARN/BITNET and EUnet (UUCP) as well as to X.25 networks (the national Hellaspac and ARIADNEt/IXI which is the Greek Part of the COSINE project). That is why it stands for the communications service center of PATRASnet.

For the time being the regional LANs of PATRASnet are connected to CTInet via 9.6 Kbps point-to-point serial links (either TCP/IP/SLIP or DECnet/DDCMP). Where possible (mainly due to performance limitations) TCP/IP is tunneled into the DECnet links. The main network services that PATRASnet currently provides are: remote login, file transfer, remote printing, electronic mail and news.

Needless to say that a great effort has been devoted to:

the integration of these services as well as to the modification (where possible) of some services in order for local needs to be satisfied (mainly problems in communication that arise from the different Greek character sets).

the training of users in order to use efficiently any service provided.

From the CTI's point of view, the main goal of the above activities is to make the academic and research community of Patras able to share valuable information and data worldwide and at the same time acquire:

Very good technical know-how in network building, integration of services in a highly heterogeneous environment, development of distributed applications where services cannot be provided adequately using commercial products.

Very good experience as a network service provider as well as disseminating any technical know-how acquired.

Future plans.

By the end of January 1992, two recently purchased Cisco multiprotocol routers (one AGS+ with 4 serial and 12 Ethernet ports and one IGS/R) and one Cabletron IRBM/MAAC, 12-port multimedia bridge, are going to support both the internal and external communications of CTInet and PATRASnet.

Having acquired official Class B Internet addresses (150.140.0.0) we expect connection to the Internet in early 1992 in order to provide official Internet services to our users. Our connection will be established through the ARIADNEt (X.25) network and then through the network of the FORTH Institute in Heraklio, Crete.

We aim to provide network services of high quality, following recent trends and advances in computer communications services/technology while adhering to related de-facto and international standards.

*Network Manager, Computer Technology Institute (CTI), Patras, Greece

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012.50 Central & Eastern Europe, Generally by Milan Sterba <sterba@vse.cs>

Internet networking in Central and Eastern Europe; and is most advanced in Poland where a primary name server and more than 20 machines are actually connected to Internet. Czechoslovakia and Hungary are now running only experimental connections and a plan currently exists to connect Baltic republics to Internet over Nordunet. A report can be found on anonymous ftp on <mcsun.eu.net>.

A significant expansion of IP facilities in ECE countries is expected during 1992. Academic IP backbone projects are now becoming a reality in Czechoslovakia, Hungary and Poland.

Unfortunately, the process is slowed down by bad and expensive telecommunication infrastructure, and lack of finances. The COCOM restriction rules do not seem to be a problem for these countries, but the administrative procedures to obtain export licenses are still very slow for certain types of equipment (e.g., IP routers, RISC machines, NetBlazers).

Coordination in network strategies and common approach to the above mentioned problems is a necessity. The general mailing list for ECE countries international networking is central-euro-net@inria.fr.

ECE countries urgently need information and contacts to be able to quickly expand Internet services. Money for network workshops, conferences and coordination and task forces meetings is still a problem. Several responsive initiatives are attempting to deal with the problems, such as NetSchool in Trieste, RIPE, EUnet and EARN support. National initiatives by DFN-WIN, INRIA France, ACONET Austria etc. tend to help in solving national and international infrastructure.

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012.54 Yugoslavia by Borka Jerman-Blazic <jerman-blazic@ijs.ac.mail.yu>

Yugoslav Network for the Academic Community (YUNAC)

Facilities:
Directory services
Electronic mail
File transfer
Electronic Conferencing

Organization and management. YUNAC is the major networking organization in Yugoslavia. It was set up in 1990 after two years of networking activities. Its aim is to care for the services provided to end users. Members of YUNAC include Universities and Research Institutes from the Academic and Commercial world. The network is managed by a management committee elected by the members of YUNAC Assembly. YUNAC is organized as limited company. YUNAC is a national member of RARE (the European Association of Research Networks) and representative of Yugoslavia in COSINE and RIPE - The European Internet Network. YUNAC is naming authority for TLD.YU.

Infrastructure. YUNAC uses as a communication infrastructure leased lines (mainly 9.6 Kbits and some 48 Kbps) and the Public Packet Switched Data Network (PPSDN). This infrastructure is used for multiprotocol services: DECnet (Phase IV), X.400, and NJE. All YUNAC nodes with X.400 services provide gateway services for electronic mail to the DECNET nodes. The number of connected hosts is cca 300.

YUNAC is connected via a leased 64 Kbps line to the International X.25 Infrastructure (IXI), run by RARE and COSINE. The connection is implemented on a leased line between Wien and Ljubljana, Slovenia. The switch and WEP are connected to the PPSDN of Yugoslavia - JUPAK. The switch and WEP (Well Known Entry Point) are located in the YUNAC headquarters at the Jozef Stefan Institut in Ljubljana. The connection to Internet is currently available via lines and gateway services offered by DFN. The YUNAC switch provides a TCP/IP over X.25 connection to the European Internet Network (RIPE).

Services. The services offered to the end users include: electronic mail, computer conferencing, transfer of data, directory services, remote login, and connection to the international networks EARN/BITNET, EUNET/USENET, and the Internet (US) via gateways. A regular information service connecting Yugoslav users abroad to the domestic source of information via electronic mail and distribution lists is also working well (Rok Press, BEST, etc.).

Other internationally connected networks in Yugoslavia. In Yugoslavia, there are two additional networking activities which are part of international networks (i.e., EARN and EUNET). The entry point to EARN/BITNET network is located in Beograd. This entry point (an IBM machine located at the Statistical Office of Serbia) is connected with a leased 9.6 Kbps line to Linz, Austria. The EARN entry point in Beograd provides gateway services for electronic mail to DECNET nodes through a leased line to a mvax machine (with PMDF and JNET sw) located on the premises of the Electrotechnical Faculty of Beograd.

The EUNET backbone for Yugoslavia is located in Ljubljana at Electrotechnical faculty of Ljubljana University. The backbone host uses PPSDN and dial facilities for connecting the EUNET backbone in Europe (Amsterdam). Gateway services are not provided. Other EUNET hosts in the country use mainly UUCP and dial up facilities.

The Slovenian PTT is also offering mail box services to commercial users on their host with X.400 facilities. This site is connected to the YUNAC WEP.

Addressing. All computers on YUNAC with X.400 facilities use a X.400 address with an appropriate Internet-style domain addresses mapping. That is:

X.400: s=user/o=institution/p=ac/a=mail/c=yu
Internet: user@institution.ac.mail.yu
Decnet: user@host
EARN: user@host

Warning!! Recently YUNAC had adopted a new addressing scheme. It will be announced in the near future (implementation to start starting December 1.) In RFC 822, the form will disappear "ac.mail" !!

Future plans. The Domain Name System (DNS) for .YU was set up recently (Internet address 153.5.1.1). The current DNS for .YU from the US will be moved in Europe. Currently, an X.500 project is going on in cooperation with the Slovenian PTT. Implementation to be offered to the users next year.

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012.55 Hungary by Laszlo Csaba <ib006csa@huearn.bitnet>

Since 1988 the Information Infrastructure System (IIF) has been providing national and international network services for the Hungarian R&D community. The "Academic" segment of the system is the HUNGARNET (Hungarian Academic Research Network).

At present the system is based on a X.25 data network. The higher level services like e-mail, bulletin board, terminal access to databases are provided for several thousand users of 200 institutions. The Hungarian segments of the EUnet and the EARN networks are providing e-mail access through a gateway of the national mail system.

In October 1991, an IBM 3090 mainframe was installed in the framework of IBM's Academic Initiative. The computer will be an EARN node . The community of high energy physicists is connected to HEPnet via CERN.

In October by sharing the EARN line the first TCP/IP connection was established. The COCOM limitations for Eastern Europe are gradually disappearing. As a result of this in the near future we are going to install a national pilot IP network. A 64 kbps international digital leased line has already been ordered and the CISCO routers, UNIX servers and workstations are being delivered or are waiting for delivery.

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012.58 Lithuania by Jonas Mockus <lmockus%ma-mii.lt.su@fuug.fi> [in the near future <mockus@osts.mii.lt>]

Lithuania is experimenting using several e-mail systems. You can presently get assistance in using the network at the following addresses.

X.400
S=postmaster/OU=skailab/O=mii/PRMD=litnetADMD=litpakC=lt/@gateway.uninet t.no

Internet
postmaster%skailab.mii.lt@gateway.uninett.no

RELCOM
postmaster%ma-mii.lt.su@fuug.fi

Later, Lithuania will get its own code "LT". Then you will get help at the following addresses.

X.400
C=lt;ADMD=litpak;PRMD=litnet;O=mii;OU=skailab;S=postmaster

Internet
postmaster@skailab.mii.lt

Lithuania is a full country member of EARN, with SUEARN Moscow node as the nearest connection. Lithuania also takes part in NORDUNET Baltics program.

Main Lithuanian EARN nodes are:

Institute of Mathematics and Informatics, Akademijos 4, Vilnius, 232600. Contact: Mr. Petras Sulcas

Kaunas Technological University, Computing Center, V.Juro 50, Kaunas 233028. Contact: Dr. Aleksandras Targamadze

*Prof at the Institute of Math. & Informatics in Vilnius Lithuania and representative for the Lithuanian EARN.

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012.70.3 USS GLASNET by Anatoly Voronov <avoronov@glas.apc.org>

GlasNet is a non-profit, non-governmental telecommunications network established in Moscow and made fully operational in June, 1991 by the Institute for Global Communications (IGC), which operates PeaceNet, EcoNet and ConflictNet in the U.S., and the International Foundation based in Washington, DC. GlasNet is run by an entirely Soviet staff, with the support of American technicians at IGC in San Francisco.

Through a host computer in Moscow running Interactive UNIX system V/386 r. 3.2, GlasNet offers inexpensive electronic mail and conferencing capabilities to individuals and organizations in what is called now USS (Union of Sovereign States).

Its primary objective is to provide communications services to new, citizens-based groups including human rights activists, educators, journalists, computer enthusiasts, environmentalists, and entrepreneurs that have emerged in the former USSR to challenge the monopoly of state-sponsored organizations. GlasNet meets this need for easy and inexpensive information exchange among groups and citizens within the USSR by offering electronic mail (e-mail) and conferencing services, with user fees charged exclusively in rubles.

Glasnet has gateways to more than 70 networks worldwide.

Glasnet proved its usefulness during the coup of August 19- 21, staying on-line all the time and helping the Russian and foreign users to exchange relevant information about the events in Moscow (see Tales of the Electronic Resistance by John C.Ausland, International Herald Tribune, 25 Sep 1991).

In order to strengthen its financial self-sufficiency and at the same time keep the rates for the pro bono users as low as possible, Glasnet plans to implement new facilities, such as:

GlasMail (messages sent by email are posted, or faxed, or even sent by telegraph to the addressee in the USS, an acknowledgment can be delivered to the sender)

GlasNet Liaison (on user's request person or organization in Russia is notified that somebody wants to establish communications with them), GlasNet Money Transfer (delivery of small sums of hard currency to USS residents indicated by the user)

Glasnet Remote Secretary (may be interesting for those who can't afford an office in Moscow, but need to resolve their problems with USS counterparts)

GlasNet Escort (the user emails to the Glasnet office the information about his arrival in Sheremetyevo airport in Moscow, and is escorted in a taxi from the airport).

Glasnet has 170 users as on 1 November 1991. 20-30 new users are registered monthly.

A partial list of organizations using GlasNet.

Democratic Information Exchange, Tallinn, Estonia
Catholic Information Center, Moscow
Interlegal Research Center , Moscow
Physics Society, Dnepropetrovsk, Ukraine
Transnational Radical Party, Moscow
Ecological Research Center, Obninsk (Moscow region)
Soviet-American Humanitarian Initiative, Moscow
The Lake Baikal Institute, Ulan Ude
Nevada-Semipalatinsk Movement, Alma-Ata - Moscow
Human Rights Project Group, Moscow
Leningrad Academy of Sciences Ecology Group
Moscow News Weekly
Georgia Greens Movement
Protein Research Center (Puschino, Moscow region)
Ecology Association (Kamchatka)

The Glasnet address is: Yaroslavskaya ulitsa 8, korpus 3, suite 111;
129164 Moscow Russia

*Glasnet Executive Director is Anatoly Voronov. The Glasnet USA
Director is David Caulkins <dcaulkins@igc.org>

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013.10 Tunesia by Nejib Abida <abida@tnearn.bitnet>

Tunisian Academic and research network. Network facilities provide
electronic mail, file transfer, and remote interactive access. Bitnet,
X.400, and Internet addresses are supported.

Tunisia, through the research center called IRSIT, is making effort to
connect universities and number of research organisations. Today, there
is three international node at IRSIT (Institut Regional des Sciences
Informatiques et des Telecommunications) Tunis, Tunesia which are a
EARN/BITNET node, X.400 mail facilities and Internet node. Users outside
IRSIT are connected to IRSIT via X.25 and dial-up modem.

IRSIT uses a x.25 public network to support NJE for EARN/BITNET, TCP/IP
for Internet and X.400 for X.400 mail facilities.

Future plans include connecting universities and research centers as
nodes, using a leased line and multiprotocol routers to share BITNET and
INTERNET traffic.

IRSIT is making an effort to establish international nodes in other
North African countries. Algeria and Morocco as members of EARN, will
be connected to this network, and contacts with EMI, in Morocco, and
CERIST in Algeria have been made in order to undertake the first steps
toward the establishment of a research Network for the Maghreb
(Maghrebnet).

*IRSIT (Institut Regional des Sciences Informatiques et des
Telecommunications) network manager and responsible for developing the
research and academic network in Tunisia.

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013.30 Israel by Hank Nussbacher <hank%vm.tau.ac.il@taunivm.tau.ac. il>

Israel currently allows only academic institutions and R&D not-for-
profit organizations to connect to the Israeli portion of the Internet
called ILAN. This is a government limitation that we are attempting to
change over the next few months.

In October 1991 our second 64 kbs IP circuit became operational to CERN in Switzerland. This link is via a new undersea fiberoptic cable called EMOS which only became operational in March 1991. Our first 64 kbs link is via a satellite circuit to PSI in the USA. The two IP links are terminated at different sites in Israel so as to provide maximum "disaster recovery" planning.

Between the two international circuits, we move between 10-15 Gb/s of data per month.

On a national level, we use 64 kb/s leased line circuits routing IP, DECNET and Appletalk using Cisco routers.

We have placed a request to upgrade all our national links to 128 kb/s but due to PTT infrastructure problems, this won't be accomplished until the second quarter of 1992. We use IGRP on a national level for optimal routing between our seven Cisco backbone. On a national level, we move approximately 40 Gbit per month.

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014.10.2 Sub-Sahara, generally by Bob Barad <bob.barad@f151.n109.z1.fidonet.org>

In this, my first contribution to Internet News, I can only attempt a broad overview. More detailed reports will follow. Mike Lawrie <ccml@hippo.ru.ac.za> just completed a tour of the USA during which he spread the news that email is flowing in Africa. A dedicated 9600 baud line is now operating between the ac.ZA domain host at Rhodes University in Grahamstown, South Africa and Portland, Oregon, USA.

Botswana, Ethiopia, Namibia, and Zimbabwe are connected to Rhodes by dial-up uucp and/or z5.fidonet.ORG. Zimbabwe has requested registration of the ZW domain.

Pascal Renaud <renaud@orstom.fr> reports uucp links from orstom.FR domain to Senegal, Mali, Burkina Faso, Cote d'Ivoire, Niger, Togo, and Cameroon.

The NGONET and ESANET projects are providing access for African NGOs (non-governmental organizations) and universities using fidonet software connecting with gateways to apc.ORG domain. Current sites include Kenya, Ethiopia, Ghana, Senegal, South Africa, Zambia, and Zimbabwe.

Please send questions or news for future articles to me at Baobab Communications or to the "The Baobab" BBS, reachable via modem at +1 202 296 9790 in Washington, DC, USA

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014.90.1 South Africa by F. Jacot Guillarmod <ccfj@hippo.ru.ac.za>

There are several networks in South Africa. The most visible is Uninet-ZA, a research and academic network that links participating Universities and research organisations via low speed TCP/IP trunks. There is also a loose confederation of dialup uucp sites, known collectively as Sanet, which links together private individuals and commercial undertakings in order to exchange Usenet news and electronic mail. Gateways between Uninet-ZA and Sanet exist, but are unofficial and experimental at this time..

Other networks include Fidonet, which has a substantial presence (and to

which Uninet-ZA owes a considerable debt of gratitude for services rendered); there is WorkNet, which links up non-Governmental Organisations (NGO's) in South and Southern Africa; and finally, several of the larger commercial organisations (such as the SA Wool Board) have extensive but isolated TCP/IP based WAN's.

Recently, Uninet-ZA established a dialup uucp connection to provide email to the University of Zimbabwe in Harare, and is in the process of setting up a similar link to the University of Namibia in Windhoek. There is potential for converting these rather unsatisfying low tech solutions into dedicated TCP/IP links in the future.

Networking in South Africa took a giant leap forward in late November, when a dedicated TCP/IP link to the United States was commissioned at Rhodes University in Grahamstown. This link connects Uninet-ZA to RainNet in Portland, Oregon, and from there into Alternet, and finally into the NSFNET.

Before this dedicated link was installed, connection to the Internet was indirect, via UUCP dialup between two UNIX systems acting as gateways between Uninet-Za and the Internet. Traffic volumes on this link had been showing continuous growth, and the cutover point, where it became cheaper to rent a dedicated circuit than to continue with dialup, were reached many months ago.

The process of cutting over from dialup UUCP to a dedicated TCP/IP link has not been trouble free. The link itself is a 9600 baud analogue circuit, but use of V32.bis modems increases throughput to an effective 14.4 kb/s. The routers on either end are normal PC XT's, running the public domain ka9q package. On a physical level, the link is remarkably stable. The cutover was planned in several stages so as to integrate the Domain Name universes as painlessly as possible. The first phase was to change the transport from UUCP to SMTP between the original gateway machines, while leaving Uninet-ZA and it's dummy root domain isolated. The switch over went smoothly.

What was totally unexpected was the traffic volume. Within six hours of the link being in place, there was a mail storm, consisting of replies from mail based archive servers. The feeding frenzy had begun. Within the blink of an eye, there were tens of megabytes of electronic mail queued up, and more pouring in while users all over South Africa determinedly tried to import the entire Simtel-20 archives as soon as possible. The fix was to increase the number of machines acting as gateways on either side of the link, and to artificially filter the 'worst' of the traffic until the situation stabilized. In all of this, surprisingly, the bottleneck was on the gateway machines themselves, and not on the bandwidth of the link.

The next phase of the integration was to ensure that RIP was propagating effectively between Uninet-ZA and RainNet - a painless process. Slightly more painful, in terms of paperwork, was providing detailed lists of IP network numbers so that the router blocks into Alternet and NSFNET could be lifted.

The final phase of this exercise, which is in progress, is to merge the Domain Name universes without committing the unpardonable sin of propagating bogons. While intricate, this is proceeding smoothly, and by the time you read this, there will be complete TCP/IP connectivity.

Of course, this won't be the end of the story. There never is with networking.

*Computing Centre - Rhodes University - Grahamstown

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014.90.2 South Africa by Mike Lawrie <ccml@hippo.ru.ac.za>

A dedicated line has at last been installed between Rhodes University in Grahamstown, and RAINet at Randy Bush in Portland OR. This line runs TCP/IP protocols, and it is now possible to access computers on the Uninet-za research network. Similarly, access to the Internet is at long last possible. Activities at present are concentrating on the final phase of cutting over the local Domain Name Service in order to integrate into the Internet's root servers. This network is a project of the Foundation for Research Development (FRD) in South Africa.

The line operates at 9600 baud, and uses KA9Q on PCs at each end. Modems are Penrils, running at 14.4 kb/s. RAINet links via Alternet to the Internet. It was clear from before the line was ordered that it would overload, and plans were laid to replace it with a 56 Kb/s link, in all likelihood in March 92. Currently Uninet-za enjoys some generous temporary concessions from Alternet and NSFNet.

Plans are in hand to upgrade the internal Uninet-za trunks to operate at 64 Kb/s on digital circuits. Choice of routers is being debated - there are serious financial problems regarding the prices of routers if bought from the South African agents, and this is now the stumbling block. With high-speed routers, the existing 7500 kilometers of Uninet-za trunks can be reduced to about 4500 kilometers, with resultant savings and a greatly improved resilience.

There are currently 12-odd University and research sites connected via TCP/IP, with a further three with immediate plans to connect. Internetting is done using multiplexers on the digital links to give virtual circuits of 9600 or 19200 bit/s between sites, and PC Route for routers.

Apart from the tcp/ip sites, there are several mail-only sites, within South Africa and in the region. Namibia has found a second uucp user, a link to three uucp systems has been installed to the University of Zimbabwe in Harare, and a Fidonet channel to the University of Zambia is undergoing tests. The ZImbabwean Mango Fidonet site has established reliable email links to the Uninet-za network as well, and uses the Uninet-za gateway to the USA.

There is every likelihood of links being established in the near future to Lesotho and to Mozambique. Due to the costs of dedicated circuits, IP connectivity will not be available initially.

Several South African commercial sites are interested in connectivity to the Internet. Current Telkom regulations make this very difficult. The SANET UUCP network continues to be very active - this is the home of some highly competent commercially-based netters.

* Director Computing Services, Rhodes University, South Africa (Rhodes University condemns racism and racial segregation and strives to maintain a strong tradition of non-discrimination with regard to race and gender in the constitution of its student body, in the selection and promotion of its staff and in its administration.)

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015.10.1 Japan-WIDE by Jun Murai <jun@wide.sfc.keio.ac.jp>

Japan(WIDE). The Widely Integrated Distributed Environment (WIDE) project was initiated in July 1987 by a group of researchers led by Professor Jun Murai. 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 resulted software are also distributed.

The WIDE Internet is composed of a variety of links, including voice grade leased lines, 64 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 passing a traffic of other research networks such as JUNET (Japan University Network) or JAIN (Japan Academic Inter-university Network) which does not have a long haul nation-wide 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 the basic protocol.

WIDE operates in conjunction with the Pacific Area Computer Communication (PACCOM) project to provide international inks for Japanese researchers using 192 Kbps under-sea cable via University of Hawaii to NASA Ames, FIX-WEST.

The actual location of WIDE Internet backbone nodes (WNOCs) are Sendai, Fujisawa, Tokyo, Kyoto, Osaka and Fukuoka, and the backbone is formed by connecting these WNOCs via 64 Kbps lines (192 Kbps between Tokyo and Fujisawa), which is backuped by the ISDN technology developed by WIDE project itself.

*WIDE Project contact and Professor, KEIO University, Fujisawa, Japan.

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015.10.2 Japan - InetClub by Kazunori Konishi
<konish@kddnews3.kddlabs.co.jp>

InetClub is a group of users who belong to a volunteer-based network JUNET (top level domain is ".jp"), and pay their own international electronic mails. After the domain registration has been completed in the NIC of Japan, the user can join the club as one of the three member classes: domain member, plural accounts member and a single account member. The former pays more for the annual fee, but the usage fee is just for the international transmission cost.

The gateway of InetClub is kddlab.kddlabs.co.jp located in the R & D Laboratories of a communication carrier, KDD. The domestic links are made up of a 64 kbps leased circuit connected to WIDE Internet with a Cisco router, and telephone circuits with fast modems employing UUCP protocol or Point-to-Point Protocol (PPP).

KDDlab polls uunet.uu.net, mcsun.eu.net and uknet.ac.uk with fast modems using UUCP protocol. Although the voluminous overseas messages (300 MB emails and 80 MB USENET news) are relayed in a month for about 190 domestic organizations, it is not be able to use the leased circuits to observe the regulation in Japan. Efforts are being made to solve this problem.

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015.20.1 Australia by Geoff Huston* Australia by Geoff Huston<G.Huston@aarnet.edu.au>

Within Australia the Australian Academic and Research Network (AARNet) provides infrastructural internetworking services to the broad national academic and research community.

The network interconnects all 38 higher education institutions, the divisions of the Commonwealth Scientific and Industrial Research Organisation and also provides connection services to sectors of the national and state governments and various governmental and commercial organisations. AARNet currently supports some 22,000 connected end user host systems and supports a user population of in excess of 100,000 people, drawn predominately from the academic and research domain. The network was established in May 1990.

The internal structure of AARNet is based on the deployment of multiprotocol routers and point to point leased serial lines. Internal capacity of the links ranges from 2 Mbps on the major internal trunk routes to 48 Kbps for tail loops and a number of low speed 9.6 kbps tails. The major networking protocol in use across AARnet is the TCP/IP protocol suite. A national Phase IV DECnet is also supported (this network does not use addressing modes which allow direct DECnet connectivity to the HEP/SPAN DECnet) and regional X.25 switching facilities are also supported within the transport infrastructure. The namespace of Australian nodes is within the national top level domain ".au".

The major international facility is a satellite link to the US Federal exchange point on the West Coast, Fix-West. From this point direct connectivity is established to a number of other Asia/Pacific national networks, and through connections within the national US infrastructure connections to the remainder of the global Internet are established. Additionally AARnet supports international mail connections to Papua New Guinea and Thailand.

AARNet is operated by the peak national university body within Australia, the Australian Vice-Chancellors' Committee. The facility is funded directly by the user community through institutional participation in the program.

More information on services and facilities available within AARNet can be retrieved via the anonymous ftp facility from the host aarnet.edu.au. Documents held there include a resource guide of Australian resources and copies of periodic newsletters and informational publications from AARNet.

*Network Manager, Australian Academic and Research Network.

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015.20.2 Australia by Bob Kummerfeld Australia <bob@cs.su.oz.au>

The annual Australian Networkshop was held in Hobart, Tasmania from Monday 2nd to Wednesday 4th of December. These workshops began in the early 1980's when a small group met at the University of Sydney to discuss the state of academic and research networking in Australia.

This was followed by meetings in Brisbane, Melbourne, Sydney, Adelaide and Canberra in 1990. This series of workshops has been used to develop the technical design, organisational structure and funding method for the Australian Academic and Research Network, AARNet. The workshop continues to provide a forum for the development of the network.

The 1991 meeting was attended by more than 200 people from all parts of Australia representing a wide range of interests in network research, development and application. Sessions included status reports on AARnet in general, regional hubs and international connectivity, a technical stream concentrating on the X500 directory pilot, a stream discussing library applications and sessions on security, management issues and high speed networking.

Invited guest speaker for the meeting was Peter Deutsch from McGill University who described the Archie Project. As well as the history and current status of the project, Peter gave an overview of work on network wide information systems and resource discovery systems. Peter's talk was inspirational and provided a glimpse of the future of network services.

A session was devoted to reports for AARNet development projects. These projects are funded by AARNet to carry out work of benefit to the whole AARNet community. The projects described were: a survey of email to fax gateway systems for AARNet, an AARNet resource guide, the feasibility of AARNet wide access to the Australian Associated Press wire service, a message based file transfer system, a link to the Australian Antarctic base and a project to establish an AARNet archive service.

The AARNet project to establish an Australian X.500 directory service pilot is larger scale and was discussed in a separate session.

This group invited Paul Barker from University College London to speak on the Paradise directory project in Europe.

Many of the speakers for the meeting submitted full papers and these will be available from an archive at the University of Tasmania. For details send a request to netws@probitas.cs.utas.edu.au.

* University of Sydney, Australia

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015.28 Antartica by Andy Linton* <Andy.Linton@comp.vuw.ac.nz>

In February 92, NZ Telecom will have a satellite connection available to Scott Base in the Ross Dependency offering data circuits of up to 64 Kbits/sec in the first year of operation and 2 Mbits/sec thereafter.

Preliminary enquiries in New Zealand show that an Internet link to Scott Base would be useful to researchers and that there are no technical reasons why the link could not be operational in February before the end of the summer season. This link could be made available to researchers at the American and Italian bases in the area relatively easily.

Work on funding the link will continue and we hope to report positive progress soon.

*Dept of Comp Science, Victoria Uni, Wellington, New Zealand

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015.35 China by Tian Bai Quin* <qian@ica.beijing.canet.cn>

The Chinese Academic Network (CANET)

Background and history. CANET was co-initiated by ICA (Beijing Institute for Computer Application) and University of Karlsruhe (Germany) in 1985.

The first link to CSNET was set up in 1986. A pmdf/bs2000 was installed on a Siemens 7760 in 1987. The "cn" top level domain was registered with ddn src-nic by ICA in 1990.

Techniques. Internet DNS naming and addressing has been implemented using pmdf 3.1 on a vax/vms or siemens/bs2000. RFC822 format has been adopted. For communication links, both the public telephone network, as well as the packet switching data network - CHINAPAC is used. Transmission speeds of 1200/2400/ 4800 bps are supported and worldwide e-mail service is supported.

Current status. The top level domain "cn" has been operational since Jan.1991. Currently, international mail delivery takes half a day. At present, 16 sites have been connected.

Administrative and technical contacts.

Administrative contact : Tian Bai Qian; p.o.box 2418; Beijing Institute for Computer Application; 10 che dao gou; Beijing 100081; China

Technical contact: Michael Rotert; University of Karlsruhe; Computer Science Department; D-7500 Karlsruhe; Germany; E-mail rotert@ira.uka.de

*Director of CANET

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015.50 Malaysia by Mohamed Awang Lah <mal@jaring.ism.MY>

JARING (Joint Advanced Research Integrated NetworkinG) Project is a development project coordinated and managed by MIMOS - a government research and development (R&D) institute for microelectronics and information technology. The institute is responsible to the Ministry of Science, Technology and Environment, Malaysia.

JARING has evolved from RangKoM, a pilot project initiated in 1987 which has established links amongst local universities. Electronic mail service is available for local researchers to communicate with their counterparts in other countries having similar networks.

Objectives. The project has the following objectives:

to establish an integrated data communication network (known as JARING - literally NET);

to enhance multidisciplinary R&D activities; and

to study and evaluate the use of data communication technology and its impact on socio-economic activities.

Activities. One of the major activities being undertaken in the project

is the coordination of database development in various fields related to science and technology as well as education. Most users will be using terminals to access remote databases through JARING. The development of JARING has in fact been integrated with other development programs including Computer-In-Education and the Government Open Systems Program for Public Sector. Many multidisciplinary research activities will be conducted using JARING as the means for data communication.

Topology. Nodes will be set up in various parts of the country according to the distribution of users. Dedicated leased-lines at speeds of 9600 bps to 64 Kbps will be installed to link the nodes. Dial-up lines at speeds of 1200 bps to 9600 bps will be made available at certain nodes. JARING is linked through the public X.25 network (MAYPAC). Its major link is to other countries is through "uunet" in USA.

Protocol. All nodes support X.25 protocols. Some nodes will also support TCP/IP.

Cost. Local users have to pay the cost of connection to the nearest JARING node. Infrastructure and communication cost within the country is paid by the government through the Project allocation.

*Malaysian Institute of Microelectronic Systems (MIMOS) 7th Floor, Exchange Square Jalan Semantan, Damansara Heights 50490 Kuala Lumpur MALAYSIA

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016.10.1 Low cost global electronic communications networks for Africa

by Mike Jensen & Geoff Sears <mikej@gn.apc.org> <gsears@igc.apc.org>

Introduction

Electronic mailbox and messaging services offer an ideal tool for enhancing communications in Africa. Electronic mail can be less expensive and more convenient than facsimile or telex wherever a computer and phone line are available. However, the communications infrastructure in the African countries varies from very good to very marginal. As a result, the appropriate communications solution may vary from one location to the next. This paper outlines the two basic means of connecting mailboxes to the global network and discusses which method may be the most appropriate under various circumstances.

Local Network Applications in Africa

Bulletin Board systems, both those packages designed for single users as described above, and full-scale systems supporting several users (not simultaneously, though), are already being used by a number of organizations in Ethiopia, Kenya, Uganda, Tanzania, Zambia, Zimbabwe and South Africa. The International Development Research Centre (IDRC) in Ottawa, Canada has been responsible for helping to establish many of these networks by funding the ESANET, PADIS, WEDNET and NGONET projects described below.

NGONET. The NGONET Africa project is based out of the Environment Liaison Centre International (ELCI) in Nairobi, where a Fido bulletin board system has been set up to provide a conduit for electronic mail traffic in the region and to NGOs worldwide. This is done using a high-speed modem to make daily calls to the GreenNet Fido gateway in London. The project is also supporting the MANGO (Micro-computer Assistance for NGO's) Fido bulletin board project in Zimbabwe (see below) and plans to assist in the establishment of a third bulletin board system in Dakar

and another possibly in Ghana.

In particular, support is being given to improving the flow of electronic information around the preparations for the UNCED conference in Rio, Brazil in 1992. An earlier survey found there were significant numbers of NGOs which had computers but were not using electronic mail yet. A total of 48 NGOs are being identified to receive modems, training, documentation and support.

Electronic mailbox and messaging services offer an ideal tool for enhancing communications in Africa.

ESANET. ESANET (Eastern and Southern African Network) is a pilot project to link researchers at universities in Uganda, Tanzania, Zambia, Zimbabwe and Kenya with each other and with researchers worldwide by installing electronic mail facilities at the computer centres of universities in these countries. ESANET is based at the University of Nairobi Institute of Computer Science. To maximise scarce resources, coordination and technical support is being shared with the NGONET project. Where there is no local NGO host system it has been agreed that NGOs will be able to use the resources of the campus based nodes.

Nodes are currently being installed in Kampala - Makarere University - nodename MUKLA, Nairobi - nodename UNICS, Dar es Salaam - University of Dar es Salaam/Eastern and Southern African Universities Research Project - nodename ESAURP, Lusaka - University of Zambia Computer Center - nodename UZCC, and Harare - University of Harare Computer Centre - nodename UHCC.

Each node runs a suite of Fido software on an IBM compatible AT with 40 MB hard drive, high speed modem (PEP) and dedicated phone line. Zambia, Kenya and Harare can connect directly to the GreenNet Fido gateway (GNFido), while Uganda and Tanzania can only connect via Nairobi because direct dialling facilities outside the PTA (Preferential Trade Agreement) area are not available. Zambia has begun to experiment with direct dialling to London and the other nodes are expected to begin testing connectivity later next month. They are still awaiting arrival of hardware shipped from Nirv Centre (Web) in Toronto, Canada.

HealthNet. HealthNet is operated by a Boston based NGO called Satellife which was initiated as a project of the International Physicians for the Prevention of Nuclear War (IPPNW). Satellife have purchased 60% of the capacity on the University of Surrey (UK) built Uosat-F satellite. This will initially be used to exchange health and medical information within the same Universities (coincidentally) participating in the ESANET project and via Memorial University in Newfoundland Canada. Memorial is an appropriate site because of Dr Maxwell House' work with telemedicine and because it is so far north the satellite passes overhead 10 times a day on its polar orbit.

Because of the total overlap in institutions in Africa, the HealthNet project is being administered by the African participants as part of the ESANET project to evaluate alternative data transport methods. Although the current traffic is limited to health related issues, it will be up to the individual participating institutions in Africa to obtain clearance from the authorities for a wider interpretation of the health mandate. As far as the funders of the HealthNet project are concerned, this could encompass a much broader range of environmental and social issues. Currently however, only Zambia has been successful in obtaining approval for the installation of the ground station and this was with a specific medically oriented application.

The Zambian approval nevertheless sets a precedent for the authorities in the other countries. Also Zambia will now be able to host satellite traffic from the other participating countries via direct dial telephone lines with the ESANET Fido network until other ground stations have been approved.

PADISNET. The Pan African Documentation Centre Network - PADISNET is a project to link 34 countries into a network of participating development planning centres which exchange databases and information. PADIS is based at the United Nations Economic Council on Africa (UNECA) in Addis Ababa which also operates a Fido node connecting on demand to London, South Africa and the US. NGONET and PADISNET project workers have held joint workshops it is likely that the two projects will be able to share resources in the support of other nodes in Dakar-Senegal (CRAT), Accra-Ghana (AAU), Dar es Salaam- Tanzania (ESAURP).

WEDNET. WEDNET supports research on women and natural resource management. The aim is to link researchers in Senegal, Ghana, Burkino Faso, Nigeria, Sudan, Kenya, Zimbabwe, Zambia and Canada via electronic communications and conventional networking. WEDNET is also based at ELCI in Nairobi.

WorkNet. WorkNet operates as the national electronic network host for NGOs in South Africa. The network has been established for about three years and now has about 150 users on a multi-user BBS programme called MajorBBS. Users include the labour movement, human rights groups, the alternate press, documentation centres, service organisations and church groups. The ICTFU has funded the development of gateway software which will allow MajorBBS users to send messages to other systems and obtain conference postings. The MajorBBS format is converted to the Fido standard and a separate machine operates as a Fido bbs to transmit and receive the messages. The Fido machine is now officially registered on the Internet (worknet.alt.za) and is in daily contact with MANGO in Harare and the GreenNet Fido gateway in London via high speed (PEP) modem. An X.25 leased line is already on premises awaiting the installation of X.25 software and PAD in September/October.

MANGO. MANGO is a bulletin board service in Harare, Zimbabwe, operated by a collective of NGOs:; Africa Information Afrique (a regional news agency), EMBISA (religious development group), SARDC (Southern African Research and Documentation Centre), EDICESA (Ecumenical Documentation and Information Centre for Eastern and Southern Africa), and SAPES (Southern Africa Press Service). It was recently agreed that the system be made available to the NGO community as a whole and a fee structure has been developed. MANGO now connects three times daily with the Web Fido gateway in Toronto. In addition it connects three times a day to WorkNet in Johannesburg.

Through this system users in Africa can gain access to the community of 10,000 NGOs and individuals

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ARSONET. ARSONET is a CIDA professional development project to link the Africa Regional Standards Authorities in Addis Abbaba-Ethiopia, Nairobi-Kenya and Cairo-Egypt with Fido networking technology. In all these networking initiatives users are connecting to their nearest host node. This provides them with a link to the global network for receiving or sending private messages and public bulletins via a gateway operating at the Association for Progressive Communication's London host - GreenNet. Through this system users in Africa can gain access to the community of 10,000 NGOs and individuals working in peace, social development and

environmental issues who use the APC network.

With a 2400 baud modem, users are reliably achieving transmission speeds of 220 characters per second (cps), even on relatively poor phone lines. Because the messages and files are automatically compressed before transmission to as little as one third of their original size (and even more for fixed length record databases - up to 10 times) it is possible to send or receive about 40,000 characters (about 6,500 words) during a one minute call. Because the connection between the computers is all under control of the machine at each end, the only time when the full 220 cps transmission speed is not being achieved is during the first 10-15 seconds while handshaking between the two computers takes place.

Creating African Electronic Mail Host Systems

The methods and systems described above are the early stages of establishing full electronic mail hosts systems in Africa, owned and operated by Africans.

Complete electronic mail, computer conferencing and database systems are now being run on small and relatively inexpensive microcomputers ('286, '386, SPARC based hardware platforms can all be set up for between $5,000 and $15,000). Locally-based systems such as these can greatly reduce the costs to the individual user of computer-based telecommunications. In this case users can make a local phone call and share the cost of the international connection, rather than all individuals competing for scarce and expensive international lines.

The benefits of such local operations has been proved by small UNIX systems installed by the Association for Progressive Communications, the RIO project in French-speaking countries of Africa and the Caribbean, and by the Bureau for Latin America of the United Nations Development Programme in Cuba, Bolivia, Ecuador and Costa Rica, and by BBS systems operating in several Eastern European and African countries. These benefits include service at a far lower cost than presently available.

There is now a variety of software and hardware available for this purpose. Selection is not easy; some factors to consider include not just the cost of the original equipment, but the availability of skilled technical people to maintain the system, the availability of spare parts, and the cost and availability of technical support from vendors. The significant barriers to rapid implementation are the need to train system operators and the high state tariffs on computer and communications equipment.

The challenges of making this technology work in Africa are balanced by significant rewards. African countries are in a position to leap-frog technologies and install relatively sophisticated information technology now, skipping older, less effective techniques and methods. With this kind of information system in place, dialogue and information exchange regionally and internationally can greatly expand, with benefits to every sector of African development.

*A computer engineer based out of London. He was a founder of Web, a non-profit computer network in Canada, and, while working at GreenNet in London, developed software to gateway the UNIX systems of the Association for Progressive Communications with the FIDO world. Most recently he has been traveling extensively in Africa setting up small BBS systems and training non-governmental organizations to use them.

GreenNet 23 Bevenden Street London, N1 6BH, ENGLAND tel: +44 71 608 3040

fax: +44 71 490 4070

** Director of the Institute for Global Communications in San Francisco, California. IGC operates the non-profit PeaceNet and EcoNet international computer networks. IGC is a founding member of the Association for Progressive Communications, and is currently involved in the establishment of computer networks in the USSR, Eastern Europe and Latin America.

Institute for Global Communications 18 de Boom Street, 1st Floor San Francisco, CA 94107 tel: +1 415 442 0220 fax: +1 415 546 1794

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016.30 United Nations Development Programme by Lawrence Yeung <lawrence.yeung@nygate.undp.org>

UNDP is one of many agencies within the United Nations system, with its own Governing Body and an Administrator, Mr William H. Draper III.

Why is UNDP interested in Internet? Well, our Statement of Purpose will underline the work we set out to do in networking offices in developing countries.

UNDP promotes human development; we seek to create opportunities through which people's abilities, talents and creativity can find full expression. We help countries to develop the capacity to manage their economies, fight poverty, ignorance and disease, conserve the environment, and stimulate technological innovation.

UNDP builds partnerships to foster human development (and telecommunications is a major component of this development). We forge alliances with the people and governments of developing countries, with the donor community, with the specialized agencies of the United Nations, and with private institutions and non-governmental organizations.

UNDP works in more than 150 developing countries and territories. Through our worldwide network of offices - and in dialogue with governments and other development partners - UNDP supports programmes for human development. These spring from national priorities and are shaped by local culture. Beyond this, UNDP manages an increasingly diverse range of development services through its country offices.

UNDP plays a leading role in coordinating the development efforts of the United Nations system. In times of disaster - natural or human - UNDP helps orchestrate the United Nations' response in the field.

UNDP operates across national boundaries. We sponsor programmes that are regional, interregional and global in scope. We promote the sharing of experience among developing countries and draw international attention to issues of global concern. Communications with institutions, universities, academic and research personnel are an integral part of our activities.

The structure in UNDP can be logically divided into programme and core (corporate), although these activities are interlinked. Programme work in the field is managed by four Regional Bureaux in conjunction with the field offices and project staff. The Bureaux are Asia and Pacific, Africa, Arab States and Europe, and Latin America and the Caribbean.

The connection of UNDP headquarters to Internet ...via a dedicated 56

Kbps line...opens up a new chapter for information access...

Telecommunications are major elements in UNDP's global development. A number of Governments have asked UNDP to improve their ability to coordinate and access information using electronic means. For its corporate work, use of telephone service is dominant, not just for voice, but for facsimile and electronic mail. Telex has been the traditional means of communications between headquarters in New York and the field offices. Moving away from this outdated mode of communications has been slow.

More than 50 field offices are presently using email through TCN (Telecommunications Co-operative Network) using BT/Tymnet services. To cater for emergencies and to alleviate the difficulties of the local loop in some countries, portable INMARSAT (International Maritime Satellite) terminals are located in nearly 40 countries. High Frequency, Very High Frequency and Ultra High Frequency radio networks for communications between field offices and in-country locations have also been established. Lastly, mail, pouch (diplomatic), and courier services complement the rest of UNDP's communications means.

The connection of UNDP headquarters to Internet via Princeton University in New Jersey, USA was made in November 1991. This interconnection, via a dedicated 56 Kbps line between a Novell LAN (local area network) of 1,500 workstations and Internet, opens up a new chapter for information access, not just for UNDP personnel but for some authorized Government missions and agencies. We will explore some of our objectives on this connection in the next issue.

* Telecommunications Coordinator, UNDP, New York.

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020.06 Education by Steve Ruth <ruth@gmuvax.gmu.edu>

An evolving project in the Czech and Slovak Federal Republic (CSFR) has made a contribution to improving the ability of universities, laboratories, and other complex and expensive improvements in data communications infrastructure. Funded by the Mellon Foundation, the project has had a role in making CSFR's first year as a full-fledged user of international networks successful.

Since last November when the first node was established in Prague, over two thousand new network users have been registered and monthly message volume has steadily risen to over a billion characters per month. CSFR's monthly EARN volumes are consistently higher than those of other Eastern European users like Poland and Hungary.

The Mellon grant offers "Value Added Services" that are aimed at bringing the low unit costs of academic networks to many more users than would normally be possible. Also, these users become much more sophisticated in network capabilities and are better prepared to take advantages of better hardware and software as they become available.

Many smaller institutions are particularly helped by this process. For example, the Palecky University in Olomouts in central CSFR probably would have had to wait for a year or more--until mid or late 1992--to be able to connect to the networks under normal circumstances, but through special training and network services they were connected in January of 1991.

This enabled the rector, Dr. Josef Jarob, and his faculty to have the

ability to be in direct contact with hundreds of thousands of researchers in nearly sixty countries at a cost of a few cents (five CSFR crowns) or less per message. Jarob immediately took advantage of this opportunity, using the network to contact various institutions to establish fellowships, scholarships and major grant arrangements around the world.

The faculty of Palacky University routinely exchange manuscripts, research findings and other data with an expanding group of colleagues around the world. In addition, one of their major grant proposals, to establish a university wide local area network, has already been funded and the equipment and training provided. Using the network greatly facilitated the preparation and approval of the grant.

A similar case is that of the Czech Academy of Physics which received help to revise existing network software to accommodate several hundred researchers who would normally have had to wait for a year or more to be connected to the international networks. They were connected in the spring of 1991. About a dozen other diverse value added projects are already completed or under way.

The administrator of the Mellon grant, Dr. Stephen Ruth, director of the International Center of Applied Studies in MIS at George Mason University <ruth@gmuvax.bitnet> or <intmis@ gmuvax.bitnet>, sees the value added services approach as appropriate for all of Eastern Europe as well as the former Soviet republics. "It makes sense to take full advantage of the networks that already exist by giving every professor and student in the world a chance to be in contact with others. Eventually the telecommunications infrastructure will improve, but these opportunities exist now and we don't have to wait."

It makes sense to take full advantage of the networks that already exist by giving every professor and student in the world a chance to be in contact with others.

Ruth is particularly impressed with the results in CSFR where the first year's outcomes have been three times the estimates made before the project began. He is now working with organizations in Moravia and Slovakia to assist in increasing their network use and expects nearly a thousand new users from that region in the coming year.

The project also aims to involve the faculties and students in liberal arts and the humanities, medicine, law and other disciplines that frequently are among the last to become proficient in informatics technologies.

Ruth and Harry Barnes, former U.S. ambassador to Romania, have recently received approval and funding to begin a similar project in Romania where they begin with three major nodes in Bucharest sometime later this year. Says Professor Ruth, "We would like to do this in all the countries of Eastern Europe, the Baltics and of course the former Russian republics. By concentrating on the user and not so much on the hardware, our approach is very low in unit cost and the results in CSFR speak volumes about who is benefiting."

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O20.15 Biomedicine, by Ted Shortliffe <ehs@camis.stanford.edu>

Although late to join the Internet community, biomedical researchers and educators have been increasingly aggressive in their efforts to connect to the network and to articulate a vision of what national electronic

connectivity and information access can mean to both the medical practitioner and the biomedical researcher.

A recent report from the Institute of Medicine (Computer-Based Patient Records: An Essential Technology for Health Care, National Academy Press, November 1991) has been particularly explicit about the need for an enhanced role of the biomedical community in national network planning.

Most academic health science institutions are joined to the Internet via their main campus computing and communications facilities. This has left community hospitals and other non academic healthcare institutions with a limited understanding of the Internet and a simultaneous lack of models for how they might best get connected to their regional networks. The National Library of Medicine is hoping to address this problem as one aspect of its role in the national High Performance Computing initiative.

To help address both the clinical and research uses of networking in biomedicine, the American Medical Informatics Association (AMIA) has identified Broadband Networks, High Speed LANs and Multimedia as one of the two tracks in its annual Spring Congress to be held at the downtown Marriott Hotel in Portland, Oregon from 7-9 May 1992 (the second track deals with Decision Support Systems in biomedicine).

The program chairman for the networking track is Dr. Jerome Cox from Washington University <jrc@wucs1.wustl.edu> and more information about the meeting may be obtained from the AMIA Offices, 4915 St. Elmo Ave, Suite 302, Bethesda, MD 20814 Tel: +1 301 657 1291 or email to <mutnik@lhc.nlm.nih.gov>. Abstracts are due 10 January 1992 and the preliminary program will be available by 1 March.

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020.20.1 Internet Online Public Access Catalogs by Billy Barron* <billy@vaxb.acs.unt.edu>

For the first issue of the Internet Society newsletter, I thought would start with the Internet Online Public Access Catalogs (OPACs), the most well known Library Science application of the Internet. OPACs primarily offer access to bibliographic information. Uses of this information range from InterLibrary Loan to Research to collection development.

Currently, the bulk of the OPACs on the Internet are in the English speaking countries. Hopefully, this will change in the near future. According to my sources, we should see a good number of libraries in Finland soon on the network.

The primary mailing list on OPACS is called PACS-L. It is housed on ukupvm1.uh.edu or uhupvm1.bitnet. Subscriptions may be obtained by sending mail to LISTSERV on that node with "SUBSCRIBE PACS-L firstname lastname" as the body of the letter.

Many sources of information on accessing Internet OPACs are available via anonymous FTP. I try to maintain a fairly complete collection on ftp.unt.edu in the library directory. The guide of the most general use is my own which is in the filenames starting with LIBRARIES.

*VAX/Unix Systems Manager, University of North Texas.

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020.20.3 Library Science, by Michael Break* <LIBMLB@vaxb.heriot-watt.ac.

uk>

Libraries are becoming heavy users of the network both for their operations and to provide information services for their users. There are a range of applications already in use, including:

(i) electronic mail for individual communication and for the provision of specialist discussion lists, exchange of information;

(ii) access to OPAC's (Online Public Access Catalogues) connected to campus networks;

(iii) exchange of bibliographic records, which are more cost-effectively produced on a shared basis;

(iv) transmission of inter-lending requests and experiments with transmission of full text documents for direct supply to end-users;

(v) access to remote databases, such as the UNCOVER journal article database or to the three ISI Citation Indexes available over the JANET network to staff and students in UK universities.

However, as the number of resources available on the network increases, there are several major problems emerging:

* it is increasingly difficult for a user to identify and locate potential relevant resources to satisfy a need for information in a specific area, particularly if the user is not a specialist in that area.

* each resource is mounted as part of its own independent information retrieval system and there is a need to learn a new, unique user interface for each resource.

* there is no simple way to move results from one system to another for consolidation, analysis, and storage since access to each system is through remote login.

These problems are is being addressed in a number of ways:

(i) through the development of Internet resource directories, but they will need to provide the facilities of deep indexing and convenient searching.

(ii) front-end based systems that provide the user with a common interface to a range of disparate systems, but this is currently only in the form of menu gateways which provide login facilities to remote services.

(iii) the development of applications-layer protocols, such as Z39.50 or Search and Retrieve, which allow a client machine to submit a search to a server, manage the search process and learn the outcome.

The establishment of the NREN (National Research and Education Network) in the USA has been strongly supported by the library community and the Association for Research Libraries (ARL), EDUCOM, and CAUSE have recently formed the Coalition for Networked Information (CNI) to promote and address issues related to the availability and role of networked information resources. CNI's agenda is "to develop a set of initiatives to address the public policy issues and to identify and assign priorities for the provision of information resources on the NREN."

Issues will include:

intellectual property rights
standards
licensing
service arrangements
charging algorithms and cost-recovery fees
economic models
identifying information resources for NREN.

Access to networked information resources will soon be one of the major issues in the development of national computer networks.

The recent approval for funding for the SuperJANET network in the UK, will be encouraging similar organisational initiatives there building on the already close relations between libraries and computing centres.
Access to networked information resources will soon be one of the major issues in the development of national computer networks.

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O20.23 Mathematics by Flemming Topsoe* <topsoe@euromath.dk>

An issue of central importance for efficient electronic interchange and processing of mathematical documents is that of standard representation. In order not to limit future possibilities, the representation should reflect structure, i.e., mathematical semantic content (rather than layout). A completely faithful representation is neither feasible nor desirable.

The best chance to achieve a result within a short time horizon seems to be to agree on a selection of DTD's (Document Type Definitions) in the sense of SGML (Standardized General Markup Language) in order to define types of Mathematical Documents (Articles, Expressions, etc.).

A committee with an aim as indicated above has just been formed as a sub-committee of a committee sponsored by AAP (American Association of Publishers). The committee is chaired by William B. Woolf of the AMS (American Mathematical Society) and will base its work on suggestions and results already obtained by the following organizations or projects:

AAP
AMS
Arbortext
Euromath Project,
ISO (TR 9573)
TEI (Text Encoding Initiative)

It is an absolute necessity that professional mathematicians take an active part in this work.

Interested persons should contact the chairman, W.B.Woolf <wbw@math.ams.com>.

*professor, University of Copenhagen, Mathematical Institute, Denmark.

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O20.45 Disaster Assistance by Marie-Jo Floret* <floret@unicc.bitnet>

The Office of the Disaster Relief Co-ordinator, UNDRO was created in December 1971 as a focal point within the United Nations System to mobilize and co-ordinate international relief assistance in case of a

disaster, as well as to promote preparedness and prevention of natural disasters. UNDRO is headed by the United Nations Disaster Relief Co-ordinator who reports directly to the Secretary-General. The Co-ordinator's responsibilities include:

(a) Mobilizing, directing, and co-ordinating the relief activities of the various organizations of the UN system in response to a request for disaster assistance from a stricken state;

(b) Co-ordinating UN assistance with assistance given by inter-governmental and non-governmental organizations, in particular by the International Red Cross;

(c) Promoting the study, prevention, control and prediction of natural disasters;

(d) Assisting in providing advice to governments on pre-disaster planning in association with relevant voluntary organizations;

(e) Acquiring and disseminating information relevant to disaster relief;

UNIENET is an electronic network which places members of the world-wide disaster management community in direct contact with each other, and provides them instantaneously with both background and operational disaster-related information

(f) Preparing a biennial report for the Secretary-General, to be submitted to ECOSOC and to the Assembly.

In subsequent resolutions the UN General Assembly has further regulated international action in emergency situations and has reaffirmed the mandate and central position of UNDRO in the management of natural disasters and other disaster situations.

UNDRO's Communications and Information Systems

UNDRO maintains a computerized directory of fax and telex numbers which allows timely delivery of information to emergency contacts worldwide.

UNDRO also maintains several databases. Some are only available internally such as the roster of experts in disaster management and the disaster-prone country profiles. Others, although maintained internally, are partly available through the United Nations International Emergency Network (UNIENET).

In addition to the above, UNDRO makes use of databases produced with assistance from UNDRO by external collaborative institutions. This applies, in particular, to the disaster events and the emergency country factsheet databases produced by The Centre for Research on the Epidemiology of Disaster (CRED), which is located in Brussels.

Established in 1987, UNIENET is an electronic network which places members of the world-wide disaster management community in direct contact with each other, and provides them instantaneously with both background and operational disaster-related information. UNDRO is responsible for the administration of the network. UNIENET operates as a joint venture with other organizations active in disaster management.

The Bulletin Boards and Databases on the network cover a wide range of topics such as:

UNDRO:
Disaster Situation Reports
Emergency Contacts
Disaster Relief Contributions
Disaster History
Disaster News in Brief
Disaster Related Terminology
Conferences and Meetings
Training Resources
Press Releases

IDNDR:
National Committees

FAO:
Special Alerts and Reports
Food Situation in Africa
Foodcrops and Shortages

WHO:
Current Disaster Situation

PAHO:
Latin America Conferences

ICVA:
NGO Database

*Disaster Assistance Coordinator, UNDEO, Geneva.

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020.55.1 Internet and Environmental Law, by John E. Bonine* <jbonine@oregon.uoregon.edu>

John Muir, nineteenth century naturalist, once wrote that when you take hold of anything in this world, you find that it is hitched to everything else.

A growing number of young environmental lawyers and public interest scientists around the world are putting this principle of ecology to use in the Information Age. They are using electronic mail and computer conferencing to obtain information transnationally that before now has been largely unobtainable in their own countries.

With this information and advice, they are rewriting the book on environmental law in the developing world. Environmental Law Alliance Worldwide (E-LAW), formed by public interest lawyers from Peru, Ecuador, Australia, Malaysia, Indonesia, the Philippines, Sri Lanka, and the U.S., recently began operation. Members of E-LAW are committed to helping get good science and legal information into the hands of lawyers (often volunteers) who are representing citizen groups at the grassroots level.

Their goal is that government policies will be made with the full participation of those affected by pollution and environmental harm, and that environmental laws will be properly enforced.

After receiving a grant in late 1990 to get the Alliance off the ground, the E-LAW members decided that rapid, cheap communications through e-mail had to be at the heart of their work.

For their initial e-mail and conferencing host, they selected Pegasus in Australia and Econet/Peacenet in the U.S. (a project of the nonprofit Institute for Global Communications (IGC) and member of the Association for Progressive Communications (APC)).

Within a few months they had E-LAW offices in Malaysia, the Philippines, Australia, and the U.S. online through national packet-switching networks. Other countries have proved to be much more difficult.

The greatest quantitative difference in environmental protection through information exchange can be obtained in those countries that have the least access to computer networks. When the barriers of cost and technology are high, successfully leaping those barriers with environmental law and science information can be like a drink of water to a parched person. Consequently, E-LAW participants found that to link together they would have to use whatever computer links were available, and ask for help where none exists.

In Ecuador E-LAW has been working to get connected through Ecuanex, an academic and nonprofit uucp network partially funded by the United Nations Development Programme.

In Peru the public interest lawyers are waiting for the final steps in setting up PeruNet to be completed. E-LAW's public environmental law discussion conference is now carried through Internet/Bitnet/Fido links to three dozen bulletin boards in Germany, Austria, and Switzerland on ComLink, and is now being started on Worknet in South Africa and Mango in Zimbabwe.

The conventional wisdom said that Sri Lanka is impossible. But monitoring of a mailing list devoted to technical discussions of low-cost e-mail revealed that a new academic and research UUCP network is being established in Sri Lanka (LankaNet).

E-LAW moved quickly to get hooked up and professors at the University of Moratuwa cooperated. In the Philippines, the E-LAW offices has experimented with FidoNet as a possibly cheaper alternative to direct calls to Econet.

Meanwhile, international networking expert Randy Bush of Portland, Oregon, has been advising the non-technical E-LAW users in Eugene about adopting a more distributed approach through the Internet, Bitnet, and UUCP, particularly where the APC systems do not reach. Working with Econet, he has designed a linked mailing list that will allow E-LAW's discussion conferences on Econet to be networked through the Internet to quite remote sites, despite the e-mail-only connection.

Does all this make any difference? Owls in Australia and Amazonian Indians in Ecuador would be likely to say yes.

An urgent request was flashed to E-LAW U.S. in August for information that would help an Australian barrister protect the Sooty Owl and 24 other sensitive species in a State Forest. In response, a U.S. scientist who had worked extensively on both the Northern Spotted Owl of the Northwest U.S. and the Sooty Owl in Australia produced decisive evidence. A court granted an injunction against the logging in late September. The court's ruling that the government was violating a variety of environmental laws has been called one of the most significant in Australian environmental history.

Ecuadorian public interest lawyers have been fighting to prevent oil

drilling in a National Park in the Amazon considered to be the most biologically diverse on the planet. They uncovered information on improper interferences in the Ecuadorian judicial system by certain foreign oil companies, drew up a complaint to the U.S. government, and publicized the complaint worldwide on computer networks.

Combined with other activities by rainforest protection groups, it appears that these efforts had something to do with the announcement in October by the major North American oil company seeking drilling permission that it would not pursue the project.

Other public interest lawyers are seeking information on the safety of planned nuclear plants in Asia, on health effects of a plastics production process in Sri Lanka, and on threats to still other National Parks in South America and Central America.

The thirst will not soon be sated. Once the information stream starts trickling through the Internet, Bitnet, UUCP, FidoNet, and APC systems into a region, numerous nonprofit groups and their public interest attorneys quickly line up to drink from it.

In the end, environmental policy decisions will be made by the governments, courts, and peoples of each country. But until now there has been an imbalance in information and persuasion.

...those who question the safety or environmental impacts of unwise projects are catching up, and the nonprofit computer networks like the Internet are providing the essential basis for changing the balance.

Those who build or operate industrial or development projects have had worldwide resources to press their points of view. They could even (as in the case of toxic dumping in the Third World) roam the world searching for countries where information about possible dangers is the most absent. Now, those who question the safety or environmental impacts of unwise projects are catching up, and the nonprofit computer networks like the Internet are providing the essential basis for changing the balance.

* Professor of Law, University of Oregon

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030.50.1 Gigabit Networks by Robert E. Kahn* <kahn@nri.reston.va.us>

A small number of research sites will soon be gaining limited access to experimental networks which support end-end user communication rates on the order of a gigabit per second (i.e. a billion bits per second). While many technical problems must be solved before wide-area common-user networks are available with this capability, it cannot be assumed that they will simply happen because all the technical problems are solved.

Backbone speeds on the order of Terabits per second and higher will be necessary to support a large user community with gigabit access speed requirements...

High speed "network backbones" have been cost effective for multiplexing large numbers of lower speed users. Backbone speeds on the order of Terabits per second and higher will be necessary to support a large user community with gigabit access speed requirements in a wide-area common user network. Many factors, including sustained throughput requirements, acceptable levels of delay, the need for real-time delivery guarantees

and overall size of the market will surely be taken into account in determining the price of gigabit network services.

Quantitative changes often lead to qualitative changes when the magnitude of change is sufficiently large. Substantial investment is being made in the development of 1) gigabit technology for computing and communications and 2) lightwave technology for all-optical networking at much higher speeds.

However, a critical concern is identifying and developing applications that require or can make effective use of such high data rates to the end user. For over twenty years, network users have relied principally on text-based forms of communication due to limitations in speed of existing computer communication networks to the range of megabits per second and less.

With the advent of common user networks operating at speeds on the order of a gigabit per second or more, new visual forms of communication becomes practical including the regular use of images, graphics and real-time video. End-user data rate requirements can also approach gigabit per second speeds with real-time high-resolution large screen display systems. The impact on the user of such visual communication systems may be hard to quantify, but the practical result will be a radical alteration of the relationship between a user and data output from a computer or network. Visualizing the pictorial output of a simulation can take place in a fraction of a second, while scanning reams of printed computer data may never afford a clear picture of the results no matter how much time is taken to absorb it.

High Performance Computers may also need to interact with each other at gigabit per second speeds. This is currently a subject of considerable interest within the scientific community. The value of such high speed computer interactions, once they have been demonstrated, may eventually be of interest to many other sectors of society.

Other uses of gigabit networks may not lead to qualitative change immediately. It is clear that higher speed networks will enable computers to exchange files more quickly, but this may not necessarily produce any real or perceived benefit to the end user.

In those cases where storage exists to hold extremely long files and databases, one-time transfers of large data sets on demand or by pre-arranged distributions of these data sets at selected user sites on a network may be desirable. However, these transfers need not necessarily occur at gigabit per second speeds and remote use of the files may even be possible initially. The speed of such network transfers can be technologically impressive and may not disadvantage the application, but it may be unnecessary in many cases as well as unaffordable.

In weighing the value of gigabit networks to the end user, one must include the basic economics, the competitive value, the qualitative value and the changes (real and perceived) wrought by such new technological capabilities. For many applications and users, lower speed network alternatives may well suffice. However, as technology matures and advances, the relative cost of gigabit technology and services can be expected to decrease and we should ultimately see the widespread deployment of the technology to all sectors of society.

Gigabit technology will be expensive to build and deploy for many more years. When the technology is widely available and networks are deployed with end-end gigabit speeds, users can begin to explore possible new

uses and applications that may create a significant marketplace for gigabit services. But, without an existing or nascent market for gigabit speeds to the end-user, industry will find it difficult to justify many of the requisite initial investments. We plan to explore various aspects of this "chicken-egg" problem along with other matters relating to gigabit networks in future columns.

* President, Corporation for National Research Initiatives, Reston, Virginia, USA.

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030.50.2 Gigabit Networks by Craig Partridge <craig@aland.bbn.com>

There are now strong signs that research and development in gigabit networking has begun to make that critical move from paper studies to real systems of fiber, silicon and lasers.

First, we're beginning to see a flood of papers from researchers who have built at least some hardware. Two different papers on recently constructed ATM (Asychronous Transfer Mode) interfaces were published at SIGCOMM '91. The folks at Cambridge University have been reporting interesting work with their 600 Mbit/s prototype of the Cambridge Backbone Ring. And IBM-Zurich demonstrated its gigabit LAN at a telephony conference this fall. (Indeed, it is somewhat sobering truth that we may be innundated with gigabit literature in 1992.)

A second, and possibly more important, development is that the computer communications community has begun to get seriously involved in the process of making standards for future gigabit networks. In particular, the computer communications community began to get involved in Broadband ISDN (B-ISDN).

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the computer communications folk had taken a close look at B-ISDN and concluded that it didn't adequately support the transmission of datagram traffic
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The standards process for Broadband ISDN (which is built on ATM) has been underway in CCITT for a few years now. B-ISDN is the technology that the telephony community plans to deploy in the coming decades to serve a wide range of voice and data communications requirements.

Before late 1990, almost no one in the computer communications community (people worried about making computers communicate) had looked very closely at the B-ISDN standards. By late 1991, the computer communications folk had taken a close look at B-ISDN and concluded that it didn't adequately support the transmission of datagram traffic (a big concern for protocols like IP!).

So in late 1991 a consortium of computer companies (Apple, BBN, DEC, IBM Motorola/Codex, Sun Microsystems and Xerox) brought their concerns before the US ANSI T1S1.5 standards committee in the form of a proposal called SEAL to augment the B-ISDN standards.

ANSI and CCITT are trying to wrap up the initial B-ISDN specifications so this late appearance by the computer companies could have caused problems. But instead, in a pleasant case of the standards process working as it should, the consortium's contributions were welcomed and the committee agreed to ask for a change to the ATM header to support the SEAL proposal. This change will make it possible to experiment with implementing datagram protocols over B-ISDN.

Some of this implementation work will be done in conjunction with the IETF. Send mail to atm-request@bbn.com to join the IETF discussions). The plan is to take the results of this experimentation and incorporate it into the next standards release.

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030.50.3 The View from the Gigabit Networking World by David J. Farber* <farber@central.cis.upenn.edu>

In subsequent issues of the ISOC Newsletter, this column will cover specific research issues and accomplishments of both the NSF/DARPA/CNRI Gigabit Testbeds Initiatives and other gigabit network related research activities. This first contribution is timely since it is concurrent with the passage of the US HPCC bill.

The U.S. testbeds, Aurora, Blance, CASA, Nector, and VISTANET are an ongoing activity now in the second year of a three year initial program. It aims to provide a set of experimental testbed of different characteristics with the intent of allowing the research community to have the opportunity create and explore working prototype networks.

This would in collaboration with other research activities provide feedback to the hardware and software designers as to what the long term technical requirements would be for a future gigabit NREN.

This will provide an insight into the hardware/software alternatives that must be faced in the creation of the Gigabit NREN as envisioned in the HPCC bill. It is not the intention of the testbeds to have a bakeoff of technology. . We will have a handful of major switch designs, some ideas of what we have to do with protocols and operating systems -- for example the National Backplane ideas, the application level protocols, the speed up of TCP/IP, ATM, PTM etc. These approaches will not be examined in order to "pick one" but rather to get a better handle on the fundamental issues. At the end of the initiative we will be where the Arpanet was back in the mid 70's -- a working set of demos, some protocol ideas and lots of enthusiasm.

These approaches will not be examined in order to "pick one" but rather to get a better handle on the fundamental issues.

And finally and most importantly, I believe we will have a good enough feel for the benefits of gigabit networks to the science community, that we will be able to answer the question we should be asking -- is such a network a reasonable use of limited science resources?

*Director, Distributed Systems Laboratory, University of Pennsylvania, Philadelphia, USA.

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030.60.2 Multimedia by Larry Masinter <masinter@parc.xerox.com>

What's multimedia? For me, "Multimedia" is an adjective; it implies only that human-sensible information is being transmitted (the "media") via the use of more than simple text (the "multi"). That it crosses application areas engenders confusion among those who try to bound the set of multimedia applications.

Much of the current growth of multimedia computing is a byproduct of changes in consumer electronics. The transition of ordinary consumer and office information devices and services (telephones, copiers, cameras, television) from analog to digital is happening because those

devices can be made with better quality, features, and lower cost. These developments shaped the technologies available for multimedia computing today, in support of audio, document imaging, color and video.

In particular, interest in multimedia computing is fueled by the availability of low-cost hardware for aquisition, compression, decompression and reproduction of page images (with scanners, binary image compression using "Group 4" compression, and page-size displays or image-capable printers), color (slide scanners, video frame grabbers, and electronic cameras; JPEG compression, and color displays and printers), sound (these days, most workstations and PCs either have built-in sound capabilties or low-cost add-on boards are available), and full-motion video.

The activities in networking and communication center in two areas: real-time or interactive communication in multimedia applications, and transmission, storage and retrieval of static multimedia documents; call these "telnet" and "ftp".

For the "telnet" applications, the goal is to develop the underlying infrastructure to support communication with real-time requirements.

At the transport layer, the conflicts between the telecommunications and packet-network views of communications seem to be resolving in the ATM standardization community. For more conventional internet activities, we'll watch the development of extensions to X and other windowing protocols for dealing with multimedia data, communication protocols for not-quite-real-time network video and the like.

For "ftp" applications, the focus is on is standardizing the interchange formats and transmission mechanisms for multimedia documents across the network.

Thus, the IETF NetFax group is pushing ahead with a profile for TIFF (Tagged Image File Format) format as the standard for page images (fax or scanned), while the Internet Extensions Task Force has been laying the groundwork for describing and encoding mail containing audio, image or formatted text, possibly in multiple parts.

In other areas, we'll watch for development of interchange standards for particular kinds of multimedia applications; for example, "MHEG" (the Multimedia and Hypermedia Experts Group) is developing an interchange standards for "synchronized multimedia and time dependent hypermedia structures", scheduled to reach initial draft stage some time in 1993. Another group is working on an international standard for AudioVisual Interactive 'scriptware' (AVI).

*Xerox Palo Alto Research Facility

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030.70.2 Directories by Erik Huizer* <Erik.Huizer@SURFnet.nl>

The importance of a global directory service which holds (and provides) information on persons, applications and services, is a necessity that is clearly perceived in the Internet Society. This is true for those aiming at OSI-services as well as for those who prefer IP-based services.

In 1988 the first standard on directory services was published jointly by ICO and CCITT and is commonly known as X.500. This standard has since then been put into practical use in various (cooperating) Directory

Services pilots within the Internet Society. For example the Nysernet/PSI White Pages Project, the FOX project and the European Paradise project.

Many holes have been discovered in the not yet full-grown standard and several working groups within the Internet Society are working on these problems in a joined effort. Within the IETF there are the OSI-DS working group and the DISI (Directory Information Services Infrastructure) working group. In Europe there is the RARE WG3 on Directory Services. The RARE WG3 and IETF-DS group share the same E-mail distribution list for discussions, called: osi-ds@cs.ucl.ac.uk (if you want to subscribe, send a mail to: osi-ds-request@cs.ucl.ac.uk).

The pilot projects mentioned above are all inteconnected, and all use the same 'root' Directory Server for the world, which is based in London (ULCC), and maintained by the Paradise project.

The currently registered amount of data in the pilot projects is not large, but it is growing steadily. A recent survey ("Paradise International Report, november 1991) shows the following figures:

Almost all of this data comes from organizations closely related to the Internet Society. PTT involvement has so far been minimal, but it is expected that this will change rapidly in the next couple of years.

For example, in the Paradise project PTT Telecom (The Netherlands) is a participant, responsible for interwoking tests. Industry, in the form of the major computer manufacturing companies, is showing more and more interest, and is participating in a.o. the IETF-DS group.

Recently the DISI group has published an internet-draft available as draft-ietf-disi-catalog-01.txt, which lists the currently available X.500 products.

Recently the DISI group has published an internet-draft available as draft-ietf-disi-catalog-01.txt, which lists the currently available X.500 products. Within the pilot projects the ISODE/Quipu implementation is the one that is mostly used.

Other products that are used are the Pizarro implementation (fr) and the DirWiz implementation (it). It is expected that in 1992 commercial X.500 products and the e.g. the NIST (custos) product will be integrated into the pilot projects.

*SURFnet BV, Netherlands

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040.10 Internet Activities Board (IAB) by Vint Cerf* <vcerf@NRI.Reston.VA.US>

Apart from its regular standards-review activities, the Internet Activities Board has been paying increasing attention over the last year to architectural imperatives brought on by the rapid expansion and diversification of the Internet. During the summer of 1991, an architectural retreat was convened by the IAB and hosted by the San Diego Supercomputer Center, at which members of the IAB, the Internet Engineering Steering Group (IESG) and a few invitees debated and explored the future needs of the Internet at all levels of the protocol hierarchy.

Many important requirements were recognized, but among the most pressing

were: the need to scale to over one billion (109) networks; the need for a high-quality security architecture; the need for a common, well-maintained and populated "white pages" directory service. A second retreat has been scheduled in early January in Boston, Massachusetts.

The Internet Activities Board announced in early December that Lyman Chapin would assume the chairmanship of the IAB in January, 1992, when the present chairman, Vint Cerf, steps down to devote his attention to the needs of the Internet Society. The IAB also accepted, with regret but with a great deal of appreciation for his service, the resignation of Dr. David D. Clark. Dr. Clark served as chairman of the Internet Activities Board from its inception until 1989, as chairman of the Internet Research Task Force from July 1989 to January 1992, and has been a productive contributor to the TCP/IP protocol suite development for over a decade.

*Vice President, Corporation for National Research Initiatives

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040.20 Internet Engineering Task Force Report by Phillip Gross* <pgross@ nri.reston.va.us>

This is the first report on the Internet Engineering Task Force (IETF) in an Internet Society publication. Therefore, I'd like to start by saying how exciting it is for the Internet Engineering Steering Group (IESG) and IETF to be part of the formation of a new professional society concerned with something very important to us all -- the global communications network called the Internet. The IETF has played a key role under the Internet Activities Board (IAB) in many important Internet development activities. We all look forward to working within the Internet Society in the future.

Since this is an initial report on the IETF, I feel it is important to give an overview of the IETF, how it operates, and how to become more involved in the open IETF activities. I will also give a brief report on the most recent IETF meeting, which took place in November 1991 in Santa Fe New Mexico, USA.

IETF Overview. The Internet Engineering Task Force (IETF) is the protocol engineering, development, and standardization arm of the Internet Architecture Board (IAB). The IETF began in January 1986 as a forum for technical coordination by contractors for the U.S. Defense Advanced Projects Agency (DARPA), working on the ARPANET, U.S. Defense Data Network (DDN), and the Internet core gateway system. Since that time, the IETF has grown into a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet protocol architecture and the smooth operation of the Internet.

The IETF mission includes:

Identifying and proposing solutions to pressing operational and technical problems in the Internet,

Specifying the development (or usage) of protocols and the near-term architecture to solve such technical problems for the Internet,

Making recommendations to the IAB regarding standardization of protocols and protocol usage in the Internet,

Facilitating technology transfer from the Internet Research Task Force

to the wider Internet community, and

Providing a forum for the exchange of information within the Internet community between vendors, users, researchers, agency contractors, and network managers.

Technical activity on any specific topic in the IETF is addressed within Working Groups (WG). All Working Groups are organized roughly by function into nine technical areas. Each is led by an Area Director who has primary responsibility for that one area of IETF activity. Together with the Chair of the IETF, these nine technical Directors (plus, a director for Standards Procedures) compose the IESG.

The current Areas and Directors, which compose the IESG, are:

IETF and IESG Chair
Phill Gross/ANS

Applications
Russ Hobby/UC-Davis

Internet
Noel Chiappa/ Consultant
Philip Almquist/ Consultant

Network Management
James Davin/ MIT

OSI Integration
David Piscitello/ Bellcore
Ross Callon/DEC (retiring)

Operational Requirements
Susan Estrada/ CERFnet
Phill Gross/ANS
Bernard Stockman/ Nordunet

Routing
Robert Hinden/BBN

Security
Steve Crocker/TIS

Transport and Services
Dave Borman/Cray Research

User Services
Joyce Reynolds/ISI

Standards Management

Dave Crocker/DEC

The IETF has a secretariat, headquartered at the Corporation for National Research Initiatives in Reston Virginia, with the following staff:

IETF Executive Director
Steve Coya

IESG Secretary

Greg Vaudreuil

IETF Coordination
Megan Davies

Administrative Support
Debra Legare
Cynthia Clark

The Working Groups conduct business during plenary meetings of the IETF, during meetings outside of the IETF, and via electronic mail on mailing lists established for each group.

The IETF holds 4.5 day plenary sessions three times a year. These plenary meetings are composed of Working Group sessions, technical presentations, network status briefings, WG reporting, and an open IESG meeting. A Proceeding of each IETF plenary is published, which includes reports from each area, each WG, and each technical presentation. The Proceedings includes a summary of all current standardization activities.

Mailing Lists. Much of the daily work of the IETF is conducted on electronic mailing lists. There are mailing lists for each of the Working Groups, as well as a general IETF list. Mail on the Working Group mailing lists is expected to be technically relevant to the Working Groups supported by that list.

To join a mailing list, send a request to the associated request list. All internet mailing lists have a companion "-request" list. Send requests to join a list to <listname>-request@<listhost>.

Information and logistics about upcoming meetings of the IETF are distributed on the general IETF mailing list. For general inquiries about the IETF, send a request to ietf-request@isi.edu. An archive of mail sent to the IETF list is available for anonymous ftp from the directory ftp/irg/ietf on venera.isi.edu.

On Line IETF Information. The Internet Engineering Task Force maintains up-to-date on-line information on all its activities. There is a directory containing Internet-Draft documents and a directory containing IETF working group information. All this information is available in identical format for public access at several locations globally. (See below for locations.)

The "IETF" directory contains a general description of the IETF, summaries of ongoing working group activities and provides information on past and upcoming meetings. The directory generally reflects information contained in the most recent IETF Proceedings and Working Group Reports.

The "Internet-Drafts" directory makes available for review and comment draft documents that will be submitted ultimately to the IAB for standardization and/or submitted to the RFC Editor to be considered for publishing as an RFC. Comments on Internet-Drafts from the wider Internet community (i.e., in addition to those attending the WG sessions at the IETF plenaries) are strongly encouraged and should be addressed to the responsible person whose name and electronic mail addresses are listed on the first page of the respective draft.

The IETF Directory. Below is a list of the files available in the IETF directory and a short synopsis of what each file contains.

Files prefixed with a 0 contain information about upcoming meetings.
Files prefixed with a 1 contain general information about the IETF, the
working groups, and the internet-drafts.

FILE NAME

0mtg-agenda the current agenda for the upcoming quarterly IETF plenary,
which contains what Working Groups will be meeting and at what times,
and the technical presentations and network status reports to be given.

0mtg-logistics the announcement for the upcoming quarterly IETF plenary,
which contains specific information on the date/location of the meeting,
hotel/airline arrangements, meeting site accommodations and travel
directions.

0mtg-rsvp a standardized RSVP form to be used to notify the support
staff of your plans to attend the upcoming IETF meeting.

0mtg-schedule current and future meeting dates and sites for IETF
plenaries.

1id-abstracts the internet drafts current on-line in the internet-drafts
directory.

1id-guidelines instructions for authors of internet drafts.

1ietf-overview a short description of the IETF, the IESG and how to
participate.

1wg-summary a listing of all current Working Groups, the working group
chairmen and their email addresses, working group mailing list
addresses, and, where applicable, documentation produced. This file also
contains the standard acronym for the working groups by which the IETF
and Internet-Drafts directories are keyed.

Finally, Working Groups have individual files dedicated to their
particular activities which contain their respective Charters and
Meeting Reports. Each Working Group file is named in this fashion:

<standard wg abbreviation>-charter.txt

<standard wg abbreviation>-minutes-date.txt

Using FTP, the "dir" or "ls" command will permit you to review what
Working Group files are available.

The Internet-Drafts Directory. The Internet-Drafts directory contains
the current working documents of the IETF. These documents are indexed
in the file 1id-abstracts.txt in the Internet-Drafts directory.

The documents are named according to the following conventions. If the
document was generated in an IETF working group, the filename is:

draft-ietf-<std wg abrev>-<docname>-<rev>.txt , or .ps

where <std wg abrev> is the working group acronym, <docname> is a very
short name, and <rev> is the revision number.

If the document was submitted for comment by a non-ietf group or author,
the filename is:

draft-<org>-<author>-<docname>-<rev>.txt, or .ps

where <org> is the organization sponsoring the work and <author> is the author's name.

For more information on writing and installing an Internet-Draft, see the file 1id-guidelines, "Guidelines to Authors of Internet-Drafts".

Directory Locations. The directories are maintained primarily at the NSFnet Service Center (NNSC). There are several official "shadow" machines which contain the IETF and INTERNET-DRAFTS directories in identical format. These machines may be more convenient than nnsc.nsf.nsf. (Plus, there are numerous "unofficial" sites, that may also be more convenient for specific users.)

To access these directories, use FTP. After establishing a connection, Login with username ANONYMOUS and password GUEST. When logged in, change to the directory of your choice with the following commands:

cd internet-drafts

cd ietf

Individual files can then be retrieved using the GET command:

get <remote filename> <local filename>

e.g., get OOREADME readme.my.copy

IETF Directory Locations.

NSF Network Service Center Address

nnsc.nsf.net

The Defense Data Network NIC Address

nic.ddn.mil

Internet-drafts are also available by mail server from this machine. For more information mail a request:

To: service@nic.ddn.mil

Subject: Help

NIC staff are happy to assist users with any problems that they may encounter in the process of obtaining files by FTP or "SERVICE". For assistance, phone the NIC hotline at 1-800-235-3155 between 6 am and 5 pm Pacific time.

Pacific Rim Address: munnari.oz.au

The Internet-drafts on this machine are stored in Unix compressed form (.Z).

Europe Address: nic.nordu.net (192.36.148.17)

*Advanced Network and Services

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040.25 The IANA Story by Jon Postel* <postel@isi.edu>

The Internet Assigned Numbers Authority (IANA) provides for the assignment of numbers, keywords, and other protocol parameters for the Internet community. For example, the assignment of network numbers, protocol numbers, port numbers, and MIB numbers are the responsibility of the IANA.

The Internet Activities Board (IAB) has the responsibility for the management of the Internet including its address spaces. The IAB has delegated the management of the Internet address spaces to the IANA.

The IANA is located at USC's Information Sciences Institute in Marina del Rey, California, and is staffed by Joyce K. Reynolds and Jon Postel.

The assignment and recording of network numbers is a substantial part of the activity and this has been identified as the Internet Registry. The support of the Internet Registry is currently delegated to the Network Information Center. For the assignment of an Internet network number (an IP address) please contact "Hostmaster@NIC.DDN.MIL".

The following is a list of the types of numbers, keywords and other parameters currently registered or recorded directly by the IANA:

Version Numbers
Protocol Numbers
Port Numbers
Unix Ports
Internet Multicast Addresses
IANA Ethernet Address Block
IP Type of Service Parameters
IP Time to Live Parameter
Domain System Parameters
BOOTP Parameters
Network Management Parameters
ARPANET and MILNET Logical Addresses
ARPANET and MILNET Link Numbers
ARPANET and MILNET X.25 Address Mappings
IEEE 802 Numbers of Interest
ETHERNET Numbers of Interest
ETHERNET Vendor Address Components
ETHERNET Multicast Addresses
XNS Protocol Types
PRONET 80 Type Numbers
Address Resolution Protocol Parameters
Reverse Address Resolution Protocol Parameters
Dynamic Reverse Address Resolution Protocol Parameters
X.25 Type Numbers
Public Data Network Numbers
Telnet Options
Mail Encryption Types
Machine Names
System Names
Protocol and Service Names
Terminal Type Names

The IANA records the assignment of these and other numbers and occasionally publishes lists of the currently assigned numbers and parameters in an RFC titled "Assigned Numbers" (most recently as RFC-1060).

A common request to the IANA is for the assignment of an enterprise or "company private" management information base (mib) number. A more interesting case is a request to assign a port number for a new application or service based on UDP or TCP. In these cases, there is often some discussion to understand the protocol aspects of the use of the port. Normally, a two-page description of the application (focusing on the protocol aspects) is required before a port number is assigned.

Other types of assignments are less frequent. It is always helpful when a request is accompanied by a description of the proposed use of the parameter to be assigned.

To contact the IANA for information or to request a number, keyword or parameter assignment send an electronic mail message to iana@isi.edu.

*Communications Division Director, Information Sciences Institute, University of Southern California

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040.31.1 Resource Discovery Beyond X.500 by Michael F. Schwartz* <schwartz@latour.cs.colorado.edu>

The Internet connects thousands of sites and millions of users around the world. As it continues to grow and offer new types of services, being able to locate and make effective use of the available resources becomes increasingly difficult. To address this issue, the CCITT has developed a directory service specification called X.500, as an OSI application layer standard.

X.500 describes a hierarchical collection of servers, with provisions for caching and replication. Each participating site maintains directory information about resources at that site, as well as administrative information needed for traversing the tree and maintaining proper distributed operation. Unlike the TCP/IP Domain Naming System, X.500 supports authenticated runtime updates, and stores typed data using a structured schema. Field trials conducted by Performance Systems International and the Field Operational X.500 Project demonstrate that there is significant interest in deploying X.500 servers at institutions around the world. Tools exist to ease the task of searching the tree, and to make long-distance operations more efficient. Graphical client interfaces exist for a number of platforms.

X.500 is an important standard with growing momentum, but it is not a complete solution to the resource discovery problem. Its current use focuses primarily on providing a "white pages" directory of Internet users. However, over time X.500 will need to accommodate many other types of resource discovery. Consider two realms very different than user directories: commercial network services, and wide area distributed file systems.

In a commercial network service environment (such as airline computer reservation systems), the resource discovery mechanism should support fair access among competing information providers. This issue will heat up significantly in the next few years, as the U.S. Regional Bell Operating Companies enter the information services market, and the Internet begins explicitly allowing commercial traffic.

Supporting resource discovery in a distributed file system requires support for two distinct problems. First, how does a user discover a needed resource based on an attribute-based description, such as source

code for a particular X-window system application? Second, how does a user locate an appropriate instance of this resource, from among the many replicas available (e.g., by anonymous FTP)? This decision should consider network bandwidth and version information about the file, and eventually should also consider cost and policy routing considerations. The popular Archie system developed at McGill University addresses the first of these problems. The second problem is currently a topic of research.

Beyond supporting different types of resource discovery, other problems arise in trying to organize a widely shared, broad information space. While the hierarchical organization used by X.500 supports scalable decentralized administration, hierarchies become convoluted as an increasingly wide variety of resources are registered. Moreover, hierarchical information is only efficiently searched according to its primary organizational attributes (country and organization in the case of X.500). Searching for resources according to other criteria (such as the functionality of a software package) is inefficient. Inserting cross links between parts of the tree according to such criteria does not adequately solve this problem, since the information is still physically distributed in a fashion that does not permit efficient searching.

Moreover, creating such links requires a large amount of manual administrative effort.

There are a number of research efforts under way to address the problems discussed here. In time, the ideas introduced by these projects may find their way into future versions of X.500.

*Assistant Professor, Department of Computer Science, University of Colorado - Boulder

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040.31.2 Discovery Research by Alan Emtage* <bajan@cc.mcgill.ca>

Although it has been many years since the term "Information Age" entered the vocabulary, we are only now beginning to realize what that it could mean in the day to day lives of people on very large networks such as the Internet. The archie system, developed at McGill University in Montreal, is one of a number of ongoing projects, throughout the world, trying to bring some order out of the current information chaos.

Simply stated, archie's purpose is to track any kind of information on the Internet which is freely available and frequently updated. The prototype system, now in operation in 8 countries on 4 continents, monitors approximately 900 anonymous FTP UNIX sites on the Internet. It is expected that in the coming months facilities for accessing anonymous FTP sites running VMS and other operating systems will be added. Every day archie retrieves the directory listings from a subset of these sites and integrates this information into its own specialized database. All sites are accessed in a monthly cycle.

At the time of writing, publicly available servers are running on archie.mcgill.ca (Canada), archie.sura.net (USA), archie.fi (Finland), archie.au (Australia), archie.doc.ic.ac.uk (UK) and cs.huji.ac.il (Israel). Currently, three methods can be used to search for filenames in the hundreds of anonymous FTP sites:

(a) When installed on your local system, archie clients allow the user to remotely access the archie databases. These clients can be obtained via anonymous FTP from any of the archie hosts. Command line based

clients written in Perl or C as well as an X11 client are available.

(b) telnet (or rlogin) connections. Connect to one of the archie hosts and log in as "archie". No password is required. Full online help is available by typing 'help'.

(c) Send electronic mail to 'archie' at one of the the archie hosts with the word, 'help' as the subject or in the body of the message.

Archie also has a Package Description database which contains the names and short descriptions of about 3,500 pieces of information (software packages, documents, datasets) available on the Internet. Users can search through this database to locate useful information by using the 'whatis' command on the telnet and email interfaces.

The implementors of archie can be reached by sending mail to archie-group@archie.mcgill.ca

*Unix Consultant, McGill University, Montreal, Canada

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040.33.1 Security Initiatives In the Internet by Dr. Stephen Kent* <kent@ bbn.com>

The Internet has grown to encompass over 5000 "connected" networks spanning numerous countries. Internet technology is employed not only in academic and research networks, but also in an increasing number of commercial networks. Although this technology has brought many benefits to its subscriber community, e.g., multi-vendor and multi-platform interoperability, security and privacy concerns have never been at the forefront of the technology. Several initiatives are underway to incorporate security and privacy technology into Internet protocols, including Privacy Enhanced Mail (PEM), SNMP security extensions, and Common Authentication Technology (CAT). This article briefly explores PEM.

Privacy Enhanced Mail is an extension to the familiar RFC 822/SMTP electronic mail system which is used extensively throughout the Internet and which has links to many other major electronic mail systems, e.g., BITNET, EARN, UUNET and many commercial electronic mail systems. PEM allows a message originator to affix a digital signature to a message, so that each message recipient can verify the identity of the sender and the integrity of the message.

Signed messages may be forwarded to third parties who can, in turn, verify the identity of the (original) sender and the integrity of the original message. A message originator also may elect to encrypt the message, protecting it against disclosure while the message is in transit or residing in a mailbox.

As part of developing the PEM standards, an infrastructure is being established which will include a facility for organizations and individuals to be "certified", i.e., to bind a public key to the individual's or organization's name. The resulting certification system will be used not only with PEM, but also provides essential security capabilities for use with a variety of applications, including X.500 directory authentication and the CAT system noted above. In recognition of personal privacy concerns, provisions are being made to support PEM users who do not wish to disclose their identity but do want to make use of the security facilities in an "anonymous" fashion.

The availability PEM and its associated certification infrastructure may expand the ways in which the Internet may be employed. For example, applications requiring transmission of data that was deemed too sensitive for unprotected messaging may now be able to make use of the Internet. New applications may arise which make use of the PEM digital signature facility to support billing for various services accessed via the network.

The Internet Society is slated to play an important role in the certification system alluded to above. Current plans call for the Society to serve as the root of the certification hierarchy, and to provide a clearinghouse database to help avoid name collisions in the certification process. Members should be proud of the pioneering role the Internet Society is playing.

*Chief Scientist, Communications Division, Bolt Beranek and Newman, Inc.

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040.33 Passwords: Our Keys to the Network by Jeffrey I. Schiller* <jis@mit.edu>

Perhaps one of the most useful doors that crackers are finding open on the Internet today are the passwords of others.

For most users, passwords are the way that they prove their identity to computers on the network, and the way that crackers forge their identity in order to break in. The road to better security on the Internet starts with good password choices.

By definition a good password is one that is easy for you to remember, but difficult for anyone else to guess. You want it to be easy to remember, so that you don't need to resort to writing it down. It should be obvious why you don't want others to guess it!

Here are some guidelines to help you choose a good password (from the Site Security Policy Handbook (FYI 8, RFC 1244):

DON'T use your login name in any form.

DON'T use your first, middle, or last name in any form.

DON'T use your spouse's or child's name.

DON'T use other information easily obtained about you (like license plate numbers, telephone numbers etc.).

DON'T use a password which is all digits, or all the same letter.

DON'T use a word found in a dictionary (of any language!).

DO use a password with mixed-case alphabetics (if your system allows it).

DO use a password with non-alphabetic characters (digits or punctuation).

DO use a password that is easy to remember.

DO use a password that you can type quickly, without having to look at the keyboard.

You should also change your password frequently. Just in case your password has been compromised by an intruder, changing it will probably lock them out. If your password grants access to sensitive information, you also need to consider if crackers are attempting computational attacks. These attacks, typically done offline using information already obtained from your system, for example a password file, may take weeks to succeed.

However if you change your password before the offline attack completes, you have won! System Administrators may wish to check the quality of the passwords that their user community are using. Several programs exist, depending on the type of computer system you have, that allow you, the System Administrator, to attempt to "crack" your users passwords. In this fashion you can warn those who have poor passwords. Some programs can even be put in place that disallow the selection of a password which fails to meet some or all of the guidelines given above.

A good source of information on this and other security related topics is FYI 8, RFC1244, The Site Security Policy Handbook. This document, available free from distribution sites around the Internet, is a valuable source of information and references to other security related works.

In future issues we will discuss other Internet security issues, like protecting passwords as the traverse the network.

*MIT Network Manager, Massachusetts Institute of Technology

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040.50 Cooperation Among Network Operation Centers - A Beginning by Elise Gerich* <epg@merit.edu>

In the summer of 1988, when the NSFNET T1 backbone became operational, the NSF mid-level networks and the NSFNET management team discussed the need for the distribution of real-time information about the status of the NSFNET backbone. The mid-level networks provide direct support to the network users within their region or organization. The users call the mid-levels when they perceive a problem reaching someone or some machine via the network. The network is and should be perceived as one entity; the multiple component networks that provide the path from one destination to another should be transparent to the user. Therefore, the network operation centers which are responsible for various portions of "the network" need a way to share information about the health of their portion of the network.

The result of these discussions was the creation of a mailing list, network-status-reports <nsr@merit.edu>. For the last three years the Merit Network Operation Center has posted notices of scheduled backbone activity and disruption of service on the backbone to nsr@merit.edu.

The mid-level networks agreed to create distribution lists for the network status announcements. The Merit Network Operation Center used this mailing list to apprise the NSF regionals of the status of the NSFNET backbone. Some of the mid-levels, notably JVNCnet, also started to use nsr as a vehicle to notify other network operation centers of activities within their regional network. However, the list has primarily reported information about the NSFNET backbone.

As more and more networks accessed the NSFNET and the NSF regionals, the original distribution list has expanded to include more network service providers, for instance, CA*net, SWITCH, and EASInet.

At the Network Joint Management working group meeting at the last IETF in Santa Fe, New Mexico, the usefulness of sharing information concerning the status of the Internet was discussed. From all reports, the working group agreed that the network operation centers need to know what is happening in remote parts of the Internet that may impact the ability of their users to access some destinations. This sharing of information permits the network operation centers to more efficiently debug problems reported by their constituents.

The working group also agreed that while the nsr mailing list acts as a good vehicle for dispersing operational information to other centers, it is inappropriate to use that vehicle as a forum to discuss meta issues. The integrity of the mailing list should be maintained so that network operators can keep the real-time network messages separate from other topics.

A second mailing list should be used for on-going discussions concerning cooperation between network operation centers. The working group proposed that the njm@merit.edu mailing list is the appropriate forum for other topics concerning distributed management of the Internet.

Network Operation Centers are encouraged to use nsr@merit.edu to notify other NOCs of scheduled maintenance and other service activities for which they are responsible. Accurate and timely postings by NOCs to nsr will benefit all of us in serving our users.

*Merit/NSFNET

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040.51 User Services by Joyce K. Reynolds* <jkrey@isi.edu> and Gary Scott Malkin* <gmalkin@ftp.com>

As the Internet has rapidly developed to encompass a large number of internationally dispersed networks in academic and research fields, many new users of different backgrounds are added to the community. Buried deep within the heart of the Internet are countless servers providing information about everything from aerospace information to the weather. However, few users on the Internet know where even a small fraction of this information can be found. The reason is because it is globally scattered throughout the thousands of host machines connected to the network. This growth has placed the user services provider in the difficult position of trying to provide much needed user support, while at the same time restructuring the user services' system to accommodate continued expansion.

Recent changes include the establishment of a User Services Area within the Internet Engineering Task Force (IETF). This area provides an international forum for people interested in all levels of user services, to identify and initiate projects designed to improve the quality of the information available to users of the Internet. Interaction with other national and international user services entities began in 1991 with the creation of the User Services Area Council (USAC). Currently, USAC's membership includes representation by Australia, Canada, Europe, Israel, Japan, and the United States. USAC's goals will be ongoing as the Internet evolves globally.

One continuing goal of the User Services Area is to coordinate the development of user information services by providing documentation information and distribution for the Internet community. With the "For Your Information" (FYI) series of "Request For Comments" (RFC), the User

Services Area provides introductory and overview documents for network users.

Their purpose is to make available general information, rather than the protocol specifications or standards that is typical of other RFCs. FYIs are allied to the RFC series of notes, but provides information about who does what on the Internet. The FYI RFC series has proved a success since its initiation, and its goal is to continue to do so.

Current list of publications related to user services:

FYI9
Who's Who in the Internet: Biographies of IAB IESG and IRSG Members (Also RFC 1251) August 1991.

FYI8
Site Security Handbook (Also RFC 1244) July 1991.

FYI7
FYI on Questions and Answers: Answers to Commonly Asked Experienced Internet User Questions (Also RFC 1207) February 1991.

FYI6
FYI on the X Window System (Also RFC 1198) January 1991.

FYI5
Choosing a Name for Your Computer (Also RFC 1178) August 1990.

FYI4
FYI on Questions and Answers: Answers to Commonly asked New Internet User Questions (Also RFC 1206) February 1991.

FYI3
FYI on Where to Start: A Bibliography of Internetworking Information (Also RFC 1175) August 1990.

FYI2
FYI on a Network Management Tool Catalog: Tools for Monitoring and Debugging TCP/IP Internets and Interconnected Devices (Also RFC 1147) April 1990.

FYI1
F.Y.I. on F.Y.I.: Introduction to the F.Y.I. Notes (Also RFC 1150) March 1990.

Instructions for retrieving FYI RFCs may be found in the file: "in-notes/rfc-retrieval.txt" on VENERA.ISI.EDU.

*Member of the Technical Staff, Information Sciences Institute, University of Southern California

*Member of the Technical Staff, FTP Software, Inc.

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040.52 What's Important in Coordinating Internet Activities Internationally by Steven N. Goldstein* <sgoldste@cise.cise. nsf.gov>

The opportunity to write comes on the heels of the 13-15 November 1991 meetings of the Coordinating Committee for Intercontinental Research Networking (CCIRN), generally pronounced "kern", and its engineering advisory body, the Intercontinental Engineering Planning Group (IEPG),

in Santa Fe, New Mexico, USA. These were followed the next week by the meeting of the Internet Engineering Task Force (IETF), including a session of its Operational Requirements Area Directorate (ORAD), also in Santa Fe.

In addition, the Federation of American Research Networks (FARNET) met jointly with the ORAD. All of these groups are concerned with a central issue: maintaining stability in the Internet and encouraging network interconnection architectures and engineering practices which in one way or another fit people's views of "optimality".

I was not able to attend the IETF/ORAD or FARNET meetings, and the minutes and business of the CCIRN and IEPG meetings have not yet been finalized. So, I will not attempt to report on those events per se, but rather, I will present a general discussion of the ideas that face us all in this arena.

I recently read an article about bulletin boards which referred to Fidonet in terms like "chaotic, self-organizing beast", and, by juxtaposing the Internet implied similar qualities for our collective body. There may be a ring of truth to that, especially by limited analogy with fractals in Chaos Theory: LANs connect to MANs and WANs, and, now WANs are connecting into super-WANs, and the trend may take even higher steps of organizing. Yet, this is being done without any central authority. In the U.S., many campuses have several levels of LANs which may ultimately connect to the regional WAN.

The regional WAN connects to the NSFNET WAN. Some regional WANs also connect directly to other regional WANs. Also, portions of a campus may connect to the ESnet or the NASA Science Internet WAN, or to the Terrestrial Wideband Net. And, the NSFNET, ESnet, NSI and TWB WANs connect to each other at two Federal Internet eXchanges, FIXs. But, similar things are happening among commercial nets in the U.S., and the CIX (for Commercial Internet eXchange) Association has formed CIXs.

There have been proposals to link FIXs and CIXs into National EXchanges (NEXs). There is talk of one or more CIXs in Europe. Japanese research and academic networks are talking of a JIX. A proposed European Backbone, Ebone, would create a supra-national network infrastructure to which national and [intracontinental] international European nets would connect at main nodes, again WAN-to-super-WAN.

If one were to visualize each network as a chain link with shape somehow indicative of topology and link thickness and size representing network size (number of connections, traffic levels, capacities, etc.), the result would be a three-dimensional mail (fabric). Some network researchers, engineers and operators assert that the fluttering of the wings of a butterfly in some distant link can cause huge storms throughout the net. Less whimsically stated, some of my colleagues maintain that the present state of Internet technology is not up to the task of protecting the stability of their networks from poor engineering choices in neighboring networks. And, as the technology catches on throughout the world, new links continue to materialize, as do new connections among them. New tools are being developed to try to cope with this, especially hierarchical routing protocols (e.g., the Border Gateway Protocol-BGP) and the ability to interject policy into routing decisions (policy-based routing). So, it is a race of sorts between the proliferation of scale and complexity and tools designed to cope with them to preserve stability and performance.

This, then, is the context as I see it. And the question(s), as yet

unsolved: "Can we, collectively, create a forum for exchanging information and evaluating proposed linkages before the fact in order to preserve stability and performance in the Internet?" And, relatedly, "Is it possible to have a shared sense of optimality against which alternative solutions emanating in the forum can be evaluated?" Finally, "Under what sets of circumstances might we expect individual network administrations to behave according to the best judgments of other network administrations represented in the forum?"

The CCIRN and the IEPG and the IETF/ORAD and FARNET did not achieve closure on these issues this time around, and they may not do so in the next few rounds. Yet other bodies may have to join the forum as the Internet becomes increasingly populated with commercial interests. Yet, the quest must not be given up, because we all live together in the same flat address space, and in one way or another we will share similar fates if instabilities occur.

*Program Director, Interagency & International Networking Coordination, Division of Networking and Communications Research & Infrastructure, National Science Foundation.

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040.62 Europe Commercial Nets by Juha Heinanen <Juha.Heinanen@funet.fi>

In this first report, an overview is given on present European commercial providers of Internet services.

Traditionally commercial customers needing Internet services in Europe have turned to EUnet, which is a not-for-profit network related to EurOpen association. The branch of EUNET offering IP level services is called InterEUnet and currently it has points of presense in Austria, Belgium, France, Germany, Ireland, Netherlands, the Nordic Countries, Switzerland, and United Kingdom. Connectivity to the U.S is via Alternet.

Another network providing European wide Internet services is InfoLAN. InfoLAN is owned by InfoNet which is a Los Angeles based international network operator. InfoLAN has IP access nodes in Belgium, France, Finland, Germany, Sweden, and United Kingdom and links from Europe to the U.S. Customers subscribe to InfoLAN usually because of their internal interconnection needs and Internet connectivity is offered as an added value to qualified users.

Besides these international service provides, there exists national commercial internet networks in Finland and Sweden, where open competition has encouraged fulfilling of advanced user needs.

In Finland, DataNet, which is run by the state owned telecom company, and LANLINK, which is managed by a consortium of local telecom companies, offer LAN interconnectivity supporting (among others) the TCP/IP protocol suite. Qualified DataNet customers can get Internet Access either via NORDUnet or via DataNet's InfoLAN connection.

In Sweden, there exists similarly two competing IP providers: SWIPNET, which is an IP service of a privately owned telecom operator Tele2, and TIPNET, which is run by the state owned PTT. Both of these networks can currently both closed and open IP connectivity and Internet access to qualified customers via NORDUnet.

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040.70 USENET by Rick Adams* <rick@uunet.uu.net>

USENET READERSHIP SUMMARY REPORT for Oct 91

This smple was estimated for the entire net

Sites

701

40,000

Fraction reporting

1.75%

100%

Users with accounts

159,480

9,100,000

Netreaders

33,345

1,902,000

Average readers per site

48

Percent of users who are netreaders

20.91%

Average traffic per day (megabytes)

27.301

Average traffic per day (messages)

11,318

Traffic measurement interval

last 28 days

Readership measurement interval

last 75 days

There were 154,597 articles, totaling 295 Mbytes (364 including headers) submitted from 15,531 different Usenet sites by 41,378 different users to 1,810 different newsgroups for an average of 21 Mbytes (26 including headers) per day.

*UUNET Communications Services, Falls Church, VA, USA, with assistance from Brian Reid, DEC Western Research Lab, Palo Alto, CA, USA

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040.90 RARE (Reseaux Associes pour la Recherche Europeenne) by Josefien Bersee* <bersee@nikhef.nl>

Networking for Researchers in Europe since 1986, RARE is the association of European networking organizations and their users. RARE's aim is to foster cooperation between both national and international networking organizations to develop a harmonized data communications infrastructure in Europe. RARE supports the principles of Open Systems and the international standardization activities.

The Association has four types of members. The twenty European countries listed in the statutes are eligible to be the National Members which, as voting members, formally constitute the Association. Associate National Members are national research networking organizations in other countries which support the objectives of RARE. International Members are international organizations within Europe which support the objectives of RARE and are closely associated with the use, coordination and provision of an infrastructure to the benefit of the research community. Liaison Members are organizations which are involved in networking and related matters with whom RARE considers it important to have close and continuing contact. At this point in time, RARE has 26 National Members and 10 International and Liaison Members.

RARE Projects RARE is carrying out a number of projects. Its largest project is the COSINE (Cooperation for Open Systems Interconnection Networking in Europe) Implementation Phase, EUREKA Project No.8. This project is carried out under contract with the CEC. Under the Implementation Phase a number of Pilot Projects and User Services are operated.

One of these User Services (S2.1) was created out of the RARE MHS Pilot Project, which established a pilot infrastructure for electronic mail based on the X.400 standard.

Another well-known project is the International X.25 Infrastructure (IXI), COSINE Service S1. The IXI backbone was created to interconnect the public packet switching networks and the private research networks across Europe.

Other RARE projects concerned electronic mail reliability and a connectionless network services pilot project - to gain experience with the internetworking of products based on ISO-IP standards. Recently a project has started on the international character set issue, which is now being incorporated in the COSINE framework.

Another recent initiative has been the setting up of Ebone 92: an interim backbone infrastructure providing value-added open networking services for Internet IP and pilot ISO CLNS.

The Operational Unit. To handle the operational management of existing and future networking services for the European Research and Education community, RARE is now preparing the establishment of an Operational Unit. This Operational Unit will operate on a not-for-profit basis, having Europe as a primary geographic scope, but if necessary also including services to other countries.

Conferences Each year RARE organizes a Joint Networking Conference (JNC) to provide the opportunity for a broad discussion on networking for the European research community, to review progress in its area of activities and to stimulate new work. In 1992, the JNC will take place

in Innsbruck, Austria.

Liaisons with other Organizations RARE provides a user's voice on a number of European standardization and political bodies, such as EEMA, EWOS, ECTUA, ECFRN and and ETSI. On a broader scale, RARE represents the European participation on the Coordinating Committee for Intercontinental Research Networking (CCIRN). Recently, RARE has agreed in principle to become a charter member of the Internet Society.

*Publicity Officer, at the RARE Secretariat of the RARE Association

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040.91 RIPE: A Short Status Report by Joy Marino* <Joy.Marino@Italy.EU.net>

As probably many know, RIPE ("Reseaux IP Europeen": we have many languages to play with) is the informal coordinating body for all Internet-related activities in Europe. It was established in 1989, and up to now it coordinates the activities of about 40 organizations of 23 countries. The long standing cooperation between EUnet and NORDUnet was taken as an good example of cooperation at the technical level, but many other partners have had a key role in RIPE; the initial list of participating organizations being: BelWu, CERN, EASInet, EUnet, GARR, HEPnet, NORDUnet, SURFnet, SWITCH, and XLINK.

The main scope of RIPE is the cooperation among the existing IP networks, both on a intra-european basis, and from the point of view of US-Europe connectivity.

So far, RIPE has set up a registry data base of all networks, domains, leased-lines, and persons involved in IP networking, in Europe. The database, which can be downloaded via anonymous FTP on "nic.eu.net" or queried via "whois" port on the same host, lists 2474 persons, 1622 networks and 1161 domain names, at the end of November.

It is interesting to look at DNS host counts, also: a monthly poll of IP registered hosts lists 12965 in November 1991, which is about four times the hostcount in November 1990, and the European IP community is still exhibiting an exponential growth: someone has predicted one million sites at the end of 1992!

The issue of routing is quite complicated: most of the European IP networks have and need to have peculiar routing policies, and the connectivity among different networks is primarily based on bilateral agreements. The scenario is even more complicated by the use of both "interior" and "exterior routing" between international routers. Although a solution based on a European-wide backbone, with interior routing within the backbone is considered optimal, in the meantime a workable solution is being carried out, based on the collection of all the existing "policies", their uniform and univocal labelling into the RIPE database, followed by the (automatic) generation of lists of which networks each international router announces. A similar scheme is already in place, but the formal coordination is on going and the coordinated routing policy will start on January 1st.

People in RIPE are aware that the level of informal coordination cannot continue forever, and have recommended the creation of a formally established Network Coordination Center. A Request for Proposal for a NCC and for a NCC manager were issued on October 21st, and a decision will be taken in January.

The work of RIPE is also at the base of the EBONE initiative, whose goal is to implement a true European Backbone, which will be based, on the first year - 1992, on the resources made available by the contributing partners, but later on it will have one common network infrastructure.

A bunch of documents about the activities of RIPE is maintained on- line on "nic.eu.net" and is available via anonymous FTP in the directory "-ftp/ripe/docs"; see the file "README" for more details.

*Treasurer, EUNET Executive Board

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040.92 EARN by Frode Greisen* <NEUFRODE%NEUVM1.BITNET@searn.sunet.se>

Established in 1985, EARN has become a stable provider of networking services for research and academic users in Europe, the Middle East and Africa. EARN is an organization with country membership and technically, the services are totally integrated with the CREN services. EARN now comprises 950 host computers in 550 institutions in 27 countries and the traffic volume increased by 57% from 1989 to 1990 up to a volume of 6 billion records.

Geographically, the main recent development was the connection of new East European countries. This happened quickly after a statement was obtained from the US Department of Commerce that EARN could connect to COCOM proscribed countries - with some restrictions on speed and services and as long as appropriate safeguard procedures were established at the supercomputer sites on the network. Poland was first to connect, soon followed by Hungary, CSFR and USSR. Furthermore, Rumania, Bulgaria and Lithuania have advanced plans connect.

What EARN offers to the new countries is that by becoming a member of just one organization, and by using well established and widely accessible technology, they can exchange electronic mail and files with 45 other EARN/BITNET countries. Furthermore, they can use the value added services on the network and due to the gateways and bilateral agreements of EARN and CREN with other networking organizations they can communicate with colleagues in a total of 90 countries.

Networking is in rapid change so is EARN. Basically, EARN is a store and forward network using IBM's NJE protocol which is emulated most of the major operating systems. Some years ago an EARN OSI project was established and this project has now been successfully concluded. With generous support from DEC, IBM and Northern Telecom software stacks were developed and systems installed enabling countries to run the NJE protocol on top of the five lower OSI layers, including X.25. Several countries now employ this system for their international EARN traffic using the private European X.25 network IXI, which is temporarily provided by the European COSINE project.

However, other countries chose to rely on the TCP/IP protocol suite which to run NJE the same way CREN core sites ship traffic via NSFnet. According to this move, in 1991 EARN has developed a regionalization plan to group the EARN hosts around core sites which have multiple links between them. This means both increased bandwidth and alternative routes in case of line failure so that users get improved performance and reduced response times.

The regionalization has only been economically feasible by cooperation and line sharing with other organizations. In the mid-eighties, a 9,600 bps EARN line was often the only international connection for academic

networking in a country whereas the community is now slowly but steadily taking advantage of economy of scale by sharing international lines running from 64 kbps up to 2 Mbps.

In 1990, EARN adopted a strategic plan. Working according to this EARN has increased its geographic coverage and large portions of the network has moved to higher speeds. Focus has been put on tools and documentation to make the use of the network easier for new and occasional users. Work is going on to improve application services such as data base access. The goal is to continually provide easy to use low cost networking services to the community.

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050.01 National Network Legislation Enacted in U.S. by Mike Roberts <roberts@ivory.educom.edu>

President George Bush signed the High Performance Computing Act of 1991 into law on 9 December 1991. The legislation contains omnibus provisions covering computer hardware and software, science education, and the National Research and Education Network (NREN).

The final bill closely parallels a federal program announced early in 1991 and brings Administration and Congressional proposals into alignment. It is anticipated that approximately U.S. $100 million will be available in each of the next five years for federally sponsored NREN development and deployment. These funds are allocated among a number of federal agencies whose programs include both research and production network components.

A major goal of the NREN program is to demonstrate the feasibility of gigabit computer networking by 1996, a twenty-fold speedup from the 45 megabit per second capacity of some backbone links currently operating in the U.S., most notably on NSFNET, which currently serves as the means for connectivity to the Internet for nearly all American colleges and universities. More than 500 of the approximately 1400 four year institutions of higher education in the U.S., which includes well over half of the total faculty and student population of 14 million, are now connected to NSFNET and the Internet.

The legislation passed unanimously in both houses of Congress following a three year effort by a partnership of American universities, research laboratories and organizations, supercomputer centers, and private sector computer and communications companies. The bill was delayed in recent months by internal debate within the Congress and the Administration over management roles for the NREN. In a last minute compromise, the bill was amended to leave responsibility for designation of network managers with the White House.

In related developments, the National Science Foundation (NSF) recently made two announcements of its networking plans. In September, Steven Wolff, Director of the Networking Division in NSF, formed a new program office for the NREN and named Robert Aiken, formerly of the Lawrence Livermore Laboratory, to be its head. Aiken is preparing a development plan for the next three years, during which time the network will be called the Interim Interagency NREN to reflect its joint support by several federal agencies, and its pre-gigabit deployment character.

On 26 November, Wolff announced that the National Science Board had approved a proposal that the NSFNET backbone be continued for three additional years, and that a new cooperative agreement for its operation be solicited on a competitive basis in 1992. As part of the new

solicitation, NSF intends to separate the responsibility for routing from that of circuits and packet switches. As a result, it is likely that multiple awards will be made for the provision of backbone connectivity in various parts of the U.S., while a single award is made for a routing authority, whose responsibilities will be broadened beyond NSFNET to include both national and international components of the Internet, working cooperatively with national authorities in other countries.

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050.10 U.S. NRC CSTB Policy Research by Monica Krueger <mkrueger@nas.bitnet>

Since this is the first issue of the Internet News some introductions seem in order.

The NRC is the National Research Council and the CSTB is the Computer Science and Telecommunications Board. The NRC was formed by the National Academy of Sciences in 1916 "to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government." The NRC is the principal operating agency of the NAS in providing services to the federal government, the public, and the scientific and engineering communities. The Computer Science and Telecommunications Board is a group within the NRC which specializes in studies dealing with computer science and telecommunications issues.

The CSTB is currently working on over a dozen projects, any of which might prove interesting to a sub-set of the subscribers of the Internet News. However, one project, the "Strategic Forum on Rights and Responsibilities for Participants in Public Data Networks and Information Services" is a project which engenders interest from nearly anyone using a pc. The project is in the earliest stages of development but, it is expected to provide a framework in which competing technical, business, and legal/regulatory perspectives can be aired in the interest of mutual exploration and understanding.

This forum should prove to be particularly timely as citizens, members of the business community and members of the government begin to ask questions about civil liberties, equitable access, privacy, security and appropriate use of computer networks in the electronic age. A date for the forum has not yet been set.

A recently completed project of the CSTB, the Workshop on Computer Simulation and Visualization will be reported on in the January issue of IEEE Computer Graphics and Applications. This workshop brought together individuals from industry and academia to discuss the state of the art and directions for computer simulation and visualization. Participants in the meeting highlighted the evolution of simulation and visualization into a discipline in its own right and pointed to benefits which may be realized as the discipline becomes more broadly recognized and utilized.

The two projects mentioned above demonstrate the breadth of subject matter which the CSTB addresses as it strives to support the National Academy of Sciences in its "dedication to the furtherance of science and technology and to their use for the general welfare."

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060.01 Rules of the road: network law by Patrice Lyons, Esq* <3432266@mcimail. com>

When I was out driving last weekend, I noticed a stop sign placed at a dangerous intersection. Down the road a bit, there was another sign to indicate a hidden driveway. We often take such indicators for granted. Rules of the road have evolved over time in most parts of the world for the protection of motorists and pedestrians alike. By facilitating the flow of traffic, these rules contribute to the orderly conduct of commerce.

In the case of the Internet, however, we are still in the early stages of reaching a consensus on the digital equivalent of basic rules of conduct to govern access to and the orderly dissemination of information. This space in the Internet News will be used to focus attention on specific legal issues arising in the context of the Internet. In doing so, it may serve to advance the development of rules of conduct for the Internet community, or, at least flag important matters for more detailed consideration. Please let the editor know if there are legal concerns about networking that you would like to see discussed. We will attempt to cover them in up-coming issues.

To initiate this forum on network law, I have elected to focus attention on what I consider to be the most basic of rules for the user of networks, namely respect for the rights of individual authors. In particular, I refer to the right to claim authorship as set forth in the Berne Convention for the Protection of Literary and Artistic Works. Generally, by denying an author credit for a work, the public may be misled into believing a third party was the actual creator.

There are at least three aspects of this right to consider: (1) the right to be named as author; (2) the right to object to another person being identified as the author of your work; and (3) the right not to be identified as the author of a work created by another person. In addition, an author may decide to remain anonymous or to adopt a pseudonym.

In the context of the Internet, where portions of a work created by a person may easily be taken out of context, it may be useful to consider the development of standard electronic identifiers that would follow works, or excerpts from works, as they migrate over the Internet. For example, an electronic system of footnoting may point the reader back to the Internet mailbox of the source, together with a mention of the author's name and the time, date and place of origination. False attribution of authorship and other violations of this "moral right" may be avoidable. Such a system may provide for the electronic equivalent of road signs to facilitate the flow of information over the Internet.

*Law Offices of Patrice Lyons, Chartered

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060.10 The Electronic Frontier Foundation (EFF) by Gerard Van der Leun <van@eff.org>

Since the inception of the EFF in April of 1990, we have become an organization dedicated to the protection and promotion of the emerging electronic environments of the information age. We believe that computer-based communications should be useful, affordable and accessible to all citizens, and that all systems should be created and managed in keeping with our societies highest traditions of the free and open flow of information and communication.

To accomplish this, we have taken on the complimentary roles of watchdog and advocate; the former to make sure that the constitutional rights and

privileges of other media are extended to this new realm, the latter to ensure that this new realm is settled in a way that benefits as wide an array of citizens as possible.

During the first phase of our existence, we were instrumental in reducing, through numerous public appearances, press conferences, and other means, the wave of "hacker hysteria" which was prevalent throughout 1990 and much of 1991. When warranted, we have defended people unjustly accused of computer "crimes" and lobbied successfully against faulty legislation on the federal and state level. We believe that much of the apprehension of the public and law enforcement about computer networks stems not from ill-will, but from ignorance of the technology and the networked culture that the technology creates. We are continuing in our efforts to inform and enlighten individuals and groups throughout the country through a program of presentations, speeches and symposiums.

At the same time, it is not enough to simply defend and explain. To create the kind of National Public Network that this nation needs requires that we be pro-active in the political arena. Political and legislative decisions made now and in the next few years will shape the electronic environments of this nation and the world well into the next century. The central position of the EFF is that any nationally deployed telecommunications infrastructure should be, in all senses of the term, an open platform. Only a National *Public* Network open to all information providers, large or small, and accessible to all citizens in an affordable manner, can satisfy the needs of the nation.

Currently, we are developing a proposal for Congress calling for the early deployment of such a system through the use of existing ISDN technology. We believe that the use of this technology will be a means of jump-starting the National Public Network if it is guided by an overarching vision of openness, competitiveness, and affordability. While we agree that fiber-optic technology will ultimately be used, we see no reason to lose a generation of experience and usefulness waiting for the highly expensive and time-consuming re-wiring of America.

In concert with this, and because we believe that the current Internet will become an important part of the National Public Network, we have been working closely with the Commercial Internet Exchange and the ANS to develop policies in line with the public interest.

In order to give citizens with networking experience a voice in the ongoing national debate over telecommunications policy, we have now established a Washington office to compliment EFF headquarters in Cambridge, Massachusetts.

The EFF is a non-profit, membership organization. You can find out more about us by sending requests for information to eff@eff.org. You can retrieve information about the EFF and its projects via anonymous FTP via ftp.eff.org. Our mission statement and back issues of our online newsletter, EFFector Online, are held in the EFF directory.

We maintain two Usenet groups on the Internet, comp.org.eff.talk and comp.org.eff.news.

*Director of Communications at the Electronic Frontier Foundation, Cambridge, MA, USA.

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070.10 Internet in the News by Vint Cerf* <vcerf@NRI.Reston.VA.US>

Any system with the size and geographic scope of the Internet is bound to find itself at the core of newsworthy events. I suppose this is the natural consequence of the evolution of all infrastructure. Most people pay little attention to the power system or the road system until something goes wrong. THEN these quietly-serving infrastructures suddenly get a good deal of local, regional and, sometimes national or even international attention. So it seems to be with the Internet and the various activities surrounding it.

The Internet is frequently mentioned in the trade press as the largest collaborative internetworking system ever built (and it is still GROWING!). Its very scale almost guarantees that some things that happen in the Internet environment earn international attention. For instance, Cable News Network (CNN) ran stories recently about the use of the Internet in Project Gutenberg (headquartered in the state of Illinois in the U.S.) to disseminate public domain books and about Dutch hackers who spend their time attempting to break into various hosts on the Internet, especially those operated by the U.S. Department of Defense.

More often, it is the standards-making activity which attracts trade press attention. Recent announcements of plans for support of Privacy-Enhanced Mail and the adoption of Open Shortest Path First routing garnered considerable attention.

The Internet Society, itself, has caused no little stir in many circles. The Chronicle for Higher Education ran a recent story about the formation of the Society and this led to a small storm of queries and applications for membership which descended on the staff of the Internet Society secretariat.

Not long ago, a special arm of the U.S. Agency for International Development, Volunteers in Technical Assistance, announced their plans to use the Internet to assist in disaster relief planning and coordination. The Secretary-General of the International Telecommunication Union announced plans to place on-line copies of all CCITT standards document in archives accessible to Internet users.

Announcements of commercial Internet service offerings from Sweden, Finland, the United Kingdom and the United States seem to pepper the news with increasing regularity. Another sign that the Internet is outgrowing its historical research focus. Similarly, strong interest in the Internet in the Library community and among elementary and secondary school educators reflects yet other facets of the increasingly diverse communities relying upon and exploring new uses of this global system.

*Vice President, Corporation for National Research Initiatives

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075.05 Internet Digest by Philip H. Enslow Jr* <enslow%cc@gatech.edu>

Computer Networks and ISDN Systems

Recent items of interest. CN/ISDN is published by Elsevier Science Publishers, Amsterdam.

Distributed Operation of the X.500 Directory, B. Smetaniuk, Vol. 21, No. 1.

An Approach to Indirect Protocol Conversion, J.C. Shu and M.T. Liu, Vol. 21, No. 2.

Special Issue on ODA-Open Document Architecture, Vol. 21, No. 3.

Special Issue on High Speed Networking for Research in Europe, RARE, Vol. 21, No. 4.

Special Issue on Protocol Specification, Testing and Verification, Vol. 22, No. 1.

Special Issue on Driving Applications for Future Networks, Vol. 22, No. 2.

Policy Requirements for Inter-Administrative Domain Routing, D. Estrin, Vol. 22, No. 3.

Special Issue on Computer-Network Security, Vol. 22, No. 5.

*Editor-in-Chief, "Computer Networks and ISDN Systems", Professor, College of Computing, Georgia Institute of Technology

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075.06 Internet Digest, by John S. Quarterman* <jsq@tic.com>

Matrix News is a monthly paper newsletter about contextual issues related to computer networks; preferably issues that cross network, organizational, or political boundaries.

The first issue included an article on "National Network Policy", which has been followed by articles such as, "Exactly What is the NREN?", by Jay Habegger, and by the guest editorials (called Martian Packets), "Encouraging Equitable Competition on the Internet", by Mitchell Kapor, "Public Institutions in an Electronic Society", by Steve Cisler, and "Walking the Beat in the Global Village", by Richard Civille. Steve Jackson's "The Top Ten Media Errors About the SJ Games Raid", is also relevant. The monthly Network Policy Updates have mentioned the first EARN connection to Moscow and the passing of the NREN bill. Network policy is not just national, as indicated in R.R. Ronkin's "Global Cyberspace -- Who Needs It".

Every issue attempts to draw connections between technology, politics, and community, ranging from Smoot Carl-Mitchell's "X.400 - Fact and Fancy", to John S. Quarterman's "Networks from Technology to Community", "Boundaries, Resources and the Law", "Which Network, and Why It Matters", and "Analogy is Not Identity". We also print reports from networked communities, such as artists in "Cyber Art: The Art of Communication Systems", by Anna Couey or Billy Barron's "Libraries on the Matrix" and "BBSing Around the OuterNet".

User and directory services are often covered, with the Martian Packet "On the Need to Develop Internet User Services", by Peter Deutsch There were MIDS reports on the CNI and NSF Directory Services workshops, and the articles, "Strategies for Finding People on Networks" and "Networks Are Volunteers".

Issue 5 (August) was a theme issue on K-12 (Kindergarten-12th Grade) networking, with articles on KIDSNET, the electronic college classroom, and specific K-12 networking projects.

Issue 8 (November) examines networks in Argentina in depth and reviews the program netfind.

For further information, please contact: mids@tic.com.

*Editor, ix News, Matrix Information and Directory Services, Inc. (MIDS)

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100.01 INET-92 by Larry Landweber* <lhl@cs.wisc.edu>

INET 92, to be held in Kobe Japan on 15-18 June 1992 will be the first annual meeting of the Internet Society. Its predecessor, INET 91, held in Copenhagen last Summer attracted almost 500 network planners, implementors, maintainers, managers, and funders from almost sixty countries throughout the world. The Conference Chair is Professor Hideo Aiso from Keio University; the Program Chair is Professor Haruhisa Ishida from the University of Tokyo.

INET 92 will feature presentations in four tracks, technology and services, policy, applications and regional reports. Tutorials on networking technology, ranging from futuristic/state-of-the-art to "how to get started" will be featured. In addition, a special workshop for attendees from developing countries will precede the conference and it is hoped that over 50 people from countries just now beginning to develop networks will attend. At the end of the conference, special regional planning meetings will be held.

The meeting will be held in a picturesque setting on an artificial island outside of Kobe on the Inland Sea. Within an hour of Kobe are Kyoto and Nara, both of which are must sees for the visitor to Japan.

INET 92 is a working conference which should be of interest to all who are actively involved in helping to build the global internet.

*Chair, INET

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100.07 Interop by Dan Lynch <dlynch@interop.com>

In 1992 there will be two INTEROP Conferences instead of one. The first of them will be held in Washington, DC from 18-22 May. The second will be held in San Francisco, CA from 26-30 October.

The focus for the Spring Conference in Washington is on the "Business of Internetworking". While the technology that enables internetworking is certainly important and constantly evolving, the business opportunities and challenges are critical to the successful deployment by all end users.

Two major speakers address these business areas. Mitch Kapor, as President of the Electronic Frontier Foundation, will address the public policy issues surrounding the establishment of commercial internetworking. Mitch is especially concerned that this new capability be made accessible to as many persons as possible and that users of it are protected by intelligent extensions of the US Constitution and Bill of Rights.

Dixon Doll, General Partner of Accel Partners, a venture capital firm, will describe the fears, hopes, dreams and schemes of those who step up to the opportunity to provide products and services in this new internetworking age. While as users, we all want to have the cheapest, fastest, most reliable stuff we can, it is also in our interest to have suppliers who are competent, innovative, stable and responsive. How is that balance met?

The 45 Conference sessions will be broken into two main clusters: Deployment (or Tools for Today) and Technology (or Ideas for Tomorrow). 34 Tutorials will be offered on Monday-Tuesday and 7 of them will also be offered on Thursday-Friday due to strong expressions of demand for this format from previous attendees.

The cooperative demonstrations of vendor offerings will center on SMDS, Frame Relay, Network Management, FDDI, X.400 Messaging, Token Ring and ONC/NFS.

For more information you may reach us in the following ways: info@interop.com, 1-800-INTEROP, 1-415-941-3399 or fax to 1-415-949-1779.

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100.08 IFIP CONGRESS '92 by Jack L. Rosenfeld* <rosenj@watson.ibm.com>

Final plans have been announced for IFIP Congress '92 -- the 12th World Computer Congress of the International Federation for Information Processing (IFIP) -- which will be held in Madrid, 7-11 September 1992.

The Congress will comprise five streams, which will be presented during all five days of the Congress, and two subconferences, which will run for two and one half days each:

Streams. From Architectures to Chips Informatics and Education The Vulnerability of the Information

Society. Social, Legal, and Security Aspects Software Development and Maintenance Algorithms and Efficient Computation

Subconferences. Expanding the Power of the Personal Computer Enhancing the Intelligence in Information Systems

For information about submitting papers and posters, please contact the IFIP Congress '92 Committee at the address given at the end of this article. The deadlines for receipt of papers and posters are 10 January and 15 April 1992, respectively. Proceedings will be published by Elsevier/North-Holland.

In addition to the streams, subconferences, and workshops, there will be tutorials, an exhibition, technical visits, and a tourist program that will coincide with the Spanish celebration of the 500th anniversary of Columbus's discovery of America.

For further information, please contact: IFIP Congress 92 c/o Grupo Geyesco Mauricio Legendre 4, 8G 28046 Madrid, Spain fax: 34

(1) 3234936 e-mail: ifip92@dit.upm.es

*Editor, IFIP Newsletter

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100.3 Inter-American NET - Background Information by Tadao Takahasi* <TADAO%ETHOS1.ANSP.BR@uicvm.uic. edu>

The so-called First Interamerican Networking Workshop which took place in Rio de Janeiro from October 7th to 11th, 1991 began to be organized as the third meeting of SIRIAC GROUP. An initiative which started in Sevilha (Oct '90), promoted a second meeting in Santiago (March '91),

and in this process managed to attract representatives from major relevant networking efforts in LA&C.

As one of the decisions of the Santiago Meeting, Brazil was entrusted with the responsibility for the organization of the third meeting, which would strive to ensure the participation of all major players in networking in LA&C.

In the process of assembling a program for the meeting, it soon became clear that it would not be a simple "extended SIRIAC meeting". The number of participants and themes would be much higher than usual. After a number of false starts, the event was finally organized into two tracks, one to address organizational and political issues, and the other to address technical aspects in networking.

The Workshop included presentations on the following topics:

Building a Research Network: An Advanced Tutorial (Daniel Karrenberg)

Organizational Aspects of INTERNET (Steve Goldstein)

Organizational Aspects of RARE (Jose' Barbera')

Trends in Academic Networking in the US (Glenn Ricart)

Trends in Academic Networking in Europe (Jose' Barbera')

An Appraisal of RIPE (Daniel Karrenberg)

Low Cost Communications (Randall Bush)

Packet Satellite Communications (Charles Clemments and Junior de Castro)

Trends in High-Speed Networking (Guy Almes)

A Satellite Backbone for LA&C : Issues (Joseph Choy)

VSAT Technology (Brien Morgan)

Long Distance Education (Armando Villarroel)

Health Applications (Carlos Gamboa and Pablo Liendo)

In addition, several panel and open sessions were organized, involving the participants in lively discussions and exchanges. One of the most informative panel sessions dealt with the current activities of international agencies (OAS, UNPD, etc.) in the LA&C networking. The agencies were represented by Saul Hahn (OAS), Enzo Puliatti (UNDP), Daniel Prado/Daniel Pimienta (UNION LATINA), and Gian-Franco Romero (UNESCO).

Finally, it is important to mention that the Workshop was preceded by a Hands-on Training Seminar on Networking (a series of talks and demonstrations on grass-roots approaches to Networking) and conjugated with the CRESALC/REDALC Meeting on Science and Technologies Systems in LA&C.

The Event and its Results. Over 120 participants from countries in the Americas attended the Workshop and associated events. All workshop sessions allowed unrestricted access to any interested participant.

Given the current situation of most networking efforts in the region (which are just getting organized), it was not surprising that the political track attracted overwhelming attention.

After several rounds of open discussion in a very hectic atmosphere, 29 representatives from LA&C held a closed session, the outcome of which was a proposal which was unanimously approved by a general assembly. The workshop participants agreed to establish a "permanent forum for the coordination of networking activities" in LA&C, having as its mission:

to establish the LA&C Academic, Scientific, and Research Network,

to promote the development of national networks in participating countries, and

to foster cooperative integration between the LA&C network and counterparts from regions all over the world.

The Forum was concretely established as a Working Group composed of five elected members (Ida Holz, Julian Dunayevich, Roberto Loran, Sergio Flores, and Tadao Takahashi) which will address the following short-term tasks:

to identify joint projects currently in development which can help establish a framework for regional networking activities.

to define a set of projects to develop within a 6-month time frame.

to develop a strategic plan for the LA&C initiative.

The proposal went on to enumerate six activities for the Working Group to execute during 1992, ranging from general studies and assessments to specific, local-impact activities.

Finally, a major commitment of the subscribers of the proposal was the naming of a formal representative from each country no later than November 10th, 1991.

Conclusions. All in all, the final results of the Workshop were amazing and incredibly matter-of-fact. The Working Group was stocked with credibility that no previous or competing initiative can claim.

A concrete timetable of activities was proposed to the Working Group. Finally, the commitment was made to univocally define one representative per country to interact with the Working Group.

Not all problems are solved. In particular, the role of international agencies such as OAS, UNDP, UNESCO, etc., with respect to the newly formed Working Group is not all clear.

Notwithstanding, the progress made is remarkable, and the LA&C networking community has many reasons to be proud of its impressive growth in maturity in such a short time.

The next Inter-American NET. It is still too early to guess whether the Second Interamerican Networkshop shall take place next year. The Working Group is still trying to get fully organized. The on-going activities will have a good checkpoint at INET'92 (Kobe, June 1992). Then, it will be possible to decide when and how the next edition will happen. As a preliminary guess, a smaller, more technically-oriented workshop in October/November of 1992 is a good bet.

*Coordinator, Brazilian Research Network

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100.08 IFIP CONGRESS '92 by Jack L. Rosenfeld* <rosenj@watson.ibm.com>

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Streams:

From Architectures to Chips

Informatics and Education

The Vulnerability of the Information Society: Social, Legal, and Security Aspects

Software Development and Maintenance

Algorithms and Efficient Computation

subconferences:

Expanding the Power of the Personal Computer

Enhancing the Intelligence in Information Systems

For information about submitting papers and posters, please contact the IFIP Congress '92 Committee at the address given at the end of this article. The deadlines for receipt of papers and posters are 10 January and 15 April 1992, respectively. Proceedings will be published by Elsevier/North-Holland.

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For further information, please contact:

IFIP Congress 92   c/o Grupo Geyesco   Mauricio Legendre 4, 8G
28046 Madrid, Spain   fax: 34 (1) 3234936   e-mail: ifip92@dit.upm.es

*Editor, IFIP Newsletter

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100.10 Canadian Networking by Dave Brent <brent@cdnnet.ca>

Networking '92: The 6th Annual Canadian Networking Conference

Memorial University of Newfoundland

St. John's, Newfoundland, Canada

30 June - 3 July 1992

The 1992 Canadian networking conference objective is to provide attendees with an update of emerging network developments and focus on other technical networking topics of interest.

The evolution and issues regarding TCP/IP and OSI will be discussed at management and technical sessions.

A number of Canadian computer networking organizations (CA*net, NetNorth, CDNnet) will be holding their meetings in the days before and after the conference.

Networking '92 is sponsored by the CA*net, NetNorth and CDNnet Executive Committees and is hosted by Memorial University of Newfoundland.

For more information, send electronic mail to: net92@random.ucs.mun.ca
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