



Annual Report
1987-'88

EUROPEAN ***A***CADEMIC & ***R***ESEACH ***N***ETWORK



President's Message

This has been a year of outstanding success for EARN. Among the most significant achievements are the agreement of the Board of Directors to funding the international lines for 1988, the contribution of IBM towards the management and administration of the network, and the agreement by DEC to provide support for the EARN OSI Migration Plan.

The success of EARN to date is a tribute to the staffs of the Computer Centres who have worked long and hard to establish the network and who, through their constant diligence and devotion to the task, ensure that these essential services are available to the academic community as a whole.

As we who are privileged to serve on the Board of Directors of EARN, representing both the academic users and the personnel who run the services, plan the strategy for the next stage of EARN's development we can look forward with confidence to the challenging tasks ahead.



Dennis Jennings
President



Secretary's Report

As a research network, EARN has all the ingredients which make it attractive and useful to users:

- rich functionality with the major function related to electronic mail*
- comfortable user interfaces which result in an easy-to-use network*
- many centralised services in the area of network management and management/distribution of information*
- simple operation and coordination in the computing centres by automated distribution of the common network description and local generation of system dependant network definitions*
- implementation on all major systems like VAX/VMS, UNIX, CDC, Siemens/BS2000 and IBM, to give just some examples*
- low costs due to the very large financial and personnel support by IBM until the end of 1987*

EARN has been warmly welcomed by tens of thousands of researchers using the network and has proven the necessity of telecommunications and telecooperation for academics. The Network must rank as one of the greatest European successes of recent years.

The limit of IBM support to four years caused some of the problems EARN had to solve before 1988. A professional EARN management was required and the Network has now engaged four full-time employees – Joe Chester, Executive Assistant to the President and Alain Auroux, Manager, as well as two secretaries.

A financing model was agreed by the Board of Directors following the lines of the BITNET model, i.e. each country pays for one international line and a share of the 56kb transatlantic link.

In addition, EARN was, and still is, confronted with the major problems of PTT tariffs. The German PTT has introduced volume-dependant tariffs on the international EARN links which results in serious problems. EARN has reacted to this problem with a strategy to avoid pass-through traffic by relocating most of the international lines away from Germany.

Two years ago, EARN stated its intention to migrate to the International Standards Organisation/Open Standards Interconnect (OSI) protocols. During the past year, EARN has also developed a migration strategy to get an X.25 based infrastructure which will enable the introduction of new OSI services while still preserving the existing services.

Because EARN is a very attractive network, a number of new countries have requested EARN membership during the past year. They include Yugoslavia, Greek Cyprus, Luxembourg and the Ivory Coast, the first African country to join the network. Approximately five more countries are preparing EARN membership requests which show the importance of a working network.

Michael Hebgen

Michael Hebgen
General Secretary



Country Reports



AUSTRIA

1. EARN nodes in Austria

The actual number of active nodes is nine (detailed information in the list below).

Most of these nodes are running VM, with the mainframes consisting of:

- 4 IBM
- 1 NAS
- 1 Comparex
- 1 Cyber
- 1 Sperry
- 1 Prime

Since October the IBM systems (VM and MVS) are communicating via SNA. Two of the nodes are currently installing OSI software from IBM (OSI layers 4-6).

2. Line Traffic

The level of acceptance of EARN by the Austrian user community can be seen from these figures:

Line traffic (Jan. 1987 — Sept. 1987), International link AEARN-DEARN:

Total:	Mean:
483 MB sent	53.6 MB sent
951 MB received	105.6 received

3. Financial Situation

Although EARN is being used by Austrian scientists (about 300 specific users), the costs for 1988 for the international link are not yet guaranteed by the Austrian Federal Ministry of Science and Research.

Arno Schultz

LIST OF NODES FOR AUSTRIA

NODE ID	NUM.	COUNTRY INSTITUTE CONNECTED TO (NUM) VIA NODE CONTACT PERSON (NAME, ADDRESS AND PHONE NUMBER)	SOFTWARE SYSTEM (DIST. TO LOCAL)
AEARN	0433	A UNIVERSITAET LINZ, AUSTRIA CON. TO O VIA CONT (GUENTHER SCHMITTNER) K000163 @ AEARN (+43 732 2468-554)	(RSCS) IBM VM/SP R4 (O INTERM. NODES)
ALIJKU21	0781	A UNIVERSITAET LINZ, AUSTRIA CON. TO AEARN 433 VIA CONT (CHRISTIAN PRAGER) K000161 @ ALIJKU21 (+43 732 2468-590)	(JES2) IBM MVS/SP 3.8 (O INTERM. NODES)
AWIBOK01	0556	A EDV-ZENTRUM BOKU WIEN CON. TO AWIIEZ11 1390 VIA AWIIMC11 CONT (PAUL FINSTER) H210T1@AWIBOK01 (+222) 342500-415)	(HASP) PRIMOS REL. 20 (3 INTERM. NODES)
AWIIEZ11	1390	IEZ NUMERISCHER RECHNER, WIEN CON. TO AWIUNI11 1259 VIA AWIIMC11 CONT (DI. HELMUT MASTAL) ZIOMAR01@AWIIEZ11 (+43 222 58801-5816)	(RSCS) IBM VM/SP R4 (2 INTERM. NODES)
AWIIMC11	0913	A IMC UNIVERSITAET WIEN, AUSTRIA CON. TO AEARN 433 VIA CONT (GERHARD GINZLER) GINZLER@AWIIMC11 (+43 222 4800-4001)	(RSCS) IBM/SP HPO R4.2 (O INTERM. NODES)
AWITUW01	1463	A EDV-ZENTRUM TU WIEN CON. TO AWIUNI11 1259 VIA AWIIMC11 CONT (JOHANNES DEMEL) ZOOOONJ@AWITUW01 (+43 222 58801-5829)	(NJE) NOS 2 — NOS/VE 1.2 (2 INTERM. NODES)
AWIUNI11	1259	A EDV-ZENTRUM UNI WIEN CON. TO AWIUNI11 913 VIA AWIIMC11 CONT (ERWIN HALPERN) NODADMIN@AWIUNI11 (+43 222 436111-24)	(RSCS) IBM VM/SP HPO R4.2 (1 INTERM. NODE)
AWIWSR01	1609	A WSR, VIENNA, AUSTRIA CON. TO AWIUNI11 1259 VIA AWIIMC11 CONT (DR. ERICH WANG) EW@AWIWSR01B (+43 222 51519-42)	(TELC) SPERRY OS 1100 (2 INTERIM NODES)
AWIWUW11	1013	A WU-WIEN, AUSTRIA CON. TO AWIIMC11 913 VIA AWIIMC11 CONT (VB/SV K.F. FISCHER) EARN@AWIWUW11 (+43 222 340525-786)	(RSCS) IBM VM/SP R4 (1 INTERM. NODE)

TOTAL NUMBER OF NODES: 9
NETWORKING SOFTWARE:

RSCS: 5
NJE: 1

JES2: 1
NOS: 0

JES3: 0
UREP: 0

JNET: 0
OTHER: 2

BELGIUM

BEARN is currently migrating from BSC lines to SNI (back to back) in Belgium. The connection BEARN (IBM - 4341) — BLEKUL21 (IBM 3090) has now been successfully completed for both file transfer (RSCSV2-JES3) and interactive works (VM-TSO). It is furthermore expected that other sites (BLIULG11-BMSUEM11-BUCLLN11-BNANDP10-BBRIBM11) will migrate to SNI soon.

BEARN now has its own domain name; FNRS.AC.BE. We are still working on a proposal for migrating to X.25 and X.400 protocols.

International Link:

Up to September 30th BEARN-FRORS31 has supplied international link services but BEARN-FRORS12 is now operative.

Traffic:

Some idea of the increase in traffic on the national and international lines can be gained from comparing the Belgian figures for September '86 and June '87.

September 1986	June 1987
436 KREC in Belgium	2336 KREC in Belgium
267 KREC to/from Europe	870 KREC to/from Europe
467 KREC to/from intercontinental links	978 KREC to/from intercontinental links

Miguel Ramos

DENMARK

The number of Danish nodes is now 17, all connected by leased lines. Most nodes are connected directly to the VM system (with SNA partially installed) on an IBM 3081 at UNI-C in Lyngby. This machine in turn is connected to Darmstadt. We have four VAX, two UNISYS, one Prime, one Cyber, one Amdahl and eight IBM systems.

We have not been able to run the accounting programme for some time, so we must rely on numbers from DEARN indicating a traffic of about 10,000 files and two to three million records per month.

The EARN user community seems to be growing and enthusiastic, both because of the services of the Network and the fact that they will not be billed for file transmission in 1988. The line to Germany will be paid for in 1988 by the Danish Computing Centre for Research and Education (UNI-C).

So far, there have been no formal contacts with the PTT on national or international lines and their use, or eventual volume charging.

Preliminary meetings have been held between the Nordic countries within the Nordunet Project to discuss cost sharing, migration to OSI, and eventual use of the EARN lines for other networks provided the EARN traffic is not impaired.

Frode Greisen

FINLAND

The use of EARN has increased considerably in Finland, mainly due to the addition of new sites, improved support to users (e.g. a user's guide in the native language), and services such as a local file server.

New functionality is provided by Listserv at Finhut. It acts as a European distribution point for many mailing lists originating in the United States. Provision of the UUCP news service within the framework of EARN is currently under study.

The gateway functions of the node Fingate have been extended, and they now include mail gateways to the most recent important international networks as well as to the Finnish University and Research Network (FUNET), Finland's Internet domain, etc.

The number of sites in Finland now totals nine. There are 14 nodes, one of which is a vaxcluster with two processors. Connections are mainly based on running JNE over Decnet.

Jukka Korpela

FRANCE

There are currently five international links in operation:

1. CIRCE (Paris) — Belgium (Brussels)
2. CNUSC (Montpellier) — CERN (Geneva)
3. CNUSC (Montpellier) — Spain (Barcelona)
4. CNUSC (Montpellier) — Ivory Coast (Abidjan)

and four links are in the process of installation:

1. CNUSC (Montpellier) — Italy (Pisa)
2. CNUSC (Montpellier) — Crete (Heraklion)
3. CNUSC (Montpellier) — Turkey (Izmir)
4. CNUSC (Montpellier) — Israel (Tel Aviv)

Traffic on these international links is increasing very quickly. The graph on the following page shows this evolution.

Examination of the main French users is a prime example of the diversity of the EARN Network.

The main communities at present are:

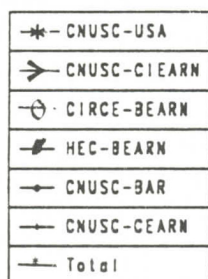
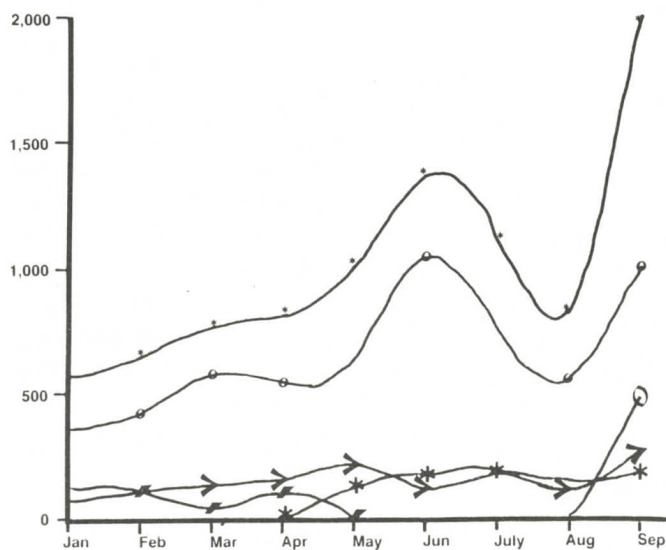
CNRS, CIRCE, Centre de Calcul de Strasbourg, different laboratories and study centres)
Education nationale (CNUSC and regional university computer centres)
Schools (Ecole Normale Supérieure, Paris; Ecole des Mines de Paris; SUPELEC X, Centrale...)
Hospitals (CRIH, Marseilles, Bordeaux and Rouen; SIR Ile-de-France; Assistance Publique, Paris)
INRA
INSERM

The main machines connected to the network are:

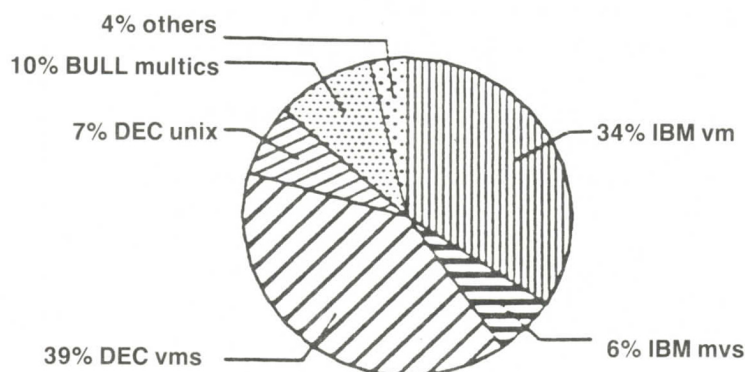
BULL	8 nodes	HB 68, DPS8
DG	1 node	MV/8000
DEC	39 nodes	micro-vax 2, vax 11/730, vax 11/750, vax 11/780,

Dominique Dumas

IBM	33 nodes	vax 8600 4341, 4361, 4381, 3081, 3090
NAS	1 node	9060
MODCOMP	1 node	classic 32/85



EARN-FRANCE January-September 1987
Traffic on international lines (megabytes)



EARN-France: Distribution by system

GERMANY

Approximately 180 nodes are now connected in Germany. This means that about one-third of all the European EARN nodes and users originate in Germany.

The following table shows traffic figures in Gbyte/month for Dearn

	National Links	International Links	Total
Jan 85	0.5	0.2	0.7
Jun 85	0.7	0.3	1.0
Jan 86	1.1	0.6	1.6
Jun 86	1.7	0.8	2.5
Jan 87	2.0	1.2	3.2
Mar 87	2.3	1.8	4.1
Oct 1987			5.5

The German PTT has recently introduced volume-related charges on the leased lines which has resulted in such serious problems as doubling the costs of these lines and/or change of protocols and topology.

Most of the German EARN installations are members of the OSI oriented German research network DFN and vice versa. Therefore a concrete migration plan has been produced which is very similar to the EARN migration strategy for the international EARN backbone and Germany is currently installing a national backbone based on X.25 64KB links.

Michael Hebgen

GREECE

At present, there are three active nodes in Greece, two on Crete and one in Patras. Six more nodes will become active shortly, pending installation of corresponding telephone links by the Greek PTT. These are: University of Thessaloniki; University of Ioannina; University of Athens; National Technical University of Athens; National Research Centre in Athens; and the General Secretariat of Research and Technology (Ministry of Industry, Research and Technology). Various obstacles have been overcome and the above connections are now expected to proceed on schedule.

Beginning in 1988, EARN will be funded by the General Secretariat of Research and Technology (GSRT) as well as the individual institutions. Specifically, it has been agreed that GSRT will pay for the international line to Montpellier and each institution will pay for the telephone line which provides the link to the next node. So far, no mention has been made of volume charges by the Greek PTT, which has been very supportive of our efforts.

The University and Research Centre of Crete are fully committed to supporting the development of EARN in Greece and have made available one IBM 4361 each for this purpose. One of these is the national node GREARN. Negotiations are underway with IBM Greece to obtain a front end processor or communications adapter which would free the ports of the

University and Research Centre computers which will soon be fully occupied. In addition to nodes mentioned above, which will soon come on line, it is expected that Cyprus will be connected to the national node on Crete.

The development of EARN in Greece and the EARN Migration Plan do not appear to be incompatible with other plans to develop a national network in Greece.

Stelios Orphanoudakis

IRELAND

The EARN network in Ireland consists of two sites, University College Dublin (UCD) and University College Cork (UCC). There are currently four nodes.

Ireland has had an operational Academic network, HEAnet, since 1983. This network uses the UK Coloured Books protocols and a combination of the public packet switched network and leased lines. A mail gateway between HEAnet and EARN is provided at UCD. From February 1988 the gateway at UCD will route mail between EARN and the EUnet network within Ireland.

During 1988 there is expected to be a small growth in the number of systems and sites connected to EARN. In particular EuroKom, the ESPRIT IES Computer Conferencing and Electronic Mail Service will be connected. This service is operated at UCD and provides services to some thousands of Industrial and Academic researchers throughout Europe.

The Irish national EARN node IRLEARN provides Netserv and Listserv facilities to the Irish community. Some lists have been established for European or general distribution and at least one file server is in place, for the general distribution of the Apple University Consortium library.

Ireland holds the Presidency of EARN and UCD is host to the EARN Executive Office.

Michael Walsh



ISRAEL

Israel currently has 44 computers connected to EARN and these computers send/receive approximately 3,000 files per day over our international link to Italy. Below are detailed statistics of our data transfer rates:

Future Directions

Israel is in the early stages of setting up a national network based on the TCP/IP protocols. This network will serve as an interim solution to our pressing telecommunications needs until all seven layers of the OSI model are available as products for the operating system we use today (VM, VMS, MVS, NOS, UNIX). Currently, all seven Israeli universities have local area networks running TCP/IP and during 1988 we will be focusing on interconnecting these geographically distant LANS into a countrywide WAN. All EARN services (file transfer, electronic mail, interactive messages, etc.) will be supported in a transparent fashion to all end-users.

Avi Cohen

Cumulative BITNET/EARN Statistics for Israel

Month	USA → IL	EUROPE → IL	IL → EUROPE	ARPA → IL	INTERNAL	
JAN 87	226	78	193	30	63	111
APR 87	225	93	125	57	72	123
MAY 87	276	139	167	77	91	233
JUN 87	171	123	84	56	49	221
JUL 87	226	123	99	58	62	328
AUG 87	233	128	123	53	57	349

1) All numbers are in megabytes (1024K).

2) Europe includes traffic to all places other than the USA (such as Canada, Japan, Mexico, etc.)

3) The "ARPA → IL" column represents that section of "USA → IL" traffic that originated in ARPANET.

4) "Internal" represents traffic internal to Israel between various 44 computers that are interconnected.

ITALY

The EARN nodes in Italy now total 59, covering 42 sites.

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Software used is divided as follows:

MVS/JES2	4 nodes
MVS/JES2	4 nodes
NOS/NJEF	2 nodes
UNIX/UREP	1 node
VM/RSCS	40 nodes
VMS/JNET	12 nodes

The five international lines which were financed by IBM Italy will be eliminated before the end of 1987 are replaced by the line from Pisa (CNUCE) to Montpellier (CNUSC). A second international line, financed by ESA, links Frascati (ESRIN) to Darmstadt (ESOC). ESRIN is not directly connected to the other Italian nodes.

During 1987 IBM also financed three national lines but in 1988 will pay only for the line that connects the IBM Scientific Centre in Rome (node IECSEC) to the national root node in Pisa.

The Italian academic community also has direct connections to EARN and EUNET (via PSDN), HEPNET/SPAN (via a 48 kbps line from Bologna (CNAF) to Geneva (CERN) and Internet (via Satnet).

Mail gateways exist between EARN and HEPNET/SPAN (at CNAF) and between EARN and Internet (at CNUCE) but EARN and EUNET are still reachable only through foreign mail gateways.

CNUCE is not allowed to send on or receive from SATNET traffic coming from, or directed to, non-Italian sites. The EARN/Internet gateway of Pisa can therefore be used only by the Italian nodes. This limitation is due to the low throughput currently available through Satnet. The type of ground connections available on the American side affect Satnet performances at present. However, if these connections were improved, usage of the gateway would probably also be allowed to the rest of Europe.

The evolution of Italian research networking is now co-ordinated by GARR (Gruppo Armonizzazione Reti per la Ricerca). GARR is sponsoring the adoption of OSI standards, through the activities of the technical working groups who are now busy with the following activities:

- creation of a common X.25 infrastructure;
- testing X.400 implementations;
- reorganisation of the electronic mail service (usage of domain-style addressing, RFC987 relays, etc.).

As a result of the activities of the e-mail working group, national gateways will be available soon for EUNET and EARN.

Marco Sommani

NETHERLANDS

The total number of nodes in the Netherlands as of October 1987 is 49, divided between the following systems: VAX/VMS — 36, VM — 6, UNIX — 1, MUSIC — 1, CDC/CYBER — 1, Data General MV10000 — 1. All Dutch universities are connected to EARN. The research laboratory of the Dutch PTT, the Dr. Neher Laboratorium, is an Associate Member of EARN.

Every month over 2000 researchers in the Netherlands use EARN. Since the introduction of the Network in early 1985, some 5,000 different users have accessed the Network. The traffic routed via the national backbone now totals almost one gigabyte per month. Sixty per cent of this traffic is entering the Netherlands (via DEARN), ten per cent is leaving the country and some thirty per cent is national traffic switched via HEARN.

At MCVAX in Amsterdam a gateway is operational for mail to the EUNET and INTERNET networks. There is an agreement between EARN in the Netherlands and EUNET/INTERNET on the naming of RFC822 addresses in the Netherlands.

Full organisational integration of EARN within the Dutch Research Network, SURFNET, is scheduled for January 1, 1988. Integration of user support of EARN and SURFNET users is already operational in the Dutch Universities; all activities are coordinated by the same persons and supported by a common newsletter.

The University of Nijmegen took part in the EARN X.400 experiments with the Heidelberg system. Following successful installation of the software of the HEARN system and a Series/1 frontend X.400, mail was exchanged with other EARN backbone sites.

Our relationship with the Dutch PTT is good. No extra or volume charges are applied on national or international lines.

NORWAY

Kees Neggers

Norwegian EARN representatives have participated in a number of meetings during the year including the Technical Group meeting in Crete and the Heidelberg Group meeting, both held in May, and all Norwegian representatives attended the EARN Norway meeting in June 1987.

Development of an EARN/EARN/X.400 gateway has been going on at the University of Trondheim for most of the year. Versions 1 and 2 of the Heidelberg X.400 software has been installed in Trondheim and tested.

IBM (Norway) stopped all funding of EARN in September 1987, except for technical maintenance of the IBM 4361 in Trondheim. No other funding was available for the remainder of 1987 and the gateway project continued only by using University of Trondheim (RUNIT) internal funds. At the time of writing, the gateway is expected to be operational by the end of 1987. All other activity stopped for the remainder of the year. Funding for the line costs and for operation has now been secured for 1988 by a government grant.

Arne Laukholm

PORTUGAL

There is a general agreement in Portugal that 1988 will be a year of major developments in the national network. Funding has already been agreed for next year by the "Fundacao Nacional Para o Desenvolvimento dos Meios de Calculo Cientifico". Portuguese representatives take an active part in the work of the Technical Group and a Technical Group meeting was held in Lisbon at the end of November, organised by the University of Lisbon.

Since the beginning of 1987, EARN representatives have been actively promoting the Network. This work was difficult because many people in Portugal are unfamiliar with EARN and the people who are aware of the Network have financial difficulties in connecting. However, this work has paid dividends and Portugal now has another node (PTIFM). The University of Oporto is awaiting connection and two more nodes are pending (the PTT lines have been requested). These two nodes are also located in the Lisbon region.

SPAIN

Pedro Amorim

There are twelve members in Spain, with 14 nodes, all connected by leased lines. The breakdown of computers is IBM (11), Data General (1) and Digital (2). Two universities with IBM computers and one research centre with CDC are waiting for the telephone lines to enable connection to the Network. In our country the interest in EARN is increasing and we hope in a few months to have more than 20 members. We maintain contact with our Ministry of Education to finance the cost of EARN in Spain.

Arturo Ribagorda

SWEDEN

The number of nodes in Sweden now stands at 15. At present, they comprise 7 VAX/JNET, 3 IBM/VM, 3 IBM/MVS-GUTS and 2 CDC/NOS systems. The Com-system can be reached indirectly via a special interface solution. Via the JNET and software G-mail or PMDF a larger DECnet of approximately 200 nodes can be reached.

At a local EARN conference in August a decision was taken to finance EARN in 1988 and the proposed national academic network organisation will take over the responsibility for financing EARN.

Under the Nordunet umbrella two agreements were signed. The future of Nordic-EARN and the technical migration of EARN services was a common interest among the Nordic countries. A planning project, Nordic X.EARN has been set up to cover some of these issues.

Mats Brunel

SWITZERLAND

The number of nodes managed jointly with CERN now totals 30; these nodes cover both Federal Institutes of Technology, all the Swiss Universities except Basel and International Organisations. Approximately one-third of the nodes are installed at CERN. More than half the nodes are VMS Vaxes, the rest are VM (6), or MVS (3), and others. All the nodes are connected through leased lines, with BSC/NJE/JESX-RSCS, X.25/Decnet/JNET protocol/software stacks.

Traffic statistics are kept at the main nodes, CEARN (International) and UNI Zurich. The main traffic is generated on the internal CERN links with 15 m. records and 55 m. files per month. The UNI and ETH Zurich each produce 1.2 m. records and 6,000 files per month. Finally UNI Berne, UNI Geneva and ETH Lausanne produce about 450 k records and 3200 files each. These numbers are based on statistics from August 1987 and don't include the international pass-through traffic.

In general, traffic in Switzerland tends to double each year. So far as it is possible to evaluate this traffic, the main part is generated by mail and file transfer. Job submission is still not widely used: even when this facility exists from vaxes the user community is not aware of it. We expect an increase in job transfer for next year, at least within Switzerland, as resource sharing between some universities has already been planned.

The Swiss PTT position is clear; the PTT supplies as many of our needs as possible and has no objection to the use of leased lines. There are no plans for volume charging. Contacts with the PTT have been established by the management of SWITCH (future National Research and Academic Network Team).

The user community in Switzerland appreciates the services provided by EARN, especially the high degree of availability and performance of the Network. The users are anxious that there will be no loss or degrading of service during the forthcoming transition to OSI, in particular due to the introduction of new software products.

Gerard Pitteloud

TURKEY

1987 saw the addition of two more nodes in Turkey — First UN. — Elazig (TRFIRAT) and Middle Eastern Technical University — Ankara, (TRMETU).

National Board Meetings are held bi-monthly in Turkey and a new national Technical Group, proposed to the Board, has been approved.

TRAFFIC ON THE LINK TO STOCKHOLM

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
FILES (1000)	7.07	10.31	10.23	11.85	10.91	8.33	11.58	9.05	13.99	14.73	12.98
RECORDS (1000)	902.4	1118.4	1387.2	1208.0	1228.1	933.4	1094.9	1326.5	1902.0	2472.5	1486.4

LISTSERV is now installed at TREARN and the international line is soon to move from Pisa to Montpellier.

Ege University is currently making arrangements for EARN 88, the annual users meeting, to be held in Izmir from 18-20 April 1988. The university was also the location for EARN users seminars on 16 and 17 December 1987.

Sitki Aytac

UNITED KINGDOM

Traffic

Traffic using the EARN JANET Gateway is very erratic but averages about one gbyte per months. Over half of this traffic is coming from, or going to, CERN. About half the traffic is coming from, or going to, CERN. About half the traffic goes through the gateway to JANET Mail and JANET File transfer and the rest is to or from the IBM Machine at Rutherford.

User Support

Analysis of the queries from users shows that the main problem is with gateways to networks outside the UK. It appears that the addresses required are often difficult to determine. The second problem is with missing mail. Quite often it turns out that mail is delayed for long periods of time which gives cause for some concern. Even so there is still quite a lot of vanishing mail almost all of which is traversing distant gateways.

Finance

In line with other gateways to JANET it is proposed to finance the line and gateway from the users. This will be done via their funding sources, not by charging them directly. The final details of how this will be done are currently being worked out.

Technical Development

Eric Thomas was at Rutherford for a month and made substantial improvements to the mail gateway. There are still a few changes to be made but it is now far more satisfactory as the latest version of the mailer is in use and many aspects of the system are now automated. We are indebted to Eric for his work.

Paul Bryant



Migration to OSI Protocols

1 Summary

EARN is determined to migrate to the use of ISO protocols as soon as possible and it is vital that during this migration there is no significant loss of service to the users.

Until recently there have not been the products available to start a migration. There are now a number of developments which suggest that the first stages of a migration could be undertaken. The completion of the process will take several years.

The EARN Board of Directors set up a working party to define the migration path which has recently concluded its work. This paper is a summary of their report.

2. Why migrate?

There are three reasons for EARN wishing to use ISO protocols:

- EARN had to obtain permission from the various national regulatory authorities in order to operate. This was because it infringed the PTT monopolies in some countries. CEPT, the European advisory body for such matters, agreed to recommend that EARN should be permitted as long as it migrated to ISO protocols by the end of 1987.

- EARN uses the fairly primitive IBM NJE protocols which provide a store and forward network for file transfer and mail. The use of ISO protocols would provide a broader range of services. ISO protocols are expected to be available under most systems whereas NJE is restricted to the more popular ones.

- All the west European countries (and many others) are expected to base their academic networking on ISO protocols. EARN must cooperate and interwork with these networks.

3. The state of protocols

The CCITT X.25 protocol is widely available but only in its 1980 version. The 1984 version is required for the support of ISO protocols. The PTT's planned dates for the 1984 version are not yet clear. Various private switch suppliers now provide it.

The X.400 mail protocol is available in a number of experimental or pilot versions. The use of this protocol is likely to expand rapidly as the PTTs provide services based on it in the near future.

FTAM (the ISO file transfer protocol) is only now becoming stable and implementations are not expected for some time.

VTP (virtual terminal protocol) and JTP (job transfer protocol) are both unstable and implementations are not expected for a long time.

4. The parts of EARN

EARN can be regarded as two parts — the national parts and the international ones.

The migration of EARN within a country must be undertaken in close cooperation with other national activities and will therefore not be directed centrally.

The migration of the international parts will be directed by the EARN Board. All the international EARN nodes are IBM ones. This is the principal subject of this paper.

It is essential that the international and national migrations are carefully coordinated.

5. The first stage, strategy

The only ISO protocol that can currently be adopted is X.25.

The strategy is to operate the NJE protocol over X.25. This can be achieved using IBM products. The users will not need to be aware of the change since the strategy will not alter the services provided or the interface to the user.

The use of NJE over X.25 demands the use of X.25 permanent virtual circuits. These cannot be provided internationally by the PTTs and therefore EARN will have to provide an interim X.25 network. This has the secondary advantage that X.25 (1984) can be used which is not currently available from the PTTs and which is needed to support the higher level ISO protocols.

6. The first stage, tactics

A survey has shown that switches which provide permanent virtual circuits and X.25 (1984) are available.

The number of switches and their location depend on the cost of switches and the cost of lines. An incomplete study suggests that initially there should be two switches — one serving the north of Europe and one the south.

There would need to be some relocation of lines but this could be done over a longer period.

At its last meeting, the Board of Directors approved further study of its options for the topology of the X.25 infrastructure.

It is intended to use the X.121 address scheme. This defines the first four digits of an address. Eight digits will remain for use within a country which will be allocated according to national needs although it is suggested that four digits define a site and four should be for use within a site. A two digit subaddress will not be policed by the network.

Initially a few sites with good networking expertise should be connected. The rest of the international lines will be migrated in a planned way, and in some cases when lines are relocated. A few sites may need additional software which may also cause a slight delay.

The EARN services will be enhanced by the addition of the X.3, X.28, and X.29 services on some sites. This will not be very useful until the national parts of EARN have migrated to X.25 or gateways are provided to other X.25 networks.

The tactics within a country will be the responsibility of the country. Some countries will want to migrate in step with the international part of EARN. Others will want to wait. Others may want to provide gateways and relays to existing or proposed national networks.

The use of Coloured Book protocols and DECNET and other protocols will be allowed for an interim period to meet the needs of some specific groups of users.

7. The second stage, strategy

The first higher level ISO protocol to be promoted will be the X.400 mail protocol.

8. The second stage, tactics

There are a number of X.400 systems now available.

In particular the IBM Heidelberg system will operate on IBM VM systems and so it could be mounted on many of the international nodes. This system has the property of allowing parts of the system to be located remotely over the NJE network thus allowing greater penetration of EARN by X.400 than the extent of the X.25 network would suggest.

Other X.400 systems, such as EARN, are expected to interwork with the Heidelberg one and recent tests are encouraging. These will be of greatest interest within a country.

Some countries are expected to be part of the EARN address space as they migrate. Others will have different schemes and gateways and relays will be provided to maintain a service. Various promising products are in existence or being produced.

The most important relay will be between X.400 and RSCS mail systems.

9. The fourth stage, strategy

The use of NJE, DECNET, Coloured Book and other protocols will be phased out leaving a pure ISO network. At this stage it will be possible to interoperate with the public networks.

The removal of these protocols depends on the provision of FTAM (the ISO file transfer protocols) which should be available in a year or two.

10. The fourth stage, tactics

Currently there are no suitable versions of FTAM available and no firm indication of dates. EARN will wait for suitable products and promote them as soon as possible.

The fourth stage will require further study. It is unlikely to be concluded before 1989.

11. Time scales

The international switches plus a few connections could be provided immediately, depending on funding. The complete migration of the international part of EARN to X.25 will take place during 1988. NJE services must be provided immediately.

X.400 can be provided on some nodes by early in 1988 with all international nodes operating it at the end of 1988.

The use of Coloured Book, DECNET and other protocols will only be provided where needed.

An ISO transition strategy based on this and other documents produced by the Technical Group was adopted in the last meeting of the Board of Directors. It is available from the EARN offices in Dublin or Paris as EARN Policy Document No. 3.

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