

Annual Report 1992-1993



EUROPEAN ACADEMIC & RESEARCH NETWORK

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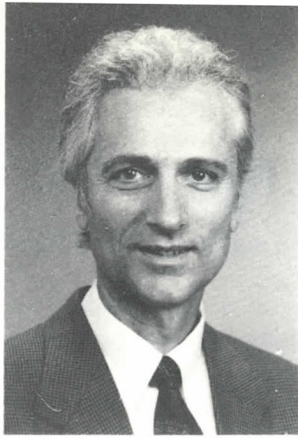
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1993 Executive Committee

Standing from left:	T. Hofmohl	F. Greisen President	P. Bryant General Secretary	D. Bovio Technical Manager
Sitting from left:	P. Amorim	A. Cohen Vice-President	M. Sommani Treasurer	H. Deckers General Manager

Not shown: J.-L. Delhay



President's Report

Within the Northern part of its geographical coverage, EARN still connects virtually all countries, most recently establishing connection to Romania and Iran. This brings the number of connected countries to 31. However, in the Middle East and Africa there are still many countries without a connection to EARN, or to any other network. It is clear that there is a need for low cost and easy to maintain networking in those countries.

In addition, the dissolution of the Soviet Union and Yugoslavia has created numerous new countries with an acute need for establishing network connections as has been done successfully in recent years by the Central European countries. EARN is therefore establishing a program for assisting those countries in establishing networks and spreading their use. The plan to de-couple EARN responsibility from lower layer technology has continued. While EARN has sponsored RIPE and Ebone in their first years of existence, such support is decreasing and countries are expected to take responsibility for those layers, with EARN staff and technical groups assisting with advice where needed. The focus on securing NJE routing and operational performance is unchanged.

In the application area, EARN continues to support key tools and servers. Accordingly, a contract with a new commercial company has been signed to secure high quality List server and mail software for the EARN membership and to support the development of a list server on a lower cost and more ubiquitous platform than IBM's VM system. EARN has also provided support for tools such as INTERBIT and BITFTP which improve connectivity between the Bitnet and Internet communities.

With the de-coupling from lower layers, EARN has focused on end user support, no matter whether NJE or other protocols are used, since service and not protocols are of interest to the end users. During 1992 and 1993, we have established such support in user documentation, in a pilot help desk, in conferences and in a new scientific journal.

The EARN documentation plan covers end user documentation for wide area networking on the most common platforms and in particular a guide on the new advanced Network Resource Tools is now out in its second edition. Generally, documentation is published on-line and the major items are also printed.

The help desk is an e-mail address maintained by a small group of experts. The pilot is expected to show if the service should be tuned toward end users or toward second level support.

The first Network Service Conference in Pisa in October, 1992 was attended by 325 people and the focus on service instead of technology was widely appreciated. The second Network Service Conference is due in October 1993 in Warsaw.

In cooperation with RARE, a new journal - Computer Networks for Research in Europe - has been launched. It is published both electronically and in paper form by Elsevier.

The EARN organization has been streamlined and our General Manager Hans Deckers has left us after serving for three years. With staff now headed by Technical Manager Daniele Bovio, I look forward to seeing EARN continue to support its membership with both established and new services.

A handwritten signature in blue ink, appearing to read 'F. Greisen'.

Frode Greisen
President

Technical Work in EARN

This report gives a status of the technical work in EARN. For full details about the EARN technical structure refer to document BOD31 89.

Since March 1990, the works of the EARN technical groups has been heavily supported by manpower made available at the EARN Office. During the last 12 months, in particular, EARN Staff has focused on users services, such as the production of end-user documentation and the Network Help Desk. See the dedicated chapters in this booklet for a full report.

In January 1993 the EARN Executive decided on a reorganization of the EARN staff and Daniele Bovio, a member of the EARN permanent staff since March 1990, became EARN Technical Manager. His role is to manage the EARN Staff as well as coordinate the various EARN technical activities.

EARN Permanent Groups

EARN NOG

The EARN Network Operations Group (EARN-NOG) was established in 1987. The group is responsible for the operations of the EARN international backbone and has to approve all technical changes on EARN international connections as well as any proposed EARN technical directive or recommendation.

The NOG consist of:

- one Network Country Coordinator (NCC) per country, and possibly a NCC deputy. The NCC is technically responsible for EARN in his/her country,
- the EARN Technical Manager, who chairs the group,
- the EARN Staff,
- developers of major software tools used by EARN,
- a CREN representative.

The EARN-NOG meets twice a year, in conjunction with other EARN technical meetings, usually before the BoD meetings. For each meeting minutes are produced and made available electronically.

The EARN-NOG met twice, during the last 12 months, in Pisa (November 1992) and in Trondheim (May 1993). During these two meetings several recommendations were issued by the NOG, concerning key aspects of the EARN services such as the installations of INTERBIT gateways, the preservation of DISTRIBUTE services independently from NJE, and the deployment of LISTSERV 1.7 and LMail 1.1 throughout EARN countries. All recommendations were afterwards welcomed and adopted by the EARN BoD.

EARN INFO

The most important task of the EARN Permanent Group on Information Services (EARNINFO) has been a review and discussion of the documentation modules produced by the EARN Staff. Several suggestions were put forward by Info group members, which were subsequently adopted by the staff. As new modules are produced, they are available first to EARNINFO members only, and after EARNINFO comments and criticisms have been taken into consideration, the modules are made public and included in published EARN documents.

EARNINFO has inaugurated a policy of cooperation with the RARE Working Group on Information Services and User Support. The two groups are working together on reviewing and overseeing the work on the second edition of EARN's Guide to Network Resource Tools. The two groups (EARNINFO and RARE WG-ISUS) have scheduled a joint meeting in Warsaw on 11 October 1993 to discuss the Guide, as well as other matters of mutual interest.

EARN Project Groups

EARN RPG

During its meetings in Pisa (November 1992) and Trondheim (May 1993), the EARN Routing Project Group concluded that it has met the requirement on providing better and faster communication paths to the end-users of the whole networking community. On the other hand the group also reaffirmed the usefulness of a forum to discuss and propose solutions to cope with the constant evolution of the European academic network infrastructure.

At the EXEC meeting in Trondheim it was afterwards decided to turn the group from a 'Project Group' into a 'Permanent Group'. The group will ensure guidance for the preservation of the basic EARN services on top of different technologies and infrastructures, proposing technical solutions and modifications of the routing topology accordingly to new needs, as well as pointing out new requirements. The new term of reference for this group was on the agenda for the Executive meeting in September 1993.

EARN PEG

The EARN Performance Evaluation Group was created in June 1991 to continue the work of the EARNSTAT group and, additionally, to develop a set of new network monitoring tools and procedures. The terms of reference for the EARN-PEG are available as the document EXEC51 91. It is chaired by Daniele Bovio from the EARN Office.

The HIMON monitor was developed during the first half of 1992 and placed fully in to production from June of the same year. The critical areas monitored to evaluate network performance are link availability, the behavioral patterns of queues and round trip times for both file transfers and interactive messages across network links. Reports are distributed on a weekly and monthly basis on the EARNSTAT mailing list.

The work of the EARN-PEG has recently turned to the production of a network performance index (NPI). This will summarise the performance results of the above crucial network areas in to a single figure. This figure may then be used to gauge performance. The index is measured on a linear scale starting at 0 with an ideal value of 11. Anything above this is considered less than ideal, the higher the index value, the poorer the performance. The NPI will be presented on a region by region basis.

At the EARN-PEG meeting in Trondheim (May 1993) it was noted that, due to developments within the EARN network, the current method of collecting traffic statistics no longer gives a complete figure for measuring the volume of EARN services rendered by individual countries. An increasing quantity of EARN services are being accessed through direct connections with cooperating networks and thus are invisible to NJE traffic volume collection techniques. The EARN-PEG started work on a new strategy for measuring the use of EARN services based on the number of server requests processed rather than by traffic volume.

EARN Special Interest Groups

These groups have been started informally by the EARN technical community and are run as open mailing lists of those interested in the subject. The existing groups fall mainly in the area of the EARN services. The active groups at present are Netserv and RED (related to Trickle services).

A new group was started during June 1993, following the recommendation issued by the EARN-NOG, to define the protocol of an unsolicited file transfer mechanism similar to SENDFILE for the Internet. The goal of the group is to have a powerful, generic protocol able to support VM, VMS, and UNIX file systems, finalized within a year at most. The protocol will be placed in the public domain. The group works through the mailing list : UFT-L@EARNCC.BITNET. Volunteers are welcome to subscribe to the list.

New EARN services

EARN presently focuses on maintaining the satisfactory quality of service reached thanks to its regionalization, on facilitating the mail/file exchange with other networks, and on offering more and new services on top of the network layers.

One side effect of the regionalization plan that was completed in 1992, is that EARN no longer needs a private dedicated backbone. A common IP infrastructure (EBONE) is in fact used today in Europe both by Internet and EARN users. The EARN private line to the USA was cancelled at the end of 1991 and the money invested in the EBONE.

As a result of this, NJE can today be assimilated with other applications based on IP lines like FTP or Telnet. EARN is, obviously, still coordinating the activities related to NJE, but is also focusing on other user services which are entirely independent of NJE.

Important efforts have been made in order to facilitate the exchange of traffic, both mail and files, with the Internet.

The INTERBIT gateways are used to exchange electronic mail between Internet and EARN/BITNET. Between September 1992 and April 1993, all the 9 EARN core sites became operational INTERBIT gateways, thus trapping all the traffic originated by each region directed to an Internet node. One big advantage of this is that all the traffic directed to the European part of the Internet, which is growing daily, will not cross the Atlantic twice, via NJE toward the US (where the only INTERBIT gateways were in the past) and coming back to Europe through SMTP.

One key aspect of a distributed gateway service is the guarantee that the address and character translation is homogeneous, regardless of both the gateway and user location. In order to guarantee the common behavior of all the INTERBIT gateways a set of guidelines and requirements has therefore been agreed upon by all the EARN countries willing to offer the gateway services, and by Princeton University, the maintainer of the main INTERBIT gateway in the USA.

Concerning the file transfer services, EARN provided partial funding for the development of a portable VM/CMS version of the BITFTP server, that allows users with only mail access to the Internet - or with so slow and unreliable access that normal FTP is impractical - to FTP files from Internet-only sites with simple commands. A beta test version of the server has been running without problems for a month in Germany (GMD, node DEARN) and it is now open to public service. Even without being advertised, this server has already transferred 1.5 GByte of data during one month (April 1993). EARN plans to locate more servers at some of its European core sites, thus granting a better distributed service.

In January 1992, thanks to a joint effort of EARN Staff, IBM, and C.I.R.C.E., an experimental gateway was opened between EARN and the IBM network (IBMMAIL). The gateway, hosted at C.I.R.C.E, after some months of pilot service restricted to the EARN nodes in France, was opened to public service during summer 1992.

During the past 12 months the gateway has been up and running, delivering successfully more than 8000 mail items (on the average) per month. Unfortunately, due to lack of funding, IBM decided to discontinue the services. The gateway was closed in August 1993 and the users are encouraged to use the IBMMAIL gateway to the Internet.

User support services

NETHELP The Network Accessible Help Desk

A completely new service in the users support area was inaugurated in April 1993.

Users, as well as system administrators throughout EARN, often come across problems in dealing with the network and have no local source of help to turn to. EARN decided to address this problem by offering a Net-consulting Help Desk service. The service is free of charge and is limited to users in EARN countries.

A Network Consulting Team (NCT) has been established to handle questions from users and is available via e-mail. The NCT is composed of EARN Staff and external consultants and is mandated to handle questions and problems

related to the realm of networking. The helpdesk is managed through a LISTSERV list; in order to submit questions to the NCT, users send electronic mail to NETHELP@EARNCC.BITNET. During the first 4 months of pilot service more than 180 questions, essentially coming from Central and Eastern European countries, were successfully processed. The EARN Executive will decide during its September meeting if this service shall be continued, and under which form in the future.

Users Documentation

EARN Staff has been producing a database of texts related to the use of the electronic mail network - users guides, command summaries, lists of services, etc. - which are of interest to users. While there are many other texts of this kind in existence today, they are dispersed throughout the networks and not always accessible. In many cases, these texts are either incomplete, inaccurate, obsolete, or not aimed at the EARN audience.

Hardcopy versions of several of the documents described herein were distributed at the meeting of the EARN Board of Directors in Trondheim, Norway, in May 1993.

The focus and emphasis of the documentation has evolved since its original conception over one year ago. This evolution parallels the changing emphasis within EARN. The original documentation plan was designed for NJE-only users. However, as more and more EARN users gained Internet connectivity, it became clear that the main aims of our user documentation must be:

1. Document the key user services within the NJE network, and describe their use for NJE and non-NJE users,
2. Document all key user services, whether or not they are available on the NJE network,
3. Make the documentation easily accessible to EARN members.

In line with the aims as listed above, it was decided that serious documentation work was needed for LISTSERV. After the existing documentation for LISTSERV was evaluated, it was determined that there was a need for short guides to LISTSERV usage which users can always have handy. Two such guides have been produced:

- Starting Out with LISTSERV - an overview of the purpose and function of LISTSERV with explanations of the most important commands: SUBSCRIBE, UNSUBSCRIBE, LIST, REVIEW, GET and HELP.
- LISTSERV Quick Reference - a listing and brief explanation of all useful general user commands.

A more comprehensive user's guide to LISTSERV has also been prepared. The LISTSERV Users Guide is available electronically in both plain text and PostScript formats. A hardcopy version of this guide will be distributed to EARN countries in September 1993.

Documentation modules for the major new user tools in the Internet (archie, Gopher, WAIS and WWW) have also been produced by EARN Staff. These modules, along with modules on other user tools (such as LISTSERV and NETSERV), have been compiled into one comprehensive users guide to networking tools. The first version of the Guide to Network Resource Tools was released, both electronically and in hardcopy, in May 1993. This guide has aroused much interest throughout the network and has garnered much praise. An expanded and improved second edition of the guide will be available in time for the Network Services Conference in Warsaw in October 1993. It will also be released as an official Internet For Your Information document (FYI).

A glimpse to the future

During the EARN meetings in the spring of 1993, decisions were taken concerning the future of EARN services.

It has been stated in several forums that LISTSERV is by far the most important service available today on the NJE network and that it would be of great advantage (from the users perspective) to have it implemented and available on the Internet.

LISTSERV is a set of connected servers allowing open and closed interest groups to communicate via email. The servers offer automatic subscription, open, closed and edited lists, archives and convenient management functions. In addition, LISTSERV operates with a so-called DISTRIBUTE function between servers which saves bandwidth at a

factor between 5 and 25, and guarantee a fast delivery of mail messages regardless of the number of recipients (list subscribers).

LISTSERV presently does not require NJE connectivity to implement its DISTRIBUTE function anymore, but the current non-NJE based version is still lacking a proper inter-server file exchange mechanism and this makes it impossible to deploy identical servers on the non-EARN/BITNET part of the Internet granting the same level of functionality. This however is being addressed, on one hand by modifying the software to work on different platforms than IBM/VM, and on the other hand by addressing the larger issue of topological data for the Internet.

The EARN Association is, in fact, partially funding the development of a DEC/VMS version of LISTSERV, to be developed by Eric Thomas, and has also started a special interest group for the definition of an unsolicited file transfer protocol over TCP/IP, to be used by LISTSERV as well as by any other server performing DISTRIBUTE functions.

In addition, EARN is collecting topological data for the Internet, without which there can be no efficient distribution, and plans to update and maintain such information in a standard form as a value-added service to its membership.

Conferences in 1993

Fourth Joint European Networking Conference

As in previous years, EARN was a co-organizer of RARE's Joint European Networking Conference which took place in Trondheim on May 10-12. This conference had a high quality technical program and it drew the attendance of about 350 participants from 33 countries.

The Networking Services Conference 1993

NSC'93 is scheduled for Warsaw, Poland, in October 1993.

Building on the success of the first Network Services Conference in Pisa Italy, NSC'93 will focus on the issue of providing services to customers, with special attention paid to the actual usage of the various tools available. We will address the impact of today's global tools on service development and support, the changing function of traditional tools and services (such as archives), new services (such as multi-media communications), the future role of the library and the effects of commercialization of networks and network services. Customer support at the institutional and campus level, and the role of support in accessing global services, will also be covered.

Talks, tutorials, demonstrations and other conference activities will address the needs of the research, academic, educational, governmental, industrial, and commercial network communities.

Tutorial sessions on specific network services have been integrated into the regular conference program. Practical issues in the use of these services and tools will be covered in detail by experts. Throughout the conference, participants will be able to get hands-on experience in the well-equipped demonstration area.

NSC'93 is being organized by EARN in conjunction with EUnet, Internet Society, NORDUnet, RARE, and RIPE, with EARN having the financial responsibility.

Traffic Report

EARN collects traffic figures on international network links. These statistics are needed to show the load on network links and to identify the need for link upgrades, server relocations or changes to the network topology. They also provide a measure of the level of service provided by EARN countries.

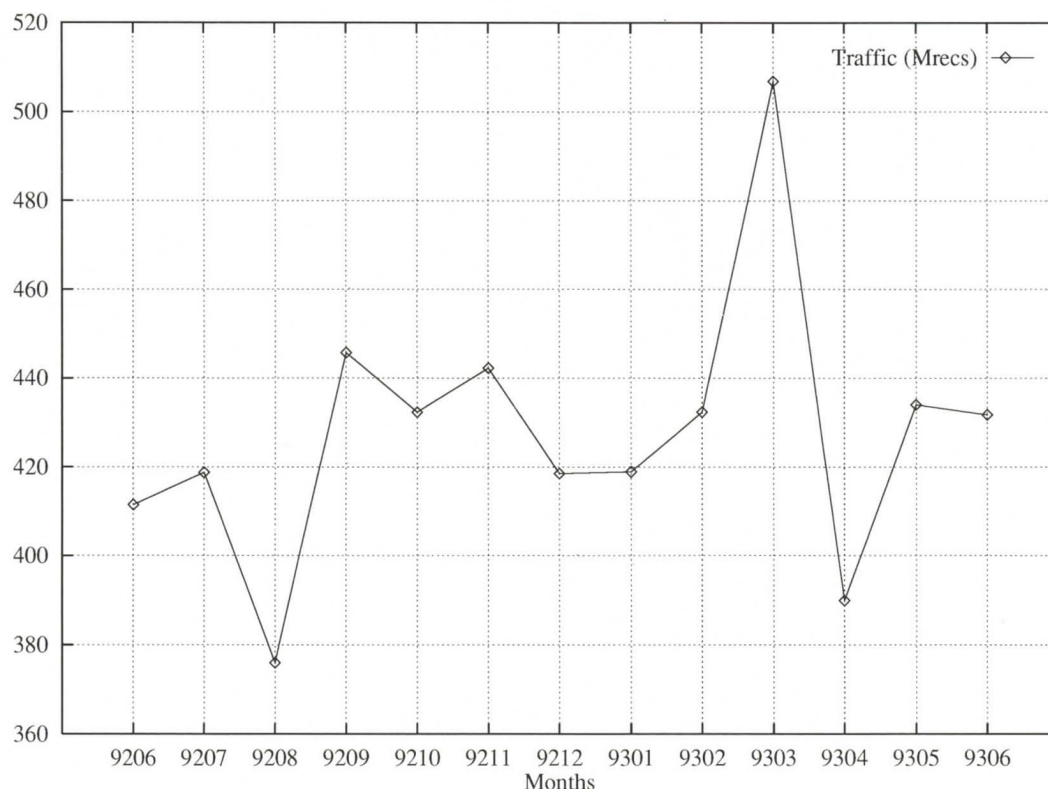
Table 1 shows the traffic for 1992 and a comparison with the same data from 1991.

Summary of records sent and received between 01/92 and 12/92 (*1000)							
Country	1992	%	1991	Country	1992	%	1991
Argentina	97	0.0	97	Italy	486,437	5.1	484,048
Austria	660,094	6.9	381,630	Japan	7,301	0.1	8,493
Bahrain	20	0.0	-	Korea, Republic of	3,276	0.0	3,184
Belgium	469,500	4.9	351,067	Kuwait	1	0.0	3
Brazil	13,090	0.1	11,678	Luxembourg	12,313	0.1	6,007
Bulgaria	3,090	0.0	0	Malaysia	37	0.0	18
Canada	45,453	0.5	43,514	Mexico	2,046	0.0	988
Chile	1,440	0.0	2,086	Netherlands	610,827	6.4	422,947
Colombia	840	0.0	500	Norway	57,102	0.6	75,470
Costa Rica	305	0.0	277	Poland	116,341	1.2	26,808
Cyprus	12,070	0.1	78	Portugal	42,727	0.4	34,278
Czechoslovakia	140,584	1.5	73,291	Puerto Rico	103	0.0	10
Denmark	135,647	1.4	93,559	Romania	291	0.0	-
Ecuador	7	0.0	7	Russian Federation	1,264	0.0	16
Egypt	25,050	0.3	17,233	Saudi Arabia	622	0.0	760
Finland	102,448	1.1	97,288	Singapore	1,620	0.0	2,287
France	920,201	9.6	1,097,743	Spain	210,699	2.2	43,499
Germany	1,420,376	14.8	1,300,392	Sweden	412,762	4.3	202,397
Greece	116,362	1.2	91,254	Switzerland	708,248	7.4	444,163
Hong Kong	1,300	0.0	4,132	Taiwan	3,892	0.0	8,078
Hungary	65,524	0.7	6,911	Tunisia	2,244	0.0	180
Iceland	0	0.0	6	Turkey	323,040	3.4	230,262
India	34,767	0.4	17,475	United Kingdom	447,592	4.7	369,880
Iran	59	0.0	-	United States	1,246,086	13.0	819,535
Ireland	163,649	1.7	154,154	Uruguay	0	0.0	4
Israel,	504,004	5.3	331,777	Yugoslavia	76,346	0.8	91,947

Table 1: Traffic Volume by Country.

Each international EARN node is supposed to collect the traffic data for its own set of international links. This is done on a monthly basis. This data is then delivered to a central site for further processing. Although not all international EARN nodes are able to carry out this procedure, sufficient redundancy in the collection of traffic data allows an accurate proxy computation to be made on half of such sites.

Graph 1 shows the overall traffic figures in records sent and received at all EARN international sites. Each record can hold up to eighty bytes of data.



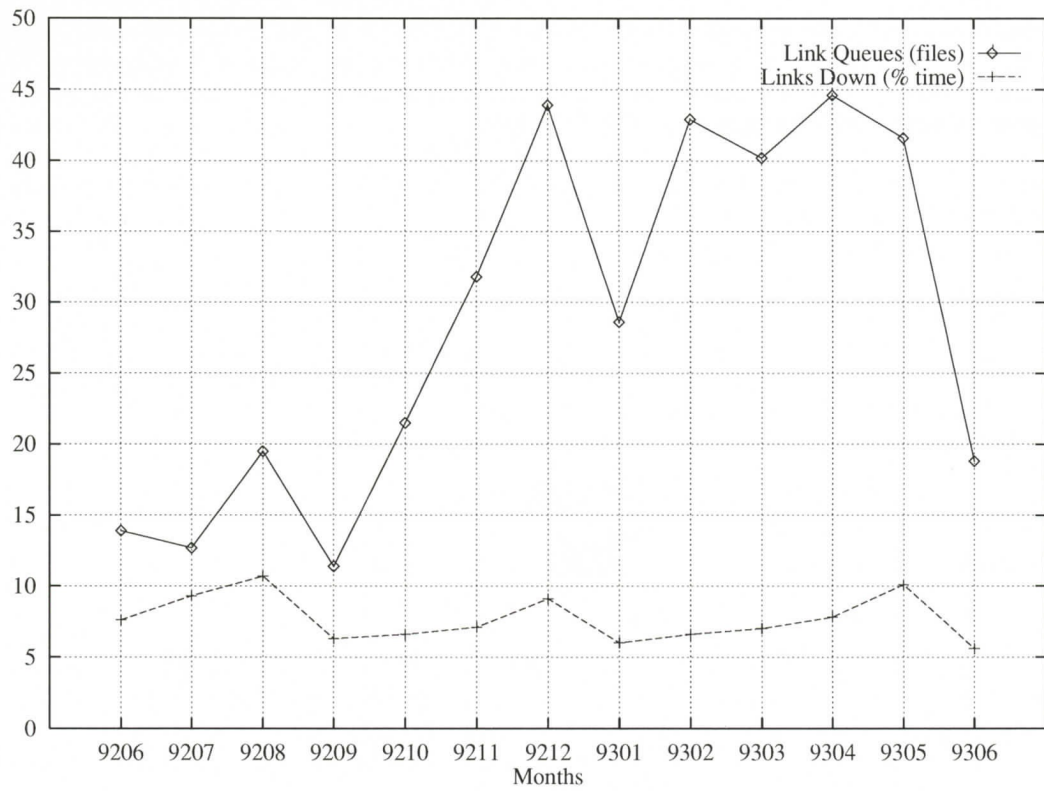
Graph 1: Traffic Volume (Sent and Received).

As can be observed from the figures, the overall traffic volume across the network remains steady. It must also be noted that these figures do not represent the entire measurement of EARN services rendered. An increasing quantity of EARN services are being accessed through direct connections with cooperating networks and thus are not present in these NJE traffic figures.

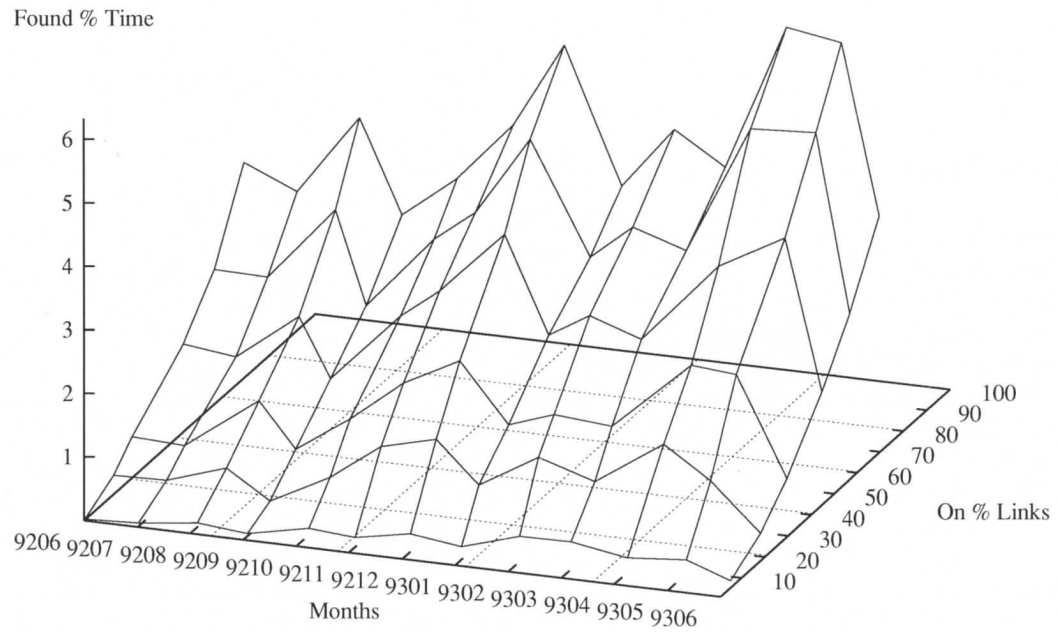
Link Down Times and Queues

From June 1992, EARN commenced measuring network performance via the newly developed HIMON monitor. All of the following figures come from the data provided by this monitor. HIMON monitors the status of all network links and their associated file queues every ten minutes. The mean link down time and file queue for the entire EARN network are shown on a monthly basis in Graph 2.

As may be observed in the graph, the size of the mean file queue has varied dramatically in the last twelve months while mean link down times have been showing a gradual decline. The EARN network still supports the use of some dial-up lines which contribute a constant value to the link down time and file queue figures. Nevertheless, the steep climb in file queue values over the last quarter in 1992 can be primarily correlated to the chronic saturation of a number of network links. Fundamental alterations to the physical network infrastructure utilized by EARN countries and the success of the regionalization plan for the network has had a two-sided effect on queue patterns. Firstly, it has meant that files traversing the network do so with much smaller transit times than previously experienced. This results in a much quicker and more serious state of congestion on any links unable to cope with an increase in incoming traffic. The quick formation of large queues can be clearly observed in Graph 4 which shows the link and queue performance of the EARN core nodes. In this case, queues are correlated to link down times, however, the same effect is true for chronically congested network links. The second factor introduced by the changes to the physical network infrastructure used by EARN and the regionalization plan (in this case, specifically the use of virtual NJE circuits) has enabled many EARN countries to improve their network connectivity. This has occurred with a number of heavily congested links during June 1993 and resulted in a sharp drop in mean files queued. This drop cannot be attributed solely to the traditional decrease in traffic volume over the summer vacation period (as shown in Graph 1).



Graph 2: Link Down Times and File Queues.



Graph 3: File Queues by Threshold.

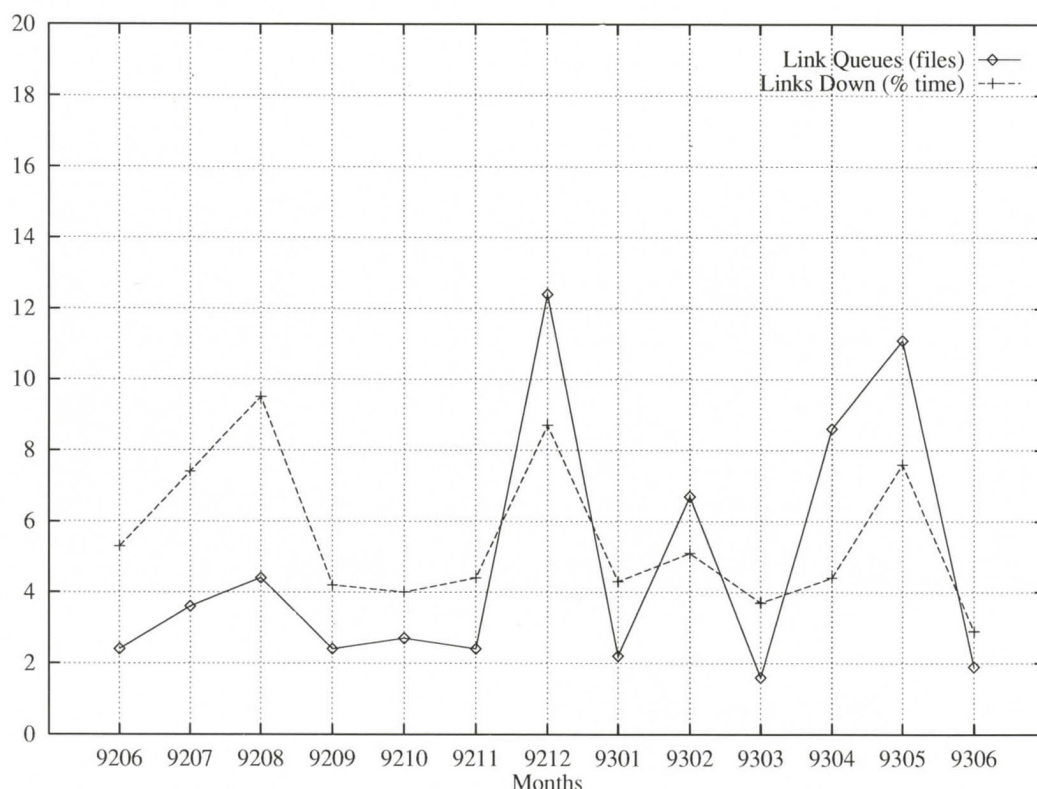
Graph 3 shows the behavior of network queues by threshold values. The overall network queue has been broken down into six categories by the following threshold values: queues of between 50 and 100 files, of between 100 and 200 files, of between 200 and 500 files, of between 500 and 1000 files, of between 1000 and 3000 files and queues of more than 3000 files. These queue threshold figures are represented on two scales: the percentage of time that each threshold category was observed on any network links and the the percentage of network links that carried each threshold category. This gives an indication of how the overall monthly queue values were made up and how widely queues are spread over the network. The major contribution to the queue values has been made by queues of 1000 files and above and these queues have been forming on an increasing number of network links.

Graph 4 shows the link and queue figures from the EARN core nodes. These nodes act as both the international and inter-regional gateways for the EARN countries within the network region they service. As can be seen from the graph, the link down time figures have been gradually improving while the queue figures have been extremely spiky. This spiky queue behavior results from the quick formation of large queues (and also their quick dispersal) due to link down times. This type of queue behavior indicates a high rate of traffic throughput.

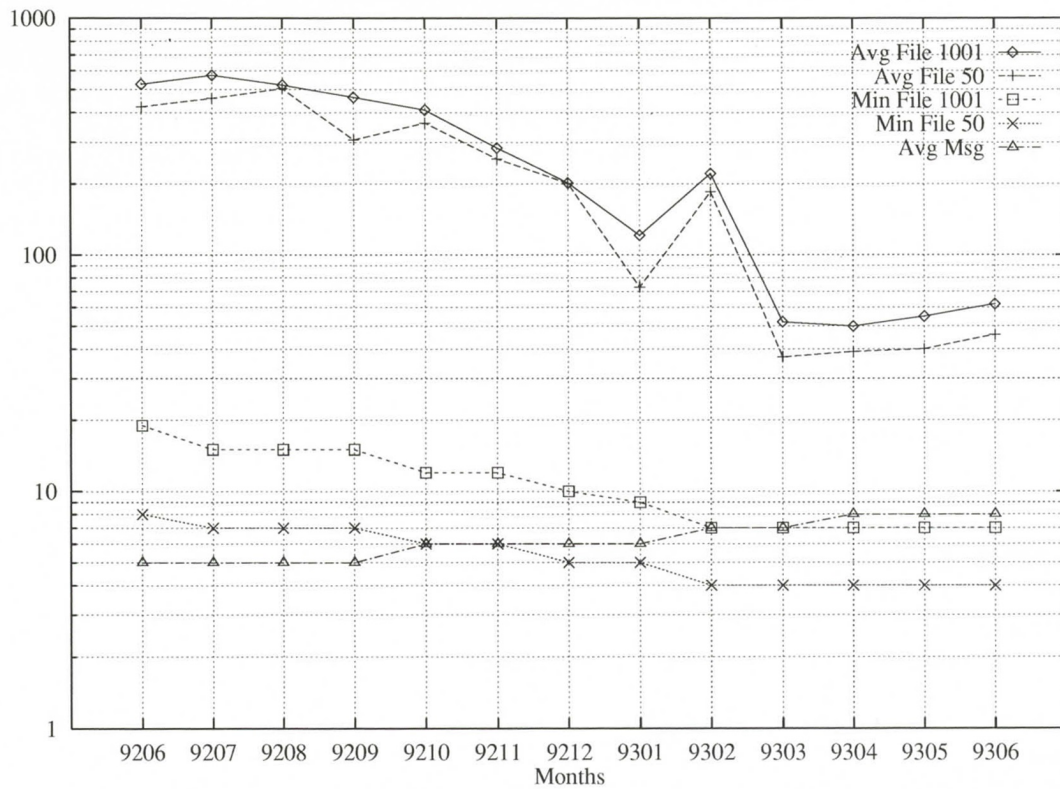
Round Trip Times

Two measurements of Round Trip Time (RTT) are made on the EARN network by the HIMON monitor. These are file and interactive message RTTs. The file RTTs are designed to approximate the quality of service (in terms of elapsed time) a user may expect when transferring files across the network. These figures are designed to measure both the speed at which files are physically moved on the network and delays caused by time spent in any file queues. File RTTs are measured for two different file sizes: 50 and 1001 record files. The 50 record files represent a typical piece of e-mail (which make up the bulk of EARN NJE traffic in terms of file numbers). The 1001 record files represent a data file of medium size. File RTTs are measured on an hourly basis. Interactive message RTTs are designed to approximate the quality of service (also in terms of elapsed time) a user may expect when interacting with network server machines (for example, LISTSERV). They are measured every ten minutes.

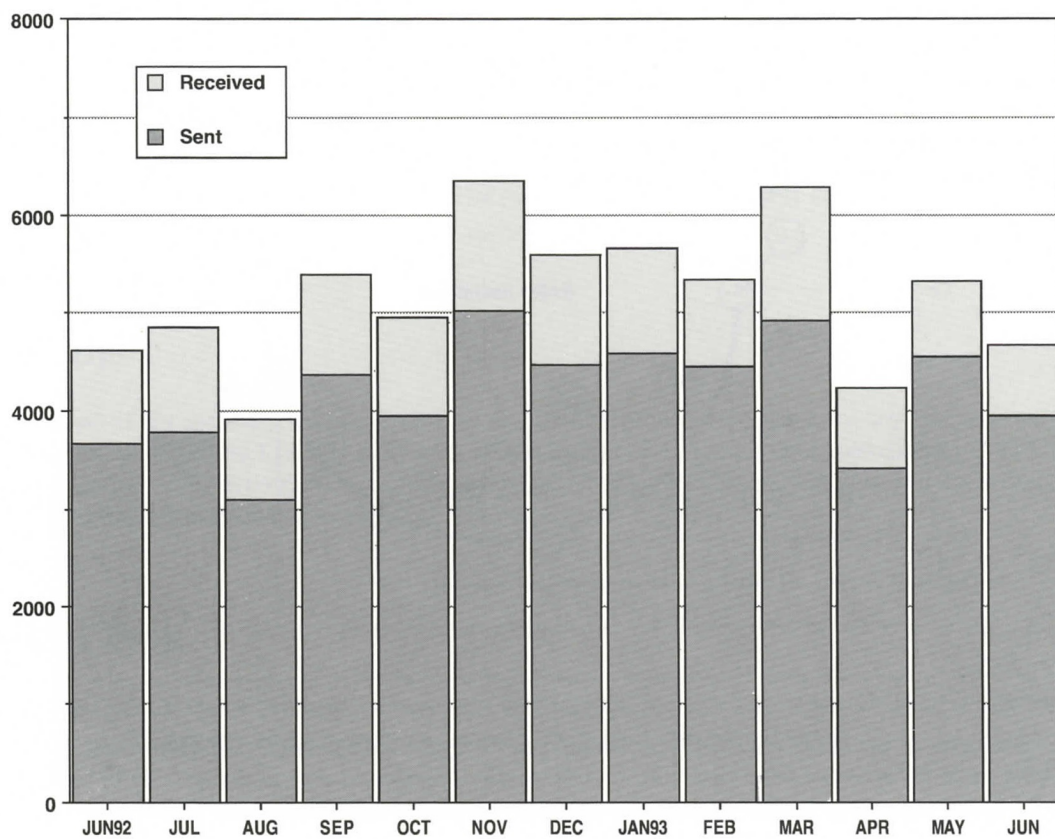
Graph 5 shows the figures for both file and message RTTs. The large drop observed in mean file RTTs is correlated to improvements in both the EARN network and also the measuring techniques of the HIMON monitor. They show that, on average, files can now traverse the network and return in less than one minute. The mean minimum file RTTs show the average fastest time taken to traverse the network and return. They provide a benchmark figure that shows transit times under ideal conditions and may be used to gauge the delays caused by file queues on the network. These figures also show the physical limitations of the network infrastructure. The graph shows a steady improvement in mean minimum file RTTs until February 1993 when a plateau was reached.



Graph 4: Link Down Times and File Queues for the Core Sites.



Graph 5: File and Message Round Trip Times (Seconds).



Graph 6: Total Trickle Traffic (Mbytes).

Message RTTs have, on the other hand, been steadily increasing since June 1992. This can be largely attributed to an increase in the number of congested links and the introduction of low speed links to Central and Eastern European countries.

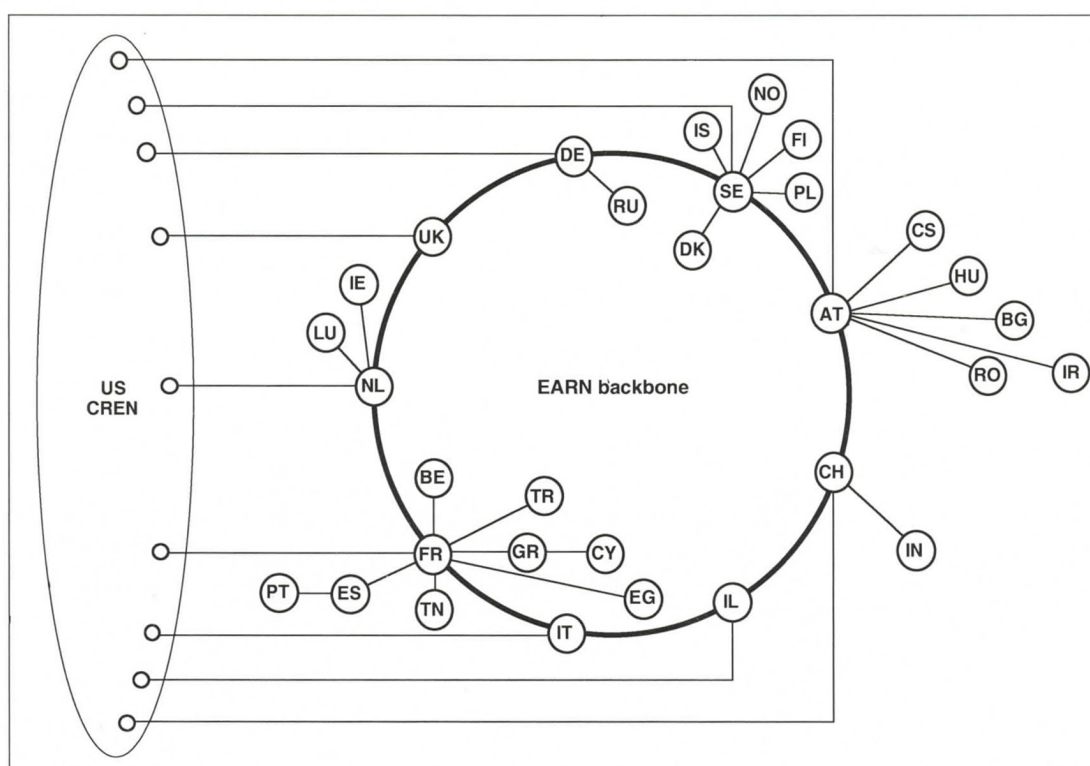
Trickle statistics

Trickle is a server that mirrors popular software archives accessible via FTP and caches recently requested files for faster delivery. It has advanced features such as shared cached disks, generation of “New File Listing” reports, accepting subscriptions to files stored at FTP sites, and delivering files to the user’s PC or workstation via FTP.

In EARN, the Trickle servers are located in Austria, Belgium, France, Germany, Israel, Italy, The Netherlands, Poland, Sweden, Turkey, and United Kingdom

Graph 6 shows a breakdown by received bytes and sent bytes of the Trickle traffic between June 1992 and July 1993. The incoming traffic consists of the commands from the users, the directory updates, and the software obtained for distribution to users. The outgoing traffic is mainly the software requested by the users. Because the software is cached on Trickle’s disk, it is usually obtained once, and sent out many times to users.

EARN countries and their virtual links



In addition, each country in the circle (or EARN backbone) has complete connectivity with every other country on the circle. This configuration of network links (also called a full mesh) is comprised almost exclusively of virtual NJE over IP links. Most of these links run over the IP backbone for Research and Education (Ebony). The transatlantic links run over IP links provided by Ebone partners and NSFnet.

Countries are denoted by their two letter ISO code.

Countries to be connected in 1993/1994: Algeria, Azerbaijan, Cameroon, Georgia, Jordan, Lithuania, Morocco, Pakistan, Slovenia, Syria and Ukraine.

Treasurer's Report

Summary of 1992 accounts

EARN's income and expenditures were, for the most part, in line with the budget.

In all areas, apart from the audit, there has been no significant overspending. Indeed in many areas the budget allocation was not reached. This was achieved within a budget whose income had been reduced from 1022 KECU to 921 KECU whilst expenditures had been reduced from 793 KECU to 728 KECU. The figures are based on the assumption that outstanding subscriptions will be paid.

Leaving aside EARN's capital assets (computers, Northern Telecom switches and furniture) the financial reserve or contingency fund has risen from 802 KECU to 821 KECU as a result of the underspending discussed above.

The audit was more expensive than anticipated because in the 1991 accounts we were determined to produce a document which was fully satisfactory. Now that this is accomplished we expect the audit costs to be significantly less for the production of the 1992 accounts.

The principal areas of underspending have been in development where projects had not come to fruition or where expenditure had been less than anticipated. For example, the use of X.500 for EARN directories had not progressed and the EARN user survey had been cheaper than expected due to the generosity of Turkey in processing results.

The Extended Visitor's Program, which invited representatives from new countries for training had also underspent although it has been a great success and much appreciated by those participating. The programme will continue since a number of new countries are expected to join EARN.

EARN has again had problems with late payments with 40% outstanding at the end of the year. This is an improvement over the previous year with 64% outstanding. Nonetheless, the problem of subscription collection remains. The Executive have presented various options for discounts for early payment and penalties for late payments although so far none have been adopted.

Recently an option for a subscription based on the number of nodes has been introduced as a way of meeting the particular needs of some countries. There are still a number of problems in this area to ensure a fair distribution of subscriptions.

1994 budget

The 1994 budget is not yet finalised but it unlikely to rise. EARN no longer pays for any international lines and the financial support of RIPE and EBONE will cease although there will be a modest subscription to EBONE. With the emphasis on higher level activities, expenditure on improvements to LISTSERV is expected together with the production of documentation on a wide range of services.

Forward look

With EARN's increasing interest in end user services it is difficult to predict the financial requirements of future years. This change may well require some thoughts on how the association should be funded.

Financial Data

The two next tables reflect the official documents by EARN's auditors KPMG Audit at Neuilly-sur-Seine, France

Balance Sheet December 31, 1992 (Expressed in French Francs)			
	December 31, 1992	December 31, 1991	
Fixed assets	328,060		130,780
Current assets			
Debtors	2,082,360	2,343,458	
Marketable securities	4,580,999	4,463,163	
Cash at bank and in hand	1,461,475	399,933	
Prepaid expenses	14,538	-	
	8,139,372	7,206,554	
Current liabilities			
Accrued liabilities	1,530,127	1,632,277	
Prepaid income	543,759	-	
	2,073,886	1,632,277	
Net current assets	6,065,486		5,574,277
	6,393,546		5,705,057
Funds			
Net capital	5,705,057		5,730,526
Income less expenditure	688,489		(25,469)
	6,393,546		5,705,057

Income and Expenditure Account
December 31, 1992
(Expressed in 000 French Francs)

	1992 (actual)	1991 (actual)
Income		
- Countries contributions	5,040	5,491
- Other income	1,292	2,058
Total	6,332	7,549
Budgeted expenditure		
- President office	268	254
- EARN office	1,150	1,213
- EARN staff	1,949	1,886
- Other expenses	621	602
- Intercontinental line	573	611
- Other development expenses	772	934
Less fixed assets	(273)	
Total	5,060	5,500
Income less budgeted expenditures	1,272	2,048
Unbudgeted expenditures	584	2,074
- Unbudgeted expenditures include depreciation of equipment and other expenses balanced by items under "other income".		
Income less total expenditures	688	(26)

In the next table, we compare the 1993 budget with the 1991 and 1992 accounts, sorted into the same categories as used in the EARN budget.

Accounts 1991 and 1992 and budget for 1993 (KECU)						
	Accounts 91		Accounts 92		Budget 93	
	Expenses	Income	Expenses	Income	Expenses	Income
President's Office	36		39		40	
EARN Office	175		165		186	
EARN Staff	274		280		261	
Other expenses	86		89		101	
Conectivity (including EBONE)	88		83		85	
Development	134		111		106	
Less fixed assets	0		(39)			
Total budgeted expenses	793		728		779	
Unbudgeted expenditures	299		84			
Net surplus	(4)		98			
Countries contributions		791		724		641
Contribution from contingency fund		0		0		91
Other income		297		186		47
Total	1,088	1,088	910	910	779	779

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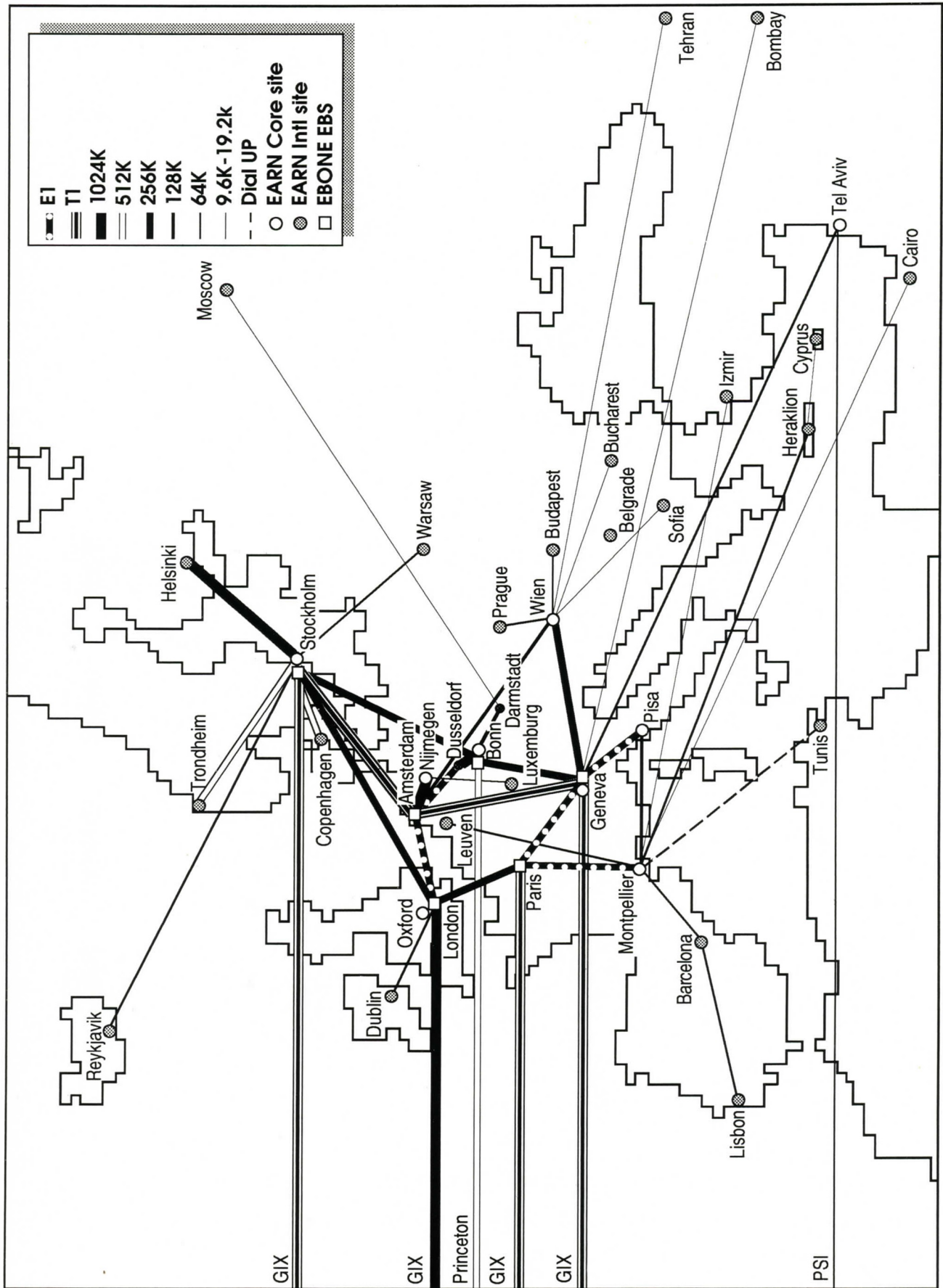
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Lines used for EARN traffic



The lines shown in this map were used to carry EARN traffic at the date this report was prepared. Given the fast evolution of the European backbone for Research and Education the paths used may well have changed by now. We will be very grateful to receive comments helping us for the production of future editions of the map.