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LATE NEWS

INTEROPERABILITY TESTING.

SPAG and EurOSInet have concluded an interoperability registration and testing agreement.

CONFORMANCE TESTING and CERTIFICATION.

The proceedings of this CEN/CENELEC and ETSI organised conference (Brussels, June 1990) have been published by IOS Press, Amsterdam.

COMMUNICATIONS APPLICATIONS and PROTOCOLS.

Contributions are invited for this ACM Conference to be held in Zurich, 3 - 6 September 1991.

AVAILABILITY of STANDARDS

Copies of most international standards (including CCITT, NETs, ETSs, ISO, CEN/CENELEC, ECMA and GOSIP) can be obtained from OMNICOM International, London

Esprit
Information Exchange System

iesnews

Issue No 31, December 1990

From January 1991, DG XIII, the Directorate-General responsible for Telecommunications, Information Industries and Innovation, will launch its new "XIII Magazine", integrating IES News and other newsletters. The XIII Magazine will consist of 24 pages and will be published in five European languages. Publication will be quarterly in the first year and bi-monthly thereafter. The first issue will include interviews with Mr. Filippo Maria Pandolfi, Vice President of the Commission of the European Communities (CEC) and Commissioner responsible for R&D, and Professor Antonio Ruberti, the Italian Minister for Universities and Scientific

New "XIII Magazine" to be launched in January 1991

and Technical Research, who chaired the Council of Research Ministers of the CEC during the recent Italian presidency. There will also be articles about the Esprit Conference '90, a review of the Telecom's market in Eastern Europe (with special emphasis on Hungary), an assessment of the CEC's Green Paper on Telecommunications, a paper on European High Definition Television, the VALUE (VALorisation and Utilisation for Europe) programme and ETSI (European Telecommunications Standards Institute).

The XIII Magazine will also be issued with a supplement providing information on current events, key decisions, new services, networks, conferences, seminars, workshops, calls for proposals and specific sections on computer networking, standards, Esprit, etc.

Esprit
DGXIII
Telecommunications
Information Industries
and Innovation

THIS ISSUE

COSINE NEWS

The Y-Net Project Overview

A contract was signed on 15 October 1990 between the Commission of the European Communities (CEC) and Teleo SpA of Italy for the implementation of the Y-NET Pilot OSI Network project.

Aim of the Y-NET Project

The aim of the project is to ensure that all participants in ESPRIT and other CEC R&D programmes will be able to better communicate and exchange data, using OSI conformant software and equipment. Such facilities may currently not be available in all industrial SMEs (Small and Medium Enterprises) participating in such programmes. Y-NET will therefore ensure that this user group will enjoy the same access facilities to networks as being provided for the COSINE and RARE community. The OSI network services provided by Y-NET will also be available to the industrial R&D community and academics in need of such services.

The project has a duration of 48 months (initial phase 18 months, main phase 30 months). The CEC's ESPRIT Information Exchange System (IES) as part of its communication infrastructure activity is fully funding the operational and management costs.

Equipment for the Y-NET Pilot project will be provided free by a group of European manufacturers led by BULL, and they will assist Teleo in the resolution of technical issues involved in Y-NET's implementation.

Services Offered

The new user group will be able to use OSI based services via Y-NET through their national X.25 facilities. Services to be provided via the Y-NET nodes will initially consist of X.400 mail and FTAM (File Transfer and Access Management). Directory services and ODA (Office Documentation Architecture) will be available in the main phase of the project.

Organisational Aspects

Teleo will provide staff for the Y-NET Management Unit (YMU), which is now located in Brussels.The management of the Y-NET services at the national level, will be subcontracted, through the YMU, to local organisations (National Operational Units [NOUs]).

Cooperation

The NOUs will be responsible for operating the National OSI Service Points, administering Y-NET's users and providing service support and promotion. The YMU will be responsible for monitoring the NOU activities, coordinating Y-NET with COSINE and RARE and the coordinating Y-NET service enhancements, in cooperation with manufacturers, for issues such as interoperability testing and operations, new OSI services, integration of various products and evolution of new technical directions for the project.

Y-NET traffic will be routed over the International X.25 infrastructure (IXI) as a result of the established cooperation between Y-NET, RARE and COSINE .

Y-NET Architecture

The Y-NET Pilot OSI Service is to establish a pan-European distributed OSI network to serve the pan-European user community.

The Y-NET Architecture is based on the following concepts:

a) Service Points to be installed in each Member State (one node to be shared by Belgium and Luxembourg). These Service Points are OSI systems, accessible by all research organisations. Access is possible through either an X.25 PAD, dial-up or other network connections.

b) Access Points used in conjunction with X.400 store and forward functions available through Y-NET to serve as a routing point for international traffic between the Service Points. These Service points constitute Private Management Domains (PRMDs). In the case of FTAM, OSI systems will make direct X.25 connections.

c) Gateways between the OSI and non-OSI communities for X.400 message handling applications will use a a gateway to networks based on the RFC 987 protocol.

d) A gateway to connect to EuroKom, Dublin X.400 world.

A first overview of the Y-NET configuration is shown opposite.

The Y-NET Management Unit Team

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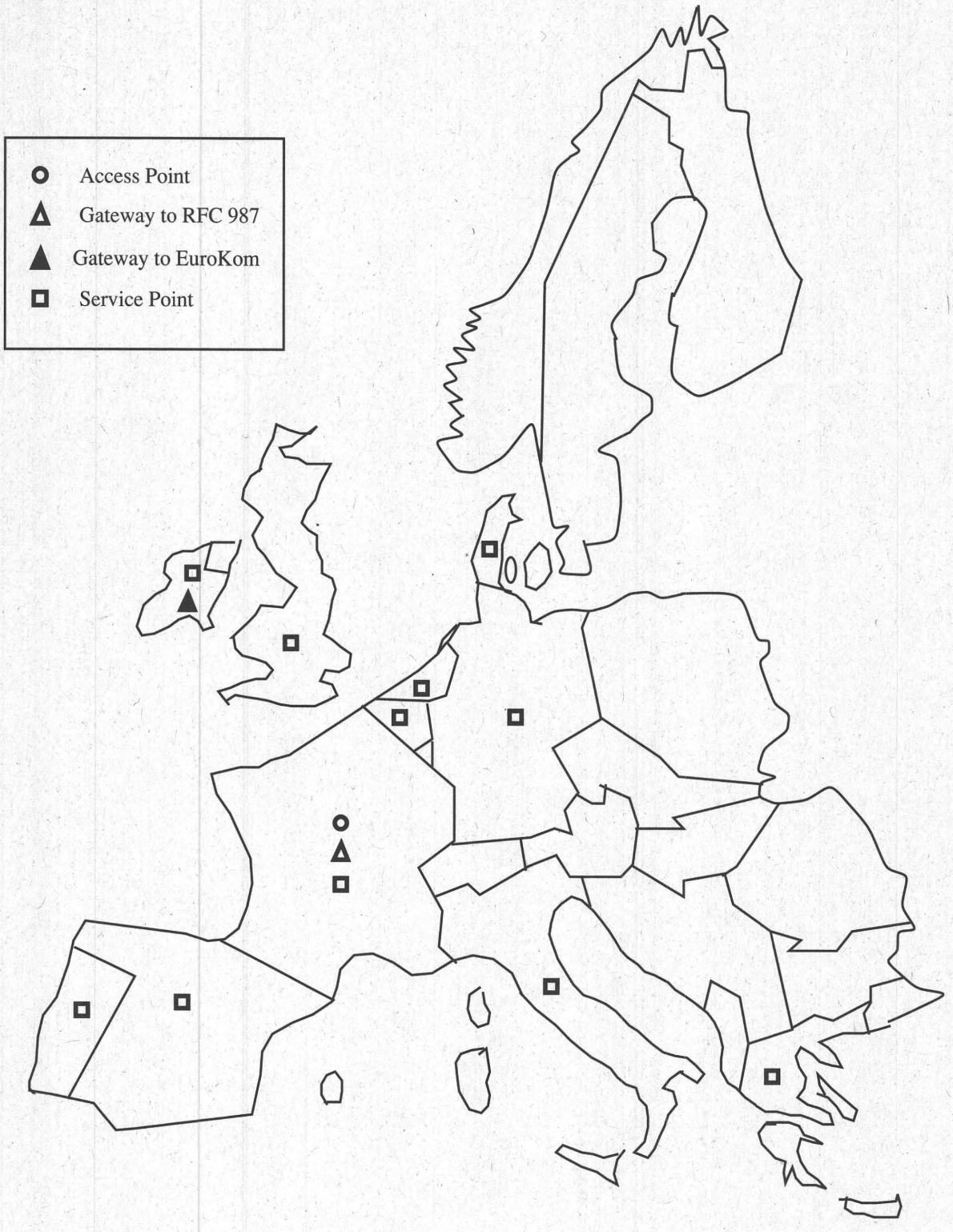
INITIAL Y-NET OSI CONFIGURATION



Upgrading the Intercontinental Links for Research Collaboration: Fat Pipes

Introduction

Over the last ten years there has been an accelerating trend to more data links in the European research communities. Until five years ago, most of these links used analogue transmission facilities and speeds of 9.6 Kbps or less. Over the last five years, most links have migrated to digital transmission - first over satellite channels, and more recently over fibreoptic cables. In the process, the channel speeds have been raised to 56 or 64 Kbps. At the last count, there where some 25 such links in place. Most were for some particular pair of communities on either side of the Atlantic, with the funding paid entirely by one party or shared between a single agency at each end. While there were often further distribution networks at each end, these were usually national in scope. The reasons for the pair-wise agreements were partly regulatory (more channel sharing was often not permitted) and partly because bandwidth limitations did not really justify the involvement of more parties.

Recently higher speeds have become available in the form of n x 64 Kbps channels. There is considerable economic advantage in going up to full E1 (n = 32, 2.048 Mbps) or T1 (n = 24, 1,544 Mbps) speeds or even higher. There has also been considerable relaxation of the restrictions on sharing of channels by the research community. At the same time some of the applications require the availability of higher data rates (e.g., large file transfers, video conferencing and distributed simulation). As a result there has been increasing interest in the provision of higher speed pipes, so-called "fat pipes", with speeds up to n = 30.
For cost reasons, these pipes normally have to be shared between several agencies and applications. Some of these are mission-oriented and some are put in for a general infrastructure purpose.

The Status of Intercontinental Higher Speed Links

At the beginning of November 1990, two higher speed links were in operation (Switzerland - US [from CERN] and UK - US [from ULCC (London University Computer Centre)]); three more were in various stage of procurement (Germany - US from DFN and from WPC, Sweden/France - US and from NORDUNET/INRIA - US); several more were under discussion.

The CERN - US (Cornell University) link has been in operation since early 1990, and runs at 1.544 Mbps (n = 24). The channel is supported completely by IBM for the first three years, and is primarily to support the IBM EASINET initiative in linking IBM supercomputers in Europe to ones in the US; nevertheless it is available for other purposes. The ULCC - US link is discussed in greater detail later; it is a multiplexed multi-agency one with one channel running at 384 Kbps (n = 6) for academic and unclassified defence research use, and another one at 128 Kbps (n = 2) for NASA purposes between ULCC and GFSC (Maryland, US). The DFN - US link will be at 128 Kbps (n = 2) for civil research purposes between Germany and the US. The WPC - US link will be at 256 Kbps (n = 4) for unclassified defence research - again between Germany and the US. The exact topology and speed of the NORDUNET/INRIA - US link are currently being negotiated; it is for civil research use, and may involve one or more links depending on the costings of the terminations.

The Status of International European Links in November 1990

There are many links between European countries at link speeds up to 64 Kbps. There are currently few at higher speeds and most that exist are centred on CERN. It is currently planned to link together the 18 EASINET European sites at speeds of 64 Kbps or more, and to give all access to the EASINET link. The switch technology on the link is the same as that used by the NSFnet backbone, allowing the management of the link to be compatible with the NSFnet practice. The ground rules for use of the link have been laid down by IBM, but a committee has been set up to oversee and administer the link. All use for EASINET purposes will be allowed as of right, others have to be agreed. It has already been decided in principle that EARN may use the channel to link into the US Bitnet/CERN, and that the High Energy Physics community can use it (hence partially the termination at CERN). It will probably be used, on a reciprocal basis, for back-up of other US - European channels, and possibly also for newer services that can benefit from the facility.

Most of the European countries are now linked by the COSINE-IXI packet-switched network with an

access speed to the National networks at 64 Kbps, but an inter-switch which is much higher.

Common Problems on Intercontinental Links

Many on the intercontinental links share some common problems. Their justification usually comes from several interest groups, and several funding bodies. Usually one justification is a specific mission; another is infrastructure for a set of users. This leads to questions about the prospective allocation of resource between the users, and a retrospective review on what was consumed. These links are more than just transmission channels; their terminating switches have to be integrated into other networks, with consequent management and protocol implications. Adequate provision must be made for access to the terminations - often on a international basis. Rules must be defined for acceptable use, because of requirements of the funding bodies, the networks attached, and the regulatory bodies. Each such link represents a major resource, and will be relied on by a substantial community. Provision must be made first to achieve adequate reliability of the individual links, and to provide back-up facilities in case of failures.

The Sponsoring Parties and the Requirements.

The UK - US Fat Pipe is an example of the implications of multi-agency sharing. There are four pairs of interested parties:

1. The British Joint Network Team (JNT) and the US National Science Foundation (NSF).

2. The British Royal Signals and Radar Establishment (RSRE) and the US Defense Advance Research Projects Agency (DARPA).

3. Specific research projects involving the National Aeronautical and Space Administration (NASA) and certain UK space researchers [particularly at Oxford University and the Rutherford and Appleton Laboratory (RAL)].

4. Specific research activities such as DARPA-sponsored research groups in the US and at University College London (UCL).

The four sets of projects have contributed different portions of the costs; they have different specific functional requirements (in speed, termination, and protocols) and operate under specific constraints.

The links in both countries terminate in facilities which are professionally managed (preferably 24 hours per day - 7 days per week). The links terminate in facilities which allow further distribution via the networks of the participating partners.

The JNT/NSF requirement is to link data facilities in the US (running the TCP/IP protocol suites) with ones in the UK (mainly running the UK Coloured Book [CB] but also some others including OSI and TCP/IP). The UK link terminates at the ULCC, which is a key node of the British JANET network. The US end terminates at the NSFnet node in SURANET (where the Federal Interagency Exchange "FIX-East" is located). The JNT/NSF users must be provided with a minimum of 64 Kbps, and their link must provide TCP/IP at the terminations of the international links (though X.25 may also be required later). Mail, file transfer (FTP), terminal services and directory services must be supported.

The RSRE/DARPA requirement is to provide at least 64 Kbps to RSRE (at Malvern) and to terminate in the US, also at FIX-East. The link must offer TCP/IP at the link terminations. The services to be supported are the same as those for the JNT/NSF users.

The NASA sponsored portion must have direct channels to Oxford and RAL in the UK. It terminates in the US at the Goddard Space Flight Centre (GSFC) near Baltimore, and must support at least 128 Kbps of data traffic, as a part of SPAN. Again, this must support the same standard services as the JNT/NSF link.

The DARPA-sponsored research activity must again support certain TCP/IP services but in addition it must be able to provide 256 Kbps of a specific stream protocol required for video conferencing between FIX-East and UCL.

The Technical Solution for the UK - US Link

It would have been possible technically to support all requirements by using a single 512 Kbps channel terminated by a multi-protocol gateway. However, the gateway would not have been one supported normally by either the DARPA or the NASA/SPAN operating components. Since this was one of the first multi-agency links, it was considered much simpler to partition the problems by hard-multiplexing the channel.

This allowed the needs to be met by single protocol gateways, which could be managed as a part of other

constituent networks. The resulting configuration is shown in Fig.1. The portions relevant to management and topology of the UK - US link are indicated.

The US ends should really terminate at FIX-East; this is the Federal Internet Exchange (near the University of Maryland), where all the Federal Internet Research networks terminate. For logistic reasons, while most of the links land at FIX-East, the SPAN portion is terminated at the GSFC. The UK termination is at ULCC, which is a central node of the UK Academic Network (JANET) and of IXI.

The AC and AO are application relays. AC does terminal, file and mail relay between the DARPA Internet Suite and the UK Coloured Book Protocols. AO relays between US mail systems and X.400, and between US file transfer protocols and the OSI FTAM one; other OSI facilities will be added later. A CISCO router is also being installed at ULCC. This will be used for the back-up arrangements, via IXI. It also allows direct routing to IP facilities either on JANET or the IXI networks. The switches on JANET and IXI are shown as a different symbol from the routers, since they have quite a different functionality.

Specific Concerns with the Resource Allocation on the UK - US Link

The initial requirement from the different interested parties included specific minimum data rates. This is no problem in the provision of resources to the NASA portion; the 128 Kbps is hard-multiplexed. There is a problem, however, in the shared portion between the Bs and RSRE, UCL, ULCC and GSFC; there has had to be a modification of the way packets are sent to ensure that the minimum requirements are met.

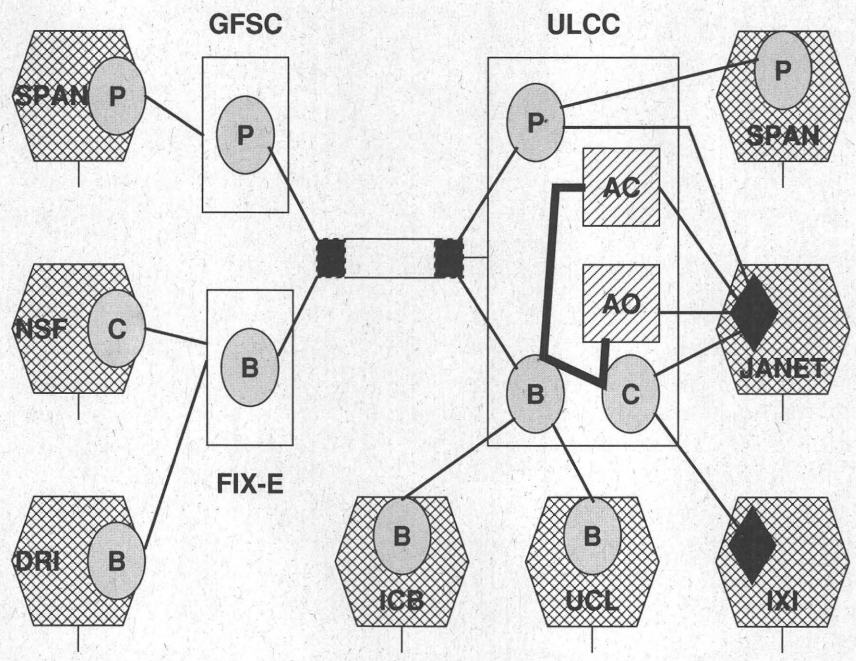
All the parties concerned realise the potential problems. The resource sharing algorithms will be tuned, and statistics will be furnished on the sharing of capacity actually achieved. Here it is important to provide information on the real data traffic to the users; only too often the statistics generated include all overhead traffic. While such statistics bolster arguments that channels are used heavily, they do not really measure the end users' share of the traffic capacity.

Upgrading the UK - US Link

The capacity of the two routers (B and P) is such that each could support a full 1.544 Mbps between two similar relays. With the present tariff structure, there is considerable incentive to increase the international channel capacity by bringing in more partners. Additional UK partners would come in through JANET or by direct links. Discussions are in progress with several such partners. The North American counterparts already have a high bandwidth access to FIX-East or MSFC.

Discussions with partners outside the UK are in progress. Here there is a number of potential access methods to ULCC: leased lines, the international public packet switched data network (PPSDN), the international integrated services digital network (ISDN), and IXI which terminates for the UK at the ULCC. Both the leased lines and the IXI access methods raise policy and interconnection problems, but these are resolvable. Access via the PPSDN and the ISDN

Figure 1 Schematic of the Configuration of the UK-US Fat Pipe
The hexagons denote various attached networks; the circles denote various makes of Routers, the rectangles denote Application Relays.



does not look attractive economically for any large-scale service use; they are candidates for intermittent use, diagnostic fault isolation and possibly even provision of lower performance back-up paths.

Management of the UK-US Link

It is important to keep the management of such links as simple as possible. By having the routers and links all managed as part of complete data networks, the problems are simplified. While there is still a problem, for example, at the interface between JANET and the network of Bs in Fig.1, at least that interface occurs only at one site. The Network Operations Centres (NOCs) for the individual networks can liaise directly with carriers. Problems arise in the conflict between mission and infrastructure responsibilities. For example the NASA SPAN network is normally managed from the NASA-Ames Network Operation Centre (NOC) - irrespective of the intermediate data networks. On the other hand, the Joint Network Team (JNT) provides a data network which supports specific protocol stacks for specific purposes - including DECNET. There is discussion on whether a different protocol stack should be carried over JANET with control over NASA NOC, or whether the management interface should be at the JANET - international boundary.

"Acceptable Use" statements have been defined by each of the parties for the traffic which is acceptable over the network and the links. In general each party will honour the Acceptable Use policy of its corresponding partner, though there may be exceptions to this. There is a "responsible person" at each of the constituent sites or networks, who can initiate actions if there are allegations of problems, or violations of policy, through ports attached to the international gateway. Working with the responsible persons are responsible persons of other systems which are accessible.

In addition both a Project Steering Group (PSG) and an Operations and Management Group (OMG) have been established. The first meets quarterly by video conference (with preparation by electronic mail) to resolve management and policy concerns. The second meets as required to resolve operational matters.

Back-Up Arrangements

A single back-up philosophy cannot always be aligned to multi-agency pipes. For instance the technical requirements may be different between the different pairs of interacting parties (e.g., the desire to carry real-time traffic or the intention to incorporate privacy devices). Some parties may prefer reduced performance over facilities of a third party, but the parties may have different preferred routes. For example, in the UK - US pipe, the NSF/JNT back-up has been arranged to be via another existing academic intercontinental link - currently via IXI; the RSRE/DARPA back-up is partly via the PPSDN and partly via the ICBnet link through Frankfurt and used mainly for defence purposes. It is often important to make technical provision for the different groups of users on each fat pipe to be able to use different back-up facilities.

The existing European infrastructure is inadequate to back-up fat pipes. None of the existing or planned fat pipes has really resolved how to provide back-up facilities. It is usually possible to use IXI or the PPSDN to

Figure 2 The minimal configuration for a Packet-Video installation.

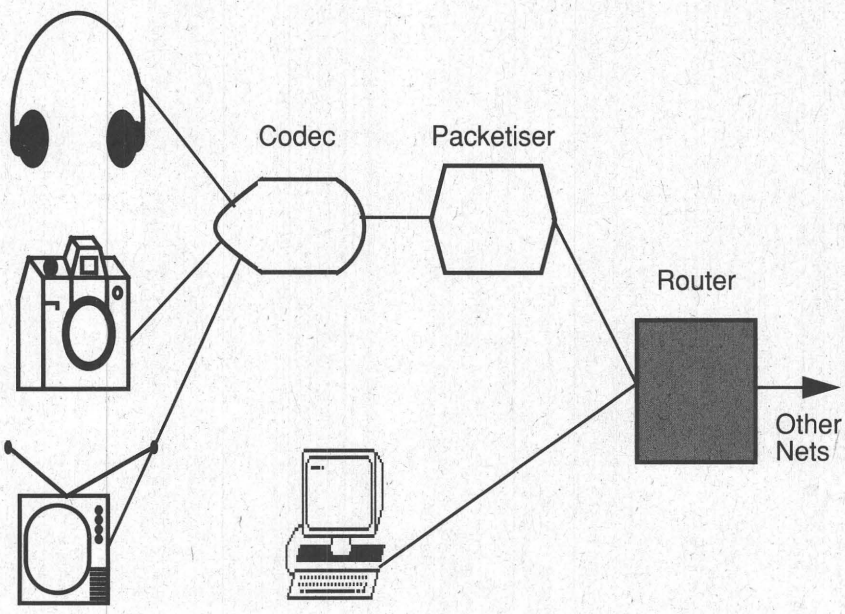
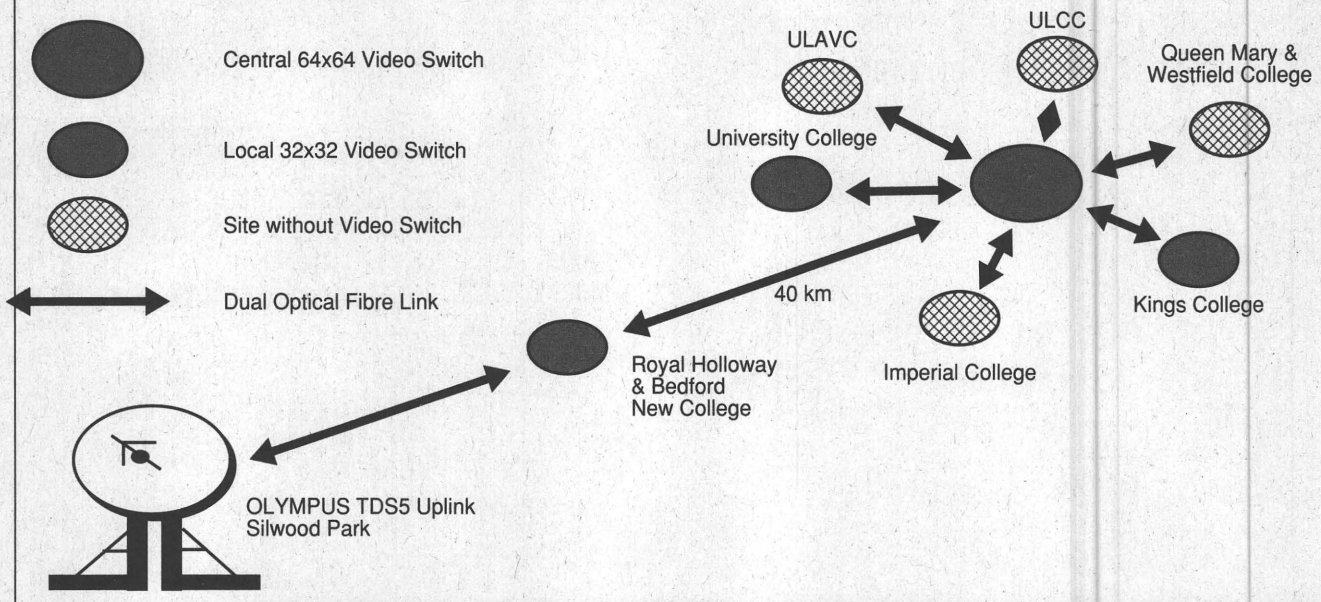


Figure 3 The topology of the University of London LIVENET Video network.



other European sites - at reduced data rates. The IXI route has a 64 Kbps limitation at present to the whole of the national traffic, and the PPSDN traffic capacity is usually even more limited. For this reason the National operators are also exploring the feasibility of putting in appropriate leased capacity directly between the fat pipes. This is contributing to an immediate need for a higher speed European infrastructure. Considerably fuller European co-ordination in this area is expected over the next year.

The intercontinental links use mainly the connectionless US Internet protocols (IP) at present, though some also support DECNET; they expect to transition to ISO connectionless protocols eventually. The IP protocol structure is very convenient for automatic rerouting of traffic in case of failure, and can incorporate an X.25 transmission infrastructure without any problem. Nevertheless, many of the switches and relays belong to different manufacturers, and partially use different routing protocols. Care must be taken to ensure that the different autonomous management domains (like the UK - US infrastructure one managed by BBN as part of the ICBnet, and the US - CERN one managed as part of EASINET) can interwork, and know of each others' existence. At the same time, once the domains can interwork, care must also be taken that they do so in the right way. For example, it can easily happen that all traffic between one European system and another is routed via the US - even though there is a direct path between them. An organisation called RIPE (Réseaux IP Européens) has been recently inaugurated as Working Group under RARE (Réseaux Associés de Recherche Européenne) to manage and solve any European IP problems arising. RIPE also works closely with relevant US groups.

Video Conferencing

The communication needs for the conventional services like mail, FTP, terminal, traffic and directories are well-known and little further comment is needed. The needs of video conferencing are sufficiently new to deserve explanation.

Video conferencing in the DARPA experimental progamme is carried out with packets of compressed video. At present, there are five sites collaborating actively in the video conferencing programme. The system is now in regular use for video conferencing between London, Boston, Washington, Los Angeles and the Bay Area through the UK - US pipe. It is also possible to integrate shared workspace use of workstations with the video conferencing using the same transmission medium.

The terminal equipment required is indicated in Fig. 2. Here there is at a minimum a camera and a display for

the video; for the audio a microphone and a speaker are needed. In practice, there are usually several input and output devices for both the audio and the video, and switching between them. This allows documents to be shown, and several parties to participate. The system currently uses proprietary CODECs. They can run the video with speech included at 128 Kbps; alternately the audio can be passed separately at 64 Kbps. The video is digitised and highly compressed. It is then split up into packets, which can pass through the interconnected network using a stream reservation between gateways. It is also possible to encapsulate the stream packets in IP and, therefore, pass them through a concatenation of different systems of the interconnection, provided the transmission resource between the intervening sub-systems will allow an adequate packet rate. A previous system used CODECs capable of a multiway conference; the present ones have better quality, but are limited to point-to-point operation. With sufficient bandwidth, and use of both sets of CODECs, multiway conferencing is still achievable; however, only one user can be in Europe with current set-up. The provision of separate audio is to ease multiway conferencing. This allows the video to be quadruplexed over quadrants of a TV screen, and the audio to be summed to allow simultaneous speech from all participants.

One motivation of the arrangements for the UK - US pipe is to allow the utilisation of the appropriate bandwidth for some of the time in order to investigate both the feasibility and usability of extending the US video conferencing to Europe. At the University of London, there is a sophisticated video network (LIVENET). As part of the collaborative activity, we have connected our studios directly to the Internet through the same CODEC as used in the US activities. A schematic of the LIVENET is shown in Fig. 3. The significance of this approach is the feasibility of attaching islands of high speed connections, which may well be a pattern of European development.

The JANET infrastructure is being upgraded to provide 2 Mbps access to many sites - albeit above an X.25 infrastructure. Experiments will be made to see whether this infrastructure will have adequate performance to support the compressed video more broadly over the UK. It would be desirable to extend this style of video conferencing throughout Europe. This would require networks of adequate performance to accommodate the 128 Kbps streams (or possibly more for multiway conferencing), and the requisite gateways.

All these activities are regarded as experimental - it is the intention for that activity to migrate towards the new international standard n x 64 video CODECs which should have a potential of wider standard connectivity with European video conferencing in due course.

Conclusions

Some of the plans, problems and intentions in the provision of a broader pipe between the US Internet and European facilities have been initiated. Key problems are provision of an infrastructure which allows, both technically and administratively, for rational management - including provision and upgrading - in the multi-agency, multi-function environment. Clear administrative boundaries, and the provision of Responsible Persons in each administrative capacity are vital. The provision for adequate further distribution is vital; the present pan-European infrastructure is inadequate, and it is not yet clear what the national infrastructure will support. It is very important to have a clear written record of the basis of participation of each party in this type of activity. This includes the resources expected, share of costs, management responsibilities and acceptable use. It is felt that the provision of higher bandwidth than 64 Kbps will now allow very interesting new services to be mounted, at the same time they will provide many challenges of both a technical and a managerial type to ensure that they work effectively.

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The above paper was presented at the COMPUTER NETWORKING Session of the ESPRIT Conference Week, 1990, but was not included in the published proceedings.

The bound volume is available from:
KLUWER Academic Publishers
Dordrecht: 1990, 894 pp.

EDI (ELECTRONIC DATA INTERCHANGE) IN EUROPE THE BUSINESS OPPORTUNITY

Today, there are merely 5000 EDI users in some 6 million companies and these use a mix of incompatible standards, a wide range of unlinked services and communications protocols and both paper-based and electronic methods for trading processes. There are concerns over EDI security and the legal status of EDI transactions so that small companies see few reasons to join EDI communities.

EDI market development

The market for EDI services and products in the four major European countries is forecast to grow from 66 Mecu's in 1990 to 300 Mecu's in 1994. The evolution however varies in the four major European countries analysed.

United Kingdom

Estimated at 36 Mecu's in 1990, the UK EDI market, with 130 Mecu's revenues forecast for 1994, will remain the largest in Europe during the next few years. Most EDI users in the UK - some 75 per cent of the current EDI user population in Europe - are well-established communities, based on the TRADACOMS (Trading Data Communications Standards) and ODETTE (Organisation for Data Exchange through Teletransmission in Europe) standards.

France

The French market will grow from 7.5 Mecu's in 1990 to 50 Mecu's in 1994. The dramatic growth is explained by the fact that the market is now in its infancy but that the momentum is building up. Users seem to be turning a late start into an advantage by moving straight into Open EDI. But France needs more operational users to influence future directions.

Germany

The German EDI market will grow from 7 Mecu's in 1990 to 42 Mecu's in 1994. The growth rate is significant and will be influenced by three main factors: a strong tradition of using direct links which slows down community growth, the German PTTs late entry into EDI markets and the strength of alternative technologies such as teletex. But there is evidence that many German users are highly committed to EDIFACT and Open EDI.

Italy

The Italian market starts from a smaller base (approx. 3 Mecu's's in 1990) and will develop slower than in France and Germany to 24 Mecu's's in 1994. Most EDI activity in Italy is currently at the level of planned or operational trials. Italy will follow the trend set by the other major European countries.

The different users

It is estimated that the European EDI population will grow from the current 5000 users to 40,000 in 1994.

Bona fide EDI users today are primarily large companies who have integrated EDI into one or more local data-processing applications(s). Most small and medium-sized companies (SMEs) are forced to join EDI communities. There is seldom any integration with a local application and for these companies, EDI is one (unwelcome) administrative addition to their paper-based processes.

The EDI supply industry

There are four main market segments from which EDI suppliers will generate revenue:

1. EDI clearing house services, where users can send EDI files for onward transmission
2. packaged EDI software, which most users install on their systems to provide the interface between local applications and the EDI service
3. one-off EDI software, developed by systems houses for large companies to meet their special needs
4. EDI consultancy and training services, to offer both business and technical support to users as they decide how to use and implement EDI.

Of these, the first will grow fastest.

EDI services

Revenues for EDI services in the four major European countries, estimated at 40 Mecu's in 1990, will grow ten-fold by 1994. Over the next five years there will be:

(a) a massive twelve-fold growth in EDI traffic
(b) a move by users from direct links with trading partners to third-party clearing house services
(c) a move towards commodity services based on international standards
(d) EDIFACT (for EDI message format and syntax) and X.400 (for the underlying file transfer service)
(e) a move towards generic file transfer services, in which EDI is the dominant but not the only application
(f) the need for less functionality in EDI services as high functionality EDI software is implemented.

These trends will lead to a shakeout among EDI service providers and the expectation is that there will be room for no more than two national service providers per country (as illustrated by the UK market development) plus several pan-European users within the next five years. The European Telecommunication Companies in

EDI (ELECTRONIC DATA INTERCHANGE) IN EUROPE THE BUSINESS OPPORTUNITY

France, Germany and Italy are well positioned to be one of the national suppliers in their own countries where they will compete with GEIS (General Electric Information System) and IBM (International Business Machines). In the UK, there are already two established leaders and there is little reason for a third national player.

The pan-European EDI services market is very small at the moment. It will grow rapidly with the creation of a single European market. One of the keys to success in this market will be the need for a local presence and links to local EDI services. Joint ventures between the national and pan-European EDI service providers are therefore to be expected.

Software products and consultancy services

The market for software products (packaged and tailored) and consultancy services accounts for 59 per cent of overall revenues for EDI in 1990. This percentage will decrease to 46 per cent in 1994, as the market matures. The market is complex and even more crowded than the services market. Suppliers include:

most EDI services providers
independent software vendors
DP system suppliers
systems houses.

The prices of EDI software packages should drop over the next few years, putting pressure on already slim profit margins. The key to survival for these players will be to offer total solutions in specific industry niches.

Some new players will also enter the EDI software market. The trend has already started with software houses launching accountancy back-ends to link their mainstream financial packages to EDI services.

The benefits of EDI

There are major benefits associated with using EDI which explain why the market is growing so rapidly. However, these benefits are mainly limited to the large companies.

It is easy for most large companies to justify EDI. It is rare in offering both an immediate cost justification and longer term strategic benefits:

1. Cost justification. Case studies show that payback is often realised in one to three years. There are clear and tangible benefit areas of cost reduction with reduced staff costs, stock holding costs and cash requirements

2. Strategic benefits. These include faster, more timely marketing information, better customer service and a leading-edge image compared with competitors (until these catch up and EDI becomes a competitive necessity).

Problems experienced by SMEs

Some SMEs reap similar benefits to those enjoyed by bigger companies but these are in the minority.

Most SMEs in today's EDI communities have tried to respond to the challenges posed by EDI. When they join they have:

no computers and hence no relevant local DP application
no in-house resources to integrate EDI into their DP system.

They usually operate a PC-based EDI station as an input/output device to existing manual processes. Hence, they reap no benefits and EDI generates an added administrative burden. This predicament poses a major problem for the long-term growth of EDI. Without motivation, SMEs will resist implementing EDI as long as they can. There are therefore two scenarios for future development:

1. A gradual process. As SMEs acquire PCs for local applications, in time they will also implement EDI
2. A process accelerated by the activities of the large users. Bigger players may stimulate take-up of EDI amongst SMEs by providing cheap, user-friendly integrated EDI software such as accountancy back-ends.

The move to Open EDI

As the use of EDI grows, the complexity of communications patterns increases. This causes new problems, for which Open EDI is the ultimate solution.

There are three main reasons for the increased complexity:

more EDI applications
more EDI partners
more international EDI.

Direct trading applications are the core of EDI activity today but support trading applications are developing fast, "closing the loop". There are two generic direct trading applications, namely ordering and invoicing. Trading support applications which are emerging today relate to payment, transport and administrative services. They involve intermediaries between buyers and sellers. These include banks, transport operators and public administrations. Although constituting today a new niche service, with Open EDI support trading EDI will become a logical extension of direct trading.

There are three types of EDI user communities co-existing today. They represent three periods of development and reflect a continuous increase in the number of partners. Communication patterns become more complex:

EDI (ELECTRONIC DATA INTERCHANGE) IN EUROPE THE BUSINESS OPPORTUNITY

(a) first-wave EDI communities (tens of partners) started in the early 1970s. They use direct links, proprietary protocols, fixed message formats and proprietary message syntax. They include closed user groups (CUGs), made up of partners associated in a specific trading relationship (e.g. port communities) and early hub-and-spoke communities (a large company and its dependent trading partners, usually SMEs)

(b) second-wave EDI communities developed from the late 1970s onwards. These new CUGs, often championed by their trade associations, are larger (hundreds of partners), industry-specific and predominantly national. They use generic message standards (e.g. TRADACOMS, ODETTE) and a service provider, instead of direct links (a trend which was emulated by the hub-and spoke-developments of that period). There are instances of interconnection between hub and trade-association-led CUGs. Hub and spokes may also start a chain process, as large spokes become hubs themselves

(c) third-wave users are dominated by the Common Interest User Groups (CIUGs). A CIUG is generally a partnership of equals, rather than the situation in the earlier EDI communities where a single large company (the hub or community initiator) was likely to dominate. Its members probably come from many industries, rather than a single industry and similarly, from many countries rather than a single country. Although typical membership is in the hundreds today, they have the potential to grow to encompass thousands of users. CIUGs want easy interconnection with other communities internationally. As a result, they are committed to universal standards and tend to use a number of service providers which can/will interconnect in the future.

The fourth wave, starting in the late 1990s, will be the era of Open EDI.
Today, the bulk of operational EDI activities is national. This will change during the 1990s in the run up to 1992 because of more pan-European companies through mergers, acquisition, joint-ventures and pan-European trading because of easier access to other national markets and greater competition on home ground.

The CEC has recognised the importance of EDI to support trading in a single European market. It is giving strong support to European EDI initiatives. For example, it is itself using EDI and promoting it through the CEC initiative TEDIS (Trade EDI Services).

The trend to international EDI creates also a greater complexity in the pattern of communications, compounded by national differences in standards, legal and security regulations.

Open EDI needs:

(a) a universal EDI message standard. This is EDIFACT. The Edifact Board is publishing United Nations Standard Messages (UNSMs) as fast as it can, with strong industry and government support

(b) the right communications services. The X.400 (1988) message standard offers a universal transport medium for EDI traffic. CCITT has accelerated standardisation work to improve compatibility between EDIFACT and X.400 and develop the PEDI protocol

(c) the right security procedures. Today, a suitable level of security is achieved through a variety of means including clearing house services, an internal gateway system and interchange agreement between partners. These are not adequate for Open EDI. A number of security features is currently being considered at CEC and government level. They include X.400 security features, the digital signature (at message or interchange level), third-party notary services and the European Interchange Agreement (EIA)

(d) the right legal framework. Open EDI needs a harmonised European legal system. This is till a long way off. Short-term measures are being considered now. They include increasing the liability of service providers and banks, and developing EIA. TEDIS is leading a team of experts from all member states for the establishment of a European Interchange agreement to be published during 1990-1991.

Implications for EDI players

To obtain the maximum benefits from EDI will require cooperation between users, service providers and software suppliers, with support by governments and the CEC. High on the list of recommended measures to ensure successful application of EDI is top management commitment in companies and early gaining of experience in practical usage. The various national and international bodies on their part will have to ensure an early establishment of an harmonised legal framework, as well as supporting measures to make EDI benefits appreciated by SMEs. The ultimate aim of all players must be the introduction of Open EDI, which is essential for the single European market. Universal standards such as EDIFACT and X.400 are essential to EDI development, and support for these must be given by all concerned.

Summary of Report by

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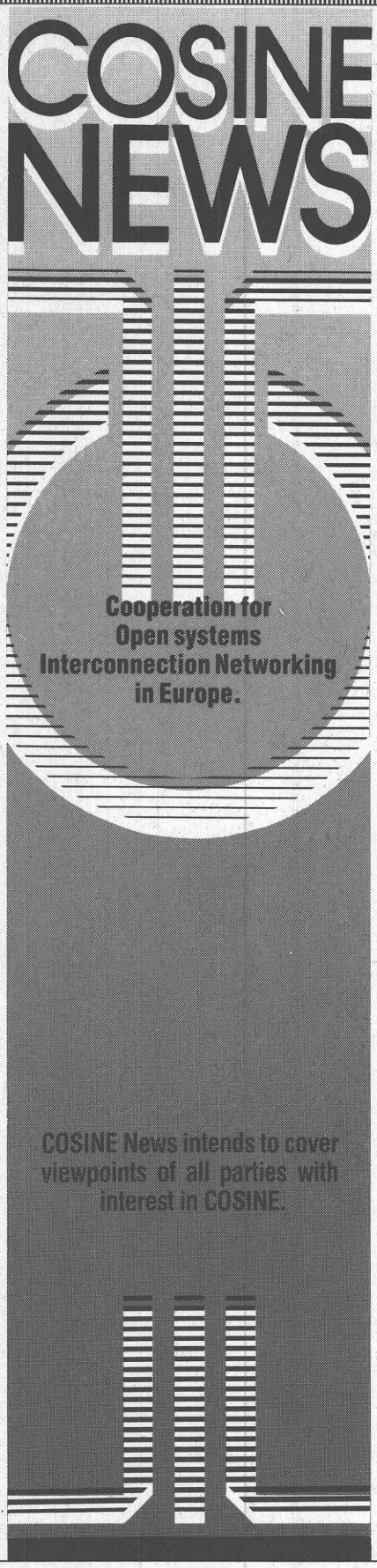


THE COSINE PROJECT

Background

COSINE (Cooperation for Open Systems Interconnection Networking in Europe), the Eureka Project No.8, is funded by a total of 18 European countries as well as the Commission of the European Communities (CEC). Its main purpose is to create a computer networking infrastructure, based on the use of OSI protocols, which will provide services to the whole research and development community (academic, commercial and governmental) throughout Europe. The COSINE services will be of particular interest to the ESPRIT community since they will extend the types of data communications and messaging facilities that are already available locally and in some cases nationally, to the whole of Europe in a systematic and consistent manner.

Following preparatory work started in 1986, a contract for the COSINE Specification Phase was awarded to RARE (Réseaux Associés pour la Recherche Européenne). The result of this Phase, completed in July 1988, was a set of technical reports summarised in which analysed the requirements for pan-European networking services in terms of the size and needs of the user community, the suitability of defined and emerging OSI standards, the likely availability of commercial systems and services, and the operational problems of providing a unified service to the whole research community. In May 1989, the COSINE Policy Group (CPG) published the COSINE Implementation Phase (CIP) Project Proposal) which specifies a number of pilot sub-projects and services which will be set up and operated during the three year lifetime of this phase of COSINE.

RARE has been asked to undertake the management of the CIP and has created the COSINE Project Management Unit (CPMU) to carry out this task. Detailed arrangements are defined in a contract between RARE and the CEC, acting on behalf of the CPG.

Work on the CIP had already started in August 1989 under a Memorandum of Understanding between the CEC and RARE. The COSINE Funding Arrangement, which defines the terms of the financial contributions from Member States, came into force on 1 January 1990, triggering the start of the three year CIP clock.

The ways in which COSINE subprojects and services will continue after the end of the CIP are as yet undefined but one of the tasks of the CPMU in the later stages of the project will be to make the successful services self-funding, for example by getting them taken on by commercial operators or by implementing some other kind of charging scheme.

Aims and Objectives

The objectives of COSINE, as defined in the CIP Project Proposal, are:

(a) to create a common operational OSI interworking infrastructure on the basis of federated research networks to support all European research;
(b) to establish and integrate on the required scale all the functions and support services necessary to allow the users to take full advantage of the infrastructure;
(c) to take steps to ensure that the infrastructure remains available to European researchers after completion of the project; and
(d) to thereby contribute to the market pull for OSI.

The principal aim, therefore, is to create a set of OSI-based networking services for the European research community which will outlast the "pump-priming" period which COSINE funding supports. An important subsidiary aim is to involve the industrial community, not only as network users alongside researchers from the academic community, but as partners in the development and operation of the necessary projects and services.

COSINE has no intention of trying to provide an exclusive set of networking services. On the contrary, COSINE forms part of a wide spectrum of networking activities. It will have links to existing networks such as EARN (European Academic Research Network), EUNET (European Unix Network) and HEPNET (High Energy Physics Network); there will be close cooperation with other new projects such as Y-NET in order to ensure, that as far as possible, the sets of services are complementary; and the progress of high speed initiatives such as EBIT and EASINET will be closely followed so that users can benefit from the results that they are expected to produce. Through RARE and the CCIRN (Coordinating Committee for International Research Networking, for which RARE provides one of the two co-chairmen), COSINE will be able to follow and participate in the coordination of networking services between Europe and the US.

Planned Sub-Projects and Services

The list of sub-projects and services planned for COSINE is shown in Table 1. A sub-set of these (as indicated in the Table) is covered by the first year budget for COSINE and work has already started on them; more details of active projects are given below. The "core set" includes all the first year sub-projects and services plus one further sub-project, P8. The CPMU will complete the specification of Activity Plans (i.e. detailed sub-project specifications) for the core set by the end of the first year though not all of the sub-projects will actually start by then.

Where the technology and expertise in a particular area are already sufficiently well developed, services are being set up immediately. To meet other user requirements, further work is necessary either to develop suitable products or provide additional support to service developments already undertaken in the community. In these cases, pilot sub-projects, some of them with less than the three year lifetime of

COSINE, are being set up to provide additional information before full scale services can be started. The detailed specification of some services (S3, S4, S5 and S6) cannot be made until further experience becomes available from the corresponding pilot sub-projects. Although the set of sub-projects and services defined in the CIP Project Proposal forms the contractual as well as the technical basis of the all current COSINE activity, it is expected that changes will be introduced (in a controlled fashion and with the agreement of the CPG) to take account of technological developments, changing user needs and experience gained as the Project progresses.

Initially, the arrangements for service S1.1, X.25 (1984) Service Provision, were different from that of other COSINE sub-projects and services. The International X.25 Infrastructure (IXI) Pilot Project was initiated in 1989, the pilot service being provided by the Netherlands PTT Telecom under a contract with the CEC, with RARE providing technical management supervision via the IXI Project Team. When the CIP Execution Contract between the CEC and RARE was signed, IXI formally became COSINE Service S1.1 and the IXI Project team came under the management control of the CPMU. The basic data transmission services provided by IXI, which gives X.25 based connections at 64 kbit/sec accessible for all COSINE member states, are fundamental to many of the other planned services.

Organisation and Method of Working

COSINE Policy is determined by the CPG on which all funding parties are represented. A sub-set of this group, the COSINE Policy Bureau, acts as an Executive Committee and deals with the more urgent matters that arise between meetings of the CPG.

The CEC is the largest financial contributor to COSINE, manages the Project's funds and monitors the

Table 1: COSINE Sub-Projects and Services

Sub-Projects	Services
P1 Pilot Gateway Services to USA	S1 Provision of X.25 (1984) infrastructure
P1.1 FTAM	S1.1 X.25 (1984) service provision
P1.2 Remote Access to Computing Services	S1.2 Preparation, monitoring and evaluation
P2 Pilot Information Services	S2 Message handling services
P2.1 International Directory Service	S2.1 Interworking of existing X.400 administrative domains
P2.2 Support and Information Services	S2.2 Gateway services to the US
P3 International User Group Support	S3 Information services
P4 Pilot Projects on migration of existing networks or user groups	S4 Other gateway services to the US
P5 Tools and Techniques of OSI adoption and migration	S4.1 FTAM
P6 Pilots for implementations/demonstrations of multivendor interworking	S4.2 XXX
P7 Pilot procurement exercises for OSI-based products	S5 International Directory Services
P8 Security mechanisms: study and pilots	S6 Security key management
P9 Future facilities	
P9.1 OSI over ISDN	
P9.2 Full screen terminal services	
P9.3 Job transfer and manipulation	
P9.4 High speed networking	
P10 LAN/WAN interworking: investigation and testing	

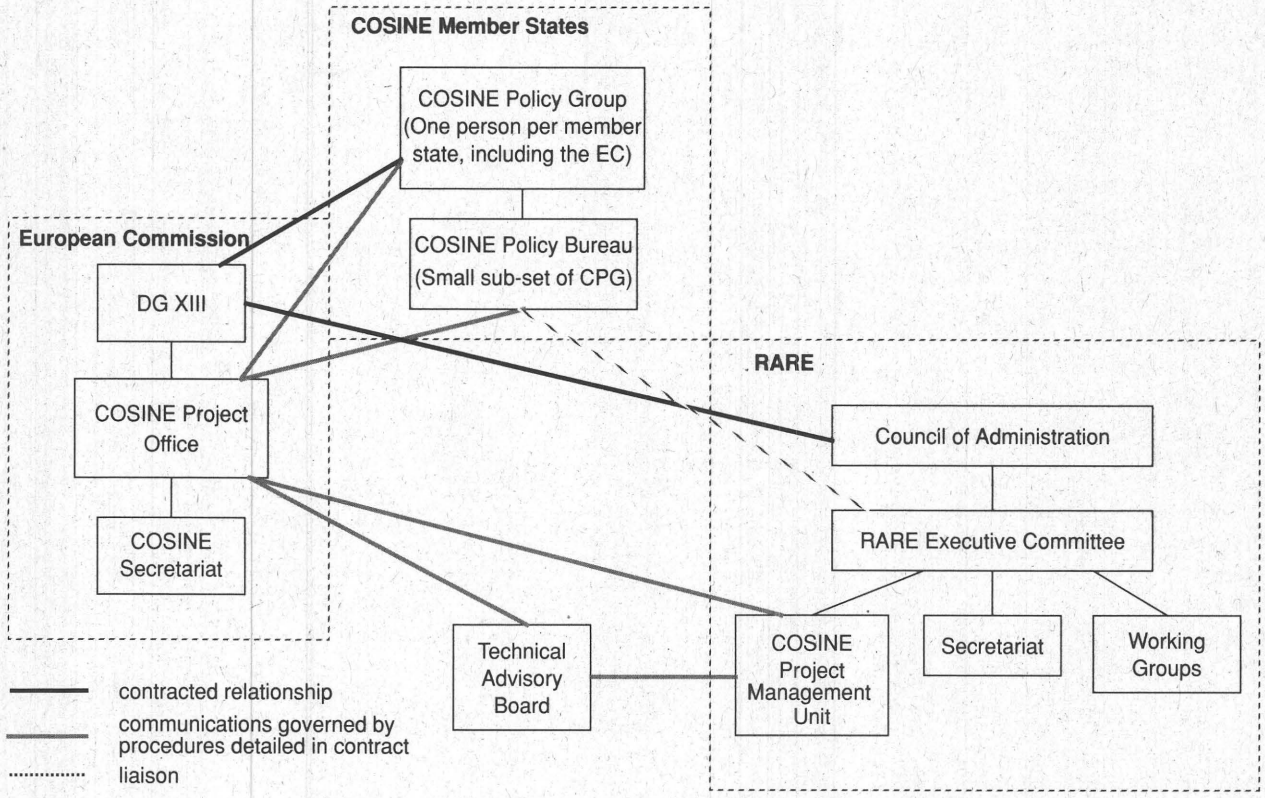
progress of the sub-projects. In order to do this it provides a COSINE Project Officer (CPO) and Secretariat functions.

The sub-projects and services themselves are carried out by companies or other suitable organisations (including, in some cases, groups based in Universities) who are selected as a result of open tenders. Activity Plans are (or will be) defined for each sub-project and service and form the basis of an Invitation to Tender. The tendering process, including tender evaluation, is based on that used by the CEC for ESPRIT projects. The principal changes that have had to be made result from the fact that COSINE sub-projects and services are not research projects but are organised as commercial sub-contracts with payments to sub-contractors made only on delivery of agreed product or service items.

Management of the sub-contracts, including preparation of the Activity Plans, issue and evolution of tenders, and supervision of sub-contractors, has been contracted to RARE acting through the CPMU. The CIP Execution Contract between RARE and the CEC defines procedures for reporting, accounting and approval of major expenditures which enable the COSINE Project Officer to carry out his monitoring functions. The CPO acts as the formal channel of communication between the CPMU and the CPG; a RARE/CPG Liaison Group meets from time to time and provides another channel of discussion of problems and proposals for solutions.

The role of the CPMU is strictly one of project (sub-contract) management within the terms specified by the CIP Project Proposal. The CPMU is, however, able to call on the resources of the RARE Working Groups which are a valuable source of expertise in many areas of computer networking and whose members have a particular awareness of the additional difficulties of operating international services. Besides supplying people who, acting individually, can work as experts in tender evaluation teams, RARE Working Groups can be asked to investigate technical problems that arise. In their normal role, which extends beyond COSINE, they can investigate and analyse new networking techniques and strategies, make contributions to the development to OSI standards, and prepare further proposals for sub-projects and services which could be incorporated into COSINE. A diagram representing the inter-relationship between all the parties involved is shown in Fig.1.

There is no intention in COSINE to provide services directly to end users; any attempt to do so would require enor-



mously larger resources in order to provide the necessary geographical coverage and would in any case not be very productive. Instead, COSINE services will be provided via existing national organisations. Where these do not exist or cannot offer suitable support (for example, because of regulatory constraints), alternative access methods will be provided, in the case of access to IXI via the national Public Switched Packet Data Network (PSPDN). Much of the COSINE activity, including that supplied by subcontractors, will therefore be in the form of coordination, support and encouragement of national activities with the aim of ensuring that incompatibilities are minimised and that all COSINE participants are fully informed about progress which is being made elsewhere.

Active Projects

Activity Plans for the first set of COSINE sub-projects and services were prepared before the MoU deadline of 10 January 1990; tenders were invited and evaluated during the first half of 1990. These sub-projects and services are as follows:

(a) P1.1 Pilot FTAM Gateway Service to the US: selected File transfer, Access and Management (FTAM) products which can pull and send files to and from North America systems on DECnet and the Internet will be used to mount a service which will be available to all European users who have IXI access. The pilot service will be openly available for trial purposes to European FTAM end-user systems and will provide experience of operating such a gateway so that the CPMU can plan a self sustaining gateway service which can be contracted beyond the pilot project.

(b) P2.1 Pilot International Directory Service: this sub-project will encourage the establishment of a Europe wide X.500 based directory service and will interconnect the national X.500 pilot directory projects. It will include the North American pilot X.500 directory service and ensure that there are no significant problems of interworking at the international level between different X.500 implementations. In so doing, it will remove one of the major barriers to the spread of other OSI applications, in particular electronic mail and the transfer of files, by providing directory information for both applications and human users. At the end of the pilot project, the CPMU will have all the information needed to issue an Invitation to Tender for the full directory service (Service S5) and national networking organisations will also be able to place invitations to tender for a directory service that will be able to operate internationally with other national services. Cooperations with Public Telecommunications Operators (PTOs) is being sought; the pilot service should interwork with those PTO X.500 services that are available.

(c) P2.2 Support and Information Services: this sub-project will establish a COSINE information service which will be available to all target users of OSI networks in the COSINE countries. It will coordinate national information service provision initiatives so that a consistent access is provided to all support services for information providers. It will provide initially a focal point for users to get information about network products, projects and services, and will be used as a vehicle for promoting OSI and COSINE. Special Interest groups will be able to run their own information services for group communication and information dissemination. The service will be reachable by a variety of methods, including message handling file transfer and terminal connections through both private research networks and PSPDNs (Packet Switched Public Data Networks).

(d) S1 Provision of X.25 (1984) Infrastructure: IXI in combination with national networks and PSPDNs will provide the carrier service for data transferred as part of the other COSINE sub-projects.

(e) S2.1 Interworking of Existing X.400 Administrative Domains: this service will enable national end users to use an international message handling service (MHS) based on the X.400 (1984) set of protocols. It will provide national MHS managers with information on other MHS services and with an error reporting service at the international level. It will link the COSINE community with similar communities in other parts of the world and ensure full connectivity with existing international RFC mail networks. Cooperation with public X.400 services will be encouraged and the requirements for a transition to X.400 (1988) will be studied. The COSINE MHS service is likely to provide the vehicle to support a number of other applications, for example the Pilot Information Service, sub-project P2.2

(f) S2.2 Message Handling Gateway Services to the USA: this service complements service S2.1 by providing one of its essential components, the transition via a gateway of messages exchanged between Europe and North America. This service will also be used to define tests that can be used to ensure that an operational gateway is performing to adequate levels of service and functionality and will provide the CPMU with the information needed to specify a self-sustaining gateway service for the longer term.

Activity Plans have also been prepared for sub-projects P6 and P9.2. Sub-project P6 aims to demonstrate interworking of equipment from different suppliers and, in particular, to investigate the effectiveness of protocol conformance testing services and the degree of assurance they provide to users who need to know whether products which have received a conformance certificate will in practice interwork.

Sub-project P9.2 will be in two phases; the specification of a machine indepen-

dent implementation of the ISO Virtual Terminal Protocol and the installation of software conforming to this specification on a number of widely used computer systems.

The User Community

COSINE services will be made available to the whole R&D community in all the Member States. In those countries which already have an existing network linking, for example, university and government funded research laboratories, it will be relatively easy to make COSINE services accessible to a large community of end users. In other countries, national networking organisations may need assistance in mounting new services and in making them available to research workers working within their boundaries. Across Europe, the degree of integration of academic, government funded and commercial research organisations varies widely. Generally speaking, there is still a lack of easy intercommunication between workers in commercial R&D laboratories and those who are government funded, directly or indirectly. Although PSPDNs can in principle be used to link users of all kinds, no matter where they are located, regulatory and tariff issues continue to impose obstacles to rapid progress, particularly to the provision and use of services which require medium to bandwidth. COSINE will attempt to assist user groups to remove such obstacles.

Sub-project P3 will give support to international user groups of research workers in particular disciplines. The requirements and existing patterns of use of selected groups will be studied and analysed. Other user groups will be encouraged to experiment with networking techniques to confirm that the full range of characters, data formats and other requirements that are particular to them can be made available through the proposed COSINE services. Subsequently, all these groups will be helped to make use of those services which are appropriate to their requirements and the lessons learned in providing this support will be passed on to other groups.

Transition from Existing Network Services

A large proportion of potential users of COSINE services are already network users. They will not wish to give up their existing working methods until they are convinced not only that any alternative service is better but also that the cost in time and trouble of switching to it is outweighed by subsequent gains in the quality and the nature of the new service. Sub-project P4 therefore aims to ease the process of migration to OSI based services of a number of selected groups.

In some cases, some aspects of a transition can be handled in a way which is transparent to users; for example, traffic for a message handling system which makes use of a proprietary data transmission system can be moved to an OSI network such as IXI without changing any of the facilities which are available to users at the application level. More frequently, changes will be visible to users, especially if they are to take advantage of improved functionality of services, including for example the ability to reach a large number of other users and services.

Sub-project P4 will investigate how existing services can be mapped on to the set of OSI protocols and the use of gateways as a means of passing traffic between proprietary and OSI based systems. Close cooperation will be established with existing networks such as EARN and EUNET which are already provide services to a large part of the COSINE community.

The large, and still growing, community of users of services based on the TCP/IP protocols deserves special attention. Outside the framework of COSINE, RARE is providing a forum for the discussion of TCP/IP services through its support of RIPE (Réseaux IP Européenne). COSINE will accept proposals for new projects for pilot services based on ISO IP protocols once the standards and the equipment needed to implement them have reached the required level of maturity. The CPMU is working with the relevant RARE Working Groups to ensure that the steps towards the provision of OSI connectionless services are taken as soon at it is practical to do so.

Access to Services

Because of the way COSINE services are organised, users will normally access them through the appropriate national service. COSINE pilot information services, including detailed information on access methods, are expected to be available through these channels from early in 1991.

Conclusion

COSINE aims to set up and offer a number of OSI based data communications services to the members of the R&D community throughout Europe. The first pilot projects and services are under way; other services will be initiated and it is planned that they should be transformed into longer lasting, self-funding services by the time the Project formally terminates at the end of 1992.

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The Greek ARIADnet Network

ARIADnet is the national network programme for academic and research networking in Greece which from mid-1988 has been administered by the National Research Centre "DEMOCRITOS" in Athens. The programme is funded by the General Secretariat for Research and Technology and the CEC.

The infrastructure for data communications interconnects over 10 sites in the community the hub being ARIADnet, a private X.25 packet switched network. At several sites, local area networks are connected to ARIADnet allowing off-site access for the host computers and terminals connected to these networks. These site networks are based on CSMA/CD (Ethernet) and packet switched technologies.

A strategic objective of ARIADnet is to establish a widespread harmonised infrastructure for the academic and R&D community where OSI conformance is envisaged to be of prime importance. In this evolution process, and in collaboration with other national and international activities (EARN, RIPE, etc.), ARIADnet will serve and support other practical interim or proprietary services and products whilst pursuing its OSI policy. Solutions based on non-OSI protocols, which in terms of functionality and performance are of practical importance are therefore a part of ARIADnet activities.

The ARIADnet programme is coordinated by the Greek representatives to COSINE and RARE, thus participating in the corresponding projects and providing the Greek community with the resulting services (e.g. IXI). The ARIADnet network has been a practical and operational reality since 1989 and is developing rapidly.

Present State of ARIADnet

The ARIADnet network currently operates and supports a private X.25 infrastructure consisting of seven PSEs (Packet Switch Exchanges) interconnected by trunk lines. Use is also made of the Public Packet Switched Networks, both nationally and internationally, via a gateway that links ARIADnet to PSS (Packet Switched Stream). International connections are also served by means of the IXI link to ARIADnet, while another gateway provides access to the US DARPA network over IXI. Other gateways provide access to the EARN/BITNET network.

An infrastructure upgrade is in progress in collaboration with the Greek PTT on the basis of which new institutional nodes are being installed and interconnected via either leased lines or the public X.25 infrastructure. At the moment, it is estimated that more than 100 hosts are accessible, or have access, nationally via ARIADnet and the PSS infrastructure using a mix of different operating systems, together with a population of over 1000 terminals. The infrastructure is evolving continuously in several directions including user population growth, services offered and protocols supported.

Current Operational Services

The ARIADnet network started normal operation during 1989 and since has been offering users access from remote terminals and host computers connected to the network. A dial-up service is also provided and is extensively used by PC users.

The community served by ARIADnet comprises both academic and research user groups as well as industrial R&D involved in CEC projects.

An X.400 gateway provides access to the growing number of systems supporting the X.400 electronic mail standard, while file transfer services are currently based on proprietary products and electronic mail services.

ARIADnet is linked to other networks both in Greece and throughout the world via gateways. Recently a link has been established over IXI to support connections to international internets while DECNET connections have been established over national and international lines. Thus ARIADnet is used for transporting IP and DECNET traffic.

Other service activities, aiming at OSI transition, include installation and testing of various products and various machines (DEC, SUN, PRIME and soon IBM) which are situated at the Management Centre of the network.

Conclusions and Future Plans

ARIADnet's main objective is the provision of services for the users based on an infrastructure which ensures interoperability and connectivity. The long term ARIADnet plans are OSI conformance but moves are gradual so as to preserve the current level of service to the users.
The growing usage of ARIADnet, both in terms of sites and traffic, lead to plans for infrastructure and performance upgrades by installing products to improve internetworking and by upgrading the lines to 64 kbps, at least between the major switching centers.

As for application services a pilot X.400 MHS Network is being installed to cover the main institutional sites in parallel with FTAM base and conferencing services. Pilot implementations of new products and services are also a development strategy (e.g. testing products of various suppliers for MHS, FTAM, Network Management). The most important issue facing a national networking activity is cooperation between user groups and the various networking activities, and to this end ARIADnet will pursue such a policy both at the national and international level to improve the networking infrastructure.

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UK HIGH SPEED LOCAL AREA NETWORK (LAN)

At the end of 1988 the Joint Network Team (JNT) created the Fibre Distributed Data Interface (FDDI) Advisory Group to provide a forum for technical advice and community liaison. The membership now covers most universities together with several Research Council sites and Polytechnics. One function of the FDDI Advisory Group to date has been to educate the Group on FDDI. A number of suppliers has attended afternoon sessions of the group to give presentations on FDDI products, standards, etc.

In April 1989 the Computer Board approved a new local area networking initiative with the aim of supporting the installation of an initial high performance backbone LAN in each university over a four year period (starting in the financial year 1990-91). The Computer Board's contribution to this initiative is sufficient to provide starter kits or pump priming. It is intended that every university will receive a share of this funding.

The JNT in conjunction with the FDDI Advisory Group has identified the following as objectives of the High Speed (or Fibre) LAN initiative:

1. To enable an order of magnitude increase in perceived performance in data transmission for existing users over the LAN (workstations to servers) at all University sites and to upgrade the infrastructure to allow access to data applications to users on a campus;

2. Facilitating introduction of new data applications impossible/impractical at present;

3. To provide infrastructure on campuses in anticipation of the SuperJANET's wide-area backbone;

4. To prepare to accommodate very high performance hosts/servers/workstations;

5. (Physical) Security will also be a consideration.

Having surveyed the current standards activity in this area, it is clear that the only contender at this point in time is FDDI. Although the FDDI standards are mature enough to begin to make plans and to purchase products with a commitment to the published standards, the JNT felt that it would not be prudent to commit to a full programme of spending in the financial year 1990-1991. The JNT then proposed a strategy to the Computer Board of supporting a limited number of FDDI pilot projects in the financial year 1990-91 in order to assist in the preparation of the installation of a high speed LAN backbone on each campus which will commence in the financial year 1991-92. This was accepted and Universities were invited to bid to be an FDDI pilot site.

The FDDI Advisory Group has defined a set of objectives for the pilot phase. The principal objective of the pilot studies is to make recommendations on how to deploy the available funding in order to meet the objectives 1-5 above.

The following sub-objectives were identified in order to meet this main objective:

a. Test a range of manufacturer's kit
- Basic interworking of the standard
- Reliability
- Throughput
- Ether-bridges/Token-ring-bridges/concentrators

b. Test FDDI as a high speed backbone
- Transparency
- Throughput
- Routing/filtering algorithms
- Bottlenecks

c. Evaluation of Network Management
- SMT conformance
- Overall network control/monitoring

d. Test end systems directly connected to FDDI
- End system protocol stack
- Workstation boards
- VME boards
- (IBM) channel adaptors

e. Test under full user load
- Several ethers onto one FDDI
- Bottlenecks
- Retries at higher layers

f. Review dependencies on fibre size

g. Review installation procedures
- By host site staff or external contractor
- Local politics
- Security of ducts
- Physical environment

h. Test an intensive application over FDDI and Ethernet
- Diskless workstation with fileserver at other side of campus
- Packet speech or video across campus

i. Test and compare MAC and level 3 interconnection
- Throughput
- Which network level protocols
- Congestion

j. Determine if FDDI is the correct standard
- or DQDB
- or FDDI II
- or ISDN-B

k. Survey of available equipment

l. Provide OR (or parts of) for equipment to be procured in main project.

A number of Universities submitted proposals for pilot projects which ad-

UK HIGH SPEED LOCAL AREA NETWORK (LAN) INITIATIVE

dressed one or more of the objectives and the proposals received were evaluated by a small group of experts drawn from members of the FDDI Advisory Group that had not submitted proposals. Five sites were selected as potential FDDI pilot sites: Birmingham, Edinburgh, Glasgow, Manchester and Queen Mary and Westfield College. The Computer Board approved funding for these five pilot sites.

The progress of the pilot sites will be monitored by the FDDI Advisory Group.

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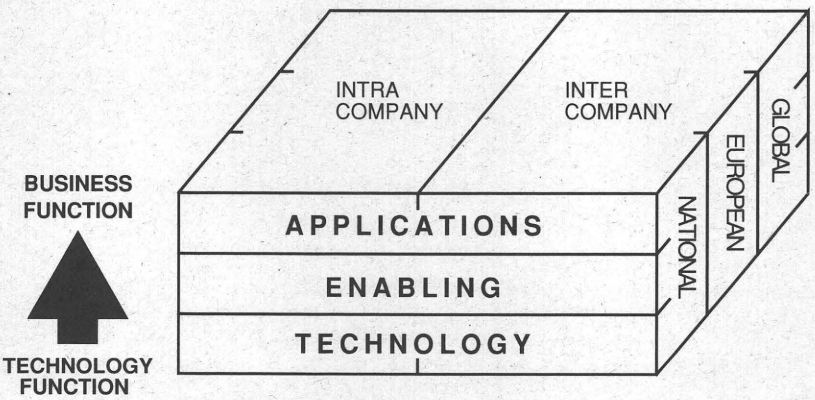
ELECTRONIC MESSAGING IN THE 1990s

The Context

In 1966, Felix Kaufman observed in the Harvard Business Review that "all business is involved in constant interaction and intercommunication with other organisations, whether suppliers, customers or competitors". Twenty-one years later the author rephrased this statement as "every organisation participates in a complex network of product and associated information flows between themselves and their supplier, customers, and through their distribution channels", and that we must "identify the impact of information flows between companies within, and in different, industry sectors since future business operations will be dependent on networked services and, in particular, inter-company networking will be the trigger for competitive moves, market consolidations, and information system supplier opportunity".

Felix Kaufman was reacting to the introduction of computer timesharing systems and, sensing the importance of these networking capabilities, he suggested that management should "think beyond their own organisational boundaries to the possibilities of extra-corporate systems".

Figure 1 Dimensions of the networked application



At the beginning of the 1980s, electronic messaging was emerging and in the wake of office automation hyperbole was being provided as in-house proprietary systems based on general office support systems of the information systems suppliers, point-to-point (such as telex or facsimile), or as public or closed-user-group computer-based message systems (CBMS) provided by the Value added networks (VANS) suppliers.

At the beginning of the 1990s, the framework in which electronic messaging/message handling is provided and is used has changed dramatically. Previously disparate islands of information or data processing within organisations are being "systematised" or coordinated according to "IT strategies" or "IT architectures" based primarily on proprietary standards but increasingly, with an eye on openness. The external provision of telecommunications-derived services, such as electronic messaging/message handling has been stimulated by increased competition, and thus, innovation in the supply of services.

The Forces for Change

Across the 1980s, particularly since the mid '80s, a number of critical forces had combined to put into place some key enablers and drivers for business networking. These forces have included:

- the changes in regulation of the European telecommunications environment on a national and Community-wide basis;
- the increasing awareness of the goal of the Single European Market of 1992;
- the globalisation/internationalisation and increased competitiveness of business activities;
- the recognition of the potential, or

proven, strategic corporate importance of information (for many companies, an unrealised corporate asset);
the converging supply of data processing and telecommunications equipment and services driven by the commercialisation of technology and the large user requirement for systematisation;
increased user sophistication shifting the focus from the features of technology to its corporate benefits.

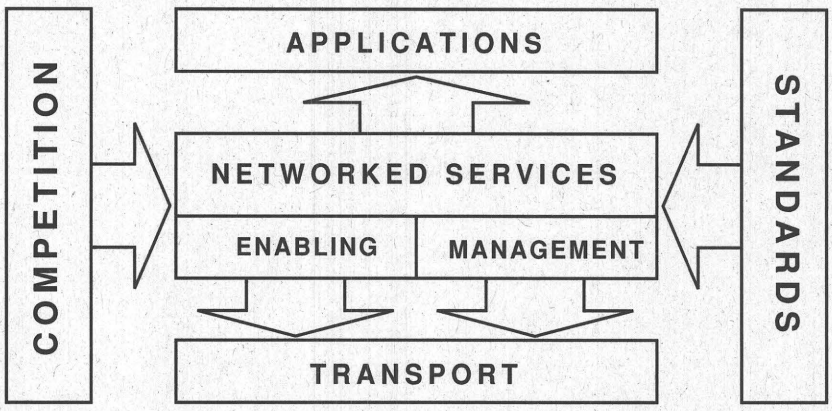
These drivers create the business need for network-derived applications while the enablers provide the technology platform for facilitating the applications aligned to essential business functions.

The major regulatory changes and liberalisation of the European and extra-European telecommunications environments, which began in the late '70s and permeated throughout the '80s, are ensuring that the essential enabling platform of telecommunications is being moved into place either by the actions of information systems providers, service providers, or the newly competitive Telecommunications Administrations (PTTs).

Without the current loosening of the often restrictive monopoly-based, national-orientated, telecommunications services and equipment markets to stimulate product and service innovation closely aligned with demand, the development of effective business information systems including, in particular, inter-organisational information systems, would have been inhibited.

The key ingredient of telecommunications change has been the stimulation of a competitive services environment driven by the European Commission. This determines the ground rules for effective competition for those services offered across the monopoly infrastructure services of the Telecommunications Administrations. As a result, those organisations offering value-added services (which include electronic messaging/message handling) are increasingly able to compete i.e., offer services on an equal playing field.

Figure 2 The networked services architecture



Open Network Provision (ONP) is central to the definition of this competitive framework across the Community and extending into EFTA and, perhaps, the Eastern Bloc.

Electronic messaging - interpersonal messaging - is a telecommunications derived application while message handling is a service. In simple terms, a service is a generally-available (neutral) enabling function whereas an application is the function which translates information or data contained within a system into information usable by an individual or a business function (Figure 1).

There are two contrary forces acting upon these telecommunications-derived services (Figure 2). The first is that of competition driven by telecommunications changes in regulation and liberalisation which serves to fragment provision of the enabling services while stimulating innovation but creating the need for interconnection. The second force is that of standardisation (a tool for managed competition) which creates the consolidation of enabling services and interconnection. Thus, electronic messaging/message handling has suffered from lying at the intersection, or collision of the forces of changes in regulation and the marketplace (demand).

EEMA (European Electronic Mail Association) has a critical role to play in the balancing of these forces, to ensure innovation and competition to stimulate and meet user requirements while ensuring levels of standardisation to eliminate islands of information. This can be seen as the goal of the MoU (Memorandum of Understanding).

The Characteristic of Demand

A recent study estimated that, in 1989, the European demand for "public" electronic messaging services was 339 MEcu of a total VAS (Value Added Services) demand of 2.02 BnEcu. By 1992 the messaging demand would grow to 535 MEcu out of a total of 5.14 BnEcu, declining in VAS market share from some 17% to 10%. After on-line database access in 1992 (some 38%), EDI is forecast to overtake electronic messaging to grow to 11% from 2,5% in 1992.

ELECTRONIC MESSAGING IN THE 1990s

These forecasts do emphasise a critical message for those in the electronic messaging industry. While changes in regulation and liberalisation are stimulating the market for network-derived services, the total combination of forces (Figure 3) is shifting demand to different, higher-value services. Enabling services, which include message handling and, in this argument, interpersonal messaging, are being reduced to a "commodity" or basic service status which is, probably, best supplied by those organisations with economies of scale (Telecommunications Administrations) or as (an enabler for) a portfolio of services by the larger international services providers or national providers who will be increasingly niched to vertical sectors (industry or application focus).

The increasing sophistication of large user demand (normally the transnational) organisations is shifting the industry through a series of 'profitability cycles' which have been analysed In summary, the analyses suggest that in terms of levels of profitability there are three cycles:

1. The Equipment Cycle
This has been in the ascendancy from the mid 1970s and across the 1980s. Profitability is now declining with increased competition and the 'commodity-nature' of the equipment. This is evidenced by the shake-outs in the computer industry (as well as the public telecommunications equipment industry).

2. The Services Cycle
This has been in ascendancy since the early-to-mid 1980s. We have seen the growth of international networked services providers together with those operating on a national basis. Increasingly the national operators are seeking an international presence and/or networked applications presence. With increased standardisation, the migration towards 'commodity status' and increased competition, one might anticipate increasing profitability in networked services (particularly those offered with a wide geographic span) across the '90s with profitability decline beginning in the mid '90s.

3. The Applications Cycle
The most successful networked services providers have been in the networked applications business. Examples are Reuters and Dun & Bradstreet. Increasingly, the major international service providers are seeking a networked applications/industry focus posture with a wide geographic span. We are in the first years of the ascendancy of the networked applications cycle which, stretching forward into the late '90s/next century will suffer the same fate as the previous cycle while a new equipment cycle has begun.

Market opportunity lies in the gap between demand and supply. The demographics of demand are complex and, it would appear, at present are being dominated in terms of market-pull by the larger, international buyers. There is a significant gap between the demand for international services and networked applications which will provide the revenues for proactive suppliers. But, for many suppliers without the economies of scale, there is a significant range of opportunities particularly in serving the requirements of small and medium enterprises (SMEs), a focus of Commission activity which can be met by the niched, national supplier.

Electronic messaging/message handling must be regarded as a component of the enabling services provided across network infrastructures. In particular, message handling will be a major building block for providing networked applications. It may be supplied as a product leaving the higher-value applications provision to other parties, or it may be used by the service provider as an enabler for their own provision of networked services. The key lies in understanding the critical elements of demand, and the profitability cycles to determine appropriate investment.

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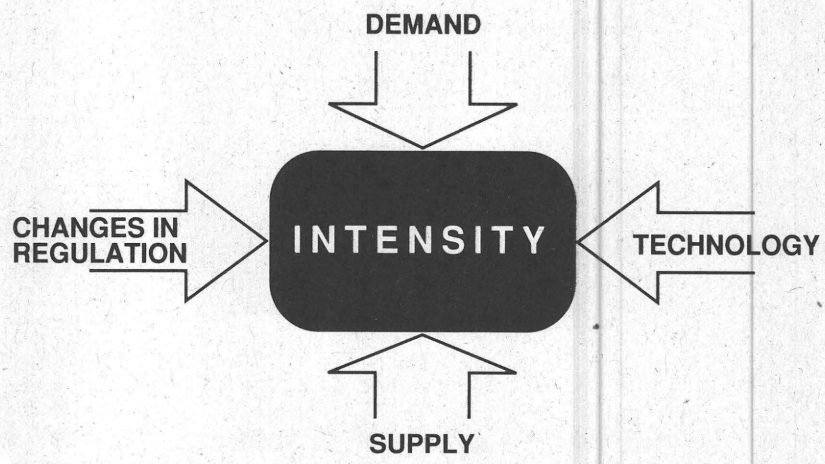
Figure 3 The market forces



Policy Measures for the Creation of an Open Network Environment

The European Community vision of a market without obstacles to the free movement of goods, services, capital and people to be achieved at the end of 1992, must be supported by the cost-effective interconnection of advanced information and telecommunications services - PAN-EUROPEAN NETWORKING.

The strategy to achieve this goal was outlined in 1987, by the Commission of the European Communities (CEC), in "Towards a Dynamic European Economy Green Paper on The Development of the Common Market for Telecommunication Services and Equipment". By the close of the 1980's the CEC was up to date in terms of the Green Paper initiatives and on course for 1992.

The national approach to providing Telecommunications services based on government controlled organisations with obligations to provide universal service nationally does not easily map onto the Community-wide telecommunication requirement. Whereas many large business organisations have been working on a European wide basis for many years, small and medium sized businesses are now being encouraged by the single market to look beyond their national boundaries. To provide the telecommunications and information services required by the business community, which up to now have not always been available from the public network operators, private service providers have entered the scene. However, their task is not an easy one because of the differing regulatory situations in each country.

Public and Private Networks

The technological revolution of the past 2 - 3 decades has introduced digital techniques and new transmission facilities and brought together telecommunications and computing. Private networks have exploited these advances in technology to provide those telecommunications and information services which are not always available from public network operators but are required for businesses to operate more efficiently. There have been rapid developments and innovation resulting in provision of new private network services including E-mail and message handling services (MHS) which use the basic transport facilities (leased lines and packet switched networks) of public network operators.

E-mail and MHS may well have been developed initially to serve a single organisation but often become of interest to other organisations as a result of increasing awareness of telecommunications services within the business community. As a result private network operators may wish to sell to or to share the cost of these offerings with third parties.

With increased mobility of the European businessman E-mail, MHS and voice messaging are becoming essential tools. Alongside this potential development by private operators the public network operators are beginning to compete in the same areas which will in general lead to better service and greater user choice.

Supply and usage conditions of these services, however, have traditionally been based on the assumption that the "customer" is the end user, i.e. not offering services to third parties.

The control, by the public operators acting as agents of the government, of interfaces to the network infrastructure by way of regulatory and technical restrictions has the effect of discouraging the connection of certain terminal equipment and the provision of particular services. Tariff principles, applied to the provision of basic transport, have developed in an unbalanced manner where cost-orientation has not been the overriding consideration.

The development of E-mail and MHS, as well as other value added services (VAS), has become a cornerstone of European telecommunications policy, requiring in the first instance the existing usage conditions imposed on monopoly services to be reconsidered. In addition the markedly different national regulations concerning access to and use of the monopoly network infrastructure acts as a barrier to the full development of corporate, national and trans-European telecommunications services.

European Telecommunications Policy

In addressing the development of pan-European networking substantial progress has been made in the telecommunications sector of the Community since 1984, with the implementation of a policy aimed at:

> promoting an advanced European telecommunications infrastructure stimulating the Community-wide market for services and equipment contributing to the competitiveness of European industry and services

The Green Paper of 1987 launched a major debate, and the numerous opinions and reports generated following its publication were taken into account in February 1988 in a Communication from the CEC on the Implementation of the Green Paper Proposals [COM(88) 48] which regarded the policy actions set out in the Green Paper as central to the functioning of a competitive market.

A Council resolution of June 1988 endorsed the objectives of the Green Paper and supported the phased introduction of legislation opening the markets in terminals and services and stated that the rapid definition of Open Network Provision (ONP) condition was of crucial importance and closely linked with the creation of an open common market for non-reserved services and one of the major policy goals of the telecommunication policy.

The two proposals concerning telecommunications services that resulted from the Green Paper are:

> to ensure the compliance with

Treaty of Rome requirements, and to harmonise conditions for access to and use of the infrastructure - ONP.

The first proposal, to ensure compliance with Treaty requirements, is covered by a Directive on Competition in the Markets for Telecommunications Services based on Article 90 of the Treaty of Rome, seeking to ensure a free market across the community in all non-reserved services. Article 90 accepts certain limitations on the rules of competition for organisations who provide facilities of "general economic interest", e.g. telecommunications infrastructures. The CEC is responsible for ensuring application of the rules of the Treaty and may address appropriate directives to Member States. These directives do not require the approval of the Council of Minister. The Services Directive establishes the possibility for Member States to maintain an monopoly (or special rights as is the case in the UK) for the provision of infrastructure and voice telephony. Other services are to be offered in competition. In order to allow time for the telecommunications authorities to adapt to the new situation, a transition period is foreseen up to the end of 1992. Telex service and satellite communications are not covered in this Directive.

The second proposal, to harmonise access conditions, is covered by a Directive on the Establishment of the Internal Market for Telecommunications Services through the implementation of ONP, based on Article 100a of the Treaty of Rome which is aimed at the approximation of laws and regulations in the Member States, in order to remove barriers for achieving the common market of 1992. This Directive provides a framework for the development of ONP.

The CEC is committed to a policy where liberalisation and harmonisation go hand in hand and with the ONP Framework Directive and the Service Directive, the programme for a new regulatory framework as proposed in the Green Paper had been largely covered. The complementary nature of the two Directives was stressed by their simultaneous adoption by the CEC in June 1989.

In December 1989 a compromise was reached on the two Directives leading to the adoption of a common position at the Council of Ministers meeting on 5 February 1990 on the ONP Framework Directive. The final adoption of this Directive took place at the Council of Ministers meeting of 28 June 1990. The ONP Framework Directive and the Services Directive were notified to the Member States on 13 July 1990. These two Directives establish for the Community a clear regulatory environment for the provision of basic telecommunications transport and services.

The ONP Framework Directive

The ONP Framework Directive sets out the principles of ONP, outlines the procedure for the development for the ONP conditions for the priority areas - leased lines, voice telephony, packet data services and ISDN, identifies a work programme and proposes future areas of application.

ONP addresses two key areas, the promotion of a VAS and the promotion of fair competition. The first will stimulate the development of new services and use of the public network infrastructure by both public telecommunications organisations and private service operators, whereas the second will create equal availability of public network infrastructure resources and services.

ONP is therefore concerned with achieving:

- open access to public network resources,
- open, unrestricted use of contracted services and
- equitable operating conditions for competitive telecommunications services

The ONP Framework Directive outlines a number of common principles for the development of ONP conditions which are to:

- be based on objective criteria
- be transparent and published in an appropriate manner and
- guarantee equality of access and be non-discriminatory, in accordance with Community law

There will be no access restrictions to public telecommunications networks or services under ONP except for reasons based on essential requirements, which are non-economic and compliance is a matter of legal obligation for general public interest, within the framework of Community law. These requirements are:

- security of network operations,
- maintenance of network integrity,
- interoperability of services, in justified cases and
- protection of the data, as appropriate

To comply with the complex objectives and principles envisaged for ONP offerings, it is proposed that an appropriate set of provision conditions will be devised successively for each of the designated specific areas in terms of three parameters:

- technical characteristics
- supply and usage conditions
- tariff principles

Technical characteristics are the arrangements by which the users access ONP offerings in designated telecommunications areas and the service features available with these offerings. These will wherever possible be based on existing international (CEPT, CCITT) standards. Technical standards referred to in ONP conditions will generally be of a functional nature, concerned with functional requirements between systems and services and not concerned with the internal working of systems and networks.

It is intended that ONP offerings shall in general present increased versatility compared to existing offerings. It is therefore quite likely as further progress is made in the definition of ONP that new types of interfaces with enhanced capabilities will be required for which

no suitable international standard already exists. In this event ETSI, the European Telecommunications Standards Institute, will be requested to develop appropriate interface and performance specifications.
Supply and usage conditions may include the following attributes as applicable in specific telecommunications areas:

maximum provision time,
maximum contract period,
quality of service parameters,
maintenance and fault reporting arrangements,
conditions for resale of capacity and shared use and
conditions for interconnections with public and private networks.

As ONP is intended to be a vehicle for stimulating the European market for VAS, restrictions in the use or application of ONP offerings would be permitted only to the extent necessary to ensure that essential requirements are fulfilled.

The setting of tariffs is a normal function of supply and demand in competitive markets. This is also the case for VAS. But, since these are built "on top" of public network resources which may be provided only by Telecommunications Organisations, there is a need to define tariff principles which will ensure fair and open access by all users of these resources.

Tariffs must be guided by the general principles applying to ONP and:

1. be based on objective criteria and must not impose directly or indirectly unfair purchasing or selling prices. They must in principle be cost oriented.
2. be transparent and properly published. With regard to service elements, tariffs must be sufficiently unbundled, in order to avoid obligations and charges for users which are unrelated to user needs.
3. be non-discriminatory and guarantee equality of treatment.

The applications of these principles in relation to ONP offerings does not imply any harmonisation of the absolute levels of tariffs which may differ for the same services from one supplier to another, depending on prevailing costs and market conditions

The Process of Development of ONP Conditions

The procedures set out in ONP Framework Directive for developing the ONP conditions call upon the CEC to be assisted by a Committee consulting all parties concerned. This will prepare work programmes for the development of ONP and will review the CEC analysis of particular areas which will lead to a report on which interested parties will be invited to comment. On the basis of both the public comments and the report, the CEC will prepare a proposal to Council. The ONP Committee will have met for the first time in October 1990.

ONP conditions will be defined progressively and as rapidly as the Community consultation and standardisation processes will allow for a number of key areas in the telecommunications sector.

A work programme up to the end of 1992 is set out in the ONP Framework Directive and within this period Directives are to be prepared for leased lines and voice telephony services both of which remain in the monopoly according to the Services Directive.

Progressive development of Standards, Recommendations and Directives will take place for Public Data Networks and ISDN. In addition consideration will be given to access to telex and mobile services, new types of access to local networks and intelligent network functions and access to broadband networks where ONP may be applied.

The ONP conditions that will be developed are aimed at providing equal and open access to the infrastructure which is the base on which Community-wide VAS can develop.

ONP in Specific Areas

Substantial work has already been made in the areas of leased lines and public data networks, while independent studies are being conducted on behalf of the CEC in the areas of voice telephony and ISDN.

The report of the Analysis and Forecasting (GAP) sub-group of the Senior Official Group-Telecommunications (SOG-T) on "ONP for Leased Lines in the Community" produced during 1988 and the subsequent public comment period have provided the CEC with the proposal for harmonised offerings throughout the Community of four types of leased lines:

1. Ordinary quality, voice bandwidth leased lines
2. Special quality, voice bandwidth leased lines
3. 64 kbit/s. (nominal bit rate) digital leased lines
4. 2 Mbit/s. (nominal bit rate) digital leased lines

with the provision for new and existing types to be included at a later date.

Usage and supply conditions will follow the principles set out in the ONP Framework Directive and particular usage conditions should not be imposed via technical restrictions, but via regulatory means and be linked to essential requirements.

The development of a common ordering procedure for leased lines, offered under ONP conditions including ONE STOP SHOPPING procedures, and full definition and publishing of the supply conditions (e.g. target delivery periods, repair times, refund policy, etc.) are a further proposal, as is the availability on an annual basis of statistics on delivery periods and repair times of ONP leased lines. Published tariff principles will be cost oriented.

The voice telephony service has been given a high priority as the result of the agreement reached by the Council of Telecommunications Ministers. VAS providers depend on the Telecommunications Organisations for access to this service which is one of the major underlying services for VAS (e.g. the MINITEL in France). Voice messaging services making use of new intelligent features are

expected to have a big market potential.

The use of the telephone network in an open and unrestricted environment will promote new services. In order to identify the major issues in this area, the CEC launched a study at the beginning of this year. In this study particular attention will be given to new intelligent functions which have become available through advancing technology, such as Green Numbers, Emergency Services, Itemised Billing and Reverse Charging. In relation to these new functions increasing attention needs to be given to user privacy aspects.

The area of packet switched data services, whether they are being provided under monopoly or in competition, constitute a major building block for MHS. A study undertaken by GAP resulted in a report released in January 1990 for public comment. GAP concluded that ONP conditions for access to and use of PDN's will facilitate the development of Europe-wide services. ETSI will be requested to produce the standards, based on CCITT recommendations.

Other proposals by GAP relate to Quality of Service, numbering schemes (which should reflect the need for interworking with private networks), network management information, one-stop shopping and billing.

Two types of access have been identified for Community-wide provision:

1. X.25 direct access as defined in CCITT X-series recommendations, European standards and CEPT recommendations.
2. X.32 and X.28 (dial-in only) indirect access throughout the PSTN as defined in CCITT X-series recommendations, European standards and CEPT recommendations.

ONP PSPDN offerings will be made on an adequately unbundled basis in order to ensure maximum flexibility for users. For each basic service interface a minimum set of access features will form the core set. The user may add to this individual optional facilities, chosen from the ONP user options and/or additional offerings. User options will enrich the core offering with advanced facilities suited to support pan-European VAS. It is recognised that further offerings are not (or will not be) available from all networks initially, but that these offerings could become significant for Community-wide use in future. In order to ensure that such offerings develop in a harmonised manner, a third category of additional offerings has been identified.

It will be a challenge for the Public Operators to provide on an Europe-wide basis the features which presently are available an a nation-wide basis and on specialised international private or corporate networks.

The Integrated Services Digital Network (ISDN) will play a central role in the evolution of the current telephone network to a fully digitised network offering a multitude of services over the existing telecommunications infrastructure.

Although it is difficult to predict the outcome of market forces in this dynamic environment of ISDN, the adoption of Europe-wide standards and of a set of harmonised supply and usage conditions will be a major factor for wide availability of basic and value added services.

ONP proposals will be developed on the basis of CCITT and ETSI standards. A study on ONP for ISDN is being carried out on behalf of the CEC by consultants to establish a clear picture of market perspectives (user needs) and network development plans of Telecommunications Organisations.

The Future

The ONP conditions that will be developed are aimed at providing equal and open access to the infrastructure which is the base on which MHS can develop. They will provide access to the basic transport services offered by the monopoly infrastructure that is freely available in each Member State to a common interface standard, without undue usage restriction, under the same supply conditions and with common tariff principles. These harmonised non-discriminatory conditions of access to the infrastructure will allow the development of Community-wide MHS both complementary to and in addition to those provided by the Telecommunications Organisations.

The competitive market thus created should provide opportunities for vendors of messaging products and services and present potential users with greater variety, better quality and lower cost MHS. These services will be able to develop on a Community-wide basis as the individual regulations in the Member States progressively converge to the ONP conditions.

To take full advantage of the potential development of message handling services the private service providers must identify the basic network facilities that are required to meet future needs while taking advantage or improve access to the existing facilities.

The debate begun by the publication of the Green Paper on Telecommunications will continue and Member States governments are increasingly aware of the needs of the private service providers and the business community. The CEC supported by the European Parliament encourages all interested parties to contribute to the process of development of ONP conditions. The private service operators and the business user community and their representative groups are invited to organise themselves effectively in order to play a role in the process, attempt to work closer with the Member States governments and increasingly prepare proposals for access to facilities that can support services that they identify as necessary for the future economic growth in the community that the single market of 1992 will bring.

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EuroKom News

EuroKom Transition to Independent Company

The big news from EuroKom is that it is now poised to make the transition to being an independent company. Although continuing to provide services to the CEC-funded research community, growth in user numbers (and, in consequence, income) has been such that EuroKom no longer needs CEC funding for the mail and conferencing service.

Commenting on the development, EuroKom's Director, Dr. Dennis Jennings, said 'The last two years saw a significant increase in the use of EuroKom, and the users base grew by 50% to 2,200 registered users. In 1990, revenue from users exceeded our operating costs; EuroKom can now stand on its own, as a self-sufficient business. We no longer need partial public funding for our electronic mail and conferencing services. These services are now well established with a loyal and enthusiastic user population. We are happy to offer these services on a commercial basis. The change in our status will also mean we can expand the marketing of our services, and our significant technical expertise, outside the R&D community, to commercial organisations, financial institutions, other government agencies etc.'

The new company will still focus on the R&D community as its primary market. 'Our services have grown up around that community,' said Jennings, 'We understand it, and our mainstream mail/conferencing product is uniquely appropriate to the needs of that market'.

EuroKom owes its origins to the ESPRIT programme, which identified the need for a computer conferencing and electronic mail service when it commenced in 1983. A pilot service was commissioned as a part of the ESPRIT Information Exchange System (IES), which evolved into the current EuroKom service.

Mr. Horst Hünke, Head of ESPRIT's Operations Division, said 'ESPRIT R&D projects have produced over 300 significant results that are used in practice, in products or as the basis for international standards. It is a particular success that EuroKom as a service project has also matured to the stage where it can operate on an independent basis. The services of EuroKom, especially its conferencing facility, are expected to remain an important and attractive complement to the OSI-based services now emerging. We expect that our experience with the new company will be as fruitful and professional as our experience with the project'.

EuroKom and the IES Users' Forum

During the IES Users' Forum, held at the ESPRIT Conference 90, Mr. John Conroy presented the following paper.

Overall Strategies for 1991/92:

A more accelerated move to the OSI platform, to eventually integrate with the Y-NET network. Although the emphasis will continue to be on the mainstream conferencing product, there will be a re-orientation of some elements of the service, in particular:

Mail-forwarding will be introduced during 1991, which will allow users to receive their mail without accessing the service. This will require externally registered users, and there will be a new price structure associated with this, as part of a more transaction-based pricing approach which will be introduced in March 1991.

Following on from the first-phase Personal Computer Utility, a more advanced form of User Agent will be delivered, which will allow totally unattended use of the system. In particular, a need is perceived for unattended file exchange, allowing users to pass files from their local computers into common directories on the host, without their having to manually interact with the host user interface.

A batch fax capability is now available, and is being tested by a pilot community. This new service, which will be available from the top-level EuroKom menu, will allow the user to:

- Administer a private fax mailing list
- Include host files in a fax batch, including non-English character-sets
- Manage a fax mailing list without accessing conferencing.

EuroKom News

The UNIX/VMS interoperability continues to be popular. Further developments in this area will see EuroKom being accessible from the Internet early in the new year.

An Applications Programme Interface (API) for EuroKom is at an advanced design stage at KOMunity Software, the PortaCOM authors. When this is available, the EuroKom user will be able to exchange and manipulate his mail without apparently leaving his local PC environment.

Apart from being a challenging and exciting year for the new company, 1991 will see many exciting developments in EuroKom functionality. In general, we share the views of our many users, that the EuroKom environment, though still the environment of choice for the serious researcher, needs to move closer to the user, and needs to be integrated, as seamlessly as possible, into the local desk-top platform that the user is used to.

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Towards a free sky for a border-free Europe

Green Paper on satellite communications

As a result of technological evolution over recent years, satellites can today contribute greatly to the development of trans-European networks and services, needed for the achievement of the 1992 Internal market.

Following a proposal by Vice-President Filipo Maria Pandolfi, the Commission adopted on 14 November 1990, a "Green Paper on a common approach in the field of satellite communications in the European Community" which defines its basic political orientations for an opening of satellite communications in Europe.

The approach proposed by the Commission extends to satellite communications the general principles of Community telecommunications policy based on a balance between liberalisation and harmonisation measures in conformity with the consensus achieved at the Telecommunications Council of 7 December 1989; it also takes into account the special features of this sector.

The orientations put forward in the Green Paper will now initiate a debate within the Community institutions and the professional groups concerned. The conclusions reached from this debate will contribute to the elaboration of the proposals which the Commission will subsequently submit.

Considerable technological progress but outdated regulations

Despite the considerable technological progress of recent years, regulation and organisation of satellite communications remain in most of the Member States as they were in the 1960s and 1970s.

In those days a relatively small number of large satellite dishes (30 m in diameter) was contolled by telecommunications and radiobroadcasting organisations. But now, the availability of small satellite dishes (0.5 to 2,5 m in diameter) has created substantial demand for specialised communications services such as communication between subsidiaries of companies throughout the Community, in particular in the financial, automobile and tourism sectors.

These new terminals ("VSATs" - Very Small Aperture Terminals) have the potential to become vital elements for the development of business communications at European level, news gathering systems and direct-to-home television. This last aspect will contribute considerably to the introduction of High Definition Television in Europe.

However, these new services and markets, based on small satellite dishes, can only become a reality if regulatory restrictions are reviewed carefully and in-depth.

This ajustement is already underway in some Member States. The coordination of these efforts at Community level is necessary in order to ensure the supply of services on an European scale.

Towards a free sky for a border-free Europe

Green Paper on satellite communications

Proposals for the development of an adequate regulatory environment

On the basis of existing Community telecommunications policy, four major changes are proposed in order to remedy the situation:

a. Full liberalisation of the earth segment, including the abolition of all exclusive and special rights in this area.

In future, it should be possible to obtain and use satellite dishes for direct reception, notably of television, without any restrictions.

Concerning the use of other equipment, type approval and licensing procedures may apply, in particular to avoid harmful interference and to guarantee data protection and the protection of privacy.

b. Free (unrestricted) access to space segment capacity, subject to adequate licensing procedures in order to safeguard exclusive or special rights or regulatory provisions set up by Member States in conformity with the Community law and based on the consensus achieved in Community telecommunications policy.

In conformity with these procedures, service providers will be able to obtain the transmission capacity they need through contracts with satellite providers; and these service providers will themselves be able to transmit signals via satellite.

c. Towards commercial freedom for space segment providers

The objective is to move towards the direct sale of satellite transmission capacity to service providers and users by satellite providers, in particular EUTELSAT (European Telecommunications Satellite Organisation).

d. Adoption of harmonisation measures to facilitate the provision of Europe-wide services

This concerns in particular the mutual recognition of licensing and type-approval procedures, frequency coordination and matters related to the coordination of services provided to and from countries outside the Community, and the definition of Community standards to ensure a better compatibility of equipment and techniques.

With the combination of these changes, a broad range of specialised services will become possible.

COMMSSION OF THE
EUROPEAN COMMUNITIES

200 rue de la Loi
B-1049 BRUSSELS

Third IFIP (International Federation of Information Processing) Conference on High Speed Networking

This Conference, to be held in Berlin, 18-22 March 1991, is dedicated to various aspects of new engineering technology. It is intended as a milestone for reviewing the state of art at an international level and outlining future technical developments in high speed networking.

Programme

Session 1	Opening Session
Session 2	New Network Architectures
Session 3	FDDI
Session 4	Routing and Congestion Avoidance
Session 5	Light weight protocol
Session 6	Protocols in High Speed Environments
Session 7	High Speed Network and Multimedia
Session 8	Multimedia applications
Session 9	Panel: High Speed Network Integration
Session 10	Broadband ISDN
Session 11	Getting connected to broadband

For the final programme and registration form please contact the Conference Secretariat:

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Performance of Public Packet Switched Networks: Experience and Theory

The Inter-University Institute for High Energy in Brussels has made several series of performance measurements of public packet switched networks; one was made as part of the Specification phase of the COSINE project. All measurements were made at the application level and express performance results from a user's view. No special equipment was used and the measurement environment was not specifically monitored.

After gaining practical experience with performance measurements, the need for a more standard approach was clearly felt, and with this in mind the CCITT recommendations and the ANSI standards concerning performance of data networks were studied.

The CCITT provided a first series of recommendations on performance aspects of public data networks in 1984 and upgraded and completed this series in 1988. Recommendation X.140 (1988) defines general quality of service parameters for communication via public data networks and aims at providing users of data transmission services with parameters which can express their quality of service requirements without reference to a particular service or the means of its provision. Recommendations X.135, X.136 and X.137 map the X.140 parameters for communication via public packet switched networks: X.135 defines delay and throughout performance values, X.136 accuracy and dependability performance values and X.137 availability performance values.

In 1983 ANSI made available the ANSI X3.102 standard defining quality of service parameters for use by data communication users. The parameters defined in X3.102 are independent of network topology, protocol, code or other design characteristics. In 1987 the ANSI X3.141 standard was published. It specifies a method of measuring the performance of any data communication service in accordance with the performance parameters defined in X3.102.

When comparing CCITT recommendations to ANSI it was found that:

a) ANSI did not provide the equivalents of CCITT X.135, X.136 and X.137 which are specifically oriented towards performance related issues in packet switched networks;

b) CCITT did not provide a measurement method as found in ANSI X3.141;

c) CCITT recommendation X.140 and ANSI X3.102 can be compared easily. Both are "user oriented" in that they provide a common language to user and service provider to specify performance requirements. However, X.140 states that the general parameters it defines are "principally intended to describe performance at interfaces between public data networks and customer DTE's" and that "detailed characteristics of such network-user interfaces depend on the type of network service and the user application". X3.102 defines what can be a user/system interface and adds that this interface does not necessarily coincide with the interface between data communication user and network service provider.

Most primary parameters are identical.

Differences between both standards are more important in their definition of the non-primary parameters (respectively availability parameters in X.140 and ancillary parameters in X3.102)

When following the above CCITT recommendations or ANSI standards to measure performance of data networks, some problems arise in that the standards are not always detailed enough to prevent possible ambiguities in the measurement method or they are difficult to implement at user level.

When taking X.140 or X3.102 as a model for performance measurement, a major difficulty lies in the provision of a clear definition of the interface and the (relevant) interface events. Furthermore both standards require additional information on statistical sampling.

Some of these statistical problems are alleviated when using X3.141 in combination with X3.102, and although X3.141 defines a measurement method for parameters defined in X3.102, it can be applied to measure the majority of the primary performance parameters defined in X.140.

When measuring performance of public switched networks using X.135, X.136 and X.137, interface and interface events are clearly defined. But for some parameters there is a shortage of statistical information. There are also conditions under which the values provided in the CCITT recommendations are not clearly defined, e.g. the definition of "normal busy hour load" requires further study. The biggest problem with the applicability of these recommendations is the difficulty of relating the network performance values to the service obtainable at given points within the scope of the DTE's, as recognised in X.134.

The CEPT/CAC X.25 project team, recognising that there are no measurement methods and tools to measure the QOS parameters defined in CCITT recommendations X.134 through X.137 and that there is a urgent need for such tools, proposed a recommendation (T/CAC 2 E) where performance criteria

Performance of Public Packet Switched Networks: Experience and Theory

indicators are defined. Four of these indicators are considered essential for the performance of PSPDNs. These are: Unsuccessful Network Congestion (UNCR), Mean Time between Network Congestion Disconnections (MTNC), Transmitted Throughput (TTP) and Received Throughput (RTP). UNCR and MTNC cannot be measured by the user. Procedures to measure TTP and RTP are proposed in T/CAC 4 E and are meant to be used by all public X.25 network providers but can easily be adopted by users.

In conclusion, performance measurement of public packet switched networks is still in its infancy. Such measurements should be carried out in accordance with CCITT recommendations X.135, X.136 and X.137 in such a way that effects of packet layer or transport layer software are minimised. In the absence of a CCITT recommendation concerning a performance measurement method, the proposed measurement procedures from the CEPT/CAC X.25 project team could be used to measure TTP and RTP and the method defined in ANSI X3.141, adapted to CCITT parameters, should be followed to obtain measurements for other QOS parameters.

An interesting experiment would be to apply such standardised measurements to evaluate the performance of the RARE/COSINE IXI network.

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News from the Commercial Action Committee (CAC) of CEPT

CEPT (Conference of European Postal and Telecommunications Administrations) was founded in 1959 to strengthen relations between European countries. The PTT Administrations of 31 European countries are now members of CEPT; i.e.:

Austria, Belgium, Bulgaria, Czechoslovakia, Cyprus, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Spain, Sweden, Switzerland, Turkey, United Kingdom, Vatican State and Yugoslavia.

The principal aim of CEPT is to ensure that there is effective co-ordination and co-operation on a European basis in the postal and as well as in the telecommunications sphere.

Telecommunications

CEPT Telecom is the Telecommunication side of CEPT responsible for the determining the telecommunications policy within CEPT. The aim is to achieve the effective operation and interconnection of international public telecommunications services among member countries, to promote the development of new services and products, and to co-ordinate developments in international telecommunications, notably within the ITU (The International Telecommunications Union).

The CEPT Telecom Plenary, the highest body in CEPT Telecom, has nominated seven specialist Committees to co-ordinate activities across the entire range of technical, regulatory, operational and commercial issues.

CEPT Management

CEPT has no permanent headquarter. The management of the organisation is being taken care of by member Administrations by turns every two or three years.

A number of practical tasks related to printing and distribution of CEPT Recommendations and similar secretarial tasks is carried out by a permanent Liaison Office.

The address of the current Managing Administrations:

CEPT Managing Administration
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The thirteenth meeting of the Commercial Action Committee (CAC) took place in Oslo, Norway, 22 - 26 October 1990, where more than 50 representatives of Public Network Operators from 16 countries attended the meeting.

News from the Commercial Action Committee (CAC) of CEPT

New Structure

CAC has decided to implement gradually a new internal structure over the coming 7 months. The new organisation is scheduled to be fully operational on 1 June 1991.

The Committee agreed to adapt its structure and working methods to the changing environment and to the recently introduced new organisation of CEPT Telecom, according to which CAC became a committee of European Network Operators.

The new structure will consist of three levels which will be more efficient than the present two layer structure where a large number of Working Groups and Project Teams reports directly to committee meetings.

CAC will in the future allocate specific jobs to Coordination Groups which shall be responsible for having the necessary activities carried out by small Project Teams or groups of experts. The Committee and its Working Groups/Project Teams are now finalising a major review of all existing study questions, recommendations and work programmes in order to align them to the new situation.

Structure of Telephone Tariffs

The Operators have adopted a Recommendation the objective of which is that the structure of the telephone tariffs should better reflect the costs. This envisages the progressive rebalancing of the local, trunk and international tariffs, and the avoidance of too great a disparity between charges applied at the two extremes of the same international route.

Charging Principles for Specific Supplementary Services Provided over the ISDN (Integrated Service Digital Network)

Charging of supplementary services should be cost oriented.

When their provision does not require use of additional network functions or other resources they may be included in the basic rental for ISDN. This could apply for CLIP (Calling Line Identification Presentation, , CLIR (Calling Line Identification Restriction) and TP (Terminal Portability) in narrow band ISDN in Europe.

The supplementary services which may require special resources such as DDI (Direct Dialing In), MSN (Multiple Subscriber Number) or CLIR (on a per call basis) may be subject of additional charges. These charges could be subscription or usage based or a combination of both according to the supplementary service.

ISDN Services

The teleservice "Video telephony" has been described covering all kind of videophone services regardless of quality of service and network environment where the service might be offered.

It contains among other things classification of videophone services, description of call control procedures, list of applications, user-requirements, terminal aspects and inter communication with audiovisual services.

The new supplementary services LH (Line Hunting) and RC (Remote Control of supplementary services) have also been defined.

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Telecommunications, Computer Networks and the Law

The growing importance attached to legal issues involved in telecommunications, especially Electronic Data Interchange (EDI), is reflected in the number of publications devoted to this aspect of networking.A book on this has recently been received by IES News and is noted below.

Legal and Economic Aspects of Telecommunications.

S. SCHAFF (Editor)
Amsterdam: North-Holland, 1990, 755 pp.

"The telecommunication industry and services are experiencing today tremendous changes due to technical progress and especially to the joint utilisation of telecommunications and computers. These changes have a profound impact on our whole society, as well on the conduct of business and of public services as on our private lives.

From the regulatory point of view, the Commission of the European Community has recognised these facts and, through the recent publication of a Green Paper on Telecommunication Services, has urged the Member States to adopt a common approach on what will constitute one of the major assets for the development of the Common Market. As a first step toward the implementation of the Green Paper, the Commission has adopted in the beginning of July 1989 a new Directive on Competition in the Markets for Telecommunication Services.

The time seemed thus appropriate to simulate a full debate on all the issues involved. This was the aim of this International Chair in Computer Science, organised by the Belgian National Fund for Scientific Research in cooperation with the academic representatives of several Belgian universities involved in the field of telecommunication, law and economics, and especially Professor Yves POULLET of the Facultés Universitaires Notre Dame de la Paix of Namur and Professor Bart DE SCHUTTER, of the Vrije Universiteit of Brussels.

This series of conferences dealt with the major aspects of telecommunications today. On the basis of the users needs, they analysed the modifications of the technical and economic structures and regulatory responses of the various countries and thus they contributed to a clarification of the major issues involved and of the positions adopted by the various actors in this field. However, as these conferences were held from December 1988 to March 1989, some of the considerations expressed might already be under discussion due to the rapidity of the evolution in this field."

This volume reproduces the texts of some 50 papers presented.The topics addressed were user needs (education, banking, insurance, industry and public services); telecommunications technology, partners in the market (public sector, environment and computer science strategy), monopoly or competition, policy trends, standards, services, legal and economic aspects of value added network services and a synthesis of the various subjects.

The IES USERS' FORUM

The IES Users' Forum at this year's ESPRIT Conference, held on Tuesday morning, 13 November, was chaired by P. Van Binst (University of Brussels). Following a brief scene-setting introduction by R. Speth (DG XIII) on the role of IES in ESPRIT and its aims, an outline of achievements and future plans of EuroKom was presented by J. Conroy (EuroKom, University College Dublin). The EuroKom electronic mail and conferencing system was set up for the ESPRIT participants at the beginning of this programme in 1983. It was state of the art at that time and has maintained its position over the years. It is now widely used by participants in many other CEC programmes and is also finding potential user communities outside these groups. EuroKom, now still under contract from ESPRIT, will become a fully self-supporting company from 1 January 1990. Although of course EuroKom will continue to provide services to its present user community, this change does allow them to explore other markets. (See article under EuroKom News, p. 27.)

J. Perez Vidal (DG XIII) then reported on the IXI service from a user's perspective. The Commission has long recognised that researchers face many problems in intercommunication: the lack of functionality have led to the realisation that alternatives to the publicly available services were needed. Taken in conjunction with the policies to create a single European space, to promote collaborative programmes like ESPRIT and

to promote the use of standardised products the definition of a requirement for a highly functional and performing infrastructure for this purpose became essential. As a consequence and in collaboration with RARE, negotiations leading to a contract with PTT Telecom of the Netherlands for the provision of the pilot IXI service were started. IXI is or will become the basis for access to the various COSINE services (X.400, X.500, FTAM, gateways to the US) as well as for other CEC sponsored telematics services such as Y-NET.

Packet switched X.25 networks have existed in Europe for many years. While it is true that the currently provided X.25 IXI service is not, from a technology standpoint, a leading edge task, it is no less true that from a systems integration, management, uniformity and political perspective it is very much a European "first". This is demonstrated by its geographical coverage, the uniform access speed of 64 kbps (except from Lisbon, Athens and Ljublijana) and the placement of switches with a Dutch DNIC in countries other than the Netherlands.

Technical and managerial problems have had to be overcome: being the first pan-European X.25 backbone with X.75 gateways to several PDNs has disclosed a number of interworking incompatibilities which were not in evidence when the IXI software was used in a purely national context.

It must be stressed that IXI is a pilot service. The production service will be awarded after a call for tenders.

Both Esprit's IES and the COSINE Policy Group are strongly committed to IXI as shown by the financial and other support. The COSINE project is to become self-supporting at the end of its current three year phase. The contract for the IXI production service is expected to be awarded towards the middle of 1991 and alternatives are under study to ensure continuity of service until the production service is available. Any COSINE user with connectivity to a national research network will normally be authorised to use IXI. For those not having network connectivity, there is in some countries the possibility of accessing IXI via national public data networks.

The recently launched Y-NET Pilot OSI Network project was described in detail by C. Corte (Teleo, Italy). The project resulted from joint efforts by the CEC and a group of European manufacturers to promote and accelerate OSI introduction for the benefit of ESPRIT participants, especially those working in small and medium enterprises where OSI equipment may not yet be available in-house. The intention is to provide OSI services at one or more Service Points (SP) for each country. The equipment for Y-NET will come from different manufacturers using a number of well-known OSI standards.

The planned timescale for the project is 4 years with an initial phase of 18 months to develop a fully operational network providing basic services and a main phase of 30 months to expand service type availability. First phase services are message handling (X.400/84) and FTAM, with X.500 and Electronic Document Interchange reserved for the main phase, together with enhancements of existing services.

Operational SPs are to be provided as soon as possible with the first due to come into use during the first quarter of 1991, and all by mid 1991. Each SP will provide direct user support for its area, but management will be centralised in the Y-NET Management Unit (YMU) located in Brussels. The national organisations will operate under subcontracts from the YMU, the contract for which has been awarded to Teleo (a member of the Italian STET group). In addition to monitoring national activities, the YMU will be responsible for coordinating Y-NET activities with those of other CEC involved activities such as RARE and COSINE.

Access to national SPs will be by different means: the most widely used method should be through public packet switching networks based on X.28 and X.29 protocols, but access involving V21/V21bis modems will also be feasible. In addition, terminals connected to national research networks will be capable of direct access to SPs. User

The IES USERS' FORUM

support will be available at the SPs including a help desk.

Y-NET, being part of IES, will involve much synergy in its evolution with other IES and CEC activities. Interoperation via X.400 between these and Y-NET is considered an essential element of the new service. Gateways to other research communities are being planned so that the target group of researchers will have wide communication possibilities. A flexible and efficient general routing function is envisaged for the overall Y-Net service, and dedicated equipment is to be provided for international routing support. No new or special products are to be developed for these applications but existing products of the manufacturers will be tested for interoperability and much emphasis will be on providing and organising network services.

The interrelation of the various services of IES was presented by K. De Vriendt (DG XIII):

The need for a basic set of services for the programme participants was realised at the start of the ESPRIT programme: the EuroKom services have been available since 1983 and IES News has been published since 1985. EuroKom is a centralised service, with gateways to various R&D networks. Recently a PC front-end has enhanced the user-friendliness of the system and the availability of IXI may improve international access to the EuroKom host.

Over the years, IES has also promoted the further developments of the OSI concepts via support for the development of prototype OSI implementations (the IES development projects) and via the support for the introduction of OSI based services for European researchers (by the Commission's participation in the COSINE project and the funding for IXI).

Now, to complement these activities, Y-NET will be launched. Targeted to provide OSI based services to ESPRIT participants who do not have access to the various research networks, Y-NET will start with the provision of E-mail and file-transfer services via national Y-NET servers. Although for the end-user, not so different from the EuroKom service (in terms of access, location of mailboxes, user interface style), Y-NET will enable the end-user to have access to a rapidly expanding X.400 community (thanks to the links between Y-NET and the COSINE IXI service) and to become familiar with OSI concepts, possibilities and limitations. Also, support for the end-user will be organised at a national level (using the local languages). In the longer term, Y-NET can be an element in the interlinking of the private OSI domains of large industrial groups, participating in ESPRIT.

The ultimate goal of the IES service provision activities is to provide an European wide network for researchers, supporting end-user oriented applications (whenever possible based on international standards) and to provide, on top of that network, value-added services specific for our target community (like an EuroKom conference server or an ECHO/CORDIS database server).

These presentations were followed by a lively discussion which centred around: How to avoid conflicts of interest or even head-on competition between COSINE and Y-NET? Should the IES activities be limited to the provision of infrastructure and the co-ordination of R&D networking at an European level or should IES also be involved in the provision of end-user/value-added services? What is the place of OSI servers (such as the Y-NET servers) in a world where OSI applications are becoming available on a wide range of computers, including personal workstations?

Esprit
Information Exchange System

IESNEWS

Issue No 31, December 1990

Open Systems Interconnection (OSI) is the internationally-standardised communications technology which enables users to select communications equipment according to functionality without having to worry about incompatibilities between different suppliers. CEC Directives now require public sector procurements of networks and telecommunication equipment to be according to OSI standards.

Because OSI meets a wide variety of operating requirements, it is necessary to specify a defined set of options known as a "profile". GOSIP (UK), accepted in many European countries and even as far as Australia, provides the ready-made solution to enable the design and procurement of networks that will interwork with other GOSIP networks.

What is GOSIP? (Government OSI Profile): A Briefing

GOSIP has been developed by the (UK) Central Computer & Telecommunications Agency (CCTA) primarily to meet the requirements of Government, although GOSIP is equally appropriate for many non-Government applications.

A one day meeting on 25 January 1991 in London will present in full detail:

- OSI
- GOSIP Rationale
- GOSIP Concepts and Architecture
- Overall scope and technical aspects of GOSIP
- OSI Planning and Migration
- Planning for migration to OSI
- Use of GOSIP in Procurement

Full details from:
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Future Events

EUROPEAN CONFERENCE ON INTEGRATED HOME APPLICATIONS. CEC and CENELEC. Amsterdam, 13 - 15 January 1991.

EUROCOMM 91. RAI. Amsterdam, 22 - 24 January 1991.

OSI FOR USERS. OMNICOM. London, 23 - 25 January 1991.

ONLINE (GERMANY) 91. Online GmbH. Hamburg, 4 - 8 February 1991.

DATA PROTECTION AND SECURITY IN TELECOMMUNICATION SERVICES IN THE EUROPEAN COMMUNITY. Wissenschaftszentrum Berlin. Berlin, 7 - 9 February 1991.

PAN-EUROPEAN DIGITAL CELLULAR RADIO CONFERENCE. IBC Technical Service., Nice, 5 - 6 February 1991.

COMPUTERS IN LIBRARIES. Meckler. London, 26 - 28 February 1991.

INTERNATIONAL WORKSHOP ON HDTV AND BEYOND. IEEE, Society of Motion Picture and Television Engineers and European Association for Signal Processing. Turin, 27 February - 1 March 1991.

TECHNOLOGY OF OBJECT-ORIENTED LANGUAGES AND SYSTEMS. CNIT. Paris,4 - 8 March 1991.

Future Events

EUROPEAN BUSINESS INFORMATION CONFERENCE 1991. TFPL. Amsterdam, 6 - 8 March 1991.

THIRD IEE CONFERENCE ON TELECOMMUNICATIONS. IEE EDINBURGH, 17 - 20 MARCH 1991.

OPTICAL STORAGE - ITS PRACTICAL APPLICATIONS. Institute of Information Scientists. London, 20 - 21 March 1991.

INTELLIGENT TEXT AND IMAGE HANDLING. CID, INRIA ICYT and CNRS. Barcelona, 2 - 5 April 1991.

INTERNATIONAL SYMPOSIUM ON INFORMATION TECHNOLOGY IN SUPPORT OF LEARNING. Lancaster University. Lancaster, 8 - 11 April 1991.

EUROPEAN TEST CONFERENCE 91. IEEE Computer Society and VDE. Munich, 17 - 19 April 1991.

EURO-ARAB SEMINAR ON INFORMATION SYSTEMS AND NETWORKS. Institute for Information and Documentation. Granada, 22 - 26 April 1991.

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