

COMPUTER AND AUTOMATION
RESEARCH INSTITUTE
HUNGARIAN ACADEMY OF SCIENCES

MAGYAR TUDOMÁNYOS AKADÉMIA
SZÁMITÁSTECHNIKAI ÉS AUTOMATIZÁLÁSI KUTATÓ INTÉZET

THE
ACADEMIC
COMPUTER INFRASTRUCTURE
DIVISION

Budapest, 1992

ADDRESS: H-1132 Budapest, Victor Hugo u. 18-22, Hungary

FAX: (361)-129-7866 TELEX: (861)-22-4694

The Academic Computer Infrastructure Division

The Organization

The Academic Computer Infrastructure Division (ASZI) (the successor of the former Computer Services and Computer Networks Departments of the SZTAKI) was founded in 1991 as an autonomous unit of the Institute. It incorporates the *Computer and Networking Center* of the Hungarian Academy of Sciences as well as several research and development departments active in engineering fields such as *centralized computer services, computer networks, network applications, data base management and electronic mail systems*. The employees directly elect the Head of the Division who appoints the department heads.

The main objective of the Division's activity is to provide *computer based infrastructural services* for the Hungarian academic community at the highest possible level. This means continuous maintenance and development of available computer systems, network technology and services which includes information and training support for users, releasing relevant technical information, giving consultancy, setting up and studying pilot systems, co-ordinating national and international networking activities, operating national network nodes and gateways, maintaining databases as well as electronic mail and bulletin board systems, running file servers. A further task is to maintain and supervise the terminal points (about 250) of the country wide *IIF network* (the network of the National Information Infrastructure Project) and to support several thousand users of those services. The Division is also the focal point of *networking activities* within the Institute and one of the most influential computer networking centers in Hungary. Several assistants of the Division are members of national and international committees and working groups. The research and development departments of the ASZI contribute to these activities by adding a deep understanding and a high expertise to the day-to-day work, while in return acquiring experience and a testbed in planning and developing the *systems of the future*.

The ASZI Division consists of the following units:

Computer Center Department (head: Anna Erdős),
Informatic Services Department (head: László Király),
Network Department (head: István Tétényi),
Hardware Department (head: Sándor Manno).

Main fields of interest and strategic directions at the ASZI Division

Our traditions in *ISO/OSI networking* are worth mentioning primarily. The packet switched network system (SOKBOX) developed by us became the first public X.25 network in Hungary and it is now operated by the PTT. The different hardware and software tools form a modular set. On this basis we solve various connectivity problems between separate systems and implement network applications over this stack. Many private networks have been installed for users of different types (banks, railway, travel agencies etc.). Our network applications are widely used all over the country (e.g. the ELLA mailer has about 3000 mail boxes).

Available tools of *X.25 networking* are: the interface for IBM like PCs, stand-alone modular PADs and switches, network management and operation center. Connectivity is provided for Novell and BSC systems.

Network applications include mail systems, file transfer and file server services, bulletin boards, data bases.

The *development directions* of the present and the near future are:

- introducing the X.400 message handling and the X.500 directory system services in Hungary,
- setting up mail gateways,
- introducing Internet network services and integrating the internet and X.25 networking technology,
- setting up an ISDN pilot system and developing an ISDN based integrated electronic office environment,
- creating a new, integrated multi-network management system.

Budapest, February 1992

Balázs Martos
head of the ASZI Division

Phone: (36-1)149-7532

Fax: (36-1)129-7866

E-mail: h160mar@ella.hu

DEPARTMENT OF HARDWARE DEVELOPMENT

Phone: (36-1-)149-7532, E-mail: h366man@ella.hu, Fax: (36-1-)129-7866

Head of Department: Sándor Manno

X.25 packet switches and PADs

The Department provides a sound hardware development and production basis for the Division. It plays an important role primarily in marketing devices required for accessing computer networks or for establishing large networks themselves.

One of the widely used devices is the *HBOX*, a microprocessor based stand-alone equipment that meets the requirements of the international standards and recommendations (ISO/OSI, CCITT) for *data communication with packet switching technology*. The software operating the HBOX gives the system high reliability even at peak loads. The compact, yet powerful, modular X.25 network switch, terminal and inverse Packet Assembler Disassembler (PAD), BSC-X.25 protocol converter, transparent BSC carrier provides high performance at low cost. Multipoint link handling, address transformation, different kinds of security and monitoring are also provided. It is certified and approved by the Hungarian PTT for private and public packet switched networks.

The microprocessor based IBM/PC/XT/AT plug-in board called *COMX* meets the ISO/OSI and CCITT international standards and it may have two X.25 interfaces. The communication between the board and the host PC is performed through 64 kbytes of dual port RAM memory. The board shows 8 virtual terminal or inverse PAD interfaces for the host PC. The on-board ROM contains a loader program while the system with the current configuration is downloaded from the host. With the program developed at the Division the NetBIOS-X.25 connectivity is also provided (e.g. for the Novell-X.25 gateway function).

More than 300 HBOX-es and about the same number of COMX boards operate in Hungary. Most of them are the endpoints of the nationwide IIF network, but other small enterprises and large organizations (e.g. Hungarian Railways, National Savings Bank, K&H Bank) use them to communicate over the public packet switched network or develop their own private networks as well.

Integrated Services Digital Network (ISDN) technology

We have been facing a revolutionary change in the information technology, generated by some *new data communication means* such as fiber optics, digital satellite data transmission media and high performance digital switches. An important component of these developments is the *Integrated Services Digital Network (ISDN)* concept. Instead of using the former technology of separated information channels (picture, voice, data, facsimile) the ISDN combines these types of information on local, country and international level and provides a standardized, integrated information connectivity for the users. An intensive research and development activity is going on nowadays in this field all over the world. The department is active in

- studying the integration of circuit switched and packet switched type of data transmission networks within the frame of the narrow-band ISDN system,
- setting up a narrow-band ISDN pilot system,
- studying the conversion and gateway problems between ISDN and non-ISDN (e.g. Ethernet, X.25, telephone) networks,
- developing a Hungarian ISDN terminal.

DEPARTMENT OF COMPUTER NETWORKS

Phone: (36-1-)149-7532, E-mail:h50tet@ella.hu, Fax: (36-1-)129-7866

Head of Department: István Tétényi

X.25 packet switched network technology

In the division there is a long tradition of ISO/OSI networking. The department developed several programs for building up an X.25 packet switched network system, and a number of gateways and application programs.

Our *packet switched network* (called SOKBOX) is a medium size exchange facility. It meets all the relating international standards (CCITT X.3, X.20, X.21, X.21 bis, X.25, X.28, X.29, X.32, X.75, X.121). The distributed architecture of the system provides high reliability and it is easily serviceable. At the network control center window techniques are applied to help easy system configuration and network supervision. The basic elements of the SOKBOX are the CENTER and the RBOX-es, and they are connected through serial X.25 lines. An RBOX is a centrally (remote) configurable X.25 switch (HBOX). It provides more sophisticated network services than a stand-alone one (e.g. dynamic routing, accounting etc.). The CENTER is an IBM PC/AT running XENIX operating system with COMX plug-in board. The Network Control Center and the Operator Console processes are running in the CENTER. A hot stand-by CENTER may also be connected to the system, and all functions can be executed from any terminal (password protected). The SOKBOX (certified and approved by the Hungarian PTT) was installed at many places in Hungary to form a private packet switched network (e.g. Atomic Power Station in Paks, travel agency IBUSZ).

Mail gateways

The Division is the most important *mail service* provider in Hungary. We operate the

- main server of the ELLA mail system,
- the Hungarian national node of the EARN (European Academic & Research Network), which has a sophisticated mail and conference service,
- the Hungarian national node of the EUnet (European Unix Network), which uses the well-known UUCP mail protocol and
- a VMS mail server for IIF members.
- A further X.400 PRMD (Private Management Domain) will be installed for the IIF community in 1992.

In order to meet the users' needs, the level of integration of the different popular value added networks has to be increased, particularly in the field of electronic mailing. For example it is very important to be able to receive a mail in a network of a mail system "A" sent from a network of a mail system "B". It requires the development and/or implementation of the necessary gateway programs. The problems of different addressing schemes, different network and mail protocols must be solved as well.

Internet network technology

A de facto standard in networking is based on the TCP/IP protocol stack. The most attractive feature of the technology is that users have access to off-the-shelf services. The protocol stack itself is well engineered and efficient. Using *TCP/IP networks* is very cost effective, their price/performance ratio is very attractive. The *Internet* facility, which is based upon the TCP/IP environment, provides extremely wide choice and excellent services. The gap between the OSI and the TCP/IP world has been narrowing whereby knowing both environments is a must. Our aim is to develop a firm understanding of Internet, its related protocols, and we are going to set up a networking environment where networking technology could be fully investigated.

We also would like to gain experience concerning the relationship between the communication media and the used protocols. In this respect a practical aim is to clarify the relationship between the X.25 protocol set and the TCP/IP stack. We want to find out the viability of integration of our X.25 networking results with the TCP/IP world.

The Department is going to set up a center where users of the IIF network will be able learn about the Internet and its services. Finally, our main goal is to *connect the IIF network to Internet* with all the available features for the users.

DEPARTMENT OF INFORMATION SERVICES

Phone: (36-1-)149-7532, E-mail: h12kir@ella.hu, Fax: (36-1-)129-7866

Head of Department: László Király

Electronic mail and bulletin board systems

Two of the most widespread applications of wide area networking are *electronic mail and bulletin board systems* (BBS).

Supported by the National Information and Infrastructure (IIF) Project, the Department has developed an *electronic mail system*, called ELLA, for the Hungarian R&D community. ELLA is a centralized e-mail system, i.e. an "electronic post office" running around the clock on an IBM mainframe (managed by the Department in co-operation with other units of the Division). On the other hand, the mail system is used by local mailers all over the country. They use different kinds of operating systems (mainly MS-DOS, since IBM PC-s and compatibles are the most common computers in Hungary, but also VM/CMS, VMS, Macintosh and UNIX). The mailer programs communicate with the post office mainly through the Hungarian packet switched network, but it is also possible to set up a connection through an ordinary, switched telephone line equipped with an appropriate modem. The ELLA mailer programs have numerous *user friendly features*, e.g. a Hungarian language interface, nickname facilities, address groups, delivery confirmation, directory, password protection against illegal use, automatic redirection of incoming mails, free choice of built-in text editors, register notebook etc. Now (March 1991), ELLA has more than 4000 users (mail boxes) and the number is permanently growing.

ELLA is connected to other international mail networks through *gateways*. The Department is responsible for operating the Hungarian national node of the European Unix Network (EUnet) and the ELLA-EUnet gateway.

As to the BBS systems, another popular product of the Department is the ELF *bulletin board system*. Likewise to ELLA, the central server is operated by the ACI Division. Users can access the service by means of a menu driven user interface. After logon, a structured list of interest groups appears on the screen. The user can choose an interest group, can put his own article in it and can read those of others.

On-line information services

Another common application based on computer networks are on-line information retrieval service. In this field our aim is to give a kind of service similar to the well-known DIALOG in the U.S. or STN in Germany. Our service, of course, cannot cope with their large databases covering information of worldwide origin. Our databases contain mainly information specific to Hungary, such as the Hungarian Patent Database, the Hungarian Standard Database, the 'Who Is Who in Hungary' Database, etc. Just like in the case of ELLA and ELF, the users can access the databases through the X.25 network or through ordinary telephone lines. At present, the retrieval software is ISIS, which is a text-oriented information management program developed by UNESCO. However, in the near future, the service will switch from ISIS to BRS/SEARCH, a very powerful retrieval software of an American company, BRS Software Technologies. We also co-operate with that company as authorized distributors of their software products in Hungary.

AKAMIK

The Department hosts a small group called AKAMIK, which is the Hungarian abbreviation for Microcomputer Support Center for Academic Users. As already mentioned, IBM PC-s are the most common computers within the Hungarian academic community. The users of these computers are not computer experts in every case, they often need help in choosing the right tool for solving their particular problem, in using the software etc. AKAMIK can be characterized as a kind of information collector and distributor. The assistants of AKAMIK are, of course, not able to solve every problem arising but, as a minimum, they can help in bringing together people struggling with the same problem or they can also help in contacting an expert.

AUTOMATED LIBRARY MANAGEMENT SYSTEMS

Recognizing that libraries must play an important role in an information society, our department's mission is to promote modernizing the management of Hungarian libraries.

We co-operate with an English company, IME. Their integrated library package, named TINLIB is a good solution in changing manual methods to fully computerized administration at Hungarian libraries.

COMPUTER CENTER DEPARTMENT

Phone: (36-1-)149-7532, E-mail: h325erd@ella.hu, Fax: (36-1-)129-7866

Head of Department: Anna Erdős

Computer Services

The basic responsibility of the Department is to maintain and to operate the *computer based central services of the Hungarian Academy of Sciences*. There are two computer configurations under the Department's control: an IBM 4341 and an IBM 4381 type computer running the VM/SP, CMS system.

The members of the department have to support the operating systems, some program packages of common interest (e.g. compilers) and data retrieval systems. We also

- maintain central data bases,
- install new programs or new program versions,
- consult and advice users,
- manage a library of computer system documentation (freely accessible by the academic community),
- provide remote (network) terminal access,
- support (in co-operation with other departments of the division) special network services on behalf of the Hungarian Information and Infrastructure (IIF) Program,
- operate the Hungarian national node of the European Academic & Research Network (EARN).

On a contract base, the Department offers designing, building and servicing *text related data bases* (ISIS, BRS/SEARCH).