NJ SZT

NEUMANN JÁNOS
SZÁMÍTÓGÉPTUDOMÁNYI
TÁRSASÁG

Österreichische
Computer
Gesellschaft

LOCAL NETWORKS

Budapest

21-22.June 1984.

AUSTRIAN COMPUTER SOCIETY

JOHN V. NEUMANN SOCIETY
FOR COMPUTER SCIENCES

Bilateral conference on

LOCAL NETWORKS

Budapest

21-22.June 1984.

PROGRAM COMMITTEE

dr.L.Csaba (MTA SZTAKI)
dr.I.Margitics (SZKI)
Gy.Kovács Secretary General of NJSZT
dr.N.Rozsenich President of OCG
dr.P.Sint
dr.K.Tarnay (MTA KFKI)
F.Telbisz (MTA KFKI)
M.Tóth (NJSZT)

ADDRESSES IN CONNECTION WITH THE CONFERENCE (SEE MAP)

Conference and reception 1
MTESZ Technika Háza
(House of Technique)
Budapest, V.
Kossuth tér 6-8.

Folklor program 2
FOLKLOR Centrum
Budapest XI.
Fehérvári ut 49.

SZKI 3
Budapest I.
Donáti u. 35-45.

RÉGI ORSZÁGHÁZ Borozó 4
(Old Parliament Wine Cellar)
Budapest I.
Országház u.

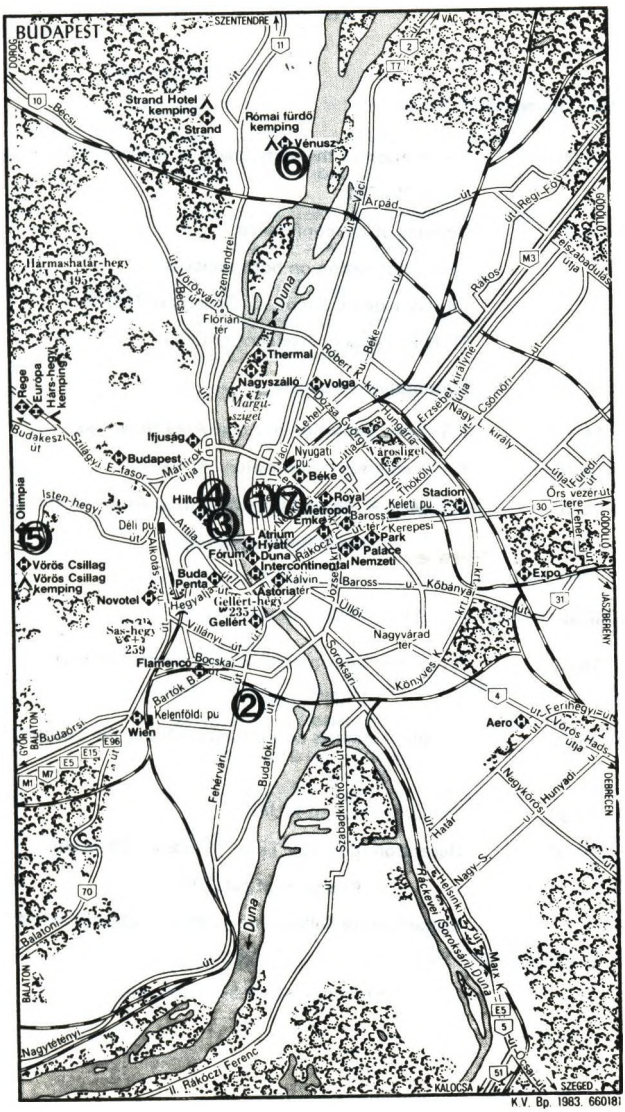
H o t e l s

1/ Hotel Olympia 5
Budapest XII.
Eötvös u.
Tel.: 166-450

2/ Motel Vénusz 6
Budapest III.
Dósa u. 2-4.
Tel.: 687-253

SECRETARIAT of NJSZT 7
Budapest V.
Báthori u. 16.
Tel.: 329-349; 329-390

MAP OF BUDAPEST



TIME-TABLE

(Ist day)

21. JUNE (Thursday)

12,00 - 13,00	**Registration of the participants in the House of Technique, Room No. 702.**
13,00 - 13,40	**Opening of the conference** **Brief information on both societies** (Mr.Gy.Kovács, Secretary General of NJSZT Mr.N.Rozsenich, President of OCG)
13,40 - 16,30	**Presentation of papers**
13,40 - 14,10	F.Telbisz: Evolution in Local Area Networks
14,10 - 14,40	K.H.Kellermayr: Simulation of LAN's
14,40 - 15,10	A.Balázs: A Message Oriented Local Area Network Operating System Based on UNIX

Coffee break

15,30 - 16,00	P.Lakatos: Telecommunication control through LAN concepts
16,00 - 16,30	P.Lipp: Activities concerning LAN's at the Technical University of Graz
16,30 - 17,30	Demonstration of MUPID
18,00 - 20,00	**Reception (given by Tibor Vámos academician, President of NJSZT)**
20,00 -	**Departure for folklore program at Folklore Centre**

TIME-TABLE

(2nd day)

22. JUNE (Friday)

9,00 - 13,20	**Presentation of papers**
9,00 - 9,30	E.Querasser, M.Lindner, H.Preineder, F.Buschbeck: Implementation of a Powerful Local Area Network on a Fibre Optic Loop
9,30 - 10,00	P.Sugár: Distributed Resource Management in the EXLOC Local Area Network
10,00 - 10,30	A.Balázs, R.Jákfalvi, P.Sugár, J.Szentner: The Communication Architecture of the EXLOC Local Area Network
10,30 - 11,00	P.Póka: The Csepel VIPS File Server System
Coffee break	
11,20 - 11,50	D.Schornböck: Local Network at the Technical University of Vienna
11,50 - 12,20	S.Lökös, G.Illés, T.Novitcky:Local Network in the Data Acquisition and Processing System of a Cyclotron Laboratory
12.20 - 12,50	A.Arató, I.Sarkadi-Nagy, J.Sulyan, F.Telbisz: A Local Area Network Architecture Tailored to Laboratory Environment
12,50 - 13,20	S.Rainer: Evaluation of Local Area Networking
13,20 - 14,20	**Lunch break**
14,20 - 16,30	**Visit to SZKI**
16,30 - 19,30	**Sightseeing**
19,30 -	**„GET TOGETHER" Party in the „RÉGI ORSZÁGHÁZ Borozó" (Old Parliament Wine Cellar)**

ABSTRACTS

Ferenc Telbisz:

EVOLUTION IN LOCAL AREA NETWORKS

The local area networks have gone through a considerable evolution since their first appearence. This evolution can be characterised by the principle of „the survival of the fittest" (Ch. Darwin). Up to now from the amazing multiformity of the different proposals for arbitration schemes only three have the prospect of being accepted by the IEEE 802 standardisation project: the CSMA/CD bus arbitration method and the token passing both for the ring and the bus. A fourth surviving species is the Cambridge ring with its empty slot technique.

The predominance of these „de iure" standards will further be stressed by the „de facto" standards imposed by the appearence of the LAN communication chips.

The competing LAN techniques offer different characteristics that may or may not suit the different applications. At least the following application fields are discernible as requiring different network characteristics:

office automation,
networks of personal computers
computer communication in distributed systems
(back-end networks included),
process control networks,
terminal networks.

In some of these fields even the third generation PBX is competitive.

In conclusion we may state that although certain branches of the evolution turned out as being non-prespective, further ramification is still going on in this field.

Dr.Karl H.Kellermayr

SIMULATION OF LOCAL NETWORKS

Besides technical aspects, standardizing local networks is one of the most interesting subjects in data communication. IEEE started Project 802 in February 1980, with the aim of defining the 1st and 2nd levels of the ISO Refrence Model for the open communication over local computer networks.

Several subcommittees deal with communication media, data link level and tasks of higher levels. The original plan of defining a single standard within six months was not to be achieved either in time or in content. Much rather, some options were accepted, namely:

- CSMA/CD procedure as defined by the company Digital Equipment, Intel and XEROX (ETHERNET),
- Token ring by IBM,
- Token bus by several other manufacturers.

At the Institute for System-sciences a project has been supported for several years to simulate the power of local nets. Besides the procedures recommended by IEEEE802, we also examine others which are already available on the market, or which are still under development.

Our short presentation discusses our results in that field.

dr. András Balázs

A MESSAGE ORIENTED LOCAL AREA NETWORK OPERATING SYSTEM BASED ON UNIX

In the first part of the presentation the special characteristics of local networks which were given special attention in the MIX design (high speed of data transmission, simple topology) with their possible impact on distributed operating system architecture are discussed. The the chosen design principles are stated and contrasted to the limited capabilities of the standard UNIX lernel.

In the second part, an overview of the distributed system model is given. It comprises a short overview ot the basic notions of MIX, naming the access control issues of system resources, together with the presentation of the main communication mechanisms.

In the next section, the architecture of MIX is described in some detail. The architectural layers are divided into two groups. The first is the Network Service layer, the other is the Communication System layers. The former includes services provided by MIX to the end users of the network, while the latter deals primarily with message passing.

Network services primordial to the operation of MIX, like the Name Server, the Remote Process Execution Server and the File Server will be presented. They use distributed control procedures, and so users may work even on subsets of the network.

The Network Communication System layers include the interprocess Communication Layer, the Transport Layer, the Network and Physical Layers.

The Interprocess Communication Layer is characterized by a highly efficient multicasting mechanism. This possibility is widely used by the basic MIX network services.

There are two kinds of transport services in MIX, namely the ,,realiable virtual-circuit type" transmission, and the ,,nonreliable datagram" service.

The Network Layer makes ,,best effort" transmission of data packets inside the network, and ensures internetwork communications according to international standards (DOD).

The fourth section considers the selected implementation issues of MIX. Functions are implemented either in kernel, or in user spece. The ,,Why"-s are explained.

The set of 9 system primitives, which realize the Interprocess Communication Layer and display interesting features of MIX, are described in greater detail.

In the concluding part, the author tries to show that the simple architecture and efficient mechanisms in the MIX design make it an adequate operating system for the high speed, simple topology local area network environment.

Péter Lakatos

TELECOMMUNICATION CONTROL THROUGH LAN CONCEPTS

Being involved in the development of control systems for PABXs, our team at the BHG Works plans to incorporate communication means between PABX control elements based on LAN concepts.

This is justified by the need of a highly realiable and distributed control scheme in PABXs, along with the demand for PABXs built up of subsystems with relative autonomy, spread over to the wider area of an industrial plant, for example. These requirements can be met by low-end LAN-s at an affordable price.

Throughout the development of our LAN standards and products we have been confronted with a lot of problems not appropriately discussed in literature on LANs.

These problems, which are essentially related to the physical implementation of a LAN, tend to limit seriously the efficiency and costs must be low. We found, for example, that implementing a simple collision detection mechanism does not contribute substantially to enhancing LAN throughput, if sufficient bandwidth can be provided and is often ineffective in LANs where communicating equipment are separated by longer distances.

Considerations like this led us to defining a LAN standard with the following characteristics:

- bus topology,
- low-cost coaxial cable as transmission medium, with a maximum length of 1 km,
- 250 to 1000 kbit/s transmission with Manchester encoding,
- up to 32 stations,
- special CSMA access scheme,
- HDLC-compatible data link protocol.

The paper describes some of the problems listed above and our planned LAN products.

Peter Lipp

ACTIVITIES CONCERNING LANs AT THE TECHNICAL UNIVERSITY OF GRAZ

Two Projects are presented:

- *The ACONET-Project* (Academical Computer NETwork)

We present the connection between a local area network (Ethernet) and ACONET, which is based on the Austrian Packet-Switching-Network (DATEX-P) and which will connect the Austrian Universities.

- *The Fileserver-Project*

We present an Inhouse-Videotex-System with consistent decentralisation of machine-intelligence. This is achieved by using intelligent terminals only (MUPID, PC-s) and by using a dedicated file-machine as centre. Such a Videotex-System will be used as an Information System for the students, institutes and administration of a Technical University.

E.Querasser, M.Lindner, H.Preineder, F.Buschbeck

IMPLEMENTATION OF A POWERFUL LOCAL AREA NETWORK ON A FIBRE OPTIC LOOP

The paper describes the implementation of a LOCAL AREA NETWORK in the AUSTRIAN RESEARCH CENTRE of SEIBERSDORF. This future oriented Implementation differs from other available Local Area Networks especially in the following aspects:

- timeslotted system,
- defined transmission delay,
- no Store and Forward,
- no Local Area Network specific protocol,
- optical medium in a loop configuration.

This Local Area Network has a capacity of about 500 full duplex connections (channels), each working up to 9600 bit/s. If higher datarates are desired, the number of channels decreases proportionately. The Network is CONNECTION ORIENTED and transparent to any transmission protocol.

Péter Sugár

DISTRIBUTED RESOURCE MANAGEMENT IN THE EXLOC LOCAL AREA NETWORK

One of the most important criteries of distributed processing systems is the multiplicity of resources, accessed by user processes only with symbolic names in a transparent way. With their high communication capacities, local area networks make it possible to approach the distributed resource manamement in a new manner. The paper presents such an experience for Videoton's local area network called EXLOC, connecting a set of microcomputers. It introduces the definition and representation of the global resources, then presents the protocol aimed at the distributed management of the global resources together with a simlified solution to their registration problem.

A.Balázs, R.Jákfalvi, P.Sugár, J.Szentner

THE COMMUNICATION ARCHITECTURE OF THE EXLOC LOCAL AREA NETWORK

Up to now several local area networks have been advertised. However, most of them have failed to present a communication architecture specific and simple enough for local area network environment. The paper presents the current development of Videoton's experimental local area network called EXLOC.

EXLOC integrates a set of general purpose desktop microcomputers to share each-other's resources. The main purpose of the communication architecture is twofold. On the one hand, it should be compatible to all the available application programs developed for a single machine environment, by the means of hiding the locality of their referenced resources. On the other hand, it should be specific and simple enough for a local area network connecting microcomputers of limited capacities. The paper presents the protocol-layers and the protocols to meet the requirements.

Péter Póka

THE CSEPEL VIPS FILE SERVER SYSTEM

Dieter Schornböck

LOCAL NETWORK AT THE TECHNICAL UNIVERSITY OF VIENNA

For about one year the E.D.P. Centre of the Technical University of Vienna has been carrying on preliminary studies for the realisation of a local area network. The analysis of the existing communication-structures at the Technical University and an estimation of the present and future demand constitute an important basis for planning. For this analysis the institutes and other institutions of the Technical University of Vienna have been interviewed extensively on the details of their needs for datalinks for communication. The architectural and technical constraints have also been studied.

Sándor Lőkös:

LOCAL NETWORK (LANDEX) IN THE DATA ACQUISITION AND PROCESSING SYSTEM OF A CYCLOTRON LABORATORY. PART I. PHYSICAL AND DATA LINK LAYERS

This paper reviews some details of the network-end of the LANDEX (Local Area Network for Data Exchange) being developed in our institute.

The aim of the application of the LANDEX in the cyclotron laboratory is to share the resources of a few mini hosts among a number of micros.

The micros control the measurements and prepare the data for subsequent processing. They support mainly real-time transformation and routing of data and produce a large amount of output to be transmitted to the mini hosts. The hosts are responsible for the perfect processing and store the whole information of a measurement.

The hardware of the LANDEX and the lower levels of communication protocol are implemented by a ,,front-end'' micro to improve power and flexibility. The physical layer is a coaxial bus which must be formed into ,,logical ring'' owing to the real-time requirement of a measurement.

The data link level of communication is realized by a modified HDLC protocol. The modifications are, as follows:

a/ ,,destination-source'' addressing;
b/ a node consist of a primary station and many secondary ones in ARM mode.

The exact number of the secondary stations of a node equals to the number of connection directed to that node.

The hardware interface control and the ,,logical ring'' control levels, are layered between the data link level and the network level (front-end micro and host) of protocol.

The ,,logical ring'' with reconfigurable capability allows for a node to monopolize the bus and transfer high count rate of experimental data without significant losses.

G.Illés and T.Novitcky

LOCAL NETWORK (LANDEX) IN THE DATA ACQUISITION AND PROCESSING SYSTEM OF A CYCLITRON LABORATORY. PART II.
RSX-11M SYSTEM SOFTWARE

This paper reviews some details of the communication software part of the LANDEX. Only the RSX-11M system software related to the network is mentioned here.
During software development the following goals were kept in mind:

1. the network must be capable of maintaining connections between the processes of the hosts:
2. several processes of a certain host may wish to communicate over the network simultaneously:
3. the network structure must be capable of satisfying the different requirements of the growing configuration;
4. the software must be fast enough in transferring messages with quite different lengths.

As an outcome of these considerations the following approach has been choosen. Communication between the processes in realised via full-duplex logical channels. These channels (in close correspondence with virtual circuits) are establised by vitual calls.
Comparing the architecture of LANDEX to the well-known Digital Network Architecture (DNA) of DECnet, several differences and very important similarity can be identified.
Firstly, we could shift the implementation of the Data Link Layer to the hardware. Then, the middle three layers of the DNA have been merged into a common layer named the Network Layer. For the protocol of this layer we adapted the packet-level of the CCITT X25 recommendation, with some modifications needed to satisfy the requirement of a local area network. The main similarity with the DNA is that our Network Layer provides the same network service primitives for the higher layers as the Session Control Layer of the DECnet does.

The Network Layer itself can be split into two RSX-11M-specific processes.
The Network Service Driver plays a double role since it functions as an interface between the Network Layer and the adjacent higher and lower layers. The interface with the Application Layer has been realized via the usual RSX queue I/O-mechanism. The same I/O function codes and parameter set-up have choosen as in DECnet, so any DECnet application program (including all of the utilities) can be used without modifications. The driver's interface with the front-end uses special control data structures (XCB's), which carry the X25 protocol header and an optional pointer to the user data buffer.

The other component of this layer is the so-called Network Service Ancillary Control Processor (ACP). The ACP is part of the RSX-11M/0) mechanism. They are special privileged tasks tied to a device driver to implement device protocols. In our case, this ACP implements the modified X25 protocol. The XCB's mentioned earlier used in the connection between the driver and the ACP.

There is a third process in the architecture: the Network Service Control task. It is used to start up and shut down the network components, to modifiy and display network parameters (to get statistics), and during development this task has some debugging functions as well.

S.Arató, I.Sarkadi-Nagy, J.Sulyán, F.Telbisz

A LOCAL AREA NETWORK ARCHITECTURE TAILORED TO LABORATORY ENVIRONMENT

A hierarchical local area network architecture is developed in the Central Research Institute for Physics. Its main application fields will be process control and data axquisition both in laboratory and industrial environments. At the higher layers i.e. at the area control level TPA-11 minicomputers will be used, while the DDC level is implemented by intelligent CAMAC crate controllers (Intel -8080).

The communication media are coaxial cables and the control of access is totally distributed. The transfer rata is 1 Mbps.

Two different arbitration algorithms are implemented in the experimental networks, both working on a modified CSMA/CD algorithm. The first one provides station priorities as well as message priorities, while the second one realises a low level fast token passing method.

Only connection oriented logical link service is available. The contention free multiframe control sequences supported by the physical layer provide a facility to implement a selective flow control which is applied independently for each logical link.

The network services such as the file transfer or remote terminals are based on these logical links and they are realised by the network utility programs.

Siegfried Rainer

EVALUATION OF LOCAL AREA NETWORKING

TOPICS:
- History of Networks
- Generations of Local Area Networks
- Comparisons between Communications Networks and local Area Networks

WE NEED NETWORKS

Mainframe Philosophy and Problems
Distributed Computing Power
Local Area Networks in General
Geographical Distribution of Networks

WE HAVE NETWORKS

° Public Networks
° Private Networks
° Local Area Networks

TECHNICAL COMPARISONS OF LAN's

- Globals
- Data rates
- Connections
- Transmission Technics
- Topologies
- Access Schemes

LIST OF PARTICIPANTS

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Year of foudation: 1971 as society affiliated to Federation of Technical and scientific Societies

Objectives: - promotion of the study, development and application of computer science,
- promotion of the information of computer specialists,
- facilitating the spread of the practical applications of the results,
- facilitating the spread of the culture of computing and the regular in-service training of specialists,
- promotion of the recognition and awareness of the social influences of computer science,
- paying special attention to young people taking interest in computing,

by relying on social means for support.

Activies: It organizes lectures, conferences, congresses, debates, professional shows and exhibitions as well as study trips at home and to destinations outside Hungary.
It makes proposals and voices views in support of the work of state and social organizations.
It sets up working groups to accomplish certain specific tasks.
It holds competitions and maintains relations with the competent state and social organizations in its specific field of activities.
It awards the Neumann Prize to members performing top quality work and awards the Kalmár Memorial Medal to those carrying on outstanding scientific activity.

Membership: 3800

Affiliated companies and institutions: 130

Sections: - State Administration Applications
- CAD/CAM
- Artificial Intelligence and Pattern Recognition
- Education
- Operation Research
- Medical Biology
- Programming Systems
- Systems Theory
- Systems Analysis and Informatics
- Hardware
- Computer Centre Management
- Text Processing and Human Application
- Agricultural Applications
- Users' circle
- Home Computer Club

Publishing activities: Issuing an independent periodical: Micro-Magazine published 6 times a year;
Participation in editing two periodicals: Számítástechnika (Computing), Információ-Elektronika (Information and Electronics)

International relations: As a member of IFIP it offers information about all the activities of IFIP to its membership and appoints Hungarian representatives for IFIP TC and WG.
On the basis of bilateral cooperation agreements it collaborates with societies of a simular nature in other conutries.
It also represents Hungary in IAPR, DECUS

Leadership:

President: dr.Tibor Vámos academician
Honorary president: Lajos Pesti
Vice-president: dr.Iván Kádár
Vice-president: dr.Gyula Obádovics
Vice-president: dr.Bálint Dömölki
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IN BRIEF

Year of foudation: 1975 as the top organization of societies in the field of computing

Objectives: The principal objective of OCG is study information processing in a comprehensive manner and on an interdisciplinar basis, with its influence exerted on man and society taken into consideration. Accordingly, it has three basic tasks to accomplish:

1. It operates as the top organization of Austrian societies and organizations which are related to information processing.
2. It represents Austria in IFIP and other similar foreign, regional or international societies or associations.
3. It offers counselling, assistance and information to its members.

Activies: OCG organizes series of lectures, seminars and sympsiums for domestic and foreign experts in the field of the application of computer science.

It publishes the manuscripts of lectures, makes available and distributes lectures on casettes.

It organizes excursions at home and abroad to study interesting computer applications.

It offers reduced subscription fees to its members for periodicals.

Its research activities include the initiation and carrying out of research and development projects which are of an interdisciplinar nature in the majority.

Membership: 700

Affiliated companies and institutions: 23

Sections: Viewdata Systems
- The Computer and Society
- Text Processing
- Education in Information Processing
- Performance of computers
- Computer Science and the Law
- Computer Graphics
- The Macro-economic Analyses of the Information Sector
- Medical Biology
- Microprocessors (programming and application)
- Pattern Recognition
- Measuring and Optimizing Data Processing Systems

Publishing activities: It publishes an information bulletin (Mitteilungsblatt) six times a year. It contains information on current affairs, a calendar of events and programs and it has a regular technological and scientific supplement.

It also puplishes volumens containing different scientific works in the field of computer science and being of general interest.

International relations: As a member of IFIP offers information about all the activities of IFIP to its membership and appoints Austrian representatives for IFIP TC and WG.
It also represents Austria in IMIA

Leadership:

President: dr.Norbert Rozsenich
Honorary president: Univ.Prof.dr.Heinz Zemanek
1. Vice-President: Gen.Dir.Stvtr.Dkfm.Herberg Mauser
2. Vice-President: Univ.Prof.dr.Manfred Brockhaus
3. Vice-President: dr.Wilhelm Frank
Secretary General: Otto Böhm
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CONTENTS