HISTORY OF RESEARCH, DEVELOPMENT AND APPLICATION OF COMPUTER NETWORKS IN SLOVAKIA

Štefan Schill, Štefan Kozák

Abstract:

The paper focuses on the description and characteristics of research, development and application of computer networks in the Slovak Republic, following the development of computer and telecommunication technology since the seventies. In the seventies of the last century, research and development of technical and software means for the creation and use of computer networks was initiated in Slovakia at the Institute of Applied Cybernetics (UAK). The result of these efforts was the launch of the first UAKNET computer network in the countries of Eastern Europe in 1984. The computer network used datagram technology. It was used primarily by professionals in the field of research and development to exchange information and to access library information. On the basis of the experience gained, there was a growing demand for interconnection with foreign computer networks. This triggered the need to switch to X.25 technology.

Keywords:

Computer, computer networks, software development, node computers, host computers, front end computers, terminals, datagram technology, X.25 technology, Internet.

Introduction

Computers originated in the first half of the 1940s in the USA with the development of the atomic bomb and the requirements of industrial modernization. The existence of computers sparked the continuation of research and development in computing and computer technology mainly in the USA and Germany. The development of telecommunication technology was strongly influenced by space research. The use of computing also presupposed the availability of appropriate software and, last but not least, skilled personnel who were in a position to develop software for the field. A prerequisite for the emergence and development of computer networks was the necessary requirement to have computing at a certain higher level. Another prerequisite for the development of computer networks was modern telecommunications technology.

In Slovakia, the Department of Computers at Slovak Technical University in Bratislava (today: Slovak University of Technology) was the first to deal with the preparation of people for the field of computer technology. This department had computers at its disposal since the early 1960s (type Ural 2 and LGP 30). To a lesser extent, this issue was also addressed by the institutes of the Slovak Academy of Sciences and other universities in Slovakia. Experts for this field were mainly trained in research organisations. These included the Institute of Technical Cybernetics at the Slovak Academy of Sciences, the Research Institute of Computing in Žilina, and the United Nations Research Computing Centre (INFOSTAT) in Bratislava,

which already in 1969 had at its disposal a modern powerful Control Data 3300 computer equipped with relatively good communication technology, which at that time already allowed remote input of programs and printing of outputs. A research group on remote data transmission and processing was also set up at the institute.

In 1971, the Slovak Commission for Scientific, Technical and Investment Development (actually a ministry) established the Institute of Applied Cybernetics (ÚAK). The main focus of the ÚAK was research and development of software systems for the national economy. Another area was computing, mainly focusing on the research, construction and application of computer networks.

1 Research and Development of Computer Networks in Slovakia in 1975-1990

The only research centre for computer networking in Slovakia and Czechoslovakia was the institute of Applied Cybernetics (UAK). In this period, computers with communication technology were not produced in Eastern European countries. Another disadvantage was that Western companies, due to the embargo, could supply less powerful computing equipment without the means to transmit data. In Slovakia at that time, east-European EC computers compatible with IBM 360 and SMEP (small computers) compatible with DEC products were available. The SMEP computers manufactured in Slovakia were also produced with communication devices and elements, which created suitable conditions for building data and computer networks. As far as potential users were concerned, there was no interest in data communication at that time. Even the telecommunications in Slovakia did not realise the economic importance of data communication at the beginning and did not create the necessary technical prerequisites for its development.

In the late 1970s, a research group of experts at the UAK began to deal with the problem of computer communication. The aim was to build a computer network that could be used in the future mainly for scientific purposes. At that time there were no technical means for computer network operation available in Slovakia. There was also no network software available and there was a lack of experience in the operation of computer networks. The main objective was to develop network software for equipment produced in Eastern European countries. For hardware development was limited to add-on devices. The research and development resulted in the design of the network architecture, the development of software for the node computer, for the terminal concentrator, the front-end computer, the network metering system and the intermediate link to connect the SMEP computers to the EC computer channel. The following first-generation products were used to build the experimental computer network. The experimental computer network was put into operation in 1984. The Department of Telecommunications made fixed lines available free of charge. The main objective of the network was to allow direct access to databases in Bratislava and Prague. The main users were universities, research institutes of the Slovak Academy and the Czech Academy of Sciences. Among the first users were also research institutes and several manufacturing companies. The UAK Computer Network (UAKNET) was the first computer network in the countries of the east-European Council for Mutual Economic Assistance (RVHP). Based on its objectives and the composition of its users, it was a research network.

In 1988 a connection to the EUNET network in Vienna was implemented. The connection was made via a switched telephone line twice a day. Information was downloaded from the EUNET network - mail for UANET users to access and use. Their "documents", which were intended for EUNET subscribers, were stored on UAKNET and sent twice a day during the telephone connection to EUNET. The configuration of the UAKNET network, including the subscribers at the time, is shown in (Fig.1).

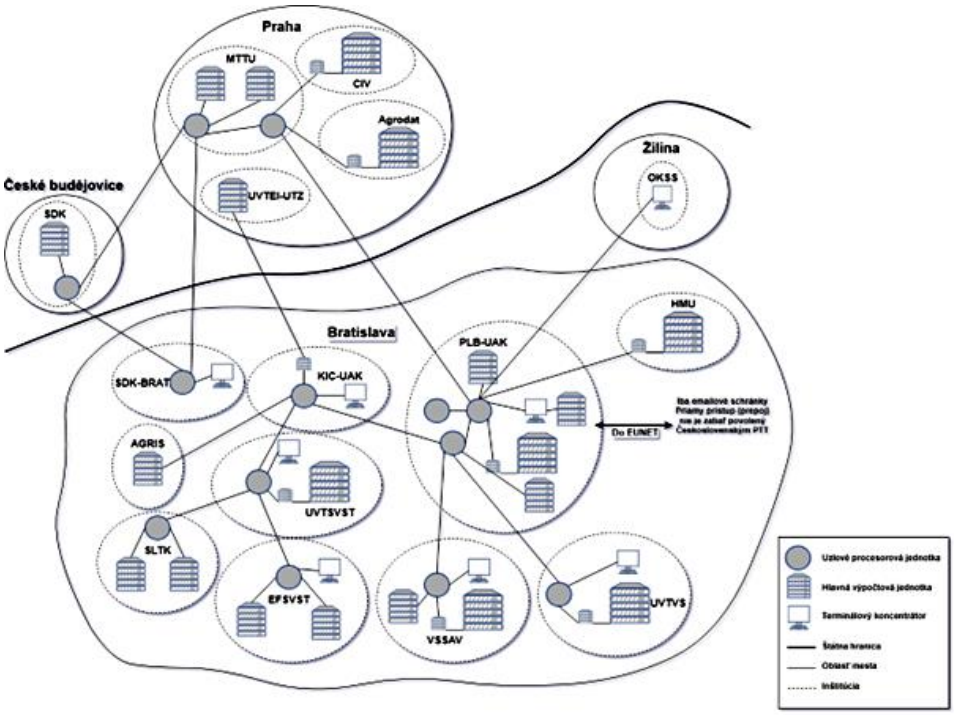

Fig.1. Netwok UAKNET configuration.
Symbols: node, computer center, terminal hub.
Lines: state border, city border (Praha, etc.), institution area.

The following organisations were connected to the UAKNET computer site:

- Institute of Applied Mathematics and Computer Technology of Comenius University (UVTVS)
- Faculty of Electrical Engineering (EF SVŠT)
- Slovak Technical Library (SLTK)
- Information Centre of Agriculture and Food Industry (AGRIIS and AGRODAT)
- Long Distance Cable Administration - Telecommunications (SDK)
- Research Institute of Telecommunications (MTTU)
- Information Centre of the Federal Office for Patents and Inventions (CIV)
- Institute of Scientific, Technical and Economic Information - Central Technical Base (UVTEI-ÚTZ)
- Bratislava Long Distance Cable Administration (SDK BRAT)
- Computer Laboratory of the IAC (PLB-ÚAK)
- Communication and Information Centre of ÚAK (KIC-ÚAK)
- Institute of Computer Technology of the Slovak University of Technology (UVT SVŠT)
- Computer Centre of the Slovak Academy of Sciences (VSSAV)
- Slovak Hydrometeorological Institute (HMU)
- Žilina District Communications Administration (OKSS)

2 UAKNET's Entry on the International Scene

Thanks to the cooperation and contacts with the RWTH Technical University in Aachen, West Germany, in December 1989, a representative of Slovakia (Mr. Schill) was invited to West Berlin for the annual meeting of the DFN Verein (Association of Research Networks of Germany), where he presented the state of the art of computer networking in Czechoslovakia and especially in Slovakia, became its representative, and introduced the participants to the NET network (Schill, 1990). On the basis of the information translated by him, Czechoslovakia was admitted to the association of operators of corporate, university and research networks RARE Working group 8, later TERENA .

The Association subsequently invited a representative of the Czechoslovak Republic (CSSR) to present the state of computer network development in the Slovak Republic at the 1990 annual meeting in Killarney, Ireland (Schill, 1990). The paper presented there was published in the professional journal Computer Networks and ISDN Systems. In the following year, another expert meeting was again held for the purpose of building modern computer networks. This meeting featured a discussion by the world's leading computer networking expert from the USA - Vint Cerf, who had built and introduced the Pentagon's DARPA-NET computer network in the early 1970s. In his paper, he recommended that the isolated computer networks then in operation should be interconnected by operators using IP addressing. With this paper (May 1991) he initiated the worldwide build-up of the INTERNET network, especially in the USA and Europe.

3 Further Development and Use of Computer Networks in Slovakia

The political changes after 1989 brought significant changes also in the field of computing. With the lifting of the embargo on the import of more powerful computing equipment from Western countries, professional literature became more accessible and experts also in the field of computing were able to travel to industrially developed countries and learn on the spot about the state of "networking" in Western Europe. For the UAK, this meant the legalisation of cooperation with EUNET and the possibility to connect to networks in Western Europe. This resulted in an increase in the number of NET users. As UAK was a budgetary organisation, it was not able to finance the operation of the network from its own resources. It therefore introduced user charges.

Connection to the Internet was only possible with X.25 technology. For this reason, UAK concentrated all its possible capacities on the development of X.25 technology. Slovak Telecommunications also realised the economic importance of the provision of its services for the operation of computer networks and therefore intensified its work on the creation of a data network based on X.25 technology. It set itself the goal of commissioning a public data network in 1992. It should also be noted that in 1992, the UAK won a tender for the construction of a computer network for the Government bodies of the Slovak Republic. The computer network was built and put into operation under the name GOVNET in mid-1993.

Research, development and operation of the UAKNET network was carried out until mid-1995, when the managers of the Statistical Office of the Slovak Republic, under which the UAK belonged, decided to abolish it as a legal entity as of January 1st, 1996. Its activities, assets and staff were transferred to INFOSAT body. This sealed the future fate of computer network research and development. However, the main focus of INFOSTAT's activities was statistics. Shortly after this event, the operation of GOVNET was "handed over" to a private company. After the merger, a substantial part of the UAK staff moved to various other research organisations in Slovakia.

Conclusion

The research, development, design and operation of the computer network at the IAC was of considerable importance for the development of computer communication in Slovakia. It was here that experts were "grown up" who significantly influenced the development and use of computer technology in the future. The existence of UAKNET also resulted in the fact that Telecommunications also realized the economic importance of computer communication and began to intensively build communication channels using X.25 technology. These facts significantly influenced and accelerated the introduction of the INTERNET network into operation in Slovakia.

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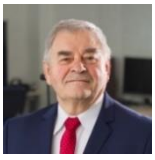

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