THE FIRST COMPUTER COMMUNICATION NETWORK BETWEEN EAST AND WEST

Sreedeep P, Srusti Vaibhav , Sneha, Somesh K H, Pradeep Nayak

[1]Student , CSE (IOT ,Cybersecurity including blockchain technology), Alva's Institute of Engineering and technology, Karnataka, India
[2] Student , CSE (IOT ,Cybersecurity including blockchain technology), Alva's Institute of Engineering and technology, Karnataka, India
[3]Student , CSE (IOT ,Cybersecurity including blockchain technology), Alva's Institute of Engineering technology, Karnataka, India
[4] Student , CSE (IOT ,Cybersecurity including blockchain technology), Alva's Institute of Engineering and technology, Karnataka, India
5 Assistant Professor , CSE(Information Science and Engineering), Alva's Institute of Engineering and technology, Karnataka, India

ABSTRACT

The Cold War era, often characterized by political and ideological divisions, also witnessed significant advancements in technology, particularly in the field of computer communication networks. This paper provides a comprehensive review of the development of computer communication networks in COMECON countries from the post-World War II period to the early 1990s. It explores the technical, political, and social drivers that shaped these networks, focusing on key milestones such as the experimental data transmission line of 1977. By analysing the historical context and the interplay between politics and technology, this paper highlights the often-overlooked contributions of the Eastern bloc to the global evolution of computer networks.

Keywords : - *Cold War ,COMECON , Post-World War II , Experimental data transmission line , Eastern bloc , Technology advancements , Political drivers, Social drivers , Historical context , Politics and technology , Global network evolution , Eastern bloc contributions .*

INTRODUCTION

The Cold War period was marked by a global race for technological supremacy, with advancements often motivated by political and military objectives. While much attention has been given to the innovations in the Western world, particularly in the United States and Western Europe, the Eastern bloc, under the COMECON framework, also made significant strides in developing computer communication networks. These efforts were driven not only by military

needs but also by the desire to modernize economies and facilitate scientific collaboration despite the barriers posed by the Iron Curtain.

This review aims to provide an in-depth analysis of the progress made in computer communication networks in the Eastern bloc, focusing on three distinct phases of development. The first phase, spanning the 1950s to the mid-1960s, was characterized by the use of centrally controlled wide area networks for military applications. The second phase, from the mid-1960s to the late 1970s, saw a transition to civilian applications, including data transmission and networked computing for scientific and economic purposes. The third phase, extending to the late 1980s, marked the practical implementation of these networks and increased international collaboration.

By examining key initiatives, such as the Ryad computer system and the 1977 experimental data transmission line, this paper sheds light on the innovative approaches adopted in the Eastern bloc. Furthermore, it discusses the challenges posed by political restrictions, resource limitations, and technological embargoes from the West. In doing so, it emphasizes the resilience and ingenuity of scientists and engineers who contributed to the advancement of computer networks in a complex geopolitical environment.

1. Experimental Data Transmission Line in 1977

In July 1977, the International Institute for Applied Systems Analysis (IIASA), located near Vienna, conducted a three-week experimental data transmission across the Iron Curtain. This initiative involved scientists from four countries—Austria, Poland, the USSR, and the USA—marking a significant milestone in the history of international computer networks. Interestingly, the primary motivation for this project stemmed more from political considerations than technological advancements. Soviet science researcher Gennadij Michailovi Dobrov viewed science as an inherently international and cooperative endeavor. He advocated for forming multinational teams of scientists to address humanity's critical issues, regardless of political or ideological divides. Due to bureaucratic challenges, safety concerns, and occasional shortages of foreign currency in Eastern countries, organizing physical meetings across the Iron Curtain proved difficult. This led to the idea of overcoming these barriers through the use of computer networks.

The three-week data transmission experiment in 1977 demonstrated that the concept was viable in principle. However, the project was discontinued due to technical issues with the telephone system, which were not unique to socialist countries. There were also complaints about the poor quality of the telephone line between Laxenburg and Vienna.

In recent years, numerous studies on the history of the internet have emerged. However, despite much of the early development of the World Wide Web occurring during the Cold War, these accounts rarely reference contributions from the East and only occasionally mention telecommunication and data network technologies that could be considered foundational or precursors to the internet. This gap may stem from the intermediate role these technologies occupied between telecommunication and computer science.

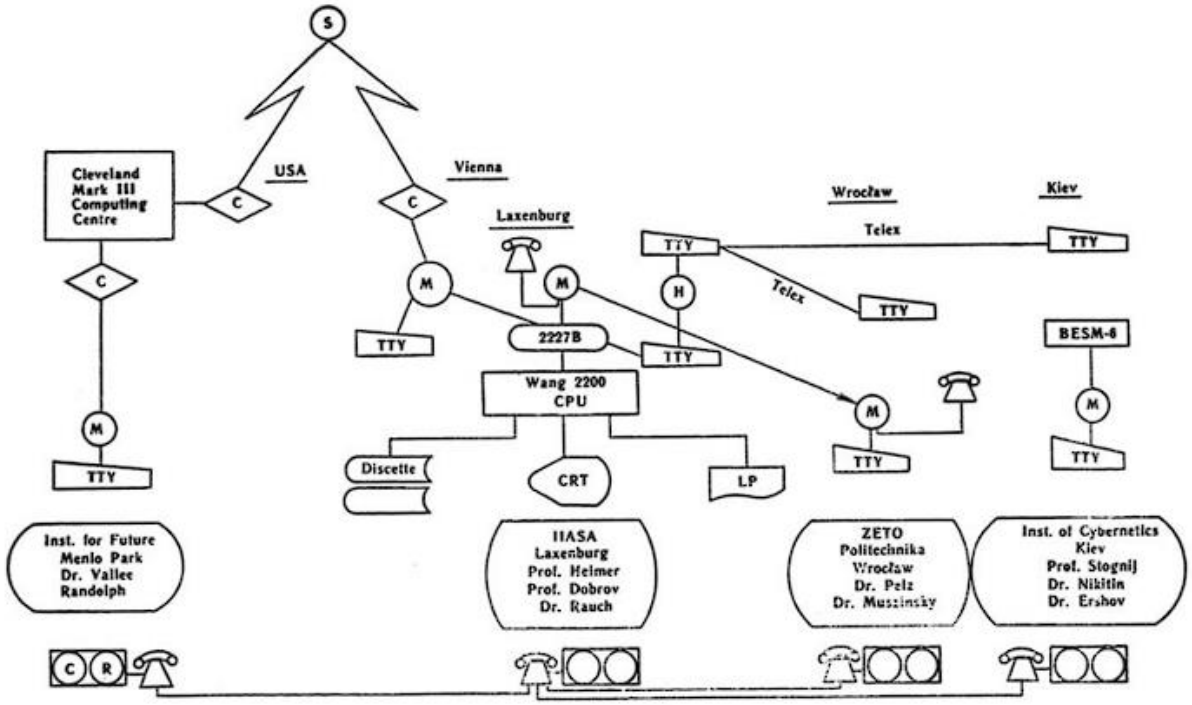

FIG -1: Experimental data transmission between Austria, Poland, USSR, and U.S. in July 1977

2. Computer Communication Development in the East

The development of computer communications up to 1990 can be divided into three distinct phases. During the first phase, both the East and the West focused on centrally controlled wide-area networks for military applications. In the West, the primary initiative was the Semi-Automatic Ground Environment (SAGE) system, developed between 1950 and 1963. SAGE was a semi-automated control system in the United States used to detect, track, and intercept Soviet bomber aircraft from the late 1950s to the 1980s.

Similarly, in 1953, a team of specialists at the Moscow Institute of Precision Mechanics and Computing Machinery began developing a computer-based missile defense system .

This institute, under the leadership of Sergey Alekseevich Lebedev, played a significant role in the history of Soviet computing. Initial experiments started in 1956, with radar stations transmitting data to a computer center via remote data links over distances of 100 to 200 kilometers. A specialized computer, identified as M-40 processed and digitized this data to track flying objects' trajectories, while another computer generated control signals to guide missiles. This system enabled automatic targeting of ballistic missile threats.

2.1 First Phase (1950 to mid-1960s)

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By the late 1950s, the experimental anti-aircraft system was replaced with an upgraded version, expanding the network to cover several hundred kilometers. In 1969, this system was further improved and replaced by a more advanced anti-aircraft complex.

Data transmission technology was also applied to automatically transfer information from stations monitoring Soviet spacecraft and satellites. In 1962, Viktor M. Glushkov, director of the Institute of Cybernetics at the National Academy of Science of Ukraine, proposed a concept for a nationwide computer network to manage the economy, known as OGAS (All-Union Automated System). However, the project was never realized due to technical limitations, political resistance, and insufficient resources.

2.2 Second Phase (Mid-1960s to Late 1970s)

During the 1960s, computer systems in both the East and West began to be increasingly used for civilian purposes. From the mid-1960s to the late 1970s, engineers in COMECON countries experimented with data transmission and computer networks, particularly in major scientific institutions like the Joint Institute for Nuclear Research in Dubna and the Institute for High Energies in Moscow . Similar to Western practices, these local networks were connected via public telephone systems. Other countries in the Soviet bloc also undertook similar initiatives. For example, in 1967, the Hungarian PTT introduced data transmission services , while in 1969, the East German PTT established a high-quality data network supporting up to 600 users. By around 1971, the Central Bureau for Statistics in East Germany began utilizing these data transmission services.

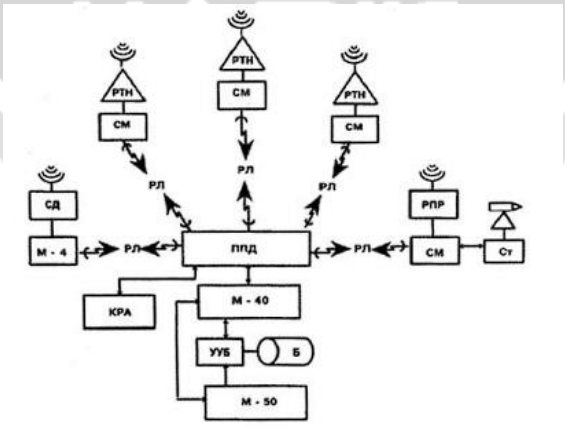

FIG. 2. Computer network of an experimental missile defense system

The push for developing commercial data transmission technologies was influenced by the political liberalization during the Soviet Union’s thawing period, which began after the 20th Congress of the Communist Party in 1956,

when Nikita Khrushchev denounced Stalin's crimes. However, Khrushchev was ousted by a conservative faction led by Leonid Brezhnev in 1964, which led to a partial rollback of liberal reforms.

One idea from the thawing period that endured was the ambition to improve the Central Planning System by leveraging data processing technologies. State-owned companies were tasked with using computers for automated management systems, production control, statistics, inventory management, and documentation. Additionally, political leaders saw computers as tools to enhance national economic planning through macroeconomic modeling. However, since computers had previously been overlooked in economic policies, there was a shortage of production capacity.

To address this, COMECON, the Eastern Bloc's economic organization, initiated the creation of a unified computer system in 1969, called Ryad in Russian. This standardized system, modeled after IBM's System/360 and later System/370, involved 20,000 scientists and 300,000 workers across 70 companies in the USSR, East Germany, Hungary, Poland, Romania, Bulgaria, and Czechoslovakia. The first Ryad computer was launched in 1973, and the system was subsequently equipped with data transmission components. Although based on IBM 360 clones, the Ryad project fostered closer ties with Western technology, although socialist countries struggled to close the technological gap .

TABLE I
COMPUTERS OF THE RYAD SYSTEM

	Type	Country	Main storage	Operations per sec.
Ryad-1	EC 1010	Hungary	8 - 64 KB	10.000
	EC 1020-A	Czechoslovakia	16 - 64 KB	40.000
	EC 1020	Bulgaria, USSR.	64 - 256 KB	20.000
	EC 1030	Poland, USSR	128 - 512 KB	100.000
	EC 1040	GDR	128 - 1024 KB	320.000
	EC 1050	USSR	128 - 1024 KB	500.000
Ryad-2	EC 1025	Czechoslovakia	128 - 256 KB	30 - 40.000
	EC 1035	Bulgaria, USSR	256 - 512 KB	100 - 140.000
	EC 1045	Poland	256 - 3072 KB	400 -500.000
	EC 1055	GDR	256 - 4096 KB	750.000
	EC 1065	USSR	1 - 16 MB	4 - 5.000.000

Table 1: - Computers of the RYAD system

East Germany emerged as a leader in data transmission technology. Starting in 1968, the East German company Robotron produced the DFE 550 modem, which achieved a data transfer rate of 1,200 Baud over public telephone lines. Despite the Cold War, trade relations with the West were never completely severed. Beginning in the 1960s, COMECON countries acquired Western computers from companies like British ICL, Honeywell-Bull, NCR, CDC, Sperry Univac, Siemens, and others. They also obtained licenses for Western technologies; for example, Czechoslovakia's Tesla 200 was a clone of the Bull-GE Gamma 140/145, Hungary and Romania produced clones of French computers, and Poland's Odra-1300 series used software from ICL. In 1973, the U.S. company CDC and the Soviet government established a cooperative agreement .

However, the situation changed drastically in 1980 with a shift in U.S. policy toward confrontation. After his election, President Ronald Reagan tightened embargoes on Eastern countries, citing the Soviet invasion of

Afghanistan in December 1979 and the political unrest in Poland as reasons. The Reagan Administration viewed high technology as a key competitive advantage for the West, seeking to widen the technological gap with the East as a strategic move.

2.3. Third Phase (Late 1970s to Late 1980s)

Similar to developments in the West, during the third phase, computer networks and data transmission lines were developed, tested, and put into practical use. At the Neutron Physics Laboratory of the Joint Institute for Nuclear Research (JINR) in Dubna, near Moscow, around twenty PDP-11 computers were used for data acquisition and measurement control. The collected and preprocessed data were then transferred to the laboratory's main computer for storage on disk or tape and further processing. In 1982, a data file transfer system was implemented for this purpose, using standard serial interfaces. In the West, CERN, the European Organization for Nuclear Research, played a key role in advancing transmission technology. The large volumes of data generated by physics experiments significantly spurred the development of transmission technologies.

TABLE II
EXAMPLES OF COMPUTER NETWORKS IN COMECON COUNTRIES.

Year	Network	
1974	network of the Hungarian Academy of Science	science
1977	network of the Central Research Institute for Physics, Budapest, Hungary	science
1977	network of the Polish Scientific Centers	science
1977	public net in Czechoslovakia	PTT
1978	terminal network of the Research Institute for Applied Computer Science, Budapest (SzÁMKI), Hungary; research for the Videoton network	science
1981	DELTA, Academy of Science, GDR	science
1982	IHDne, University for Applied Sciences Dresden, GDR	science
begin '80s	LANCELOT, Humboldt University Berlin., GDR	science
begin '80s	SEKOP, Keldysh Institute of Applied Mathematics, Academy of Science, USSR	science
begin '80s	LOTUNET, University of Technology Dresden, GDR	science
mid '80s	LOCHNESS, Local Highspeed Network System of the Central Research Institute for Physics, Budapest, Hungary	science
mid '80s	EXLOC, Videoton, Budapest, Hungary	commercial product
1986	ROLANET, Robotron, GDR	commercial product

Table-2(Font-10, Bold): Examples of computer networks in COMECON countries (Font-10)

In 1981, the Hungarian PTT launched a high-speed public data network. Meanwhile, in East Germany, computer scientists developed the DELTA computer network. The DELTA concept was designed as a model for a national computer network intended for educational and research institutions in the GDR. In 1982, an experimental data link between Berlin and Prague was established, enabling the sending and receiving of e-mails.

Though the Cold War began to ease after 1980, scientific collaborations between East and West remained uninterrupted. For instance, in 1976, the Russian translation of *Communication Networks*, a textbook by Donald Davies and Derek Barber, was published. Additionally, international conferences provided Eastern computer scientists with opportunities to meet their Western counterparts. Starting in 1977, every four or five years, an International Congress on Computer Networks was held in Budapest, Hungary. Table III shows the countries represented at these conferences.

TABLE III
PARTICIPANTS OF COMNET CONFERENCES IN BUDAPEST

	Country	1977	1981	1985	1990
WEST	Austria	●	●	●	
	Belgium	●	●		●
	Brazil			●	
	Canada	●	●	●	●
	Denmark		●		
	France	●	●	●	●
	FRG	●	●	●	●
	Finland		●		●
	Greece			●	
	Ireland		●		
	Italy	●	●	●	●
	Japan		●		●
	Nederlands			●	●
	Norway		●		
	Sweden			●	●
	Switzerland	●		●	
	U.K.	●	●	●	
	USA	●		●	●
EAST	Bulgaria		●	●	●
	Czechoslovakia	●	●	●	●
	GDR		●	●	●
	Hungary	●	●	●	●
	Poland	●	●	●	●
	USSR	●	●	●	
	China			●	
	Cameroon		●		

Table 3:- Participants of COMNET Conferences in BUDAPEST

Overall, participants from the USSR and other COMECON countries were active members in international organizations such as the International Federation of Automatic Control (IFAC) and the International Federation for Information Processing (IFIP). A significant role in facilitating communication and cooperation between Eastern and Western countries on network technology was played by the CCITT (International Committee for Telephone

and Telegraph Systems), a French acronym. Established in 1924, CCITT served as the standardization committee of the International Telecommunication Union (ITU) until 1992. The origins of its work date back to 1865, and in 1993, the Telecommunication Standardization Sector (ITU-TSS) took over this responsibility. Most national PTT organizations were members of CCITT. While CCITT standards were recommendations, many members incorporated them into national law to ensure seamless communication, regardless of the different equipment manufacturers. In 1968, CCITT established the working group on New Data Networks, and its first conference on the subject was held in 1969.

3. CONCLUSIONS

Despite the Cold War, computer scientists in the East were aware of activities in the West. Many participated in international conferences or were involved in international organizations. Moreover, commercial relations between East and West never ceased throughout the Cold War. The end of the Cold War marked a significant personal shift for Eastern European computer scientists, but it did not render their professional expertise obsolete. These individuals were already familiar with Western computer technology through their previous work, which enabled them to integrate into the new labour market after the Cold War ended.

The development of computer communication network technology in both the East and West followed a similar trajectory. An important aspect of network technology history, aside from military interests, was the desire of scientists to quickly exchange large volumes of information. For the East, an additional motivation for advancing computer networks was the political leadership's hope of improving the planning system through the use of computers, which justified the allocation of resources for these developments.

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