RELCOM, AN APPROPRIATE TECHNOLOGY NETWORK

Larry Press

California State University, Dominguez Hills
10726 Esther Avenue
Los Angeles, CA 90064
(310) 475-6515
lpress@venera.isi.edu

ABSTRACT This paper begins with a description of Relcom, a Soviet uucp based network which relies primarily on personal computers and dial-up telephone connections. After a description of Relcom, we examine its role during the coup, then its day-to-day role in Soviet development. The paper concludes with a discussion of the role of Relcom as a model for networks in other lesser developed nations.

I. INTRODUCTION

> We are witnessing a revolution of international relations toward increasingly open and mass-scale communication. And this greatly increases the role of creative and positive policies. But equally, it raises the price of mistakes -- the price we must pay for adherence to outdated dogmas, routine and old thinking. Mikhail S. Gorbachev, address at Stanford University, Summer, 1990.

This quote refers to two facets of the communication revolution, the potential for creativity and the cost of errors. Both of these are illustrated by the Relcom computer network in the Soviet Union. Relcom was active throughout the attempted coup of August, 1991, and it helped exact the price paid by the leaders of that attempt. It also has the potential to contribute to the creative development of the Soviet Union.

This paper discusses both facets. After a description of Relcom, we examine its role during the coup, then its day-to-day role in Soviet development. The paper concludes with a discussion of the role of Relcom as a model for networks in other lesser developed nations.

II. RELCOM

Snyder, Jarmoszko and Goodman [9] and Dyson [3] describe the history and status of Soviet networks. Between them they mention seven electronic mail carriers, including Sprint and a network of about 60 Fidonet bulletin boards. The only one providing widespread domestic service, international connection, and marketing its services for rubles is Relcom (RELiable COMmunication).

Relcom is operated by the Demos Cooperative. Since 1982, Demos has distributed their own version of Unix in the Soviet Union. (Demos is a Russian acronym for Interactive Portable Operating System). Initially they built a small network in support of their users, but it became clear there was pent-up demand for communication outside their customer base, so Re-

lcom was formed with the cooperation of the prestigious Kurchatov Institute of Atomic Research. Relcom became a commercial enterprise April 1, 1989. Demos does development for Relcom and operates its Network Information Center.

Relcom has no government sponsorship. Organizations joining the network supply their own computer and modem and pay an initial fee of 20,000 rubles. That fee covers training, communication software, 8MB if internal traffic and 6MB or international traffic. Additional traffic is 630 rubles/MB.

Since the number of personal computers in the Soviet Union has been growing rapidly, there is great demand for communication between them, and Relcom has grown without marketing. As of September, 1991, they connected 391 organizations in 70 cities ranging from Saint Petersberg in the West to Vladivostok in the East.

However, Relcom is nothing like a national network in an industrially developed nation. Where a network in the US typically uses large computers connected with dedicated high speed communication links, Relcom uses mostly personal computers and dial-up telephone connections. (See Figure 1). Out of 391 Relcom organizations, 7 use VAXes or "VAX-like" computers, 17 use 386-based PCs, 2 use Next workstations, 1 a 486-based PC, and most of the rest are 286-based PC clones. There are leased voice-grade lines between two cities now, and two more planned -- the rest of the connections are dial-up.[1]

All of the nodes use uucp [10], the Unix to Unix copy program to send mail and Usenet News. They use a DOS-based version of uucp on machines which are too small to run a version of Unix. Since August 22, 1990, Relcom has had a link with EUnet through Helsinki Finland. This enables them to exchange electronic mail with the rest of the world, and to send and receive Usenet News. A dial-up connection is established with Helsinki every hour, and approximately 30 megabytes are exchanged daily. Connections are also made to Norway 4 times a day and to Hungary daily.

A description of Relcom would be incomplete without mentioning the people. The Demos Cooperative consists of approximately 70 people. The professionals are capable, highly educated technicians. They are also deft entrepreneurs, having run a free enterprise business in the Soviet Union since 1982. They understand the value of publicity, and have made extensive international contacts. They remind me of early entrepreneurs in the personal computer business, before they traded their blue jeans for suits.

While several of them work at official institutes, they were staunchly independent of and opposed to the government long before the attempted coup. They have no government funding, though they have government customers. While Soviet shopkeepers and officials are famous for indifference and indolence (the joke goes -- "we pretend to work and they pretend to pay us"), the people and atmosphere at Demos are very active and involved.

Since free communication is incompatible with repressive dictatorship, Relcom would have been prohibited in the past. Gorbachev's glasnost made Relcom possible, and it quickly became a significant segment of the Soviet communication infrastructure. Relcom repaid Gorbachev during the coup by helping save his job and perhaps his life. Having described Relcom, let us look at its role during the coup attempt.

III. RELCOM DURING THE COUP

Relcom defied the coup-leaders'decree asserting control over mass media, and operated throughout coup.[1] They provided a channel for communication from and to the Soviet Union and, most important, internal communication.

A. Information from The Soviet Union

Messages were sent from the Soviet Union by email and by posting them to the Usenet Newsgroup talk.politics.soviet.[3] One of the first postings after the coup began was by Vadim Antonov of Demos:

> Oh, do not say. I've seen the tanks with my own eyes. I hope we'll be able to communicate during the next few days. Communists cannot rape the Mother Russia once again!

This set the tone for Relcom's activity during the rest of the coup. This message was quickly and continuously followed by news from various (banned) Soviet news agencies and government officials. For example, Boris Yeltsin's defiant decrees were hand-carried to Demos headquarters and posted as soon as they were written. The Russian versions were quickly translated into English and reposted by several people on the Internet. CNN, AP and other news agencies were alerted and began watching the postings.[4]

B. Information to the Soviet Union

Perhaps the most notable message to the Soviet Union was from Jie Liang, who sent advice based on his experience at Tiananmen Square. He also called for "a campaign to let people inside the USSR to know the truth and how the world is reacting," and stated that "at this heavy historic moment, Chinese people are standing by the Soviet people."

Messages like Liang's were posted to talk.politics.soviet and came into the Soviet Union as part of the regular News feed through Finland. In addition, many people sent personal mail to friends. As a result, traffic through Finland increased sharply, at one point causing Relcom to stop the feed for 4 hours. This led Vadim to post the message:

> Please stop flooding the only narrow channel with bogus messages with silly questions. Note that it's neither a toy nor a means to reach your relatives or friends. We need the bandwidth to help organize the resistance. Please, do not (even unintentionally) help these fascists!

In spite of of this message, traffic rose to a high of 13,159 messages on August 21st, more than twice the usual volume. However, they did not want to cut incoming information completely. Soon after the coup began, I received the following request from Vadim's wife Polina, who is also a Demos staff member:

> ... maybe you'd write me what do they say on your TV about the situation, as we can't watch CNN now.

In response I began sending periodic summaries of US news coverage, which Polina translated and posted internally. Jonathan Grudin and others did the same from Europe. While this information may have had some value, I believe that its primary effect was in providing moral support. Afterwards Polina wrote:

> You can't even imagine how grateful we are for your help and support in this terrible time! The best thing is to know that we aren't alone.

This paid me 1,000 times for time spent on-line during the coup.

C. Internal Communication

While information coming in and out was of some value, I believe that Relcom's primary contribution was internal to the Soviet Union because other mass media were suspended or taken over. Polina's first email message to me during the coup read in part:

> They try to close all mass media, they stopped CNN an hour ago, and Soviet TV transmits opera and old movies.

In addition to TV, radio stations were seized and jammed, and newspapers and news services banned. Relcom was evidently the only reliable mass media in the Soviet Union.

The banned newspapers and news agencies continued operation using Relcom, distributing their reports at no cost. A digital radio receiver was installed at Demos headquarters, and news was transcribed and posted. Officials in many cities posted and received news from Demos. General Konstantin Kobets, head of Yeltsin's Defense Committee used Relcom. A portable computer was taken to Yeltsin's "White House," but a reliable phone connection was not available at the time, so it was not used.

Many man-in-the-street messages were also carried to Relcom nodes and posted, for example this message from Nizhniy Novgorod:

> Yesterday at 17:00 a rally in support of Yeltsin was held; regional deputies participated. Today at 17:00 there will be a rally in the city center where a strike committee will be formed. ... The atmosphere is calm in the city, there are no troops to be seen.

Or this from Kiev:

> It is relatively quiet in Kiev as it all seems like a silly joke from here. On top of this, relevant information is not being supplied on the TV. I was on the central square at 12:30. A group of about 100 people was discussing the news.

Since Relcom had operated long before the coup, and was well known, one also wonders why they were not stopped. When I asked Polina that question during the coup, she replied "Thanks Heaven, these cretins don't consider us mass media!" However, after the coup was over, she and her colleagues speculated that the KGB may have remained passive because they were not confident of the outcome.

If the KGB had acted early, they could have stopped Relcom by pulling the plug on a computer at Demos (located within a mile of KGB Headquarters). However, within a few days, the network had decentralized, making it more difficult to stop. As Vadim stated in a message to Doug Jones at the University of Iowa:

> Yes, we already prepared to shift to underground; you know--reserve nodes, backup channel, hidden locations. They'll have a hard time catching us! Anyway, our main communication line is still open and it makes us more optimistic.

The backup channels were alternative

accounts on EUnet machines in Norway and The Netherlands. Employees of the Institute of Space Research suggested another channel using their facilities, but they were blocked by NASA. A portable, satellite-based node would be even more difficult to locate and stop. The staff also disbursed after the early days. Polina sent me the following message:

> Don't worry; the only danger for us is if they catch and arrest us, as we are sitting at home (Valera is at Demos) and distributing all the information we have.

At the beginning of the coup, memories of the Hungarian revolt, Kruschev's ouster, the Prague Spring, and Tiananmen Square did not give one much hope. Had the coup succeeded, the Demos staff and people using the network would have been in danger. Polina's first message to me after the coup began read in part:

> Don't worry, we're OK, though frightened and angry. Moscow is full of tanks and military machines -- I hate them ... Now we transmit information enough to put us in prison for the rest of our life.

And later Vadim posted this message:

> If these dogs win, for certain they'll throw us in prison -- we distributed the proclamation from Yeltsin and the Moscow and Leningrad Soviets throughout the entire Soviet Union, together with the forbidden communiques from Interfax ... Greetings from the underground.

The operation of Relcom required courage and a deep sense of professionalism (a "subliminal professional kernel" as Unix-hacker Vadim put it).[5] This is acknowledged in George Tereshko's grateful posting after the coup had failed:

> When the dark night fell upon Moscow, Relcom was one source of light for us. Thanks to these brave people we could get information and hope.

IV. ENCOURAGING DEVELOPMENT

Relcom played a dramatic role during the coup, but it has also become an important part of the day-to-day Soviet communication infrastructure. The list of organizations with Relcom computers includes:

> 11 government agencies, including the USSR and Russian Finance Ministries
>
> 15 foreign and domestic publications and news services including AP, UPI, the German Press Agency, and Financial Times
>
> 20 commodity, raw material and stock exchanges[6]
>
> 26 universities and university departments, including several machines at Moscow State and Leningrad Universities
>
> 96 limiteds, corporations, enterprises, companies, firms or banks, joint ventures or small ventures
>
> 117 scientific and research institutes, nearly all in technical fields such as mathematics and physics.

It should be noted that this is an informal count, and I was unable to classify many of the organizations on the list. (I only had their names). The examples are

intended to show diversity. Relcom is being used by the government and business. It is interesting that many of the businesses are capitalistic -- commodity exchanges, limiteds, etc., as opposed to cooperatives. (There were only 5 cooperatives). Of the news agencies and publications, 8 are from the US or Western Europe, the others are Soviet or Baltic.

The university and research community are also heavily represented. An example application is my work with Juri Gornostaev to organize a workshop on human-computer interaction (HCI) held in Moscow in August, 1991. The entire workshop, from drafting and circulating the call for papers to working out final problems with visas and travel arrangements for researchers from 11 nations, was planned and executed on the network. Before Relcom, this conference could not have occurred.

Soviet and foreign HCI researchers are now in contact using Relcom. For example, Victor Kaptelinin, professor at Moscow State University, is offering the first HCI course in the Soviet Union. Using Relcom's facility, he is in contact leading HCI researchers and educators in the US.

V. RELCOM AS A MODEL

Relcom is primitive compared to the Internet. While the US Congress debates the funding level for an experimental gigabit-per-second network, Relcom is trying to get a leased phone line from Moscow to Vladivostok and some 9600 bit-per-second modems. There is a gap between information-rich and information-poor nations. Lawrence Landweber periodically posts a list showing connectivity to international networks. Of 213 political entities listed in his current survey, only 106 are connected to international networks, and as seen in Figure 2, connectivity is concentrated in the Northern Hemisphere.

Dertouzos [2] argues that the value of information is related to the value of the goods it leads to. Since there are more goods in industrially developed nations, it follows that the value of a network would be greater. For that reason we see a much greater investment in industrially developed nations. On the other hand, alternative forms of communication such as telephone, fax, and post are typically poor in lesser developed nations, which means, that even a low-technology network can have a significant impact.

Is Relcom a good model for other nations with poor telephone and postal systems and little capital? To an extent they are, though they have some advantages others do not have. Compared to many nations, they have well educated, motivated professionals. (Nevertheless, a shortage of qualified sytem operators contrains their growth). The arbitrary, low prices of Soviet phone service have also worked to Relcom's advantage. Moscow phone service had a very low, fixed rate, making all-day dial-up connections feasible, and the calls from Demos headquarters to Helsinki were only 6 rubles per minute. The market price of phone connections will be higher. Finally, many nations have even poorer communication infrastructures than the Soviet Union (Shetty [8]). In such cases, satellite communication may be necessary, and at least one organization, VITA (Volunteers in Technical Assistance), has begun satellite experiments[7] using "microsatellites," Bird [1], Garriott [5].

There is also a hurdle that Relcom has yet to jump. They are growing rapidly, with a projection of 300% by next Spring. To accomplish this they are converting

from a cooperative to a limited organization. It will be interesting to see if they can attract capital and develop management skills for the transition from a start-up to a large organization.

While Relcom's example can help, each case will doubtless be different. Still, appropriate technology networks like Relcom may be the first step toward *truly* global networking, changing the face of the earth in peace time as well as helping to keep the peace.

ACKNOWLEGMENTS This paper was based on visits to Demos, electronic mail during the coup, and post-coup interviews with Polina Antonov, Vadim Antonov, and Valera Bardin of Demos, and Kirill V. Tchashchin of Newsbytes News Network. The warmth, hospitality, and music of Natasha Bardin was also invaluable.

FOOTNOTES

1. The call for free markets of Yeltsin's government implies that high speed communication systems, which were used exclusively by organizations such as the Communist Party, KGB and Military will now come on the open market.

2. Glasnet, another email connection with the West also operated during the coup.

3. Complete archives of talk.politics.soviet, Relcom postings in the USSR, and Radio Free Europe's daily reports and analysis articles during the coup are available via anonymous FTP at moxie.oswego.edu and nic.funet.fi. These archives have been used by scholars from around the world. They are machine-readable historical source documents, an interesting side-effect of the network.

4. A CNN announcer identified Relcom on the air at one point. They were quickly admonished not to do so.

5. It should be noted that the "right" side is not always so obvious in a political dispute. Goodman (1992) vividly demonstrates this point by quoting Serbian and Croatian email messages during the fighting in Yugoslavia.

6. Galuszka and Kranz [4] state that there are some 300 commodity exchanges operating in the Soviet Union with goods ranging from sugar and oil to PC-compatibles. The high prices are unreachable by private citizens, but that is the price of moving to a market economy.

7. VITA, Volunteers in Technical Assistance, runs projects and distributes information on technology in developing nations. They have also launched VITASAT, an experimental satellite for packet-radio communication. They expect to begin operational satellite service in 1993. VITA also runs an on-line discussion list, DEVEL-L, and publishes an electronic newsletter, DevelopNet News. VITA, 1815 North Lynn Street, Suite 200, Arlington, VA 22209, (703) 276-1800, vita@gmuvax.gmu.edu. VITA publications and other discussions are posted to the Usenet News group comp.society.development.

Motorola also plans a

satellite-based communication network called Iridium. Iridium's 77 low-orbit satellites will cover the globe, permitting communication from remote and undeveloped regions. For further information see Leopold [7].

REFERENCES

1. Bird, Jane, "Small is Beautiful for University Space Outfit," Science, pp 848-849, August 23, 1991.

2. Dertouzos, Michael, "Communications, Computers and Networks," Scientific American, pp 62-69, September, 1991.

3. Dyson, Esther, "E-Mail in the East,: Rel-East, 1-91, EDventure Holdings, New York, pp 4-20.

4. Galuszka, Peter and Kranz, Patricia, "Welcome to the Moscow Shopping Mall," Business Week, p 44, August 19, 1991.

5. Garriott, Gary L., "Packet Radio in Earth and Space Environments for Relief and Development," 34th Annual Meeting of the African Studies Association, Saint Louis, MO, November, 1991.

6. Goodman, S. E., "Political Activity and International Computer Networks," Communication of the ACM, pg. 174, February, 1992.

7. Leopold, Raymond, "Low-Earth Orbit Global Cellular Communications Network," Mobile Satellite Communication conference, Adelaide, Australia, August 23, 1990.

8. Shetty, Vineeta, "African Net Quality Tests User's Mettle," Network World, pp 33-35, October 14, 1991.

9. Snyder, Joel M., Jarmoszko, A. Tomasz, and Goodman, Seymour E., "International Electronic Mail Gains Significance in the Soviet Union and Eastern Europe," IEEE Computer, March, 1991, pp 81-84.

10. Todino, Grace and Dougherty, Dale, "Using UUCP and Usenet," O'reilly and Associates, Inc., Sabastopol, CA 85472, 1987.

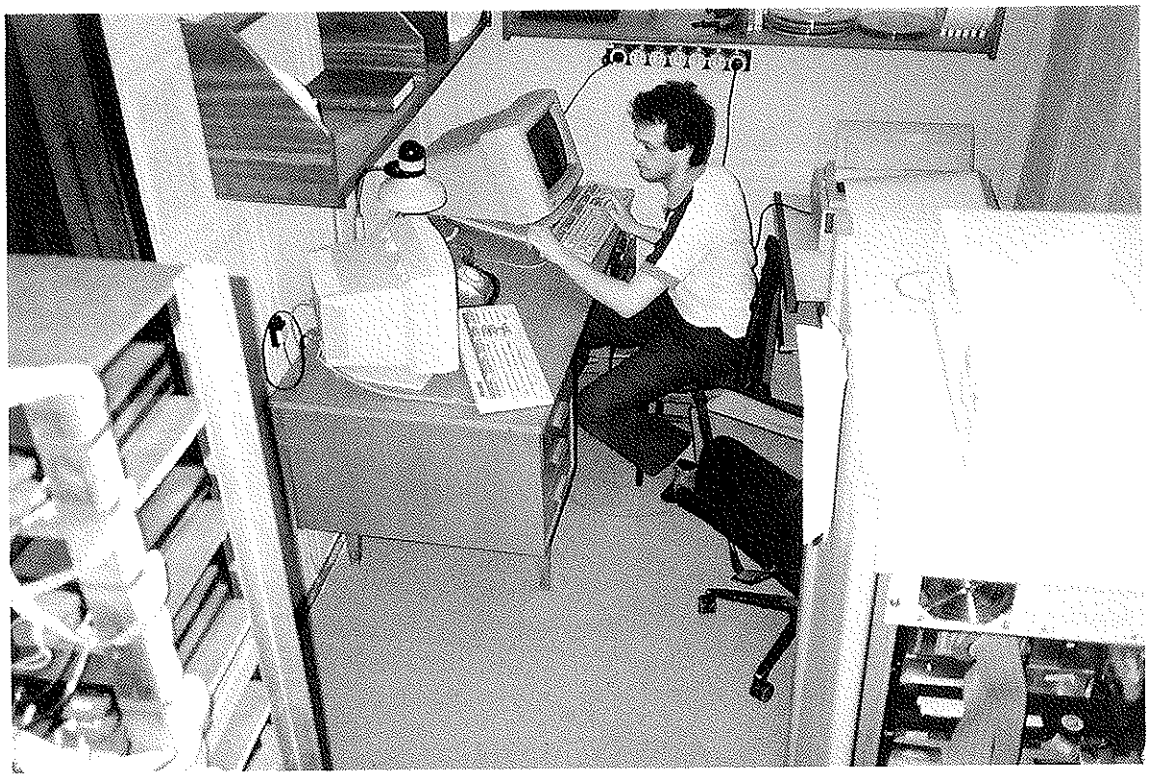

Figure 1. Relcom Machine Room. Appropriate technology networks in lesser developed nations typically use personal computers. The micro-VAX shown here links Relcom to Finland, and the modems communicate within the Soviet Union.

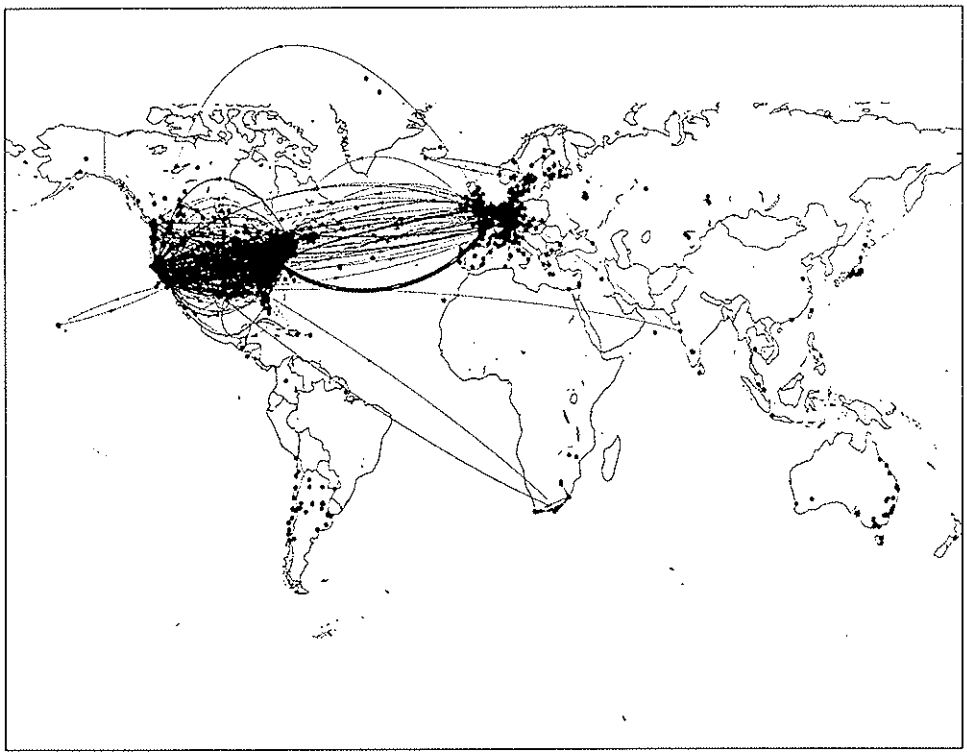

Figure 2. Usenet News Flow. Usenet and other international networks are concentrated in North America and Western Europe. In this map, prepared by Brian Reid, line width is proportional to flow volume.