

Jeffrey L. ...

# Telecommunications

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In theory, no one questions the value of an integrated, worldwide, all-purpose telecommunications network, but the reality is a good deal more prosaic.

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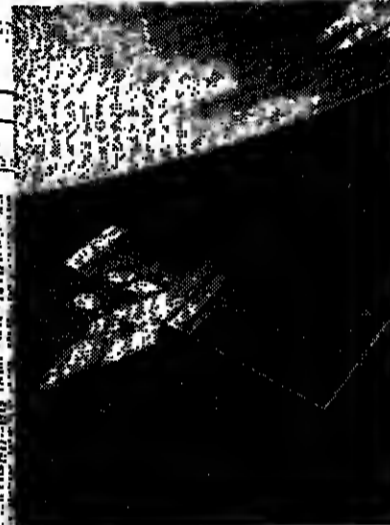
Teleports, which were first developed in the United States to provide premium digital services without going through the local telephone companies, are catching on in Europe and Asia.

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Alternative technologies, such as backyard satellite dishes and "wireless cable" systems, have met with little success in their efforts to secure a foothold in the U.S. video marketplace.

## Telephony Bursts out Of the Mold

By Eli M. Noam

**N**EW YORK — Today's policy changes in telecommunications are part of a broad transition in the public network — a system that dates back to the emergence of postal monopolies in the 16th century.

That system was based on a centralized monopoly that enjoyed broad interest group support from what may be called the postal-industrial complex of equipment companies, the rural population labor unions and state bureaucracy. The network was universal in reach, price-controlled as a necessity, and redistributive in charges. As a public service, telephony was outside the mechanism of the market, even in otherwise free-economy countries.

But despite its popularity, the traditional model of the public network has not escaped the multiple forces that have undercut its stability. Technology is one of them, but one

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should not exaggerate its contributions. More significant was the emergence of the information-based service economy as a mainstay of developed countries.

Electronic information transmission became of ever-increasing importance to the new services sector — and a major expense item. Price, flexibility, security and reliability became variables requiring organized attention by a new breed of experts outside the PTTs.

This led, in time, to new constellations. A new alliance emerged, consisting of large users, including international firms, together with the most advanced part of the equipment industry. In consequence, we are merely at the beginning of what will be a lengthy process of change. The centrifugal forces are encouraging the evolution of a new network model of telecommunications that is characterized by a great deal of openness and resembling conceptually a matrix rather than the traditional star. Here are some of its main characteristics.

The future open network system will be one of great institutional, technical and legal complexity. It will consist of an untidy patchwork of hundreds of sub-networks serving different geographical regions, customer classes, and service types with no neat classification or compartmentalization possible. The U.S. experience demonstrates the instability of structural regulation that tends to compartmentalize the industry. Hence the future network environment will have carriers engaged in many functions, though there will be no shortage of official attempts to ensure order.

The network becomes a composite of numerous separate planning decisions. This notion is so alien to the engineering world view of telecommunications traditionalists that it strikes them as bizarre. The old perspective was that of the chain of command, long-range planning and integration. To leave this system to the vagaries of hundreds of uncoordinated and selfish actors seems to invite disaster.

Can it work? This is not the right question. Perhaps a better way to frame the issue is: Can there be a stable alternative in economics that otherwise favor a market mechanism and that want to stay on the leading edge of technology and applications?

Telecommunications is in the process of becoming a market mechanism.

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## U.S. Agencies Study Effects Of New Regulatory Climate

### The seven regional Bell companies want to expand.

**W**ASHINGTON — This year could be a watershed in telecommunications policy in the United States. It is the year in which the breakup of American Telephone & Telegraph Co. got its first close examination. It is also the year in which the regulatory bonds on local monopoly telephone companies and on AT&T began to be loosened.

Federal and state regulators are replacing the 50-year-old methods they had been using to determine how much money those companies should earn. They also are rethinking how those companies should be structured to provide the most protection for rate payers, while providing the most regulatory flexibility for the companies.

When AT&T was broken up in 1984, U.S. District Judge Harold H. Greene, who presided over its divestiture, ordered three basic prohibitions for the then-newly created regional holding companies (RHCs), or Baby Bells. They could not provide long-distance service across local calling zones; they could not manufacture equipment and they could not provide information services, such as medical monitoring or data bases.

He also said that the companies would need a court waiver to enter into any other type of business. And he ordered the Department of Justice to submit a report three years after divestiture, evaluating whether the restrictions should be lifted in whole or in part.

This year the seven regional Bell companies, under the provisions for automatic review of the settlement, have been trying to persuade Judge Greene to allow them to expand by providing long-distance service. They argue that the limits imposed on them under the divestiture settlement are unnecessarily confining and that consumers are being denied the benefits of additional competition and many new products made possible by technological advances.

On Sept. 10, however, Judge Greene, issued an order finding that the long-distance and manufacturing restrictions should stay in place. He left open the possibility of Minitel-like networks developing in the United States by permitting the regional companies to provide gateway services, allowing users to enter a general menu to be directed to specific information services but not content or messaging, for vendors of information services. He also abolished the need for waivers for telecommunications businesses.

Earlier, Peter Huber, a consultant for the Justice Department, had published a report called "The Geographic Network," in which he had concluded that the telecommunications system had changed radically because there was so much intelligence in customer-based switching devices.

He recommended that the restrictions be lifted. But he also found that more than 99 percent of the telecommunications traffic still passed through local telephone company switches, a fact that Judge Greene would use to justify his own decision as well.

Meanwhile, the Justice Department, which had first recommended that the regional companies be able to offer long-distance service outside of their service areas, reversed itself and recommended that the restriction be kept, with the possibility of lifting it on a case-by-case basis. The Justice Department also did not enforce the ban on manufacturing as strictly as some manufacturers

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## Business

## Europeans Bid For Bigger Slice Of U.S. Market

By Arthur Brodsky

**W**ASHINGTON — Earlier this year, when the Federal Communications Commission had sparked a debate over U.S. trade policy while the French government was deciding whether to sell its national telephone switching system to American Telephone & Telegraph, Ericsson or Siemens, there was a brief story making the rounds in Washington.

AT&T, it was said, had the FCC Chairman Mark S. Fowler's heart. But Siemens had President Ronald Reagan's ear, literally. He wears two hearing aids manufactured by the German multinational giant.

Three years ago, none of the major European telecommunications manufacturers had any presence in the huge and lucrative U.S. market. Now, through rapid expansion and big spending, they have become an integral part of it although they still lag far behind AT&T and Canada's Northern Telecom.

Their equipment is found not only performing the mundane switching tasks done in central offices, but also on the cutting edge of U.S. technology.

Whether it is for Integral Services Digital Network (ISDN), fiber optics, packet switching or cellular radio, Siemens and Ericsson are there. And Stromberg-Carlson, now owned by Plessey of Britain, is also making a strong bid for a larger share of the U.S. market. To some degree, they have also injected themselves into U.S. policy debates, before both the Federal Communications Commission and Congress.

The largest equipment buyers, the seven divested regional holding companies, were eager to look to new telecommunications suppliers. They had AT&T and Northern Telecom, but they also wanted a third supplier to avoid a cartelization of the marketplace. It is still not clear who that third supplier will be, and once the market shakes out, it may vary from regional company to regional company.

Apart from the central office switch market, European suppliers are also making their presence felt in the large PBX market, particularly in universities and state governments.

Of the major European suppliers, Siemens has the highest profile. It scored a major coup by supplying packet switches for Bell Atlantic, Nynex, Ameritech and U.S. West. To help market the packet networks, and its switch, Siemens came up with a mobile demonstration display that has a variety of terminals and can demonstrate automatic bank teller transactions, credit card verification, electronic mail and other capabilities.

The packet switching sales are important not only in their own right but because they are seen as the forerunner of full-blown ISDN services. In another coup, Bell Atlantic and the Bell Communications Research (Bellcore) research consortium owned by the regional holding companies, are conducting a nine-month test of Siemens' digital EWSD central switch in an ISDN trial that will include a test to determine if the Siemens product can be connected to existing analog AT&T switches.

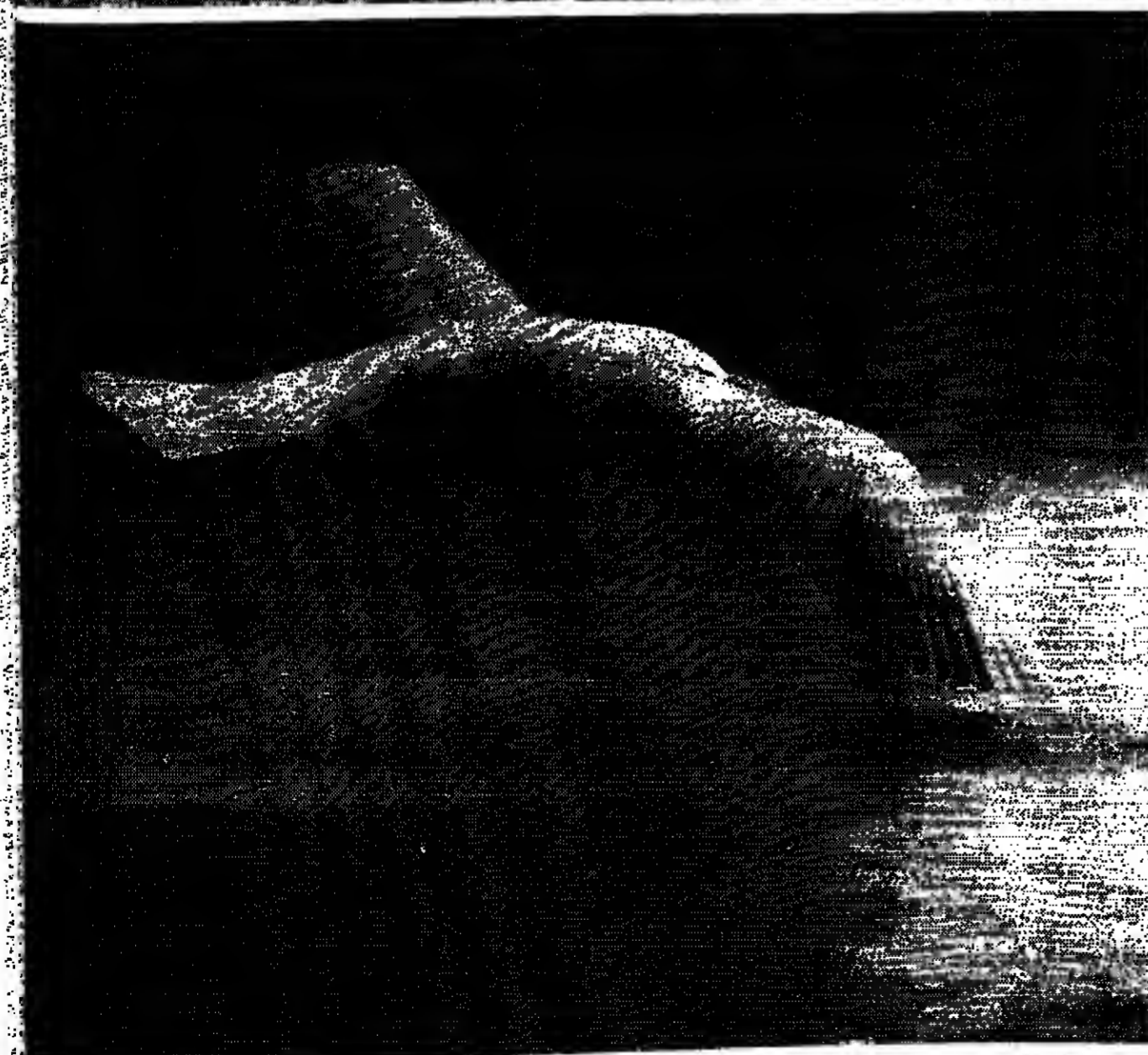
Similarly, Southwestern Bell is ISDN-testing the Siemens switch in its Advanced Technology Lab in St. Louis, along with switches from other manufacturers, including Ericsson.

Siemens apparently intends to maintain a strong U.S. presence. Altogether the Siemens companies employ more than 24,000 U.S. citizens, have \$1.3 billion invested in the United States and \$2.2 billion in revenue. Siemens Communications alone employs more than 6,200. President Herbert Asmussen has said that his part of the company is a "net exporter," and thus a positive force in helping to reduce the U.S. trade deficit.

To gear up for a big rush at the U.S. market, Siemens is converting part of its U.S. factory capacity into manufacturing space for the EWSD switch. The factories, in New Jersey and New York, will also continue to produce packet switching equipment. At the Boca Raton, Florida, headquarters of Siemens, the company has dedicated a new research center exclusively for the EWSD. It will employ more than 500 engineers.

As if to underscore its plans to stay in the United States, Siemens spent \$165 million early this year to buy 100 percent control of Tel Plus Communications, the largest business telephone equipment reseller in the United States. Before the deal, Siemens had held 35 percent of the Boca Raton-based firm. Siemens said it made the deal because it wanted direct control over its national marketing, sales and service

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## New Wings For European Telecommunications

When Eutelsat needed new multiresonance satellites, it chose Aerospatiale Spacebus 100 technology.\*

These new birds will be able to direct 16 transponders to desired coverage zones after a simple command from the ground.

Flexibility like this — provided by new reconfigurable multifield dual-grid antennas — will allow Eutelsat to keep up with the rapidly evolving needs of Europe's communications markets.

Aerospatiale is proud to have been designated prime contractor for the next generation of Eutelsats, the largest contract for communications satellites ever awarded to European industry.

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A Scarcity of Funds

# Brazil Struggling to Stay on Hold

By Mac Margolis

**S**AO PAULO — It's more than 2,000 miles from this megalopolis to São Gabriel da Cachoeira, a sleepy Amazon jungle town near the Venezuela border. To get there, one can take a five-day boat ride up the Rio Negro or, when it's not raining too hard, a twin-engine prop plane that leaves three times a week from Manaus. No highway goes that far and until last month the telephone never rang there.

But on Oct. 1, President José Sarney dialed São Gabriel's mayor to say hello and to inaugurate the ten thousandth Brazilian town to be plugged in to the country's expansive telecommunications system.

Mr. Sarney's call was symbolic of an extraordinary development drive that in just four decades has taken this country's sluggish, backward communications system and put it on a par with those of the most advanced countries.

He made the call from a new \$26 million communications station in São Paulo state that is designed to boost the number of international telephone calls by 50 percent. This station, Brazil's 27th, is the latest monument in a campaign that has connected all Brazilian cities and towns to a system of cables, microwave ground towers and satellites.

However, even though distant São Gabriel is plugged into long distance cables, only a handful of its 24,000 residents have telephones. The telephone industry is so stopped up with back orders that customers in the largest cities, let alone those in the hinterlands, must wait up to two years for a telephone line.

A fall in government investment, skyrocketing demand and steady dilapidation of cables and communications stations have badly deteriorated telephone lines, multiplied busy signals and dogged assembly lines of communications equipment industries.

Experts say that if Telebrás, the telephone company, doesn't receive a massive infusion of funds soon, the system that Mr. Sarney called the "sixth largest in the world" could slide to the status of those in the most indigent nations.

As Mr. Sarney declared, after talking to São Gabriel, the stakes

## Two million Brazilians want to buy telephones but cannot because the system cannot expand fast enough.

are high. "No nation will be truly free and independent, as the 21st century dawns, without mastering technology," he said.

Telecommunications got a late start in Brazil, considering that the country got its first telephone in 1877, a present from Alexander Graham Bell. It took another quarter century to string thousands of miles of telegraph lines over the country, from the Atlantic coast to the Amazon jungle.

Then in the mid-1950s, President Juscelino Kubitschek vowed to move Brazil "50 years in five." During that campaign, he modernized just about everything, except communications. The futuristic capital of Brasília was built, steel industries were laid down, highways built and the sparsely inhabited backlands settled.

It was not until 1962, under a system created by President João Goulart, that the telephone system began to advance. Mr. Goulart lasted only two years before he was overthrown by the military as a "leftist," but his telephone system survived.

"The one thing the military preserved was Goulart's communications plan," said Gilberto Garbi, a former Telebrás president and now director of MEC do Brasil, the affiliate of the Japanese telecommunications company.

Mr. Goulart had created a self-sustaining administration by which the National Telephone Fund collected 30 percent of all telephone bills for financing the expanding telephone network.

In 1972, the military government refined the system, creating a telephone company for each state and Embratel, a holding company, to control investments.

The military set about expanding the telephone network, dotting the landscape with microwave towers, laying three submarine cables to Europe and the United

States and buying into the Intelsat system for trans-oceanic calls. The government built a space research center and, in 1985, launched Brasilsat, the first Brazilian communications satellite for long distance calls and relaying television signals.

"The communications network was the most important work the Brazilian military achieved," said Mr. Garbi.

Despite Brazil's staggering debt burden, some advances have continued in the postmilitary years. A second satellite, Brasilsat-2, was launched last year and research is being carried out in São Paulo on improving rockets to launch more satellites and on fiber optics.

The telecommunications system on the ground has expanded as well. While there were only one million telephones up to the mid-1960s, there are now 12 million. From the remotest region of the country, a direct dial call can be made to New York or Tokyo.

But some recent figures already hint at a decline.

By one measure, Brazil, with 7.2 million telephone terminals —

there are 1.5 telephones to each terminal — ranks 10th in the world, just behind Spain and Canada. But Brazil places only 37th in telephone "density," or the number of terminals per 100 inhabitants.

And "density is the only true measurement of development," according to Luiz Carlos Bahiana, a former Telebrás executive who now heads Equitel, the Brazilian affiliate of the German communications giant, Siemens.

According to Telebrás, there are two million Brazilians who want to buy telephones but cannot because the system cannot expand fast enough.

This has spawned a thriving black market, where the lucky ones siphon their telephones at scalpers' prices.

It has also severely taxed existing lines. Brazilians make 2,500 calls per telephone a year, the highest ratio in the world. The heavy traffic has resulted in long waits for a dial tone, crossed lines and calls repeatedly falling on incorrect numbers or being cut off in mid-conversation.

The very excess in demand is, in a way, a good sign. In a country of 139 million people and with a traditional economic growth of 5 percent to 7 percent a year, there is a seemingly limitless telephone market. Telebrás has consistently been one of Brazil's most profitable state enterprises.

Yet, with rare exceptions, government investments in the telephone system have been cut back for nearly a decade.

Telebrás recently programed spending \$1 billion a year and the



Operators in the country's telephone exchanges like this one have been unable to keep up with user demands, resulting in long waits for dial tones, crossed lines and calls repeatedly falling on incorrect numbers.

installation of 800,000 telephones. But the return of triple digit inflation and Brasília's ceaseless tinkering with economic plans have frightened private investors, including those in communications.

Ironically, perhaps, the recent liberalization of Brazilian politics after two decades of military rule may have aggravated the problem.

"Unfortunately, telecommunications has been politicized. There are increasingly more politicians and ever fewer technicians, and they manage the system according to electoral needs — all the factors that make Latin America poor and miserable," said a senior executive at a private communications firm. Sources in the communications

industry say the decline need not be fatal. A healthy restoration of investments and replacing pork barrel policies with technical criteria would go a long way to help the telephone system.

"The economy demands that telecommunications keep pace with development," said Mr. Garbi.

Meanwhile, in São Gabriel da Cachoeira, as in other towns, the phone may keep ringing, but for the very few.

MAC MARGOLIS is a correspondent for Newsweek based in Rio de Janeiro. He contributes regularly to The Times of London.

## Telephony Bursts Out of the Mold

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ing transformed from one of the most regulated industries to one of the least regulated. The growing complexity of the system makes it increasingly difficult to fashion consistent rules, and rules are not likely to be enforceable. The subjects of the regulations — streams of electrons and photons, and patterns of signals that constitute information — are elusive in physical or even conceptual terms, and at the same time fast and distance insensitive.

And yet there is a need for regulatory oversight of the rules under which networks and users interrelate in the future; to bridge this tension will be one of the central challenges for regulatory policy.

The traditional public system may be losing its exclusivity, but it is gaining the flexibility of moving into new activities, including equipment manufacturing and computer applications. These new horizons are an attraction to PTTs as they consent to the loss of monopoly; for policy makers, they raise regulatory issues on how to deal, in the transition phase, with the still-substantial economic power of the unchained PTTs.

It will become increasingly difficult to reach or maintain specific agreements on standards as the number of interests and participants multiplies. Instead, standards setters or coalitions will emerge around which other actors will cluster, since incompatible services will not usually be attractive to users. The system may not be fully convergent, and some parallel standards are likely. Fortunately, electronics is flexible; a brisk industry of information and protocol arbitrage from one standard to another will emerge.

Networks must normally be able to interconnect into other networks as a matter of right, even if they are rivals. This principle requires clarification of the charges and quality standards for interconnection, and this is likely to remain a regulatory question for a long time.

While the right of interconnection deals with networks' linkage with each other, the right of access concerns users' ability to reach, if technically possible, any network they choose to, and to join, under natural conditions, user-group networks.

An open network system raises the question whether the obligations of a network operator to serve all interested users, regardless of location, applies to all services, and the answer is likely to be differentiated. For more specialized services, the general obligation will not exist. But for basic service it will continue, and the definition of "basic" is likely to expand. The boundary line is likely to be an ongoing issue of policy debate.

While it is unlikely that the traditional system of internal transfers from one class of users to others can be maintained, this does not spell the end of transfers; though there will be more external and less internal ones. Subsidies are likely to become more narrowly targeted to the poor.

The open system is not efficient in the sense of minimizing resources. There is nothing unusual about this; almost every industry has excess productive capacity. In telecommunications, with its low marginal costs, competition will cause periodic price instability, and future regulation will need to moderate price volatility and at the same time prevent the likely industry efforts at collusion.

Telecommunications operations will transcend the territorial concept and the notion of each country having total territorial control over electronic communications will become archaic. Supranational carriers and mechanisms will eventually evolve.

The two network concepts — centralized and open — are reflected in the present two major initiatives of their respective proponents. ISDN (Integrated Services Digital Network) is an archetype for the centralized network model, while the ONA (Open Network Architecture) concept, at present before the Federal Communications Commission, aims at disaggregating and opening the very core of the network.

Those holding the centralized concept of networks are captivated not just by its technical capabilities, but also by the more political notion of the exclusive super-pipe. ISDN at once reaffirms the view of the network as a centrally planned and exclusive system while providing a powerful and yet ultimately futile defense against centrifugal forces.

The traditional public network was a very appealing concept amid the cold rationality of capitalism. It was a notion of sharing, interconnecting and reaching every member of society. But certainly, the historical origin of the system, rooted as it is in 17th century European absolutism, does not support those who presently view its defense as a progressive act.

In the future, telecommunications will more closely resemble the rest of the economic system and will be less part of the political sphere. It may be much more efficient and, in parts, even less efficient than the old system, but it will be a closer reflection of the underlying complexities of society and economy.

ELI M. NOAM is a member of the Public Service Commission of New York. He is completing a two-volume study of the political economy of European telecommunications.



## The new NTT is only two-years old. But it has a history of more than a century!

Two years ago, NTT was transformed from a government monopoly to a private company in a competitive environment. NTT's basic goals, however, remain unchanged. The company's ideal is to allow every person to contact more people and have more access to more information than ever before. The natural result of this commitment to human contact and human knowledge is implementing the most advanced technologies.

To achieve our aims, we have intensified R&D activities. We also welcome equipment from vendors and manufacturers worldwide that

will enhance the scope and quality of our services. And we offer our advanced technologies in telecommunications and data processing to the international community through our subsidiary NTT International.

NTT keeps an open mind. We invite everyone to participate with us in meeting the challenges of truly compatible global information networks for the next century.

For Telecom '87, NTT will exhibit at booth 5.101 a prototype for ISDN network services which conform to CCITT recommended I-series interfaces. NTT plans to begin commercial ISDN service no later than April, 1988.



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