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NTIA INFORMATION SERVICES REPORT

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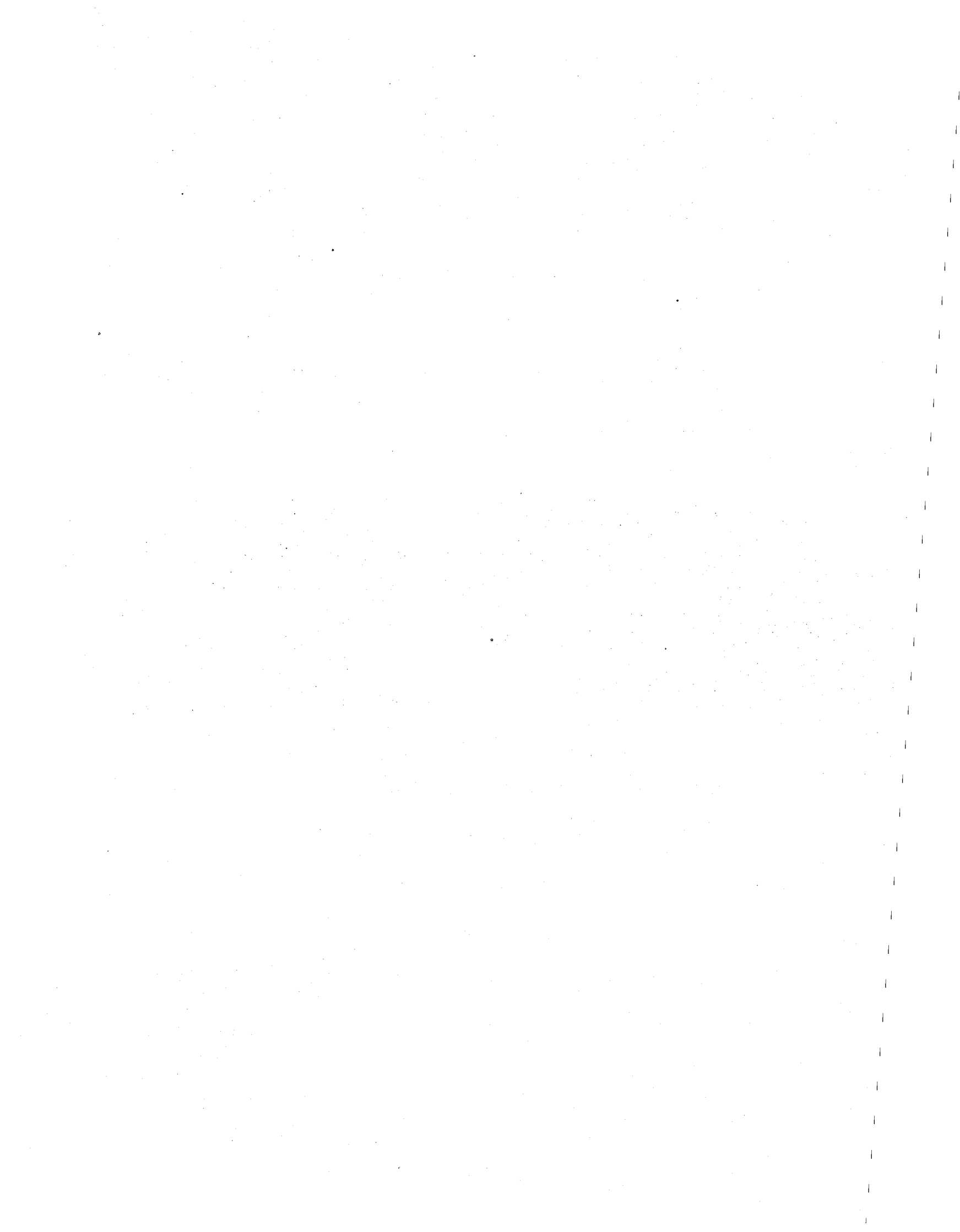
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OVERVIEW AND EXECUTIVE SUMMARY

The American telecommunications marketplace is meeting the needs of larger businesses and citizens who own and use personal computers for modern telecommunications and information services. The marketplace is now handicapped, however, in meeting the needs and wants of small businesses and ordinary telephone subscribers for these services. The result is the potential for a second class telecommunications system, with negative implications for our economy and society as a whole.

Many years after a family in Joplin, Missouri could buy call waiting and forwarding, a family in Montgomery County, Maryland, one of the Nation's most populated and affluent counties cannot get either service. So, a Bethesda, Maryland telephone subscriber is now unable to have a call home ring through to the office and if his or her child is on the phone, a caller is unable to reach his or her spouse. Five years after telephone subscribers in Strasbourg, France, could directly access one another on a video terminal by electronic means, could access electronic directories for other French cities many miles away, and could perform many other transactions, there is still little hope that such services will soon be widely available in the United States.

Yet, if a product sells well in a department store in Los Angeles, it will be available within weeks if not days in Boise, Idaho. If a retail concept works in, say, Peoria, Illinois, often cited as a national test market, much of the country will have the chance to enjoy that same retail concept within a year if not months.

The simple fact is that a layer of laws, rules, and judicial actions impede the rapid development of the retail telephone and information services market in America, while virtually all other markets quickly match demand with supply. The result of these obstacles is that the U.S. public telephone service is falling behind. Our public telephone service, considered for decades to be the world's best, risks losing claim to that title.

At the same time, the private telephone service market is flourishing. If the equipment or service is out of the laboratory, it is probably incorporated in a private network. In fact, many of the United States' biggest companies, such as General Motors, Boeing, Ford, and many others have actually gotten into the telephone business. As they place a higher and higher value on the "new information services," they invest more and more in the facilities to deliver those services. And, as they develop excess capacity and skilled telecommunications personnel, they are selling information services.

The United States can take pride in the development of private telecommunications and information equipment and services. It can be confident that in the future the "information dimension" of the competitive strength of our large industries will be strong. At the same time, without decisive action, the public telephone and information services that individuals and smaller businesses must depend on will fall farther and farther into second-rate status.

This has come about because of outmoded regulatory practices and an antitrust court that has substituted its judgment for the policy determinations of the Federal Communications Commission (FCC) and the Executive Branch including NTIA and the Department of Justice, and the business judgments of the local telephone companies serving a majority of American telephone subscribers. That court is, of course, the AT&T consent decree court, which has prevented the local Bell operating companies from providing their customers with modern information services from 1984 through 1987, and now intends to prevent them from providing all but the most rudimentary and limited information services at least through 1990.

In the meantime, the country's large and medium businesses have gone elsewhere for their modern information services needs. Sophisticated owners of personal computers have also gone elsewhere for these services. Private information services operating in large part on private networks have the incentive to meet the demand from these sectors, which have large information needs and the ability to pay.

This is not the case with small businesses and residential telephone subscribers. While they have needs for information services in order to remain competitive and in the American mainstream in the Information Age, their needs and ability to pay have not been great enough to interest significantly private providers using private networks.

This challenge of meeting the needs of small businesses and ordinary citizens has been met in a variety of ways in the past. In an era of paper-based commercial transactions and communications among people, the Government itself operated a universal postal service upon which the Nation's commerce and culture was dependent. Businesses and people within cities, between cities, then between coasts and rural areas were knit together within a commercial and social fabric that contributed to American business and cultural leadership around the world.

In the era of voice telephone transactions and conversations, Government and the private telephone industry formed a regulatory partnership where industry provided improving levels of business-to-business and people-to-people universal voice information service upon which the Nation's commerce and

culture became dependent. Businesses and people between and among cities, rural areas, and finally the nations of the world were again knit together in a commercial and social fabric that saw unsurpassed American leadership both in business and as a society.

We have now entered a new age of electronic information exchange, transactions and communication among businesses and people. Billions of bits of electronic information are each second transmitted between and among American businesses and their international associates, and among owners of personal computers. This has been the case for a decade and is now increasing exponentially. And yet the ordinary telephone subscriber and small business, who had fair and equitable access to the postal system and to the voice telephone system, have now been shut off to a significant degree from fair and equitable access to the electronic information services upon which our economy and society increasingly depend.

This is because the local Bell telephone companies, which successfully and successively brought their small business and residential subscribers multi-party, then single-party voice lines, rotary dial to touchtone phones, and operator-assisted long distance to direct distance dialing, have now been virtually barred from the next logical and necessary step -- provision of modern electronic information services. Historically, there has been a national progression of fair and equitable access by all Americans from postal communications in the nineteenth century, to constantly improving voice communications in the twentieth century, to electronic communications as we approach the twenty-first century.

This progression was moving briskly forward under the federal and state agencies charged by Congress and state legislatures with this responsibility. It is now hamstrung, however, by the assertion of broad jurisdiction by a particular federal judge and his law clerks, whose role began as the arbiter of an antitrust case involving services other than the information services addressed here. The circumstances, while perhaps understandable, have now become intolerable. The court is well-equipped to assess the possibility of antitrust harms. But it is simply not prepared, nor charged with the ability or responsibility, to detect the severe damage to our economy and society that is wrought by denying modern information services to the great majority of American businesses and consumers. It is as if a court had enjoined the provision of mail delivery or voice telephone service in the past to all but the largest businesses and wealthier citizens.

While we in the United States suffer this indefinite delay, other countries move ahead, most noticeably France. Its Minitel information service terminals now serve millions of small

businesses and the homes of ordinary telephone subscribers, placed there by the same telephone company that brought them prior communications improvements. These subscribers access other subscribers individually or in groups that can "chat". Electronic nationwide telephone directories, shopping services, travel and weather services, banking, news, municipal information services and thousands of data bases serving every conceivable interest from the law to the arts to history and health are offered. These services are available in the United States only to large and medium businesses and sophisticated personal computer owners. The result is that in France small businesses and ordinary telephone subscribers have become part of the new electronic economic and social fabric, with resulting French improvements in economic and social well-being. In France, levels of "information age literacy" are higher and rapidly growing among ordinary businesses and citizens; in the United States we have hardly begun.

The fact that the ordinary American telephone subscriber cannot have his or her basic information service needs and wants met by the most likely provider -- the local telephone company-- means the widespread deployment of new, intelligent broadband networks capable of delivering services to meet greater and different needs and wants well into the 21st century may be delayed in the United States well beyond availability in other countries. If the market for services that could today be provided over the current twisted wire pair plant is not developed and supplied, then the market for more sophisticated and useful services requiring the greater capacity of the broadband network will be retarded. Withholding vast local exchange company resources from the market, in short, is chilling future service and infrastructure developments.

Since the Court has elected to pursue a course of action with such a harmful impact upon the lives and business of the Nation, however unintended, it is now incumbent upon Congress to resolve the matter. By inaction, the Congress relegates the majority of American businesses and people to second-class citizenship in the information age -- second to larger businesses and those who already own personal computers, and second to their counterparts in some other countries with whom we compete for economic and cultural leadership. Too many in Congress have viewed the situation in the context of an antitrust matter, better handled by an antitrust court. Now, the situation must be viewed as well in the context of national and global competence and competition -- both of our companies and our citizens.

Additional barriers exist beyond those imposed by the AT&T consent decree. Outmoded regulatory regimes limit incentives to innovate, prolong depreciation beyond useful economic lives, and delay deployment of new technology and services. They must give way to modern approaches designed to allow all suppliers to meet

modern information service needs. Open Network Architecture, whereby Bell operating companies provide information services, and allow easy access to their networks for third-party providers, is an essential part of the new regime. Limits on prices, rather than profits, will lead to greater incentives to cut costs and deploy new services. Appropriate depreciation schedules will help eliminate disparate levels of services such as in the call waiting and forwarding example outlined earlier.

Our vision contemplates a vast array of information services provided to all American businesses and citizens over a new broadband infrastructure. Experiments by the Bell companies, GTE in Cerritos, California, and others clearly demonstrate that there is some movement in that direction and if, for example, video is primarily provided via broadband cable networks, valuable spectrum would be freed up for mobile radio and other use. Present day vertical calling services, videotex, and voice storage and retrieval are meager compared to the voice/data/video services of the future. As Dr. Shinto, Chairman of NTT, has stated, we are with telecommunications today where we were with electricity when we believed it could only be used for illumination. We cannot, however, reach new levels of demand and supply until current small business and consumer markets are tested.

Our vision is also one of full, fair, and equitable participation by all American businesses and citizens in the electronic information age, just as was the case in the earlier paper and voice information ages. Just as America has had "universal postal service" under the postal laws and "universal telephone service" under the Communications Act, we must now have as our goal "universal information service." We do not believe the Government should provide it, as is the case with postal services and as certain other countries, such as West Germany, now do through government-owned communications monopolies. We believe the same industry that has provided increasing levels of voice service, the local exchange companies, can and should be able to provide it, and can provide it, if free to bring their considerable human and capital resources to bear.

The ordinary small business and residential telephone subscriber may well have some of their information needs and wants met by those now serving the large businesses and personal computer markets. Government should hinder neither potential category of provider and, indeed, should work to encourage and facilitate both. It follows that the information services restriction on the Bell local exchange companies should be lifted, if not by the courts, then by Congress. The regulatory regime should also be improved, tax and other incentives considered, and the steady advance of all Americans into the electronic economy and culture of 21st century should be ensured.

Prior NTIA Reports

A number of recent NTIA reports have already dealt with the ramifications of possible regulatory changes in this country. Our 1985 report, Issues In Domestic Telecommunications: Directions for National Policy, found that then-prevailing FCC regulatory prohibitions on joint marketing of telecommunications services, information services, and equipment were adversely affecting the ability of established telephone companies to compete in meeting major users' communications and data processing needs. Such prohibitions were also found to slow the dispersal of certain information services to the residential customer market. That report also criticized restrictions placed on the Bell companies under the AT&T consent decree on the ground, among others, that information services prohibitions were excessively broad. The 1987 NTIA Trade Report: Assessing the Effects of Changing the AT&T Consent Decree also examined potential changes that could have a positive effect in terms of dispersing new services to the residential customer market.

In a separate but related effort referred to as "NTIA TELECOM 2000," we are currently undertaking a major study of the various telecommunications sectors and information industries. That effort will address information services in conjunction with a larger study of the domestic and international communications sectors, and will provide a basis for policy decisions and developments leading U.S. telecommunications into the 21st century.

Structure of this Report

This review of available information services, in part, is intended to respond to report language which accompanied NTIA's recent authorization bill. NTIA has built upon previous analyses, and has examined extensive data regarding information services available both here and overseas. This report has six major parts:

- (1) A description of recent changes affecting the commercial availability of information services;
- (2) Data on information services presently available in the United States (including government services);
- (3) A description of the legal and regulatory environment affecting information services both here and overseas;
- (4) Data on information services currently available overseas;
- (5) A description of potential new information services; and,
- (6) Principle findings and conclusions of the report.

Comparison of Information Services
Available in this Country and Overseas

This review and analysis of information services available primarily via public telecommunications networks, or "online" information services, addresses both business and mass market aspects. Specifically, three distinct markets have been identified for purposes of this report:

- (1) large and medium size business users;
- (2) households and small businesses with personal computers; and,
- (3) ordinary small business and residential telephone subscribers.

References to the "mass market" encompass the last category.

We have conducted an extensive survey of materials concerning information services available in this country. We have also compared the offerings here to those available in a number of other developed countries, as summarized below. This data reveals that the U.S. information services market is strong and growing, but mass market customers have not fared as well as larger business users and personal computer (PC) owners. Many services are available to the latter group. In fact, services available to these users in this country appear to equal or exceed what is available for their foreign counterparts.

The same is not true for the U.S. mass market, which lags behind in service availability compared to some foreign countries. Most notably, U.S. mass market services are undeveloped when comparing penetration here to France. In the United States, information service vendors presently have only about 2.3 million subscribers, which are all business and PC owners. In contrast, almost twice that number of French subscribers have access to the French Teletel service through Minitel terminals provided by the telephone company at little or no up front cost. This statistical comparison is particularly significant considering that the United States has about four times the population, five times the number of phone lines, and seven times the Gross National Product of France.

United States Information Services

Information services have been categorized in this report into seven potentially overlapping groups, and detailed descriptions of many services have been provided. The seven types of services are: consumer videotex; access and retrieval services; messaging services; transactional services; personal

and environmental management; computing services; and code and protocol conversion. Much of the emphasis in the report is on videotex services, however, because that is the type of information service many experts consider most likely to be used by the mass market consumer. For purposes of this report, videotex is defined as a group of information services delivered via telecommunications networks and displayed on a video terminal, and can include all or several of the other categories.

Online databases and interactive services experienced significant growth in the 1980s in both the business and mass market sectors. One source indicates, for example, that 3,369 databases were available via 528 online services in 1987, compared to only 400 databases available via 59 online services in the 1979-80 period. The benefits of such growth have not been uniformly felt by all sectors of the American public, however.

The business information services market is robust, and currently has about \$5 billion in annual revenues, with a forecast of \$15 billion for 1992. The number of databases doubled between 1981 and 1985, and records contained in databases grew from 52 million in 1975 to 1.68 billion in 1985, a 32-fold increase. Business uses extend into the legal, financial, and journalistic fields, among others, with reliance upon numerous databases, electronic mail services, transactional services, and a multitude of other possible applications.

In contrast, the mass market, as represented by videotex progress, has not seen such robust growth. More than two dozen videotex services and systems are in operation in the United States. The total number of subscribers to mass market videotex was slightly over one million in 1987, with revenues of \$114.8 million. All are business or residential PC owners with modems and telecommunications software. Viewed in the context of the total U.S. telecommunications industry in 1987 -- with service revenue exceeding \$127 billion, and serving about 83 million American households -- videotex services reached a rather small percentage of the U.S. population.

Information Services Overseas

The European market has shown an average annual growth rate of 27 percent between 1982 and 1985. The current size is estimated to be almost \$1.2 billion, with a market of more than \$4 billion expected by 1990. There are over 1,800 database producers and information providers in Europe, with about one-half being online.

A number of European countries have developed information services specifically aimed at the mass market. France, for example, is particularly well-known for its Teletel service, using the Minitel terminal. As of 1987, 65 percent of the

Minitel terminals were in residences, with 35 percent in business establishments. Upon initiation of Teletel service, electronic directories became commonly used, together with a host of other services for purposes such as leisure and games, general information (news, municipal information, local events), general interest (teleshopping, mail order, reservations, travel), banking and finance, specialized business and professional information, and related databases.

At the end of 1987, the French Teletel service, with more than 3.7 million subscribers, provided more than 7,300 different services. System usage resulted in more than 1 million hours of connect time for electronic directory service alone, and 4.8 million hours for other information services. Videotex revenues collected totaled \$510 million, including \$73 million for TRANSPAC (the packet switched network), and about \$240 million going to the information providers.

A number of other developed countries have also been developing mass market information services to be provided over public telecommunications facilities. West Germany, for example, offers Bildschirmtext, an interactive videotex service aimed at the general consumer.

Other examples of overseas mass market services include CAPTAIN in Japan; CETI, which plans to introduce a variation of the French Minitel in Canada; ALEX, which is being introduced by Bell Canada in its market; Prestel in the United Kingdom; and an Australian videotex service called "Viatel."

The Legal and Regulatory Environment in the United States and Overseas

In general, there is more direct government involvement in Western European online information services than in this country, which relies principally on marketplace forces. Overseas information service ventures tend to be closely tied to regulated telecommunications activities, whereas information services growth in this country is more closely associated with private ownership of personal computers and an unregulated data processing sector.

The United States

While information services in this country are not, in general, directly regulated, there are a number of distinct regulatory layers that come into play when considering the offering of such services, particularly by regulated common carriers. The FCC has long promoted and maintained an unregulated environment for the offering of information services by non-common carriers, but has been actively involved in establishing the terms and conditions under which certain regulated carriers

could offer such services. Further, the states' jurisdictional authority over intrastate common carriage may sometimes lead to policies or rules which have an effect on the provision of information services.

The AT&T consent decree court has more recently become enmeshed in a regulatory role by deciding what types of information services the Bell Companies may or may not provide, and under what terms and conditions. AT&T and GTE are also subject to certain court restrictions affecting their roles in the provision of information services. Further, court restrictions on Bell company manufacturing, as well as related research and development, now prevent those companies from being able to develop or build an information services terminal particularly suitable for mass market applications.

These various regulatory layers are not always in harmony with respect to policies aimed at furthering information services growth by U.S. companies. This is the case, for example, in relation to the FCC's recently instituted set of non-structural safeguards for the offering of information services by AT&T and the BOCs. Included among these safeguards are Comparably Efficient Interconnection (CEI) and Open Network Architecture (ONA).

CEI and ONA were premised on the understanding that those carriers would be engaged in providing information services. The purpose of CEI and ONA is to provide non-discriminatory access to network functionalities for use by the carriers and their competitors in providing information services -- thereby spurring information services growth both by regulated common carriers and unregulated information services providers. Policies of the AT&T consent decree court preventing the BOCs from more fully engaging in the provision of information services, however, impede such FCC policies by reducing incentives for faster development of both CEI and ONA capabilities.

Foreign Countries

A number of foreign administrations have been actively involved in promoting information service offerings over their public networks. Overseas telecommunications networks and terminal equipment, including rates and conditions of offering, are usually controlled by a government-owned monopoly, with some exceptions. A number of these institutions have taken measures in conjunction with their authority over telecommunications to see that the public also receives a variety of information services.

Probably the best known example of government involvement is the role of France Telecom in making its Teletel service a success. That company distributed the Minitel terminal (a small,

easy to use apparatus) free of charge to many homes, resulting in widespread use of the various information services offered. Other countries too have been engaged in subsidy plans or other government programs to implement mass market information services. While we do not suggest the same approach would be suitable here as overseas, the point is that foreign countries tend to exhibit a more coordinated effort to promote information services, in contrast to the United States, where differing government policies are sometimes in sharp conflict.

Forces Needed to Spur Information Services Growth in the United States

We have attempted to determine what is needed to establish a critical mass to ensure the success of new online information services, particularly for mass market use. Whereas some other countries may have achieved a critical mass through government initiated subsidy programs, there are other more appropriate measures that could work to stimulate growth of the U.S. information services industry.

One needed measure is removal of certain regulatory impediments to the Bell companies' manufacture and offering of low-cost information services terminals of their own design to meet their own market needs, as well as their offering of various information services which could be important magnet services, attracting and retaining a critical mass of users. This survey found that at present, the state of information services in the United States is largely a function of the dispersion and sophistication of personal computers used as information services terminals. Today, there are only 15 million U.S. households with personal computers, with a 40 to 60 percent increase forecast for 1990, but only a small fraction are connected to telephone networks.

The largest untapped market in this country, however, consists of the ordinary small business and residential telephone subscribers, who most likely do not own a sophisticated personal computer. There is no widely distributed Minitel-type, low-cost, mass-marketed information services terminal that can be connected to the public switched network to provide easy access to information services. This shortcoming could potentially be rectified if the Bell companies are permitted to manufacture terminals, as well as to offer more information services.

Entry by the Bell companies into the information services market would thus be a positive force. They are in a position to provide magnet services, such as electronic white and yellow pages, which could draw the American public into using these and other information services on a widespread basis. This does not mean that we support unregulated Bell company entry into every service. For example, in separately recommending provision of a

"video dial tone" by local exchange companies, we urged they continue to be restricted from providing video programming in their local service areas (but not so restricted outside their service areas). This conclusion was based largely on the fact that most cable companies are themselves prohibited from providing traditional local exchange carrier services. Further, NTIA maintains as a general proposition that the FCC, not the AT&T consent decree court, is the appropriate entity to decide which information services the Bell companies may provide, subject to appropriate regulatory safeguards for competitors and the public.

Principal Findings and Conclusions

o The future development of the information services industry in this country is vital to the ability of American companies to become more competitive both at home and abroad and to the ability of all Americans to become part of the economic and social fabric of an electronic society, just as they are part of the voice telephone society.

o The U.S. online information services industry is strong and thriving for larger business users and those willing to purchase a personal computer, modem, and software, and subscribe to particular information services.

o The U.S. mass market lags far behind that for larger business and residential PC owners, and also lags far behind the mass market developing in some other countries.

o A major component of the mass market is the household with an ordinary telephone subscriber who is not likely to own a personal computer, and who would benefit from availability of a low-cost, user-friendly information services terminal.

o Removal of certain regulatory impediments could accelerate the growth of successful mass market information service offerings in this country, by allowing our largest local telephone companies to offer information services and to produce suitable information services terminals.

o The development and marketing of terminals, as well as of information services, should be left to the competitive marketplace, although appropriate government policies regarding the offering of information services by regulated common carriers can serve to further spur such growth.

INTRODUCTION

The National Telecommunications and Information Administration (NTIA) is responsible under Executive Order to "conduct and coordinate economic and technical analyses of telecommunications policies, activities, and opportunities," and to "conduct studies and make recommendations concerning the convergence of computer and communications technology."^{1/} In view of its responsibilities, NTIA has prepared and published a number of extensive and detailed reports regarding both domestic and international telecommunications and information developments. This report is NTIA's first detailed survey of information services available here and abroad, and is intended to include NTIA's response to report language that accompanied NTIA's 1988 authorization bill (see Appendix A).

In a separate but related effort, NTIA is undertaking a major study of the various telecommunications sectors and information industries to establish the policy foundations for the future. To be incorporated in a far-reaching document entitled "NTIA TELECOM 2000," that effort addresses information services not as a separate and distinct item, as does this report, but in conjunction with the larger domestic and international communications sectors. "NTIA TELECOM 2000" is expected to be completed in the fall of 1988 and will provide a basis for policy decisions and developments leading U.S. telecommunications into the 21st century.

Communications Policy Concerns

Increasingly since the early years of this decade, there has been concern that some of the extensive state, Federal, and, now, judicial regulation of the U.S. telecommunications industry may be adversely affecting the development of the U.S. information services business, restricting new service choices available to the general public. Concern over the impact of telecommunications policies on the computer and associated information services business, of course, is not new.

Twenty years ago, some experts concluded that the then-prevailing cost and technical characteristics of the public-switched telephone network could distort the efficient development of the computer-related information services business. Technically, the network was primarily analog in character; telecommunications costs and thus prices were

^{1/} Executive Order 12046, Sections 2-410, 2-412, 3 C.F.R. (1979).

declining less rapidly than in the case of computers; and, there was concern that telecommunications links might prove to be technological obstacles to the development of efficient, interactive information services, or artificially push computer technology toward distributed processing (as distinguished from remote access of centralized computing facilities as was then predominant).

More than a dozen years ago, the potential expansion of traditional common carrier economic regulation to encompass new information services was a significant public policy concern. At issue was whether economic or entry regulation of such services, or both, might undesirably ensue as telephone companies provided an increasing array of new, communications-computer "hybrid" offerings. Also raised were concerns that basic telephone users might be required unfairly to pay through their rates for facilities also used to provide computer-related offerings employed chiefly by business customers.

Previous NTIA Reports

More recently, concerns have been raised regarding the impact of traditional regulatory, and newer judicial, constraints placed on AT&T and the Bell companies, which constitute more than 80 percent of the U.S. telecommunications industry. NTIA's 1985 Issues in Domestic Telecommunications: Directions for National Policy report found, for example, that then-prevailing regulatory prohibitions on the joint marketing of telecommunications equipment, services, and certain information services was affecting the ability of established telephone companies effectively to compete in meeting major users' communications and data processing needs, and also was slowing the dispersal of certain information services to the residential customer market.^{2/}

That report found that certain information services were most likely to be offered to residential users by companies which already had an established customer relationship, such as local telephone companies. The sheer marketing costs otherwise involved, especially when measured against potential short-run profits, probably would slow the dispersion of such new services to many residential customers, if telephone company involvement continued to be handicapped or foreclosed. Additionally, the 1985 NTIA report criticized restrictions placed on Bell companies under

^{2/} "Issues in Domestic Telecommunications: Directions for National Policy," NTIA Special Publication 85-16, National Telecommunications and Information Administration, Jul. 1985.

the 1982 AT&T antitrust consent decree on the ground that the prohibitions against information service provision were excessively broad. NTIA noted, for example, that while the public policy questions presented by Bell company offering of mass media-like "electronic publishing" and voice storage and retrieval services differed greatly, the prevailing judicial regime indiscriminately precluded both possible offerings.

The 1987 NTIA Trade Report: Assessing the Effects of Changing the AT&T Antitrust Consent Decree again reviewed the information services marketplace, to assess the likely benefits and potential costs of changes in the 1982 antitrust consent decree.^{3/} The report concluded that changes in the then-prevailing limits on Bell company provision of certain information services could and should be made which would clearly have a positive effect in terms of dispersing new services to the residential customer market. At the same time, these changes were unlikely to affect adversely the efficient and competitive growth of the information services business generally.

The Trade Report also noted the not inconsiderable benefits which increased use of telephone plant might engender, given current low average total usage levels (some 24 minutes per residential line per day) and the substantial capital invested in common carrier facilities (estimated to amount to some \$160 billion in net current assets for the Bell companies alone). Furthermore, NTIA noted that the public interest would be served by altering regulations which discouraged continued investment in and technological development of the public-switched telecommunications network.

In 1987, the House Telecommunications Subcommittee commendably explored the factual basis for the oft-repeated contention that several information services are routinely offered overseas which, because of Government constraints, are not widely available to residential customers in the United States. NTIA and other expert Federal agencies, as well as a number of industry representatives, participated in this inquiry.^{4/} Additionally, in 1987 the Department of Justice, acting on behalf of the Executive branch, sought changes in the AT&T consent decree for the purpose, among

3/ "NTIA Trade Report: Assessing the Effects of Changing the AT&T Antitrust Consent Decree," National Telecommunications and Information Administration, Feb. 4, 1987.

4/ Hearings on Modified Final Judgment Before the Subcomm. on Telecommunications and Finance of the House Comm. on Energy and Commerce, 100th Cong., 1st Sess., (Jul. 30, 1987).

others, of fostering greater choice by actual and potential information service customers, both business and residential.^{5/} The FCC, moreover, took steps to lessen regulatory restrictions that many believed needlessly hobbled telephone companies' marketing efforts.^{6/}

Structure of Report

This report builds upon previous NTIA analyses in this field, including a comprehensive review of international telecommunications and information policies prepared and published in 1983 at the direction of the Senate Committee on Commerce, Science, and Transportation.^{7/} This report has six parts, plus appendices that include a summary of available information services and other documentation.

First, information is provided regarding the communications and information services sectors generally, particularly the commercial availability and other changes which have occurred in recent years.

Second, some information is set forth with respect to specific commercial offerings denominated "information services"; and a detailed discussion of some of these offerings, and associated commercial activities, is presented.

Third, the regulatory and legal environment surrounding these offerings is discussed. Reviewed briefly are actions recently taken by the AT&T antitrust consent decree court altering that judgment's limitations on Bell company activities in this field.

Included, but less extensively discussed in this report are the numerous electronic information services and related activities of Federal, state, and, in certain instances,

^{5/} U.S. Dept. of Justice, "Report and Recommendations Concerning the Line of Business Restrictions Imposed on the Bell Operating Companies by the Modification of Final Judgment," United States v. Western Electric Co., C.A. 82-0192 (D.D.C. Feb. 2, 1987).

^{6/} Amendment of Section 64.702 of the Commission's Rules and Regulations, Report and Order, 104 FCC 2d 958 (1986). Modification on reconsideration, 2 FCC Rcd 3035 (1987). further reconsideration, 3 FCC Rcd 1135 (1988).

^{7/} "Long-Range Goals in International Telecommunications and Information," Committee Print 98-22, U.S. Senate, Committee on Commerce, Science, and Transportation, Mar. 11, 1983.

local government entities. In contrast to most other governments, the U.S. Government currently employs a large number of government-owned and operated electronic information systems, both to fulfill internal Government requirements and to facilitate the dissemination of information to the public. These systems range from scientific and technical data retrieval services to library and bibliographic research services. Additionally, the Board of Governors of the Federal Reserve System currently operates the most extensive electronic banking and payments network in the world. Any comprehensive assessment of the total gamut of electronic information offerings available to U.S. businesses and the public necessarily should take this array of Government-provided services into account. As reports issued by the House Committee on Government Operations over the years have shown, such operations constitute a large part of the total information services available in the United States.

Fourth, a description of the most prominent electronic online information services offered in several major developed countries is set forth.

Fifth, potential new services are identified and possible investment costs and implementation schedules are discussed. Regulatory roadblocks are identified. The capability of the telecommunications industry to provide these offerings is also discussed.

Finally, principal findings and conclusions are summarized, and information regarding the steps (including new investment) needed to offer certain residential information services in the United States is provided, as requested by the Subcommittee.

I. FORCES FOR CHANGE AND PROGRESS

Previous NTIA reports have identified several major technical, economic, and demographic factors, and other developments which have greatly affected telecommunications and associated commercial sectors over the past two decades. These factors include:

* New technologies. Microelectronics, communications satellites, and fiber optic (optoelectronic) technologies constitute revolutionary demand-inducing and cost-reducing technologies that are also amenable to ubiquitous application. They have radically altered the cost equation for conventional offerings, such as voice telephone service, while also facilitating the commercial provision of a diversity of new communications and information services.

* Globalized and converging markets. Today, most communications equipment and an increasing number of communications service markets are experiencing world-wide competition, in marked contrast to the relatively closed, noncompetitive conditions that prevailed 20 years ago. Additionally, most communications networks are intensely computerized, and most computers communicate, or could do so.

* Major shifts in business demand. Communications expenditures have approximately doubled over the past 20 years as a percentage of U.S. Gross National Product to about 5 percent. U.S. investment in computers and data processing has grown even more quickly, from about 3 percent of total business investment in durable goods to nearly 24 percent today. This growth in communications and computer expenditures reflects business judgments that such leverage technologies afford the means to compete more efficiently, both at home and overseas.

* Substantial changes in consumer demand. With certain basic communications needs having long been satisfied universally, the consumer market's priorities have shifted toward satisfying a diversity of additional desires. This shift has been fueled by: (a) significant real income gains enjoyed by American families, particularly since 1981; (b) rapidly increasing computer literacy, especially among those aged 35 to 44, who are experiencing peak earning power; and (c) much greater participation by women in the workplace which, in turn, has engendered demand for time and effort-saving, new technology-dependent services.

* Fundamental structural and regulatory change. The removal of regulatory barriers to competition, the breakup of the Bell System, and the Federal Communications Commission's (FCC) policy to avoid economic regulation of new, computer-related communications services and providers, have yielded a more technologically and commercially dynamic environment conducive to rapid growth, as well as to the provision of services responsive to shifting business and consumer demand.

Prominent among the consequences of these forces for change and progress is the development of that sector commonly referred to as the "information industry." Encompassing diverse commercial activities including remote-access data processing, computer database retrieval, interactive offerings including videotex, "electronic banking," and other financial and payments services, the electronic information business today accounts for at least \$20 billion in U.S. domestic revenues yearly, and at least a comparable amount abroad. The U.S. information services business has developed differently from that overseas,

however, due to different economic and regulatory conditions.

Information services in the United States developed in response to diverse user demand, ranging from some individual consumers, to educational and public service organizations, to small and mid-sized companies, and, particularly, major, multinational corporations. The U.S. industry also developed without direct major involvement, at least until quite recently, of the two companies which for years were considered commercially dominant in the communications and computer fields, namely AT&T and IBM.

By virtue of a Government antitrust consent decree entered in 1956, AT&T and the then-associated Bell companies were limited to retailing communications services, the charges for which were subject to public regulation. AT&T was permitted to employ computers and associated information handling and dissemination services in support of its permissible retail activities and, indeed, did so. AT&T was, prior to the 1984 Bell System breakup, the second largest user of computers after the U.S. Government. Two of the largest non-Bell telephone companies, GTE Corp. and United Telecom, were (and are) major factors in the computer data processing retail market. In general, however, franchised telephone companies have played little role to date in the development of the U.S. information services market.

Under yet another antitrust consent decree, and pursuant to settlement agreements reached in private antitrust litigation, IBM focused primarily on marketing computer equipment, not data processing or related communications services. IBM transferred its Service Bureau Corporation affiliate to Control Data Corp. in the early 1970s, and it was not a major factor in the initial commercial development of computer communications or "information" services targeting business customers.

II. INFORMATION SERVICES IN THE UNITED STATES

This review and analysis of information services available via the public telecommunications networks, or "online" information services, in the United States addresses both business and mass market aspects and emphasizes videotex and business information services. The term "mass market" generally means the home consumer market, but there is some inevitable overlap with some information services attractive to both businesses and mass markets.

A. TYPES OF INFORMATION SERVICES

Information services available via the public telephone networks can be generally categorized into seven different types, some of which can be further sub-categorized into business and consumer applications. The distinctions among the definitions are not always precise, for there is some overlap among some of the categories, e.g., some database retrieval and messaging systems are available via consumer videotex firms.^{8/}

The dependence upon public-switched telephone networks of these services, and the costs which they place on such networks, also differs. Credit card verification services, for instance, typically handle many communications, but each message is of very short duration. In contrast, remote access data processing may involve fewer messages, but each message may be of some hours' duration. Differences among services, as well as how they make use of telephone networks, are discussed in greater detail subsequently in this report.

1. Consumer Videotex. These consumer and residential services are relatively easy-to-use, low-cost services allowing residential users to store and retrieve information or perform transactions electronically. They frequently provide access to the other information services described

^{8/} The listing draws on the Huber Report developed for the Department of Justice (The Geodesic Network -- 1987 Report on Competition in the Telephone Industry, 1987) which, in turn, draws on SRI International, Information Gateways, 1985. The listing also draws on a report prepared by Link Resources for ADAPSO and used as Appendix A to the ADAPSO comments in the FCC proceeding to impose access charges on enhanced services providers (Comments of ADAPSO on Amendments of Part 69 of the Commission's Rules Relating to Enhanced Services Providers, CC Docket 87-215, Sept. 24, 1987).

below. Examples of videotex vendors are CompuServe and GENie. Businesses may also make use of such services.^{9/}

2. Access/Retrieval Services. These services provide on-line information on compilations, Government documents, bibliographic information, financial data, and more. Typical users are libraries, researchers, banks, and stock brokers. The information vendors include database/retrieval services such as LEXIS, DIALOG, and public announcement services.

3. Messaging Services. These services permit users to address, dispatch, temporarily store, and retrieve information. Storage may be incidental to delivery and may not be the principal function of the service. Examples include electronic mail, voice storage and retrieval, and opinion polling.

4. Transactions. These services authorize or perform settlements for transactions such as credit card purchases, bank withdrawals, and shop-by-phone.

5. Personal/Environmental Management. These services monitor, measure, diagnose, and control the users' information, equipment, entertainment, or environment. Home telemetering alarm service is one example.

6. Computing Services. These services enable the customer to use the computing and storage power of the remote computer via timesharing. For example, businesses having large inventories often use such services.

7. Code and Protocol Conversion. These services are low-level network support systems required by many other information services. Examples are the code and protocol services provided by value-added networks such as Telenet and TYMNET. These services enable incompatible computers and terminals to "communicate" and operate interdependently.

Online databases and interactive services have experienced significant growth in the 1980s in both the business and mass market sectors. The Cuadra/Elsevier

^{9/} The Videotex Industry Association defines videotex in a broad manner as easy-to-use, interactive electronic services. This definition encompasses a very broad range of services including audiotex, CD-ROMs, etc. The definition used in this study will be narrower, primarily covering those non-entertainment services delivered via telecommunications networks and displayed on a video terminal. Alternative technologies, such as audiotex and CD-ROMs, are discussed in Appendix E.

Directory of Online Databases, for example, indicates that 3,369 databases are available via 528 online services in 1987 compared to 400 data bases and 59 online services in 1979-80.^{10/} The growth is largely attributed to decreasing costs for computer hardware and increased computer literacy and awareness. The rapid growth in the number of online searches of databases over the past decade is illustrative: from less than 2 million searches in 1974 to 18 million in 1985.

B. INFORMATION VENDORS, INFORMATION PROVIDERS, AND GATEWAYS

A distinction has evolved in the United States between what, for purposes of this report, are called information vendors and information providers. Information vendors are firms such as DIALOG, The Source, and CompuServe, that for the most part, are retailers of information that is developed by other firms, normally referred to as information providers. Information providers or sources are firms that develop the information, update it, and store it, making it available through vendors. The situation can be viewed as a typical wholesale and retail arrangement. Examples of information providers whose information is available through one or more vendors are the Official Airline Guide, Associated Press, Dun's Marketing Services (Dun and Bradstreet), and McGraw-Hill News.

A few firms are both information vendors and information providers, but these are the exception rather than the rule. Typical examples are Dow Jones News/Retrieval, which provides its own financial information plus information from other sources such as The Washington Post and Standard and Poor's Online; and Mead Data Central, which offers its own legal information service, LEXIS, and other information such as The Washington Post, Associated Press, and TASS.

In the context of the information services business, the term "gateway" has a unique definition: a gateway is a service permitting users to access various information sources offered by other vendors by initially accessing only a single vendor. The first vendor, for all practical purposes, provides a transparency to the user. The information vendor CompuServe, for example, provides access to five other information vendors that make many information sources and databases available. Most recently, the term has been used to describe certain of the services that may now be

^{10/} Directory of Online Databases, Cuadra/Elsevier, vol. 9, no. 1, Jan. 1988.

provided by the Bell companies under the AT&T consent decree.^{11/}

C. CONSUMER VIDEOTEX

Videotex is the information service that many experts consider most likely to be used by the mass market consumer. It is a type of electronic information service that was developed in the 1970s and which began to grow as an industry in the early 1980s. As a two-way medium, videotex permits users to conduct transactions, send and receive non-entertainment electronic messages, and gain access to a wide range of information services.

In the United States, videotex has become popular with many business users as well as a substantial number of computer enthusiasts, particularly middle and upper-income level customers. A recent FCC proceeding on imposing access charges on enhanced services providers generated nearly 500 formal and informal comments and well over 5,000 letters, many of which were from mass market consumers, opposing the charges.^{12/} The letters and formal comments revealed strong interest in information services by businesses using online information; information vendors; information providers; trade associations; specialized carriers; computer hobbyists; and even groups such as rural physicians. A typical comment was from a physician located in a rural area who reportedly needs medical information services to stay current and to aid in diagnosing illnesses, indicating concern that an increase in access charges would make it much more costly to use the online service.

More than two dozen commercial videotex systems are in operation in the United States. The General Interest Services section of TABLE 1 identifies the major retailers of consumer videotex services such as CompuServe, GENie, The Source, and Delphi. These firms largely provide access to a number of information sources and databases maintained by others.^{13/}

^{11/} United States v. Western Electric Co., C.A. 82-0192, slip op. (D.D.C. Mar. 7, 1988).

^{12/} Amendments of Part 69 of the Commission's Rules Relating to Enhanced Service Providers, 2 FCC Rcd. 4305, 4306, CC Docket No. 87-215, (1987).

^{13/} "Information Industry Bulletin 1987 Online Index," Information Industry Bulletin 2/4/88, Digital Information Group, Stamford, CT, used with permission.

The total number of U.S. subscribers to mass market videotex was approximately 720,000 in 1986, and slightly over one million in 1987, with 1987 revenues of \$114.8 million.^{14/15/}

Although notable, the revenues of these services and their customer bases should be viewed in the context of a U.S. telecommunications industry that in 1987 should have service revenues exceeding \$127 billion, and will serve about 83 million American households. Electronic online information services, in short, currently serve only a statistically insignificant percentage of U.S. families. Indeed, total U.S. information subscribers of one million number less than half the current subscribers to France Telecom's Teletel (Minitel) service, despite the fact that there are about five times as many U.S. telephone access lines as in France.

The following discussion reviews some of the significant mass market information vendors. Additional information on consumer videotex is presented in Appendix B.

1. CompuServe. CompuServe is owned by H&R Block and is the largest mass market information services firm in the United States, offering over 400 products and services. The firm originated in the 1970s as a computer time sharing company, and the business generally evolved into information services. The firm had 416,000 subscribers as of March 1, 1988, and is adding five to seven thousand new subscribers per month.

CompuServe had 1987 revenues of \$37.2 million for consumer information service; \$16 million for network services; and \$44 million for business information services.^{16/}

^{14/} "United States Consumer Videotex Forecast - 1986 to 1991," LINK Resources Corp., Report No. 0180, Jul. 1987.

^{15/} "United States Consumer Videotex Forecast, 1987-1992," LINK Resources Corp., Report No. 0206, May 1988.

^{16/} Appendix A to Comments of CompuServe Incorporated, In the Matter of Amendment of Part 69 of the Commission's Rules Relating to Enhanced Services Providers, CC Docket No. 87-215, Sept. 24, 1987.

TABLE 1

Information Services Vendor Statistics
INFORMATION INDUSTRY BULLETIN 1987 ONLINE INDEX

Code	Company	Service	1/1/88	1/1/87	Change
GENERAL INTEREST SERVICES					
p	CompuServe	CompuServe Info Service	400,000	340,000	17.6%
m	British Telecom/Dialcom	Dialcom	250,000	200,000	25.0%
m	Western Union	Easylink	175,000	156,625	11.7%
p	GEISCO	GENie	85,000	37,000	129.7%
p	Source Telecomputing	The Source (1)	70,000	55,000	27.3%
p	General Videotex	Delphi (1)	55,000	45,000	22.2%
	SUBTOTAL		1,035,000	833,625	24.2%
FINANCIAL SERVICES					
p	Dow Jones	Dow Jones News/Retrieval (1)	285,000	240,000	18.8%
t	Reuters	Monitor	135,000	108,368	24.6%
t	Citicorp/Quotron	Financial Info Services	95,759	85,950	11.4%
t	ADP/Bunker Ramo	Financial Info Service	65,000	65,000	0.0%
t	Telerate	Telerate	52,000	45,000	15.6%
t	Knight Ridder	K-R Financial Information (2)	18,500	11,500	60.9%
t	Telerate/CMQ Comm.	AutoQuote	10,500	8,000	31.3%
	SUBTOTAL		661,759	563,818	17.4%
SCI/TECH/PROFESSIONAL SERVICES					
a	Mead Data Central	LEXIS, NEXIS, MEDIS	205,000	200,000	2.5%
p	Dialog Info Services	Dialog	86,000	70,000	22.9%
p	BRS	BRS	54,200	43,893	23.5%
t	PRC Realty	Multiple Listing Service	20,000	14,155	41.3%
t	OCLC, Inc.	OCLC	8,146	7,623	6.9%
p	Info Globe	Info Globe	8,100	6,700	20.9%
c	Reuters/I.P. Sharp	I.P. Sharp Online (1)	6,600	6,300	4.8%
p	Knight-Ridder	VU/TEXT	4,900	3,700	32.4%
p	DataTek	DataTimes	4,300	3,500	22.9%
t	FastFinder	FastFinder	345	170	102.9%
	SUBTOTAL		397,591	356,041	11.7%
CREDIT REPORTING					
l	TRW	Credit Data Service	64,100	59,936	6.9%
t	Dun & Bradstreet	DunSprint	48,000	32,000	50.0%
n	Equifax	Financial Control Service	47,000	40,000	17.5%
l	Chilton	Chilton Credit Reporting (1)	46,000	42,701	7.7%
	SUBTOTAL		205,100	174,637	17.4%
NEWS SERVICES					
p	NewsNet	NewsNet	15,250	14,000	8.9%
f	United Press Int'l	UPI (1)	13,500	15,000	-10.0%
f	Business Wire	Business Wire	1,300	1,050	23.8%
c	Comtex Scientific	Newsgrid/OTC NewsAlert	20	16	25.0%
	SUBTOTAL		30,070	30,066	.0%
AIRLINE INFORMATION & RESERVATION SERVICES					
t	American Airlines	SABRE	62,900	51,905	21.2%
t	United Airlines	Apollo	57,000	38,000	50.0%
p	Official Airline Guides	OAG Electronic Edition	35,600	29,000	22.8%
t	Texas Air	System One Direct Access	25,000	17,475	43.1%
t	TWA/Northwest Airlines	PARS	20,948	15,300	36.9%
t	Delta	Datas Link	12,200	9,400	29.8%
	SUBTOTAL		213,648	161,080	32.6%
	TOTAL		2,543,168	2,119,267	20.0%

(1) Estimate.

(2) Knight-Ridder adjusted to reflect MoneyCenter, TradeCenter, and Commodity News Service terminals.

Note: Online access for each company is counted by the following codes:

a=active user, c=company, f=feed, l=location, m=mailbox, n=customer number, p=password, t=terminal.

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CompuServe's annual revenues and profits are presented in TABLE 2 and it should be noted that CompuServe obtains revenues from business information services and from its communications network as well. (The business information services part of CompuServe is discussed in the Business Information Services section.)

TABLE 2

COMPUSERVE TOTAL REVENUES AND PROFITS^{17/}

<u>Year ending April 30</u>	<u>Revenues</u>	<u>Profits</u>
1987	\$102,855,000	\$15,494,000
1986	\$84,986,000	\$10,000,000
1985	\$68,862,000	\$7,153,000

CompuServe maintains some of its own databases, but the major usage is for information supplied by outside providers. The firm has experienced significant growth in the number of monthly "dialups" and minutes-of-use since its inception in June 1982. The usage data is presented in TABLE 3.

CompuServe states that the system can be accessed by either a simple French Minitel-type terminal that does not have processing capability, or by more sophisticated personal computers. CompuServe can be accessed in over 500 cities with a modem, communications software, and a local telephone call, and it is available in 74 countries. CompuServe has its own value-added packet switching communications network serving about 1300 nodes.^{18/}

CompuServe conducted a survey of its subscribers and found that 96 percent of its customers use personal computers at home and 75 percent use them at work. Furthermore, the typical user is 37.7 years old with an average annual household income of \$56,000. The survey found

^{17/} Data provided by Mr. Kent Hickman, Office of the Chief Financial Officer, H & R Block Co., Kansas City, MO, May 1988.

^{18/} "Videotex Project Reviews VI," H.J. Sloan III and W. W. Talarzyk, College of Business, Ohio State University, Working Paper Series, WPS 88-20, Apr. 1988.

that 94 percent of the users were male and 64 percent were college graduates.^{19/}

TABLE 3
COMPUSERVE TOTAL USAGE^{20/}
(Per Month)

<u>Mo./Year</u>	<u>No. Dialups</u>	<u>Minutes of Use</u>
June 82	595	9,100,000
June 83	1005	14,373,000
June 84	2000	21,307,000
June 85	3170	29,509,000
June 86	5237	31,818,000
June 87	6860	38,408,000

2. GENie. GENie is operated by GE Information Services (formerly GEISCO) and has been in business since October 1985, during which time the number of subscribers grew from zero to 100,000 as of May 1988. The information services business originated from the General Electric computer services time-sharing business. GENie is adding five to ten thousand new subscribers per month and projects 188,000 subscribers at the end of 1988. Usage is 95 percent home consumer, with the most popular information source being the Apple Macintosh bulletin board, followed by the IBM Personal Computer user bulletin board. Overall, GENie has on the order of 120 different information products available. The firm reports that a simple Minitel-type of terminal can access the system, as will low end computers such as the Commodore 64 and Texas Instruments TI-99/IV, and more sophisticated personal computers. GENie does not maintain its own databases, but rather provides the services of others. It passes on 10-20 percent of its user fee to the information provider.^{21/}

^{19/} "Research," Interactivity Report, no. 9, Nov. 1987.

^{18/} Appendix B to CompuServe comments.

^{21/} Information provided by General Electric Information Services Company, Rockville, MD, Apr. 1988.

3. The Source. The Source was originally established by several entrepreneurs in 1980 and majority interest was later purchased by Readers Digest in 1982, and it now operated by Welsh, Carson, Anderson, and Stowe. Its customer base of 70,000 is divided 60:40 between business and home usage, respectively. Electronic messaging is the most popular service, followed by investment information. The Source reports that it has "hundreds of services," including some services such as UPI News that themselves have many different services available. The firm has 30-40 external information providers and about 10 internal information services. Again, a simple terminal such as a French Minitel can access the system, as will more sophisticated personal computers. The subscriber base is growing at an annual rate of about 20 percent. Nine to 15 percent of the user fee is normally passed on to the information provider, although the rate may differ substantially for more costly information such as stock brokerage research reports.^{22/}

4. Prodigy. With operations beginning in the summer of 1988, the Prodigy Services Co., formerly known as Trintex, is expected to be a major force in mass market information services. The firm is jointly owned by IBM and Sears, which reportedly invested over \$250 million into the effort. "Prodigy" is described as an interactive personal service.^{23/}

Prodigy opened its initial markets in the San Francisco, Atlanta, and Hartford areas in the summer of 1988, and it plans to have a nationwide system operating within three years. Over 240 databases and information services will be available along with 30 "expert services" -- unique dialogue services with experts on various subjects such as politics or sports. Prodigy will have its own data bases in addition to outside data and information sources.^{24/}

Prodigy will require the consumer to have a computer with capabilities equivalent to at least an IBM or Apple personal computer with a memory of 512 kilobytes and appropriate graphics, with color graphics preferred. Rather than having a price based on usage, the Prodigy service will

^{22/} Information provided by The Source, McLean, VA, Apr. 1988.

^{23/} "Are IBM and Sears Crazy? or Canny?" Fortune, vol. 116, no. 7, Sep. 28, 1987, p. 74.

^{24/} Information provided informally by Prodigy, May 1988.

be sold at a flat monthly rate, with the initial price expected to be on the order of \$9.95.^{25/}

5. QuantumLink. QuantumLink is operated by Quantum Computer Services, Inc. of Vienna, Virginia, a firm founded in May 1985. It is an independent firm with financial backing from the venture capital subsidiaries of firms such as Citicorp, Allstate Insurance, and Hambrecht and Quist. The number of users has been published as 20,000 at the end of 1986.^{26/}

Quantum claims to be the second largest consumer-oriented videotex service in the United States, generating as of September 1987, 15 million minutes of access time per month. The QuantumLink service is identified by the firm as the "Official On-Line Service" for Commodore computer users. The service became available to Apple computer users in June 1988 under an arrangement to provide the "AppleLink" service.^{27/}

QuantumLink provides home computer users with a wide variety of educational, and informational material, including educational tutorials; adult education programs; entertainment and news; electronic mail; shopping; reservation services; and interactive forums for the disabled and other special interest groups.^{28/}

QuantumLink is only available from 6:00 p.m. to 7:00 a.m. eastern time. The firm found that telecommunications rates are much higher during other hours, and the expected usage during normal business hours would be insufficient to overcome or otherwise significantly defray the higher telecommunications costs.^{29/}

^{25/} Information provided informally by Prodigy, May 1988.

^{26/} Data obtained from Sloan and Talarzyk note, original source: Viewdata/Videotex Report, vol. 8, no.2, Feb. 1987, p. 5.

^{27/} Comments of Quantum Computer Services Inc., In the Matter of Amendments of the Commission's Rules Relating to Enhanced Service Providers, CC Docket No. 87-215, Sept. 24, 1987, p. 5.

^{28/} Ibid.

^{29/} Information provided informally by Quantum Computer Services, Inc., May 1988.

6. Boston CitiNet. Boston CitiNet, operated by Applied Videotex Systems, is a free online information service available to anyone with a computer and a modem. The CitiNet is advertiser-supported and provides services such as electronic mail (at a \$50 annual charge); real estate information; art and entertainment listings; sports and ski reports; "chat services" (at a slight charge); shopping; business news; education; employment information; and medical and travel information, totaling about 4,000 menu choices.^{30/}

The firm was started by two entrepreneurs at a development cost of \$500,000. The firm projected revenues for 1987 at \$500,000, its reported break-even point. With 35,000 users, the firm claims to be the largest local videotex firm in the United States. The firm has over 100 advertisers that are charged \$600 per month for a "screen" of advertising or a section of a screen (e.g., financial news is sponsored by a bank for \$2000-4000 per month).^{31/}

Boston CitiNet has 12 employees and 45 volunteer "editors" who write material on subjects such as aviation, families, and religion.

The user profile statistics for CitiNet indicate that 60 percent are college graduates with 31 percent having master's or doctor's degrees; 51 percent of the users are professionals; 84 percent are male; and 59 percent have incomes between \$35,000 and \$75,000. The usage pattern indicates that 18 percent use CitiNet several times per week, 29 percent once per week, and 32 percent less than once per week.^{32/}

Boston CitiNet is selling franchise rights to its software. Rights have been sold at prices that began at \$55,000 and have risen to \$130,000 plus 2.5 percent of the gross revenue; or \$500,000 plus one-half of the net profits.^{33/}

^{30/} Correspondence and brochure provided by Boston CitiNet, May 1988.

^{31/} "Boston Videotex Firm Says It's Breaking Even," Business Section, Boston Globe, Jul. 20, 1987.

^{32/} "User Profile," Boston CitiNet, Feb. 1987.

^{33/} "Suddenly, Videotex is Finding an Audience," Business Week, no. 3021, October 19, 1987, p. 92.

Applied Videotex Systems entered into various arrangements with NYNEX and its subsidiary, New England Telephone, in 1987 as part of the NYNEX planning and research activities into data network development. NYNEX sponsored a seminar in late May 1987 at Applied Video Systems where NYNEX reportedly presented its plans to serve as the central gateway to information providers.^{34/}

More recently, Boston CitiNet has been conducting an online questionnaire survey by NYNEX and New England Telephone. The survey asks about the users' interests in gateway packages and their current usage patterns for various information services.^{35/}

7. Cleveland Free-Net. Cleveland Free-Net began in 1984 as a method to exchange messages between five clinical units of the Case Western Reserve University medical complex. Public access to the system was obtained soon afterwards via "leaks" of the bulletin board access telephone number to the general public. By way of the messages sent by the general public, it was soon learned that the public had many questions concerning health and medicine. These questions were answered via the Free-Net by qualified doctors and other medical personnel. Within six weeks, the number of questions grew to 300 per week.

The original concept was called "St. Silicon's Hospital and Information Dispensary" and was an "electronic hospital." That was expanded to an "electronic city" with electronic mail acting as the "post office"; "school house" teaching telecomputing to students; "court house" providing legal information; and "government house" providing information concerning elected officials. The "electronic hospital" was later expanded to include dental and other medical and health information. Figure 1 presents the current information services available from the Free-Net. Plans are to expand to 18 or 19 "buildings" or "houses" with each having a unique information source. A chat line is being considered for the new version.

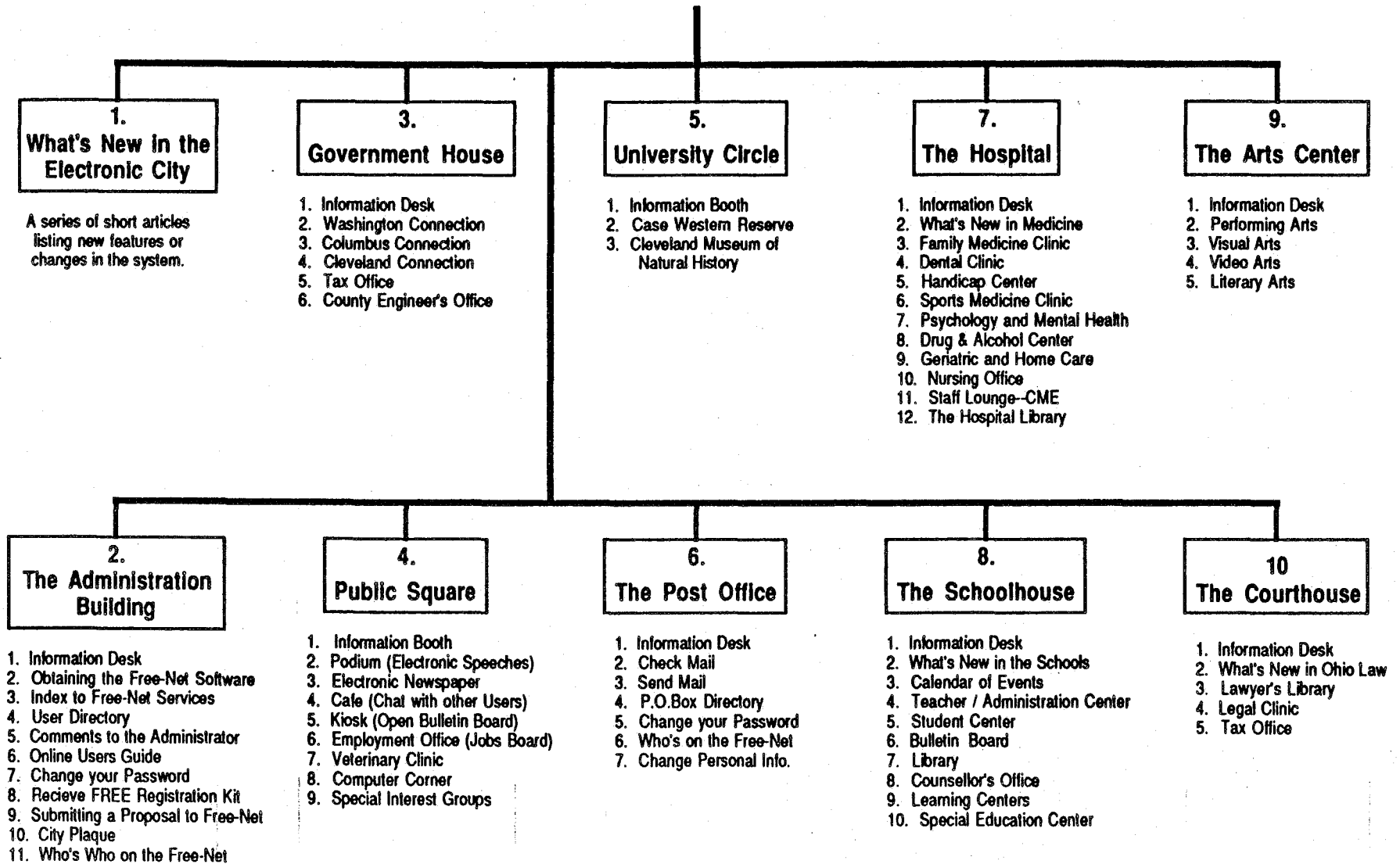
The staff consists of 1 and 1/2 full time equivalent personnel at Case Western Reserve who develop software and manage the system. The system has been funded by equipment donations from AT&T Information Systems in the form of a

^{34/} "NYNEX Reveals Network Plans and Research at Hush-hush Meeting in Boston," Interactivity Report, no. 3, Jun. 1987.

^{35/} "NYNEX, New England Telephone Run Online Survey Via Boston CitiNet, Gateway Due In Summer," Interactivity Report, no. 13, Mar. 1988.

Figure 1
Cleveland Free-Net Services

The Cleveland Free-Net Community Computer System (216)-368-3888 [300/1200 baud]



Model 3B2400 multi-user computer, and grants from Ohio Bell Telephone, University Hospital, and Case Western Reserve.

Free-Net management indicates that the most important element of the Free-Net is the volunteers, i.e. doctors, lawyers, and others that provide the expert answers to the public's questions.

Due to a shortage of resources together with a tremendous demand for information, the Cleveland Free-Net has had to limit the number of subscribers to 5,500 as of May 1988. Even at 5,500 subscribers, there is a substantial waiting time to obtain online access.

One popular application of the Free-Net has been the use of electronic mail by small businesses that cannot otherwise afford to pay the higher charges for a commercial electronic mail service. A second popular application is the teaching of telecomputing to students. Future plans are to make government-created information available via the Free-Net. This would include some census data, county real estate data, and medical information.

The Cleveland Free-Net has spawned the Society for Public Access Computing (SOPAC). Cleveland Free-Net software is being made available on lease for \$1 per year to communities and community organizations such as universities, hospitals, and county governments. The objective is the creation of "community computers" as information centers. As of May 1988, there were centers in 35 cities in various stages of development, with Youngstown, Akron, and Miami systems scheduled to become operational in the summer of 1988. The Miami system will be bi-lingual.

The Cleveland Free-Net user profile is diverse, covering a large number of users from "blue collar" parts of Cleveland, in addition to the more affluent suburbs.

Cleveland Free-Net considers itself as operating in the middle ground between the CompuServe-type service and the services based on the Minitel-type of terminal. The Free-Net director has also examined the potential growth of residential information use and has determined that there is a great need for a simple, low-cost information services terminal that will do for the residential mass market what the Model T Ford did for mass market transportation.^{36/}

^{36/} All information on the Cleveland Free-Net and the Society for Public Access Computing was provided by Dr. T.M. Grundner, Cleveland Free-Net Project Director, and Executive

The Cleveland Free-Net was developed over a 2 1/2 year period at a cost of about \$250,000. The firm estimates that a medium sized city or county could operate a free-net for \$75,000-\$100,000 per year, including staff, operating costs, and equipment.^{37/}

8. U.S. Videotel. U.S. Videotel is an information vendor in Houston, Texas that reportedly has obtained exclusive U.S. rights to the French Minitel technology. Videotel has imported a number of French Minitel terminals and plans to develop an information business using them as the foundation. The terminals will be named "Videotels" in the United States. Personal computers will also be able to access the Videotel information system.

U.S. Videotel modified the Minitel design of the French firm Telic Alcatel using U.S. and U.K. technology and software, and has imported 30,000 units. All system hardware and software has been completed and the firm is in the process (as of May 1988) of developing the information products. The Videotel firm has not decided on the terminal lease or purchase arrangements, or special marketing packages, although a \$18.59 monthly fee has been published that includes terminal rental and one hour of free computer time. There will also be a charge of 10-cents per minute of usage time.^{38/}

According to a publication dated March 1988, Videotel has approximately three dozen services available, including the Official Airline Guide, American Airlines schedules, USA TODAY news stories, and the Compu-U-Card shopping service.^{39/} Home banking is also being planned.^{40/}

U.S. Videotel plans to be in operation in 1988. The firm reports holding joint marketing discussions with several of the Bell companies.^{41/}

Director of the Society, May 17, 1988.

37/ Ibid.

38/ Information provided by Mr. Paul White, Public Affairs Director, U.S. Videotel, Houston, TX, May 18, 1988.

39/ "U.S. Videotel: Another Try at American Videotex," M. O'Leary, Online, vol. 12, no. 2, Mar. 1988, p. 72.

40/ Mr. Paul White, U.S. Videotel.

41/ Mr. Paul White, U.S. Videotel.

9. VICOM Information Service. VICOM was started by the Chillicothe Telephone Company in 1982 in Chillicothe, Ohio as an effort to establish localized information services. Service is provided to Chillicothe and Ross County. The number of subscribers is 300. The VICOM service is an example of a small information services activity that has been in operation for a number of years; it is also notable because it is operated by a telephone company.

VICOM has its own news staff and provides about 4,000 pages of news, weather, sports, and other information, much as a newspaper. Home banking, fast food purchases, games, electronic mail, and a "chat line" are also provided.

A personal computer, modem, and a signal interpreter are required for information access. The subscription fee is \$5 per month with no charges for senior citizens and libraries.^{42/}

10. Telaction. Telaction is an interactive home shopping service that uses a cable television channel for delivery of its shopping information. A telephone is used to control the presentation and selection of the video displays. Operated by J.C. Penney Inc. in the Chicago area since September 1987, the service is available to 125,000 potential subscribers.^{43/}

11. Bulletin Boards. Computer bulletin boards are easily established and enable groups of people to share information with each other. Examples are IBM Personal Computer or Apple computer user groups established in communities throughout the United States. Companies and government agencies can also establish bulletin boards to communicate via electronic mail. Although the number of bulletin boards is difficult to estimate accurately, they number into the tens of thousands. Telenet, for example, has indicated that there are 30,000 bulletin boards accessible to the public via a dial-up telephone line, a personal computer, and a modem.^{44/}

Apple Computer indicates that there are 1015 Apple user groups in the United States, many of which have their own bulletin boards. Apple also has an electronic mail system,

^{42/} Sloan and Talarzyk, p. 53.

^{43/} Sloan and Talarzyk, p. 51.

^{44/} Comments of Telenet Communications Corporation, Attachment A, p. 13, Amendments of Part 69 of the Commission's rules relating to Enhanced Service Providers, CC Docket No. 87-215, Sept. 24, 1987.

"AppleLink," operated by QuantumLink, in support of about 500 of the user groups. The service has been made accessible to all Apple computer users.

The Washington, D.C. area has 240 publicly accessible bulletin boards that are used by special interest groups.

With 27,000 members, the Boston Computer Society claims to be largest computer club in the world. The club has 20,000 members in the local Boston area and supports 17 different computer user groups with bulletin boards.

D. CONSUMER VIDEOTEX PRICES

TABLE 4 presents the prices of some of the widely used mass market information service vendors in the United States. Discounts are occasionally offered on the initial registration fees. Additional fees are commonly imposed on the retrieval of some information (e.g., access to an encyclopedia through CompuServe requires an additional monthly fee of \$7.50), and accessing specialized financial information often requires additional charges.

E. CONSUMER VIDEOTEX TERMINALS

1. Personal Computers as Terminals

The state of information services in the United States today, particularly mass market services delivered to home users, is largely a function of the numbers and sophistication of personal computers, which are used as information services terminals in homes and businesses.

For the purposes of this report, three distinct market segments have been identified:

1. large and medium size business users;
2. households and small businesses with personal computers; and
3. ordinary small business and home telephone subscribers.

The mass market consists of the third category.

The largest untapped market is the ordinary telephone subscriber that probably does not own a personal computer, although the future will see more homes with personal computers as American society becomes more computer literate.

TABLE 4

PRICING INFORMATION

Vendor	Registration Fee	Monthly Minimum	Prime Time Rate (Per Hour)		Non-Prime Time Rate (Per Hour)	
			300 Baud**	1200 Baud	300 Baud	1200 Baud
CompuServe	\$39.39	None	\$6.00	\$12.50	\$6.00	\$12.50
Dialcom	\$25.00	\$25.00	\$19.00	\$19.00	\$10.50	\$10.50
Easylink	None	\$25.00	\$21.00	\$30.00	\$12.60	\$18.00
GEnie	\$29.95	None	\$35.00	\$35.00	\$5.00	\$5.00
The Source	\$29.95	\$10.00	\$21.60	\$25.80	\$8.40	\$10.80
Delphi	\$49.95	None Local	\$9.60	\$9.60	\$6.60	\$6.60
		None Long Dis.	\$17.40	\$17.40	\$7.20	\$7.20
QuantumLink	None	\$9.95	Service not available		\$4.80	\$4.80
Prodigy	None	\$9.95/mo. flat rate	none	none	none	none
People/Link	\$15.00	None	\$11.95	\$12.95	\$4.95	\$4.95
PC Pursuit (Telenet)	\$25.00	\$25.00	\$10.50	\$10.50	Covered in \$25 monthly	

** Baud. A baud is the basic unit of modulation rate or signalling speed. One baud corresponds to a rate of one unit interval per second, where the modulation rate is expressed as the reciprocal of the duration in seconds of the smallest unit interval.

There is no widely distributed simple Minitel-type low-cost mass-marketed information services terminal in the United States, whose function it is to connect to the public-switched telephone network to provide easy access to information services. Rather, the terminals being used today are typically personal computers that have been designed and marketed primarily for home and business computing and word processing purposes, and not designed specifically as an information gathering tool. Thus, this analysis of the information services marketplace in the United States must examine the personal computer and its applications, particularly in the mass market area.

The earliest personal computers were aimed at electronic hobbyists, with the MITS/Altair of the 1970s being given credit by many as the first. The MITS/Altair was a rather primitive system requiring home wiring, assembly, and programming by altering the positions of various switches. The output consisted of a series of lights that required decoding.

Two highly significant mass market breakthroughs were the development and popularity of the Radio Shack Model TRS-80 in 1977, and the Apple computer, which was developed in 1976 and gained wide appeal in 1977. Several million of TRS-80 models and about 4 million Apple II models have been sold. Later models have increased in technical sophistication and ease of operation, with more and more software becoming available. The Commodore line of computers was and remains the only line designed to be sold extensively to the mass market consumer.

The next major milestone was the introduction by IBM of its personal computer in 1981. Widely "cloned" and with much third-party software available, the IBM Personal Computer became one of the major standards in the industry. The sales of such IBM and "IBM PC compatible" computers grew rapidly, with prices dropping to the \$500-700 range.

TABLE 5 presents data on the number of personal computers shipped to the home market in the past and projected through 1990.

LINK Resources, a private research firm, forecasts the number of personal computers in U.S. households to be 10-20 percent higher than the U.S. Industrial Outlook figures presented in TABLE 5. The LINK estimates on personal computers are presented in TABLE 6.^{45/}

^{45/} LINK Resources report, May 1988.

TABLE 5
PERSONAL COMPUTER DATA^{46/}

<u>Year</u>	<u>Units (1000)</u>	<u>Cumulative Units (1000)</u>
1981	149	149
1982	1748	1,897
1983	3355	5,252
1984	3430	8,682
1985	2190	10,872
1986	2290	13,162
1987	2050*	15,212*
1988	2010*	17,222*
1989	1975*	19,197*
1990	1910*	21,107*

* Estimated

TABLE 6

FORECASTS FOR PERSONAL COMPUTERS IN U.S. HOUSEHOLDS

Year	Units Shipped (000)	Active IB (000)	US HH (000)	HH with PCs (000)	% of HH Penetrated
1987	4,228	20,563	90,200	17,684	19.6
1988	4,482	24,645	91,600	20,209	22.1
1989	4,661	29,006	93,000	22,625	24.3
1990	4,848	33,554	94,300	25,165	26.7
1991	5,090	38,344	95,700	26,841	28.0
1992	5,344	43,488	96,900	29,137	30.1

SOURCE: LINK Resources Corporation, 1988

(Abbreviations: IB=Installed Base; HH=Households)

^{46/} "U.S. Industrial Outlook 1988," Figure 30-2, p. 30-7, International Data Corporation, 1988.

LINK develops their statistics on the numbers of households with personal computers via statistical surveys of a sampling of 4,000 households. The U.S. Industrial Outlook data is based on shipments of computers manufactured in the United States.

Although there is about a 4 million difference in the 1990 cumulative households-with-personal-computers figures between the two future projections, there is closer agreement on the percentage growth expected in the 1990-92 timeframe. The U.S. Industrial Outlook projects about a 60 percent increase from 1987 to 1990, and LINK Resources projects about a 40 percent increase.

Personal computer use at home is growing rapidly, due to decreased costs, improved ease of use, and more widespread "computer literacy." One trade association estimates that 20 percent of the 90 million households in the United States have at least one home computer -- indicating that perhaps as many as 18 million households have at least one home computer.^{47/}

LINK forecasts that PCs are expected to reach 24.3 percent penetration in 1989, and 30.1 percent by 1992. Modem penetration is expected to break the 20 percent barrier in 1991, and reach 23.9 percent by 1992.^{48/}

A videotex industry association has proposed a "vision" for the industry by the year 2000:^{49/}

- O 97 percent of the North American population will have access to videotex.
- O 50 percent of North American population will actually be using videotex on an occasional basis.

^{47/} Information provided informally by Electronic Industries Association, Apr. 1988.

^{48/} LINK Resources report, May 1988, p. 1.

^{49/} "Industry Vision and Introduction to the VIA Gateway Study," Videotex Industry Association, Draft No. 4, Mar. 8, 1988.

TABLE 7 presents data on the numbers of modems in U.S. households presenting a forecast of the numbers of households having the capability of accessing information sources.^{50/} (A modem is a device used to interconnect a computer with the telephone network. Modems cost \$100 and higher, and additional communications software is required at a typical cost of \$75 and up.)

TABLE 7

MODEM PENETRATION IN THE UNITED STATES

Year	US HH (000)	PC IB (000)	% PCs with Modems	Modem IB (000)	% of HH Penetrated
1987	90,200	20,563	29.2	5,996	6.6
1988	91,600	24,645	35.2	8,677	9.5
1989	93,000	29,006	40.6	11,773	12.7
1990	94,300	33,554	46.8	15,698	16.6
1991	95,700	38,344	50.9	19,527	20.4
1992	96,900	43,488	53.4	23,203	23.9

SOURCE: LINK Resources Corporation, 1988

(Abbreviations: IB=Installed Base; HH=Households)

The future may see the development of the end-user terminal go in several ways: it may become simpler, evolving towards the simple French Minitel terminal without processing capabilities and with self-contained modems; or it may grow in sophistication such as the terminals that will be required for the new IBM/Sears Prodigy information services -- with substantial computer memory, software, and color graphics preferred to access the information. A more likely result is a blend of terminals in the mass market ranging from simple, low-cost types to higher level personal computers.

The disadvantage of the low-cost or "dumb" terminals is their lack of processing capability. This prevents the user from "downloading" the information into his terminal and processing it at his convenience. The low-end user must stay connected online to the information source thus running up online usage charges, whereas the user with a personal computer can retrieve ("download") the information quickly, store it, and process it later.

^{50/} LINK Resources report, May 1988, p. 7.

2. Videotex-Only Terminals. Households with ordinary telephones are the largest untapped market for consumer videotex. Many of these households may in the future purchase computer terminals, but even if they do not, they may accept a low-cost easy-to-use information services terminal. Design variations of the terminal models may also enable them to be used as telephones.

Although they have not been mass marketed, there are videotex terminals available in the United States manufactured and sold by AT&T Information Services, Cardinal Technologies, Northern Telecom, and DigiTel, Inc. A France based firm, Telic Alcatel, has indicated that it plans to manufacture Minitel-type terminals in the United States beginning in 1989.

a. AT&T. AT&T sells their Model 1310 Video Communication Terminal at a price of \$249 and the Model 2300 Video Information Terminal at a price of \$795.

To display information, the Models 1310 and 2300 must be connected by the user to a television receiver or a video monitor. The Model 2300 is an outgrowth of the Sceptre videotex terminal that AT&T developed for the Viewtron service in Florida (see next section for a discussion of Viewtron).^{51/}

b. Cardinal Technologies. Videotex terminals are manufactured and sold by Cardinal Technologies, a small firm in Lancaster, Pennsylvania that was formed via a leveraged buyout of what was formerly a division of RCA. The product line apparently was not suited to the future business plans of General Electric when it purchased RCA.

The Cardinal videotex terminal uses a standard sized keyboard and self-contained modem and communications software. An external monitor such as a TV receiver is required. The basic videotex terminal Model CP 600 costs \$399 in single lots and \$249 in quantities of 100 or more.

Cardinal has been in discussions and conducted market studies with several of the Bell companies to determine the market potential for the Cardinal in conjunction with information services gateways.^{52/}

^{51/} Videotex/Teletex-Principles and Practices, A. F. Alber, 1985, McGraw-Hill, New York, NY.

^{52/} Information provided informally by Mr. Harold Krall, Chief Executive Officer, Cardinal Technologies, May 1988.

c. Northern Telecom. Northern Telecom manufactures and sells the "Displayphone" in the United States. The Displayphone is an integrated unit that combines a telephone with a computer terminal. Priced on the order of \$700, very few units have been sold.

Northern Telecom has also built a special terminal for the ALEX videotex services system that will be offered in December 1988 in Canada by Bell Canada. The unit is self-contained with a small screen and smaller-than-standard sized keyboard, similar in size to the French Minitel terminal.

d. Digitel, Inc. Digitel, Inc. is a firm in Cambridge, Massachusetts that has developed a terminal combining a telephone and a detachable computer keyboard. The modem and communications capability are built into the telephone part of the unit.

e. Telic Alcatel. Telic Alcatel, the largest manufacturer of Minitel terminals, has indicated that it plans to manufacture an "Americanized" version of the French Minitel terminal in Corinth, Mississippi beginning in 1989. The firm also plans to establish a research and development facility in the United States to develop the "next-generation" of information services terminals.^{53/} (Telic Alcatel has existing plants and facilities in the United States as a result of its purchase of ITT facilities.)

F. U.S. CONSUMER VIDEOTEX EXPERIENCES

1. Videotex Failures

An analysis of videotex in the United States should take into consideration the failures of past efforts to achieve a more complete understanding. The most notable failures are Viewtron, Gateway, and KEYFAX.

2 a. Viewtron. Viewtron was a joint venture between AT&T and Knight-Ridder, and the service was formally introduced in 1983. Earlier trials were conducted in Florida in 1980-81. AT&T provided the terminals and the telephone network, and Knight-Ridder provided the information base, computers, and software. The terminals AT&T provided were the Sceptre model, which cost \$600-795, although there were package arrangements.^{54/}

^{53/} Information provided informally by Mr. Henri Laban, Telic Alcatel, Vice President Operations - North and South America, Jun. 13, 1988.

^{54/} Alber.

Viewtron provided banking, shopping, news, and entertainment listings, and operated from 1983 to 1986. Viewtron reached a local subscriber base of around 3,000 with another 17,000 personal computer owners around the country receiving a text-only version of the service. After an estimated investment of \$40 million, the service ceased operation in 1986, giving as a primary reason: "Despite steady growth in the number of subscribers, usage numbers have not kept pace."55/56/

b. Gateway. Gateway was operated by Videotex America, a partnership between Times Mirror and Infomart of Toronto. The service was introduced into the Los Angeles area market in November 1984, and provided news, weather, sports, entertainment, data, games, education services, mail, shopping, and banking. After an estimated investment of \$10 million, the firm withdrew from the market in March 1986, after achieving a subscriber base estimated at around 3,000.57/58/

c. KEYFAX. KEYFAX was operated in a Chicago suburb in 1984-85 by Keycom Electronic Publishing of Chicago owned by Centel, Honeywell, and Field Enterprises (then publisher of the Chicago Sun-Times). KEYFAX dropped out of the market after signing up about 100 subscribers.59/

2. Analysis of Failures

Analysts have examined extensively the failure of previous videotex efforts. Rather than conduct a new analysis here, it is appropriate to review the significant comments of the expert analysts.

55/ Alber.

56/ "Announcement to Withdraw Viewtron Videotex Service," reproduced in "Videotex: Are We Having Fun Yet?", W.W. Talarzyk and R.E. Widing II, Working Paper Series No. WPS 87-72, College of Business, Ohio State University, Jun. 1987.

57/ Alber.

58/ "Videotex: Are We Having Fun Yet?", W.W. Talarzyk and R.E. Widing II, Working Paper Series No. WPS 87-72, College of Business, Ohio State University, June. 1987.

59/ Talarzyk and Widing.

Mr. John McLane, an information services consultant, states:

"Most American consumer videotex ventures haven't had a chance. They have not been market oriented. The "catchability" wasn't there. (Catchability relates to the installed base of terminal devices and consumers ready and able to use the service.) The pricing of the service and the cost of new equipment was high. The "pain" of the learning curve was high, even intimidating. The information content was available elsewhere, and the service had not been customized or made "tailorable" by consumers for electronic delivery. The market perceived no real economic value associated with the service."^{60/}

In his 1985 book on videotex, Bradley University Business School Professor A.F. Alber points out that the key to a successful videotex industry is an affordable terminal. He draws attention to the Minitel system in his discussion.^{61/}

Another observer, LINK Resources, contends out that the "newspaper model" of videotex failed for four principal reasons:^{62/}

o Lack of a focused product. The success was dependent on attracting a sufficient number of users to create an audience of interest to advertisers. None of the database services, however, was attractive enough to attract new subscribers or to retain existing ones.

o Lack of a critical mass of users. A critical mass of users is necessary to attract sufficient advertising revenue to sustain the service. Regional services often attract insufficient numbers of users.

o Emphasis on information rather than interaction. Services that were operated by newspaper publishers stressed information retrieval and had little emphasis on the interactive nature of videotex. The most popular services of CompuServe and The Source involve user interaction, such as those of special interest group bulletin boards.

^{60/} "Developing an Electronic Information Service," J.F. McLane, Proceedings of the Ninth National Online Meeting, New York, NY, May 10-12, 1988, Learned Information, Inc., Medford, NJ.

^{61/} Alber.

^{62/} LINK Resources report, Jul. 1987.

o Revolutionary rather than evolutionary approach to the marketplace. The newspaper strategy required terminals capable of displaying color and graphics, thus complicating the user process, rather than simplifying it through "user friendly" terminals. This complexity severely limited the subscriber base, particularly when a home color television receiver was required to access the service.

Dr. Wayne Talarzyk of Ohio State University, College of Business, summarized in 1987 the interrelated issues believed to be the reasons behind the failure of the regional videotex services:^{63/}

o Dedicated Terminals. Consumers are evidently not willing to pay the extra costs associated with a dedicated terminal. Instead, they may be willing to look for additional ways to make use of their personal computers.

o Small Market. The number of consumers ready for videotex may not be sufficient to support a local or regional system. It may take a national approach to assemble a critical mass of subscribers.

o Limited Usage. Consumers accessed the systems on a sporadic basis. The systems did not have a sufficient base of steady users.

o Advertising Support. Advertisers are not willing to pay the requested rates to reach such a small market making limited use of the available advertisements.

o Graphics Capabilities. Consumers may not be willing to pay the extra costs associated with a graphics-driven videotex system. Such systems are more costly to develop and update and take time to "paint" the graphics on the consumer's screen.

o Systems Operations. The system operators may have invested too much in developing their own databases rather than relying on others to be information providers. Should an operator be a major data provider or merely another "medium" to bring consumers and information sources together?

o News Oriented. These systems were developed by publishing organizations. At the present time, additional sources of news may be of minimal importance to consumers. Their needs may be quite well met through readily available alternatives.

3. Requirements for Successful Consumer Videotex

a. Critical Mass. At least three separate analyses have asserted that a critical mass of users is a key requirement to assure the success of online information services.

Developed in the context of online business information services, McLane defines the critical mass as "the minimum level of certain factors that will motivate a large enough percentage of consumers to economically support a service."^{64/} This definition is sufficiently broad to cover the mass market consumer information services sector.

LINK Resources examines the failures of previous consumer videotex efforts and asserts that the lack of a critical mass of users was a major reason for their failure. LINK indicates that a critical mass of users was not obtained, and that the services were financially draining on the service operators, leading to curtailment after a number of years when no turn-around was apparent. Thus a willingness and commitment to financially sustain a losing and financially draining operation over the long term may be of critical importance in large scale consumer videotex efforts.^{65/}

Coopers and Lybrand analyzed the status of information services by surveying leading executives in industries involved with information technology. Figure 2 presents the evolution of industry growth with the current status being in the "managed growth" phase. Coopers and Lybrand indicates that "the success of the early systems with a burgeoning personal computer user base and greatly reduced packet-switching rates (resulting from overcapacity) have convinced almost everyone that electronic information services are on their way to becoming commonplace."^{66/} The "successes" referred to means the heavy-user niche markets, primarily financial transactions.

^{64/} McLane.

^{65/} LINK Resources report, Jun. 1987.

^{66/} "Electronic Information: Is It Finally Taking Off?" Coopers and Lybrand, 1987.

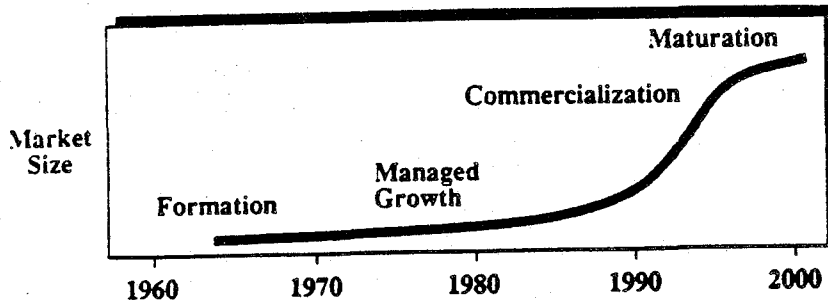


Figure 2. Information Services Industry Evolution
(From Coopers and Lybrand)

One of the principal findings of Coopers and Lybrand indicates that a realistic scenario for the development of the mass market is that it will come about more slowly than that of the heavy commercial users, one niche at a time. They indicate that it is questionable if the industry will continue to evolve along the lines of heavy-user niche markets.

Coopers and Lybrand point out that one of the primary reasons for the failures of early consumer videotex ventures was that the audience never reached a critical mass, where word of mouth and other diffusion factors could have carried it to higher levels of usage. The critical mass is identified as a key element of the commercialization phase.

b. Marketing Aspects. In analyzing the failed consumer videotex efforts, Talarzyk refers to Russo, who stated in concise terms the requirements for a successful consumer videotex operation: "The success of any information service for consumers depends upon consumer acceptance and use. The decision to use a system depends, in turn, upon a cost-benefit analysis from the consumer's perspective. That is, the anticipated benefits to the consumer, both tangible and intangible, must exceed the expected costs."^{67/}

Talarzyk has identified the "success forces" that will be needed for the consumer videotex industry to achieve a reasonable level of market success in the foreseeable future. The main requirements are:^{68/}

^{67/} "From Passive to Active Information Services for Consumers," J.E. Russo, cited in Talarzyk and Widing.

^{68/} Talarzyk and Widing.

o Increased familiarity. It may take time for consumers to become familiar and comfortable with videotex and other developing technologies.

o Cost/Value Advantages. Consumers are willing to pay for products and services which save them time, effort, and money. The problem seems to be that there are not enough consumers that see the value of videotex exceeding costs.

o Functional Shiftability. Consumers may be willing to take on such marketing functions as buying, financing, etc.

o Piggyback Effects. It is probable that a videotex system will come into a consumer's home for some specific application, and other services would then be used.

o New Players. The Bell companies and Prodigy Services are among the likely new players.

o Systems Evolutions. Based on lack of success of the regional systems and the greater acceptance of the national systems, it appears that primarily text-only services will be sufficient for the immediate marketplace, with new services and methods adopted in the future in an evolutionary process.

c. Information Services Terminals. The number of consumers using videotex would likely increase if low-cost terminals (e.g., under \$100), were widely available in consumer electronics and discount department stores. Such terminals should also be "user friendly," thus preventing "computer intimidation" and enabling consumers who are not computer literate to easily operate them.

On the other hand, the "chicken or the egg" situation is apparent without the availability of widespread, easy-to-use consumer information services. The situation is similar to that of the early days of television broadcasting when few transmitters were on the air with little corresponding demand for receivers.

Considerable attention has been focused on the French Minitel terminals (discussed later). The U.S. mass market may prefer a terminal that has some processing capability, (e.g., a device equivalent to a Radio Shack Color Computer model or a Commodore Model 64 with a built-in modem and communications software). Such a unit, however, is not available.

4. Conclusion

a. Perception of Value

If videotex is to succeed, it is critically important that the consumer must perceive that videotex provides value. This perceived value will provide the necessary impetus for the initial subscription, and it is essential for continued use after the initial novelty period ends. The perceived value must be greater than the costs -- both direct and indirect.

The perception of value must be viewed in the marketplace as a whole where strong competition exists-- newspapers; magazines; "800" services; "976" information and "chat lines;" and printed white and yellow pages to name just a few.

b. Critical Mass

A critical mass of subscribers has been identified as a key element that is needed for a successful, large-scale consumer videotex industry. Thus far, firms that have stressed niche markets such as computer hobbyists have been successful. The market has been driven by the computer industry with home computers being used as information services terminals.

The critical mass may be achieved as home computer penetration continues and the populace becomes more computer literate, but most expect that if this approach alone is used, it will be some years before the United States achieves a level of information service availability comparable to that in other countries such as France. Indeed, the district court administering the AT&T antitrust consent decree in March 1988 concluded, based on the record before it, that significant participation by telephone companies was necessary to ensure rapid developments of information services universally offered to a substantial percentage of U.S. households. This view was confirmed in the court's Memorandum, Opinion, and Order, issued June 22, 1988, denying reconsideration of its March order.^{69/}

New consumer videotex firms are also expected to contribute to the creation of the critical mass. There is sufficient room in the marketplace for both large and small firms. It is expected that the entry of more firms into the

69/ United States v. Western Electric., C.A. 82-0192, slip op. (D.D.C. Jun. 22, 1988)

market will be beneficial for all firms as more and more people become aware of the benefits of online information services.

c. Information Services Terminals

One of the likely key ingredients for a successful large-scale consumer videotex industry, many experts maintain, is a low-cost information services terminal. Past consumer videotex efforts required a costly terminal that made the service unattractive from a cost standpoint. The U.S. consumer videotex market is computer oriented, although one firm is importing Minitel terminals.

The U.S. consumer videotex marketplace would greatly benefit if low-cost and easy-to-use information services terminals were widely available in consumer electronics and discount department stores. The marketplace may evolve towards terminal design variations with some terminals having conventional telephone capabilities.

A major component of the mass market is the household with an ordinary telephone that is not likely to purchase a personal computer in the near future. Such households are prime candidates for a low-cost information services terminal.

d. Large and Small Information Vendors

Based on the analyses previously discussed, it can be concluded that the marketplace will support many firms, and it is likely that large national firms, and many regional and localized information vendors, will be the norm. Both niche and more general markets will be served by these firms. These firms are likely to originate from parent firms in the computer business, newspapers and other publishing interests, and from the business information vendors expanding to cover the consumer market. Entrepreneurial "start-up" firms are expected to continue emerging, and they are expected to serve local areas. The advertising-supported information services are expected to be the norm in the future consumer videotex market.

It doesn't necessary follow that the small residential consumer will be actively pursued by the information vendors. Market costs will tend to have firms focus on the larger, "profit-center" customers. No one today seems really interested in serving the "real mass market," at least not in the information services business, at least not until terminals exist in many more homes as is the case in France.

G. BUSINESS INFORMATION SERVICES

The technology and distribution systems for mass market information services are frequently initially developed and deployed for business use. This report will therefore describe today's business-oriented information services, some of which have already, become available and used in the consumer market.

The size of the U.S. business information market is currently about \$5 billion with a forecast of \$15 billion for 1992.^{70/} Business usage of information services is primarily for financial, legal, journalistic, library, credit reporting, and airline and travel information, and electronic mail purposes. In many cases, businesses make use of an information service provider indirectly through a third party, such as a travel agent or stock broker. The public telephone network and the available businesses providing access to information services in the United States also make it very convenient for consumers to simply call such a third party agent to obtain the information, rather than access the information themselves. Furthermore, there is also widespread use of the toll-free "800" service to obtain various information, whether from airlines, car rental companies, hotels and motels, catalogue shopping, etc.

TABLE 1 presents some of the major business information service vendors. An accurate count of the total number of subscribers is difficult to obtain because of multiple subscribership. An accurate estimate of third party or indirect consumer access to such information sources (such as the number of people calling toll-free "800" numbers to make travel reservations) is also difficult to develop.

There are several information vendors in the United States that provide access to a number of information databases, the largest of which are Dow Jones News/Retrieval; Mead Data Central; NewsNet; ORBIT; Data-Times; and DIALOG. Such vendors would typically be used by public libraries and information resource departments of private companies, government agencies, and law firms.

More specialized information vendors are the airline information and reservation services such as SABRE/American Airlines and Apollo/United Airlines.

^{70/} Information provided by Burnell Wright, LINK Resources, Jul. 1988.

The vendor-provider relationship can take several forms. The information vendor may have an exclusive contract with an information provider so that the provider does not make his database available to anyone except that vendor. The non-exclusive relationship, in contrast, permits the database provider to make his information available through a number of vendors.

Online business information services have experienced a robust growth. One indication is that there were 3010 publicly available data bases in 1985 (projected at 4000 in 1988), compared to 301 in 1975. Furthermore, the 1975 figure includes only word-oriented databases, as the numeric, modelling, image, and transaction types of databases had not yet come into the marketplace. Thus the number of databases doubled between 1975 and 1981 and quintupled between 1981 and 1985. The records contained in the databases grew from 52 million in 1975 to 1.68 billion in 1985, a 32-fold increase.^{71/}

Several trade associations exist for the business online information services industry; a number of scholarly research and applications oriented journals are published; and trade shows are held several times per year in the United States, attracting 3,000-4,000 attendees at each show where new products and services are the main attraction. Another measure of the health of the industry is the rapid growth and interests of trade associations. The Information Industries Association, for example, has over 700 members in mid-1988, a large increase over the 300 members in 1984. These activities, together with the growth evidenced by the statistics previously presented, indicate that the trend of the business information services sector in the United States is one of rapid growth in the near future.

1. Examples of Online Business Information Services

The following examples of business services were selected as typical services to develop an understanding of the status of online business information services. Additional information is presented in Appendix B.

a. DIALOG. DIALOG is a subsidiary of the Lockheed Corporation and has been in operation since 1972, beginning as a service for NASA. DIALOG bills itself as the "World's Largest Online Knowledgebank." The firm has over 300

^{71/} "Highlights of the Online Database—Field: New Technologies for Online," M.E. Williams, Proceedings of the Ninth National Online Meeting, New York, NY, May 10-12, 1988, Learned Information, Inc., Medford, NJ.

databases, providing access to over 100 million items such as summaries of articles and reports, detailed financial data, directory listings of companies, statistics and data on various topics, full-text articles, and newswires. Its main clients are public libraries, information centers and libraries of private companies, hospitals, universities, and government agencies, law firms, and to a lesser extent, private individuals.

TABLE 1 presents statistics on the number of subscribers to DIALOG -- 70,000 on January 1, 1987 and 86,000 on January 1, 1988, a growth of 22.9 percent. There is no easy method to determine the number of "secondary" users of DIALOG, e.g., the number of users accessing the service via public libraries.

The online connect rates for DIALOG depend on the type of service accessed, ranging from \$0.25 to \$5.00 per minute, with most services falling into the \$1.00-2.00 per minute range. There are additional charges for offline printing for full records and for other services involving full records. DIALOG employs the TYMNET, TELENET, and DIALNET packet data networks, with local telephone call accessibility in most cities of the United States. DIALOG can be accessed with virtually any personal computer equipped with a modem and associated software.

The Lockheed Corp. has agreed to sell its DIALOG subsidiary to Knight-Ridder Inc. for \$353 million. The Wall Street Journal news item on the sale indicated that the 1987 DIALOG net income was \$9.2 million on revenues of \$98.1 million.^{72/}

b. Mead Data Central. As indicated in TABLE 1, Mead Data Central has 205,000 subscribers and provides a range of information services via its LEXIS, NEXIS, LEXPAT, MEDIS, EXCHANGE, and ECLIPSE services. With 32 million articles, Mead claims to be the world's largest resource of full-text information. Information is provided on news and business, politics and government, finance, accounting and securities, science and technology, medicine, and legal information.^{73/74/}

^{72/} "Knight-Ridder to Buy Unit From Lockheed for \$353 Million," Wall Street Journal, Jul. 12, 1988.

^{73/} Brochure, Mead Data Central, 1988.

^{74/} Sloan and Talarzyk.

Its major clients include law firms, public libraries, and information centers and libraries of private companies and government agencies.

The LEXIS legal information service was initiated in 1972, and the firm was acquired by the Mead Corporation, a paper company, in 1976. For its information services subsidiary, Mead reported revenues of \$187.6 million for 1986, with NEXIS and LEXIS accesses numbering about 620,000. Revenues grew to \$231.2 million in 1987. Profits for the subsidiary are not disclosed by the parent corporation.

c. Dow Jones News/Retrieval. The Dow Jones News/Retrieval service is the largest financial information services firm, with 285,000 subscribers. The firm is both an information vendor, for services developed and maintained by information provider firms such as Dun and Bradstreet, and it is an information provider maintaining some of its own data bases such as The Wall Street Journal (full text version).

d. SABRE. SABRE is a airline and travel information services firm operated by American Airlines. The number of subscribers on January 1, 1988 was 62,900 and SABRE claims to have about a 37 percent share of the market. Terminals are located in 15,000 travel agencies; 62,000 are at airline terminals; and 15,000 are used by American Airlines. The firm estimates its peak day usage at 57,000,000 messages.

The host computers store 35,000,000 different worldwide airfares, information on 16,000 hotel properties and the worldwide operations of 35 rental car companies. The host computers are six IBM model 3090s operated in tandem. SABRE employs leased telephone lines for its own telecommunications network.

American Airlines also provides a limited version of SABRE called EasySABRE to the residential and small business market.

e. CompuServe. CompuServe obtains \$80 million of its \$130 million annual revenues (latest 12 months) from its business information services. The firm reports that this segment is growing at an annual rate of 25 percent. Of the \$80 million, \$25 million is attributed to the revenues of its value-added communications network and \$55 million from its information services.^{75/}

^{75/} Information provided by Suzanne E. Hohman, Account Executive, CompuServe, Jun. 16, 1988.

The firm provides computer communications services; information delivery and database services; demographic databases, database management services, news retrieval services, and value-added services.^{76/}

CompuServe provides services to the Department of Health and Human Services; Department of Interior; and the Department of Commerce. Electronic mail is the most widely used service by the government agencies.

CompuServe also serves as an interface between U.S. exporters and the Department of Commerce's Office of Export Licensing. Exporters can apply for licenses electronically thereby saving substantial time over the "paper" method. The service is called "ELAIN" (Export License and Application and Information Network).^{77/}

2. Federal Government Information

Federal Government information comes under the purview of a number of laws:^{78/} the First Amendment; the Copyright Act; the Freedom of Information Act; the Privacy Act; and the Paperwork Reduction Act. The associated regulations carrying out the legislation were developed by the Office of Management and Budget (OMB) and consist of Circular A-25 on user charges;^{79/} A-76 on commercial activities;^{80/} and A-130 on management of federal information resources.^{81/}

A survey has been conducted of the online industry indicating that out of 383 active commercial databases, government databases (it is assumed that the study refers to the Federal Government) constitute 20 percent of the top 50

^{76/} Brochure, Business Services Overview, No. CS-1213(05/88), CompuServe, Columbus, Ohio.

^{77/} "The Electronic Age of Export Licensing: "ELAIN" Joins "STELLA" to Cut Processing Time," L. Mercer, Business America, vol. 109, no. 5, Department of Commerce, Feb. 29, 1988.

^{78/} "Online Government Databases: Into the Maelstrom," D.H. Smith, Database, vol. 11, no. 3, Jun. 1988.

^{79/} Circular A-25, "User Charges," Sept. 23, 1959.

^{80/} Circular A-76, "Performance of Commercial Activities," Revised 1983.

^{81/} Circular A-130, "Management of Federal Information Resources," Dec. 1985.

files used, but only 5.92 percent of the search revenues.^{82/} Furthermore, the survey points out that MEDLARS, ERIC, and NTIS are the highest revenue-generating government databases.

The Federal Government is generally an information provider, providing its information to vendors such as DIALOG. One exception is the National Library of Medicine that acts as both a provider of databases to other vendors, and as a direct vendor itself.

A House Subcommittee of the Committee on Government Operations held hearings in 1985 on the electronic collection and dissemination of information by Federal agencies. Held over three widely-spaced days, the hearing addressed many issues, including Federal Government competition with the private sector, the OMB circulars, existing legislation, and automated filing of documents with the Government.^{83/}

3. Electronic Mail

Several information service vendors specialize in electronic mail. For example, Easylink is owned by Western Union and has 175,000 "mailboxes." Each mailbox may be used by a large number of users sending messages to each other. The following table presents the major public electronic mail services. Easylink is the most widely used electronic mail service, with the main users being medium and large corporations. With 175,000 mailboxes, Easylink transmits over 9,000,000 messages per month.

Dialcom, owned by British Telecom, is another major information vendor specializing in electronic mail. Other information service vendors such as The Source and CompuServe also have electronic mail services available, although they are not their main information services.

The market for electronic messaging services has grown phenomenally since 1980, after the FCC confirmed the unregulated status of enhanced services in the Second Computer Inquiry. The number of in-house electronic messaging users reached 5.6 million users in 1987, an increase of about 40 percent over 1986. The number of subscribers to publicly available electronic messaging

^{82/} "Online Government Databases - An Analysis," M.E. Williams, Online Review, vol. 10, no. 4., Aug. 1986.

^{83/} "Electronic Collection and Dissemination of Information by Federal Agencies," Hearing Record, Subcommittee of the Committee on Government Operations, House of Representatives, 99th Congress, Apr. 29, Jun. 26, and Oct. 18, 1985.

services has grown on the average of 20 percent over the last five years, and reached about 1.3 million users at the end of 1987. When considering both private and public electronic mailboxes, the total number of electronic messages transmitted in 1987 averaged about 62.9 million per month, of which 21 million are attributed to the public mailboxes. By way of comparison, long distance telephone calls total about 100 million daily, and the U.S. Postal Service volume totals about 130 pieces of mail daily. Thus, electronic mailbox usage today constitutes only a very small fraction of the overall U.S. message volume.

TABLE 8

MAJOR PUBLIC ELECTRONIC MAIL SERVICES^{84/}

<u>Service</u>	<u>Mailboxes</u>	<u>Messages per Month</u>
Dialcom (British Telecom)	120,000	1,500,000
EasyPlex (CompuServe)	330,000	1,100,000
Quik-Comm (General Electric)	70,000	1,500,000
On Tyme (McDonnell Douglas)	60,000	1,300,000
MCI Mail	90,000	1,800,000
The Source	65,000	1,400,000
Telemail (US Sprint)	100,000	2,200,000
Easylink (Western Union)	175,000	9,000,000

^{84/} Comments of the Electronic Mail Association, In the Matter of Amendments of Part 69 of the Commission's Rules Relating to Enhanced Service Providers, CC Docket No. 87-215, Sept. 24, 1987.

Typical prices for electronic mail from publicly available services range from \$6 to \$15 per hour for daytime usage and as low as \$4 per hour for evening and weekend usage.

4. Conclusion

The marketplace is functioning very well for business information services. The \$5 billion size of the U.S. market and the profitability of DIALOG and Mead are indicators of the robust health of the industry. With growth rates of 20 percent annually (see TABLE 1), competition among service vendors and providers, and acceptance of the "value" by information users, there is ample proof of a healthy business information marketplace at work.

As evidenced by interconnected activities in the United States, Western Europe, Australia, and Japan, the marketplace for business information services is global in scope. The communications networks provide a transparency to the user so an information source may be on another continent without the user realizing it.

H. TRANSMISSION AND DELIVERY

Advances in technological capabilities -- leading to new telecommunications and computer applications -- have been primary force changing the character of the telecommunications and information markets in the United States. Research and development efforts have yielded innovative transmission techniques (e.g., optical fiber, satellite), advances in the information sciences, and the benefits of solid state electronics. In turn, these innovations have led to telephone plant improvements and the creation of new, more sophisticated public network transmission services.

The introduction of new technology into long-distance telephone plant has reduced costs dramatically. Over the last 30 years, the cost per channel mile has dropped dramatically. Consumers are willing to pay for products and services which save them time, effort and money.

Customers have benefitted from the declining costs and improved performance of logic and memory circuits as computer processing power has been directly incorporated into their equipment. Inexpensive processing capability allows customers numerous options, including the ability to operate low-cost private networks, or to pre-process their traffic in an advantageous manner (e.g., integrating voice and data or compressing information) before giving it to a service

provider. Customers may also choose to have carriers provide desired processing functions.

1. Present Transmission and Delivery Options

There are already numerous transmission options available for large and small users to access information service providers via various vendors. While the bulk of information services now flow over the public network, there are a growing number of other transmission alternatives. Information delivery options include the following:

- (1) The public network (local calls, long distance calls, calls to a toll-free "800" number);
- (2) Leased circuits ("private lines" provided by telephone companies);
- (3) Alternative local network facilities (for example, the fiber optic network of New York Teleport);
- (4) Private microwave and fiber optic facilities (including conventional and modern digital microwave);
- (5) Cable television networks;
- (6) FM sub-carrier (examples include Telemet, Lotus Signal, and EDS/McGraw-Hill);
- (7) Satellites via small antennas (examples include CONTEL/Equatorial, Intelnet, and private business systems);
- (8) Floppy disks, read-only CD ROM disks, and other fixed cost media which can be transported by conventional delivery means.

2. Common Carrier Networks

The telecommunication networks of today can generally be described as two independent parts: the local public network, which is mainly controlled by the Bell companies (the Bell companies have over 80 percent of the local networks) and the long distance public network which is controlled by AT&T and other common carriers, such as MCI and US Sprint. Both types of networks were originally designed to transmit voice or analog signals.

In today's environment there is an increasing demand for high-speed data transmission and other specialized services, which is creating the need to redesign the networks for

digital data and voice transmission. Many of the local telephone, and some long distance, switching systems are either electromechanical or early electronic switching systems that are only capable of communicating in analog form. Through the use of modems, however, subscribers that are served by these systems, whether business or residential, are capable of accessing many of the information services available today. The high speed data transmissions envisioned for the future will be realized when the networks are nearly all "digitized," providing end-to-end, more efficient, and clearer digital telecommunications.

"Digitization" can best be described when one understands that the networks, both local and long distance, are composed of discrete segments. The local public network is essentially composed of the subscriber lines (local loops) to and from the central office, the central office switching system, internal central office trunks, external trunks to and from other local central offices, and trunks to long distance public network access points. Long distance public networks are composed of toll center switching systems, trunks from toll switching centers to and from local central offices, and external trunks to and from other toll switching centers.

The digitization process is taking place by upgrading the discrete segments. For example, upgrading in the long distance networks began by replacing analog toll office switching systems with digital switching systems. The next step began by installing fiber optic cables for trunking between toll switching centers and between toll switching centers and local central offices. Similarly, upgrading the local networks began by the replacement of analog switching systems with digital switching systems and the installation of fiber optic cables for internal trunks, external trunks between local central offices and trunks to toll switching centers. The upgrading of the segment identified as the subscriber's loop has not yet begun in earnest, particularly in the case of residential customers.

Since the network is evolving from analog to digital in segments, it is difficult to determine statistically the percentage of segments converted. The following information from two sources may provide insight as to current overall status. US Sprint, one of the long distance common carriers, reported that its long distance network of 23,000 miles is composed entirely of fiber optic trunking, controlled by 22 digital switching exchanges, developed at a cost of nearly \$2.5 billion.^{85/} MCI has invested \$1 billion per year in

^{85/} The Economist, Oct. 17, 1987, p. 10.

1985 and 1986 and planned to invest \$800 million in both 1987 and 1988 in digitizing its long distance network.^{86/} AT&T invested \$2.5 billion in 1987 and plans to invest \$6 billion through 1989. It is anticipated that more than 70 percent of the calls on AT&T's network will be handled over digital circuits by the end of 1989. AT&T's long-distance network exchanges is now more than 95 percent digital, compared with 80 percent of MCI's network.^{87/}

Conversely, the Bell companies have only converted about 20 percent of their networks, mainly in the replacement of analog switching systems.^{88/} It appears that the subscriber loop will be the last item upgraded as the Bell companies progress towards end-to-end digital communications. Conversion of this segment will likely be the most expensive and lengthy undertaking of the process. And this process may not take place if residential demand for the types of services that digital communications will provide does not develop.^{89/}

3. Data Networks

National and international information vendors rely heavily on data networks to make their services available over large geographic areas, to minimize telecommunications costs, and to provide protocol conversion. These networks are termed "value-added networks," and the major networks are Telenet, TYMNET, DIALNET, UNINET, and MARK*NET. These networks are designed to permit host computers and terminals to communicate with each other using various protocols.

The networks also enable national services to be accessed using various types of terminals via a local telephone number. The CompuServe service, for example, is available in 500 cities with a local telephone call, even though the host computers may be in Columbus, Ohio or elsewhere for various information providers that are external to CompuServe. CompuServe has its own network with about 1,300 nodes.

^{86/} The Economist, Oct. 17, 1987, p. 10.
The Washington Post, Nov. 12, 1987, p. E3.

^{87/} The Economist, Oct. 17, 1987, p. 10.
The Washington Post, Nov. 12, 1987, p. E3.

^{88/} The Economist, Oct. 17, 1987, p. 31.

^{89/} NTIA Trade Report.

4. Integrated Services Digital Network (ISDN)

ISDN has been publicized as the public switched network of the future that can provide users with end-to-end digital telecommunications to support a wide range of services. Depending upon customer demand, it is possible that ISDN could be widely deployed in the developed countries by the year 2000. With ISDN, data will be transmitted in digital form without the expense of signal processing via modems. ISDN will provide the capability to place a number of terminals on a single line. The digital information may represent voice, spreadsheets, graphs, pictures, alarm signals, text, and video. ISDN evokes images of services such as multimedia teleconferencing or interactive "scratch pad" electronic editing, all from a single wall jack. It can also make available multiple simultaneous voice calls and data channels to data bases in different parts of the world.^{90/}

In ISDN, fewer transmission lines will be needed, and each one will have the capability to carry far more information than present lines. Today, many companies that transmit and receive large quantities of information operate a number of different networks: a voice network, a telex network, and several different types of data networks. Some data networks are used only within or between local offices. These are called local area networks (LANs), and are often purchased from computer companies, not telephone companies. Other networks link the individual office with the outside world. A user who wants to transmit data outside the office must either lease special high-speed digital data lines or else purchase a modem to use ordinary telephone lines which transmit information more slowly. Some industry observers believe that ISDN will replace these different networks with a single high capacity information "pipe."

Three elements are generally recognized as being required for ISDN: All-digital channels end-to-end, a network capable of handling a multiplicity of services with possibly differing bandwidths using interleaved bit streams (packets), and standard interfaces for user access. The recommended interface of International Telecommunication Union's Consultative Committee on Telegraph and Telephone (CCITT) is the "2B + D" narrowband interface. This consists of two 64-kbps "B channels" for information transfer and one 16-kbps "D channel" for signalling and other uses. The three channels total 144-kbps of transmission capability over a single "pipe."

^{90/} Telecommunications, Aug. 1987, p. 42.

In essence, all of the information services that are available today via the public network can be accessed by a subscriber, whether business or residential. The present telephone plant can deliver the information services previously identified through the use of modems and sophisticated switching equipment.

When ISDN is operational, the business community would be the most likely initial users, particularly in the financial districts of New York City and other cities. Fiber optic technology is already available in many financial centers thus making a future transition to ISDN more feasible.

On the other hand, many large business users may not require ISDN, since they have already spent large sums on building private networks, some of which already do everything ISDN is capable of providing. ISDN services are anticipated to cost approximately one and a half times more than present network services, but could lead to substantial savings for those who transmit large quantities of data. It is not yet known whether the average householder will find it worthwhile to subscribe to the wide range of services that ISDN will offer.

In order for ISDN to become a marketable product, it will have to be priced competitively with private networks. Some question the extent of the market demand for ISDN. ISDN is perceived today as a "supply-side" development, since only limited demand has actually been demonstrated. ISDN will have to prove its economic value before businesses with large investments in their private networks will consider it.

The cost of digitizing the network from end-to-end (rewiring America) will be very expensive. Various numbers have been suggested, (e.g., a billion dollars a year for fifty years), but this is speculation. The real costs will be tied to the demand for services that require ISDN type facilities, such as video programming, enhanced electronic yellow pages, interactive home tutorials, and the like. If local subscribers are to bear part of the cost of upgrading the network to accommodate more advanced uses,^{91/} then the question asked in a recent newspaper article must be addressed, "Is this the kind of service people really want, or is it what technologists think they need."^{92/}

^{91/} The Economist, Oct. 17, 1987, p. 32.

^{92/} USA TODAY, Jan. 5, 1988, p. 7B.

The "bottleneck" to the spread of ISDN may ultimately be the local exchanges if they have fewer transmission lines and switches converted to digital services than the intercity carriers.

5. Non-public Network Transmission Options

Private leased circuits ("private lines") provided by local and long distance telephone companies are often used by business users and information service providers. They serve as the basis for corporate private networks, and can be "conditioned" for higher quality services.

Private leasing or ownership of circuits on non-public network facilities is another option which has been increasingly prevalent among business users. The relatively recent growth of these facilities has captured a significant portion of the business market, particularly the large private network users. An example is the large fiber optic cable network which the New York Teleport has extended to interconnect users in New York City and various points in New Jersey. This cable, aside from connecting users to the teleport site, can also be used for connecting users to the public long distance network.

Private microwave networks are another option widely employed by the business user, particularly where sufficiently large traffic streams are not available to justify copper or fiber optic cable and where spectrum limitations and topography permit. Under certain circumstances, it is an extremely cost effective option and a number of new digital technologies have been developed. There have been some experiments with providing residential services such as pay television over this technology but it remains largely a business-oriented option.

Satellite communications, to date, have not proven to be a likely effective transmission media for the residential user, beyond privately owned earth stations for TV reception. There has been progress in developing small antennas, however, and a considerable degree of work has been done on the subject of operating two-way service over them. Both Intelnet and the Equatorial Radio subsidiary of CONTEL appear to be making progress in this area. It would be premature to assume that technological progress, which has already seen business-oriented small earth station antennas proliferating on the rooftops of local supermarkets and other business establishments, will necessarily stop at this point. What makes the possibility of residential satellite antennas particularly interesting is that, if they prove feasible and

economical, they could provide competition to both local and long distance wire-based facilities.^{93/}

Cable television systems may also constitute an option for transmission facilities serving the residential user. While development of two-way information service provision over this medium has been very limited on a national basis, there have been some cases on a more limited basis. Data Broadcast Corporation (DBC) now provides stock quotation service over some cable systems, and Telaction (J.C. Penney) provides a home shopping service in the Chicago area. There are a variety of other information services, particularly the one-way dissemination of information, available over some cable systems.

I. BELL COMPANY ACTIVITIES UNDER THE AT&T CONSENT DECREE

Following the court ruling in March 1988, the Bell company activities regarding information services generally intensified. The following is a discussion of some of those activities. (See Part III for additional information on the AT&T consent decree.)

a. Pacific Bell. Pacific Bell, a Pacific Telesis operating company, defined its role in testimony in a hearing held on April 20, 1988 by the House Subcommittee on Telecommunications and Finance as that of a direct provider and general facilitator of services.^{94/}

Pacific Bell identified four key elements of the "information age":

1. Availability of terminals;
2. Gateways;
3. Applications with compelling benefits to potential users; and

^{93/} It should be noted that NTIA addressed the subject of private terrestrial and satellite networks in a 1987 study: "Competition in the Local Exchange Telephone Service Market," A. Lee and T. Sloan, NTIA Report 87-210, Feb. 1987.

^{94/} Testimony of Lee G. Camp, Vice President and General Manager, Information Services Marketing, Pacific Bell, before the House of Representatives Subcommittee on Telecommunications and Finance, Hearing on Information Services, April 20, 1988.

4. Diversity of content.

Pacific Bell focused on electronic directories; voice mail; and electronic mail as "magnet" or "trigger" applications that are required to build a foundation of information services.

b. Bell Atlantic. At the hearings, Bell Atlantic also testified that the Bell companies would not profit from providing information services without reform of traditional rate-of-return regulation.^{95/}

In a separate action, Bell Atlantic filed with the FCC Comparably Efficient Interconnection (CEI) plans to offer videotex gateway services in a trial in Pennsylvania in August 1988.^{96/} The firm indicated that the trial will test both the consumer and business markets. It will also offer electronic mail and computer storage capacity for users.

c. BellSouth. At the hearings, BellSouth testified that a "magnet" service such as electronic yellow pages is necessary to create the mass of customers necessary to make information services profitable.^{97/}

BellSouth has also filed a CEI plan with the FCC for gateway services. BellSouth's plan will provide "help" screens and service menus; listings of service providers; storage capacity for providers; and network security.^{98/} BellSouth has created a Transtext Universal Gateway (TUG) that will offer, among other items, automatic call identification and dialed number identification.

d. Ameritech. Ameritech is scheduled to begin trials of a videotex gateway in late 1988 in Ann Arbor, Michigan. The

^{95/} Testimony of Philip A. Campbell, Vice Chairman and Chief Financial Officer, Bell Atlantic, House of Representatives, Subcommittee on Telecommunications and Finance, Hearing on Information Services, Apr. 20, 1988.

^{96/} The Bell Atlantic Telephone Companies, Offer of Comparably Efficient Interconnection for a Gateway Service, filed with the Federal Communications Commission, March 30, 1988.

^{97/} Testimony of C. Sidney Boren, Vice President of Corporate Planning and Budget, BellSouth, House of Representatives, Subcommittee on Telecommunications and Finance, Hearing on Information Services, Apr. 20, 1988.

^{98/} CEI Plan for Gateway Services, filed April 20, 1988.

services offered will be access to information, home shopping, bulletin boards, telebanking, flight reservations, electronic mail, local University of Michigan data, and conferencing among special interest groups.

The Ameritech system will be developed by Integrated Communications Systems, a firm that is also developing the BellSouth TUG system.

e. U S WEST. U S WEST has entered into an agreement with Minitel USA, a subsidiary of France Telecom, jointly to conduct market research and technical studies to determine the type of videotex service U S WEST should offer.^{99/}

f. NYNEX. NYNEX announced that it plans to begin trials of a videotex gateway service in July 1988 in Burlington, Vermont.^{100/}

The service will have billing, welcome screen, service directory, and protocol conversion. As discussed previously in the section on Boston CitiNet, NYNEX has held discussions with information vendors and with a terminal supplier, Cardinal Technologies.^{101/}

^{99/} Communications Daily, vol. 8., no. 101, May 25, 1988.

^{100/} Communications Daily, vol. 8, no. 61, Mar. 30, 1988

^{101/} "NYNEX Reveals Network Plans and Research at Hush-hush Meeting in Boston," Interactivity Report, no.3, Jun. 1987.

III. LEGAL AND REGULATORY ENVIRONMENT FOR INFORMATION SERVICES

THE UNITED STATES

A. INTRODUCTION

Any analysis of the legal and regulatory status of information services in the United States requires that one first define the scope of services falling within that label. Information services in the broadest sense may include information provided via conventional telecommunications networks, or by other means as well -- such as cable TV facilities or printed materials. This report does not determine whether the term "information services" should generally be defined in narrow or broad terms. The NTIA review of telecommunications trade issues filed with the AT&T consent decree court in 1987 endeavored broadly to categorize information services into three classes - those which are generally regarded as logical extensions of telephone service; those that involve access to an interaction with computer databases; and those which resemble mass media offerings. The focus here, however, is on information services which may be provided via telecommunications links, such as videotex services, as earlier defined. The reason for this focus is the existence of particular regulatory and legal issues which play a critical role in the development of such information services in this country and internationally.

B. THE REGULATORY ENVIRONMENT ESTABLISHED BY THE FEDERAL COMMUNICATIONS COMMISSION

Information Services Are Not Regulated

Historically, the Federal Communications Commission (FCC) has promoted and maintained an unregulated environment for the offering of information services by non-common carriers, i.e., companies not subject to rate regulation under the 1934 Communications Act. Of course, offering of information services is subject to the antitrust laws as are other laws governing business ventures generally, but that is not a matter directly under the jurisdiction of the Commission.

Because regulated common carriers have also sought to offer information services, however, the FCC became involved in establishing various conditions under which carriers subject to its jurisdiction could do so. Concerns leading to the FCC's involvement included that carriers might use cross-subsidies from their rate-regulated services to benefit their

competitive ventures, and that there might be discrimination in favor of their own offerings of information services with respect to network access. Additionally, some have contended that permitting regulated carriers to expand their service repertoires, or diversify into new markets, in some fashion would divert management from its assumed "primary mission," a rationale, incidentally, also advanced by the AT&T consent decree court at one point.

For more than 20 years, however, the FCC has conducted various proceedings dealing with the line between regulated basic common carrier services and unregulated offerings (encompassing information-type services), and public safeguards for the offering of such services by carriers. The FCC has initiated three different major inquiries to address regulatory issues stemming from the confluence of computer and communications functions.

The Conditions Under Which Carriers May Provide Information Services Are Governed By The FCC

Pursuant to its first inquiry, referred to as Computer I, the FCC decided on a case-by-case basis whether individual services provided by AT&T, the Bell companies, or other carriers subject to its jurisdiction were more like communications or more like data processing services.^{102/} While data processing-type services were not considered common carriage, and thus were free of tariff regulation and related regulatory requirements, their provision by a carrier was nonetheless subject to strict separation from the carrier's regulated (i.e., tariffed) telecommunications offerings.

Ultimately finding this case-by-case approach to be cumbersome, impractical, and not promoting more widespread development and use of information services, the FCC took a new, simpler approach in its Computer II proceeding.^{103/} There it decided to create a definitional scheme delineating which services were subject to tariff review and facilities

^{102/} Regulatory and Policy Problems Presented by the Interdependence of Computer and Communications Services and Facilities (Computer I), 28 FCC 2d 267 (1971), aff'd in part and rev'd in part sub nom. GTE Service Corp. v. FCC, 474 F.2d 724 (2d Cir. 1973), decision on remand, 40 FCC 2d 293 (1973).

^{103/} Second Computer Inquiry (Computer II), 77 FCC 2d 384 (1980); recon. 84 FCC 2d 50 (1980); further recon. 88 FCC 2d 512 (1981); aff'd sub nom., CCIA v. FCC, 693 F.2d 198 (D.C. Cir. 1982); cert. denied, 461 U.S. 938 (1983); further recon., FCC 84-190 (released May 4, 1984).

authorization rules, and which could be offered on an essentially unregulated basis. The FCC resolved that services providing nothing more than information transport, without any content change would be labeled "basic" and would remain subject to the Title II regulatory scheme of the Communications Act, which sets forth tariff filing and other regulatory requirements.

A second category of services was labeled "enhanced" and defined as:

services offered over common carrier transmission facilities used in interstate communications, which employ computer processing applications that act on format, content, code, protocol or similar aspects of the subscriber's transmitted information; provide the subscriber additional, different or restructured information; or involve subscriber interaction with stored information.

Those services, which this report also refers to as "information services,"^{104/} were found to fall outside of the FCC's direct Title II authority, but nevertheless within its "ancillary" jurisdiction over common carriage generally. The FCC concluded that any enhanced services provided by AT&T must be offered through a separate subsidiary, but it did not impose that requirement on any of the independent telephone companies. When they were later divested from AT&T, the FCC also ruled that its Computer II separate subsidiary requirements would apply to the divested Bell companies.^{105/}

Finally, in Computer III, the FCC confronted arguments that the separate subsidiary rules were not cost-effective, and that in some instances they prevented the offering of new

^{104/} In this discussion, we use the terms information services and enhanced services interchangeably. Neither the MFJ court nor the FCC has ever determined the exact overlap between their respective definitions of the pertinent terms. (See discussion below for MFJ definition of information services). Further, it has been generally acknowledged that some, if not all, enhanced services are information services.

^{105/} BOC Separation Order, 95 FCC 2d 1117 (1983), recon. denied, FCC 84-252, aff'd sub nom. Illinois Bell Tel. Co. v. FCC, 740 F.2d 465 (7th Cir. 1984)

services to the public.^{106/} The FCC recently decided to eliminate its separate subsidiary requirements and to substitute for them a regime of "non-structural" safeguards including, among other things, additional cost allocation controls and network access requirements for competitors in the form of "Comparably Efficient Interconnection" (CEI) and "Open Network Architecture" (ONA).^{107/}

Once the FCC approves ONA plans (filed by each Bell company and AT&T) and ONA tariffs are in place, the full set of non-structural safeguards will be established. At that point, the carriers will no longer be subject to Computer II separate subsidiary requirements. Furthermore, pending ONA implementation, the Bell companies may use CEI, in conjunction with other non-structural safeguards, to be relieved of the structural separation rules. Since ONA plans are to encompass CEI parameters, CEI is strictly an interim measure to be used while ONA is being developed. Accordingly, without FCC approval of either CEI or ONA plans, a Bell company or AT&T would remain subject to separate subsidiary requirements for the offering of enhanced services.

CEI And ONA Are Means To Provide Greater Network Access For Information Service Providers

The purpose of CEI is to ensure that if certain regulated carriers -- namely AT&T or the Bell companies-- offer a specific information service, they make available to others the same type of network access provided for their own information service offering. ONA is a more long range and non-service specific plan to foster the growth of the enhanced or information services industry. It requires the Bell companies to unbundle their basic network service offerings and make the underlying basic service elements available to their information service competitors on a tariffed basis. AT&T is subject to somewhat less stringent requirements than the Bell companies in this regard, but is also required to provide ONA.

^{106/} Third Computer Inquiry (Computer III), 104 FCC 2d 958 (1986), recon. FCC 88-9 (Phase I) and FCC 88-10 (Phase II) (released Feb. 18, 1988).

^{107/} Other non-structural safeguards include disclosure rules regarding network and customer information.

To date, a few CEI plans have been approved by the FCC.^{108/} ONA plans have been filed, and a public comment process is underway. It cannot be determined at this point when ONA plans will be in place. The ONA plans are creating controversy in the industry, however, as the Bell companies and their potential competitors explore the appropriate parameters for carrying out the FCC's ONA policy.

NTIA recently participated in the Commission's ONA proceedings, contending that the Bell companies' initial ONA plans were not acceptable as filed. NTIA set forth a set of principles which it urged the FCC to adopt, in order to guide the ONA process and to create greater certainty about the Bell companies' obligations. These principles reflected various concerns including for example, suggesting that some degree of national uniformity for technical standards is needed to foster information services growth.^{109/} A key part of the NTIA proposal was the recommendation for formation of a neutral inter-industry entity to deal with certain issues more appropriate for the industry than the Commission to resolve. Finally, NTIA urged that those involved in ONA recognize it is not a one-step process, but a complex concept which must be implemented in stages, and subject to modification over time to accommodate technological developments.^{110/}

^{108/} While a number of CEI plans are pending before the FCC, a few have been accepted, subject to conditions for modification. See e.g., In the Matter of the Bell Atlantic Telephone Companies Offer of CEI to ESPs and Pacific Bell and Nevada Bell Plan for Provision of Voice Mail Services, (Common Carrier Bureau), DA 88-765, released May 23, 1988; and In the matter of AT&T Plan for the Provision of Transaction Services, (Common Carrier Bureau), DA 88-671, released May 11, 1988.

^{109/} Other proposed principles reflected the need to rely on market forces to the extent feasible, for the Commission to limit its interest in ONA to interstate services within its jurisdiction, for ONA offerings to be easily identifiable and subject to appropriate rate regulation, and for ONA not to stifle other network innovation or harm users of existing network services.

^{110/} See NTIA Comments in CC Docket 88-2 (Phase I) filed Apr. 18, 1988, and Reply Comments filed May 26, 1988.

The FCC Has Exempted Information Service Providers From Payment Of Access Charges

Access charges have recently become a significant issue for the information service industry, focusing primarily on the FCC's proposal to end that industry's exemption from payment of such charges.^{111/} These are usage-sensitive charges (ultimately paid by the customers of the information services vendor) for the use of the public network to access the information service vendor's facilities. The exemption was originally allowed in 1983, when access charges for other network users first went into effect. It was based on concerns about potential difficulties for local network carriers with respect to their ability to monitor billing minutes, and also the impact of higher rates on the development of the information services industry. The exemption has meant that information service providers typically continue to pay the flat-rate local business line rates, rather than a usage based fee for access.

NTIA, as well as many in the enhanced services industry and the Congress, adamantly opposed the FCC's plan to end the enhanced service provider (ESP) exemption from access charges. NTIA noted that it is inappropriate to treat ESPs as interexchange carriers (which are subject to access charges), because there are significant operational differences in their systems. Further, NTIA took the position that the FCC should not have, in the first instance in 1983, assumed that ESPs would ultimately be treated as interexchange carriers, thereby granting only a temporary exemption.^{112/}

Following such opposition, the FCC has indicated that it will not, at this time, move to impose access charges on ESPs.^{113/} Nevertheless, there is concern in the information services industry about possible termination of the "exemption" at some future time, or even efforts to capture such charges indirectly -- perhaps through pricing established in CEI or ONA tariffs.

^{111/} Notice of Proposed Rulemaking, Amendment of Part 69 of the Commission's Rules Relating to Enhanced Service Providers, CC Docket No. 87-215, released Jul. 17, 1987.

^{112/} See NTIA comments filed in CC Docket No. 87-215, Sept. 22, 1987, at P. 7.

^{113/} FCC Order, CC Docket No. 87-215, FCC 88-151, released Apr. 27, 1988.

The FCC Continues To Play A Crucial Role With Respect To Information Services Growth In This Country

Carrying out its statutory responsibilities over the years, the FCC has strived to promote development of information services in an unregulated environment, but has kept strict control over the conditions under which regulated carriers could provide those services.^{114/} Most recently, the FCC has taken significant steps in instituting both CEI and ONA to spur further information service development in this country. The manner in which the FCC governs implementation of such plans could have a significant impact on the availability of information services to the public.

C. THE IMPACT OF THE AT&T CONSENT DECREE

The Bell Companies Were Initially Prohibited From Providing Any Information Services

In November 1974, the Antitrust Division of the U.S. Department of Justice filed suit against AT&T. This antitrust action contended that AT&T had violated the Sherman Act. The action challenged AT&T's continued ownership of (a) companies providing about 80 percent of U.S. local telephone service, (b) long-distance operations, and (c) the principal U.S. telephone equipment maker. In January 1982, the Chairman of AT&T and the Assistant Attorney General in charge of the Antitrust Division announced a negotiated settlement of this litigation. Under the settlement, AT&T was permitted to retain most of the former Bell System's long-distance operations, Western Electric and its world-renowned research facility, Bell Laboratories. Provisions of a 1956 consent decree which had limited AT&T to providing only regulated telecommunications services were vacated, and the divestiture of some \$100 billion in assets was required.

Under the new consent decree, AT&T was required to divest its local telephone operations, except for two small nonconsolidated affiliates.^{115/} Eventually, ownership of 22 Bell Operating Companies (BOCs) was organized under seven

^{114/} The FCC's ancillary authority to control the conditions under which carriers provide regulated services is found in Title I of the Communications Act. Included are Section 151, dealing with the need to foster availability of nationwide services at reasonable rates, and Section 157 dealing with the promotion of new technologies and services.

^{115/} United States v. American Telephone and Telegraph Co., 552 F. Supp. 131 (D.D.C. 1982), aff'd sub nom., Maryland v. United States, 460 U.S. 1001 (1983).

newly-created independent holding companies. Following protracted court proceedings, a "modification of final judgment" (MFJ) differing somewhat from the initial settlement agreement was entered by U.S. District Court Judge Harold H. Greene in August 1982. Actual divestiture took place in January 1984.

Pursuant to the decree, AT&T became free to provide information services, although it was prohibited from providing electronic publishing over its own network for a period of seven years. Given their control of local bottleneck facilities, however, the Bell companies were subjected to more extensive line-of-business restrictions. These restrictions initially included an absolute ban on the provision of information services, as well as a prohibition against providing interexchange service or engaging in manufacturing. The court also placed a limit on the amount of non-telecommunications business of the Bell companies.^{116/}

The prohibition against Bell company entry into information services is defined in Section II(D)(1) of the decree as the:

offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information which may be conveyed via telecommunications, except that such service does not include any use of such capability for management, control, or operation of a telecommunications service.

As indicated earlier, this definition is similar to the FCC's definition of enhanced services, and for purposes of this report, the differences are not critical. With respect to both enhanced and information services, the decree has had a significant impact by keeping a group of major firms out of the market, despite their expertise and potential to foster information services growth in this country.

In a previous study (the NTIA Trade Report), NTIA recommended changes in the AT&T consent decree that would permit the entry of the Bell companies into manufacturing subject to screening process for joint ventures with foreign-based firms. Although NTIA did not specifically address information terminals in that study, it did recommend that the Bell companies be permitted to manufacture customer

^{116/} The Court established a waiver process, however, whereby the carriers could seek permission to enter an otherwise restricted line of business.

premises equipment (CPE) such as telephone handsets, key telephone systems, and private branch exchanges among other things.^{117/}

As currently envisioned, the information services terminal may be a logical technological advancement of the telephone handset. The NTIA Trade Report addressed the consumer handset market and concluded that restrictions on manufacturing of handsets accomplishes very little, and that there is simply no good reason to preclude the Bell companies from manufacturing handsets and related terminal equipment.

Vertical integration is potentially important when considering the mass market segment that has ordinary telephones and is unlikely to purchase a personal computer. Such a group, if it is ever to embrace information services, may accept a low-cost easy-to-use information services terminal that was marketed as an "advanced telephone" rather than a computer.

Marketing incentives would be optimized if the Bell companies were manufacturing the terminals and realizing economies of scope and scale, in addition to selling or renting them to consumers. Thus, vertical integration may optimize the mass market consumer services. There is little risk of anticompetitive behavior by the Bell companies at present because there is no business meeting mass market demand at the present time.

Bell Companies May Now Provide Information Service Gateways And A Few Information Services

In its first triennial review of the decree, the court modified the absolute ban on Bell company provision of information services. While the Bell companies, the FCC, NTIA and the Department of Justice all sought to end this particular line-of-business restriction, many potential competitors remained adamant that the restriction must not be lifted.

Nevertheless, the court did make some modifications, while otherwise continuing the restriction. The court ruled that the Bell companies could provide a limited electronic white pages -- but not electronic yellow pages.^{118/} Also, the court very recently ruled that they may provide

^{117/} NTIA Trade Report.

^{118/} See United States v. Western Electric, 673 F. Supp. 525 (D.D.C. 1987) (MFJ Modification Order), Civ. Action No. 82-0192, Sept. 10, 1987.

"information transmission", or transmission gateways,^{119/} by which others can provide information services to the public.^{120/} Finally, the court very recently ruled that the Bell companies may also provide electronic mail and voice messaging services, in order to promote development of a mass market in these areas.^{121/} The court has otherwise largely continued to prohibit the firms from engaging in the generation or manipulation of content, however, and has thus largely restricted their role in the market to the provision of an information service "conduit" for others to use.

NTIA, acting as the President's principal adviser on telecommunications and information policy matters, has petitioned the FCC for a declaratory ruling pursuant to the Communications Act of 1934, as amended, to enable the Bell companies to provide information services, based upon an FCC determination that such provision is in the public interest.^{122/} NTIA indicated that the FCC should take this step to eliminate controversy and needless uncertainties caused by the consent decree court's ruling. (For additional information, see Appendix C for a copy of Assistant Secretary Alfred C. Sikes's letter to the FCC.)

NTIA asserted that this action is essential to ensure the competitive development of information services, which is critical to American industry, businesses, and the public at large. Without these "electronic tools," American enterprise

^{119/} According to the decree court, the Bell companies may engage in the following functions to the extent necessary to provide the gateway: provision of data transmission, address translation, protocol conversion, billing management, introductory information content, and "help" for the user. They may not, however, offer a menu of services, as the court believes that would involve them in control of content. The Bell companies' ability to share in the profits of information services ventures offered through their gateways has been constrained as well.

^{120/} See MFJ Modification Order, and United States v. Western Electric (Further Modification Order), Civ. Action No. 82-0912, Slip Op. Mar. 13, 1988.

^{121/} Further Modification Order, March 13, 1988.

^{122/} "Petition for Declaratory Ruling of the National Telecommunications and Information Administration," In the Matter of the Bell Operating Companies' provision of Information Services, filed with the Federal Communications Commission, Nov. 24, 1987. (See also NTIA Reply Comments and Supplemental Comments filed Jul. 22, 1988.)

will be less able to provide the goods and services, investment, and employment opportunities needed for the growth of the American economy.

In promoting Bell company provision of information services on a broader scale, NTIA indicated that the issue is not simply whether American telephone subscribers will have access to new telephone-based services comparable to those available overseas. Rather it is also a question whether national communications assets will be more efficiently used, and whether network changes that would facilitate innovation on the part of other firms will be made by the Bell companies in an expeditious manner.

NTIA also indicated that communications trade considerations are important. The practical effect of the Court's restriction on information services has been to drive functions or "intelligence" from the public telephone network, and to stimulate demand for terminal equipment embodying capabilities the network could otherwise provide. Because foreign-based firms have a larger share of the terminal equipment market than of the network products market, the result has been and will continue to be, to make the U.S. trade deficit in this key sector artificially larger than it might otherwise be. The changes the District Court has permitted are unlikely to alter this undesirable situation significantly.

NTIA has also asserted that the FCC, not the courts, is primarily responsible to ensure the nationwide availability of communications services, and is explicitly directed "to encourage provision of new technologies and services to the public."^{123/} NTIA noted that in its Third Computer Inquiry (Computer III) ruling, the FCC established a carefully balanced regulatory scheme (with competitive safeguards) for the provision of unregulated information services by the Bell companies. The FCC determined that the approach it was adopting would, first, afford the Bell companies a positive incentive to make desirable network changes in a timely manner; second, maximize the potential for innovation; third, ensure widespread access to new services by all customers; and fourth, stimulate more efficient use of national communications assets and resources.^{124/} Accordingly, NTIA

^{123/} See 47 U.S.C. §§ 151, 157 (1986).

^{124/} Letter of Alfred C. Sikes, Assistant Secretary for Communications and Information, to Honorable Dennis R. Patrick, Chairman, Federal Communications Commission, Nov. 24, 1987. (See Appendix C for copy of letter).

maintained, the FCC, not the consent decree court should govern the extent of Bell company entry into information services.

D. THE GTE CONSENT DECREE

While independent telephone companies are not subject to all of the FCC's non-structural safeguards, or the AT&T consent decree's ban on provision of information services applicable to the Bell companies, GTE is subject to certain constraints under a 1984 consent decree. Under that decree, GTE's local telephone operating companies may provide information services, but only through separate subsidiaries, or through accounting separation.^{125/} Other requirements were also delineated, including one specifying that any facilities made available by the GTE local public networks for GTE's information services must also be made available to others on an unbundled, tariffed basis. Another provision provides that in the event the AT&T consent decree's prohibition on Bell company entry into information services was lifted, the GTE separation requirements would also be terminated.

GTE is involved in information service activities via their "Telemessenger" voice mail and storage service; in electronic mail marketed by US Sprint (jointly owned with United Telecom); via the GTE "Teleguide" tourist information service for travelers in Florida; in the development of "Mainstreet," an interactive shopping service provided over cable TV; and electronic funds transfer in California and Florida, where the company owns automated teller machines.^{126/}

^{125/} United States v. GTE, 603 F. Supp. 730 (D.D.C. 1984).

^{126/} Information provided by S. Shawhan, GTE, Washington, D.C., Apr. 1988.

E. THE ROLE OF THE STATES

In ruling that enhanced services should be provided on an unregulated basis, the FCC preempted the states from regulating such services.^{127/} Accordingly, enhanced or information services currently need not be tariffed at either the state or Federal level.

Nevertheless, the states' jurisdictional powers under the Communications Act may affect some of the policies being implemented to foster information services growth. There is concern in the information services industry that if the provision of communications services necessary to offer information services is not tariffed at the state level, there might be a lack of uniformity which could make the offering of information services nationwide difficult. Dealing with tariff proceedings before numerous state commissions could be unduly burdensome, particularly for smaller companies. There are also concerns about the effect of various state policies on pricing, as some states require the Bell companies' underlying basic services to be tariffed at a flat rate, while others allow measured or usage based pricing for the same services. Depending on the extent of state involvement in either FCC "open network architecture" or AT&T consent decree gateway implementation, therefore, individual state policies, goals, and pricing methods could have some impact on the rate of growth of information services in the United States.

F. OTHER COUNTRIES

The legal and regulatory environment for information services in most foreign countries differs from that found in the United States. Overseas, telecommunications network and terminal equipment, service offerings, rates and conditions are usually controlled by a government-owned monopoly. In those countries where some degree of competition is occurring, it is generally in the areas of customer premises equipment and value-added services. For example, some overseas countries have liberalized the rules governing entry into their domestic value-added network market. Ownership of the underlying facilities in most cases is prohibited or severely limited, however, and in cases where more than one network is permitted, the competition which characterizes facility providers in the U.S. simply does not now exist.

^{127/} This issue is now on appeal, however, with the appeal of the FCC's Computer III decision.

France

The Direction Generale des Telecommunications (DGT) maintains a regulated monopoly in basic local, long distance, and international services, but limited competition has been permitted in value-added services. Private firms can seek approval to offer information services through the Teletel/Minitel videotex system described earlier in this report.

On September 25, 1987, the DGT announced changes in the regulations governing use of leased lines, and established new rules for introducing competition to value-added services.^{128/} The French Telecommunications Minister can authorize new companies to use leased line networks (which can be interconnected with the public network) to market value-added services. The tariff for the leased lines will remain at the present flat rate level, with a possible surcharge, not to exceed 30 percent, based on the extent to which the network is capable of handling third-party traffic. This does leave open the possibility volume sensitive pricing. It is claimed, however, that provisions have been made to ensure open and fair competition.

The Federal Republic of Germany (West Germany)

The state-owned monopoly, Deutsche Bundespost or DBP, has maintained since 1928 an unchallenged authority over mail, telephone, telegraph, and data communications.

In April 1985, a Government Commission on Telecommunications was established with the objective of recommending the best possible ways to promote technical innovation, to develop and comply with international communications standards, and to facilitate competition in the telecommunications market. The Commission, chaired by University of Munich Professor Eberhard Witte, released its report in September 1987 with recommendations for restructuring of telecommunications in The Federal Republic of Germany.

A draft law concerning the restructuring of the Ministry Posts and Telecommunications, was released in early 1988 and is currently being circulated to appropriate ministerial and parliamentary circles. The law will work its way through the legislative process by the end of 1988 and be enacted late in 1988 or in early 1989. The draft law separates the Ministry of Posts and Telecommunications into three autonomous

^{128/} France Telecom News, Sept. 28, 1987.

"directories" or enterprises: posts, telecommunications (TELEKOM), and postal banking.

TELEKOM will retain a monopoly as the network operator and voice telephone provider. Competition will be allowed in terminal equipment and in all telecommunications services except voice telephone.

Canada

The Canadian long distance telecommunications system consists of Telecom Canada (TC), formerly known as the Trans-Canada Telephone System (TCTS), and Canadian National and Canadian Pacific (CNCP) Telecommunications. TC is an unincorporated association of the largest local telephone companies operating in each province, plus Telesat Canada, the domestic satellite carrier. Telephone companies in Alberta, Saskatchewan, and Manitoba are owned by the provincial governments. Local telephone companies in other provinces are privately owned. Bell Canada and GTE's British Columbia Telephone Co. are by far the largest. CNCP is a partnership of the major Canadian railways. Over the years, it has grown into operating its own national microwave system and switching centers, but leases local lines from local telephone companies.

Regulatory authority at the Federal level rests with the Canadian Radio-Television and Telecommunications Commission (CRTC). The CRTC also regulates local services in Ontario and Quebec. In addition, there are numerous provincial regulatory boards with local authority.

Within Canada, a limited open entry situation has existed for some time. In 1979, CNCP was allowed to provide competitive private line data and voice services through the Bell Canada local public network. At the present time, CRTC is considering whether to allow CNCP to offer, in three provinces, the type of interexchange services which Mercury is allowed to provide in the United Kingdom (see discussion below). Further extension of facilities-based competition is at the discretion of the regulators in the provinces where CRTC does not have jurisdiction. To date, widespread long distance competition has not developed.

Bell Canada has played a major role in promoting videotex service within Canada. It plays a gateway role and is not authorized to engage in development of information service content. At the present time, it is negotiating with information service providers for a wide range of services. Videotex services will be delivered over the public network within Canada. The service provider has the choice of either using the basic public network and handling its own fee

collection, or using the Bell Canada "INET" public network option, which includes fee collection among its features.

Japan

The Ministry of Posts and Telecommunications (MPT) is responsible for overall telecommunications policy and regulation of broadcasting and wire telecommunications. Prior to 1985, Nippon Telegraph and Telephone Corporation (NTT), then owned by the government, controlled domestic telecommunications. Kokusai Denhin Denwa Co., LTD. (KDD), a private corporation then controlled international telecommunications. Steps were since taken to privatize and inject competition in the industry, however.

Under legislation that took effect in April 1985, telecommunications service providers are now divided into Type I and Type II carriers. Type I carriers (traditional common carriers) own network facilities, and foreign ownership cannot exceed one-third. Type II carriers provide value-added services. Within Type II carriers, there are two further distinctions: General and Special carriers. Type II General carriers lease facilities for private services and are not regulated. Type II Special carriers lease facilities and provide international services, or maintain a nationwide network system. These carriers must obtain initial authorization from the MPT and are then subject to minimal regulation.

NTT still maintains a monopoly in local service, but on September 4, 1987, three carriers began to compete with NTT for long-distance service.^{129/} Minister Takada of the Ministry of Post and Telecommunications reported:

There are today 11 Special Type II telecommunications carriers and 406 Ordinary (General) Type II telecommunications carriers. New notifications are being filed at an average of 15 a month. Since there is no foreign investment restriction, about 10 foreign corporations are already participating.^{130/}

Three U.S. companies, Tymnet-McDonnell Douglas Network Systems Co., GE Information Service, and AT&T are providing value-added services in both the Japanese domestic and international VAN markets. IBM is currently in the Japanese

^{129/} Look Japan, Feb. 1988, p. 23.

^{130/} The Telecom Tribune, Sept. 1987, p. 8.

domestic VAN market and is in the process of extending its service into the international market.

United Kingdom

Until 1981, all telecommunications services were provided by the government-owned British Telecom (BT). In that year, the telecommunications functions were split away from the Government and vested in a separate government-owned company, British Telecom (BT). Three years later, 50.2 percent of BT's stock was sold to the public. The Government also licensed a private telecommunications firm, Mercury, to compete with BT. Unlike the Japanese, the British have placed no restrictions on the extent of foreign ownership or interest in either telecommunications carrier. The Government has, however, restricted the number of competing carriers to these two until 1990.

The resale of basic services is prohibited until 1989, at which time the resale issue will be reconsidered. In April 1987, the U.K. issued a class of license for non-voice telecommunications systems providing value-added and data services, which permits resale of leased capacity. Value-added and data service providers are subject to registration and publication requirements. The United States is currently working with the U.K. to extend competition in these services to the provision of value-added and data service between the U.S. and the U.K.

H. CONCLUSION

Numerous legal and regulatory policies affect the provision of information services by the largest U.S. telephone companies -- more specifically AT&T, the Bell companies, and GTE -- which provide the public networks utilized by the vast majority of residential consumers. Depending on the particular issues and the forums in which they are resolved, the FCC, the AT&T consent decree court, and individual states all might directly influence information services development in the United States.

While new policies are being pursued to foster information services growth -- such as CEI and ONA -- the full impact understandably can not yet be known. It is therefore difficult to weigh the speed with which these new policies could help foster the widespread availability of additional information services to the public. The Bell companies, which serve approximately 80 percent of the United States population, are prohibited from virtually all information content (with a few recent exceptions). The telephone companies owned by GTE are also subject to constraints on the offering of information services.

The Bell companies are also prohibited from manufacturing equipment under the AT&T consent decree. Regarding information services, the prohibition means that they cannot design, develop, or manufacture any equipment such as information services terminals. The Bell companies may only act as sales agents for terminals manufactured by others.

In summary, both the regulatory institutions and the industry in the United States are somewhat fragmented in terms of approaches to increasing the array of services available to the public. Uncertainties stemming from the regulatory and legal environment, promoted in part by industry divisiveness naturally stemming from competitive concerns, may be significant factors hampering growth in this important sector of our economy.

IV. INFORMATION SERVICES IN OTHER COUNTRIES

There are a number of information services available in foreign countries similar to many of those available in the United States. However, for purposes of this report, only the more prominent videotex services are described since these are used by the mass market including, in particular, residential users.

A. BUSINESS INFORMATION SERVICES

There is more direct government involvement in Western European online information services than in the United States where greater reliance is placed on marketplace forces. A number of the business information services are funded by their respective European governments, both at the national and joint-European levels. The funding may take several forms. Partial or development funding, with the intention that the activity be self-supporting after the initial infusion of government capital, is used in several nations.^{131/}

While North America has several large information vendors that dominate the business information services market, Europe is characterized by many specialized online services. Each country has its own national online business information service used by libraries, hospitals, government agencies, etc.^{132/}

The U.S. firm, DIALOG, has a strong presence in Europe, with a dedicated communications line to England. The 15 countries with public data networks (PDN's) enable the user to connect to DIALOG via the international telecommunications networks of DIALNET, UNIMET, Tymnet, or Telenet. DIALOG also has a direct dial number in London giving access to DIALOG via the DIALNET network, thus bypassing the public data network.^{133/}

Dow Jones News/Retrieval business information service is being offered in England via the British Hotline service. The Hotline offers other services covering various aspects of the business world.

^{131/} "Government Databases and Systems in Europe," G. Turpie, Database, vol. 11, no. 3, June 1988.

^{132/} Ibid.

^{133/} DIALOG Database Catalog, 1988.

Frost & Sullivan, a private research organization, has studied the European database market and found an average annual growth rate of 27 percent between 1982 and 1985. The current size is estimated to be almost \$1.2 billion, with a market of over \$4 billion expected by 1990. The market is in a period of transition, with about 50 percent of the services delivered online and the remainder split between batch and printed products. There are over 1,800 database producers and information providers in Europe, with one-half being online.^{134/}

B. PERSONAL COMPUTERS

The status or "health" of the online information in a country, particularly the business online industry, can be determined, in part, by the number of personal computers in the particular nation. TABLE 9 presents the number of personal computers sold in recent years and projected for 1988 in Western Europe and Japan.

TABLE 9

PERSONAL COMPUTER SALES^{135/}
(In millions of dollars)

<u>Year</u>	<u>Japan</u>	<u>W. Germany</u>	<u>UK</u>	<u>France</u>	<u>Italy</u>
1986	2,794	938	1,018	950	672
1987	3,104	1,063	1,079	1,045	806
1988	3,534	1,188	1,138	1,159	921

The annual growth rates differ considerably, ranging from the 6 percent of the U.K. ; the 10-13 percent of France and West Germany; 11-14 percent for Japan; and 20 and 15 percent increases in Italy. It should be noted that the French Minitel terminals are not so much computers as they are telephone devices.

Of the total worldwide computer market, the United States has a 50.4 percent share followed by Europe with 28.7

^{134/} "Frost and Sullivan Report: The European Market for Database Services," Online Review, vol. 10, no. 6, Dec. 1986.

^{135/} "Overseas Market Report," Electronics, vol. 61, no. 2, Jan. 21, 1988.

percent; Japan with 9.8%; and the remainder of the world at 11.2 percent.^{136/}

C. FRANCE

The Teletel service, often referred to as the Minitel service, has received widespread acceptance in France. The service was initiated in 1981 with two distinct objectives: to update the printed directories, and to move France into the information age. Trials were held in 1981 and the service became operational in 1983 with the initiation of the electronic directory service. TABLE 8 presents the number of Minitel terminals distributed over a period of years.

TABLE 8

Minitel Terminal Distribution^{137/}

<u>Year ending Dec. 31</u>	<u>No. Terminals</u>
1983	120,000
1984	530,000
1985	1.3 million
1986	2.1 million
1987	3.38 million
May 1988	3.7 million

A 1987 survey conducted by FRANCE-TELECOM on the terminal distribution indicated that 65 percent of the terminals were in residences and 35 percent in business establishments. The revenue distribution was not determined.

At the end of 1987, more than 7300 different services were available, resulting in a system usage of 1 million hours connect time on the electronic directory service, and 4.8 million hours connect time for the other services. These connect times were produced by 63 million calls per month. The total videotex revenues collected through FRANCE-TELECOM in 1987 totaled \$510 million including \$73 million for

^{136/} Computer Industry Report, Jan. 19, 1988.

^{137/} Information provided by FRANCE-TELECOM via Claire Ancelin, Jul. 1988.

TRANSPAC, the packet switched network; and about \$240 million given to the information vendors and providers.^{138/}

It was determined that the cost of the terminals was a critical factor in the success of a successful videotex venture. Being able to reach a critical mass of terminals is fundamental to overcoming the "chicken and egg" problem. As of January 1988, FRANCE-TELECOM has ordered a total of 6 million terminals allowing for economies of scale to lower terminal charges.

The Minitel terminal is small in size and easy to use. The keyboard is much smaller than the standard personal computer keyboard, with smaller keys. It is designed for the "hunt-and-peck" operator rather than the more sophisticated operator using it continuously for long hours.

The Teletel system consists of 3 parts: (1) equipment in the user's home called a "Minitel" terminal; (2) the public networks; and (3) the videotex service provider. The types of networks available in France include the public network and Transpac, the French Packet Switched data network. The user terminals are attached to the public network, which is connected to Transpac through special switching nodes called Videotex Access Points (VAPs). The VAPs not only provide interconnection between the two networks but also perform a number of other roles, such as allowing users to select services by entering an abbreviated name (rather than a long telephone number) or providing the host computer address. The VAP also echoes back characters to user terminals, permits user correction of input, and performs other support tasks.^{139/}

As Teletel has been the most successful of the overseas public videotex services, it is of interest to examine the experience to date with residential demand. The statistics on Teletel usage presented in TABLE 11 indicates that the electronic directory service is widely used by residences that have a Minitel terminal.

^{138/} "The Minitel Success," Intelmatique, Jan. 15, 1988.

^{139/} "A Videotex Success Story," J. Griener and G. Nahon, Telephony, vol. 213, no. 4, Jul. 27, 1987.

TABLE 11

TELETEL RESIDENTIAL USAGE^{140/}

<u>Service</u>	<u>Percentage</u>
Regular use of Teletel	69
Regular use of electronic directory service	93
Kiosk services ^{141/}	61
Subscription to at least one non-kiosk service	18

The kiosk services, the most popular of which are presented in TABLE 12, were originally charged on a flat rate basis and targeted largely toward the mass market. Recently, two additional kiosk charging rates were introduced, out of recognition that some services are simply more expensive than others. Subscription services, where the user contracts with a specific information service provider (and must use pass words, pay minimum monthly billings, etc.), is a relatively small part of the French residential market.

The distribution of kiosk services involves both residential and business users. There are no readily available statistics on the volume of utilization by business versus residential users.

Based on the information at hand, the typical residential utilization of kiosk services probably involves the first three categories presented in TABLE 12.

^{140/} Teletel Newsletter, Special Issue No.2., 1987, p. 7.

^{141/} The kiosk services refer to a large number of information services which are provided in a bundled billing arrangement.

TABLE 12

Distribution of Teletel Directory and
"Kiosk" Traffic in 1986^{142/}

<u>Category of Service</u>	<u>Residential User</u>	<u>Business User</u>	<u>Percent Traffic</u>
Electronic Directory	X	X	18
"Chat" Services	X		16
Leisure & Games	X		16
General Information (news, municipal information, local associations, etc.)	X	X	8
Other General Interest (teleshopping, mail order, reservations, travel, tourism, etc.)	X	X	15
Banking and Finance	X	X	6
Specialized Business or Professional and Data Bases		X	5
Internal (in-house & private) Business Services for "Closed User Groups" (Users with similar requirements)		X	16

Minitel Terminal Charges

There is no direct charge for the first monochrome Minitel terminal in each residential subscriber's household. This is a so-called "dumb" terminal without processing or storage capabilities, which must remain "on-line" in order to operate (as compared to "smart" terminals such as personal computers, which can receive data "on line" then go "off-line" in order to process the data). Additional residential and the first two business basic monochrome terminals are

^{142/} Teletel Newsletter, Special Issue No. 2, 1987, p. 7.

\$13.60 per month.^{143/} Every third basic monochrome terminal for a business firm is free. Color displays and printers are available at higher tariff rates.

Teletel Usage Charges

The Teletel service has three main categories: Teletel 1, 2, and 3.

"Teletel 1" service is a reverse-charge type of access in which the originating subscriber pays the local charge. The information provider pays for the long distance communication charge.

"Teletel 2" service is a "sent-paid" access service, charged to the originating subscriber. The provider does not pay for anything.

"Teletel 3" Service is the "kiosk" type of "gateway" service in which the DGT will provide the basic access and transport functions on a bundled or subscription basis.

The majority of charges cover the infrastructure and transmission costs, and the charges for accessing the kiosk. TABLE 13 presents the costs per hour. Some services have reduced charges for non-peak hours, with a number of levels of charges depending on the time of day and the actual service being accessed.

TABLE 13

TELETEL USAGE CHARGES^{144/}

<u>Service</u>	<u>Hourly Rate</u>	<u>End-User Cost*</u>
(1)	\$5.84	\$9.34
(2)	\$8.51	\$12.02
(2)	\$16.37	\$19.87
(3)	None	\$3.50

(1) = Kiosk access for general public services.

(2) = Kiosk for business oriented services only.

(3) = Non-kiosk access. Free or subscription service.

* = Includes transmission charge of \$3.50 per hour.

^{143/} Based on a conversion rate of the French Franc as of July 14, 1988. (1 FF = \$.1604).

^{144/} "The Minitel Success," Intelmatique, Jan. 15, 1988.

A toll-free access service is also available, whereby the service provider bears the communications costs. Electronic directory service is free for the first three minutes.

Marketing and Economics of Minitel

The French Minitel terminal is given free to French homes and businesses where the electronic directory service (electronic "white pages") is available.

O'Leary has examined the Teletel service and concluded that American companies that are dazzled by it seem to overlook three important characteristics:^{145/}

1. The DGT spent substantial sums to develop it;
2. It provides a needed electronic substitute for out-of-date print telephone directories; and
3. Costs are "hidden" in customers' telephone bills.

Stoner has also studied the Minitel/Teletel program and observed that the basic concept was to give the terminal away free to any customer who wanted one, and then to earn income from the information they access. He likened it to the marketing efforts of Kodak, which sold cameras rather inexpensively and reaped large profits from selling film, and to companies selling shaving razors inexpensively, while earning large profits by selling the razor blades.^{146/}

Stoner indicates that videotex was seen as the most efficient means of modernizing directory assistance for subscribers. Furthermore, the electronic directory application was also seen as the most significant application that would pull consumers over the "high tech-high touch" syndrome in using high technology. The directory application is the most used of the Teletel services, registering over 23 million calls per month.^{147/}

^{145/} "U.S. Videotel: Another Try at American Videotel," M. O'Leary, ONLINE, vol. 12, no.2, Mar. 1988.

^{146/} "French Connections with Minitel: The Future Has Arrived in France," M. Stoner, ONLINE, vol. 12, no. 2, Mar. 1988.

^{147/} Ibid.

Stoner also points out that the kiosk billing has certain advantages not widely reported outside of France. The telephone bill does not separate the Teletel charges from regular telephone usage. Only one bill is received, stating one amount, so that one never knows exactly how much the actual Teletel bill is.

Uses of the Teletel services such as chat lines, stimulate usage of the service and serve to overcome initial resistance to the acceptance of a "high-tech" product. The familiarity and ease of use leads to more serious uses.

The American Newspaper Publishers Association examined the Teletel service and identified several significant points:^{148/}

1. The so-called message or "chat" services account for 70 to 80 percent of Teletel 3 revenues and only 45 to 50 percent of its costs;

2. Fifty percent of Teletel 3 users completely "drop out" or stop using the services after two months. Aside from usage of electronic directories, 40 percent of the Teletel 3 users maintain a low level of usage (about 95 minutes per month);

The ANPA concludes that less than 10 percent of the users of Teletel 3 create over 50 percent of the traffic and revenues and less than 45 percent of the costs.

Information provided by the DGT indicate that the initial investment per installed terminal is \$309, of which \$217 is attributed to manufacturing, \$34 to distribution, and \$58 to network management. The annual upkeep charge is \$22, covering terminal maintenance, promotion, and network management. The yearly revenues per unit are \$92, covering traffic, rental, electronic directory use, and savings of electronic directory and operators.^{149/}

Thus the yearly gross margin is \$92 less \$22, or \$70. The return on the \$309 investment is recovered in 4.4 years.

^{148/} Memorandum, To: CEO Team and Outside Directors; From: American Newspaper Publishers Association Delegation (Lee Enterprises letterhead); Subject: The French Telematique (Videotex) System; Jul. 1, 1987.

^{149/} "Economics of Teletel," Information provided to NTIA by DGT, January 1988.

LINK Resources has analyzed the French videotex model and has determined that it will not "map" onto the United States because of critical structural differences. According to LINK, these differences will prevent the United States from becoming "Minitel-ized." Furthermore, LINK indicates that although Judge Greene was correct in identifying the electronic white pages as the market driver in France, there is no market corollary in the United States. The French turned to electronic white pages because the alternative voice-based directory assistance was really no alternative at all. The circumstances in The United States are much different where printed directories and voice-based directory assistance is efficient and sophisticated.^{150/}

D. CANADA

GRASSROOTS AND TELEGUIDE

Canadian videotex efforts under the sponsorship of the Federal Department of Communications resulted in the development of the Telidon videotex system. Extensive field trials began in 1980. Norpak Ltd. developed a series of interactive videotex packages. Infomart Ltd., which is a joint venture including Norstar Corporation and Southam Press Inc., was created to handle management and coordination of Telidon database development.

By March 1981, the Infomart database contained 50,000 pages of information on employment, tourism, and government services. Commercial videotex services which emerged in the early 1980s included Grassroots, an Infomart service aimed at the modern agribusiness and farming communities.

The Grassroots service has survived and currently operates as an independent company in Winnipeg. Grassroots serves large grain and livestock producers and provides agricultural and meteorological services. As of June 1988, there were 2000 subscribers to Grassroots. The fees for Grassroots are \$150 per year plus a \$25 per hour charge that includes the communications.

Teleguide was an Infomart service providing free access to over 1000 pages of information on subjects including tourism, travel, hotels and restaurants. Although there were at one time 1000 terminals, the service ended in Toronto in 1986, and only 571 terminals remain in five cities. Another commercial service, Weatherwatch, is provided by Meteorological Environment Planning of Ontario, offering

^{150/} LINK Resources report, May 1988.

weather forecasts and related information. The subject area distribution of Teleguide is presented in TABLE 14.

TABLE 14

Teleguide Usage

<u>Subject</u>	<u>Percentage</u>
Tourism	26
Professional Services	21
Agriculture	21
Education	14
Consumer Services	10
Other	8

The failure of Teleguide significantly to penetrate the mass market has been attributed to a number of factors, including the high cost of the terminals and inability of the consumer to send, rather than merely receive, information over the system.

CETI

A Montreal-based corporation, CETI Inc. (a closely held company established by Le Groupe Soficorp Inc., a Montreal-based financial holding company), plans to introduce a variation of the French Minitel in Montreal in 1988. CETI has obtained the Canadian distribution rights for the Minitel terminal and format and expects to spend \$200 million distributing 1.7 million terminals. The terminals have been modified for the Canadian market and are technically identical to the models being imported into the United States by U.S. Videotel. The software is essentially the same as that used in France.

Initial efforts are scheduled in the Montreal area where CETI expects to hook up 4,000 subscribers by the end of May 1988. A second effort will be in Hull/Ottawa and Quebec City, where 3,500 subscribers will be hooked up in each city. There will be 200 information banks from the beginning. CETI expansion plans call for the firm to add 5,000 terminals per month and to move into the Ontario market in late 1988.^{151/}

CETI has reported that the Ministry of External Trade; the Ministry of Commerce and Trade, the Farmers Industry Association, Groupe Transat A.T., and Bisnat (a 4,000 member stockbroker

^{151/} "Montreal Firm Wins Rights to Minitel," The Gazette, Business Section, Montreal, Apr. 22, 1988.

organization), have agreed to use the network. Other announced participants include Bank of Canada, the newspapers Journal de Montreal and Journal de Quebec, and the Montreal Stock Exchange.^{152/} Thus the CETI marketing efforts are not limited to home consumers, but include the financial industry as well.

The Minitel-like terminal will sell outright for C\$600 or it can be rented for C\$25 per month; or it can be lease/purchased for C\$30 per month for three years, after which the user owns the terminal. The rent or lease options include one hour of free usage time per month. There are no minimum usage requirements. The normal charges will be a flat rate of C\$15 per hour, or C\$.25 per minute.^{153/}

ALEX

Bell Canada will begin a market trial of ALEX, their consumer online information service in December 1988 in Montreal. If successful, the plan will be extended to Toronto.

ALEX is described as a network-based videotex gateway service. ALEX will provide the services of retailers, financial institutions, governments, services clubs, newspapers, and other service providers. The applications will be both informational and transactional, including home shopping, travel reservations, entertainment and games, communications and conversational forums, home banking, consumer services, and news and information.^{154/}

The trial period will take place in the December 1988-1990 time period, and as many as 20,000 subscribers may be involved.

Northern Telecom has developed a special ALEX terminal, although personal computers can also be used. The ALEX terminal is similar in appearance to a Minitel terminal, although the arrangement of the function keys is slightly different. The baud rate will be 1200/1200 receiving/transmitting respectively whereas the Minitel is 1200/75. The initial rental rate for a terminal will be C\$7.95 per month although this is subject to

^{152/} "Reseau CETI lands More Closed User Groups for January Launch," Interactivity Report, no. 9, Nov. 1987.

^{153/} Information provided informally by Mr. Jacques Blanchette, Vice President of Development and Communications, CETI, Montreal, May 1988.

^{154/} "Bell to Trial New Interactive Consumer Service," Press Release, no. NR-87-E24, Bell Canada, Montreal, Aug. 27, 1987.

change as a result of acceptance of the services and market conditions.^{155/}

In addition to the terminal rental charges, Bell Canada has filed an ALEX tariff consisting of four separate categories of service. The four categories are:

ALEX I -- ALEX I service is free to the user although the service provider pays the C\$.12 per minute fee for the network. A typical example would be a government agency providing free information to the public.

ALEX II -- Under ALEX II service, the customer pays the C\$.12 per minute network charges, and the service provider bills the customer separately for the additional charges for the information. A typical example would be a university providing educational information.

ALEX III and IV -- The service provider charges C\$.30 and C\$.45 per minute, respectively, under ALEX III and IV in addition to the C\$.12 network fee. Bell Canada provided the billing service.

INET

INET 2000 is a business information service offered in Canada by Telecom Canada, the Canadian consortium of telephone companies. The operation began in July 1983 and as of July 1988 has 28,000 online subscribers, and 80,000 subscribers to its "Envoy" electronic messaging service.^{156/}

INET offers 54 services including databases on agriculture, business, finance, law, government, and science and technology. INET also provides gateway access to CompuServe and The Source, services in the United States.^{157/}

^{155/} Press Release "Standby Information," Subject: ALEX-Northern Telecom Canada To Manufacture Terminal, no. 87-E50, Dec. 2, 1987.

^{156/} Information provided by Ann Bison and Darlene Cole, INET, Ottawa, Canada, Jul. 1988.

^{157/} INET 2000, Catalogue of Services, no. 135 rev.(8710), 1987.

E. FEDERAL REPUBLIC OF GERMANYBildschirmtext

Bildschirmtext (BTX), first introduced in the Federal Republic of Germany (West Germany) in 1983, is an interactive videotex service aimed at the general consumer. A TV screen is used for visual display, and personal computers, desk terminals and data terminals suited to BTX purposes can be used as control terminals. The BTX system is accessed via a telephone line to the public network. The Deutsche Bundespost (DBP) supplies the subscriber with a connecting box that interconnects the BTX terminal and the telephone, permitting direct dial to the BTX service.

The types of information available via BTX include: product information; home banking; travel; cultural information about museums, galleries, and theaters; entertainment programs; motorist information; and sports and hobby information.

The charges for the service are as follows:^{158/}

- o Non-recurrent connection charge: \$38.52
- o Monthly charge: \$4.74 This includes the provision of the BTX connecting box.
- o Call charges in the telephone network: \$0.14 for 8 minutes on peak (from 8 A.M. to 6 P.M.) or 12 minutes off peak (from 6 P.M. to 8 A.M. on Sundays and holidays).
- o The transmission of BTX messages costs \$0.24, and the retrieval of pages from other regional areas \$0.01.

As of October 1987, there were 85,000 subscribers, and each month more than 1.9 million calls are made via BTX. More than 3,400 advertisers and information providers have stored approximately 600,000 read-only and dialogue pages in the DBP's mainframe system. In addition, more than 1,000 "closed user groups" with 107,000 members have been registered for special non-public applications.^{159/}

^{158/} Based on the foreign exchange rate of Feb. 4, 1988 (1DM=\$0.5926).

^{159/} BTX Brochure, Oct. 1987.

As of July 1988, the number of subscribers had grown to about 124,000, and the number of providers had grown to 3,368 with 278 external computers.^{160/}

F. JAPAN

CAPTAIN

CAPTAIN (Character and Pattern Telephone Access Information Network) is the Japanese videotex service which was introduced in November 1984, although initial development began in 1979. The first experimental service was carried out from December 1979 to March 1981 by the Ministry of Posts and Telecommunications and the Nippon Telegraph and Telephone Corp. The first trials had 1000 user terminals, 199 information providers, and 100,000 display frames. Based on surveys, the first system was improved, and a second trial period was initiated in August 1981.^{161/}

The CAPTAIN system is divided into four parts: videotex communication network, the CAPTAIN Information Centers, user terminals, and information inputting equipment. The Information Centers provide users with access to information service providers. Types of information services provided include reference services (news, weather, and other), reservation services, direct ordering of merchandise, information processing services, and access to commercial databases. Information available to closed user groups includes community information, stock market data, information on training programs, corporate information, and various forms of legal information.

^{160/} Letter from Dr. Karl-Heinz Neumann, Wissenschaftliches Institut für Kommunikationsdienste der Deutschen Bundespost, to Ken Robinson, Jr., NTIA, no. WIK B 8165, Jul. 21, 1988.

^{161/} "Japanese VIDEOTEX System "CAPTAIN" -- Experimental Service and Reactions Outline," S. Harashima, T. Kumamoto, and T. Kitamuara, IEEE Transactions on Communications, vol. COM-29, no. 12, Dec. 1981.

CAPTAIN service opened in Tokyo, Osaka, and their metropolitan areas, and was expected to be linked to 47 other Japanese cities by April 1988. The rate structure is as follows:^{162/}

- o A uniform price of \$0.23 for three minutes throughout the nation at any time of the day;
- o A terminal fee of \$300 to \$400 for a basic model and \$1600 to \$2000 for a more sophisticated model (i.e. high resolution TV);
- o A one-time subscription fee of \$6.25.

To date, development of the service has not met original growth expectations. As a result, extensive revisions of the rates and terminal charges are being undertaken. A new pricing structure has been proposed to be implemented sometime during 1988 as follows:

- o The fee will be discounted for evening use between 7PM and 8AM to \$0.23 for five minutes;
- o In the Tokyo metropolitan area, the new charge will be \$0.08 for three minutes.

Information service providers which use the CAPTAIN Information Centers are charged a contract fee and a charge for information storage, as well as a fee for inputting information.

As of January 31, 1988, the number of terminals in use totaled 48,893. Of these, 18,394 were located in homes, and 30,499 in offices.^{163/}

HI-CAPTAIN and Super CAPTAIN

The NTT has been developing two services that are technologically enhanced on a magnitude above the CAPTAIN. The HI-CAPTAIN uses a 64-kbps digital network and provides a greater range of services than is possible with a conventional videotex system that employs the analog telephone network.^{164/}

^{162/} Based on the foreign exchange rate of Feb. 4, 1988 (1Yen = \$0.007817).

^{163/} Private conversation, Sokken Planning, Tokyo, Japan, Feb. 16, 1988.

^{164/} "Videotex: Advancing to Higher Bandwidth," M. Sugimoto, M. Taniguchi, S. Yokoi, and H. Hata, IEEE Communications Magazine, vol. 26, no. 2, Feb. 1988.

The major features of the HI-CAPTAIN are high resolution, full-color image, and high quality audio. The audio can be used for narration and music. The HI-CAPTAIN is also a much faster responding system than conventional videotex.

Digital CAPTAIN is being developed by the NTT in concert with the establishment of ISDN. The digital CAPTAIN technologies will be based on the HI-CAPTAIN. Digital CAPTAIN will be developed with the capability of sending audio signals and full-color photographs of excellent quality.

Super-CAPTAIN is a wide bandwidth digital system capable of providing information in many forms, such as color photographs, motion pictures and high quality audio. One experimental application is in the medical field, where it is used to streamline medical examinations, thereby assisting in the early detection of disease. The potential users are doctors, nurses, pharmacists, patients, and patients' family members.^{165/}

CompuServe

In February 1986 CompuServe began serving Japan under a joint venture with Nissho Iwai Corporation and Fujitsu, Ltd (see Consumer Videotex section in Part II for additional background on CompuServe). The venture, Network Information Forum, is a Japan-based service using CompuServe videotex technology.^{166/}

G. UNITED KINGDOM

Prestel

Prestel is British Telecom's public videotex service. It links a variety of terminals, including "dumb" terminals, personal computers, and special "viewdata" terminals into British Telecom information services (Prestel) and electronic mail (Gold) services. At the present time, there are approximately 77,000 terminals in the system, 70,000 of which can send and receive electronic mail.

Information services include financial quotations, reservations and related travel services, racing information, health care advice, entertainment guides, games, home shopping, and other services. Approximately 1000 independent information service providers supply the system. More specialized services are available to the owners of personal computers, including a large variety of software (accessible by joining Prestel

^{165/} Ibid.

^{166/} Sloan and Talarzyk, p. 19.

Microcomputing) and the ability to exchange information with other computer users. MAILBOX and TELEX LINK comprise the electronic mail service which is provided to Prestel users. The electronic mail services involve no registration fee, nor minimum charges, merely the normal Prestel charge and the local call (which in the UK is 99 percent of all calls). At the present time, approximately 61 percent of the terminals are located in business establishments and 39 percent in residences. The electronic mail services are believed to be among the most popular services, particularly within the business community.

Basic rates^{167/} for Prestel services are approximately \$7.92 per month for business users and \$2.85 per month for residential users. A fee of approximately \$.11 per minute, which is dropped after 6 P.M., is also charged. There are additional charges for specialized services. The cost of the basic TV, plus adaptor type terminal is \$404.64. For personal computer owners who already have a modem, the required software is provided at no charge. There are also several special "viewdata" sets on the market. The price of these was not available, although the indication is that they are relatively expensive.

H. AUSTRALIA

The Australian videotex service is called "Viatel" and it uses the UK Prestel videotex system with a hybrid 1200/75 baud rate. Viatel offer 88 information services that are provided by various businesses. There are currently 70,000 pages of information on the system.

The subscription fee is A\$12.50 per month for businesses and A\$2.50 per month for non-businesses. The non-business usage charge is 8-Acents per minute and some page usage charges.^{168/}

Viatel currently has about 30,000 subscribers, but the growth has slowed considerably after an initial upsurge of subscriptions.

Australia also has over 200 databases for businesses covering medical, science, legal, education, etc. These services are offered via 12 information vendors or "hosts."

^{167/} Based on the foreign exchange rate of Feb. 4, 1988 (1 Pound = \$1.7593 and 1 Pence = 0.01 Pound).

^{168/} Australian Database Directory, Overseas Telecommunications Corp., OTC Sydney, Apr. 1988.

I. FINLAND

Finnish videotex users can access the French Minitel system through an interconnection established by the Finland PTT. Subscribers to Finland's VDX-100 videotex network, which has operated since 1984, can access the "kiosk" system by selecting the "Teletel France" on the VDX-100 menu. Connection to the remote host computers is made through the "Groom" gateway system provided by Intelmatique. 169/

J. CONCLUSION

The content of consumer videotex information services described for five countries (Canada, France, West Germany, Japan, and The United Kingdom) is provided by private corporations. However, the "gateway" and transmission functions in all of these countries are performed by the public network providers.

The success of the consumer videotex services in terms of the number of subscribers for all of the countries, with the exception of France, is considered, at this time, to be marginal. On the other hand, France's Teletel/Minitel service appears to be successful when evaluated on the basis of revenues to the DGT, the number of subscribers, and usage, following the large investment in terminals provided at no charge to users by the DGT.

Analysts have examined the French Teletel service and concluded that the free terminals, together with a lack of up-to-date paper telephone directories, created a "critical mass" of users providing the necessary impetus to popularize the service.

TABLE 15 presents a price comparison of some of the foreign and U.S. services. The table was developed using the rates corresponding to the lowest U.S. rates, since some firms have a different pricing structure for different baud rates.

TABLE 15

PRICE COMPARISONS
(All prices in U.S. \$)

<u>Service</u>	<u>Price per Off-Peak Hour</u>	<u>Price per Peak Hour</u>
CompuServe	\$6.00	\$6.00
GENie	\$5.00	\$35.00
DELPHI	\$6.60	\$9.60
Prodigy	(\$9.95/month flat rate)	
Boston CitiNet	(free -- advertiser supported) (charges only for electronic mail)	
<hr/>		
France Teletel/Minitel	(**)	Public kiosk \$9.34 Business kiosk \$12.02 Business kiosk \$19.87 Subscription (Non-kiosk) \$3.50
Canada ALEX	ALEX I -- free to user ALEX II - \$5.76/hr plus database usage charge ALEX III - \$20.16/hr. ALEX IV - \$27.36/hr. (There are no peak/non-peak rates.)	
Canada CETI	\$15	\$15
Japan CAPTAIN	\$2.76 Tokyo - \$1.60	\$4.60 Tokyo - \$1.60
FRG Bildschirmtext	\$0.70	\$1.05
U.K. PRESTEL	(\$0.11/hr. fee is dropped)	\$6.60 plus \$2.85/month basic fee and \$7.92 per month for businesses. Additional charges for special services.

** Some Teletel services are available at non-peak time rates, and there are five different levels of rates.

V. DEVELOPMENT OF NEW INFORMATION SERVICES

The House of Representatives report accompanying the NTIA 1988 authorization bill directed that the NTIA "study shall compile a comprehensive listing of actual and potential information services, estimate the capability of the U.S. telecommunications industry to provide these offerings, and where such capability does not exist, project the cost and estimate the schedule of putting it in service."^{170/}

A. ACTUAL AND POTENTIAL INFORMATION SERVICES

Actual Services

Part II of this report identifies the major business and consumer information service vendors and provides a detailed description of the major vendors and their offerings and prices. Other information vendors are also presented in Part II, because their offerings were considered unique and deemed worthy of further examination. The listings and descriptions presented in Part II are augmented by additional material in Appendix B.

Taken all together, the national information vendors such as CompuServe, The Source, GENie, QuantumLink, DIALOG, Mead, and Dow Jones News/Retrieval offer a large variety of business and residential information services. The entry of large firms such as Prodigy into the consumer videotex business, together with the gateway services offered by the Bell Operating Companies, and an increasing penetration of personal computers, with the corresponding increased computer literacy, are expected to produce increasing levels of usage among personal computer owners.

The marketplace is handicapped in meeting the needs of ordinary small business and home telephone subscribers. The proper role of Government is to assure that the marketplace is working efficiently and that no unnecessary regulatory roadblocks are hindering the growth of the industry.

The costs of the development of new services would vary considerably due to many variables entering the cost equations. As a guideline in examining the costs of developing new services, it is beneficial to examine the prices of existing operations. Financial information on some information vendors is public information. A discussion of the costs involved in implementing some local information services is presented in Appendix D.

^{170/} House Comm. on Energy and Commerce, Authorization of Appropriations for National Telecommunications and Information Administration, H.R. Rep. No. 362, 100th Cong., 1st Sess. (1987).

B. CAPABILITY OF U.S. TELECOMMUNICATIONS INDUSTRY

Magnet Services

The Bell companies have identified the need for "magnet" services to provide the initial impetus towards a successful information services industry serving both the consumer and business markets. "Magnet" services have also been identified by independent analysts as the key ingredients for successful operations.

The Bell companies have identified the core of "magnet" services as electronic directories - both white and yellow pages - and electronic mail. Other services are also expected to be major contributors to the group of core services.^{171/} These are expected to be developed by independent providers, such as the Boston CitiNet, Cleveland Free-Net, and Prodigy, on a local basis; and firms such as GENie and CompuServe on a national basis. The independent providers are outside the telecommunications industry, normally considered to consist of the local and long distance carriers. Marketplace forces are expected to continue to make major contributions to the developing information services industry.

Electronic Directories

Under the terms of the AT&T consent decree, the Bell companies are permitted to provide electronic white page directories, but they are prohibited from offering electronic yellow page directories. Pacific Bell has established a limited white page service offering and has several subscribers, such as credit information firms. Other Bell companies are also studying the market potential of electronic white page services.

White Pages. In order to make the white page directories more attractive to potential subscribers, offering an "enhanced white pages" is the likeliest procedure. The "enhanced" version could contain features such as full name, mailing address, and zip codes; reverse directories with search capability by address; and geographical radius searches.

Yellow Pages. "Enhanced yellow pages" are also a likely evolution with the "enhanced" versions having price information and various selection and retrieval capabilities such as product brand names. This evolves to "electronic publishing" with the

^{171/} This marketing situation is similar to that of cable television, where a package of core or "basic" channels is offered for a "basic" fee, and additional charges are made for other channels such as movie channels.

enhanced yellow pages containing information on prices and sales.

C. COSTS AND SCHEDULE FOR DISTRIBUTION OF NEW SERVICES

INFORMATION SERVICES TERMINALS

The cost of the information service terminals can vary depending on the sophistication of the units.

The IBM Personal Computer "clones" are in the \$500-700 price range with a modem and communications software likely to have retail prices on the order of an additional \$200-300. As a rough estimate, the cost to produce these items is expected to be on the order of \$500 with retail prices at \$1000 or more.

The Tandy/Radio Shack Color Computer model is being sold for \$99 with a separate modem costing \$50 and software at \$50. Using a TV receiver as the display, but not counting the cost of the receiver, the retail price of going online is as low as \$200. A \$100-\$150 production and distribution cost per unit is a good approximation allowing for a gross profit margin of 33-100%.

It would be helpful to consumers intimidated by computers to have available a self-contained unit consisting of small personal computer, modem, and communications software. This would greatly simplify the computer knowledge and skills required to get online. It would also lower production costs over a large scale. The Minitel terminals costs are \$217 per unit built in France.

Using a range of production costs from \$100 to \$500 and considering 30,000,000 to 60,000,000 households, the total costs would range from \$3 billion to \$30 billion.

ENHANCED WHITE PAGES

U S WEST has analyzed the market aspects of electronic white pages and has determined that limiting the user to search strictly by a name is not an attractive offering for either the consumer or the provider. Consumers demand a feature rich product such as flexible search capabilities allowing the user to locate people when little information is known.^{172/}

One type of enhanced white pages would permit the user to search on any part of a white page listing. For example, a consumer may need to locate a gasoline station in a particular location without knowing the exact name of the station. The enhanced white pages would allow the user to search by street name until the station telephone number was located.

^{172/} Information provided by U S WEST, Jul. 13, 1988.

U S WEST has conducted an analysis of the problem of providing electronic white page directories and has determined that the system configuration needed is:

- o one system to serve the 14-state U S WEST region;
- o space to house approximately 12-14 million subscriber listings updated daily/weekly;
- o one node to handle the anticipated transactions for a 2 year period, with associated communications processors; and
- o operating, application, and user interface software development.

This configuration would require an initial investment of \$3.5 million. Additional hardware costing \$500,000 to \$1.2 million may be necessary to handle increased transaction growth if the growth exceeds the forecast.

U S WEST has determined that it would take two years to implement enhanced electronic white pages. The first year would largely consist of research, planning, system definition, development, documentation and vendor selection. The second year would consist of development, documentation, training, systems testing, technical trials, and implementation.

Ameritech analyzed the requirements for enhanced electronic white pages and determined that \$2.5 million would be required for hardware and software. This figure is for a regionwide application. It estimates that it would take less than one year to implement the service. Ameritech currently offers an electronic white pages called "Directory Express" to businesses and therefore, the development of enhanced white pages can build on the prior experiences and assets.^{173/}

In summary, the estimated costs of implementing enhanced electronic white pages range from \$2.5 to \$3.5 million, and it would take less than one year to two years to implement the service.

^{173/} Information provided by Ken Thompson, Ameritech, Chicago, IL, Jul. 1988.

ENHANCED YELLOW PAGES

The hardware and software costs for enhanced yellow pages are expected to be similar to the enhanced white pages. Furthermore, additional costs are generated by the administrative expense.

Pacific Bell has analyzed the problem of providing enhanced yellow pages and has determined that for a city like San Francisco with 75,000 businesses, it would take 100 sales people to sell the advertisements and listings to the business community. The annual cost of the sales force is estimated to be \$5 million, with revenues exceeding that number.^{174/}

Thus the cost of enhanced yellow pages is expected to be on the order of \$8.5 million, and it is expected that it would take two years to develop the service.

Ameritech analyzed the development of enhanced electronic yellow pages and determined that the development of software and hardware cost would be \$5 million. For a service free to the user, it would require an annual operations cost of \$3 million. The implementation time would be at least one year.^{175/}

In summary, it would cost \$5 to \$8.5 million for a Bell company to implement the enhanced yellow pages.

^{174/} Information provided by Pacific Bell, Mar. 7, 1988.

^{175/} Ken Thompson, Ameritech.

VI. PRINCIPAL FINDINGS AND CONCLUSIONS

o The future development of the information services industry in this country is vital to the ability of American companies to become more competitive both at home and abroad and to the ability of all Americans to become part of the economic and social fabric of an electronic society.

o Information services include more than transmission and content, i.e., they include: transmission, storage and retrieval, signal processing, gateway services, proprietary databases, non-proprietary databases, and mass media products.

o The U.S. online information services industry is strong and thriving for larger business users and those willing to purchase a personal computer, modem, and software, and subscribe to particular information services.

o The U.S. mass market lags far behind that for larger business and residential personal computer owners, and also lags far behind the mass market developing in some other countries.

o A major component of the mass market is the household with an ordinary telephone subscriber who is not likely to own a personal computer, and who would benefit from availability of a low-cost, user friendly information services terminal.

o Removal of certain regulatory impediments could accelerate the growth of successful mass market information service offerings in this country, by permitting our largest local telephone companies to offer information services and to produce suitable information services terminals

Analysts and several Bell companies have identified the need for "magnet" information services, such as electronic directories for "white pages" and "yellow pages." Such "magnet" services were the key element in the success of the French Minitel/Teletel service. Although electronic directories are not expected to be a "magnet" unto themselves in the United States because of the strong competition from existing printed directories and other printed information sources, they are foreseen as a major part of a core of "magnet" services that might also include other national or local services.

The study identified that the United States market lacked a user friendly, low-cost and widely available information services terminal with self-contained modem and communications software. The U.S. information terminal is driven by the computer industry vis-a-vis the telephone model in France and other nations.

The development and marketing of terminals should be left to the marketplace. The Bell companies are prohibited from

developing and manufacturing such terminals, a situation that slows the progress of mass market information services. NTIA has recommended that such prohibitions be removed.

The cost estimates of producing and distributing information services terminals on a large scale to the residential consumers ranges from \$3 billion to \$30 billion, with the lower figure associated with low-cost terminals and the higher figure associated with IBM-type personal computers.

Assuming regulatory and legal restrictions are removed, it would require an investment of \$2.5 to \$3.5 million to implement enhanced electronic white pages, and it would take less than one year to two years to implement the service. Enhanced yellow pages would cost \$5 to \$8.5 million to implement and it would take one to two years for each Bell company to implement the service.

APPENDIX ACONGRESSIONAL LANGUAGE

In approving the NTIA authorization for fiscal year 1988, Congress directed that NTIA undertake an information services study. The following text was obtained from the report associated with the authorization bill:^{176/}

Information Services Study

The Committee also directs NTIA to conduct a study of the information services market. The study shall compile a comprehensive listing of actual and potential information services, estimate the capability of the U.S. telecommunications industry to provide these offerings, and where such capability does not exist, project the cost and estimate the schedule of putting it in service. The study shall also identify information services that are available in other countries and examine the origin, current dimension and growth rate of the services, and the regulatory, judicial, and commercial environment under which these services are provided. The study shall be completed within 180 days of enactment of this legislation.

^{176/} House of Representatives Report No. 362.

APPENDIX BSUMMARY OF ACTUAL INFORMATION SERVICESINTRODUCTION

The language accompanying the NTIA authorization bill directs that "The study shall compile a comprehensive listing of actual and potential information services...." A description of a selected number of services is contained in Part II of this report. As listed in a database directory, the number of actual services publicly available numbers about 3,700. To include a comprehensive listing would entail, for all practical purposes, a reproduction of a commercially available database directory such as the Cuadra/Elsevier Directory of Online Databases that would be on the order of 500-600 pages long.

TABLE B1 presents statistics over a period of years from the Directory of Online Databases. A discussion of the terminology follows the table.

TABLE B1

INFORMATION SERVICES STATISTICS^{177/}

<u>Issue</u>	<u>Databases</u>	<u>Database Producers</u>	<u>Online Services</u>	<u>Gateways</u>
79/80	400	221	59	
80/81	600	340	93	
81/82	965	512	170	
82/83	1350	718	213	
83/84	1878	927	272	
84/85	2453	1189	362	
1986	2901	1379	454	35
1987	3369	1568	528	44
1988	3699	1685	555	59

^{177/} Cuadra/Elsevier Directory of Online Databases.

Database "producers" are synonymous with information providers and are the group of suppliers that develop and maintain databases. These "producers" or "providers" are the "wholesalers" of the information.

Online services are vendors that "retail" information to users.

In the industry context, there is one basic definition of a gateway and several synonymous subclasses:

The basic definition of a gateway is any computer service that acts as an intermediary between a user and the databases resident on the computers of one or more organizations.

The subclasses of the basic definition are:

1. A gateway is a service that passes users through to the online service or information provider of their choice; or

2. A gateway can also provide access to databases resident on the vendor's own computers. In this case, is fully integrated and also acts as an information provider.

Information services are global in scope and the statistics contained in TABLE A1 encompasses a number of foreign databases.

For the sake of brevity, this Appendix does not list each of the thousands of databases, producers, and online services, but simply summarizes the information services that are publicly available, and augments the material presented in Part II.

INFORMATION VENDORS

Consumer Videotex

One of the primary interests of Congress is the mass consumer videotex industry. This section augments Part II by presenting information regarding several additional information vendors.

INFO. INFO Corporation is an advertiser supported consumer videotex service operating in the Boston, MA area. The service began operation in 1985 and is totally free to the users. All revenues are generated via advertising whereby each advertiser "sponsors" the services.

INFO reports that its most popular services are stock market quotations, calendar of events, and reports on daily ski conditions during the skiing season. The firm reports having 300-500 accesses per day, with many of these being the so-called "coffee break" accesses conducted by office workers who use computers in their work.^{178/}

People/Link. People/Link, generally known as "Plink," is operated by American People/Link of Chicago. The service offers electronic mail, a chat line, special interest groups information, shopping, and travel reservations and information. An toll-free "800" number is provided for users outside Illinois.

After a \$15 sign-up fee, the rates as of May 1, 1988 are:^{179/}

a. Non-prime time --

300/1200 baud	\$4.95/hour
2400 baud	\$11.95/hour

b. Prime business time --

300 baud	\$11.95/hour
1200 baud	\$12.95/hour
2400 baud	\$14.95/hour

People/Link offers discounts from these rates for heavy users -- those who join the "frequent plinker" club.

DELPHI. DELPHI is a public access service operated in Cambridge, Massachusetts by the General Videotex Corporation. Services provided are electronic mail; news, weather, and sports; travel information and reservations; business and financial including stock market transactions; special interest groups information; shopping; encyclopedia; and entertainment services.

DELPHI also provides gateway access to DIALOG, the business information vendor with 300 information databases

^{178/} Discussion with Mr. John Goode, Chief Executive Officer, INFO Corporation, Boston, MA, Jun. 1988.

^{179/} Brochure, American People/Link, Chicago, IL, 1988.

available. The charge for the DIALOG is the DELPHI rate as described below, the individual DIALOG database fee, and an additional \$21 per hour. There is no additional communications charge as would be the case for a user accessing DIALOG directly.^{180/}

After the \$49.95 basic registration fee, the basic rates for DELPHI as of June 1, 1988 are:

a. Non-prime time --

Direct dial \$6.60/hour

Long-distance \$7.20/hour

b. Prime business hours --

Direct dial \$9.60/hour

Long-distance \$17.40/hour

The rates differ for access from Alaska, Hawaii, Puerto Rico, Canada and other foreign countries. The communications service in the U.S. is via Tymnet and Telenet, hence the extra charge for long-distance access.

BUSINESS INFORMATION SERVICES VENDORS

Part II describes some of the major business information services vendors such as DIALOG, Dow Jones News/Retrieval and SABRE. There are approximately 400 vendors of business information. In addition to those described in Part II, the following describes some of the larger and/or unique vendors.

EasyNet Knowledge Gateway. EasyNet and Knowledge Gateway are registered trademarks for services provided by Telebase Systems of Philadelphia. For the most part, EasyNet provides "one-stop" access to 13 business information vendors such as DIALOG, BRS Information Technologies, VU/TEXT, NewsNet, and Data-Star.

About 700 databases and information sources are available via EasyNet. Typical examples are the complete text of the Communications Daily trade newsletter that is on

^{180/} Brochure and discussion with Ms. Audrey Chitoff, Director of Marketing Communications, General Videotex Corp., Cambridge, MA, Jun. 1988.

the NewsNet; the full text version of the Columbus Dispatch newspaper that is on VU/TEXT; the Harvard Medical School Health Letter that is on BRS; and "Metals Information Designations and Specifications" that is on the ORBIT Search Service.^{181/}

BRS. BRS Research Service is primarily a major business information vendor with over 150 databases available, several of which it produces itself. The firm is headquartered in Latham, NY and is a subsidiary of TPG, Inc.

The firm specializes in health care information services with 35 databases available in health, medicine, and pharmacology. Other databases cover physical and applied sciences, life sciences, business, social science/humanities, education, and reference/multidisciplinary. Some examples of medical information offered by BRS (other vendors may also offer some of these services) are:^{182/}

a. The National Library of Medicine's MEDLINE which provides a comprehensive index to national and international medical literature containing citations and abstracts to over four million documents.

b. The "Medical and Psychological Previews Service," a current listing of citations from over 160 core journals.

c. International Pharmaceutical Abstracts covering over 500 journals worldwide on specific drugs, therapy, evaluations, legislation, analyses, and related topics.

d. "Medical Textbooks" service covering the complete text of over 20 key reference books.

The fees vary depending on the database accessed, ranging from \$8 to \$110 per hour, with \$50 per hour being an approximate average rate covering many of the services that are between \$30 and \$60 per hour. There are some smaller additional charges for document printing. The communications is via Telenet or Tymnet, and in some cases the charges are bundled into the database charge, and in other cases BRS bills a separate additional fee.

DIALOG. As discussed in Part II, DIALOG is the largest vendor of information services to businesses. The following is a brief description of a sampling of some of the 300

^{181/} Brochure, EasyNet, Telebase Systems, Inc., Bryn Mawr, PA, 1988.

^{182/} Brochure, BRS Information Technologies, Latham, NY, 1988.

databases offered by DIALOG.^{183/} The sampling emphasizes science and technology. Some of these services are also available via other vendors besides DIALOG.

a. "AGRIBUSINESS" is developed by the Pioneer Hi-Bred International, Inc. agricultural products firm of Des Moines, Iowa. The "AGRIBUSINESS" database provides indexing and informative abstracts from 300 industry-related trade journals and government publications. It also provides current access to agricultural business information used for strategic planning purposes. The file contains about 74,000 records and is updated every two weeks.

b. The "ANALYTICAL ABSTRACTS" database covers all aspects of analytic chemistry including inorganic chemistry, organic chemistry, pharmaceutical chemistry, environmental agriculture, and general applications. The database contains references from approximately 1,300 journals plus conference papers, books, standards, and technical reports. The database is developed and kept current by the Royal Society of Chemistry of Nottingham, England. The file contains 96,000 records and is updated monthly.

c. The "BIOBUSINESS" database covers agriculture, animal production, biomass conversion, biotechnology, crop production, diet and nutrition, fermentation, food technology, forestry, genetic engineering, health care, industrial microbiology, medical diagnostics, medical instrumentation, occupational health, pesticides, pharmaceuticals, protein production, toxicology, veterinary science, and waste treatment.

The information is directed towards business executives, financial analysts, product development and marketing specialists, and other professionals interested in business applications of biological and biomedical research. The database was developed and is maintained by BIOSIS (BioSciences Information Service) of Philadelphia. The file contains about 104,000 records that are updated monthly.

d. "CHEMICAL INDUSTRY NOTES" indexes over 80 important worldwide journals, newspapers, and related periodicals which are business related and reflect recent events in the chemical industry. The database provider is the Chemical Abstracts Service and the American Chemical Society of Columbus, Ohio. The file contains 685,000 records that are updated weekly.

^{183/} DIALOG Database Catalog -- 1988, Dialog Information Services, Inc., 1988.

e. "JAPAN TECHNOLOGY" is a database providing abstracts from the major Japanese journals in technology, applied sciences, engineering, business management and articles by Japanese authors published outside of Japan. The database was developed by University Microfilms International of Ann Arbor, Michigan, and it contains about 109,000 records that are updated monthly.

f. "KIRK-OTHMER ONLINE" is the online equivalent to the Kirk-Othmer Encyclopedia of Chemical Technology, the standard reference work on any chemical topic or industry. The file contains 25,000 records representing 1,200 chapters. All tabular material in the hard copy is included and is searchable online. The file is maintained by Wiley Electronic Publishing.

g. "Soviet Science and Technology" is a database on scientific and technological data which is published in Soviet-bloc countries. Information is obtained from journal articles, patents, technical reports, and conference papers. The file contains 120,000 records and is maintained by IFI/Plenum Data Corp. of Alexandria, VA.

STN International. STN International is a non-profit partnership consisting of the Chemical Abstracts Service in Columbus, Ohio, and organizations in Karlsruhe, West Germany, and Tokyo, Japan. STN was formed to produce information on scientific and technical subjects.

STN provides 69 databases with a majority provided by outside producers and eight produced internally. A sampling of the databases includes:^{184/}

a. BIOSIS Previews -- the world's largest and most comprehensive life science database produced by BioSciences Information Service.

b. CAS ONLINE -- various files produced by the Chemical Abstracts service.

c. COMPENDIX -- engineering and technology information containing citations from Engineering Index Monthly.

d. PHYS -- computerized Physics Briefs/Physikalische Berichte covering all fields of physics and related topics. The database is produced by FIZ Karlsruhe and is updated semimonthly.

^{184/} Brochure, STN Express, STN International, c/o Chemical Abstracts Service, Columbus, Ohio, 1988.

Databases are maintained by STN at Columbus, Ohio, Karlsruhe, West Germany, and Tokyo, Japan. A user has no way of knowing the location of the database being accessed. Dedicated communications lines are maintained interconnecting the computers in the three locations. There is no additional charge for the communications if it must go overseas. Within the U.S., STN uses Telenet, Tymnet, or a network operated by CompuServe.

NEWSNET. NEWSNET of Bryn Mawr, PA is an information vendor for 353 business newsletters, 10 newswire services and access to several other databases.

INFORMATION PROVIDERS

As discussed previously, databases are developed and maintained by information providers or information producers. The term provider is broad and covers a publisher of a business newsletter who provides it electronically to a vendor such as NEWSNET, and it covers the large scientific and financial databases.

TABLE B1 indicates that there are 1685 database producers with 3699 databases. The previous discussion on information vendors has provided a sampling of a number of the databases covering various scientific and technological areas.

Information providers may provide their databases to a number of vendors, or they may have an exclusivity arrangement or contract with a single vendor.

The following is a sampling of databases developed and maintained by information providers. Databases can generally be categorized into four different types: bibliographic records, complete text record directories/dictionaries, and numeric data. The sampling obtained from the DIALOG catalog and from the EasyNet directory includes: 185/186/

a. AP NEWS -- provides the full text of national and international news from AP Datastream service, available 48 hours after the data was first transmitted. A total of about 350,000 records are maintained going back to 1984.

b. Boston Globe -- The Boston Globe newspaper is available electronically going back to January 1980. The file contains full text coverage.

185/ DIALOG Database Catalog.

186/ EasyNet directory.

c. Dun's Electronic Yellow Pages -- Ten different files are provided covering financial information in such categories as manufacturers, retailers, services, and wholesalers. The "Retailers Directory" is the largest, with about 2,500,000 records updated quarterly.

d. METADEX -- METADEX provides a comprehensive coverage of international literature on the science and practice of metallurgy. The file contains 700,000 records and is updated monthly. Each month about 3,500 new documents related to metals technology are scanned and abstracted for the file, with intensive coverage of conference papers, reviews, technical reports, and books. Forty-three countries are covered.

e. Standard and Poor's Corporate Descriptions -- Concise descriptions and condensed annual financial statements on most publicly owned U.S. corporations.

The Federal Government as an Information Provider

As discussed in Part II, the Federal Government is primarily an information provider or "wholesaler." In some cases, the Federal Government acts as both a provider and a vendor.

The following is a brief sampling of some of the databases that are provided by the Federal Government. The DIALOG vendor makes 22 federal government databases available out their total of 300 databases, including the following:^{187/}

a. Child Abuse and Neglect -- This database is provided by the National center on Child Abuse and Neglect of the Department of Health and Human Services. The file contains research project descriptions, legal references, and other information. It is of interest to social workers, sociologists, educators, mental health professionals, criminologists, and legal researchers.

b. Foreign Traders Index -- The Department of Commerce provides this database to businesses and manufacturers. It is a directory of manufacturers, service organizations, agent representatives, retailers, wholesalers, distributors, and cooperatives in 130 foreign countries. It lists those firms which either import goods from the United States or state that they are interested in representing U.S. exporters.

c. MEDLINE -- This database is produced by the National Library of Medicine and is a major source of biomedical literature covering virtually every subject in medicine. The file has about 6,000,000 records with about 250,000 new records added every year. MEDLINE is offered through a number of vendors.

d. NTIS -- The National Technical Information Service of the Department of Commerce provides a bibliographic database of government-sponsored research, development, and engineering, plus analyses prepared by federal agencies, their contractors and grantees. The file contains about 1,300,000 records and is updated biweekly. It is available through a number of vendors such as BRS, Data-Star, DIALOG, ORBIT, and STN.

TRANSACTIONS AND SHOPPING

Accessing information services vendors enables the user to conduct transactions such as home banking and shopping. A number of information services enable the user to conduct transactions. The following is a brief description of a number of such services:

a. PRONTO -- PRONTO is an interactive home banking and information service operated by the Target Information and Transactions Network providing transactional banking capabilities and consumer and money management information in the New York City area. PRONTO is offered by COVIDEA, a joint venture of AT&T and Chemical Bank. The technology has been licensed to Shawmut Bank in Boston, Florida National Bank, and others.^{188/}

PRONTO offers a bill paying service where subscribers can pay bills electronically to over 15,000 local and national merchants. Other services are balance inquiries, electronic statements, funds transfer between accounts, checkbook register, and home budgeting.

The service can be used via a simple home computer with a modem and communications software; or through the AT&T Model 1300 information services terminal that has a built-in modem. An external monitor such as a television receiver is required with the Model 1300.

COVIDEA also offers an online securities information and transaction service called "Investment Edge." Securities

^{188/} Fact Sheet, "PRONTO Business Banker - The Electronic Banking and Information Service," COVIDEA, Jericho, NY, undated.

quotes are available and the service provides online access to a discount broker for buying and selling stocks and options. Orders placed online are transmitted to the broker, and are then relayed to the exchange floor.^{189/}

b. Harbinger Computer Services has developed the "Intouch Cash Manager Network" that is undergoing trials by Wells Fargo Bank (California); Marine Midland Bank in Rochester; and National City Bank of Cleveland. "InTouch" is being offered to small and medium-sized firms and will enable the customers to review balances, transfer funds, reconcile accounts, and obtain daily electronic bank statements.^{190/}

Harbinger has also developed an electronic banking system for the First National Bank of Atlanta that is primarily used by large customers.

c. SPECTRUM -- SPECTRUM is offered nationally by the Chase Manhattan Bank. Bank transactions are offered by Chase and stock transactions via Rose and Company Investment Brokers. Small personal computers can be used to access the service. A toll-free 800 number is provided for areas outside the local New York metropolitan area.^{191/}

d. Manufacturers Hanover Trust of New York City has developed the EXCELL home banking system, and it has licensed it to the Philadelphia National Bank. Philadelphia National is marketing the service in the state of Pennsylvania.

e. CompuServe Electronic Mall -- The electronic mall enables the user to shop from online catalogs or else have print catalogs sent to the home. Among the retailers are Brooks Brothers; WaldenBooks; Pepperidge Farms foods; Crutchfield consumer electronics; RCA Music Service records and tapes; E.F. Hutton (buying and selling securities; and the gift shop of the Boston Metropolitan Museum of Art.

f. Grocery Express -- Grocery shopping as a planned service of Prodigy in the San Francisco. Groceries will be purchased via online transactions and delivered to the subscriber's home.

^{189/} Fact Sheet, "Investment Edge Service," COVIDEA, Jericho, NY, undated.

^{190/} "Harbinger Signs Wells Fargo, National City for InTouch Network," Interactivity Report, No. 9, November 1987.

^{191/} Sloan and Talarzyk, p. 47.

g. Comp-U-Store -- This service is offered by Compu-U-Card International of Stamford, CT. Specialty retailers such as I. Magnum and Nieman Marcus are offered through vendors such as The Source and U.S. Videotel.^{192/}

^{192/} Sloan and Talarzyk, p. 21.

APPENDIX CSIKES LETTER TO THE FCC

A copy of the letter of Alfred C. Sikes, Assistant Secretary of Commerce, submitted with NTIA's Request for Declaratory Ruling on the Bell companies provision of information services, filed with the FCC on November 24, 1987, is presented in the following three pages.



UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Communications
and Information
 Washington, D.C. 20230

November 24, 1987

Honorable Dennis R. Patrick
 Chairman
 Federal Communications Commission
 Washington, D.C. 20554

Dear Mr. Chairman:

Few developments hold more national economic promise than the convergence of communications and computer technologies to yield information services. Such services afford American industry "electronic tools" critical to maintaining their competitiveness in world markets. They also offer the public a means of directly accessing — and benefiting from — the latest technological advances. A recent Federal district court ruling, however, places the future of these important developments at unacceptable risk. The Commission thus should take action along the lines we are urging today to forestall the serious problems this unfortunate court ruling could cause.

In its September 1987 decision regarding recommended changes in the AT&T consent decree, the court declined to remove major restrictions on Bell company provision of information services. The court's opinion allows these firms to provide local transmission services to unaffiliated information service vendors, much as they can today. They may not, however, offer information services in which they control the content of any transmissions nor, presumably, establish joint ventures with independent service suppliers.

The court rejected the views and recommendations of three expert Federal agencies — the Justice Department, the Commission, and the Department of Commerce. All had concluded that any extraordinary judicial constraints on information services were unneeded and would prove counterproductive.

Accordingly, today we are requesting the Commission to take remedial steps to ensure the country's competitive future in the "Information Age" is not needlessly compromised. As discussed in detail in the enclosed petition, we strongly believe the provision of information services by the Bell companies, subject to safeguards established by the FCC, is in the public interest. By promptly taking the action we recommend, the Commission has the opportunity to reduce the confusion and uncertainty engendered by the court's ruling, and we strongly urge the Commission to do so.

Information Services Critical

The communications networks operated by the Bell companies constitute unique national assets. They represent a very substantial financial investment and are operated by a highly skilled and motivated workforce. These networks are also the chief means of distributing information services to this nation's citizens today. By most estimations, these communications assets are essential to

progress and ensuring the United States has the information services infrastructure needed to remain competitive.

The Commission's Third Computer Inquiry provided for both appropriate economic incentives and necessary safeguards to maximize the rapid and efficient development of information services. But the court's ruling threatens to upset that sound balance and to frustrate the Commission's policies.

Our concern is not simply with the errors in the court's ruling, but rather goes to the continuing involvement of the district court in fashioning national communications and information policy. A judicial bottleneck blocking the development of information services is neither mandated by competition or communications policy, nor sanctioned by existing law. The Justice Department, the Executive branch agency responsible for competition policy, has stated that judicial regulation of information services is undesirable. As the Executive branch agency responsible for communications and information policy, we have consistently said that the Commission, not the district court, should be the paramount authority in this field. Existing statutes, moreover, plainly provide for such Commission leadership.

In a sector such as information services, where innovation, responsiveness, and competition are premium values, the national interest will not be served by perpetuating yet another regulatory regime, much less one administered by a single district court. To date, judicial constraints have contributed to denying American consumers access to services that are readily available in an increasing number of countries overseas. This obvious problem will continue, and will be compounded, until it is resolved by action along the lines we recommend.

Adverse Effects of the Court's Regulation

The consent decree entered by the court in 1982 placed restrictions on the Bell companies that were divested by AT&T two years later. The judgment court provided for triennial review of those restrictions, and recommended changes were submitted by the Justice Department earlier this year.

Information services were not at issue in the AT&T antitrust litigation leading up to the 1982 consent decree. It was never alleged, much less shown through record evidence, that AT&T had monopolized or attempted to monopolize the information services market. Nor was there any allegation or proof demonstrating that the participation of Bell companies in this sector was anticompetitive, or that these firms have some innate proclivity to monopolize information services. Formal hearings based on sworn testimony, moreover, neither buttressed the initial information services restriction, nor the court's recent decision to continue this severe limitation.

The issue is not simply whether American telephone subscribers will have access to new telephone-based services comparable to those available overseas. Rather it is also a question whether national communications assets will be more efficiently used, and whether network changes that would

facilitate innovation on the part of other firms will be made by the Bell companies in a timely fashion.

Communications trade considerations are also important. The practical effect of the court's restriction on information service provision by the Bell companies has been to drive functions or "intelligence" from the public telephone network, and to stimulate demand for terminal equipment embodying capabilities the network could otherwise provide. Because foreign-based firms have a larger share of the terminal equipment market than the network products market, the result has been, and will continue to be, to make our trade deficit in this key sector artificially larger. The minor changes the district court has suggested are unlikely to alter this undesirable situation significantly.

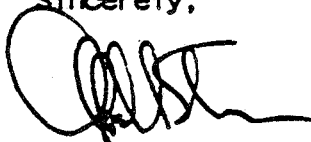
Commission Responsibility to Act

The Commission, not the courts, is primarily responsible to ensure the nationwide availability of efficient communications services, and is explicitly directed "to encourage the provision of new technologies and services to the public" (47 U.S.C. §§151, 157 (1986)). In its Third Computer Inquiry, the Commission established a carefully balanced regulatory scheme (with competitive safeguards) for the provision of unregulated information services by Bell companies. The Commission determined that the approach it was adopting would, first, afford Bell companies a positive incentive to make desirable network changes in a timely manner; second, maximize the potential for innovation; third, ensure widespread access to new services by all customers; and, fourth, stimulate more efficient use of national communications assets and resources. The district court's recent ruling undermines this balanced determination.

Conclusion

Maintaining the integrity and effectiveness of the Commission's policies requires prompt action. Accordingly, we strongly urge the Commission to determine that the Communications Act's public interest standard compels a finding that the Bell companies be authorized to provide information services, and that the district court's information services restriction represents a cumbersome, unnecessary layer of regulation in irreconcilable conflict with the requirements of the Communications Act.

Sincerely,



Alfred C. Sikes

APPENDIX DPOTENTIAL NEW SERVICES

This study identified the need for a number of "core" services that are necessary to form the key ingredients for a successful mass market information services industry, particularly the consumer videotex segment. The study identified the "core" services as electronic mail; enhanced versions of electronic directories; and unique services developed by independent outside vendors. The "outside" services are likely to be a combination of national services such as GENie and CompuServe, and smaller local services such as Boston CitiNet or the Cleveland Free-Net.

Some unique services are not available nationally. The industry would likely benefit if services such as Boston CitiNet and the Cleveland Free-Net were available in many cities across the country. The following presents a discussion of the various factors and cost estimates to establish such services in other cities.

Boston CitiNet Example

Franchises for the Boston CitiNet type of service that is advertiser supported are being sold for various prices ranging from \$55,000 to \$500,000, with a percentage of the gross revenues or net profits usually a part of the franchise price. The CitiNet was developed at a cost of \$500,000 over a two year period.^{193/} The CitiNet currently has 12 employees and a group of 45 volunteer "editors" contributing written material free of charge.

Thus a service such as CitiNet could be established in other cities at an approximate cost of \$500,000 for the franchise fee; costs for rental of computer time (a Digital Equipment VAX is used in Boston); labor costs for the 12 or so employees, although more temporary employees are likely to be needed at the start-up of the service. A rough approximation for starting up a service such as Boston CitiNet in another major city is \$700,000 to \$1,000,000.

Cleveland Free-Net Example

The Cleveland Free-Net is the initial effort in the "community computer" concept. The service was developed over 2 1/2 years at a cost of \$250,000. The Free-Net is providing

^{193/} Business Week article.

software and the franchise fee to civic organizations, city and county governments, hospitals, etc. at a \$1 price.

The director of the Cleveland Free-Net has estimated that a similar type of service can operate for \$75,000 - 100,000 per year. The main costs are associated with the computer that is estimated to cost \$15,000 for an AT&T Model 3B2400, or \$36,000 for a model 3B2600. The Cleveland Free-Net presently has 1 1/2 full time equivalent employees and many volunteers who provide the answers to the many questions that are asked by users.^{194/}

NEW SERVICE DEVELOPMENT

General Overview

An information service infrastructure consists of four parts:

1. Information sources or vendors developing and maintaining the database;
2. The information center and host computer;
3. The communications network; and
4. The users and their terminals;

The following will discuss the establishment of these elements and their costs.

Database Development

The costs of developing a database can vary considerably depending on the form of the data. If it is electronically readable, the cost of establishing the database is considerably less than if it requires manual input (at times referred to as "indexing") to put it into machine form. A major factor is the information itself i.e., if it is numerical, word-oriented, or a combination of both.

Experts have studied database creation and can develop estimates on how much the development will cost. Eddison, for example, provides an example of recording 5,000 reports into a database. A worksheet is first created and then data from the worksheet is typed into the computer. She estimated that it would take 833 hours to develop the worksheets or at 40 hours per week, 21 weeks would be required. This can be

^{194/} Dr. T. Grundner, Cleveland Free-Net.

completed by four people in slightly over five weeks and with good quality control, data entry may begin in six weeks.^{195/}

Alber has studied the amount of work involved in the maintenance of database whereby the records are kept current. He uses as his example, a 20,000 frame database consisting primarily of colored alphanumeric displays of 500 characters or less. The update frequency may be never, monthly, weekly, daily, or twice daily. The number of employees required for updating ranges from 3.2 to 141 depending on the updating frequency, indicating that the estimate can only be provided in very general terms rather than specifics.^{196/}

Information Center

The computers used in the database of an information provider are operated by the provider with user access via the vendor. In smaller operations such as the Cleveland Free-Net, the vendor and provider functions may be combined.

Computers can be leased or purchased, or excess capacity of computers operated by others can be used under special arrangements. The variables serve to complicate the cost estimation problem.

In the past, large mainframe types of computers were used, but technological advances have produced microcomputers and personal computers for various online database applications.

^{195/} "How to Plan and Build Your Own Database," E.B Eddison, Database, Vol. 11, No. 3, June 1988.

^{196/} Alber, Chapter 7.

APPENDIX E

ALTERNATIVE TECHNOLOGIES TO ONLINE SERVICES

CD-ROMs

CD-ROMs (compact disc -- read only memory) first became commercially available in 1985. Each disc is capable of storing the equivalent of about 195,000 pages of text, and retrieval is accomplished via a personal computer with a special CD-ROM reader. CD-ROMs provide locally stored information and are an alternative to online information services that have information in remote databases.

A CD-ROM disc is 4.7 inches in diameter and the data processing is via optical (laser) means. Typically, the required equipment includes an IBM PC, XT, Personal System/2 Model 30, or IBM compatible computer with a minimum of 512 K random access memory; a CD-ROM reader at a cost of \$750; and user software.

The main advantages of CD-ROMs to organizations such as libraries are local control, predictable and lower "per search" costs, unlimited access, psychological advantages, privacy, and direct end user searching. After a period of time, the lack of current data on the disc can become a problem for some users. Librarians, one large body of information users, must weigh the various options between online information and CD-ROMs. Cost is one of the main considerations since CD-ROMs are frequently sold via annual subscription costing several thousand dollars.^{197/}

Costs are the one of the primary factors considered when weighing the alternatives between CD-ROMs and online information services. In particular, the online connect time charges can become a major factor in the decisionmaking process if the information content in the two sources is similar. Other decision factors are the availability and costs of telecommunications networks, the relative ease of data retrieval, reliability, and availability.^{198/}

^{197/} "CD-ROM and Libraries: Opportunities, Concerns, Challenges," B. Bartenbach, Proceedings of the Eighth National Online Meeting, New York, NY, May 5-7, 1987, Learned Information, Inc., Medford, NJ.

^{198/} "Content Critical for CD-ROM Products: A User's View," J.I. Dysart, Proceedings of the Eighth National Online Meeting, New York, NY, May 5-7, 1987, Learned Information, Inc., Medford, NJ.

Examples of CD-ROM Information

DIALOG, one of the major vendors of online business information services, is marketing "DIALOG OnDisc," leasing information via CD-ROMs under a yearly license arrangement. The disc service has six data services available: Standard & Poor's Corporations, MEDLINE, NTIS, Agribusiness, Canadian Business, and ERIC (U.S. Dept. of Education data). For example, Standard & Poor's is leased under a yearly license fee for \$4,250; MEDLINE is leased for \$1,250 for the current year plus one year backfile, or \$2,250 for the current year plus four years backfile; and ERIC is leased for \$950 for the current file (1981 to the present 1988), or \$1,650 for the complete file (1966 to the present 1988 on three discs).^{199/}

A second example is Cambridge Scientific Abstracts, a firm having CD-ROMs available on life sciences from the Life Sciences Collection International database, MEDLINE, Aquatic Sciences and Fisheries Abstracts International; and the Physicians' Data Query Electronic Database. Some examples of services and prices are:^{200/}

Aquatic Sciences and Fisheries

Current year (e.g., 1988).....	\$1,250/year
Current year (1988) + 1987.....	\$1,750
Backfile (1982-86).....	\$2,500
(Not updated)	
Complete system.....	\$4,250

Life Sciences

Current year (e.g., 1988).....	\$1,250/year
Backfiles (not updated)	
1986-87.....	\$1,000
1984-85.....	\$1,000
1982-83.....	\$1,000
Complete system.....	\$4,250

^{199/} Brochure, "DIALOG OnDisc," no. 800032-001-9/87, Dialog Information Services, Inc., 1987.

^{200/} Compact Cambridge Fact Sheets, Cambridge Scientific Abstracts, Bethesda, MD, 1988.

AUDIOTEX

Information services have been available in the form of recorded audio messages accessed from a telephone for over 30 years. Some of the earlier applications were operated by newspapers and provided the scores of sports events. The widespread use of touchtone types of telephones provides flexibility enabling vendors to provide numerous services via a single telephone number.

Information services available via audiotex are alternatives to information provided via videotex. Figure E1 presents the services provided in the Baltimore, Maryland area by "Sundial," a services operated by The Sun, a Baltimore newspaper. The "Sundial" services are free to the users of the information.

The financial market information offered by "Sundial" is in competition with videotex services offered by Dow Jones and others. It should be noted that Dow Jones is frequently the provider of financial information to a number of vendors.

Dow Jones also offers financial information audiotex services via its "Dowphone" service. The charges are 50 cents for the first minute of usage and a declining rate for additional time.

The Bell companies can also provide message storage services for the audiotex vendor. For example, Bell Atlantic has a message storage service providing the ability to store a recorded message in equipment located in a Bell Atlantic central office. The messages can be provided under the "976" services where Bell Atlantic units can bill the user at various rates per unit of usage.^{201/}

^{201/} Brochure, "Bell Atlantic's Message Storage Service," 1988.

SUNDIALSM

783-1800

Code	Category Directory
1000	Main Directory
2000	Stockline
2001	Stockline Instructions
3000	Dow Jones® Directory
3001	News Headlines
3002	Stock Market Update
3003	Dow Jones Averages®
3004	Bond Market Update
3005	Precious Metals Report
3006	Stock Market Insight
3007	NYSE Trading Report
3008	AMEX Trading Report
3009	OTC Market Report
3010	Key Rates & Prices
3011	Local Corporate News
3012	World News Reports
4000	Travel Weather Directory
4001	National Travel Weather
4002	Atlanta
4003	Baltimore
4004	Boston
4005	Chicago
4006	Cincinnati
4007	Cleveland
4008	Dallas
4009	Denver
4010	Detroit
4011	Houston
4012	Kansas City
4013	Los Angeles
4014	Miami
4015	Milwaukee
4016	Minneapolis/St. Paul
4017	New York
4018	Philadelphia
4019	Phoenix
4020	Pittsburgh
4021	St. Louis
4022	San Diego
4023	San Francisco
4024	Seattle
4025	Tampa/St. Petersburg
4026	Washington, D.C.
5000	Sports Directory
5001	Dow Jones Sports Report
5002	Dow Jones Sports Scoreboard
5022	Oriole Schedule & Ticket Info
5023	Bird Line

Free Call.

How To Use SUNDIALSM

Using a touch-tone telephone, call 783-1800. In Anne Arundel County, dial 268-7736. Then enter the code number for the information you want.

Figure E-1.

"Sundial" Audiotex Information Services.

Source: The Sun, Baltimore, MD
August 1, 1988.

BIBLIOGRAPHIC DATA SHEET

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15. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.) The <u>NTIA Information Services Report</u> is a study of the information services available via telecommunications networks in the United States and a number of foreign countries. It presents a review of the information services available in the United States to business and residential users, and it concludes that the business market is large and thriving whereas the residential market is very small. Electronic white and yellow pages are identified as "magnet" services not yet available that could form the core of a group of information services. The report concludes by calling for "universal information service" and identifies the mass market as the ordinary telephone user whose information needs are not being met because of regulatory and legal barriers with negative implications for the U.S. telecommunications system and the economy and society as a whole. The report reestablishes previous NTIA policies by calling for removal of the restrictions on the Bell operating companies providing information services and manufacturing equipment.			
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