



I. EXECUTIVE AND PROJECT SUMMARY

I-1. EXECUTIVE SUMMARY

BACKGROUND

In recognition of the potential impact that telecommunications can have on New Jersey's changing economy, the New Jersey Board of Public Utilities (NJBPU) commissioned this study of the telecommunications infrastructure in the state. As the state's economy has shifted from a strong manufacturing base to more of a service-based economy, the telecommunications infrastructure has grown in importance to the economic development and overall vitality of the state. Innovations in telecommunications technology can be harnessed by local exchange carriers to help meet the increasing need for the state's growth industries to access "Information Age" resources. Similarly, trends in the use of information technology and video communications in the home indicate the need for the citizenry of the state to have access to new telecommunications capabilities. This study provides a framework to better understand the various impacts of telecommunications on the state, both now and in the future.

In addition to exploring the relationship between telecommunications and the state's economy, the scope of the study included an assessment of whether the state's traditional regulatory policies governing telecommunications should be modified to reflect the evolution of the role of telecommunications in New Jersey. Historically, the NJBPU's overall goal in regulating this industry has been the achievement of universal service - the extension of telephone service to every home and business in New Jersey. Since New Jersey residents already enjoy the lowest rates for basic telephone services in the country and approximately 96% of the residences in New Jersey have basic telephone service, the traditional goal of the universal service concept has been effectively achieved in New Jersey. In view of the increasing importance of telecommunications to the state and emerging trends in the demand for more advanced telecommunications capabilities from all consumers, the study was structured to provide additional perspective on whether changes in the universal service concept might be advantageous for the state of New Jersey and its citizens. Thus, the study provides the foundation to assess and modify, as appropriate, telecommunications regulatory policy to reflect the changing communications needs of the state as well as the demands for telecommunications services and capabilities in the "Information Age," and the opportunities presented by communications technology.

The consulting firm of Deloitte & Touche and its strategy consulting division, Braxton Associates, were engaged by the NJBPU to perform the study. The study was funded by the state's three local exchange carriers (LECs) - New Jersey Bell, United Telephone of New Jersey, and Warwick Valley Telephone Company - the companies charged with providing universal service in New Jersey.

OBJECTIVES

The specific objectives of the study, as developed by the NJBPU, were structured to identify what would be required for the state's policymakers to chart a new course for telecommunications regulatory policy. More specifically, these objectives included the following:

- Assess the current telecommunications network in the state.



- Analyze the sources of future demand for more advanced telecommunications services.
- Identify opportunities to improve access to telecommunications-based educational programs.
- Identify opportunities to strengthen the quality and cost-effectiveness of health care services that employ telecommunications.
- Evaluate the linkage between the telecommunications infrastructure and economic growth in New Jersey.
- Evaluate the relationship between progressive regulatory policy and the development of the telecommunications infrastructure.
- Evaluate the financial implications of accelerating investment in the state's telecommunications infrastructure.
- Identify the overall policy implications of evolving the universal service concept of simply providing low-cost basic services to a broader concept of providing universal access to "Information Age" services.

STUDY APPROACH AND METHODOLOGY

The approach used to meet the objectives of the study included obtaining direct input from managers of economic and business retention programs, businesses that have been involved in relocation decision-making, education and health care professionals, and representatives of various state agencies. In addition, each interviewee/respondent provided their perspectives on the current and future importance of telecommunications infrastructure in New Jersey. The study team also contacted numerous telecommunications and computer equipment manufacturers and research institutions. This comprehensive process involved obtaining input from several hundred parties through interviews and/or surveys. Data was also gathered from a variety of sources to provide comparative "benchmarks" of telecommunications infrastructure issues in New Jersey as compared with other areas of the country. Furthermore, input was solicited from the Office of Rate Counsel within the Department of the Public Advocate, which has traditionally been very active in representing consumer interests in telecommunications matters before the NJBPU.

SUMMARY OF CONCLUSIONS

The following summarizes the significant findings of the study. Each conclusion is addressed further in the subsequent section of the Executive Summary and in detail in Volumes II and III of the report:

- Regulatory policies in New Jersey have essentially achieved the universal service objective of statewide availability of affordable telephone service. Along with the lowest rates for basic exchange services in the country, the state has a relatively sophisticated local exchange network capable of supporting not only high-quality basic service but also many enhanced voice and data services.



- As New Jersey continues to move toward an information/services-based economy, today's local exchange carrier network will increasingly constrain users' (especially residential and small business users) ability to fully participate in the "Information Age."
- The key telecommunications policy issue is the degree to which public policymakers and regulators should encourage LECs to accelerate the deployment of advanced telecommunications technology to support broad-based availability of higher bandwidth services.
- A significant opportunity exists to advance the public agenda for excellence in education through improvements to the telecommunications infrastructure.
- Strong motivation, especially in the areas of improved quality of care and cost reduction, exists for increasing the use of telecommunications and information technologies in the health care industry in New Jersey.
- Public policies that encourage deployment of an advanced telecommunications infrastructure are essential for New Jersey to achieve the level of employment and job creation expected in the state.
- Regulatory philosophy across the country is supportive of the deployment of an advanced telecommunications infrastructure in LEC networks; the regulatory framework in New Jersey can help enhance the state's competitive position in the "Information Age."
- The deployment of advanced telecommunications capabilities can be significantly accelerated at minimal cost relative to the intrastate revenue base of New Jersey's LECs.
- In conclusion, a significant strategic opportunity exists to advance the public agenda in New Jersey through the accelerated deployment of a reasonably priced, advanced telecommunications network in the state.

CONCLUSIONS AND PUBLIC POLICY IMPLICATIONS

Regulatory policies in New Jersey have effectively achieved the historical universal service objective of statewide availability of affordable telephone service. Along with the lowest rates for basic exchange service in the country, New Jersey has a relatively sophisticated local exchange network capable of supporting not only high-quality basic service but also many enhanced voice and data services.

New Jersey Bell (NJB), which serves 97% of the access lines in the state, has the lowest rates for basic exchange services and intraLATA toll calls among the former Bell Operating Companies in the country. The other local exchange telephone companies in the state, United Telephone of New Jersey and Warwick Valley Telephone Company, have comparable or lower rates than the rates of NJB. Coupled with its low rates, the state can claim a high rate of telecommunications technology deployment and the widespread availability of advanced telecommunications products and services, such as enhanced voice services and basic data services. This speaks well of the state's regulatory policies, which to date have been focused on achieving universal service. As evidence of that achievement, it is notable that there is a 95.5% penetration level of basic telephone service among New Jersey's residences, a level above the national average. New Jersey's current telecommunications infrastructure, capital expenditures, and quality of services are comparable to other states and, in the case of international comparisons, highly developed foreign countries.

The study compared the quality of service statistics provided by the larger local exchange carriers in New Jersey to applicable regulatory standards in the state as well as to the quality of service performance of other large telephone companies across the country. The performance statistics indicate that both NJB and United Telephone of New Jersey are performing at or above the quality of service standards adopted by the NJBPU. Additionally, the statistics demonstrate that the overall quality of service has improved in New Jersey in recent years. Furthermore, the state's performance is on par with, or exceeds, the quality of service performance achieved by other Bell Operating Companies across the United States.

As New Jersey continues to move toward an information/services-based economy, today's local exchange carrier network will increasingly constrain users' (especially small business and residential users) ability to fully participate in the "Information Age."

Technological developments in the telecommunications industry will open the door to the "Information Age," especially in the areas of video communications. "Information Age" services generally require high bandwidth capabilities in the network. The term "bandwidth" refers to the capacity of the telecommunications network to transmit large quantities of information in a short period of time. Today's local exchange carrier networks constrain users' ability to transfer high bandwidth information, such as images, and restrict real-time or interactive video communication. Investment in the telecommunications infrastructure (i.e., in digital switching systems and fiber optic cabling) could result in widely available, high bandwidth network capabilities. Through such investment, the benefits of the visual evolution in telecommunications will not be limited to large business and institutional users, but will be extended to small businesses and, importantly, to residential users.

Over the next ten years, technological advances in computing power, digital video systems, and information compression techniques will enable communications with visual information in much the commonplace manner used today to communicate with voice and data.

The personal computer has been a part of the office and home environment for only a decade, but advances in desktop computer power in the 1990s will permit individual workstations to process and display ever-increasing amounts of image and video (moving images) information. Images, and particularly full-motion video, contain far more information than text or data and, therefore, require a higher bandwidth capability in order to transmit information between users. Thus, transmitting today's color television signals in a digital format could require almost 20,000 times the bandwidth used to access today's on-line information services (e.g., Prodigy). Fortunately, developments in image and video transmission technology are decreasing both the bandwidth and the cost required to transport information. The net effect of compression technology will be to dramatically increase and broaden the demand for high bandwidth services.

At the same time, consumer video equipment will increasingly incorporate computer-like capabilities.

Trends in home computers and entertainment video will create a need for increasing bandwidth. At the same time that computers are incorporating video technology, television sets are incorporating "computer-like" features. Today, at-home users likely have separate devices for entertainment video and computers. These devices could, however, share components such as video chips, monitors, and high bandwidth communications circuits. The integration of these technologies is expected to result in significant cost reductions which in turn will increase the demand for high bandwidth capabilities in the network.



Home video technology should be available in the 1990s to support on-demand entertainment and interactive educational and information services. Mass market residential video applications will create demand for widespread, higher bandwidth network capability.

Today's telephone network can transmit information at speeds that have generally proved adequate for today's information transfer needs. But while today's network has essentially reached the limits of its ability to support high bandwidth, interactive communications, technology will continue to advance the information processing capabilities available to the individual (e.g., computer processing, local computer networking, and consumer video equipment). The existing network will increasingly constrain the ability of individual users unless its capabilities to handle higher bandwidth traffic are increased.

Larger businesses are already demonstrating a demand for higher bandwidth services. Smaller business - a significant element of New Jersey's economy - will require equivalent capabilities in the public network if they are to remain competitive.

business

The large business marketplace is already demonstrating a demand for increasingly higher-power personal computers and workstations, for videoconferencing, and for the telecommunications capability to support them. Small businesses, including at-home businesses, could increasingly find themselves at a competitive disadvantage as larger users make bandwidth video/image applications an integral part of their business success.

The U.S. Small Business Administration has identified an increasing role for small business as "partners" of larger businesses, based in part on information-processing technologies which facilitate efficient small business specialization. Therefore, small businesses that increasingly employ advanced information/telecommunications technology can exploit these opportunities and retain a market advantage over other firms that do not employ such technology. Given the state's dependence on small business for economic growth and job creation, New Jersey's economy runs a significant risk if the future telecommunications needs of smaller businesses are not met by New Jersey's telephone network.

The demand for higher bandwidth residential access can be expected to grow. Residential needs could be diverse and may range from business-like telecommuting applications to interactive educational programming to switched video entertainment services.

The Cable TV Act of 1984 prohibits telephone companies from providing "video programming," that is, video transmission equivalent to broadcast video services. Consequently, higher bandwidth transport targeted at residential users may need to rely on applications other than today's "video programming."

But the success of cable television has demonstrated consumer willingness to pay for video services. Higher bandwidth network capabilities will be required to support most, if not all, other consumer video applications. These applications are likely to include the following:

- Residential units may serve as home base for small businesses or telecommuters. Businesses are increasingly relying on computers and telecommunications technology to allow employees to perform their jobs at locations other than the traditional job site.

Methodology



Advanced telecommunications, including interactive video capabilities, would significantly facilitate the telecommuting process. In addition to obvious employee and employer benefits, New Jersey's economy as a whole would benefit as well:

- Commuting costs and auto pollution should be reduced
- There would be a better matching between employer and employee locations
- The opportunities for nonambulatory individuals would be increased

Furthermore, our economic development survey found that transportation considerations influenced New Jersey corporate relocation decisions. If the telecommunications infrastructure substitutes to some extent for the transportation infrastructure, there may be significant benefits to New Jersey taxpayers as well.

- Other demand for interactive video applications is likely to develop as well. Several marketing studies have indicated significant residential demand for services such as on-demand entertainment or other features as well as access to educational programs. Bell Atlantic estimates that 50% of residences would subscribe to on-demand entertainment programming within several years of their offering and 30% would subscribe to interactive video offerings.
- Higher bandwidth network capability would also permit the introduction of more visually oriented, user-friendly information services, including camcorder-like "televists."
- Once equipment and higher bandwidth transport links are obtained for entertainment, business, or educational purposes, they will be available for other uses. As libraries and information services increasingly place both text and image information into on-line data bases, a variety of additional services would become available to New Jersey's residents.

As today's video-oriented, computer-literate students become the consumers of the next decade, the demand for interactive entertainment/educational services can be expected to increase sharply. The examples set out above represent a 1990 view of year 2000 technology. Industry observers expect that information technology and applications will unfold in ways that are far more dramatic and innovative than anticipated today.

The key telecommunications policy issue is the degree to which public policymakers and regulators should encourage LECs to accelerate the deployment of advanced telecommunications technology to support broad-based availability of higher bandwidth services.

Encouraging development of the telecommunications infrastructure that will permit New Jersey's citizens to obtain interactive access to the visual communication world may be one of the most important policy decisions of this decade.

The issue of how fast advanced telecommunications technology should be deployed to meet potential demand is complicated by the fact that widespread deployment of new technology in the public-switched network requires not only significant financial resources but also significant lead time. The provision of advanced telecommunications technologies at an accelerated rate and in a broad-based manner cannot be achieved without increased investments and, at least in the near term, increases in network efficiencies and revenues from new services phase-in. This translates into potentially higher costs to those who would benefit from these public network enhancements; namely, the LECs, businesses and residential ratepayers, and governmental entities using the public network. Furthermore, the financial ramifications of accelerated



technology deployment are a major issue for public policymakers charged with evaluating the trade-offs between the various costs and benefits of accelerated telecommunications technology deployment.

In charting a new course for telecommunications regulatory policy, the criteria used for evaluating potential change should extend well beyond the question of financial impact or rate treatment for the LECs in the state; many of the perceived benefits of accelerated telecommunications technology deployment cannot be measured in terms of their effects on the LECs. For example, if advanced telecommunications capabilities can serve as a competitive advantage in attracting business and/or retaining business in the state, the real benefits will materialize through increased employment opportunities for the citizens of New Jersey, maintenance of the tax base in local communities, and support of the overall economic welfare of the state. Similarly, to the extent that advanced telecommunications capabilities help to improve educational instruction or the quality or the cost-effectiveness of health care services delivery, the benefits realized from these capabilities cannot be measured from their impact on LEC revenues or earnings levels. Neither can the potential benefits of these new technologies and applications be fully realized without advanced telecommunications capabilities. Therefore, it is important to maintain a broad perspective in evaluating the impacts of accelerated telecommunications infrastructure deployment in New Jersey. The costs of infrastructure acceleration are much easier to estimate than the potential benefits to New Jersey.

① A significant opportunity exists to advance the public agenda for excellence in education through improvements to the telecommunications infrastructure. *education*

In New Jersey, as in the nation overall, educators and public officials are seeking to raise the level of students' performance in basic skill areas such as language, mathematics, and the sciences. At the same time, our educational system is attempting to address operating and capital budget problems and the shrinking supply of highly qualified teachers.

An advanced telecommunications infrastructure presents an opportunity to help address these pressing social issues. By providing schools in the state with generally available cost-efficient access to an advanced telecommunications network, educators would have the opportunity to take advantage of distance learning opportunities in advancing instruction in all subject areas. This could foster equity in education and a more diverse curriculum, and help address the problem of an ever-decreasing pool of qualified teachers. In doing so, the agenda for raising New Jersey's education system to a world-class level of performance could be more readily realized.

Distance learning using telecommunications could help address some of the major problems facing educational institutions today and can enhance the learning process.

By implementing a high bandwidth telecommunications network, New Jersey would be better able to provide superior quality education experiences to the most disadvantaged inner cities, the most remote rural areas, as well as the most affluent suburbs. The resources, experiences, and information sharing made possible through a statewide high bandwidth network could help break down traditional barriers to achievement and growth. The experience of Bergen County Schools in New Jersey highlights the potential opportunities for telecommunications to significantly enhance the educational process. The interactive video network implemented by Bergen County Schools is a leading edge application of distance learning using fiber optic-based telecommunications technology. This network, when completed, will link the county's 47 high schools and two colleges.

Distance learning can help improve educational quality by eliminating the geographic constraints that have traditionally prevented students from obtaining highly specialized instruction. In Bergen County, for example, students now have improved access to courses such as Latin, stenography, and world geology. Telecommunications can be used to expand the breadth of instruction in New Jersey's schools, not only increasing the value and diversity of the education, but also increasing student interest and participation. Finally, distance learning can help bridge the gap between educational "haves" and "have nots." Any school or student can have access to the same teaching expertise and curriculum diversity.

A wide range of agencies are involved in New Jersey educational telecommunications, but no central planning process currently exists. Increased emphasis on planning and cooperation between the various parties interested in improving education is needed to integrate telecommunications into education.

To date, New Jersey's success in implementing pilot distance education programs has been the result of the ad hoc initiatives and informal cooperation between a number of different state and local agencies. For example, the essence of the Bergen County interactive video network success lies in the extraordinary coordination and cooperation between the county's Board of Chosen Freeholders and the various school boards, administrators, teachers, and students involved.

Similar initiatives can be found in other areas. For example, the New Jersey Intercampus Network (NJIN) in cooperation with the Department of Higher Education is attempting to develop a statewide interactive video network to link all of the state's colleges and universities. Similarly, program administrators for the New Jersey node of the National Science Foundation Network have collaborated with NJIN in planning to link all state institutions for higher learning with a high-speed data network. These two initiatives may offer the New Jersey Intercampus Network, until now funded only for planning, educational, and design initiatives, the opportunity for centralized coordination, which would improve efficiency and better meet the telecommunications needs of the colleges and universities in the state.

Those states that have emphasized cooperation between state agencies, local municipalities, school districts, and universities have been the most successful in producing a telecommunications plan for education. These groups comprise more than just public agencies and regulatory bodies. The private sector - in the form of hardware designers, network operators, and curriculum developers - must also be part of the dialogue. Only by working together will the benefits of a long-term vision of distance learning be realized.

New Jersey has several activities under way that use advanced telecommunications to enhance education. New Jersey has played a lead role and benefited from the federal STAR Schools Program, a program which employs satellite downlinks in the state's schools. The state has also been involved in the development of two-way interactive video systems, Instructional Television Fixed Service (ITFS) technologies, and data communications networks. These experiences will clearly benefit New Jersey as it continues to develop telecommunications policy for education, since it has gained valuable experience in systems implementation.

Strong motivation, especially in the areas of improved quality of care and cost reduction, exists for increasing the use of telecommunications and information technologies in the health care industry in New Jersey.

(2)
health



Information technologies have great potential for improving quality of health care services while reducing delivery costs. An advanced telecommunications network is essential to the effective deployment of these technologies, allowing hospitals and other health care providers to extend the benefits of information across a large number of institutions and individuals. Some of the efficiencies gained from such a system could be used by health care providers to address more far-reaching issues, such as to help offset the cost of health care services to the uninsured citizens of the state.

The demand for more complex and costly health care services will increase. This situation is complicated by the rapid rise of health care costs overall, which are growing at a rate far above that of the Consumer Price Index. Additionally, pressure on the revenue stream of doctors and hospitals brought on by prospective payment and managed care plans and increases in the average age of the population all contribute to this problem. Compounding these pressures are the rising ranks of uninsured in the state, whose inability to pay places increased pressures not only on taxpayers but on those that can pay for health care services.

Within hospitals, health care information systems allow hospital administrators and physicians to more efficiently manage patient care schedules, maintain more accurate and complete medical records, effectively operate hospital subunits, keep tighter control of materials, facilitate medical decision-making, and provide strict financial control and reporting. In-hospital networks and bedside terminals can make the information generated by these systems more readily available for medical and operational decision-making, leading to more, well-informed patient care decisions.

Together with these information-based technologies, image-based technologies can improve health care efficiency and effectiveness. Specifically, electronic imaging systems, which convert x-rays and other medical images into digitized form, could be effectively disseminated among a number of experts over a high bandwidth telecommunications network. These advanced imaging systems are already being used at leading medical institutions. Where personal visits are either too costly or logistically impractical, conferences between these experts and practitioners employing videoconferencing and diagnostic imaging applications can help to bring the highest level of medical care to a greater number of individuals.

These image-based technologies also offer opportunities for New Jersey to greatly improve its health care service delivery system. Through teleradiology (the transmission of x-ray and similar imaging over the telecommunications network), hospitals in the major urban centers could share their most experienced medical personnel in the diagnosis of patient conditions. The use of such "remote diagnostics" could be used to raise the quality of care offered to all citizens in the state, not only those with access to the most advanced institutions. Similarly, the remote diagnostic concept could be extended to the rural areas of the state, eliminating unnecessary travel by patients to urban hospitals and improving health care in the state's more remote areas.

③ **Statewide availability of advanced telecommunications network technology could help reduce disparities in the delivery of health care services.**

Internal computing and information transfer capabilities are already being enhanced in hospitals in New Jersey. As these systems continue to evolve and interrelationships between health care providers develop further, New Jersey hospitals will increasingly look to the telecommunications network to satisfy their more extensive telecommunications demands.

health



By making advanced telecommunications services available through a widespread high bandwidth network, these benefits can be brought to patients everywhere, from those using the most advanced research hospitals to the smallest community health centers.

Public policies that encourage deployment of an advanced telecommunications infrastructure are essential for New Jersey to achieve the level of employment and job growth expected in the state.

Advanced telecommunications capabilities are expected to be particularly important for the attraction and retention of business in New Jersey. The focus of future economic development efforts in the state will be on the services-producing sectors of the economy, such as the finance, insurance, and real estate industries. Many states will be targeting such businesses because of their rapid growth, low-asset intensity, and job creation. Furthermore, these sectors have also been identified as among the most telecommunications-intensive sectors of the economy. Therefore, it will be essential for the state's telecommunications network to be able to support the capabilities required by these types of businesses.

Summary
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The increasing role of telecommunications in business can be traced to fundamental forces in the business environment, including the increasing intensity with which businesses use information and communications, and the increasing importance of telecommunications-intensive industries in New Jersey and the nation's economy. Advanced telecommunications capabilities are now widely recognized as a "competitive weapon" in economic development and business retention.

This reflects the overwhelming recognition of the study participants that business is rapidly becoming much more information- and telecommunications-intensive. The growth in information intensity will contribute to rapidly increasing demand for information technology and data transport capabilities, including the demand for higher bandwidth data transport through the public telecommunications infrastructure.

Advanced telecommunications capabilities can be a significant factor in the location decision-making process, especially for companies in the service-producing sector. Thus, telecommunications can serve as a "lever" to enhance the attractiveness of a state for business in the service-producing sector of the economy. As an ancillary benefit, to the extent that an increasing proportion of the state's new businesses is in the services-producing sector, which typically does not generate environmental hazards, this will also provide an indirect benefit to the state by helping to mitigate the impact of additional environmental/pollutant concerns.

The capabilities of the infrastructure must evolve in a manner to satisfy the increasingly sophisticated and more complex needs of business users. Additionally, because of the wide dispersion of businesses throughout the state, the telecommunications network must have these new capabilities widely available rather than focused in a few major metropolitan business centers as is the case in many states. As a result, it will be essential for New Jersey to have a statewide advanced telecommunications infrastructure to enhance the future economic climate of the state.

Small business enterprises are extremely important to the overall growth in employment and job growth in New Jersey. Over one-half of the employees of all businesses within New Jersey work at locations with fewer than 100 employees. Thus, small business operations are a major component of the state's and the nation's economic fabric. The needs of these businesses are as important, if not more so, to the state's long-term well being as the needs of large companies with more employees per location.

The combination of these observations suggests an explicit policy role for telecommunications in economic development and business retention.

(5) **Future public policy directions should consider the "risk" of not achieving the employment growth and job creation expected in telecommunications-intensive industries.** *business*

The state's economic initiatives should encourage employment in those sectors which are telecommunications-intensive. The development of the telecommunications network within the state must, at a minimum, keep pace with the demands of businesses in these sectors. Many of the businesses in these telecommunications-intensive industries are "innovators" in the use of information technology. Consequently, the deployment of new telecommunications technology must stay ahead of emerging transport requirements if advanced telecommunications capabilities are going to be effectively used as a competitive tool to support economic development and business retention efforts in New Jersey.

Employment growth in telecommunications-intensive sectors are forecast to significantly exceed the growth rate of other industries. Eighty-five percent of New Jersey's employment growth between 1988 and 2000 is expected to come from the services-producing sectors of the economy. The services-producing sectors, many of which have also been identified as telecommunications-intensive, will be the drivers behind the earnings capacity of employees in New Jersey in the future.

The state's ability to realize anticipated economic growth is "at risk" if the job growth in telecommunications-intensive industries is not achieved. Future public policies geared to stimulate economic activity and job growth should recognize telecommunications-intensive industries as a major component of New Jersey's expected future growth.

Therefore, because telecommunications services will play a critical role in economic growth and business attraction, the development of the state's telecommunications infrastructure should be encouraged and supported. The availability of advanced telecommunications services within the state should be particularly attractive to telecommunications-intensive industries and would provide a "competitive edge" to attract and retain these businesses.

Regulatory philosophy across the country is supportive of the deployment of an advanced telecommunications infrastructure in LEC networks; the regulatory framework in New Jersey can help enhance the state's competitive position in the "Information Age."

Representatives of state regulatory authorities around the country indicate increasing support for the role telecommunications play in economic development and business retention initiatives. They recognize that there is a competitive advantage to having advanced telecommunications technology employed in their state's networks. Similarly, when evaluating local exchange carrier investment plans, a shift has occurred from a focus on questioning why a particular technology is being deployed to one of questioning why a particular technology is not being deployed more quickly and on a broader basis. Clearly, regulatory philosophy has changed to an environment where the availability and quality of the telecommunications services offered are significant concerns.

Additionally, there has been a significant trend in recent years for regulators to adopt alternative forms of regulation. Relaxed regulatory policies have become more commonplace than traditional rate base/rate of return regulatory philosophy. These relaxed regulatory policies are in response to the rapid evolution of telecommunications technology and the emergence of competitive alternatives for various telecommunications products and services. Consequently, these



regulatory models have been structured to provide additional incentives for local exchange carriers to develop new products and services, aggressively pursue operating cost-efficiencies, and encourage the deployment of new technology.

While representatives of the regulatory agencies surveyed indicated that their primary objective is to avoid increases in residential telephone rates, they also seemed willing to consider an increase in local exchange rates to support telecommunications infrastructure development under certain conditions. For example, the majority of respondents would support an increase in basic exchange rates to promote economic development or to make more advanced services available to residences and small businesses in the state as part of a long-term upgrade program. Thus, the survey results demonstrate that, while skeptical of basic rate increases, regulators recognize the increasing importance of advanced telecommunications in the "Information Age" and are becoming more receptive to strategic investments needed to deliver the advanced telecommunications service capabilities expected by customers in the future.

The New Jersey regulatory environment has already responded to several of the issues being evaluated by regulators in other jurisdictions across the country. For example, the Rate Stability Plan (RSP), which currently governs New Jersey Bell, is an effective combination of the various forms of alternative regulatory models. The RSP caps the rates for essentially all existing services. Service offerings have been separated into competitive and noncompetitive components. The rate capping element of the plan provides price stability for NJB customers. Should the RSP continue through 1993 as expected, NJB basic exchange and intraLATA toll rates will not have increased for more than eight years. It also provides an incentive for NJB to optimize earnings by introducing new products and services, pursuing cost containment and operating efficiencies, and continuing to deploy new technology.

However, the survey of regulatory practices in other states identified one comparative shortcoming of the existing regulatory framework and model in New Jersey. Approximately two-thirds of the other jurisdictions are empowered to establish pricing flexibility or banded rates for individual services, many without the need for traditional regulatory review. Under present statutes in New Jersey, the NJBPU cannot approve a price increase for any LEC service without a comprehensive review of all revenues, expenses, and investment (i.e., a traditional rate base/rate of return rate case). This statutory requirement maintains a level of administrative burden and costs that most alternative forms of regulation have been designed to help mitigate.

The deployment of advanced telecommunications capabilities technology can be significantly accelerated at minimal cost relative to the base of local exchange carrier intrastate revenues.

While it is evident that numerous social and economic benefits could be realized through investment in a technologically advanced telecommunications infrastructure, the public policy issue of how fast to accelerate such investment is significant. Widespread deployment of new technologies in the public network will require substantial financial resources and could potentially result in higher costs to those who would benefit.

In order to assess these financial ramifications, the Deloitte & Touche/Braxton team identified three potential investment acceleration scenarios, which have been categorized as moderate, aggressive and extreme, based on the degree of acceleration as compared with business-as-usual plans.



The two major local exchange carriers in the state, NJB and United, developed ten-year business plans to determine the ramifications of meeting three accelerated infrastructure deployment scenarios. In particular, the focus of the analysis was to determine the impact of accelerated infrastructure deployment on capital investment, depreciation and capital recovery, operations and maintenance expenses, new revenue streams, and earnings as compared to a business-as-usual scenario for the ten-year period 1991 to 2000. The three different scenarios - the moderate, aggressive, and extreme - each has increasing levels of advanced telecommunications technology deployment. The extreme scenario is an "outlier" plan which exceeds the practical limits of new technology deployment, but serves as an outer boundary for the financial analysis. The aggressive scenario is a realistic plan that would place New Jersey at the forefront of technology deployment as measured by national and international criteria throughout the next decade. The moderate scenario represents a middle ground between today's business-as-usual deployment plans and the aggressive scenario. Thus, policymakers have at hand both the relative costs and benefits of accelerated infrastructure investment to consider as part of their evaluations of public policy alternatives.

The required percentage increases in overall revenues annually under the moderate and aggressive scenarios never exceed 7.5% per year, even in the peak years of infrastructure investment over the ten-year period under review. This represents the overall percentage increases required to accelerate the rate of technology deployment. In fact, except for the peak year, the percentage increase in revenues per year is considerably below this level and more in the range of approximately 5% or less.

Even under the extreme scenario, which would be impractical to pursue, the annual required percentage increase in revenues only slightly exceeds 10%, and then for only three of the ten years included in the period under analysis. The annual percentage increases in the remaining years of the period are significantly below the 10% level.

Thus, the acceleration of telecommunications infrastructure deployment could be achieved with nominal annual revenue increases. The annual increases in required revenues under the moderate and aggressive scenarios approximate the anticipated inflation rate (i.e., 4% to 6%) during the ten-year period.

It should be recognized that all of these accelerated investment scenarios incorporate significant capital investment in technology over the ten-year period, beyond the business-as-usual scenario: \$907 million in the moderate scenario, \$2.1 billion in the aggressive scenario, and \$3.9 billion in the extreme scenario. However, the incremental revenue increases required to support the acceleration of technology deployment appear reasonable. This observation is based on the general inflationary increases anticipated over the same time frame and the level of capital investment and capital recovery costs included in these scenarios.

New Jersey has several economic and demographic characteristics that have not only helped reduce telecommunications user costs in the past, but will help reduce the total cost of accelerated telecommunications technology deployment. These include:

- The relatively high density of the state of New Jersey is clearly an advantage. The population density in New Jersey is 1,034 persons per square mile, as compared to an average of 70 persons per square mile for the total United States.
- There are 531 individuals employed per square mile in New Jersey, as compared to an average of approximately 33 individuals per square mile for the nation.



