



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



