

Local Broadband Networks: A New Regulatory Philosophy

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Over the next decade, the use of fiber optics technologies will fundamentally alter information transmission. New broadband delivery techniques will render the current telecommunications regulatory structures obsolete. In this Article, the author reviews the potential uses of fiber optics and the economic and legal issues that should be considered when forming a new regulatory policy. The author proposes a new regulatory philosophy based upon competition and separate regulation of information transmission and information services. The current regulatory policies must be changed to promote optimal local network construction. The author proposes a regulatory structure to encourage the development of local broadband transmission facilities and provide a thriving marketplace for novel information services.

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Local Broadband Networks

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*The doors of the past open to those who seek to know what has been . . . The doors of the present open to those who seek to know what man can do—To master his fate by science, sustain his spirit by art and guide his life by wisdom The doors to the future open to those who wonder what life may become. . . .*¹

John Rothwell Slater

*Changing the form in which communication occurs will affect both the quality and quantity of the information we receive and use. It will influence what we know, what we think, and what we do, and shape the organization, operation, and perception of our institutions as well.*²

Professor M. Ethan Katsh

Introduction

Broadband transmission technology via fiber optics will revolutionize the scale of information transmission and the variety of information services available to each member of our society.³ Thus, the philosophy underlying telecommunications regulation, currently oriented to the older, more limited technologies, must be reconsidered. A basic result of the implementation of local broadband technology and an important aspect of the new philosophy is that information transmission and information services must be characterized and regulated separately. Government policy should encourage competition among information providers and among local broadband network developers.

1. John Rothwell Slater, private papers (available in the University of Rochester Rush Rhees rare books library).

2. M. Ethan Katsh, *The First Amendment and Technological Change: The New Media Have a Message*, 57 GEO. WASH. L. REV. 1459, 1461 (1989).

3. During the introduction of the Communications Competitiveness and Infrastructure Modernization Act of 1991 - S. 1200 Senator Conrad Burns stated:

A broadband communications infrastructure will be every American's tool of personal emancipation, will generate a quantum increase in America - freedom of speech, freedom of choice, freedom of ideas. This will allow Americans to recapture and expand upon the democratic tradition and community spirit of the early years of this great Nation by freeing Americans from constraints of space and time and will allow civic and economic participation for all members of this great Republic.

CONG. REC. S7054-7061 (daily ed. June 5, 1991). See also, Peter Coy, *How Do You Build An Information Highway?*, BUSINESS WEEK, Sept. 16, 1991 at 108.

The term broadband refers to the transmission of high frequency signals. This Article assumes that fiber optic facilities will be the local broadband transmission medium of choice.⁴ In this Article, the term "information transmission" refers to the process of moving information from one location to another. The term "information services" encompasses numerous activities that rely on information transmission, including voice, message, facsimile, video, and data transmission and reception.

Technological development makes the deployment of fiber optics in local telecommunications networks economically desirable.⁵ Furthermore, evidence indicates competitive transmission systems will develop in many localities.⁶ However, current regulatory policies discourage development of local broadband networks.⁷ Many observers argue that government action must precede the initial construction of local fiber networks.⁸

This Article examines technological innovations in the local telecommunications industry, provides an economic overview of the local advanced technology marketplaces, reviews current regulatory structures and authority, and thereafter, provides a new philosophical framework for local telecommunications regulation that can fully exploit emerging fiber optic technology. Part I presents technical innovations that will dramatically change local telecommunication transmission and details six potential uses for broadband facilities. Part II reviews the regulatory history of the local telecommunications industry and describes the economic structure of the industry. Part III characterizes the economics of emerging local broadband telecommunication marketplaces and considers the impact of competitive pressure. Part IV discusses regulatory authority in the local telecommunications industry. Part V proposes a division

4. After consideration of the relevant technical literature and current industry decisions, the author assumes that ultimately fiber optics will be directly connected to each customer in most local networks. Some local broadband networks may integrate coaxial cable, from the curb to the customer premises, with optical fiber in a transition period. However, such an implementation would significantly limit future high capacity applications, even if the coaxial cable were used only over short distances. The integration of coaxial cable and fiber optics should be viewed as an intermediate development that will help establish sufficient consumer demand for a wide range of information services only available over broadband transmission facilities. The author assumed fiber optics will be the ultimate transmission medium, even if it is not the immediate choice in all local networks. Therefore, throughout this Article, the terms broadband, optical fiber, and fiber optics will be used interchangeably.

5. See *infra* notes 159-163 and accompanying text.

6. See Paul W. Shumate & Richard K. Snelling, *Evolution of Fiber in the Residential Loop Plant*, IEEE COMM. MAG., Mar. 1991, at 68, 73.

7. "The Telecommunications Industry Association . . . has determined, through a comprehensive assessment of all studies on the subject, that deployment of fiber to every consumer is 'stalled on the way to the home' under current government policies." Conrad Burns, *The Cable TV Problem -- A Procompetitive Approach*, PUB. UTIL. FORT., Aug. 16, 1990, at 16.

8. See *Id.*, at 16; Hal Selander, *The Economics of Fiber to the Subscriber*, PUB. UTIL. FORT., Aug. 16, 1990, at 24; John R. Meyer & William B. Tye, *Toward Achieving Workable Competition In Industries Undergoing A Transition To Deregulation: A Contractual Equilibrium Approach*, 5 YALE J. ON REG. 273 (1988); Tom Hausken & Vivian Brates, *Fiber-to-the-Home: U.S. Policy Issues*, IEEE TECHN. AND SOC'Y MAG.

of government responsibility and seven basic objectives to consider when fostering a competitive environment for both information services and transmission. The discussion in this Article provides the foundation for policy and regulatory development, it does not attempt to formulate explicit regulations. Part VI discusses related issues associated with initial construction of local broadband networks in a competitive marketplace.

I. Information Transmission Technology

The unprecedented pace of technological innovation in the telecommunications industry⁹ necessitates a reformulation of present regulatory philosophy. Specifically, the imminent construction of local fiber optic networks,¹⁰ mandates a rapid re-examination of the philosophical assumptions underlying local telecommunication regulation. Furthermore, any new regulatory policy must recognize that scientific advancements will continue to alter the industry. Gaining an understanding of optical fiber's properties and the implications of other emerging technologies is critically important to formulating a new regulatory philosophy. This Part provides a brief summary of information transmission technology and describes the enormous potential benefits of local fiber optic networks.

A. *Fiber Optics' Transmission Rate Advantage*

Fiber optics' tremendous transmission capacity is dramatically greater than that of other telecommunications transmission media. The advantage of fiber

9. "The silicon revolution and software have combined to make undreamed-of things possible. The price of silicon has improved six orders of magnitude or a factor of one million in thirty years. Nothing before in history has ever changed that rapidly." Richard B. Robrock II, *The Intelligent Network - Changing the Face of Telecommunications*, PROC. OF THE IEEE, Jan. 1991, at 7, 18. Furthermore,

[d]evelopments in the information processing industry, such as the steady acceleration of computing speed and power, and the rapid diffusion of computers among businesses and households, have opened economic and social vistas unimagined even twenty years ago. With the cost of information processing power dropping by some 50 percent every year, it seems likely that the impressive accomplishments of the past ten years merely foreshadow more spectacular achievements in the future.

NAT'L TELECOMMUNICATIONS AND INFO. ADMIN., U.S. DEP'T OF COMMERCE, NTIA SPECIAL PUB. NO. 91-26, THE NTIA INFRASTRUCTURE REPORT 3 (1991). [hereinafter NTIA INFRASTRUCTURE REPORT].

10. For example, in New Jersey the two principle telephone network providers, New Jersey Bell and United, under conservative assumptions will complete a 100% local fiber network connecting to every customer between 2020 and 2030. However, under an aggressive deployment plan, favored by some industry and state officials a 100% complete local fiber network connecting every customer may be in place between 2000 and 2010. An extreme scenario predicts a 100% completion between 2000 and 2006. 3 Deloitte & Touche, *New Jersey Telecommunications Infrastructure Study*, §11, at 4-7. (January 1991) (on file with the author). See also Mary Lu Carnevale, *Bell Atlantic's Phone Network To Carry Cable*, WALL ST. J., Nov. 17, 1992, at C15. (FCC approval of agreement between Bell Atlantic and Sammons Communications would allow construction of local fiber networks in three communities to begin in spring of 1993 and could be completed by 1994).

optics is so significant that no other fixed or mobile transmission facility can substitute as an information highway.

1. *Transmission Rates*

Information is transmitted by being superimposed onto a carrier signal.¹¹ The quantity of information that can be transmitted on the carrier signal is directly proportional to the frequency of the carrier signal.¹² Fiber optics uses as its carrier signal a laser beam possessing a frequency approximately eight to ten orders of magnitude higher than a telephone's ordinary electrical carrier signal.¹³ Thus, fiber's transmission capacity is approximately eight to ten orders of magnitude greater than ordinary telephone wires.¹⁴ For example, at a data rate of 14,400 kilo-bits per second, a conventional modem transmitting over ordinary telephone lines would take approximately 170 years to transmit the entire set of documents in the Library of Congress.¹⁵ However, at a rate of 2.488 giga-bits per second, currently available over optical fiber,¹⁶ the entire contents of the Library of Congress would be transmitted in one day.¹⁷ The amount of information transmitted through an optical fiber can be increased not only by standard techniques,¹⁸ but also by techniques unavailable for copper based transmission systems.¹⁹

11. GERD KEISER, *OPTICAL FIBER COMMUNICATIONS* 2 (1983).

12. *Id.*

13. Typical wire pair communication systems applications use an electrical signal operating at a frequency between 10^3 hertz and 10^6 hertz, whereas optical fiber communication systems applications use a laser operating at a frequency between 10^{14} hertz and 10^{15} hertz. *Id.* at 3; See also, JOHN M. SENIOR, *OPTICAL FIBER COMMUNICATIONS PRINCIPLES AND PRACTICE* 7 (1985).

14. "[T]he information-carrying capacity of optical fiber systems is already proving far superior to the best copper cable systems." SENIOR, *supra* note 13, at 7.

15. Fourteen point four kilo-bits per second is a high grade modem, but not the fastest that can be used over voice grade lines. Nineteen point two kilo-bits per second is the fastest modem in use over voice grade lines. However, even higher rates are possible, but only over special private digital data lines. 3 Deloitte & Touche, *New Jersey Telecommunications Infrastructure Study*, §4, at 18. (January 1991) (on file with the author).

16. The Synchronous Optical Network Standard (SONET) operates at 2.488 giga-bits per second. *Id.* §4, at 22.

17. *Id.* §9, at 2. Although a coaxial cable or twisted pair can transmit data rates significantly higher than 9600 kilo-bits per second, the higher bit rates cannot be achieved over long distances without signal regeneration. KEISER, *supra* note 11, at 60; SENIOR, *supra* note 13, at 7. Optical fiber does not have an analogous fundamental transmission rate limitation. See David L. Waring et al., *Digital Subscriber Line Technology Facilitates a Graceful Transition from Copper to Fiber*, *IEEE COMM. MAG.*, March 1991, at 96, 100.

18. The capacity of a transmission facility can be increased by multiplexing, a process in which several individual information signals are combined into one signal before transmitting. Some methods of multiplexing can be used on both copper and fiber transmission systems. These techniques include time division multiplexing and frequency division multiplexing. SENIOR, *supra* note 13, at 417.

19. Only optical fiber transmission can take a number of information signals, some that may already have been multiplexed, and use different wavelength lasers to send all the signals over the same fiber at once. This method is called wavelength division multiplexing. KEISER, *supra* note 11, at 220; SENIOR, *supra* note 13, at 418.

2. Fixed Transmission

Fixed transmission refers to permanent transmission facilities. Typically, customers are connected to the nation's telecommunications infrastructure by a pair of copper telephone wires^{20,21} and a coaxial television cable.²² Both networks' fixed transmission facilities represent a substantial capital investment²³ subject to lengthy depreciation periods,²⁴ and require considerable annual investment²⁵ and sizable maintenance expenditures.²⁶ Furthermore, both networks require customers to purchase or rent separate Customer Premises Equipment (CPE), such as telephones and cable television selectors or decoders.

An emerging standard, Integrated Services Digital Network (ISDN),²⁷ will increase the information capacity of copper wires.²⁸ ISDN uses digital encoding to transmit simultaneously numerous information signals over standard copper wires. Thus, ISDN allows simultaneous voice and computer communication over the same copper wires. However, fiber's basic information

20. Although large businesses may customize their transmission facilities, they primarily use copper facilities to connect to the local network. However, the implementation of SONET networks are already allowing limited usage of optical fiber.

21. "The local loop . . . retains much the same technology as it has for 100 years—copper wire physically connecting equipment with the central office." Paul MacAvoy & Kenneth Robinson, *Losing By Judicial Policymaking: The First Year of the AT&T Divestiture*, 2 YALE J. ON REG. 225, 228 n.17 (1985) [hereinafter *Losing By Judicial Policymaking*]. Telephone's market penetration is virtually universal. "In 1934, telephone service was available only in one out of every three households. By 1970, 91% of U.S. households had service and, by 1984, about 98% of households had at least one telephone." *Id.* at 230 n.29.

22. Cable television's coaxial cable, although not connected to as many customers as are telephone wires, is in use in ninety percent of U.S. homes. Competition, Rate Deregulation and the Commission's Policies Relating to the Provision of Cable Television Service, 5 F.C.C. Rcd. 4962, 4966-67, 5039 (1990); See also Mary Lu Carnevale, *How Cable Bill Will Influence Rates, Service*, WALL ST. J., September 28, 1992, at B1, B11.

23. The local exchange network represents a major component of the "capital investment in the public network. It is reported, under the Federal Communications Commission[s] established Uniform System of Accounts, [to represent more than] 25% of the regional [telephone] companies' assets, or over \$50 billion." Waring et al., *supra* note 17, at 96. "In the U.S., new residential construction accounts for between 1.5 million and 2 million lines annually. . . ." Shumate & Snelling, *supra* note 6, at 68.

24. The life-cycle of copper wire transmission facilities is generally considered to be twenty to thirty years, but the emergence of competing technologies suggests a shorter period. Shumate & Snelling, *supra* note 6, at 72.

25. The average annual investment per "telephone line connecting the subscriber's terminal equipment to the public switched network and which has a dedicated port in the telephone exchange equipment" in the U.S. is \$217.89 in 1989 dollars. NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 152-3. In 1989 New Jersey Bell had capital expenditures of \$131 per line, higher than some but lower than other local telephone companies. 2 Deloitte & Touche, *supra* note 15, §4, at 99.

26. In the U.S. residential network "replacement accounts for about three (3) million lines annually." Shumate & Snelling, *supra* note 6, at 68.

27. For background on the capabilities of ISDN, see a special issue of IEEE COMM. MAG., Aug. 1992; William W. Wu & Adam Livne, *ISDN: A Snapshot*, PROC. OF THE IEEE, Feb. 1991, at 103; Sushil N. Pandhi, *The Universal Data Connection*, IEEE SPECTRUM, July 1987, at 31.

28. P. Douglas Latner et al., *Business and Residential Services for the Evolving Subscriber Loop*, IEEE COMM. MAG., Mar. 1991, at 109, 113.

capacity substantially surpasses copper wire ISDN²⁹ and there are significant costs associated with very high rate ISDN equipment.³⁰ These costs and limitations underscore that copper ISDN will not be a substitute for fiber optic transmission facilities.³¹ However, the concept of High-bit-rate Digital Subscriber Line (HDSL) may prove to be an important transitional technology.³² This technology coupled with ISDN can provide some broadband information services to customers over short copper facilities.³³ The transition applications would benefit network developers by establishing consumer demand for advanced information services before the full cost of local fiber installation was incurred.

3. Mobile Transmission

Mobile communication technologies such as cellular telephone networks and Personal Communications Networks (PCNs)³⁴ use carrier signals that propagate through the atmosphere. Since the use of mobile communications is growing at phenomenal rates,³⁵ its impact on methods of fixed transmission

29. ISDN, over copper wires, transmits digitally at 64 kilo-bits per second, whereas optical fiber transmits digitally at 2.488 giga-bits per second (Gbps). As a result, "[f]iber systems deployed commercially at 1.2 [Gbps] and 1.76 Gbps can carry 18,816 and 24,192 voice channels per fiber pair respectively." NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 94. See also Patrick E. White, *The Role of the Broadband Integrated Services Digital Network*, IEEE COMM. MAG., Mar. 1991, at 116.

30. In order to approach the theoretical maximum capacities of copper facilities, the application requires considerable equipment complexity. Specifically, when copper facilities are pushed to operate at very high speeds such as 1.6 mega-bits per second, for technical reasons, the terminal equipment must operate ten times faster than the transmission speeds. Waring et al., *supra* note 17, at 100.

31. The use of fiber optics is increasing because of its inherent advantages over copper wire:

Compared to copper or radio-based alternatives, fiber optic transmission systems have greater immunity to interference, exhibit low signal loss, and carry a much greater amount of traffic accurately at greater distances. These systems also have lower maintenance and servicing costs than comparable terrestrial alternatives. As a result, fiber optic transmission facilities are increasingly used in public and private networks.

NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 94.

32. "It is understood that HDSL will be a transitional technology, supporting the availability of ubiquitous DS1 service while fiber penetration accelerates." Waring et al., *supra* note 17, at 100.

33. See The Future for Wire Pair Transmission section in Waring et al., *supra* note 17, at 103.

34. PCNs are different from standard cellular telephones of the late 1980's and early 1990's. The primary difference is the reduced signal power from PCN customer equipment. The consumer equipment associated with PCNs will be small and light, but will require more network receivers thereby creating smaller cells and the potential to service more customers. See Theodore S. Rappaport, *The Wireless Revolution*, IEEE COMM. MAG., Nov. 1991, at 52.

35. "Over the past three years, the interest in wireless communications has been nothing less than spectacular. Cellular radio systems around the world have been enjoying 33% to 50% growth rates. . . . [I]n the United States there were more than 6.3 million cellular telephone users as of September 1991. This compares with 25,000 users in 1984, and 2.5 million U.S. users in late 1989." *Id.* at 52 (footnote omitted). International usage is experiencing growing use of cellular technology as well. "[C]ellular telephone in Sweden already enjoys a 6.6 percent adult market penetration, and this figure has been increasing by more than 0.1 percent per month. Finland, Norway and France have been experiencing similar growth rates. In Hong Kong, more than 50 percent of the adult population own or have operated cellular telephones." *Id.* (footnotes omitted). See also Edmund L. Andrews, *Cable TV Batling Phone Companies*, N.Y. TIMES, March 29, 1992, at A1, 22.

must be considered.³⁶ Some speculate that PCNs will provide one identification number that could be used to reach a customer anywhere at any time.³⁷ The growing popularity of mobile systems³⁸ will provide sufficient economic incentives for industry participants aggressively to pursue innovative mobile services.³⁹ The capacity of these mobile systems is similar to ordinary fixed telephone transmissions.⁴⁰ Therefore, mobile systems should not be considered competitors in the marketplace for broadband capabilities. However, PCNs and cellular telephones do create competition for the provision of standard voice communication. Some experts even predict that the PCNs eventually will replace the need for a fixed transmission network that only provides voice communication.⁴¹

B. Other Advantages of Optical Fiber

Aside from optical fiber's phenomenal capacity to transmit information with low attenuation, it offers many technical advantages over alternative transmission technologies. These technical advantages translate into easier placement, lower maintenance costs, greater security for transmitted information, and greater versatility.

Optical fibers are fabricated from glass or plastic and are usually the size of a human hair.⁴² Even when covered with a protective coating, the fibers are lighter and smaller than copper wires. Thus, fiber optics will reduce conduit congestion.⁴³ Optical fibers do not conduct electricity; therefore, the problems of cross-talk, electrically noisy environments, and earth-facility contact are

36. Edmund L. Andrews, *Phone Policy Starts to Blur*, N.Y. TIMES, Nov. 9, 1992, at A1; Mary Lu Carnevale, *AT&T-McCaw Link Stuns Baby Bells*, WALL ST. J., Nov. 6, 1992, at B1 ("AT&T's announcement that it plans to team up with McCaw Cellular Communications Inc. and eventually may control the giant cellular-telephone company left the Baby Bells dazed at the prospect of competing with a reconstituted Bell System").

37. Rappaport, *supra* note 34, at 52.

38. "[I]t is conceivable that 50 million to 75 million subscribers could be using wireless systems for various types of personal communications by the mid-1990s. This is corroborated by a recent Morgan Stanley report that predicts cellular and PCN systems will achieve at least 12 percent market penetration in many developed countries by the end of this century." *Id.* at 61.

39. John J. Keller, *AT&T to Unveil Wireless-Data Alliances*, WALL ST. J., Nov. 16, 1992, at B5; Anthony Ramirez, *I.B.M. and 9 Cellular Powers Team Up for Data Transfers*, N.Y. TIMES, April 22, 1992, at D1 ("Nine of the largest cellular telephone companies and I.B.M. plan to announce today that they are developing methods to send data like facsimiles and electronic mail over the existing cellular telephone network. . . . [I.B.M.] and the nine telephone carriers hope to expand the market sharply, from fewer than 100,000 customers today to more than 13 million by the year 2000.").

40. The frequency of mobile radio is somewhat higher than copper wire. KEISER, *supra* note 11, at 3. Innovative technology may someday utilize this excess band width; however, mobile radio's frequency is significantly below that of laser signals. *Id.*

41. "At best [PCNs] will offer customers the ability to use a single wireless communications unit for home, office or automobile, thereby obviating the need for a traditional wired phone to the home." Rappaport, *supra* note 34, at 52.

42. See KEISER, *supra* note 11, at 273-291.

43. SENIOR, *supra* note 13, at 7.

nonexistent.⁴⁴ Even though the fiber is made of glass or plastic, it is rugged and flexible.⁴⁵ Furthermore, fiber's useful life expectancy is 20 to 30 years⁴⁶ and its maintenance costs are low.⁴⁷

Fiber also provides customers with a highly secure method of information transmission.⁴⁸ Proper transmission of laser signals requires physical integrity of the fiber. Thus, the fiber does not emit a signal that can be easily monitored.⁴⁹

Any electrical signal can be converted easily into laser light. Therefore, optical fiber is more versatile than copper because it will transmit both the converted electrical signal and laser light. Since fiber will bring laser signals into customer premises, in the future some CPE may directly process laser signals, obviating the need for conversion to electrical impulses.⁵⁰ One potential disadvantage of fiber, as compared to copper facilities, is that fiber alone cannot supply the power to operate a basic customer telephone as does copper. However, many solutions have been proposed, among them small battery backup units in the CPE.⁵¹

C. Optical Fiber's Potential Uses

Duplex transmission⁵² over broadband fiber facilities will offer many information services to customers who are already accustomed to audio programming, computer communication, data links, facsimile transmission, voice communication, television, and pay-per-view or video-on-demand programming. In the near future, local fiber networks will also provide burglar and fire alarm systems, utility meter reading, video telephones, and High Definition Television (HDTV).⁵³ Optical fiber's vast capacity would allow simultaneous transmission of duplicate services to each customer's premises.

44. *Id.* at 7-8.

45. *Id.* at 9. *See also id.* at 133-144.

46. *Id.* at 9.

47. Maintenance cost are lower because fiber requires fewer "intermediate repeaters or line amplifiers to boost the transmitted signal strength. Hence with fewer repeaters, system reliability is generally enhanced in comparison with conventional electrical conductor systems." *Id.* at 9. "Studies in Southern Bell reflect at least a four-to-one advantage of fiber over copper for overall maintenance." Shumate & Snelling, *supra* note 6, at 72.

48. *Id.* at 8.

49. Fiber can be tapped by severely bending the fiber so a little of the laser light escapes. However, this method can be readily detected because of the loss of laser light power at the fiber's termination. Nonetheless, security at switching cites is a problem for fiber optics.

50. Optical computing is an example of directly processed laser light. For a discussion of the potential optical computing offers see RICHARD MILLER, OPTICAL COMPUTERS: THE NEXT FRONTIER IN COMPUTING, VOLS. I & II (May 1986) (on file with the author).

51. Hausken & Brates, *supra* note 8, at 24.

52. Duplex transmission means that both parties using the transmission system can simultaneously transmit and receive information. Fiber is inherently bi-directional. Shumate & Snelling, *supra* note 6, at 72. Local optical fiber systems could be configured using either one or two fibers to each customer.

53. Ted Sherman, *Bell Hoping to Rewire Jersey*, THE STAR-LEDGER, July 15, 1991, at 1, 10.

Therefore, fiber optics will make it possible for customers to choose information services from a marketplace of competing providers.⁵⁴

Once local broadband networks are in place, there will be great potential for new information services.⁵⁵ A fully developed infrastructure of local broadband networks could stimulate private vendors and suppliers to pursue research and development of new devices like optical switching systems and optical computers.⁵⁶ With the advent of local broadband networks, new information services will emerge to redefine the way citizens interact with each other and receive essential services.

1. Access for the Disabled

Disabled citizens will derive substantial benefits from the new opportunities provided by local fiber networks.⁵⁷ The information services provided by broadband networks will enable the large population of physically disabled⁵⁸ to interact with office environments and general society in a manner now difficult and expensive. A local fiber network will provide interactive voice, video, facsimile, and computer communications all over one fiber connection to the customer's premises. Some of these services are already available over copper facilities, but since its capacity is limited, the quality of some services are below that attainable over fiber facilities.⁵⁹ Furthermore, if operated simultaneously, each information service might require a separate copper transmission facility.⁶⁰ The single fiber link will replace multiple service connections and help stimulate demand for new CPE and information services, which may, in turn, drive market mechanisms to lower costs.

54. "The information infrastructure will . . . resemble an old-fashioned village market. A multitude of goods and services will be bought and sold through this new information marketplace. . . ." Michael L. Dertouzos, *Communications, Computers and Networks*, SCI. AM., Sept. 1991, at 62, 67.

55. "Thus, today's technologies, and more advanced technologies not yet suitable for loop applications but receiving attention worldwide . . . offer a multitude of possibilities for future broadband service delivery once fiber is in place." Shumate & Snelling, *supra* note 6, at 71-72.

56. MILLER, *supra* note 50.

57. "[A] 1986 survey found that two-thirds of all disabled persons between the ages of 16 and 64 were unemployed, even though the bulk of those questioned said they wanted to work." NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 81. Furthermore, "[i]n 1988, disabled men and women earned 36 percent and 38 percent less, respectively, than their non-disabled counterparts." *Id.* at 81 n.350.

58. "Today there are some 43 million Americans with some form of physical or mental disability." *Id.* at 81. As the average age of individuals increases, this figure is expected to grow. *Id.* at 81 n.347.

59. Video images and slow data transmission are services affected by the limited capacity. "High-quality, full motion digital video coupled with simultaneous voice and data services require [information transmission] speeds greater than 1.5 mega bits per second [sic]." 2 Deloitte & Touche, *supra* note 15, § 4, at 6.

60. ISDN and associated standards such as DSL could provide limited multiple services over a single copper facility.

2. *Economic Development and Business Retention*

Telecommunications is becoming an increasingly critical factor in the competitive business environment.⁶¹ The telecommunications infrastructure is an essential element in business decisions to locate, relocate, or remain in a geographical area.⁶² In a survey of fifty-three economic development managers from across the country, the importance of high-speed fiber optic transmission capabilities for business customers was rated at 4.2 out of five, with five representing critical importance.⁶³ The advanced capabilities of local broadband networks would benefit both local and national economies through increased economic activity and increased tax bases. "One economist has concluded that 'a twentieth century state without an advanced telecommunications system would be as competitively disadvantaged as a late nineteenth century state without a railroad.'"⁶⁴

3. *Education and Training*

Scarce financial⁶⁵ and personal resources could be spent more efficiently on education by taking advantage of economies of scale and expanding the opportunities offered to tomorrow's students through the use of local fiber optic networks.⁶⁶ Significant advances in educational opportunities could be made with a broadband interactive video and voice hookup between schools.⁶⁷ For example, well-funded schools could share expensive experts and highly motivating instructors with those school districts which are under-funded. Other school districts face shortages in qualified teachers.⁶⁸ Broadband networks, directly connected to schools, could provide students with highly qualified teachers who might be reluctant to go into an inner-city environment or to travel great distances to teach. Local fiber optic networks will provide the transmission

61. "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." 2 Deloitte & Touche, *supra* note 15, § 5, at 112.

62. *Area Development* magazine conducted a survey of the importance of factors in business location decisions. The availability of telecommunication services was ranked very important or important by 78.1% of the respondents in 1989, up 14.2% from the 1988 responses. *Id.* at 7. "James Schriener, Director of Industrial Location Advisor Services for PHH Fantus Corporation, noted in his analysis of the 1989 *Area Development* survey results, 'we see developments in telecommunications . . . having the most important impact on location decision-making over the next decade.'" *Id.* at 8.

63. *Id.* at §5, 30.

64. *Id.* at 8 (citation omitted).

65. The total annual spending on both public and private education, elementary through secondary, was only \$189.1 billion in 1990. Lattner et al., *supra* note 28, at 110.

66. "A significant opportunity exists to advance the public agenda for excellence in education through improvements to the telecommunications infrastructure." 2 Deloitte & Touche, *supra* note 15, §6, at 66.

67. *Id.* at 63.

68. NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 51.

capabilities that could bridge the gap between rich and poor schools and provide better educational opportunities for students in disadvantaged or rural school systems.⁶⁹

The creation of a telecommunications classroom⁷⁰ would make highly advanced courses affordable and available when only a few students in any one location are interested. would make highly advanced courses affordable and available when only a few students in any one location are interested.⁷¹ Some distance learning programs now exist,⁷² but their lack of interactive abilities may be unacceptable. This deficiency has caused an under-utilization of distance programs.⁷³ Local fiber optic networks can overcome the limitation of copper facilities and provide the type of interactive environment educators have described as necessary for the success of distance programs.⁷⁴

Higher education will benefit from local broadband networks as well. There has been substantial investment in computer and super-computer networks that connect universities, academics, and students with data and processing power.⁷⁵ Local fiber networks will allow an even more diverse population to receive the benefits of these networks.⁷⁶ Industry and business, through local fiber networks, will be able to access this computing power and establish closer links to university research. As personal computers grow more powerful and optical

69. NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 60. See also 2 Deloitte & Touche, *supra* note 15, § 6, at 1-6.

70. A telecommunications classroom would be composed of a few students in separate school facilities from a widely dispersed geographical area all receiving interactive instruction at the same time.

71. 2 Deloitte & Touche, *supra* note 15, §6, at 63.

72. Recently, the use of distance learning programs appears to be increasing:

According to the Office of Technology Assessment (OTA), as recently as 1987, fewer than 10 states were investing in distance learning. By the end of 1989, virtually all states were involved to some degree in distance learning projects. In 1990, roughly one-third of all school districts in the United States were using distance learning.

NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 50. These figures, however, relate to broadcast-type technologies, not interactive situations.

73. 2 Deloitte & Touche, *supra* note 15, § 6, at 64.

74. Interaction education, according to one report, requires substantial transmission rates: The nature of interaction over an educational network should replicate as closely as possible the "live," instructor-led classroom experience. At a minimum, educational networks must be able to support one-way full-motion video transmission, as well as data and voice. . . . As distance learning matures, the demand for two-way interactive video will increase, and networks must evolve to support this demand.

Id.

75. NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 47-51.

76. For example:

Just as consumers and businesses get their electricity from the grid network of the nation's utility companies, home and business computer users may one day be able to plug into a national computing network and draw off as much processing power as they need. 'Supercomputing is on the verge of becoming a utility,' said David Farber, a professor of computing and information sciences at the University of Pennsylvania in Philadelphia. 'You may want more computing power for a very short period of time. In the future, without even asking, your computer will reach out over high-speed computing networks to get that power.'

John Markoff, *A Crucial Linkup in the U.S. Data Highway*, N.Y. TIMES, Sept. 30, 1992, at D8.

optical computer processing draws closer, the need for local fiber optic networks to connect distant processing units becomes more imperative.

Another key component of education is continued training of the work force. Employers spent \$210 billion in 1990 on both formal and informal training of their employees.⁷⁷ “As oil prices increase, the motivation to use communication instead of transportation increases. Distance education and training are expected to increase in cost effectiveness Residential education and training has the potential to generate service demands that overlap the business market.”⁷⁸ Local fiber networks will make training at home an effective alternative to distant educational seminars, thus reducing employee fatigue and wasted travel time and expense.

4. *Entertainment*

Some industry observers believe that local fiber networks will result in a “brave new world of devices,” with many of the developments focused on leisure activities.⁷⁹ Two illustrative examples of near-term information services are “home video services on demand [and] on-line multimedia libraries that would integrate written text with video images and data.”⁸⁰ Another emerging entertainment service will be multi player and virtual reality games. “Multi-player games appear to be gaining momentum. If low-cost, high-performance [broadband] residential communications services were available, it is plausible that the \$4 billion video game and arcade industry could roll out game services where multiple players could . . . access . . . different multi-player game[s].”⁸¹ Local fiber networks create limitless potential for the development of entertainment-oriented information services.

5. *Health Care*

As health care costs continue to rise and many members of society cannot afford adequate health care, local broadband networks will reduce costs and provide access to the services of highly-qualified specialists. Local fiber systems will connect expensive and hard-to-reach specialists by transmitting patient images to distant locations for diagnosis.⁸² Using fiber networks, a poor

77. Lattner et al., *supra* note 28, at 110.

78. *Id.*

79. Andrews, *supra* note 35, at 22.

80. *Id.*

81. Lattner et al., *supra* note 28, at 111.

82. This has already been tested using over satellite transmission links. A suburban Philadelphia orthopedic clinic transmits its x-rays to the University of Pennsylvania Hospital. The remote access to the University's radiology department eliminates the need for and cost of a full time radiologist at the clinic. NTLA INFRASTRUCTURE REPORT, *supra* note 9, at 66. Broadband networks are particularly appropriate for transmitting highly detailed diagnostic images that require transmission rates of hundreds of mega-bits per

patient in an average medical facility could take advantage of a specialist's expertise thousands of miles away.⁸³ A central computer and processing unit could operate remote diagnostic imaging and interface equipment using the capabilities of local fiber networks. Health care in economically disadvantaged or rural locations would improve because communities that could not afford advanced diagnostic equipment might be able to afford less expensive imaging equipment that would use a distant processing center.⁸⁴ Furthermore, the use of a shared specialized physician, to review diagnostic images, would reduce costs. In certain areas, this might be the only way patients could receive specialized care because of the shortage of health care professionals.

Local fiber networks connecting medical data bases could provide immediate, emergency access to patient records located at considerable distances. In emergency situations, primary care physicians could be consulted from remote locations with high quality interactive video images and vital data. Local fiber networks would allow home monitoring devices to transmit significant amounts of detailed information and allow interactive communications with homebound patients.⁸⁵ Local fiber networks will also benefit advanced research applications in medical treatment programs. For example, at the University of North Carolina Medical Center, a Cray super-computer will be connected to the hospital by an optical fiber. The computer will be used to focus laser treatments for tumor patients without the hospital incurring the purchase cost of a computer with the required processing power.⁸⁶

The administrative costs of health care could also be reduced through the use of local broadband networks. Health care providers could be directly connected to insurance providers via the fiber network, which would result in lower costs of claims processing.⁸⁷ For example, a program in Connecticut allowed Blue Cross to receive twenty percent of its claims electronically. This experiment has "accelerated processing times, reduced errors, and saved the

second.

83. This could also mean training a local physician via remote interface systems connected by local fiber networks. "Electronic imaging systems will be employed on a larger scale in the 1990s. Video-based systems, currently employed on a limited basis in approximately one-sixth of all hospitals for distance education, could evolve to routine video-consultation capabilities." 3 Deloitte & Touche, *supra* note 15, § 7, at 63.

84. For example, the imaging elements of a magnetic resonance imaging device could be controlled by a distant computer communicating over high-speed fiber links. The local optical fibers would carry both the controlling signals to the interface unit and the data back to the central processor. "In Memphis, Tennessee, three hospitals are using a fiber optic network to share computer and diagnostic equipment, including a Magnetic Resonance Imaging (MRI) machine." NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 67. *See also* 3 Deloitte & Touche, *supra* note 15, § 7, at 62.

85. "[D]octors will not have to wait for regularly scheduled office visits to gain an awareness of changing patient conditions." 3 Deloitte & Touche, *supra* note 15, § 7, at 63-4.

86. NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 68.

87. "For example, according to one study, administration expenses [of medical records] comprised between 19.3 and 24.1 percent of total U.S. health care costs in 1987, a 37 percent increase (in 'real' terms) from 1983." *Id.* at 64.

firm some \$300,000 annually in administrative costs.”⁸⁸ These are only a few of the medical advantages possible with the development of local broadband networks. A study of telecommunications opportunities in New Jersey health care concluded that “[a]n advanced telecommunications infrastructure could help accelerate the use of advanced technologies within health care and help ensure the associated improvements in service efficiency and quality.”⁸⁹

6. Telecommuting

Telecommuting, working at home or remotely via telecommunications, promises to enhance the quality of life for the American work force as well as to increase its performance and productivity.⁹⁰ The environmental benefits from telecommuting are particularly significant.⁹¹ “President Bush has pointed out, for instance, that if only five percent of the commuters in Los Angeles county would telecommute one day a week, they would keep 47,000 tons of pollutants from entering the atmosphere.”⁹² The potential social and economic benefits are equally great.⁹³

Through telecommuting, companies could tap the expertise of individuals who need or desire to spend more time at home. The care of small children is one reason for relocation of a worker to the home, but, as our population continues to age, there will be a greater demand on employees to provide care and companionship for aging parents. Firms will benefit economically by retaining experienced workers and by reducing overhead expenses.⁹⁴ In the fall of 1992, Bell Atlantic gave more than 16,000 managers the option to telecommute several days a week. A spokesman said “the company had seen ‘dramatic increases in employee productivity’ during two [telecommuting] test programs.”⁹⁵ The National Telecommunications and Information Administration Infrastructure Report concluded “that greater use of telecommuting can generate unquestionable economic and social benefits for U.S. business and citizens.”⁹⁶ Local broadband networks would allow an extensive development of work-at-home programs and stimulate innovation in

88. *Id.* at 65.

89. 3 Deloitte & Touche, *supra* note 15, § 7, at 65.

90. NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 73.

91. “[A]ccording to one study, some 25 percent of all U.S. motor fuel consumption and 11 percent of our total petroleum consumption in 1979 were attributable to the commute from home to work and back.” *Id.* at 75.

92. *Id.* at 74.

93. “[A] study by Arthur D. Little, Inc. . . . estimates that substituting telecommunications for certain transportation activities could save the U.S. economy some \$23 billion annually (measured in 1988 dollars). Most of these savings represent the avoidance of productivity losses that currently result from business travel and traffic congestion.” *Id.* at 74-75.

94. *Id.* at 76.

95. *Bell Atlantic Gives Managers A Telecommuting Option*, N.Y. TIMES, Sept. 30, 1992, at D5.

96. NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 79.

the CPE industry to provide enhanced features to those choosing to telecommute.

D. Summary

Local fiber optic networks will become the super-highways of information exchange in the next century. The principles of physics that explain the enormous capacity of fiber also demonstrate that neither copper nor coaxial facilities can ever achieve fiber optics' capacity for information transmission. Thus, it is crucial to develop a new regulatory philosophy that will encourage the construction of local fiber optic networks and the development of broadband information services.

II. Regulatory History of Telecommunications

Although past regulatory policy will not be sufficient to govern this new technology, reference to past regulatory practices in the telecommunications industry will be helpful in developing a new regulatory philosophy for local broadband networks. This Part sketches some economic justifications for governmental intervention in the marketplace and outlines the regulatory structure under which the telecommunications industry developed. Then it highlights recent judicial, legislative, and regulatory actions affecting local telecommunication networks and proposes guidelines to determine future regulatory policy in the area of price regulation. Since this Article focuses on local networks, only telecommunication issues directly affecting local networks will be discussed in detail.⁹⁷

A. Competition, Market Failures, and Monopoly

It is widely accepted that competition allocates resources better than exhaustive regulation of the marketplace.⁹⁸ Over one hundred years ago the

97. For a discussion of regulation in the telecommunications industry before AT&T's divestiture, see Paul MacAvoy & Kenneth Robinson, *Winning By Losing: The AT&T Settlement and Its Impact on Telecommunications*, 1 YALE J. ON REG. 1 (1983) [hereinafter, *Winning By Losing*]; MacAvoy & Robinson, *Losing By Judicial Policy making*, *supra* note 21, at 225; Robert W. Crandall, *Halfway Home: U.S. Telecommunications (De)Regulation in the 1970s and 1980s*, in REGULATION, ECONOMIC THEORY AND HISTORY 77 (Jack High ed. 1991).

98. "The assumption that competition is the best method of allocating resources in a free market recognizes that all elements of a bargain—quality, service, safety and durability—and not just the immediate cost, are favorably affected by the free opportunity to select among alternative offers." *National Soc'y of Professional Eng'rs v. United States*, 435 U.S. 679, 695 (1978). Adam Smith wrote:

[H]e intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it. By pursuing his

United States Congress passed legislation to ensure that the national economic policy promoted competitive marketplaces.⁹⁹ Since then, the Supreme Court has vigorously upheld this congressional mandate.¹⁰⁰

Regulation affects technological progress. Professor Jack High argues, “[a]s a consequence of altered profit opportunities, technology may develop differently in the regulated environment than in the competitive environment.”¹⁰¹ Historical observations show that pervasive government regulation can be destructive as well as inefficient, particularly in areas of technological innovation.¹⁰²

When competition is lacking in a marketplace, the government may choose to regulate industries to protect social welfare.¹⁰³ Theoretically, a monopolistic market failure arises when a single producer’s economies of scale exist over the entire range of relevant demand.¹⁰⁴ Many industry observers describe traditional local telecommunication networks as inherently monopolistic, lacking in any competitive pressure.¹⁰⁵ Others conclude that governmental regulation itself created a monopoly in the telecommunications industry.¹⁰⁶

own interest he frequently promotes that of the society more effectually than when he really intends to promote it.

ADAM SMITH, *THE WEALTH OF NATIONS* 477-78 (Edwin Cannan ed., 1976).

99. The Congress passed antitrust legislation in 1890 now known as the Sherman Act. 15 U.S.C.A. §§ 1-7 (1973 & Supp. 1992).

100. See *Lafayette v. Louisiana Power & Light Co.*, 435 U.S. 389, 398 (1978); *National Soc’y of Professional Eng’rs*, 435 U.S. at 695; *Carnation Co. v. Pacific Westbound Conference*, 383 U.S. 213, 218 (1966); *United Mine Workers of Am. v. Pennington*, 381 U.S. 657, 675 (1964). *Standard Oil Co. v. FTC*, 340 U.S. 231, 248 (1951).

101. Jack High, *Introduction: A Tale of Two Disciplines*, in *REGULATION ECONOMIC THEORY AND HISTORY* 1, 16 (Jack High ed. 1991).

102. In an analysis of regulation and technology in electric utilities professor Richard Hirsh wrote: “Restrained by more traditional regulation . . . utilities must still act in a risk-averse manner that may hinder technological advances. . . . In many cases, [electric utilities] refuse to build new technologies because of regulatory risk.” Richard F. Hirsh, *Regulation and Technology in the Electric Utility Industry: A Historical Analysis of Interdependence and Change*, in *REGULATION ECONOMIC THEORY AND HISTORY* 147, 171 (Jack High ed. 1991). Professor Hirsh continues:

In contrast, technological innovation on the deregulated side of power production has been daring. R&D efforts in cogeneration technologies, for example, have thrived as numerous small power equipment companies join the large firms to cater to a growing market. Other technologies have also been advanced rapidly in the deregulated environment.

Id. at 172.

103. “The purpose of regulation is to ensure socially desirable outcomes when competition cannot be relied upon to achieve them. Regulation replaces the invisible hand of competition with direct intervention - with a visible hand, so to speak.” KENNETH E. TRAIN, *OPTIMAL REGULATION* 2 (1991).

104. *Id.* at 5. See also Harold Demsetz, *Why Regulate Utilities?*, 11 *J.L. & Econ.* 55, 56 (1968).

105. “The very reason for the regulation of private utility rates—by state bodies and by the Commission—is the inevitability of a monopoly that requires price control to take the place of price competition.” *Otter Tail Power Co. v. United States*, 410 U.S. 366, 389 (1973) (Stewart, J. concurring in part, dissenting in part).

106. “[T]elecommunications is an ‘unnatural monopoly,’ that is, a monopoly put in place by government decree.” HIGH, *supra* note 101, at 11, 15-16.

B. *The Telephone System*

Before divestiture, the American Telephone and Telegraph Company ("AT&T") operated virtually the entire country's telephone system. AT&T "supplied . . . approximately eighty-five percent of local phone service and, through its Long Lines department, approximately ninety percent of all domestic and international long-distance service."¹⁰⁷ In 1949, the U.S. Department of Justice (DOJ) filed suit against AT&T for monopolization and conspiracy to restrain trade in the telecommunications industry.¹⁰⁸ In January of 1956, AT&T and the DOJ entered into a consent decree that, among other things, limited AT&T to the "provision of common carrier communications services."¹⁰⁹ In November 1974, the DOJ filed a separate antitrust action against AT&T.¹¹⁰ Pretrial proceedings continued with intermittent regularity for seven years until the trial began on January 15, 1981.¹¹¹ On January 8, 1982, the DOJ and AT&T filed a stipulation with the District Court of New Jersey called the Modification of Final Judgment (MFJ).¹¹² Two years after the MFJ, AT&T officially divested itself of all local operations.¹¹³

Since this analysis focuses on local broadband networks, our concern with the MFJ is its effect on the Bell Operating Companies (BOCs) and their subsidiaries that provide local information transmission and services. In relevant part, the BOC restrictions, as set forth in the MFJ, are stated as follows:

[N]o BOC shall, directly or through any affiliated enterprise:

1. provide interexchange telecommunications services or information services;
2. manufacture or provide telecommunications products or customer premises equipment . . . or
3. provide any other product or service, except exchange telecommunications and exchange access service, that is not a natural monopoly service actually regulated by tariff.¹¹⁴

107. MacAvoy & Robinson, *Winning By Losing*, *supra* note 97, at 3. Non-AT&T local exchange carriers consisted "of 1,500 or so rural telephone companies, which serve[d] about twenty-five percent of the country's geographical area but less than four percent of total households." *Id.* at 3-4.

108. *United States v. AT&T*, 552 F. Supp. 131, 135 (D.D.C. 1982).

109. *Id.* at 138.

110. *Id.* at 139.

111. *Id.* at 140.

112. *Id.* at 140-41.

113. MacAvoy & Robinson, *Losing By Judicial Policy making*, *supra* note 21, at 225. "Divestiture yielded not only a scaled down AT&T, with some 370,000 employees and approximately \$33 billion in 1984 revenues, but also [created the BOCs] each with about 100,000 employees and about \$10 billion in projected revenues" which provided, through their subsidiaries, about eighty-five percent of America's local telephone service. *Id.* at 235.

114. *United States v. AT&T*, at 227-28. The MFJ defined informative service as follows:

"Information service" means the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information which may be

Under the terms of the MFJ, Federal District Judge Harold Greene retained jurisdiction to hear triennial reviews of the restrictions he placed on the BOCs' ability to enter certain lines of business.¹¹⁵ The BOCs and DOJ petitioned Judge Greene to modify the MFJ, arguing that the restrictions imposed abnormally high transaction costs upon the highly innovative and quickly changing local telecommunications industry.¹¹⁶ As a result of these petitions, the ban on the BOCs' ability to transmit information services originated by other business entities, was lifted.¹¹⁷ However, the BOCs appealed Judge Greene's decision because they believed the restrictions left in place were unnecessary.¹¹⁸ The appellate court remanded the matter, instructing Judge Greene to reconsider the prohibition that restricted the BOCs from originating information services themselves.¹¹⁹

On July 25, 1991, Judge Greene lifted the information services ban, allowing the BOCs to provide information services.¹²⁰ However, Judge Greene found the BOCs had market power in the information services marketplace.¹²¹ Therefore, he lifted the ban under heavy protest and only in deference to the higher court.¹²² To clarify the appellate court's intentions, Judge Greene imposed a stay of his order pending the appellate court's review.¹²³ The Court of Appeals for the D.C. Circuit vacated the stay, allowing the local telephone companies to enter the information marketplace.¹²⁴ On October 30, 1991, the Supreme Court denied an application to reinstate the stay.¹²⁵

On July 16, 1992, the Federal Communications Commission (FCC) adopted a rule that allows local telephone companies to transmit video programming to their customers.¹²⁶ However, the FCC's action was constrained by the Cable Communications Policy Act of 1984 (1984 Cable Act),¹²⁷ which bars

conveyed via telecommunications, except that such service does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications service.

Id. at 229.

115. *United States v. Western Elec. Co.*, 900 F.2d 283, 289 (D.C. Cir. 1990).

116. *United States v. Western Elec. Co.*, 673 F. Supp. 525 (D.D.C. 1987).

117. *Id.* at 587-97.

118. *United States v. Western Elec. Co.*, 900 F.2d 283 (D.C. Cir. 1990).

119. *Id.* at 305.

120. *United States v. Western Elec. Co.*, 767 F. Supp. 308, 327 (D.D.C. 1991).

121. *Id.* at 317.

122. *Id.* at 327-28.

123. *Id.* at 332-33.

124. "The record does not contain sufficient evidence of probability that the order will be reversed" *United States v. Western Elec. Co.*, 1991-2 Trade Cas. (CCH) ¶ 69,610 (D.C. Cir. Oct. 7, 1991).

125. *American Newspaper Publishers Assoc. v. United States*, 112 S.Ct. 366 (1991).

126. This is also known as video dial tone. In the Matter of Telephone Company-Cable Television Cross-Ownership Rules, 7 F.C.C. Rcd. 5781 (1992). See also Edmund L. Andrews, *F.C.C. Approves TV on Phone Lines*, N.Y. TIMES, July 17, 1992, at D5; Edmund L. Andrews, *Telephone Companies to Get Right to Transmit Television*, N.Y. TIMES, July 16, 1992, at A1.

127. 47 U.S.C.A. §§ 521-559 (1991).

local telephone companies' ownership of video programming.¹²⁸ Nevertheless, the FCC's decision is of critical significance for industry participants. Under the Act's regulations, cable television's estimated annual revenues for 1992 are twenty billion dollars.¹²⁹ The profit potential is particularly important as a financial incentive to encourage local phone companies to construct local fiber optic networks to carry television signals.

Senator Albert Gore offered a suggestion for lifting the ban on telephone company ownership of television programming. He proposed an agreement to lift the cross-ownership "ban in exchange for a commitment from phone companies to complete their fiber optic networks by 2015."¹³⁰ This trade-off might be interpreted as a government choice of the local phone companies as the preferred local broadband transmission developers, insulating them from competitive pressures. This proposal would quicken the development of a local fiber optic network infrastructure but since it fails to promote other developers, the beneficial effects of competition would be lost.

On September 17, 1992, the FCC voted to expand local telephone competition by permitting small telecommunications companies to interconnect with local telephone networks so they could compete directly with the established local telephone companies.¹³¹ The FCC's Common Carrier Bureau Chief, Cheryl A. Tritt, said, "The possibilities of the commission's action today are mind boggling."¹³² This FCC action takes an important step towards local telecommunications competition, but its true potential cannot be realized unless all regulators of the local telecommunications industry are guided by a unifying philosophy. These recent FCC actions favor the development of competitive local information service and transmission industries. However, because of the large number of telecommunications policy makers in the U.S., their individual actions are creating a collage of divergent and ill-fitting laws and regulations.¹³³ Although the FCC's regulations tend to be quite current, many of the other regulators use regulatory philosophies that are carryovers from past

128. "Video dialtone contemplates telephone company involvement in the video marketplace, consistent with the statutory telephone company-cable television cross-ownership restrictions." 7 F.C.C. Rcd. 5781 (1992). See 47 U.S.C.A. §533(b) (1991). See also Andrews, *supra* note 126, *Telephone Companies to Get Right to Transmit Television*, at D17.

129. Edmund L. Andrews, *Senate Sends Bush Bill To Regulate Price Of Cable TV*, N.Y. TIMES, September 23, 1992, at A1, D2.

130. Andrews, *supra* note 126, *Telephone Companies to Get Right to Transmit Television*, at D17.

131. Expanded Interconnection with local Telephone Company Facilities, Amendment of Part 69 Allocation of General Support Facility Costs Reparation Order and Notice of Proposed Rate Making CC Docket Nos. 91-141, 92-222, adopted Sept. 17, 1992, released Oct. 19, 1992. FCC No. 29440, 7 F.C.C. Rcd. _____. See also Anthony Ramirez, *F.C.C. Acts To Spur Local Competition In Phone Services*, N.Y. TIMES, Sept. 18, 1992, at A1.

132. Ramirez, *supra* note 131, at D6.

133. For example, Congress first adopted the Cable Communications Policy Act of 1984 and then reversed policy and adopted the new Cable Television Consumer Protection and Competition Act of 1992. The FCC has adopted numerous orders, two current ones discussed in *supra* notes 128 and 131. The judiciary issued many decisions, a few current ones discussed in *supra* notes 114-16, 120, 124, 125.

technological environments that are no longer appropriate, especially when dealing with the innovative technology of local broadband networks.

C. Regulation of Cable Television¹³⁴

Congress has not maintained a consistent policy with respect to the exercise of control by local telephone companies over cable television franchises and other regulatory issues. In 1971, Congress required the FCC to oversee telephone company involvement with cable television.¹³⁵ Congress then passed the 1984 Cable Act,¹³⁶ which streamlined the regulation of cable television and removed economic impediments to network development.¹³⁷

One of the 1984 Cable Act's mandates explicitly prohibits local telephone company ownership of cable television franchises.¹³⁸ This burdensome regulation discourages the integrated development of telephony and video information services. On July 16, 1992, however, the FCC adopted an order that exempted local phone companies from this prohibition in municipalities with fewer than 10,000 residents which were not also served by a cable television system.¹³⁹ In this order, the FCC recommended that Congress eliminate the ban on cross-ownership altogether.¹⁴⁰ Cable television regulation is a complex subject, to which separate analyses have been devoted to understanding the extent and division of regulatory authority.¹⁴¹ The primary

134. In 1992, cable television systems pass ninety percent of U.S. homes and provide service to nearly sixty percent, approximately fifty-eight million subscribers. Mary Lu Carnevale, *How Cable Bill Will Influence Rates, Service*, WALL ST. J., Sept. 28, 1992, at B1, B11. See also Competition, Rate Deregulation and the Commission's Policies Relating to the Provision of Cable Television Service, 5 F.C.C. Rcd. 4962, 4966-67, 5039 (1990). Cable television sales have grown from \$2.5 billion in 1980 to nearly \$20 billion in 1992. Andrews, *supra* note 129, at A1.

135. In *General Tel. Co. of Southwest v. United States*, 449 F.2d 846 (5th Cir. 1971), the court held the FCC could issue rules restricting the BOC's involvement with cable television companies based on the "public convenience and necessity" standard of 47 U.S.C.A. § 214 (1991). *Id.* at 858.

136. 47 U.S.C.A. § 521 (1991).

137. Among its objectives in passing the Cable Act, Congress purported to "establish a national policy concerning cable communications" and to "minimize unnecessary regulation that would impose an undue economic burden on cable systems." 47 U.S.C.A. §§ 521(1), 521(6) (1991). The Act was also intended to "establish guidelines for the exercise of Federal, State, and local authority with respect to the regulation of cable systems" through procedures and standards that "encourage the growth and development of cable systems and which assure that cable systems are responsive to the needs and interests of the local community." 47 U.S.C.A. §§ 521(3), 521(2) (1991). *New York v. FCC*, 486 U.S. 57, 61 (1988).

138. 47 U.S.C.A. § 533(b)(1) (1991). Congress and the FCC were concerned that BOCs would exclude other companies from owning and operating cable television systems. Their belief was that "[s]ince the telephone companies have a natural monopoly over the means required to conduct a CATV operation, i.e., the poles or conduits, they are in a position to pre-empt the market for this important service." *General Tel. Co. of Southwest v. United States*, 449 F.2d at 856.

139. 7 F.C.C. Rcd. 5781, 5784 (1992). This order raises the residential cut-off from 2,500 to 10,000. See also Andrews, *supra* note 126, *Telephone Companies to Get Right to Transmit Television*, at D17.

140. 7 F.C.C. Rcd. 5781, 5784 (1992). See also Andrews, *supra* note 136, *F.C.C. Approves TV on Phone Lines*, at D5.

141. See, e.g., Robert F. Copple, *Cable Television and the Allocation of Regulatory Power: A Study of Governmental Demarcation and Roles*, 44 FED. COMM. L.J. 1 (1991).

consideration of this Article is which cable television regulations will affect the development of local broadband networks.

The Cable Television Consumer Protection and Competition Act of 1992 (1992 Cable Act) served to re-regulate the cable television industry.¹⁴² The important question is how this new law will effect competitive development in local information and transmission markets. The 1992 Cable Act allows cities to continue to collect five percent of gross revenues as a cable television franchise fee.¹⁴³ Additionally, the FCC must establish 'reasonable' rate tiers for basic service and consumer equipment.¹⁴⁴ While the localities will actually set the regulated price,¹⁴⁵ the price of premium and special interest channels will remain unregulated. It was reported that "[i]n the sixty five cities that allow competition, prices have fallen by twenty to twenty five percent."¹⁴⁶ However, the ability to regulate rates and obtain a five percent franchise fee gives clear incentives for localities to keep gross revenues high.¹⁴⁷ Therefore, the 1992 Cable Act may cause local authorities to discourage competitive entry into local cable television markets in an attempt to keep revenues high through high franchise fees.

Other significant provisions of the 1992 Cable Act allow "over-the-air television broadcasters to demand royalties from cable companies for carrying their programs."¹⁴⁸ The law restricts exclusive franchises by requiring localities "not to 'unreasonably deny' a second franchise and prohibits discriminatory pricing among customers."¹⁴⁹ The 'program access' provision requires "large cable companies that also produce popular programming to license their material on the same terms and conditions to [other] companies;" in short, it blocks exclusive licenses.¹⁵⁰ Another provision of the 1992 Cable Act requires cable television companies to make every customer location individually addressable.¹⁵¹ Furthermore, while the act allows a ten year period to complete this cable television network improvement, it also allows cable companies to obtain a waiver of the requirement.¹⁵² Subscriber ownership of customer premises

142. Cable Television Consumer Protection and Competition Act of 1992, Pub. L. No. 102-385 (to be codified) [hereinafter 1992 Cable Act].

143. 47 U.S.C.A. § 541 (b) (1991) remains unchanged by the 1992 Cable Act. *See also* Sen. Conrad Burns and Rep. Norman F. Lent, *Bill Could Entrench Cable-TV Monopolies*, WALL ST. J., Oct. 2, 1992, at A14. *The Great Cable TV Battle*, WALL ST. J., Oct. 2, 1992, at A14.

144. Edmund L. Andrews, *Bush Rejects Bill That Would Limit Rates On Cable TV*, N.Y. TIMES, Oct. 4, 1992, at A1, A30. Carnevale, *supra* note 134, at B11.

145. Carnevale, *supra* note 134, at B11.

146. *The Great Cable TV Battle*, *supra* note 143, at A14.

147. *Id.*

148. Andrews, *supra* note 144, at A30.

149. Burns & Lent, *supra* note 143, at A14.

150. Andrews, *supra* note 144, at A30.

151. The cable television company must develop the ability to send a specific video program to a unique customer. This ability is analogous to the telephone system's ability to ring one customer's telephone rather than every phone in a neighborhood. *See* Carnevale, *supra* note 134, at B11.

152. *Id.*

equipment, prohibition of exclusive franchises, and mandatory program licensing could encourage competition in local information and transmission marketplaces.¹⁵³ Other provisions, such as franchise fees, obstacles to exclusive licenses, and continued prohibition of telephone company participation, could discourage competition. The 1992 Cable Act is focused on the cable television industry and ignores the possibility of consumer rate protection accomplished through encouraging competition from other industries, particularly local telephone companies. The 1992 Cable Act could have removed the barriers from BOC involvement in television programming and encouraged competitive local transmission networks. Removal of these barriers would have produced lower prices and better service through competition rather than direct price regulation.¹⁵⁴

D. Pricing in Non-Competitive Markets

In both the telephone and cable television industry, one of the policy makers' primary concerns has been price regulation. If a particular marketplace fails to allocate prices satisfactorily through competitive mechanisms, direct price regulation is often instituted.¹⁵⁵ The battle over the 1992 Cable Act is evidence that when consumer costs go up and there is no competitive alternative, price regulation often results.

The goal of any price regulation is to obtain near optimal pricing. Rate-of-return regulation¹⁵⁶ historically dominated the telecommunications industry. Experience indicates that certain forms of price regulation do not work well.¹⁵⁷ Professor Train has written, rate-of-return "regulation provides

153. "Wall Street analysts believe the bill will have little effect, if any, on cable revenues or cash flows. In fact, they see many new opportunities for cable companies, including using their fiber optic equipment to carry phone calls and eventually offering wireless pocket-phone service to consumers." *Id.*

154. "[Representative Edward Markey, sponsor of the bill] said rate regulation is merely an interim measure, and that what is really needed to bring prices down is more competition in the cable industry." Edmund L. Andrews, *Cable TV Regulation Battle Heats Up Before Showdown*, N.Y. TIMES, Sept. 16, 1992, at D1.

155. For example, refer to the re-regulation of cable television prices by the 1992 Cable Act.

156. "Under rate-of-return (ROR) regulation, the firm is allowed to earn no more than a 'fair' rate of return on its capital investment. The firm is free to choose its price, output level, and inputs as long as its profits do not exceed this fair rate." TRAIN, *supra* note 103, at 20.

157. The Averch-Johnson model explains the poor results of rate-of-return regulation:

Averch and Johnson (1962) initiated one of the earliest and most influential investigations into the effects of regulation on the behavior of a regulated firm. They argue that the most prevalent form of regulation currently applied to public utilities, rate-of-return regulation, induces the firm to engage in inefficiencies. These inefficiencies are the natural result of the regulation, in that a firm that is attempting to maximize profits is given, by the form of the regulation itself, incentives to be inefficient. Furthermore, the aspects of monopoly control that regulation is intended to address, such as high prices, are not necessarily mitigated, and could be made worse, by the regulation.

TRAIN, *supra* note 103, at 19. The Averch-Johnson model has been criticized as being flawed. However, the identified errors "do not affect [Averch and Johnson's] essential conclusions." *Id.*

perverse incentives that operate against optimality.”¹⁵⁸ In certain geographical areas, competition among producers may not develop in either the information services or information transmission market. Therefore, in these geographical areas, policy makers should consider past experience with price regulation but also adopt innovative approaches.

A recent example of an innovative approach is a telecommunications bill in New Jersey that proposed the public utilities board “shall not be limited to rate base, rate of return regulation.”¹⁵⁹ An innovative feature of the New Jersey proposal was that the form of price regulation would be designed by regulators familiar with the industry rather than legislators. Another alternative method uses price-caps rather than specific rates. There are many other new proposals for methods of rate regulation.¹⁶⁰

This Article will not address the best policy for price regulation; a separate discussion is needed to consider and evaluate new proposals. This Article does propose three requirements for direct price regulation in non-competitive markets. First, the choice and structure of direct price regulation must encourage prospective entrants to produce in the marketplace. Second, the regulation must be designed to be withdrawn once competitive producers are present. Finally, the pricing structure for information transmission must be distinct from information services pricing.

III. Economic Analysis of Local Fiber Optic Networks

Local broadband networks will possess a unique economic character in the history of local telecommunications regulation. Therefore, in devising a policy to govern fiber optic networks, it is essential to understand the ways in which these networks differ in economic operation from other local telecommunication networks.

This Part outlines the underlining economics of emerging local fiber networks so a proper philosophical framework can be constructed. Competitive broadband information services should develop as a result of opportunities to provide consumers with a broad range of services using fiber optic transmission. As fiber networks become less expensive to construct and install, competition among transmission providers will evolve naturally in some geographical areas.¹⁶¹ Given the enormous economic potential of local fiber network

158. *Id.*, at 20.

159. Assembly Res. No. 5063, 205th Sess., N.J., (introduced June 27, 1991), at §3(a).

160. An informative survey of alternative regulatory structures already implemented can be found in Mary Nagelhout, *Incentive Regulation of Local Exchange Telephone Carriers*, PUB. UTIL. FORT., July 1, 1991, at 46.

161. There are many examples of competitive systems being planned and developed. See, e.g., Richard Karpinski, ‘ALTs’ Joust on ComForum Panel, TELEPHONY, Nov. 4, 1991, at 22 (discussing competition in local markets throughout the nation); Carla Lazzareschi, *Local Phone Companies Brace Themselves for New Competition*, L.A. TIMES, Aug. 9, 1992, at D1 (discussing proposed plan to allow competition in the

development, the fixed costs traditionally considered a barrier to market entry of competing firms may not impede the development of most local broadband networks.¹⁶² In non-competitive markets, the natural monopoly model should be considered. Close attention must be paid to issues of cross-subsidization in order to protect free entry and competition in the marketplace.

A. *Economics of Broadband Information Services*

Broadband transmission systems can deliver an enormous range of services from different producers. Thus, competitive information services are likely to develop. The history of technological innovation suggests that once local broadband networks are installed, many new information services will emerge. For example, there was no reason to develop electrical devices until an infrastructure provided customers with electrical power. A secondary market developed for all types of electrical appliances once consumers were connected to electric power lines. Similarly, once local fiber networks are operating, consumer demand will provide an impetus for the provision of many new and innovative information services. The large potential profits for transmission providers may help explain the development of competitive broadband transmission facilities already occurring.¹⁶³

B. *Economics of Local Broadband Transmission Networks*

Local broadband networks will succeed both the local telephone and cable television networks. Recent economic analyses place the cost of installing local fiber links to customers at parity with installing new copper wire facilities.¹⁶⁴ Other estimates suggest that construction of local fiber networks is now

California phone market); Ann H. Lindstrom, *ICC Chairman Sets the Stage for Local Exchange Competition*, TELEPHONY, Dec. 2, 1991, at 8 (discussing a proposed regulatory change in Chicago that could result in all-out competition in local exchange services); Deborah Pfeiffer, *Alternative Access: Searching for CO Treasures*, TELEPHONY, Dec. 2, 1991, at S38 (discussing companies providing competitive local telephone access); J.B. Pierpoint, *Metropolitan Fiber to Press C&P for Downtown Access*, WARFIELD'S BUS. REC., Feb. 28, 1992, §1, at 3 (discussing entry of competitor in Baltimore); *Will Bypass Companies' Fight With RBOCs Result in 1990 Divestiture*, LONG DISTANCE LETTER, April, 1990, at 6 (discussing competition in local markets throughout the nation).

162. See Thomas W. Hazlett, *Private Monopoly and the Public Interest: An Economic Analysis of the Cable TV Franchise*, 134 U. PA. L. REV. 1335, 1364-75 (1986) (arguing that cable is probably not a natural monopoly); Note, *Access to Cable, Natural Monopoly, and the First Amendment*, 86 COLUM. L. REV. 1663, 1678 n.82 (1986).

163. As long ago as 1985, when telephone lines were beginning to connect the growing number of customer computers and facsimile devices, MacAvoy and Robinson suggested that "establishing competition for local [telephone] service [was] economically justified." MacAvoy & Robinson, *Losing By Judicial Policymaking*, *supra* note 21, at 247.

164. John Harrison, *Economic Considerations of Broadband Development*, PUB. UTIL. FORT., June 21, 1990, at 51; Lattner et al., *supra* note 28, at 112; Shumate & Snelling, *supra* note 6, at 72.

economically justified.¹⁶⁵ It must be remembered, however, that although economic comparisons between fiber, telephone, and cable television transmission systems are appropriate, viewing fiber optics as simply an upgrade to the current telecommunications infrastructure would be a gross underestimate of its potential.

1. Telephony

Recent technological developments suggest that although some local telephone networks are "predominantly characterized by a single monopoly carrier,"¹⁶⁶ certain geographical areas are becoming open to competition.¹⁶⁷ Mobile communication systems will compete with local telephone companies for fixed transmission customers.¹⁶⁸ Increased accessibility to the current telephony marketplace coincided with the expansion of information services, such as computer data transfer, facsimile, voice message storage, and caller identification, available over the telephone transmission facilities. The scale and type of information services available to the consumer will affect demand for connectivity to fiber networks. Emerging competition also may be driven by the downward spiral of the fixed costs associated with expanding construction of fiber networks and the resulting increase in demand for new fiber products.¹⁶⁹

165. "Technology is rapidly reducing costs The start up cost for new technology is frequently less than the marginal cost for the old." G. Lawrence Cashion, *Local Optical Interconnection Developments in the NYNEX Region*, TELECOMMUNICATIONS POL'Y AND REG., Oct. 9, 1990, at 21. "Although it is not a universal view, analyses by vendors and others indicate that the cost of integrated delivery of telephony and cable television is less and the quality higher than for separate delivery over today's independent networks." Shumate & Snelling, *supra* note 6, at 71.

166. Andrew Barrett, *Public Policy and the Advanced Intelligent Network*, 42 FED. COMM. L. J. 413, 426 (1990).

167. "For example, there are now multiple providers of inter exchanged access and local dedicated circuits for business customers in dense urban areas purely private networks . . . have experienced rapid growth In certain limited geographic areas, however, we have witnessed the sprouting of competition." *Id.* "[A]t the time of the [AT&T-Department of Justice] settlement . . . local telephone service did not constitute a 'natural monopoly.' Competition existed at the local level between the BOCs and other service providers. This competition, on the fringe of the traditional switched-voice telephone business, has continued to grow." MacAvoy & Robinson, *Losing By Judicial Policymaking*, *supra* note 21, at 255-56. See Barrett, *supra* note 166, at 414 n.6 (specific applications to state public utility boards for permission to compete).

168. "Baby Bells fear that AT&T will steal away their local phone business. As AT&T expands wireless communication, more and more people will be making cellular local calls directly through AT&T, bypassing the regional companies." Carnevale, *supra* note 36, at B1. Mr. Robert E. Allen, AT&T's chairman, said, "McCaw will put AT&T into competition with its former regional Bell companies for the first time since the government dictated breakup of the big telephone utility in 1984." John J. Keller, *Cellular Move Underscores AT&T's Transformation*, WALL ST. J., Nov. 6, 1992, at B1.

169. The downward cost spiral is evident as demand for the elements of a fiber optic transmission facility allow producers to develop economies of scale. As research and development continue, new methods for increased cost efficiency in production and design of constituent elements will emerge and also will drive costs down. Additionally, the sharing of conduit space, permitted because the fiber is so thin, may reduce network development costs.

2. *Secondary Markets*

The secondary markets created by fiber optic transmission facilities renders local fiber optic networks more closely analogous to local telephone companies than to power or water utilities. Power lines transmit only electrical current and water mains carry only water. These two utility transmission facilities are inexorably tied to delivering one indivisible good to the secondary market. In contrast, broadband transmission facilities will deliver numerous and distinct services to the secondary market.¹⁷⁰ This potential for a secondary market in diverse information services highlights the need for separate regulatory treatment of broadband transmission, particularly if direct price regulation is required for information services.

3. *Non-Competitive Markets*

Where high potential profits and an expanding consumer base are not present, natural monopolies will be the appropriate economic model. Economically depressed areas, rural zones, and regions with few information intensive businesses may not produce the initial demand necessary for the development of competitive broadband transmission systems. Some areas may not even be considered for a primary broadband network. In these geographic areas, a natural monopoly model should be considered since competitive broadband systems or competitive information services are absent.

C. *Integration and Cross-Subsidization*

In the case of a single local broadband network, cross-subsidization would occur when profits from information transmission are used to lower the price of information services offered by the same company. In doing so, the transmitting entity could price its information services below actual cost and drive competition out of the market. Alternatively, an information service provider in a monopoly situation could use its monopoly rents to subsidize its own information transmission. In either case, the subsidized market will lack competition and incentive for new providers to enter. Further, the price distortions caused by the subsidization will result in inefficient use of both transmission and information services.

In some instances the transmission provider may be compelled also to provide information services from a separate business entity under the same corporate umbrella. This arrangement would provide economic integration

170. Although electric power can be put to many different uses, it is fundamentally an electrical current. Telephony, although fundamentally an electrical signal, carries a differentiable good: voice message, computer data, or facsimile.

where the stockholders of the transmission developer share in profits derived from information services. This arrangement might attract the capital necessary to construct new fiber facilities.¹⁷¹ Economic integration, even for a natural monopoly, would not be harmful if separate business entities with separate accounting books were required.

It is Judge Greene's opinion that the local telephone companies will use cross-subsidization to eliminate competition in the information services marketplace.¹⁷² Competitive pressure in the information transmission marketplace would eliminate the problem. Nevertheless, Judge Greene makes a strong argument for pressuring the local telephone companies with a regulatory philosophy that encourages competitors to enter every level of the local telecommunications marketplace. These concerns highlight the potential problems with a government policy that establishes the local telephone companies as the preferred developer of local broadband networks.

1. *In a Competitive Marketplace*

In a competitive marketplace, where transmission pricing is at marginal cost, there are no monopoly profits from which a firm can cross-subsidize. The free market supplies pressure against cross-subsidization without any government interference.¹⁷³ Therefore, if both the transmission and information service

171. There are numerous information services with established consumer demand which could provide sufficient economic incentives to attract investor capital.

According to federal government surveys, the average household spends 102 percent more for cable service than phone service. As reported by the *Wall Street Journal*, the pay-per-view industry (a perfect broadband application) is expected to gross over \$310 million in revenues in 1989, with only 20 percent of the nation's cable homes equipped to order pay-per-view. The *Journal* article noted that a single pay-per-view event can be enormously profitable. In June of 1989, over 600,000 homeowners each paid \$39.95 to watch the Leonard versus Hearn fight. Total revenues generated from this one event exceeded \$25.5 million. Hence the market for entertainment services delivered via broadband could be enormous and may eventually outperform the business market. One study, as reported in *Telephony*, estimates the annual revenue potential for residential broadband to be between \$35 and \$80 billion with only 50 percent of the U.S. households wired for broadband.

Harrison, *supra* note 164, at 51.

172. Judge Greene stated on July 25, 1991:

In the opinion of this Court, informed by over twelve years of experience with evidence in the telecommunications field, the most probable consequences of such entry by the Regional Companies into the sensitive information services market will be the elimination of competition from that market and the concentration of the sources of information of the American people in just a few dominant, collaborative conglomerates, with the captive local telephone monopolies as their base. Such a development would be inimical to the objective of a competitive market, the purposes of the antitrust laws, and the economic well-being of the American people.

United States v. Western Elec. Co., Inc., 767 F. Supp. 308, 326 (D.D.C. 1991).

173. As two commentators explain:

Once marginal cost pricing is established, even limited constraints on the development of local distribution options should be unnecessary. If competitive distribution options can provide certain services at a lower cost than that associated with conventional telephone plant, such systems should be developed The most promising way to alter the views of BOC

markets are freely competitive, the developer of a broadband network also should be able to enter the information service industry.

2. In A Non-Competitive Marketplace

The Senate proposed a workable solution to allow economic integration but prohibit anti-competitive cross-subsidization.¹⁷⁴ The regulation does not directly interfere with free market price mechanisms, rather it creates a structural separation.¹⁷⁵ The purpose of allowing separate corporate entities to exist under a single corporate umbrella is to provide the return on investment capital that is required for construction.¹⁷⁶ Structural separation also inhibits corporate entities from engaging in a predatory pricing strategy. This regulatory structure will allow the most efficient producers to enter the transmission or service market regardless of their participation in the other.

The structural separation has two main components. First, the policy requires a corporate entity to operate fully separate subsidiaries. These subsidiaries are prohibited from cross-subsidization of any form.¹⁷⁷ Second, the penalty for cross-subsidization would dissolve the ties between the offending corporate entities. If cross-subsidization is charged, a swift administrative proceeding and then an adjudicative session should occur.¹⁷⁸ If the corporate entity is found guilty of cross-subsidization, immediate and irrevocable divestiture should be ordered.¹⁷⁹ Once robustly competitive marketplaces are

management and state regulators is to reduce the line-of-business restrictions on diversification by the BOCs contemporaneously with the expansion of local service competition. If the BOCs can generate revenues from new business ventures they will have less need for protection from competition in local markets.

MacAvoy & Robinson, *Losing By Judicial Policymaking*, *supra* note 21, at 257.

174. See S. 1200, 102d Cong., 1st Sess. §652 (1991).

175. See S. 1200, 102d Cong., 1st Sess. §651 (1991).

176. Congressman Boucher stated: "Our bill provides telephone companies with the economic incentive to modernize the telecommunication infrastructure by allowing them to compete in the cable television market through a phased lifting of the restrictions which prevent telephone companies from offering cable TV services in their telephone service areas." *The Communications Competitiveness and Infrastructure Modernization Act of 1991: Hearings on H.R. 2546 Before the Subcomm. on Telecommunications and Finance*, 102d Cong., 1st Sess. 1 (1991) (statement of Rep. Boucher) [hereinafter Boucher statement].

177. The prohibition on cross-subsidization should focus on two forms of anti-competitive advantage: capital that would allow predatory pricing practices and technical information that would provide super-competitive advantages and be a mechanism for subverting the prohibition of capital transfer. Thus, the transmission entity could not pass non-public technical network operation information to the service provision entity. The structural separation and prohibition on cross-subsidization would prevent captive rate payers from subsidizing new ventures which fail in the marketplace. Cf. Edwin B. Spievack, *The Truth About Telephone Company Diversification*, PUB. UTIL. FORT., May 15, 1986, at 13 (discussing possibility of regional BOCs from cross-subsidizing non-telecommunications business).

178. The licensing could include a clause whereby the corporate entity's right to run fully separate subsidiaries is contingent upon binding itself to the jurisdiction of some administrative agency. The enabling legislation could provide for streamlined agency determination.

179. The accused would have recourse to the judicial system's appellate process. However, this is a limited review process. Congressman Boucher suggested that it is essential to prohibit cross-subsidizing by providing a "death penalty, for willful violations of that prohibition, under the terms of which an offending

established, the prohibition on cross-subsidization could be lifted.¹⁸⁰ Lifting the ban would allow integration and economies of scale and of scope to enhance efficiency and innovation. Allowing integration in a fully competitive marketplace would create optimal pricing as well as a quickened pace of technical advancement, maximizing social welfare.

D. *New Insights*

Traditionally, policy makers regarded the local telephone industry and, lately, the cable television industry, as natural monopolies subject to public utility regulation. However, the natural monopoly model never may have accurately reflected reality.¹⁸¹ This model should not predominate in the formation of a new regulatory philosophy whose purpose is to create local broadband networks that will be interconnected to form a nationwide information super-highway. The new regulatory policy based on the novel philosophy proposed by this Article must incorporate the following five aspects. First, policy makers must characterize information transmission separately from the information services that will be provided through the local fiber networks. Second, policy makers need to distance themselves from the influence of presently regulated concerns. Third, competition in both transmission and information industries must be encouraged. Fourth, the new regulatory policy should adequately protect free entry into the marketplaces. Finally, vigilant antitrust examinations must be instituted to preserve competition in both marketplaces.

E. *Summary*

The new regulatory philosophy must combine an understanding of both the economics of fiber optics and the limitations of historical telecommunication regulations. First, local fiber networks will transmit a vast number of information services to the secondary market. Second, diverse customer demand has

telephone company would be required to divest its [offending] subsidiary." Boucher statement, *supra* note 176.

180. This suggestion assumes that present antitrust laws would be vigorously enforced.

181. Local telephone network competition has existed for nearly a century:

Competition was common and especially persistent in the telephone industry. According to a special report of the Census in 1902, out of 1051 incorporated cities in the United States with a population of more than 4,000 persons, 1002 were provided with telephone facilities. The independent companies had a monopoly in 137 of the cities, the Bell interests had exclusive control over communication by telephone in 414 cities, while the remaining 451, almost half, were receiving duplicated service. Baltimore, Chicago, Cleveland, Columbus, Detroit, Kansas City, Minneapolis, Philadelphia, Pittsburgh, and St. Louis, among the larger cities, had at least two telephone services in 1905.

Demsetz, *supra* note 104, at 59 (citing BURTON N. BEHLING, COMPETITION AND MONOPOLY IN PUBLIC UTILITY INDUSTRIES 19-20 (1938)).

the potential to create new markets and sizable profits. Third, the economics of emerging telecommunications technology is making competitive local transmission networks a reality. Fourth, if actual competitive construction does not take place, the threat of competition coupled with the downward spiral of costs and the rapid advancement in new transmission techniques will force sole transmission providers to function as competitive developers. Most importantly, the regulatory policy, adopted to encourage development of local broadband networks, must promote competitive information service providers as well as competitive transmission providers. This can be accomplished by opening both new information marketplaces to all potential entrants and preserving a competitive environment in each.

IV. The Question of Regulatory Authority

Changes in telecommunications policy to encourage the development of local fiber optics networks will not be effective unless carried out in a coherent manner. The regulatory body responsible must have the authority to carry out its responsibility and to maintain the coherence and objectives of the policy. Thus, this Part will examine the qualifications of the bodies currently active in telecommunications regulation to implement a new telecommunications policy which would allow rapid development of local broadband networks.

Current telecommunications regulatory authority is shared by the FCC, Congress, the U.S. Department of Commerce, the National Telecommunications and Information Administration, state and local regulatory bodies,¹⁸² and the judicial system.¹⁸³ This uneasy alliance consists of potentially competitive government entities, each seeking to define its sphere of control and procure regulatory structures favorable to its particular policy goals. The resulting tension produces contradictory policies that may deter construction of local broadband networks, especially competitive ones.

Although competition between regulatory authorities may be subtle, it can have a detrimental effect on the development of competitive information services and local transmission networks. For example, the 1992 Cable Act that re-regulates cable television prices may cause the FCC to shift its resources from active encouragement of competition in the local telecommunications industry to the task of defining reasonable cable television rates. What emerges

182. Most states have created regulatory bodies to oversee public utilities, including local exchange telephone companies and cable television systems. The 1992 Cable Act involves local regulatory bodies in price regulation.

183. Substantial amounts of litigation concerning telephone communications and cable television regulation has occurred in the federal courts. Rate payer concerns may be addressed initially by administrative law sessions held by public utility boards. The conflicts arising between state interests in regulatory control and FCC rule making naturally result in litigation under the jurisdiction of the federal courts. *See, e.g., United States v. AT&T*, 552 F. Supp. 131 (D.D.C. 1982).

from this review is the distinct absence of a unified policy that could guide the creation of competitive local broadband networks. Furthermore, the uncertainty created by the lack of a clear national policy objective, shared by all, or at least by most, regulatory authorities, to develop such networks will delay, if not deter, private business's decision to enter either the information transmission or information services marketplaces.

This Part will explain why two of the bodies heavily involved in telecommunications regulation, the FCC and the federal courts, lack the authority and coherence necessary to establish an effective local broadband policy. This Part will show that Congress must take the initiative to form a new and unified telecommunications policy, and that Congress can do so despite the formidable political obstacles.

A. *The FCC*

Congress created the FCC and granted it certain regulatory authority.¹⁸⁴ Courts have interpreted Congress's grant of regulatory authority to the FCC to be "sufficiently elastic . . . such that it could readily accommodate dynamic new developments in the field of communications."¹⁸⁵ The FCC's powers were even interpreted to preempt state regulations in certain circumstances.¹⁸⁶ However, the demarcation between FCC and state agency jurisdiction is not always clear. Therefore, courts have attempted to clarify this division in numerous court decisions, establishing a mosaic of directions and directors. The FCC has issued rules and regulations concerning Open Network Architecture (ONA)¹⁸⁷ and advanced network capabilities known as the First, Second and

184. In relevant part, 47 U.S.C.A. § 152(a) (1991) states: "The provisions of this chapter shall apply to all interstate and foreign communication by wire or radio." The FCC is empowered to enact any rules "as may be necessary in the execution of its functions." 47 U.S.C.A. § 154(i) (1991). *See also*, *General Tel. Co. of Cal. v. FCC*, 413 F.2d 390, (D.C. Cir.), *cert. denied*, 396 U.S. 888 (1969); Steven M. Spaeth, *The Balance of Interests in Administrative Law and Telecommunications Regulation: Have We Broken the Scales?*, 43 FED. COMM. L. J. 23 (1990).

185. *General Tel. Co. of Southwest v. United States*, 449 F.2d 846, 853 (5th Cir.1971).

186. *See* *National Ass'n of Regulatory Util. Comm'rs v. FCC*, 746 F.2d 1492, (D.C. Cir. 1984); *Comtronics, Inc. v. Puerto Rico Tel. Co.*, 409 F. Supp. 800 (D.P.R. 1975), (allowing FCC preemption of state rule making) *aff'd* 553 F.2d 701. *But see*, *Kellerman v. MCI Telecommunications Corp.*, 479 N.E.2d 1057 (1985), *aff'd* 493 N.E.2d 1045, *cert. denied*, 479 U.S. 949 (1986); *Sherdon v. Dann*, 229 N.W.2d 531 (1975) (FCC preemption was not recognized).

187. ONA requires local telephone companies to advise all those who wish to provide information services over their networks of their technical specifications. Thereby, new information services, like facsimile transmissions, can be designed knowing the technological requirements of the current network. *See* Warren G. Lavey, *Universal Telecommunications Infrastructure for Information Services*, 42 FED. COMM. L.J. 151 (1990).

Third Computer Inquiries.¹⁸⁸ Each of the FCC's policy statements has been litigated and revised by court order.¹⁸⁹

The revisions and alterations of some of the FCC's orders highlight the deficiency in its current jurisdictional authority to promulgate a coherent and organized national policy that could reach all the issues critically important to local broadband network development. This is especially true where those rules relate to services that have both an interstate and intrastate component.¹⁹⁰ Since the FCC derives its jurisdiction, authority, and direction from Congress, it cannot vest itself with all the authority it needs to set a unified regulatory policy framework for encouraging competitive local broadband network development. Only Congress has the ability to give the FCC the jurisdictional authority it needs to develop a coherent and organized policy framework that it can enforce even at local and state levels.

B. *The Judiciary*

The primary example of judicial involvement in telecommunications regulation is the divestiture of AT&T. Perhaps due to Judge Greene's skillful management of the seemingly unmanageable divestiture case,¹⁹¹ the ruling he entered was affirmed by the Supreme Court, albeit over the dissent of Chief Justice Burger and Justices Rehnquist and White.¹⁹² However, his subsequent

188. Phase I Order, 104 F.C.C.2d 958 (1986); Phase II Order, 2 F.C.C. Rcd. 3072 (1987); Third Computer Inquiry, 3 F.C.C. Rcd. 1150 (1988).

189. The procedural history of the Computer Inquiries includes orders, modifications, reconsiderations, and petitions for review. *See Lavey, supra* note 187, at 161 n.30; *California v. FCC*, 905 F.2d 1217, 1223 (9th Cir. 1990).

190. The FCC was denied "the power to pre-empt state regulation of depreciation for intrastate ratemaking purposes." *Louisiana Pub. Serv. Comm'n v. FCC*, 476 U.S. 355, 373 (1986). In *AT&T v. FCC*, 836 F.2d 1386, 1389 (D.C. Cir. 1988), the court found that the FCC's rule requiring refund of earnings in excess of expected rate of return was "arbitrary and capricious agency action under the Administrative Procedure Act." The court in *California v. FCC*, 905 F.2d 1217, 1246 (9th Cir. 1990), held: "(1) that the FCC's substitution of nonstructural safeguards for the federal structural separation requirements to which the BOCs were subject was unlawfully arbitrary and capricious; and (2) that the FCC has failed to carry its burden of showing that its pre-emption orders are necessary to avoid frustrating its regulatory goals."

191. Judge Greene's investigation and hearings were conducted over seven years prior to the 1982 final judgment. During those seven years AT&T spent some \$375 million and assigned 3,000 people to the case. It leased a building, filling three floors with millions of documents.

Every evening the lawyers for both sides would decide which documents should be presented to the Judge the next day, following an established agenda. The documents were organized and photocopied that night, then loaded onto carts to be wheeled to the court room. No fewer than 300 employees were needed for this daily task.

Judge Greene wanted all the essential documents to pass through his hands. He wanted to see and hear everything. He wanted to go to the heart of the matter.

JEAN-CLAUDE DERIAN, *AMERICAS' STRUGGLE FOR LEADERSHIP IN TECHNOLOGY* 215-16 (Severin Schaeffer trans. 1990). *See also* Trudy E. Bell, *The Decision to Divest: Incredible or Inevitable?*, IEEE SPECTRUM, Nov. 1985, at 50.

192. *Maryland v. United States*, 460 U.S. 1001 (1983) (mem.), *aff'g*, *United States v. AT&T*, 552 F. Supp. 131 (D.D.C. 1982). The dissent, written by Judge Rehnquist said in part:

several States contend that the decree improperly preempts state regulation of the telephone industry. They contend their regulation of the industry is "state action" which is exempt from

142¹⁹³ rulings, memoranda and orders effectively transformed his judicial chambers into a telecommunication policy office.¹⁹⁴

The Administrative Procedure Act requires the judiciary to play a role in the regulatory process.¹⁹⁵ For example, the FCC lifted certain structural separation requirements imposed on local telephone companies because it recognized an evolution in the underlying economics of the enhanced telephone service market.¹⁹⁶ Following the FCC action, the court of appeals invoked its duty to review the reasonableness of this decision under the Administrative Procedure Act.¹⁹⁷ However, the judicial role is better performed when it interprets laws than when it seeks to design policy through its rulings.¹⁹⁸

the Sherman Act under *Parker v. Brown*. Thus they do not appear to challenge the conclusion that this consent decree is in the public interest; they claim that the District Court lacked the authority to override state law by entering this consent decree. . . . I am troubled by the notion that a district court, by entering what is in essence a private agreement between parties to a lawsuit, invokes the Supremacy Clause powers of the Federal Government to pre-empt state regulatory laws. The District Court may well be correct, but I am not prepared to create a precedent in this Court by summarily affirming its decision. This is particularly true when it is not at all clear whether the summary affirmance disposes of the merits of the States' contentions.

Id. at 1002 (citations omitted).

193. A Lexis search conducted by the author on November 1, 1991 shows the number of post divestiture (1982) matters handled and reported by Judge Greene to be at least 142.

194. In *United States v. AT&T*, 552 F. Supp. at 231, Judge Greene stated:

Jurisdiction is retained by this Court for the purpose of enabling any of the parties to this Modification of Final Judgment, or, after the reorganization specified in section I, a BOC to apply to this Court at any time for such further orders or directions as may be necessary or appropriate for the construction or carrying out of this Modification of Final Judgment, for the modification of any of the provisions hereof, for the enforcement of compliance herewith, and for the punishment of any violation hereof.

Id.

195. *See, e.g., California v. FCC*, 905 F.2d 1217, 1230 (9th Cir. 1990) ("Section 10(e) of the Administrative Procedure Act requires us to set aside agency action if it is 'arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.' 5 U.S.C. § 706(2)(A).").

196. The Ninth Circuit accepted the following logic:

The FCC explains its lifting of the structural separation requirements by arguing that certain developments in telecommunications markets and technologies have materially changed circumstances in the industry. Specifically, the FCC asserts that technological advances, political and regulatory pressure by the states, divestiture, and a generally competitive enhanced services market have reduced the risks of both cross-subsidization and discriminatory access.

Id.

197. "Section 10(e) of the APA requires us to determine whether the Commission's decision was a reasonable exercise of its discretion, based on consideration of relevant factors, and supported by the record."

Id.

198. "The courts do not always constitute the optimal forum for addressing, much less soundly resolving, complex regulatory issues. In the case of the AT&T settlement, turning matters over to the court has created as many problems as it was supposed to resolve." MacAvoy & Robinson, *Losing By Judicial Policymaking*, *supra* note 21, at 261.

C. Congress

The Supreme Court, in *Louisiana Public Service Comm'n v. FCC*, stated that given the "realities of technology and economics[,] . . . intrastate service . . . is thus conceivably within the jurisdiction of both state and federal authorities."¹⁹⁹ A recurring question, especially with respect to new rules or new technology, like cable television,²⁰⁰ is whether Congress delegated responsibility for regulation to the FCC or left it with the states.²⁰¹ Congress's indecision is a serious impediment to local broadband network construction. Specifically, the current regulatory system does not empower the FCC to regulate critical aspects of local fiber optic network policy.²⁰²

Our society relies on private entities to provide a telecommunications infrastructure. Therefore, congressional indecision and position reversal stymie corporate officers' decisions to commit substantial capital resources to construct local broadband networks. Until there is a clear government policy and regulatory philosophy upon which corporate action can be based, development of competitive information transmission and information service markets will be slight.

Congress must act now to form a new regulatory philosophy and set goals within a workable policy structure. The Supreme Court, in *New York v. FCC*, stated that the authority to preempt state laws resides in Congress when it acts

199. 476 U.S. 359, 360 (1986). The affection doctrine has been interpreted to extend to intrastate utility services:

As one commentator has put it: "By 1942, when *Parker v. Brown* was decided, the interpretation and scope of the commerce clause had changed substantially. With the development of the "affection doctrine" purely intrastate events—like state-mandated anti-competitive arrangements with respect to in-state agricultural production or in-state provision of utility services—'could be regulated under the commerce clause if these events had the requisite impact on interstate commerce.'"

Cantor v. Detroit Edison Co., 428 U.S. 579, 636-37 (1976) (Stewart, J. dissenting) (citing Slater, *Antitrust and Government Action: A Formula for Narrowing Parker v. Brown*, 69 NW. U.L. REV. 71, 85 (1974))

200. Long before the Cable Act of 1984 the question came up whether the FCC had statutory authority over the newly emerging cable television industry. The court of appeals upheld the FCC's authority, holding:

The jurisdictional questions raised here are not altogether new; the explosive growth of [cable television] has understandably caused the Commission a great deal of concern, and it has undertaken, little by little, to assert its control over the industry. In the past, where similar, if not identical, objections to the Commission's authority over [cable television] systems have been advanced, the courts have held for the Commission.

General Tel. Co. of Southwest v. United States, 449 F.2d at 853.

201. See *Louisiana Pub. Serv. Comm'n*, 476 U.S. at 359. See also, *California v. FCC*, 905 F.2d at 1240 (invoking the language of 47 U.S.C.A. § 152(2)(b)(1) (1991) and holding that "the broad language of § 2(b)(1) makes clear that the sphere of state authority which the statute 'fences off from FCC reach or regulation.'") (citing *Louisiana Pub. Serv. Comm'n*, 476 U.S. at 370).

202. For example, *Louisiana Pub. Serv. Comm'n*, 476 U.S. 355, held that the FCC could not issue rules regarding depreciation of past capital expenditures of the local exchange telephone companies. The construction and finance section below will detail many important considerations which the FCC may not have authority to regulate. Flexibility in accounting methods such as depreciation may be critical factors in developing the economic climate necessary to attract the capital required for construction of local fiber networks.

within its constitutional powers and speaks with a clear and unambiguous voice.²⁰³ Therefore, Congress could establish a unified philosophy encouraging the development of competitive local broadband networks with competitive information marketplaces. This policy could eliminate the indecision between state and federal regulatory authority and could empower the FCC to orchestrate a coherent development policy.

D. *Political Constituencies*

The congressional role in regulation cannot be examined without considering the political pressure exerted by both constituent consumers and producers involved in the information industry.²⁰⁴ Principally these interests are telephone companies, newspapers, television program producers, Hollywood producers, cable television providers, and consumers. Political considerations have already prompted special interest bills. One bill proposes to overturn Judge Greene's decision to permit local telephone companies to originate information services.²⁰⁵ Another proposal permits the BOCs to conduct research on, design, and manufacture telecommunications equipment formerly prohibited by the MFJ.²⁰⁶ Representative Brooks sponsored a bill to supersede the terms of the MFJ.²⁰⁷ The 1992 Cable Act is the most recent example of political pressure influencing congressional regulatory action.

The original motivation for cable price re-regulation was the increase in rates consumers were forced to pay. This consumer protection action soon turned into a political struggle between economically opposed entities. The battle lines were drawn over reconstructing the relationship between television program production and program distribution and transmission. Rate regulation became a subordinate substantive consideration, but a prominent political rallying issue, once the powerful lobbyists were engaged. The most important observation from this conflict is that the telecommunications industry is extremely powerful and its members often have diametrically opposed positions.

Implementation of the new philosophy proposed by this Article could produce even greater conflicts.²⁰⁸ Historically, the change from a regulated industry to a competitive one has met substantial resistance. Typically, the regulated industry participants do not want to be subject to a competitive

203. *New York v. FCC*, 486 U.S. 57, 63-64 (1988). *See also*, *Golden State Transit Corp. v. Los Angeles*, 493 U.S. 103, 107 (1989).

204. "The post-divestiture experience reveals major political resistance to such deregulation." MacAvoy & Robinson, *Losing By Judicial Policymaking*, *supra* note 21, at 257.

205. H.R. 3515, 102d Cong., 1st Sess. (1991).

206. H.R. 1527, 102d Cong., 1st Sess. (1991).

207. H.R. 5096, 102d Cong., 2d Sess. (1992).

208. The framework proposed here would involve all the participants from the 1992 Cable Act battle, plus the telephone companies and the print media concerns.

market.²⁰⁹ However, the outlook for local broadband networks need not be so glum. Unlike established industries that are forced to change the way they do business, local competitive broadband networks will open up new possibilities for both consumers and producers.

There are two steps which could accomplish this delicate political maneuver. First, the executive and legislative branches firmly must resolve that it is in the nation's interest to foster local competition in broadband transmission and information service markets. To shore up this resolve, the public must be shown how it will benefit. Second, the industry participants must be given potentially lucrative incentives to agree to an amicable dissolution of the highly regulated local telecommunications industry. The information transmission and service providers must see how they will benefit from increased profit potentials in the new regulatory environment of local broadband networks. Their profit potential will be established through new product development and decreased production costs. It must be emphasized to consumers that the new profit potential will come from innovations in the telecommunications marketplaces rather than from higher rates for existing services. Regulations to provide appropriate consumer protection, based on true economic characteristics of individual marketplaces must not be sacrificed to lure industry participants into accepting this new philosophy. These political changes are possible, although their implementation will require strong conviction and a vision of what the future could be with competitive local broadband networks.

V. Rethinking Regulatory Structure

Fiber optic technology has evolved to cost parity with local copper facilities; its deployment now depends on government action.²¹⁰

The evolving telecommunications infrastructure can accelerate economic development and improve the quality of life for all Americans through the delivery of health, education, entertainment, and other needed services. Government can best help to make that happen, not by mandating its own blueprint for progress, but by serving as an intelligent referee in a highly competitive contest among industry participants. Competition in an open marketplace is the best guarantor of quality, diversity, and affordability.²¹¹

209. AT&T is one example within the telecommunications industry.

210. "With fiber network costs only at parity with copper, any rapid fiber deployment must presume that policy changes at the federal level are imminent, thus allowing the rate payer to reap the benefits of fiber in terms of new services, besides immediate efficiencies from network modernization." Selander, *supra* note 8, at 24.

211. NTIA INFRASTRUCTURE REPORT, *supra* note 9, at 5.

Congress must demonstrate its ability to unify divergent interests and build a consensus to encourage competition and construct local broadband networks.²¹²

The new regulatory philosophy should require separate treatment for information services and information transmission. It is critical that this new philosophy embrace the idea that local telecommunication marketplaces should be competitive. If this philosophy is adopted, the congressional framework should establish guidelines promoting critical policy objectives but also should permit localities to develop individual regulations tailored to the unique needs of each community.²¹³ Alternately, if Congress adopts a policy encouraging monopolistic transmission networks and information service providers, it will effectively foreclose local competitive development. This Part suggests seven policy objectives critical to the development of a new philosophy for local broadband regulation.

A. *Federal Role*

A federal regulatory body will insure coherent development of local broadband systems across the country. Among the most important roles a regulatory body can perform is to adopt standards ensuring that independently developed local transmission facilities will be compatible with each other. A federal command and control structure, which might even implement direct price regulation, would negate almost every benefit that competitive local broadband networks could offer. The policy objectives proposed below would establish a framework through which individual state and local regulatory bodies could create less restrictive individualized regulations.

The FCC is a natural focal point for overseeing implementation and operation of local fiber optic networks. No justification supports the creation of a separate bureaucratic agency to supervise these new facilities. However, in recognition of the fundamental alteration in regulatory philosophy, the necessary deviation from past economic characterizations, and the recognition of new powers required for effective implementation, Congress should pass a

212. MacAvoy & Robinson, *Losing By Judicial Policymaking*, *supra* note 21, at 247.

213. The benefits of innovation under a decentralized system were nicely captured by one of the leading figures in classical economics:

We flatter ourselves undeservedly if we represent human civilization as entirely the product of conscious reason or as the product of human design, or when we assume that it is necessarily in our power deliberately to recreate or to maintain what we have built without knowing what we were doing. . . . Many of the greatest things man has achieved are the result not of consciously directed thought, and still less the product of a deliberately coordinated effort of many individuals, but of a process in which the individual plays a part which he can never fully understand. They are greater than any individual precisely because they result from the combination of knowledge more extensive than a single mind can master.

FRIEDRICH A. HAYEK, *THE COUNTER REVOLUTION OF SCIENCE* 149-50 (Liberty Press 1979) (1952).

separate enabling statute for a local broadband regulatory office. Additionally, since this policy relies on competition, success will depend on federal enforcement of antitrust laws.

B. *National Information Offices*

The congressional enabling statute ought to establish a new BroadBand Office (BBO) within the FCC.²¹⁴ The BBO should be divided into two subordinate structures. The first, the National Information Transport Office (NITO), would oversee the construction and the operation of local broadband transmission networks. Its counterpart, the National Information Services Office (NISO), would oversee the establishment of competitive information services transmitted through local broadband networks. Congress should clearly outline their powers and duties, granting the NITO and NISO enough authority to ensure that a coherent and unified national policy of development could be implemented. National policy objectives must be set swiftly, before individual states and localities take divergent paths, making a national policy impossible to design.²¹⁵

These offices would create an economic and regulatory environment in each state and locality that would encourage competitive industry participants, rather than directly regulate new industry participants. Secondly, these two national offices would coordinate the implementation of critical policy objectives as defined by Congress. Since state and local authorities would customize their individual applications of these objectives, the national offices could ensure basic compatibility among local variations.

C. *State Information Offices*

Each state should create two offices or agencies analogous to the federal ones suggested above, referred to here as a State Information Transport Office (SITO) and a State Information Services Office (SISO). If appropriate, economically sound, and politically feasible, these offices could be regional, encompassing more than one state. Alternatively, a state with diverse development patterns could create multiple offices within its borders. These offices should be streamlined and funded by small, fixed licensing fees imposed

214. Monetary restrictions are an appropriate political concern with the creation of a new federal office. With the immense profit potential of new transmission and information services, a small licensing fee could provide an adequate source of funding for this regulatory body and the associated local supervisory offices.

215. Many states are poised to begin regulatory programs that will supersede the construction of local fiber optic networks. For one example, see the bills introduced in New Jersey's legislature. S. Res. 3617, 205th Sess., N.J., (introduced July 15, 1991) and Assembly Res. 5063, 205th Sess., N.J., (introduced June 27, 1991).

on local broadband network and information service providers.²¹⁶ The SITO and SISO would locally implement NITO and NISO guidelines, with appropriate and flexible responses for each community's needs.

The formation of state and local offices will ensure a decentralized policy implementation and allow for innovative approaches. Primarily, a SITO should create an economic and structural environment that encourages competitive broadband transmission network development. Secondly, it should oversee operations to ensure policy objectives are carried out. A SISO should primarily nurture a regional or local structural environment that would develop competitive information service providers, and secondly, supervise the industry participants and ensure adherence to critical policy objectives. Both local offices should formulate fall back provisions in case the economic characteristics of a locality only support a monopolistic industry provider. This alternative policy, however, must be structured to encourage competitive industry development once such characteristics change.

D. Proposed Legislation

Congress already has begun considering the development of local broadband networks by introducing the Communications Competitiveness and Infrastructure Modernization Act of 1991 (CCIMA).²¹⁷ However, current drafts of CCIMA do not satisfactorily address the concerns discussed in this Article. Its enabling language merely creates an addendum to the regulatory power of the FCC.²¹⁸ Particularly disturbing for setting a national policy framework is CCIMA's restriction of federal power: "Nothing in this section shall be construed to change the balance between the Federal and State regulatory

216. The fees should not be based on a percentage of gross revenue. A percentage fee would provide states and localities with incentives to keep companies' gross revenues high. One method to keep a high gross and therefore a high percentage would be to reduce price competition. The simplest way to reduce price competition is to forbid or eliminate competitive industry participants.

217. S. 1200, 102d Cong., 1st Sess. (1991); H.R. 2546, 102d Cong., 1st Sess. (1991).

218. In pertinent part (from the Senate draft) the proposed bill states:

THE NEW NATIONAL GOAL

Sec. 102. Section 1 of the Communications Act of 1934 (47 U.S.C. 151) is amended by inserting immediately after "at reasonable charges," the following: "for the purpose of establishing a nationwide, advanced, interactive, interoperable, broadband communications system available to all people, businesses, services, organizations, and households on or before the year 2015"

Sec. 104. Title I of the Communications Act of 1934 (47 U.S.C. 151 et seq.), as amended by section 103 of this Act, is further amended by adding at the end the following new section:

COMMUNICATIONS INFRASTRUCTURE PLANNING

Sec. 10. (a) Notwithstanding any other provision of law, and in order to improve and foster the continued development of a nationwide communications infrastructure and to assure the broad availability of information services, the Commission shall prescribe rules and regulations establishing procedures for local exchange carriers. . . .

S. 1200, 102d Cong., 1st Sess. (1991).

authorities with respect to multiple uses of communications technologies, as in effect on the date of enactment of this section.”²¹⁹

The CCIMA explicitly denies the FCC the authority needed to develop, guide, and implement a coherent policy for development of competitive local broadband networks. For example, the FCC has limited authority to create capital incentives for current telephone companies to invest in the construction of local fiber optic networks.²²⁰ From the structure of the CCIMA, it is clear that Congress implicitly or explicitly adopted the philosophy that only monopolists will operate in each transmission marketplace. Perhaps in response to Nippon Telephone & Telegraph’s²²¹ stated goal to complete an all-fiber network in Japan by the year 2015, U.S. legislators may have decided that quick construction of local broadband networks by local telephone companies would be more important than encouraging competition in the marketplace. Furthermore, the CCIMA assumes the local broadband networks will merely upgrade existing telephone or cable television networks.²²² If the structure set forth in the CCIMA is accepted, the true potential of local broadband networks will be lost, and the prospect for competitive marketplaces will be greatly diminished.

E. *Critical Policy Objectives*

The following objectives are essential to a unified and coherent policy ensuring optimal development of local broadband networks. Since separate corporate entities will construct our telecommunications infrastructure, we must coordinate the development of new local broadband networks so that all independently developed systems are compatible. Each political entity should incorporate the objectives in a fashion tailored to the individual needs of its constituent concern, while operating within the framework established by its supervisory organization.

219. *Id.*

220. The FCC would be unable to adjust accounting methods so as to encourage sufficient capital investment. Therefore, rapid construction would severely retard construction of local fiber optic networks in some locations. The FCC has argued that

the revolution in telecommunications occasioned by the federal policy of increasing competition in the industry will be thwarted by state regulators who have yet to recognize or accept this national policy and who thus refuse to permit telephone companies to employ accurate accounting methods designed to reflect, in part, the effects of competition.

Louisiana Pub. Serv. Comm’n, 476 U.S. at 358-59.

221. NTT is the national telecommunications company of Japan and primarily owned by the Japanese government.

222. The CCIMA in pertinent part states “the Commission shall prescribe rules and regulations establishing procedures for local exchange carriers.” S. 1200, 102d Cong., 1st Sess. (1991). It makes no mention of encouraging competition.

1. *Technical Standards*

Before AT&T's divestiture, technical uniformity was easily achieved. Telephony was transmitted by one system, under the control of one corporate entity. Now, diverse participants provide a range of competitive perspectives.²²³ Some experts believe that this process is inefficient and may hinder the implementation of new technologies.²²⁴ Therefore, the national offices should assume the position of intelligent referees and join international standards committees to support standards which would benefit U.S. networks and telecommunications industries.

The NITO should develop technical standards which ensure compatibility of independently developed fiber optic networks with other telecommunication systems. These standards should focus on the transport technology without paying particular attention to any one information service. The NITO should also publish and distribute these standards. This standard adoption process must be put in place quickly and efficiently.²²⁵

2. *Open Network Architecture*

Open Network Architecture (ONA) is essential to the promotion of competition in both the service and transmission industries.²²⁶ An ONA requirement assures every interested party access to the local fiber optic network's technical specifications. Prospective information suppliers could use this information to design their services, and prospective network providers could use the information to achieve inter-connectivity. National guidelines could reduce needless transaction costs of interpreting widely variant network architecture disclosure statements. Mandating the availability of network architecture and

223. Department of Commerce, *Comprehensive Study of Domestic Telecommunications Infrastructure*, 55 Fed. Reg. 800, 815 (1990).

224. "Recent studies indicate that voluntary standards may not always achieve efficient results." *Id.* at 816 n.143. (citing Stanley M. Besen & Garth Selander, *The Economics of Telecommunications Standards*, in *CHANGING THE RULES* 177, 193-201 (Robert W. Crandall & Kenneth Flamm eds., 1989)).

225. But keeping ahead of Japan and other economic rivals in telecommunications may be increasingly difficult. Already, a dire lack of standards looms as a huge obstacle, complicating buying decisions and slowing investment. "Every standards body seems to be churning out protocols left, right, and center," says A.G. "Sandy" Fraser, executive director of information sciences research at AT&T Bell Laboratories. "We may already have passed the point where we can all come together."

Coy, *supra* note 3, at 112.

226. The Department of Commerce has concluded:

The FCC's ONA program has the goals of promoting greater competition in enhanced services markets and increased availability of these services to the general public, while preventing discrimination by the BOCs in favor of their own enhanced services operations. . . .

. . . Furthermore, to the extent ONA permits enhanced service providers to operate efficiently and develop new services, the utility of the telecommunications network to their customers should also be increased.

55 Fed. Reg. at 813. See *Filing and Review of Open Network Architecture Plans*, 4 F.C.C. Rcd. 1, 11 (1988), *petitions for reconsideration pending*.

its technical specifications should stimulate competitive entrants in information services and in information transmission by allowing easy access to information that would be otherwise difficult to obtain.

3. Access

It is critically important that competitive information providers have access to transmission facilities.²²⁷ It is equally imperative that competitive networks interconnect. Access issues include the ability to physically connect to a network as well as the ability to co-locate equipment. The local policy offices must balance the need for access against competitors' potentially abusive tactics. Special provisions should be established to deal with the exhaustion of network facilities. This will be particularly important when network switches cannot accommodate additional information services or connect additional alternate networks. Which entity decides who gains access to the local broadband networks and how may be one of the most important access issues. Although the question of access does not arise until an operating network is in place, it must be considered contemporaneously with the policy of development. This is especially true if competitive local networks would make a significant difference in policy. These policies should be formulated on a state wide scale, but individual application could be flexible.

4. First Amendment Principles

First Amendment issues are tied inexorably to the question of access.²²⁸ This topic is exceedingly complex and worthy of a separate analysis.²²⁹

227. The cable television industry exhibits great similarities to a fiber system regarding questions of access. Therefore, it is instructive to look at access regulation in the cable industry.

The FCC, in 1972, promulgated access requirements for cable, Cable Television Report and Order, 36 F.C.C.2d 143, 189-98 (1972), revised in Report and Order, 59 F.C.C.2d 294 (1976), which were struck down in *FCC v. Midwest Video Corp.*, 440 U.S. 689 (1979) (Midwest Video II), on jurisdictional grounds. Congress adopted limited access regulations in the Cable Communications Policy Act of 1984, §§ 611, 612, 47 U.S.C. §§ 531, 532 (1991). State and local access regulations, which are often more comprehensive than those at the federal level, remain in effect. *See, e.g.*, CAL. GOV'T CODE § 53066.2 (West Supp. 1986); MINN. STAT. ANN. § 238.081, subd. 4(3)(iv) (West Supp. 1986); N.Y. COMP. CODES R. & REGS. tit. 9, subtit. R, § 595.4(b) (1986).

Access to Cable Network Monopoly, and the First Amendment, *supra* note 175, at 1663 n.3.

228. *See* U.S. CONST. amend. I. In pertinent part it states: "Congress shall make no law . . . abridging the freedom of speech, or of the press . . ."

229. *See Access to Cable Network Monopoly, and the First Amendment*, *supra* note 175, at 1663. The application of the first amendment to cable television has been guided by the Supreme Court's statement that "[e]ach medium of expression . . . must be assessed for First Amendment purposes by standards suited to it. . . ." *Southeastern Promotions, Ltd. v. Conrad*, 420 U.S. 546, 557 (1975). The idea that different media should be accorded different First Amendment treatment has been repeatedly accepted by the Supreme Court. *See also*, *Metromedia, Inc. v. San Diego*, 453 U.S. 490, 501 (1981) (quoting *Kovacs v. Cooper*, 336 U.S. 77, 97 (1949)) ("Each method of communicating ideas is 'a law unto itself' and that law must reflect the 'differing natures, values, abuses, and dangers' of each method"); *Red Lion Broadcasting Co. v. FCC*, 395

Nonetheless, access concerns support the encouragement of competition in the development of local broadband networks.

Professor Nadel explains the central access question as: "What First Amendment protection do media owners have against laws and regulations that would require them to disseminate the messages of others? In other words, what types of media access rules will survive First Amendment challenges?"²³⁰ Professor Nadel provides a framework for analyzing access issues:

The proposed test for ascertaining the constitutionality of regulations granting access to media sorts them into three categories. If access to a medium is available at competitive prices and in reasonable units of quantity, the First Amendment does not permit media owners to be saddled with access regulations. Common carrier-like regulations are desirable (and are required for a publicly owned medium) where a medium has characteristics of a natural monopoly. The only media that may be subject to the most intrusive content-based regulations, including a public trustee standard or some manifestation of the Fairness Doctrine, are those for which neither alternative is viable. The courts should treat the third category as one of last resort.²³¹

Professor Laurence Tribe wrote, "[t]he rate of technological change has outstripped the ability of the law, lurching from one precedent to another, to address new realities."²³² In developing a framework to determine the future of the telecommunications infrastructure of this country, Congress must consider First Amendment issues.

5. *Integrated Customer Base*

As competition arises in local telecommunication networks, the economic characteristics of some localities may drive some local fiber optic network developers to serve only the most profitable customers.²³³ Non-integrated local networks may destroy efficiencies found in universal broadband connection and produce an undesirable division between the economically advantaged and disadvantaged. If there is no requirement to integrate customer bases,

U.S. 367, 386 (1969) ("[D]ifferences in the characteristics of new media justify differences in the First Amendment standards applied to them.")

230. See Mark S. Nadel, *A Technology Transparent Theory of the First Amendment and Access to Communications Media*, 43 FED. COMM. L.J. 157, 158 (1991).

231. *Id.* at 183-84.

232. Katsh, *supra* note 2, at 1493 (citing LAURENCE TRIBE, *AMERICAN CONSTITUTIONAL LAW* 930, 1007 (2d ed. 1988)).

233. For example in his article *supra* note 166, at 414 n.6, Commissioner Barrett cited numerous cases where local exchange telephone service companies were being pressured by competition.

exclusive fiber networks will develop, leaving potential, but less lucrative customers unconnected.²³⁴ Therefore, the policies guiding the development of local broadband networks should ensure all local broadband network developers serve an integrated customer base. The integrated customer base should be mapped by policy makers who are most familiar with the geographical area and economic distribution of potential customers. The key to achieving this object will be a balance between a sincere attempt to price close to marginal cost and the need for some subsidization. Government policy cannot forbid the development of private broadband networks, which means those customers with the financial means may flee a public switched broadband network if resultant prices are significantly above marginal costs. One method of encouraging integrated customer bases might be marginal cost pricing.²³⁵ Nevertheless, integrated customer bases may also allow a certain amount of cross-subsidization between high-volume, high-profit users and low-volume, low-profit customers. Although cross-subsidization is economically inefficient, for a limited time it may be a socially desirable way to connect an integrated customer base to a local broadband network. After essential service costs fall because of economies of scale and other factors, it may be possible to move toward marginal pricing for all customers. Some form of subsidization may be a necessary political concession, at least in the beginning, to obtain the political consensus needed for implementation of this new philosophy that encourages a competitive framework at every level of the local telecommunications marketplace.

234. A Department of Commerce study voices this concern:

NTIA [the National Telecommunications and Information Administration] is of the view that public networks play a special role in our nation's telecommunications infrastructure. First, as a matter of efficiency, public networks with their ubiquity, interoperability, and network design (based on switches and shared facilities) have certain technical and economic advantages over non-public networks for many applications. Second, as a matter of equity, public networks are available not only to large users, but to small businesses and organizations and residential users. Thus, we are concerned that regulatory and other public policies not result in a public network infrastructure that is so technically unsophisticated and uneconomically priced that it ill serves both large users (who will abandon it for private solutions) and small users (who will have to do without advanced services). Such a result would be neither efficient nor equitable.

55 Fed. Reg. 800, 801 (1990).

235. Marginal pricing of broadband transmission services would deter bypass networks. Lessons from telephony regulation can be instructive in this area of policy formation, as discussed by Dean MacAvoy:

Inefficient duplication of local exchange functions can be avoided if local telephone companies are permitted to price their distribution services in line with marginal costs. Marginal cost pricing would eliminate the incentive for firms to enter select local exchange markets to skim away profits which the BOCs currently generate to subsidize local telephone rates.

MacAvoy & Robinson, *Losing By Judicial Policymaking*, *supra* note 21, at 256.

6. *Universal Service*

The idea of an integrated customer base dovetails with the objective of universal and affordable broadband service.

For more than 50 years, a cornerstone of United States telecommunications policy has been “to make available, so far as possible, to all the people of the United States, a rapid, efficient, nation-wide, and world-wide . . . communication service with adequate facilities at reasonable charges.” . . . NTIA stated that: “In light of the possibilities of new service offerings by the 21st Century, as well as the growing importance of telecommunications and information services to U.S. economic and social development, limiting our concept of universal service to the narrow provision of basic voice telephone service no longer serves the public interest.” . . . Others suggest that a failure to expand the concept of universal service could result in society becoming divided between the “information rich” — with access to a wide range of innovative services, and the “information poor” — served only by basic voice service. The economic and social implications of such a scenario run counter to long-held American policy goals of promoting equal opportunity. . . . In addressing whether “universal service” should be redefined, we must consider two questions: (a) Service definition: Whether the service components to be offered universally should be different from the “basic voice services” now commonly offered and whether these components should be included in the monthly “basic service package” or offered as optional features, and (b) universality: How the service should be made universally available and affordable.²³⁶

However, some experts contend that imposing regulations to foster universal availability of advance broadband networks at affordable prices is incompatible with a desire to develop information services in a competitive marketplace.²³⁷ Other experts argue that some regulation mixed with competitive marketplaces pressures will better serve the nation economically.²³⁸ Although which new

236. 55 Fed. Reg. 800, 816 (1990).

237. Lavey, *supra* note 187, at 153 (citing Larry Pressler & Kevin V. Schieffer, *A Proposal for Universal Telecommunications Service*, 40 FED. COMM. L.J. 351, 370 (1988)). See also 55 Fed. Reg. 800, 803 (1990).

238. See Lavey, *supra* note 187, at 101, for an excellent discussion of this topic. Lavey contends that such a combination of proper regulation and competitive market development will benefit the “nation in terms of economic activity, education, health care and the quality of life in general.” *Id.* at 189. See also 55 Fed. Reg. 800, 802 (citing E. PARKER, ECONOMIC AND SOCIAL BENEFITS OF THE REA TELEPHONE LOAN PROGRAM (1983)) (“Parker estimated that the Rural Electrification Administration’s (“REA”) telephone loan program contributed \$283 million to U.S. GDP in 1980, as well as \$196 million in new tax revenues from

information services will be included under the umbrella term of universal service with the advent of local fiber optic networks may be debatable, universal telephone services should remain a firm goal of any national or local policy.

7. *Local Network Ownership*

Consideration should be given to the ownership of the companies that will own and operate local fiber optic networks as well as those that will own and operate individual information services. One option is to restrict ownership to United States entities.²³⁹ Clearly, as has been brought out in this Article, local broadband networks will become the lifelines in our country's economy.²⁴⁰ Additionally, foreign control of local fiber optic networks might affect our national defense.²⁴¹ Therefore, majority ownership of local broadband networks must remain in American hands. This does not preclude foreign ownership of debt instruments, an important source of potential financing, as long as they were not convertible to equity interest.

F. *Summary*

The creation of the proposed national, state, and local policy offices will provide sufficient flexibility for regional concerns and allow innovative approaches to difficult problems. The currently proposed CCIMA does none of the above. It does, however, perpetuate the misconception that local telecommunication networks are natural monopolies and severely limits the potential for competitive development. In encouraging a re-evaluation of Congressional action, this analysis outlines seven critical policy objectives that are consistent with national goals and the encouragement of competitive industry participants. However, no one of these considerations should dictate policy formation. Rather, they should be the cornerstones of policies that allow flexible consideration of individual circumstances.

REA borrowers and subscribers whose income had increased as a result of having telephone service.”).

239. See generally 47 U.S.C.A. § 310 (1991), which forbids ownership of broadcast licenses by aliens, representatives of aliens, corporations organized under the laws of a foreign government or corporations having ownership or alien directors positions as specified in 47 U.S.C.A. §§ 310(b)(3), 310(b)(4) (1991).

240. “Over 50 percent of all U.S. workers are currently employed in information-intensive service industries that are heavily reliant on telecommunications” 55 Fed. Reg. 800 (1990) (citing BUREAU OF THE CENSUS, U.S. DEPT. OF COMMERCE, STATISTICAL ABSTRACT OF THE U.S. (1988)). Furthermore, “in a recent survey of U.S. business executives, the vast majority of the respondents stated that the domestic telecommunications infrastructure is ‘absolutely critical’ to the nation’s economic prosperity.” *Id.*

241. “[T]he strategic nature of telecommunications for national defense and the common wellsprings of and similarities between military and civilian telecommunications equipment, suggest that many ties still exist between civilian and military development in this field” Derian, *supra* note 191, at 75. Furthermore the U.S. military uses the public switched network through the Defense System Network (DSN). If the local exchange carriers utilized the local fiber optic networks, the DSN would be transmitted over the fiber network resulting in U.S. military information under the control of foreign entities.

VI. Construction Issues

Current industry initiatives disprove the conclusion that a natural monopoly is inevitable in every local information transmission marketplace.²⁴² Nonetheless, the demise of the system that perpetuates currently regulated transmission monopolies as the sole providers in most local telecommunications marketplaces will not occur without regulatory reform.²⁴³ While the installation of fiber to each customer premises already is anticipated,²⁴⁴ the policy guiding development of local broadband networks must encourage competitive entry.²⁴⁵ Furthermore, the operational regulations must be structured so projected revenues will attract competitive entrants into the information transmission industry. The regulatory scheme adopted must take into account the following issues: location of the fiber optic lines, financing of the local network development, choice of network developers, and potential profitability of the enterprise.

A. *Placement of the Local Optic Network*

A local broadband network's optical fiber must connect to each customer's premises in order to permit access to the transmission network. Technical considerations will dictate whether the fiber will be strung on utility poles or buried in conduits. Currently, local telephone exchange companies have virtually universal connectivity to potential customers.²⁴⁶ Cable television transmission facilities pass nearly as many customer premises. The preferred broadband network configuration will probably match one of these existing transmission facility routes.²⁴⁷ Therefore, the best option will be to co-locate the fiber with the local phone company's copper wire routes or cable television's coaxial

242. "In reality, a more likely scenario is that there will be competition, or the threat of competitive entry, at all levels of the market. There already exists the potential for a competing broadband network in most markets . . ." Harrison, *supra* note 164, at 52.

243. "The basic structure of regulation must change if the [BOC] industry is to remain competitive in tomorrow's telecommunications market." Harrison, *supra* note 164, at 54.

244. For example:

By the end of the decade, as many as one in five residential telephone lines is expected to be "fibered" in areas of the country such as the [S]outheast, where growth is high and a need exists for advanced telecommunications services. In such areas, complete conversion is expected by about 2010-2011.

Shumate & Snelling, *supra* note 6, at 68.

245. Bruce L. Egan, *Telecommunications Strategy in an Age of Risk*, PUB. UTIL. FORT., April 26, 1990, at 22, 23.

246. "The FCC's studies indicate that, as of July 1989, over 93 percent of American households had telephones." Lavey, *supra* note 187, at 154 (citing FCC News No. 723: Preliminary Domestic Information from Statistics of Communications Common Carriers Released by FCC, at Table 9 (1989)).

247. "The general consensus among the [regional Bell holding companies] appears to be that a star architecture is preferable." Marshall Yates, *The Promise of Fiber Optics*, PUB. UTIL. FORT., Aug. 16, 1990, at 14, 15.

routes. Co-location would reduce the unknown and potentially large transaction costs associated with negotiating new rights of way.²⁴⁸ Congress must adopt enabling legislation that defines optical fiber transmission facilities as a compatible use with most existing utility rights of way²⁴⁹ and reasonably assures the ability to co-locate.²⁵⁰

However, some portions of the new local broadband network architecture may differ from embedded facility routes. If part of the new fiber network cannot co-locate, state legislatures can provide an alternative solution. State enabling legislation should grant the same powers of condemnation to the fiber developer as are granted to most local telephone companies through franchise agreements.²⁵¹

Currently, the question of telecommunications access in multiple dwellings and new developments is unsettled.²⁵² As a result, divergent regional policies are developing. Federal policy guidelines must provide states and localities with model statutory language and discourage aberrant regional impediments to universal connectivity.

B. Financing Options

Government policy can help solve the complex problem of financing the construction of competitive fiber networks.²⁵³ Developing financial incentives

248. Cable companies are permitted to construct cable systems over rights-of-way and through easements that have been dedicated for compatible uses. 47 U.S.C.A. § 541(2) (1991). The court in *Centel Cable Television Co. v. Thos. J. White Dev. Corp.*, 902 F.2d 905 (11th Cir. 1990), held that this was not a violation of the takings clause of the Fifth Amendment.

249. See 47 U.S.C.A. §541(2) (1991). This section of the 1984 Cable Act addresses this problem but does not clearly state that cable is a compatible use. It authorizes construction over public rights of way which have been dedicated to other uses to which cable may or may not be comparable. The congressional declaration of fiber as compatible should be broad enough to allow its placement in co-location with an existing technically acceptable transmission facility including electrical power lines, natural gas pipelines, or railroad rights of way. The purpose for this broad declaration would be to reduce legal challenges to "compatible users" and to reduce transaction costs. See also, *Williams Telecommunications Co. v. Gragg*, 750 P.2d 398 (Kan. 1988) (fiber and natural gas pipelines found to be non-compatible uses, but taking allowed). But see, *Re Hawaiian Electric Co.*, 87 Pub. Util. Rep. 4th (PUR) 227 (Hawaii P.U.C. 1987) (did not allow co-location of fiber and electrical transmission facilities because public right of way for electrical transmission was incompatible with information transmission through fiber optics).

250. Compensation might be required to allow some co-location in view of the Fifth Amendment's prohibition against takings.

251. Under the current enabling statutes of individual states, the Franchise Agreements with the local telephone companies authorize their actions as public utilities with the right of condemnation equivalent to local municipalities. See, e.g., N.J. Stat. Ann. § 48:17-9.1 (West 1991 Supp).

252. See *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419 (1982) (installation of cable facilities constituted a taking); *Cable Assoc. v. Town & Cty. Management Corp.*, 709 F. Supp. 582 (E.D. Pa. 1989) (no right to interior access); *Cable TV Fund 14-A v. Property Owners Ass'n*, 706 F. Supp. 422 (D. Md. 1989) (cable provider was able to enforce its right of access to public utility easements); *Cable Investments, Inc. v. Woolley*, 867 F.2d 151 (3rd Cir. 1989) (denied cable operator right of access to multi-unit dwellings); Nagelhout, *supra* note 160, at 46.

253. One observer believes that

a 'strategic investment' probably will be required to advance fiber 'over the hump' to the crossover point. The strategic investment is the total excess cost of fiber over copper expended

and a policy framework that creates incentives for entry into the competitive telecommunications marketplace is critical to fostering interest and competition in the local transmission industry.²⁵⁴ A prospective transmission provider's decision to enter the industry will be linked to its expected return on investment.²⁵⁵ The following five options are broad categories of financing resources, but are by no means an exhaustive set of alternatives.

1. *Corporate Structure*

The traditional corporate structure offers the ability to draw upon a diverse and broad base of financial resources such as equity and debt securities and loans from lending institutions. Since regulated industries often yield lower rates of return than firms in unregulated industries, government policy may need to provide incentives for private investing in particular local network developers that remain regulated.²⁵⁶ However, incentives for private investing in competitive, unregulated local transmission developers may be unnecessary. New local broadband transmission network developers may readily find private investors for their new ventures.²⁵⁷ The government could influence investor behavior

in the first few years. This expenditure reduces the investment per subscriber to acceptable levels by moving the costs down the experience curve More importantly, the timing of this investment is also in question . . . deployment really does not begin until public policy changes.

Selander, *supra* note 8, at 30.

254. If policy is formed without contemplating alternative resources or participants, the framework designed to encourage quick local broadband network development may undermine the ability of competitors to enter the market place. Transaction costs and barriers to entry may be embodied in a policy which favors current information transmission providers. These providers would then have incentives to perpetuate ideas of natural monopoly status which would insure their market position.

255. Operation revenue can be derived from two sources: transmission fees and information service fees.

256. If the corporate structure seeking capital is a public utility subjected to regulation by a government commission, its ability to deliver a highly attractive return on investor's equity may be severely limited. The Supreme Court in *Federal Power Comm'n v. Hope Gas Co.*, 320 U.S. 591 (1941), recognized the problems involved with raising capital in a regulated environment. However, the court held that the regulations need only be just and reasonable. *Id.* at 602. In its opinion the court stated:

The rate making process . . . i.e., the fixing of "just and reasonable" rates, involves a balancing of the investor and the consumer interests. Thus we stated in the *Natural Gas Pipeline Co.* case that "regulation does not insure that the business shall produce net revenues." But such consideration aside, the investor interest has a legitimate concern with the financial integrity of the company whose rates are being regulated. From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock. . . . By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise so as to maintain its credit and to attract capital.

Id. at 603 (citations omitted).

257. "According to Professor William Davidson of the University of Southern California, more money was invested in private information networks last year [1989] than in the publicly available system." Barrett, *supra* note 166, at 424 (citing Davidson, *Telecommunications Takes Off: While the U.S. Dithers, Other Nations are Aggressively Modernizing to Compete*, L.A. TIMES, Feb. 26, 1989, §4, at 3).

through a temporary reduction in tax rates for investments in broadband transmission companies.²⁵⁸ If this incentive were available, corporations might engage in quick construction of local fiber networks to realize substantial profits and a high rate of return for their shareholders.

2. Corporate Tax Issues

Adjusted tax burdens can create significant capital resources within corporations, especially current telecommunications companies.²⁵⁹ Corporations with significant capital expenditures might be induced to develop networks if their federal and state taxes were reduced.²⁶⁰ The government could create the capital for construction by accelerating the depreciation of a corporation's capital plant expenditures in return for local fiber network development.²⁶¹ The change in depreciation rates could be tied directly to demonstrable expenditures on construction of local fiber networks. While reduced tax revenues present a valid concern, revenue losses may be offset shortly thereafter by increased tax revenue from technology suppliers. An overall increase in GDP²⁶² also would result from expanding marketplaces for information services and information transmission.²⁶³ Investment tax credits for fiber optic networks could also stimulate local broadband network development. However, the corporate tax incentives must not be aimed solely at the current local telecommunications providers.

258. The Congressional policy encouraging information transmission facility development would receive considerable financial backing if it was coordinated with small changes in tax policy that would encourage equity investment in local fiber optic network installer-operators. The most appropriate policy would reduce the tax rate for returns on this type of equity investment. This union of policies could accomplish two very desirable effects. First, it would encourage equity investment as opposed to debt instrument funding. Second, it would accelerate the development of the local fiber network resulting in an accelerated development in the new information services marketplace, bringing new jobs, new industry, and a greater tax base.

259. "Due to the tremendous cash flow and healthy financial position of the phone companies . . . investment funds are generated internally, without borrowing. Capital turnover rates are high at over eight percent per year, and in 1988 depreciation alone provided almost ninety percent of funds required for new construction." Egan, *supra* note 245, at 22.

260. For example, local telephone companies have significant capital expenditures, especially in their embedded copper transmission facilities and switching machines. "Phone companies collectively spend about \$25 billion annually on new capital. . . their total network capitalization is about \$180 billion." Egan, *supra* note 245, at 22. However, other industries also have significant capital expenditures. These industries might be interested in developing fiber optic networks if tax incentives encouraged such investment.

261. This could apply to many industries that have capital expenditures depreciated over periods of time.

262. "[T]oday, over half of our gross national product and employment are tied to the distribution of information." Burns, *supra* note 7, at 17.

263. Analogy to the expenditures of Rural Electrification Administration and resultant tax revenues is appropriate. See Parker, *supra* note 238.

3. *Government Loans*

Low cost government loans or direct grants to construct local fiber networks may be necessary when profit motives fail to promote financing or to facilitate competition among transmission providers. However, some experts believe that direct public financing would be detrimental to the overall efficiency of the marketplace.²⁶⁴ While there may be little chance of direct governmental grants in an era of increasing government debt, limited government loans similar to those administered through the Rural Electrification Administration's loan programs may be feasible.²⁶⁵

In fact, governmental financing may be necessary to achieve universal telephony service. Financial assistance will be needed especially in economically depressed and rural areas. Limited government financial participation is appropriate for ensuring that rural and disadvantaged areas may benefit from the expanded resources of a broadband network.²⁶⁶ Local policy makers must balance the interests between government financial participation, integrated customer bases, and local broadband service areas that might not allow marginal cost pricing.

4. *Joint Ventures*

Joint ventures between independent corporations broaden the financial base of prospective developers and reduce the risk to individual investors. One of the most appealing suggestions has come from the electric utility industry.²⁶⁷ The electric industry proposed to subsidize part of the construction costs of broadband facilities in order to realize the potential that local broadband networks would facilitate highly efficient demand-side management of energy production.²⁶⁸

264. See Barrett, *supra* note 166, at 423. Commissioner Barrett suggests that publicly financed fiber networks would not be advisable "because the encouragement of private enterprise will bring about efficiency, product and service innovation, and lower rates." Barrett, *supra* note 166, at 424.

265. Barrett, *supra* note 166, at 424.

266. *Id.*

267. See Rivkin, *White Knights for Fiber Nets: How Electrics Can Help Telcos Build Fiber to the Home*, PUB. UTIL. FORT., Aug. 16, 1990, at 20.

268. The following description of "demand-side management" is a technical simplification. If electric producers could receive demand information from electric consumers in real-time, they could adjust their output. The investment electric companies would make in the construction of local fiber networks would be more than recouped by the savings they would derive from more efficient production. This increased efficiency is justified solely on an economic basis; however, society also benefits from conservation of natural resources used to produce electricity and the resultant decrease in pollutant by-products of the production process. *Id.* "[P]reliminary results are tantalizing; TransText, for one, has documented a 23 percent drop in electricity peak consumption with the utility making more money and the consumer spending less." *Id.* at 23.

5. *Rate-Base Investment*

The rate-base investment method of financing directly incorporates the cost of construction into transmission rates. This financing will only be available to public utilities such as local telephone or cable television companies and is an arrangement devoid of competitive pressures, a lack of which could foster significant inefficiencies. However, since not every locality is likely to develop a competitive transmission industry, this form of financing, in the absence of others, would allow a fiber network to be constructed.

Rate-base investment requires substantial price regulation, and customers will receive no competitive industry benefit. If this financing is used, state regulators must be particularly careful to maintain the separation between transmission and information service providers. Public utility boards generally require investments derived from the rate-base to be "used and useful" to the rate payer.²⁶⁹ Because of this requirement, rate-base funding has met significant resistance from state officials charged with protecting captive rate payers.²⁷⁰ Thus, it is the least desirable option outlined in this Article. Even so, it may be necessary in some areas until a substantial number of information services are available and are sufficiently profitable to support a competitive transmission system.

6. *Summary*

Each of the first four financing options can encourage development of a competitive transmission industry or at least help to create a contestable one. However, the reaction of capital investors and private industry cannot be predicted. Government policy will be the determinative factor for both parties. Therefore, the BBO and NITO should create policies that encourage privately financed construction.

The initial transmission provider, in non-competitive marketplaces, probably will be the currently operating local telephone company. In these cases, the primary financing concern will be the burden borne by the captive rate payers. This becomes especially acute in the short run because the rate payer will not see a benefit during construction of local broadband networks. One way to solve this problem is to allow the local telephone companies to accelerate depreciation and thereby offer higher investment returns to attract private capital.

269. Rivkin, *supra* note 267, at 20.

270. The typical state agency is called the Public Advocates office. Its primary concern is to protect average rate payers from shouldering the financial burden of constructing a fiber network when they, in the perception of the advocate agency, might not see immediate benefit from increased rates.

C. Construction

Currently, more than thirty local fiber network tests are underway.²⁷¹ These efforts will contribute valuable information to prospective network developers. Two construction scenarios are possible: a single developer or multiple network developers.²⁷² The outcome in each geographic area should be determined by market forces, as Andrew Barrett, the Commissioner of the FCC, has opined.²⁷³ A streamlined licensing procedure guaranteeing the applicant's compliance with NITO and SITO requirements should precede construction.²⁷⁴ Compliance with local integrated customer base requirements must be strictly enforced.²⁷⁵ The definition of a "local network" should be left ambiguous so that it can reflect both prevailing economic forces and the SITO's requirement of integrated customer base.

It is logical to consider the possibility that current telecommunications providers will construct fully integrated fiber networks.²⁷⁶ Although these companies appear to be the obvious broadband network developers, policy must

271. "Over 30 tests now are being conducted by various telephone companies." Yates, *supra* note 247, at 14. See *In re* Application of General Telephone Co. of California, 66 Rad. Reg. 2d (P & F) at 1148 (July 17, 1989) (waiver of telephone/cable cross-ownership rules granted to allow an experimental local fiber network (ultimately to 5000 homes) to be constructed in Cerritos, California).

272. An interesting question arises with this assumption: should the construction and operation of the new network be considered separately? The operation could be based on grants of franchise operation for limited periods of time. This arrangement would provide incentives to reduce rates in non-competitive marketplaces. The renewal process could take into account past performance including evaluation of quality of service, encouragement of new service offering and rates. However, this option raises serious questions regarding transmission facility ownership and significant government oversight.

273. "As to the question of whether sufficient revenues will be generated to justify two loops to the home, I feel that is a question the market should decide." Andrew C. Barrett, *The Potential of Fiber Optics to the Home: A Regulator's Perspective*, PUB. UTIL. FORT., Jan. 19, 1989, at 14.

274. The requirements should reflect basic objectives and include any particular local criteria especially important for the particular geographical deployment. NITO's policy should set the bounds of local requirements so they cannot become burdensome. More importantly, NITO should prohibit local policies which would protect primary transmission providers from subsequent competition. The national policy should forbid local constraints from being considered except where a compelling government interest was present. The national policy should specifically exclude claims of inability to operate in a competitive environment as compelling government interests justifying local franchise restrictions.

275. "Today, many [local phone companies] are watching a new breed of competition lay fiber in many of their prime service areas. These alternative access providers are cream-skimming the high-end of the market by providing state-of-the-art (fiber) facilities at prices below [current] tariffs." Harrison, *supra* note 164, at 53; see also Bruce W. Radford, *Fiber Optic Networks Nibble Away at the Bell Local Monopoly*, PUB. UTIL. FORT., Dec. 21, 1989, at 4; *California v. FCC*, 905 F.2d at 1234-35.

276. Such a policy is not without competitive pressures, as some may argue:

Some industry observers might be tempted to throw stones at phone company strategy for fiber optics as anti-competitive or just plain folly, and recommend public policies preventing it, but this would be wrong. Remember the alternative business strategy remaining open to phone companies — invest their money elsewhere in anything from pizza parlors to mortgage banking. Since phone companies are businesses, they should be allowed to invest in adoption and deployment of new technology for the future benefit of phone users and for revenue growth.

Egan, *supra* note 245, at 23. See also 137 CONG. REC. S7054 (daily ed. June 5, 1991) (introduction of the Communications Competitiveness and Infrastructure Modernization Act of 1991 by Sen. Conrad Burns).

not be structured around their peculiar interests, as it is in some recently proposed legislation.²⁷⁷ It is critical that the NITOs and SITOs not develop their construction policy so as to favor one potential local fiber network developer over another.

Conclusion

Legislatures should consider the following guidelines when devising regulatory structures governing local fiber optic networks. Competition should be encouraged in both the information transmission marketplace and the information services marketplace. Uniform technical standards must be adopted to ensure compatibility of local networks. Access to the network's technical specifications and transmission facilities must be provided to all potential competitors. Local networks must provide affordable broadband service to all residential and commercial customers. Regulators should promote domestic ownership of local fiber optic networks.

Federal and state regulatory agencies must be established to implement these policy objectives. Sufficient flexibility, however, should be accorded each locality to respond to indigenous variations. With the appropriate regulatory policy, the potential for United States dominance in the global information age will be limited only by the ingenuity and vision of its citizens.

277. For example, a bill introduced in the New Jersey legislature, but not passed in this form, provided financial incentives for pre-existing local telephone companies only. In pertinent part, the bill reads as follows:

4. In order to provide appropriate incentives to encourage economic development and investment in the telecommunications infrastructure, the board shall have the authority to approve an economic development program proposed by a local exchange telephone company which is designed to develop a state-of-the-art telecommunications infrastructure. Any economic development program must, at minimum, include:

a. A comprehensive, long-term program of infrastructure development for the local exchange telephone company extending over a fixed term of years.

S. Res. 3617, 205th Sess., N.J., (introduced July 15, 1991).

The Communications Competitiveness and Infrastructure Modernization Act of 1991 also exclusively targets the local telephone companies. "[E]ach local exchange carrier shall prepare and carry out a broadband communications system implementation plan for the states in which such carrier operates." S. 1200, 102d Cong., 1st Sess. 6-7 (1991).

