

# HDTV DEMYSTIFIED: HISTORY, REGULATORY OPTIONS, & THE ROLE OF TELEPHONE COMPANIES

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## INTRODUCTION

Over the past several years, high definition television ("HDTV") and the U.S. role in its development have been the focus of a great deal of discussion and attention. The government and groups from the broadcasting, telecommunications, and consumer electronic manufacturing industries have devoted significant resources to HDTV-related issues. Ironically, the typical consumer, for whom HDTV is being developed and upon whom its success depends, is often unfamiliar with the controversy surrounding HDTV and has only a vague idea of what HDTV actually is.

This Recent Development is designed to demystify HDTV and the controversies that surround it. Section I explains the technology and significance of HDTV and traces the historical development of HDTV technology. Section II discusses the standards being considered for application to the United States' domestic version of HDTV. Specifically, it addresses what options are available and the trade-offs and communication policy implications associated with each alternative. Finally, Section III highlights one of the most controversial questions in the HDTV debate: whether or not the government should allow telephone companies to compete against other program providers in the future market of selling high definition, interactive information services. The dispute focuses around the fact that the telephone companies would hold regional monopolies over the fiber-optic telecommunications systems through which the services would be distributed.

## I. HDTV: BACKGROUND

### *A. What Is HDTV?*

HDTV is an emerging technology that delivers both a clearer, more detailed picture and improved sound quality to a television set. The video

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quality is equal to that of photographs taken with a thirty-five millimeter camera, and the audio quality is equal to that produced by a compact disc player. HDTV achieves its superior picture quality through an increase in the number of lines of electrons scanning across the back of the screen. The increased number of electrons creates a more detailed picture. Conventional sets produce 525 scan lines per image, each line having approximately 300 dots. HDTV has more than 1000 lines, with about 1000 dots per line.

HDTV systems transmit a significantly greater volume of data than a conventional (or "NTSC"<sup>1</sup>) system. This increase in data requires either greater bandwidth or a more efficient use of bandwidth.<sup>2</sup> The original Japanese HDTV system, for example, required thirty MHz of bandwidth. In contrast, the Federal Communications Commission ("FCC") allocates only six MHz of bandwidth to each television channel. As a result, true HDTV pictures cannot be received by NTSC sets. Because the FCC has decided to transmit HDTV via terrestrial broadcasting,<sup>3</sup> for which there is a limited amount of spectrum space, the bandwidth required for a domestic HDTV system will have to be reduced through a combination of encoding, modulation, and digital compression techniques.

### B. Commercial Impact of HDTV

The potential significance of HDTV extends far beyond the production of an enhanced television picture with stereo sound. Many believe that the new technology will enable American consumer electronic companies to regain their preeminence in the domestic and global marketplace.

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1. NTSC is an acronym for the National Television Systems Committee, which was formed in 1940 for the purpose of developing technical standards for television broadcasts. Subsequently, the NTSC developed technical standards for adding color to black and white television sets. 56 Fed. Reg. 58,207 (1991). The term NTSC is frequently used to refer to both the television system and the sets we use today. It will be used in this manner throughout this Recent Development.

2. Bandwidth refers to the range of frequencies throughout which signals carrying, for example, television video and sound, can travel through a system without significant attenuation. ARTHUR J. MEADOWS ET AL., *DICTIONARY OF COMPUTING AND INFORMATION TECHNOLOGY* (3d ed. 1987).

3. Terrestrial (or conventional) broadcasting involves making a program available to the general public by transmitting it through a ground-based system in the form of electromagnetic waves. Regular television programming in the United States is delivered via terrestrial broadcasting. Satellite broadcasting also makes programs available through electromagnetic waves, but, as the name implies, the signals first pass through a satellite in geostationary orbit before being transmitted to a receiving station or to an individual receiver. *See id.*

Enthusiasts claim that HDTV will explode into a multi-billion dollar industry over the next two decades and will become the driving force behind a technological revolution resulting in the integration of telecommunications, computers, and entertainment. Such integrated systems are referred to as high resolution systems ("HRS"). HRS allow individual interaction with the high resolution video display picture. Hence, their potential applications extend to a variety of contexts outside of entertainment, including education, medicine, and defense.<sup>4</sup>

Sinking "[l]ike a rock" describes the status of the domestic consumer electronics industry, according to a recent *Fortune* magazine assessment of U.S. competitiveness in the global marketplace.<sup>5</sup> During the 1980s, production in Japan grew three times faster than in the United States.<sup>6</sup> European production grew nearly twice as fast.<sup>7</sup> The U.S. share among the top dozen electronics companies, which was forty-four percent in 1980, sank to eleven percent by 1990.<sup>8</sup> A deficiency in government support combined with American management's neglect of quality and productivity are the factors normally blamed for the decline of the domestic consumer electronics market.

HDTV and its related technologies represent a key opportunity for American industry to strengthen its global position in the high-technology market. This technological competitive resurgence would occur on two levels. The initial level would entail providing the component parts for HDTV sets. HDTV sets are semiconductor-intensive. Thus, the demand for semiconductors would increase proportionately with the demand for HDTV sets. At the second level, electronic manufacturers would benefit from HDTV's linkages to computer and telecommunication technologies. Because they must quickly process large amounts of information, HDTV systems use technologies similar to those used for computers and telecommunications. To function efficiently HDTV systems require technological developments in digital signal processing, high performance displays, and data storage systems. This linkage would not only motivate

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4. For example, in the context of medicine, high resolution medical images of x-rays, CAT scans, or tissue samples could be transmitted to specialists for instant diagnosis. In educational applications, students could interact with computer-produced displays of ancient cities, mechanical configurations, or biological specimens. See generally OFFICE OF TECHNOLOGY ASSESSMENT, U.S. CONGRESS, *THE BIG PICTURE: HDTV & HIGH RESOLUTION SYSTEMS 5* (1990) [hereinafter *THE BIG PICTURE*].

5. Andrew Kupfer, *How American Industry Stacks Up*, *FORTUNE*, Mar. 9, 1992, at 30.

6. *Id.*

7. *Id.*

8. *Id.*

manufacturers to reenter the consumer electronics market, but would also act as an impetus for their increased participation in other high-technology markets. Failure to capture a majority of the domestic and a significant portion of the global HDTV production market would cause a further erosion in the United States' global market share in semiconductors and personal computers.

### C. Historical Development of HDTV

The development of HDTV is a three-way race among Japan, the United States, and Western Europe in which the winner will claim the lion's share of the global market in HDTV equipment. Until recently, Japan was indisputably in the lead. Now, it is unclear which country is in the forefront.

#### 1. Japan

Japan has been developing HDTV for more than twenty years. Its government has taken a primary role in the development and implementation of the commercial HDTV industry. Through a combination of indirect and direct government support systems, manufacturers were relieved of many of the risks and expenses usually associated with introducing a new electronic product in the consumer marketplace.

The government-owned broadcasting corporation, Nippon Hoso Kuyokai ("NHK"), which is financed through a mandatory subscription fee imposed on every television household,<sup>9</sup> initiated a research program in 1970.<sup>10</sup> After this initial research phase, NHK coordinated the efforts of equipment suppliers in the development of system components and HDTV-related technologies. By allocating a separate research task to each equipment supplier, NHK maximized efficiency by avoiding duplication of efforts and making the results of research and development available to all interested companies.<sup>11</sup> As a result of such efforts, Japan became the first country to offer regular HDTV programming. Daily one-hour experimental HDTV broadcasts of its Hi-Vision system

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9. THE BIG PICTURE, *supra* note 4, at 30. The monthly fee is the equivalent of approximately eight dollars for those homes having a television set and fourteen dollars for those homes with satellite broadcast reception. *Id.*

10. *Id.* at 27-28.

11. *See id.* at 28-30.

began in June 1989.<sup>12</sup> The programming day was increased to eight hours in November 1991.

Government involvement did not cease with the development and construction of an HDTV system. Incentives are in place to encourage the use of HDTV, as well as to produce more HDTV programming. Low interest loans and tax advantages are available for those businesses that perform research and development, initiate an HDTV-related business, promote a market related to Hi-Vision, or purchase products associated with Hi-Vision.<sup>13</sup> In an effort to alleviate the financial burden imposed on burgeoning HDTV broadcasters and program producers, the government has created several holding companies that purchase expensive equipment and then lease it to producers and broadcasters.

Japan's multi-billion dollar investment has not yet paid off as expected. The market is not growing as quickly as anticipated. A major problem has been the high cost of HDTV sets. Thus far, only 2000 sets have been sold,<sup>14</sup> the majority of which were purchased for hotel lobbies and large public buildings.

HDTV sets currently on the Japanese market contain several semiconductors needed for the Muse decoder, a signal transmission device.<sup>15</sup> The expense of these semiconductors is largely responsible for the high cost of the sets. The first Japanese HDTV sets were priced at around \$30,000. Tremendous downward pressure has gradually decreased the price, and currently sets with full HDTV capability are priced between \$10,000 and \$20,000.<sup>16</sup> Sony and Sharp are now developing HDTV

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12. *Id.* at 27.

13. *See id.* at 30-31.

14. David E. Sanger, *Few See Japan Make TV History*, N.Y. TIMES, Nov. 26, 1991, at D1 [hereinafter *Few See Japan*]. Sony has been one of the victims of the stagnant HDTV market. In an unsuccessful attempt to encourage producers to produce films on video for HDTV broadcast, the company constructed the world's most expensive high-definition production facilities on its newly acquired Columbia Pictures lot. Since then, Sony has decided to convert a large HDTV plant into a plant to manufacture conventional televisions. These mishaps contributed to a 45% decline in Sony's operating income for the fiscal year ending March 31, 1992. *See* David E. Sanger, *Stalking the Next Walkman*, N.Y. TIMES, Feb. 23, 1992, § 3, at 1.

15. *Sharp's HDTV Strategy Shakes Up Market; Is Y1 Million A Viable Price-tag?*, NIKKEI WEEKLY, Feb. 22, 1992, (Industry Section), at 9 [hereinafter *Sharp's HDTV Strategy*].

16. *See Price War Continues In Japanese HDTV Market*, SCREEN DIGEST, Aug. 1992, available in WESTLAW, Business Library, PTS-Promt File. In turn, the lower-priced, full-capability HDTV sets are placing pressure on the cost of quasi-HDTV sets such as the 36C SEI Model introduced by Sharp at a price of \$8000 in April 1992. NHK refers to the sets as "bare bones HDTV" that do not showcase the technology in its full glory. *Sharp's HDTV Strategy*, *supra* note 15, at 9.

components that are expected to drive the price tag to about \$4000 or lower.<sup>17</sup> Japanese manufacturers predict that this reduced price will encourage rapid market growth.

However, Japan's HDTV system may be obsolete before it has the opportunity to penetrate the marketplace fully. The Hi-Vision technology developed in the 1970s is based entirely on analog technology.<sup>18</sup> Since that time, HDTV has taken a major evolutionary step and advanced to digital-based systems.<sup>19</sup> The United States and Europe have already declined to accept the Japanese-developed technique for the production of HDTV programs as the international standard.<sup>20</sup>

Even if its role in the global HDTV consumer marketplace falls short of expectations, Japan hopes to capitalize on the technological linkages between HDTV, high resolution systems, and other sectors of the electronics industry. Japan views HDTV as the initial step toward its future information society.<sup>21</sup> The major project of Japan's Nippon Telegraph & Telephone Company ("NTT") during the 1980s has been the construction of an Information Network System ("INS"). INS, whose completion is scheduled for the beginning of the twenty-first century, will be an integrated digital broadband network constructed with fiber-optics.<sup>22</sup> After its completion, Japan will begin development of several INS applications designed for business and residential use.<sup>23</sup> The Japanese anticipate that the INS will provide an edge in the global market for products needed for future telecommunications applications.<sup>24</sup>

## 2. Europe

In 1986, nineteen European countries formed the joint venture, Eureka 95, to develop a European HDTV system and to support the domestic

17. *Lower-Cost HDTV From Hitachi*, NEWSBYTES NEWS NETWORK, July 29, 1992, available in WESTLAW, Business Library, PTS-Prompt File.

18. See *Few See Japan*, *supra* note 14.

19. See *infra* text accompanying notes 39-46.

20. Three categories of standards are relevant to HDTV. They are production standards, transmission standards, and reception standards. See discussion *infra* part II.

21. See ROBERT B. COHEN & KENNETH DONOW, TELECOMMUNICATIONS POLICY, HIGH DEFINITION TELEVISION AND U.S. COMPETITIVENESS 15 (1989).

22. See *id.* at 18-19.

23. See *id.* at 18.

24. See *id.* (quoting FRANCOIS BAR & MICHAEL BORRUS, FROM PUBLIC ACCESS TO PRIVATE CONNECTIONS: NETWORK POLICY AND NATIONAL ADVANTAGE (Berkeley Roundtable on the International Economy Working Paper No. 28, 1987)).

consumer electronics industry.<sup>25</sup> Like the Japanese system, the European system uses analog technology and satellite transmission. In May 1992, the European Community officially adopted D2-MAC as the transmission standard<sup>26</sup> for HDTV.<sup>27</sup> D2-MAC, an interim step toward HDTV, was developed by SGS-Thomson of France and Philips Electronics of the Netherlands. The standard will be required for wide screen broadcasts and other new satellite services launched from January 1, 1995.<sup>28</sup>

The European Community's current plan is to upgrade European television from the current system to D2-MAC and eventually to HD-MAC, a full analog HDTV system. This transition plan has met some resistance. Many Europeans fear that D2-MAC and HD-MAC will have short life-spans as a result of the development of digital television systems.<sup>29</sup> As a result, they urge that Europe concentrate its efforts on developing and implementing a digital system.<sup>30</sup>

Despite such opposition, European Community officials are considering a proposal to budget the equivalent of one billion U.S. dollars for the promotion of MAC. The United Kingdom has taken the lead in blocking the budget proposal, arguing that if the European Commission has developed the best HDTV transition strategy for Europe, companies will implement it without subsidies.<sup>31</sup> In addition, several Member States, including Greece, Spain and Ireland, have expressed concern about the allocation of the funding. They want to ensure that small businesses in smaller and poorer European Community countries receive a sufficient amount of funding even though those companies may be initially unable to meet program requirements.<sup>32</sup> According to European Community diplomatic sources, any budget that is finally accepted may be slashed by as much as 75% from the original proposal.<sup>33</sup>

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25. THE BIG PICTURE, *supra* note 4, at 32.

26. The transmission standard determines the manner in which HDTV programs are distributed.

27. Linda Bernier, *MAC Standard Under Fire In France*, ELECTRONIC WORLD NEWS, Oct. 12, 1992, at 2.

28. *Id.*

29. *See id.*

30. *See id.*

31. *See Telecommunications Council: Strong UK Opposition to HDTV Action Plan*, TECH EUROPE, July 9, 1992, available in WESTLAW, Business Library, PTS-Prompt File.

32. *See HDTV: Agreement in Principle On Moves Toward HDTV*, EUROPE 2000-COMM. & INFO. TECH., Aug. 1992, available in WESTLAW, Business Library, PTS-Prompt File (describing Greece's concerns).

33. *See Bernier, supra* note 27, at 2.

Currently, there are no HDTV broadcasts in Europe. However, several French television stations are planning to begin HDTV satellite broadcasts via the D2-MAC system.<sup>34</sup> The market impact of this endeavor will be limited because HDTV sets compatible with the D2-MAC signal start at a cost of \$5000.<sup>35</sup>

### 3. *The United States*

The American electronics industry complains that several barriers have blocked its successful entry into the HDTV market. The risks and costs associated with the development and marketing of HDTV discourage individual companies from entering the market. At the same time, American antitrust laws prevent companies from sharing these risks and costs.<sup>36</sup> Representatives of the electronics industry propose a relaxation of antitrust laws in order to allow companies to form consortiums for the production and marketing of HDTV systems. An additional obstacle is the inadequacy of sources of capital investment for funding the development and commercialization of HDTV. In this arena, the United States government has provided only marginal support.<sup>37</sup> Still another disadvantage is the fact that the United States, which was at one time preeminent in the television industry, has only one remaining domestically owned television manufacturer, Zenith.<sup>38</sup> Hence, the United States trails

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34. See Steve Gold, *France Moves Ahead On HDTV Broadcasts*, NEWSBYTES NEWS NETWORK, Sept. 11, 1992, available in WESTLAW, Business Library, PTS-Promt File.

35. *Id.*

36. Electronic consumer manufacturers fear violating a section of the Clayton Act, 15 U.S.C. §§ 12-27 (1988), commonly referred to as the Merger Clause. The Merger Clause prohibits a company from acquiring the stock or assets of another company engaged in the same business if such acquisition results in less competition within the industry or in the creation of monopoly power. If found guilty of violating the clause, a company confronts treble damages, as well as the possibility of federal dissolution in a criminal proceeding. For a more detailed discussion of the effect of antitrust legislation on the HDTV industry, see David L. Glotzer, Note, *Reading Between the Lines: High Definition Television, Antitrust Reform and America's Chance to Get Back into the Television Business*, 10 CARDOZO ARTS & ENT. L.J. 127 (1991) (advocating relaxation of antitrust laws in order to promote American HDTV developers). *But see* David R. Gibson, Note, *High Definition Television, Joint Production Ventures, and the Antitrust Barrier*, 24 CORNELL INT'L L.J. 325 (1991) (arguing that the antitrust laws are not a barrier to the formation of an industry-wide HDTV joint venture).

37. Despite the Bush Administration's initial reluctance to structure a formal government-funded industrial policy, the government has now allocated funds for private firm research into high-technology industries. However, the U.S. government funds distributed for HDTV development are only a small fraction of the sum the Japanese government has dedicated to HDTV research and development. See Gibson, *supra* note 36, at 338.

38. Zenith television sets are now manufactured in Mexico. Thomson and Philips are the

Japan and Europe in television manufacturing ability.

These barriers, however, have not impeded the United States in taking the lead in the development of the next generation of HDTV technology: digital-based systems. Digital transmission uses a stream of 0's and 1's like a personal computer, rather than using traditional analog, or "wave," transmissions.<sup>39</sup> The development of these digital-based systems was motivated by the United States' unique decision to promote a nationally broadcasted HDTV system that will make the medium available to the public over broadcast transmission facilities.<sup>40</sup> HDTV distributed via terrestrial broadcast represents a major difference from the satellite transmission systems in Japan and Europe. Satellite transmissions are impractical and cost inefficient for the United States television system, because local programming occupies a significant portion of program time. A satellite system would require local stations to beam shows up to a satellite and then be beamed down into the same general area. In contrast, small European countries and Japan have a tradition of national broadcasting. As a result, satellite transmissions cause no major inconvenience.<sup>41</sup> The FCC's decision to transmit HDTV via terrestrial broadcast forced U.S. electronic manufacturers to develop a compression technique in which all the data required for an HDTV signal could fit into the six MHz of bandwidth allocated to a standard television channel.

General Instrument Corporation ("GIC") made a major breakthrough when it developed such a compression technique for use with an all-digital system. The GIC compression method packs all the 0's and 1's into a narrow broadcast spectrum without compromising the movie-like picture potential of HDTV.<sup>42</sup> In April 1992, GIC publically introduced digital HDTV when it demonstrated its DigiCipher system during the National Association of Broadcasters Conference and Exhibition in Las Vegas.<sup>43</sup>

By removing many of the technical flaws associated with analog transmission,<sup>44</sup> a digital system can offer better picture quality and lower

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two leading television manufacturers in the United States. Between the two companies, more than 15,000 workers are employed in ten plants in six states.

39. Leonard S. Greenberger, *U.S. Companies Leapfrog Foreign HDTV Technology*, PUB. UTIL. FORT., Feb. 1, 1991, at 52-53.

40. REGULATION AND THE NEW VIDEO MARKETPLACE (Pat Beattie ed., 1988).

41. Greenberger, *supra* note 39, at 52-53.

42. *Id.* at 54.

43. Harry A. Jessel, 1992: *The Year of HDTV?*, BROADCASTING, Mar. 23, 1992, at 62.

44. These technical flaws include higher energy output requirements and susceptibility to transmission problems, such as ghosts, snow (noise), and interference from other stations.

transmission costs. Digital HDTV could eventually store information and share it with computer and telecommunication equipment, making possible broader applications of HDTV technology.<sup>45</sup> Four of the five transmission standards the FCC is considering are digital.<sup>46</sup>

The European Community, Japan, and the United States have devoted tremendous resources to the development of HDTV. Each is poised to capture a significant share of the global and American HDTV market. The FCC's adoption of domestic standards is a significant factor in the determination of which party will be victorious in the United States. However, as detailed in the following section, ensuring participation of American companies in the domestic HDTV market is only one of the United States' considerations in choosing domestic HDTV standards.

## II. STANDARDS

Three distinct but interrelated categories of standards are applicable to HDTV: transmission, reception and production standards. Transmission standards determine the manner in which HDTV programs are distributed to viewers after they are produced.<sup>47</sup> Reception standards, closely linked to transmission standards, determine with which media the new HDTV sets will be compatible.<sup>48</sup> Production standards determine "the manner in which audio and visual information is recorded to create" an HDTV program.<sup>49</sup> Thus far, transmission standards have received the most attention.

The FCC and other government agencies involved in communication policy must pursue an assortment of often conflicting objectives in adopting a set of domestic HDTV standards. These objectives include bringing about a smooth transition from NTSC to HDTV; maintaining the American broadcast tradition of localism<sup>50</sup> and free program availability; ensuring the participation of American companies in the HDTV industry; and creating an HDTV system that is adaptable to change.

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45. Greenberger, *supra* note 39, at 54.

46. Glotzer, *supra* note 36, at 135 & n.62.

47. *Id.* at 134-35.

48. *Id.*

49. *High Definition Television: Hearing Before the House Comm. on Science, Space, and Technology*, 101st Cong., 1st Sess. 77 (1989) [hereinafter *HDTV House Hearing*] (statement of National Telecommunications and Information Administration).

50. Localism is a policy by which each local television system is encouraged to address issues of local significance.

First, the transition from conventional television to HDTV should be implemented without complete disruption of the national broadcasting system. Adopting standards which immediately cast NTSC sets and related equipment into obsolescence would be unfair to both consumers and broadcasters. Consumers would have to discard the 160 million conventional television sets in use today and purchase HDTV replacement sets.<sup>51</sup> In order to remain competitive, broadcasters would need to make an immediate investment of at least two million dollars per station for equipment upgrades.<sup>52</sup>

To maintain the United States' broadcasting policies of localism and free program availability, the new technology must be accessible to terrestrial broadcasters. If it is not, terrestrial broadcasters would be severely disadvantaged in relationship to other users of media<sup>53</sup> on which HDTV will be available.<sup>54</sup> The possible result is the decline of broadcast viewer market share and the gradual phasing out of broadcast television. As a result, free television could be replaced by a system in which programming is available only upon payment of a subscription fee or after a costly investment in specialized hardware.

To ensure conventional broadcast participation in HDTV, the government must set official standards and not adopt a laissez-faire approach in which the marketplace would determine the standards. The amount of government regulation to which terrestrial broadcasting must conform distinguishes it from other potential methods of HDTV transmission. A television program distributed via terrestrial broadcast must abide by the NTSC requirements, most of which are not compatible with HDTV.<sup>55</sup> Before terrestrial broadcasters can make the changes

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51. *Developing a National Technology Strategy for High Definition Television: Hearings Before the Subcomm. on Science, Technology and Space of the Senate Comm. on Commerce, Science, and Transportation*, 101st Cong., 1st Sess. 100 (1989) [hereinafter *HDTV National Technology Hearing*] (statement of John Abel, Executive Vice President, National Association of Broadcasters).

52. According to 1990 studies, each broadcast station will need to make an initial investment of two to three million dollars in order to offer the minimum levels of HDTV service. The estimated cost to complete the transition is 12 to 13 million dollars. Jessel, *supra* note 43, at 64.

53. Potential HDTV mediums include terrestrial broadcasting, cable television, satellite broadcasting, video cassette and fiber-optic cable.

54. See *HDTV House Hearing*, *supra* note 49, at 40-41 (statement of Alfred C. Sikes, Assistant Secretary for Communications and Information).

55. These requirements include use of a six MHz channel, a four-by-three screen dimension, and 525 scanning lines per frame. See *id.* at 81 (statement of National Telecommunications and Information Administration).

necessary to implement features for HDTV, the government needs to set the new standards by which they must abide. Other program distribution methods, such as cable and videocassette tapes, are not as restricted in the features they must adopt, although many of them voluntarily duplicate the standards used by terrestrial broadcasting.<sup>56</sup> The absence of official standards would permit distributors using these methods to introduce equipment, and thereby create a *de facto* standard via recorded media.<sup>57</sup> Because the Japanese and Europeans are already manufacturing HDTV software and hardware, adoption of such a *de facto* standard could considerably decrease opportunities for American participation in the domestic HDTV market. Foreign electronics companies could place their products on the market and win market share before their American counterparts could do so. Domestic standards set by the FCC, on the other hand, would place all manufacturers at the same starting point in designing and introducing HDTV products in compliance with FCC requirements.<sup>58</sup>

The FCC must also set these standards quickly so that the United States can effectively launch its HDTV system. Delays place manufacturers farther behind in the competition to win HDTV market share and to benefit from related technological product markets. Yet, the need to act quickly must be balanced with the objective of choosing a flexible standard, as opposed to one that will rapidly become obsolete or lock in inferior technologies.

The necessity to achieve this balance was already illustrated by the FCC's delay in adopting a transmission standard.<sup>59</sup> The FCC's

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56. See *id.* at 59.

57. See *id.* at 63 (statement of North American Philips Corp.).

58. The FCC will require the winner of the HDTV system to make any relevant patents it owns available to other manufacturing companies either free of charge or on reasonable and non-discriminatory terms. 57 Fed. Reg. 21,744, 21,749 (1992). Nevertheless, there will still be a significant amount of foreign competition in the U.S. HDTV market. Foreign companies can adapt their hardware (HDTV sets) to accept United States broadcasts no matter what the transmission format. Hence, even if a domestic transmission technique is adopted, many foreign firms will still have an advantage over domestic firms in the production of hardware. If the system is digital, U.S. manufacturers could still gain from the components of the high definition television sets. American-made logic chips would probably be a central component of a set for a digital system. The logic chips process the signal and turn the digital bits into a crisp picture. See *Few See Japan, supra* note 14.

59. This is not meant to imply that the United States lag in the HDTV race is attributable to a lack of HDTV standards. On the contrary, the delay in setting standards is a manifestation, as opposed to a cause, of the United States' late arrival to the HDTV market. A number of factors have contributed to the domestic HDTV market's delay in arriving at a point at which standards could be established: the need to develop a system that

Advanced Television Advisory Committee was originally scheduled to begin testing of systems in 1991, but new adoption of a standard is scheduled for late 1993.<sup>60</sup> As it turned out, however, the delay was opportune. Originally, only analog systems had been submitted for testing.<sup>61</sup> Since General Instrument developed and submitted its all-digital HDTV system in 1990-91, four of the five transmission standards being considered have been upgraded from analog to digital systems.<sup>62</sup>

#### A. Transmission Standards

The proposals for domestic HDTV transmission standards fall into four categories: the alternative media approach, the non-compatible recorded HDTV approach, the NTSC receiver compatible approach, and the simulcast (or channel compatible) approach. In September 1990, the FCC decided that the HDTV system to be selected would operate on a standard six MHz channel and that the HDTV channel would be separate and independent of the existing NTSC channel.<sup>63</sup> Only two of the transmission alternatives can conform with the FCC decision: the NTSC receiver compatible approach and the simulcast (or channel compatible) approach. Of these, the FCC probably will adopt the simulcast approach. The five competing transmission technologies<sup>64</sup> the FCC is currently testing for adoption as the domestic standard all use the simulcast approach. Furthermore, the FCC has issued rules<sup>65</sup> in anticipation of adopting the simulcast approach.

The simulcast approach meets the U.S. HDTV implementation

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distributes HDTV via terrestrial broadcasting; the desire to consider digital systems; the reluctance or inability of the United States' consumer electronics companies to devote resources to HDTV research and development; and government attempts to develop HDTV policies that appease powerful interest groups, each with divergent objectives.

60. See *HDTV House Hearing*, *supra* note 49, at 82 (statement of National Telecommunications and Information Administration).

61. Greenberger, *supra* note 39.

62. See *supra* text accompanying notes 42-46.

63. First Report and Order, 55 Fed. Reg. 39,275 (1990).

64. Currently, the FCC is considering proposals for HDTV transmission technology submitted by the following groups: General Instruments Corporation ("GIC") in conjunction with the Massachusetts Institute of Technology ("M.I.T."); NHK of Japan; a joint venture between Zenith and AT&T; and a consortium consisting of SGS-Thomson of France, Philips Electronics of the Netherlands, Sarnoff Laboratories, and broadcaster NBC. GIC and M.I.T. have submitted two of the five proposals. NHK has submitted the only proposal based on analog technology. The other systems are digital. See Glotzer, *supra* note 36, at 135 n.62.

65. 57 Fed. Reg. 53,588 (1992).

objectives better than the three other options. Alternative media HDTV, such as the Japanese and European satellite systems, use a transmission method other than terrestrial broadcasting. Hence, an alternative media standard would fail to meet the United States' objectives of ensuring the participation of terrestrial broadcasters in HDTV, and, as a result, the continuation of localism and free program availability.<sup>66</sup> Nor would an alternative media system necessarily prompt consumers to accept HDTV since it would be in direct competition with NTSC. Similar objections apply to a non-compatible recorded media HDTV system, such as a high definition video cassette used on a high definition VCR.

The version of NTSC receiver-compatible HDTV submitted to the FCC for consideration is Enhanced Definition Television ("EDTV"). EDTV would require only slight alterations in current transmission and broadcast standards. The resulting television signal would be compatible with current television sets. However, the system would allow for only modest enjoyment of the potential benefits of HDTV.<sup>67</sup> Some broadcasters, hoping to delay or stagger the required investment in HDTV transmission and production equipment, recommend that HDTV be implemented in a two-step approach by beginning with EDTV and then upgrading to a full-scale HDTV system. However, EDTV could stymie consumer acceptance of a full capacity HDTV system. The United States might find itself technologically behind the rest of the world by being locked into a television system described as a "technological mouse" compared to HDTV.<sup>68</sup>

Simulcast HDTV will allow production of an HDTV-quality picture within the constraints of the current NTSC six MHz channel bandwidth. However, the technology will not be compatible with current NTSC sets because the spectrum will have to be used more efficiently.<sup>69</sup> This means that an HDTV signal will be broadcast on one station, while an

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66. See *supra* text accompanying notes 53-58.

67. Requiring HDTV compatibility with NTSC could lock in several technical flaws associated with NTSC: inefficient use of the available spectrum and susceptibility to transmission problems such as ghosts, snow (noise), interference from other stations, etc. Although some of these problems could be ameliorated through better antennae and electronic improvements, a new system would make a much more significant improvement.

68. Daniel Cerone, *TV's Turning Points; Technology and Legislation Will Affect What and How We Watch in 1992 and Beyond*, L.A. TIMES, Dec. 29, 1991, (TV Times), at 4 (quoting FCC chairman Alfred Sikes).

69. See *HDTV National Technology Hearing*, *supra* note 51, at 103 (statement of John Abel, Executive Vice President, National Association of Broadcasters).

NTSC signal is broadcast on another.<sup>70</sup> Under this system, the NTSC stations will be gradually phased out and eventually replaced by the HDTV stations.<sup>71</sup> Hence, both consumers and broadcasters will be allowed to stagger their investments in the equipment necessary to receive and transmit HDTV programming. This fulfills the goal for a smooth transition from NTSC to HDTV. The requirement that the system operate on a standard six MHz channel clearly carves out a role for terrestrial broadcasters. Furthermore, depending on the manner in which the standard is implemented, simulcast HDTV can provide flexibility.<sup>72</sup>

In order to prevent the transition to HDTV from being accompanied by a change in the ownership structure of the entire broadcasting industry, the FCC will initially make HDTV channels available only to existing broadcasters.<sup>73</sup> Each broadcaster will be eligible to have an HDTV channel as well as an NTSC channel.<sup>74</sup> The FCC stresses that allocation of two channels to each broadcaster will be a temporary arrangement until the completion of the conversion to HDTV, at which time each station will be forced to surrender one of its six MHz channels. The FCC envisions a gradual shift to HDTV and a phase-out of NTSC over a fifteen-year period.<sup>75</sup>

The exclusion of those who are not currently broadcasters from the application process for new HDTV channels arguably violates the Supreme Court decision of *Ashbacker Radio Corp. v. FCC*.<sup>76</sup> The case held that every applicant for a broadcast channel has a right to a hearing in which the FCC chooses the one applicant it feels will best serve the "public interest." Those who support a set-aside for existing stations agree that *Ashbacker* guarantees a fair hearing for all eligible applicants for a channel. However, according to this interpretation, the FCC may restrict the pool of eligible applicants, as long as it offers sufficient

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70. *See id.*

71. *See* 56 Fed. Reg. 58,207 (1991) (to be codified at 47 C.F.R. pt. 73) (proposed Nov. 18, 1991).

72. The degree of flexibility is highly dependent upon the type of reception standards that are adopted. *See* the discussion of Reception Standards *infra* part II.B.

73. 56 Fed. Reg. 58,207 (1991) (to be codified at 47 C.F.R. pt. 73) (proposed Nov. 18, 1991).

74. *Id.*

75. The FCC has ruled that complete conversion to HDTV will occur 15 years from the date of adoption of either an HDTV system or a plan for HDTV-channel allotment, whichever date is later. *See* 57 Fed. Reg. 53,588, 53,592 (1992) (to be codified at 47 C.F.R. pts. 73 & 74).

76. 326 U.S. 327 (1945).

public-interest justification for doing so.<sup>77</sup> The FCC has concluded that its method of HDTV-channel allotment is consistent with the *Ashbacker* decision,<sup>78</sup> reasoning that "existing broadcasters possess know-how and experience such that their continued involvement in [HDTV] is the most practical, expeditious, and non-disruptive way to bring improved service to the American public."<sup>79</sup>

But even if the HDTV license distribution method is technically consistent with *Ashbacker*, the set-aside seems to undermine open access to broadcast channels. Because the FCC will cease issuing new NTSC licenses once the assignment of new HDTV licenses is complete,<sup>80</sup> hopeful new broadcasters will be blocked from acquiring any new channel frequencies.

However, those who do not currently hold licenses will not be completely locked out of television broadcasting. Aspiring broadcasters will still be able to purchase an existing channel.<sup>81</sup> New broadcasters will also be able to apply for HDTV frequencies if a NTSC licensee fails to take steps toward acquiring an HDTV license and initiating HDTV transmissions within a required time period.<sup>82</sup> Furthermore, they will be able to file competing applications when HDTV licenses come up for renewal.<sup>83</sup> However, these options might prove to be illusory opportunities for budding broadcasters. NTSC licensees applying early for HDTV licenses would have at least six years in which to construct an HDTV broadcast facility.<sup>84</sup> In the event that a broadcaster failed to meet the deadline, the FCC could conceivably grant a hardship extension upon the showing of a good faith effort. Nor is there any security in the

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77. See 57 Fed. Reg. 21,744, 21,745 (1992) (to be codified at 47 C.F.R. pts. 73, 74, & 75); see also Harry A. Jessel, *FCC's New Licensing Plan: Members Only*, BROADCASTING, Aug. 26, 1991, at 50. Another interpretation of *Ashbacker* is that such a procedure would be legal if the Commission adopts a strict definition of simulcast requiring 100% of HDTV programming in duplication of NTSC programming. See Randall M. Sukow, *FCC to Tackle Tough Issues of HDTV Simulcasting*, BROADCASTING, Oct. 14, 1991, at 32.

78. 56 Fed. Reg. 58,207 (1991).

79. 57 Fed. Reg. 21,744, 21,745 (1992).

80. *Id.* at 21,748. There is already a freeze on NTSC applications in major markets.

81. According to the rules, HDTV licenses will not be transferable independent of the associated NTSC license, nor vice versa. *Id.* at 21,745.

82. Broadcasters will have three years from the date on which the frequencies become available to apply for a construction permit. Broadcasters will have an additional three years to construct an HDTV broadcast station or forfeit the permit. 57 Fed. Reg. 53,588, 53,589 (1992) (to be codified at 47 C.F.R. pts. 73 & 74).

83. The FCC will issue HDTV licenses for periods concurrent with the license of the associated NTSC channel. 57 Fed. Reg. 21,744, 21,745 (1992).

84. 57 Fed. Reg. 53,588, 53,589 (1992).

prospect of an aspiring broadcaster acquiring a channel when the license of an existing broadcaster comes up for renewal. The history of the FCC reveals a strong preference for license renewal of incumbent licensees, and statistics overwhelmingly indicate that an existing broadcaster's application for license renewal will be approved.<sup>85</sup>

Preventing the transition to HDTV from disrupting the current broadcasting system is a legitimate FCC concern; however, this concern does not justify potentially blocking aspiring broadcasters from acquiring licenses for an extended period of time. A "fair" procedure would require that the FCC allocate HDTV licenses to current NTSC licensees while reserving a certain percentage of HDTV licenses for new applicants. Admittedly, there may not be enough HDTV licenses to allocate to all the existing broadcasters. However, the FCC must realize that fully integrating HDTV into the U.S. marketplace will inevitably create some disruptions. A possible solution would be to take one HDTV license from each large broadcasting company having multiple NTSC licenses and to place that HDTV license in reserve for new broadcasters.<sup>86</sup>

The FCC is currently considering options for the definition and regulation of simulcast HDTV channels. It has decided to require 100% simulcasting at the "earliest appropriate time."<sup>87</sup> That time is scheduled for a date within nine years after the adoption of an HDTV standard.<sup>88</sup> This method of implementing simulcasting is preferable to both the marketplace approach and the flexible approach.

Under the marketplace approach, the FCC would neither define the term simulcast nor set regulations controlling content on HDTV channels. Because broadcasters could conceivably offer all the quality programming on HDTV, this approach might fall short of the FCC's stated objective of protecting consumers from immediately having to invest in new television receivers to receive quality television programming during the transition period.<sup>89</sup> Under the flexible approach, the FCC would

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85. See generally *Central Fla. Enters., Inc. v. FCC*, 598 F.2d 37 (D.C. Cir. 1978).

86. For example, a company with 10 NTSC licenses would receive nine HDTV licenses.

87. 57 Fed. Reg. 21,755, 21,757 (1992) (to be codified at 47 C.F.R. pts. 73 & 74) (proposed May 22, 1992).

88. 57 Fed. Reg. 53,588, 53,593 (1992). The FCC proposed that the simulcast requirement be implemented in two phases. Phase one, to occur within seven years after adoption of an HDTV standard, would require broadcasters to simulcast 50% of each day's programming. Phase two would occur two years later and would increase the simulcast requirement to 100%. *Id.*

89. 56 Fed. Reg. 58,207, 58,212 (1991) (to be codified at 47 C.F.R. pt. 73) (proposed Nov. 18, 1991).

impose simulcast regulations after formation of a significant HDTV marketplace. The formation of such a market, however, would be difficult, because implementing HDTV requires a large capital investment on the part of each broadcast station without any guarantee of an immediate and satisfactory return.<sup>90</sup> Hence, without simulcast requirements, broadcasters may not have the incentive to make the financial investment required to produce and acquire quality HDTV programming. The absence of programming which could attract enough viewers would prevent formation of the significant HDTV market for which the FCC would be waiting.

Some level of regulation, such as that offered by the current FCC policy, is needed. Still there are potential problems associated with the regulations. First, requiring 100% duplication raises potential First Amendment implications.<sup>91</sup> In addition, the FCC must still define what constitutes simulcasting. An overly strict interpretation of simulcast would place an undue burden on broadcasters to devote a majority of their resources to acquiring HDTV programming and studio equipment. Thus, while the FCC has made preliminary decisions on many of the issues related to transmission standards, ~~other issues remain to be resolved.~~

### B. Reception Standards

Reception standards determine the compatibility of terrestrial HDTV with other forms of transmission and applications, such as satellite broadcasts, video cassette recorders, and computer applications. The degree of compatibility is determined by the type of receiver (or set) that is chosen. There are currently four categories of proposals for receivers: closed receivers, multipoint receivers, open architecture receivers, and "smart" receivers.<sup>92</sup> Each involves trade-offs between flexibility, unit cost, and ease of operation for the consumer.

Use of closed receivers would require a single standard for all media. Since these receivers would be similar to the television sets in use today, they would be simple for consumers to operate. They would also be the least costly of the four alternatives. On the other hand, because there

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90. See *supra* note 52.

91. FCC to Tackle Tough Issues of HDTV Simulcasting, BROADCASTING, Oct. 14, 1991, at 32.

92. See THE BIG PICTURE, *supra* note 4, at 58.

would be one standard, the HDTV signal of each transmission method would have to be compressed to fit into the channel with the most constrained bandwidth.<sup>93</sup> As a result, consumers would not receive the advantage of enhanced picture quality offered by other mediums; the quality would be limited to that available over the weakest transmission link.<sup>94</sup> More importantly, such a system would be susceptible to obsolescence because no improvements in broadcast standards or additions in HDTV options could be accommodated without making changes in the receiver.

Multiport receivers would have multiple ports, each of which could receive a separate incompatible signal.<sup>95</sup> Although it could take full advantage of the picture quality offered by each medium, the multiport would not be an efficient alternative to the closed receiver. The cost would be greater, especially as the number of signals the receiver needed to accommodate increased. At the same time, the multiport receiver would share the closed receiver's limitations in adaptability to changing broadcast standards and supplemental HDTV options.

Open Architecture Receivers ("OAR") would accept a variety of standard plug-in circuit boards. The sets could be modified over time to accept a wide variety of signals and standards and could provide other services, including home computing and telecommunications. The OAR is criticized for being too complex. The National Association of Broadcasters, for example, expressed concern that consumers would be burdened with an expensive television set and computer that would need additional hardware and software to display HDTV pictures.<sup>96</sup>

The most technologically advanced proposal for receivers is the "smart receiver." Smart receivers would adjust to a wide variety of transmission standards by automatically decoding the transmission format.<sup>97</sup> Both the OAR and smart receiver are very costly, so they could delay the acceptance of HDTV by consumers unwilling to purchase the necessary hardware.<sup>98</sup>

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93. See *HDTV House Hearing*, *supra* note 49, at 208 (statement of Jules A. Bellisio, District Manager, Digital Signal Processing Research, Bellcore). As a result of the FCC decision to transmit HDTV via a standard channel, the most constrained bandwidth would be six MHz, that of terrestrial broadcasting.

94. See *id.*

95. THE BIG PICTURE, *supra* note 4, at 58.

96. See *HDTV National Technology Hearing*, *supra* note 51, at 102 (statement of John Abel, Executive Vice President, National Association of Broadcasters).

97. See THE BIG PICTURE, *supra* note 4, at 58.

98. See *HDTV Technology Hearing*, *supra* note 51, at 109 ("Another significant unknown

At this point, the FCC has taken no firm steps toward the adoption of fixed reception standards. In the absence of official government standards, the market choices will result in a de facto decision. The potential advantage of such a scenario is that consumers will be able to choose from receivers offering different features and price ranges. The potential disadvantage is that many consumers may select receivers doomed for obsolescence and then be obliged to bear the expense of upgrading HDTV receivers.<sup>99</sup>

### C. Production Standards

Production standards are significant because they affect the costs of and the difficulty associated with distributing programs internationally. There is not a single international standard for color television; however, "transcoding techniques"<sup>100</sup> can successfully convert from one standard to another without any significant losses in quality or excessive costs. Because the sale of programming is a major export industry for the United States, the United States originally supported the adoption of a global HDTV production standard. The Western European nations blocked acceptance of the standard under consideration—the Japanese-developed 1125 line, sixty Hz—at the 1986 Plenary Assembly of the International Radio Consultative Committee.<sup>101</sup> Currently, one international standard is unlikely to be implemented. However, transcoding techniques to allow conversion from one to the other may be developed. In any event, the FCC has indicated that it will assume its historical stance and allow the film industry standard-setting bodies to set a production standard.

Adopting standards and placing HDTV on viewers' sets is phase one of HDTV's introduction into U.S. culture. Phase two concerns whether HDTV will meet its potential as the root of an information-technological revolution or simply remain a prettier picture on a different type of

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is whether any of the many proposed advanced television technologies can sustain the higher receiver prices that generate all the rosy economic forecasts of the HDTV market. In the television industry's view, whatever standard is selected should be as economical as possible in order to maximize the chances for consumer acceptance.").

99. An analogous phenomenon took place upon the introduction of videocassette recorders ("VCR's"). Consumers who purchased beta-capable VCR's were forced to replace them with VHS-capable VCR's when VHS became the de facto standard.

100. See THE BIG PICTURE, *supra* note 4, at 56.

101. HDTV House Hearing, *supra* note 49, at 79 (statement of National Telecommunications and Information Administration).

television set. The answer depends upon whether or not the United States develops the infrastructure needed to accommodate HDTV's interactive capability. Part III addresses this issue.

### III. ROLE OF TELEPHONE COMPANIES IN HDTV: CONSTRUCTING A FIBER-OPTIC HIGHWAY TO THE FUTURE

#### A. HDTV/Telco Synergy

HDTV is an initial step toward the construction of an integrated telecommunications and computer system which will offer interactive services to consumers. The system will offer access to a wide variety of services so that any home or office can be turned into a library, conference center, shopping mall, or movie theater. The development of HDTV digital-based systems will enable HDTV to interface with high-speed personal computers that can store, manipulate, and transmit large amounts of data. Needed to complete this television-based communications console is a mechanism by which broad bandwidths of audio, video, and computer data can be carried back and forth between consumer homes or businesses and the information service providers. Enter the telephone company and "ISDN."

ISDN,<sup>102</sup> or an Integrated Services Digital Network, requires a major upgrade of the current voice-based telephone network into a network that can carry all types of electronically transmitted digital information.<sup>103</sup> Such a network would consist of a software-driven service implemented by digital central office switching equipment and delivered over public telephone lines.<sup>104</sup> The network would enlarge the types of services available over a telephone line to include consumer control of video services such as pay-per-view, video on demand, interactive home video, and interactive business applications, such as production-line trouble-

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102. ISDN is "[a] digital transmission network which is able to integrate voice, data and other services over a common transmission medium. An integrated telecommunications network carrying both voice and data must be completely digital, with sufficient bandwidth to handle the large amounts of information involved. The aim is to allow any communications device—telephone, facsimile or computer—access to the network through a standard wall socket and to transmit digital information to other devices similarly connected." MEADOWS, *supra* note 2, at 130.

103. *See generally* COHEN & DONOW, *supra* note 21, at 8-13.

104. *See id.* at 10.

shooting and on-the-spot deposition taking.<sup>105</sup>

Currently, the majority of residential homes receive telephone calls via analog transmission over an electrical configuration consisting of two pairs of twisted copper lines. The configuration is frequently called a "twisted pair."<sup>106</sup> A twisted pair can normally carry between a few hundred kHz and a few MHz of information.<sup>107</sup> When combined with a narrow band ISDN ("N-ISDN"), copper lines will have the potential to carry 1.54 Mbps of information.<sup>108</sup> This capacity could accommodate interactive digital computer information services and a modest quality video signal for teleconferencing.<sup>109</sup> However, to accommodate high resolution motion video (e.g., HDTV), telephone companies would need a broadband ISDN ("B-ISDN") system with fiber-optic cable. Fiber-optic cables would enable ISDN to carry efficiently the large amount of data in an interactive television system. Fiber-optic cables, strands of glass roughly equal in diameter to a strand of hair, have 30,000 times the capacity of traditional copper wires.<sup>110</sup> Information such as voice, data, or video can be transmitted as light through the filaments.<sup>111</sup>

Cable companies are also in the process of taking advantage of fiber-optic cable connections.<sup>112</sup> A cable system constructed with fiber-optics could provide high-quality HDTV video, but it would have no switching system. This means that, unlike a similar system constructed by the telephone company, the cable system could not offer interactive programming. However, a cable system combined with an N-ISDN system could provide some interactive information systems without high

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105. *Id.*

106. See THE BIG PICTURE, *supra* note 4, at 46.

107. The amount of information the twisted pair can carry is determined in large part by the distance between amplifiers along the line. See *id.* Because signals grow weaker as they travel greater distances, repeaters are used along the line to electronically amplify those signals that must travel long distances. Amplifiers can be either analog or digital. In addition to amplifying the signal, digital amplifiers (also called digital or regenerative repeaters) recover the data in the signal and emit a new digital signal. As a result, a digital signal produces far less distortion than an analog signal. See *id.* at 41.

108. *Id.* at 47.

109. Such teleconferencing can only be achieved by compressing the digital signal. See generally *id.*

110. Cerone, *supra* note 68, at 4.

111. Advantages of fiber over cables and wires include wider bandwidth and longer spacings between repeaters, lower weight, immunity to electrical interference, higher reliability, and lower maintenance costs. See THE BIG PICTURE, *supra* note 4, at 46.

112. Cable companies have traditionally used coaxial cables. Coaxial cables consist of a central copper wire surrounded by an insulator and a copper shield around the insulator. Current coaxial cable systems, which have bandwidths from 300 to 550 MHz, are capable of carrying between 35 and 80 video channels.

quality video. This might be a good interim solution until a B-ISDN system is developed. Alternatively, it could merely delay the modernization of the U.S. infrastructure.

Hence, HDTV and the telephone system have a synergistic relationship. Because B-ISDN could provide the broad bandwidth and the quality transmission required to bring out the full potential of HDTV, as well as the switching network to enable interactive video, the existence of such a network could play a crucial role in HDTV's successful penetration of the consumer marketplace. In turn, the potential of HDTV could motivate the telephone companies to complete construction of a national fiber-optic B-ISDN.<sup>113</sup> The cost of providing all residential homes with fiber-optic cables is estimated to be between \$150 billion and \$500 billion.<sup>114</sup> The price of fiber-optic cable is low enough so that its increased carrying capacity makes it cost effective for phone companies to use fiber rather than copper in new high-density residential developments.<sup>115</sup> However, because copper is an efficient conductor of voice, the telephone companies have little incentive to make the required investment to replace copper wire with fiber if they are not allowed to benefit financially from the network's new ability to accommodate data and video transmissions.

Interest groups within the media industry want to restrict the telephone companies' participation in the information services market to the role of leasing the lines to HDTV program and service providers. The telephone companies, however, wish to provide programming and services that travel over the lines. A combination of factors block the extent to which telephone companies can provide services. First, an assortment of current statutory and regulatory provisions limit the actions of phone companies. Cross ownership prohibitions, codified in the Cable Communications Policy Act of 1984,<sup>116</sup> prevent telephone companies from owning cable systems or providing video service in areas where they also provide telephone service.<sup>117</sup> The provision does not apply in rural communities having a population of under 2500. Interest groups

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113. The current fiber network system is concentrated in digital voice and data going to businesses, and digital voice, data, and video going to residential homes on a trial basis.

114. Thomas McCarroll, *A Giant Tug-Of-War; New Technology and Deregulation Are Blurring the Lines Between Telephones and Cable TV, Provoking a Battle for America's Homes*, TIME, Feb. 24, 1992, at 36.

115. REGULATION AND THE NEW VIDEO MARKETPLACE, *supra* note 40, at 30.

116. 47 U.S.C. § 533 (1988).

117. *Id.*

from the cable, publishing, and broadcasting industries have banded together in the hopes of maintaining the cross-ownership restrictions.<sup>118</sup> The telephone companies have responded in kind by launching their own lobbying campaign.<sup>119</sup> In addition, the Modified Final Judgment,<sup>120</sup> resulting from antitrust litigation against the Bell System, bars the Bell Operating Companies ("BOC's") from interexchange service, equipment manufacturing, information services, and non-telecommunications businesses.

### B. Recent and Pending Legislative, Administrative, and Judicial Developments

Lobbying by the telephone companies has motivated pending legislation, judicial decisions, and regulatory action that may result in the complete repeal of the restrictions on services offered by telephone companies. The thrust of the recently passed Cable Television Consumer Protection and Competition Act of 1992<sup>121</sup> is to return to local and city governments much of the regulatory jurisdiction over cable TV systems which the 1984 Cable Act took away.<sup>122</sup> More importantly for HDTV, the bill encourages local governments to license more than one cable franchise and to encourage competition from other industry members such as wireless cable companies and the telephone companies.

The original Senate version of the Act<sup>123</sup> proposed raising the rural exemption to include areas having populations of up to 10,000. Ultimately, Congress adopted the House of Representatives' position<sup>124</sup> on rural exemptions and left the authority to define "rural area" for

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118. *Wired For Failure? Will the Global Telecommunications Revolution Leave The U.S. Behind?*, FED. NEWS SERVICE, Jan. 24, 1992 (Special Transcript).

119. *Id.*

120. The Modification of Final Judgment (the "Decree") was the culmination of over three decades of antitrust litigation by the Justice Department against the formerly integrated Bell System. The decree mandated that the Bell System be divided between seven monopoly local exchange businesses (Regional Bell Holding Companies or "RBHC's") and the competitive long-distance and manufacturing businesses (AT&T). Among the RBHC's, there are 22 operating affiliates (Bell Operating Companies or "BOC's").

121. Pub. L. No. 102-385, § 12, 106 Stat. 1460 (1992).

122. The new Act will give local governments authority to regulate rates where there is no effective competition; forbid cable program services from refusing to deal with wireless cable, direct broadcast satellite, and other emerging technologies; limit the number of program services a cable system operator may own or hold partial interest in; and set a maximum number of homes which a cable system can serve.

123. S. 12, 102d Cong., 2d Sess. (1992).

124. H.R. 485C, 102d Cong., 2d Sess. (1992).

purposes of cross-ownership restrictions with the FCC.<sup>125</sup> Accordingly, the FCC is currently seeking comment on proposed rules that would allow telephone companies to provide video programming directly to subscribers in areas with fewer than 10,000 people.<sup>126</sup>

The Communications Competitiveness and Infrastructure Modernization Bill<sup>127</sup> was designed to encourage the construction of an ISDN network and to increase competition within the cable industry. The bill would have repealed a provision of the Cable Act in order to allow cable-telephone company cross-ownership. The bill proposed allowing telephone companies to own up to twenty-five percent of the program services distributed through their systems. The telephone companies would have been committed to using the profits earned by providing the services for construction of a nationwide, wideband fiber-optic network. The bill specified 2015 as the mandatory completion date for the network.<sup>128</sup> The bill was not enacted into law before the close of the Congressional session. However, because Vice-President-Elect Al Gore was a principal sponsor of the bill, similar legislation could very well be introduced during the next Congress. The telephone companies have mixed feelings about the proposed legislation. They want to participate in cable but are concerned about completing a B-ISDN network by 2015.

While Congressional action remains pending, judicial and regulatory agencies are gradually eroding the power of the cross-ownership ban. In a recent Court of Appeals decision,<sup>129</sup> Judge Harold Greene allowed telephone companies limited participation in information services that provide computerized information, such as stock quotes, sports scores, and an electronic version of the Yellow Pages. The FCC recently amended its rules on "video dialtone"<sup>130</sup> as an interim solution to the cross-ownership prohibitions.<sup>131</sup> The new rules allow telephone companies to lease space on their broadband telephone networks to cable operators and other program providers on a nondiscriminatory basis.

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125. H.R. CONF. REP. NO. 862, 102d Cong., 2d Sess. (1992).

126. 57 Fed. Reg. 41,118 (1992) (to be codified at 47 C.F.R. pt. 63) (proposed Sept. 9, 1992).

127. There were versions of this legislation in both the House, H.R. 2546, 102d Cong., 1st Sess. (1991) and the Senate, S. 1200, 102d Cong., 1st Sess. (1991).

128. See 137 CONG. REC. S7054 (daily ed. June 5, 1991) (statement of Rep. Burns).

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

130. 57 Fed. Reg. 41,106 (1992) (to be codified at 47 C.F.R. pt. 63).

131. The FCC also recommended that Congress amend the cross-ownership ban and permit telephone companies to provide video programming directly to consumers. . . . at 41,107.

Once telephone companies act on the opportunities created by the new rules, consumers will be able to call and order the services they want. Telephone companies will also be able to provide consumers with on-screen menus and search features listing services available from all program providers.<sup>132</sup> Many telephone companies, impatient for a complete repeal of cross-ownership restrictions, argue that the rules do not go far enough.<sup>133</sup>

In any event, the telephone companies are not idly waiting for the elimination of the last remnant of cross-ownership restrictions. They are already positioning to provide alternative services in video entertainment and information services when and if cross-ownership restrictions are lifted. Most of the regional holding companies have also announced trials to carry optical fiber into residential homes. The trials will be utilized for basic telephone service, but the design will contain the flexibility to provide other services.

Modernization of the United States' infrastructure is critical to improving the country's competitive and economic positions. Japan is prepared to invest up to a quarter of a trillion dollars in its Information Network System ("INS"), the equivalent of U.S. plans for B-ISDN. Japan's network is scheduled for completion by the year 2000, at which point development of applications will begin. Hence, the INS will act as a driving force behind Japan's future development and export of telecommunications applications. In Western Europe, France and Germany are taking the lead in the development of ISDN. Programs are being guided by national organizations and through the European Community.<sup>134</sup> In contrast, the U.S. government has not provided support for ISDN construction. Instead, the country is relying on the individual phone companies to update the network. As mentioned above, the telephone companies have no incentive to make the investment for the digital and fiber-optic conversion if they cannot financially benefit from

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132. Harry A. Jessel, *Video Dialtone Falls Short For Telcos*, BROADCASTING, Feb. 10, 1992, at 48.

133. *See id.* (quoting Bell Atlantic as responding to an FCC inquiry about how to get telephone companies more involved in providing information services by stating that, "[i]f the FCC is to attain its goals and 'consumers are to reap the benefits of true competition, telephone companies must be permitted to compete in both the transport and creation of video programming"). Cable companies and municipalities are dissatisfied with the proposal because telephone companies and their programmer customers would be exempt from having to acquire a municipal franchise from local governments.

134. *See* COHEN & DONOW, *supra* note 21, for a more complete discussion of Japan's and Europe's ISDN programs.

the capabilities of the network.

Cable, broadcasting, and publishing companies raise some valid objections to the provision of information services by telephone companies. The principle concern is that the Bell Operating Companies ("BOC's") will use their respective monopoly powers over the network facilities to exclude from the market competing information service providers, who must depend on the network to disseminate their programs. The BOC's could, for example, use revenue from residential telephone services to subsidize the development of entertainment programming or other information products. They could also hinder their competitors' access to network support systems, technical information, and billing and collection mechanisms. The consumer market information to which the BOC's have access through phone bills could afford another unfair advantage. Competitors could gain the same information only through expensive surveys.<sup>135</sup>

Uncertainty concerning the FCC's ability to monitor the cross-subsidizing activities and other anti-competitive behavior of the BOC's does not help.<sup>136</sup> According to witnesses at a March 1992 Economic and Commercial Law House Subcommittee Hearing, budgets for monitoring antitrust violations have been drastically cut in recent years.<sup>137</sup> One viable option is a requirement that telephone companies offer video services through separate subsidiaries with separate books and personnel.

In the end, participation by telephone companies appears inevitable, as well as appropriate. The approaching technological revolution inspired by HDTV and related high resolution systems demands this participation. The interest groups blocking it are in large part motivated by a self-serving desire to maintain the status quo. The revolution will no doubt alter the manner in which these interest groups function in society. Rather than obstinately blocking progress, these groups would be better served by seeking methods to adapt to and to capitalize on it.

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135. See STAFF OF SUBCOMM. ON ECON. & COM. L., HOUSE COMM. ON THE JUDICIARY, 101ST CONG., 2D SESS., REVIEW OF NATIONAL TELECOMMUNICATIONS POLICY 710-11 (Comm. Print 1990) (statement of the National Newspaper Association).

136. See Randy Sukow, *Brooks Skeptical of FCC Ability to Watch RBOC's*, BROADCASTING, Mar. 23, 1992, at 46.

137. See *Competition Policy in the Telecommunications Industry: A Comprehensive Approach (Part III): Hearing Before the Subcomm. on Economic and Commercial Law of the House Comm. on the Judiciary*, 102d Cong., 2d Sess. (Mar. 18, 1992).

## CONCLUSION

High Definition Television is without question on a fast path leading to American television sets. The manner in which HDTV is delivered, the nationality of the sets on which it is viewed, and the entities allowed to offer HDTV programs and services are issues to be determined by warring interest groups in the political and regulatory arena and by competitors in the international marketplace. Viewers are advised to stay tuned.