Scarcity of the Airwaves: Allocating and Assigning the Spectrum for High Definition Television (HDTV)

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Scarcity of the Airwaves: Allocating and Assigning the Spectrum for High Definition Television (HDTV)

by

JANINE S. NATTER*

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* J.D., Hastings College of the Law, 1991; B.A., International Relations, American University, 1987. The author dedicates this Note to her mother, Sylvia Natter, who has greatly influenced her life. She also thanks David Siddall, Senior Attorney, FCC, and Gregory M. Schmidt, Esq., of Covington & Burling, Washington, D.C., for their assistance. Last, but definitely not least, she thanks her family and her roommate, Val.

This Note is being entered in the fourth annual Catholic University Communications Law Institute Writing Competition.
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Introduction

Technological innovation has become a constant in our rapidly evolving society. The entertainment industry is no exception. Consumers spend billions of dollars each year to receive the best in audio and video equipment. The patterns of technological innovation and consumer spending are evidenced by the transitions in radio (AM to FM stereo); video recorders (Beta to VHS and super VHS); sound recordings (records to compact discs and digital audio tapes); television (black-and-white to color); and photography (black-and-white to color). Currently, we are faced with yet another transition, from standard color to High Definition Television (HDTV).

HDTV promises high quality pictures and digital sound, neither of which can be achieved with the present color television system. HDTV will require new equipment and transmission standards to process the additional information necessary to create better quality television viewing. Terrestrial broadcasters require a certain amount of space on the electromagnetic spectrum to transmit broadcast television signals that are free from interference. If broadcasters are not granted sufficient spectrum, HDTV will pose a threat to the universal, free, and local television system that exists in the United States.

The broadcast industry’s ability to implement HDTV is more restrained than that of the nonbroadcast industries like cable and satellite communications, which may implement HDTV at the first opportunity.

1. Although Beta is qualitatively superior to VHS, VHS cassettes have longer playing time. Telephone interview with David Siddall, Senior Attorney, FCC, Washington, D.C. (Oct. 9, 1990) [hereinafter 1990 Siddall Interview].
2. HDTV should be available by late 1990. The early sets will cost at least $2500, but these costs should quickly decline as volume increases. Brown, Battling Over Your TV, Newsday, June 24, 1990, (Sun. Magazine), at 12, col. 1.
3. Id. col. 2.
4. “Terrestrial” is a term used to describe the transmission of a signal from one earth station directly to another. See THE BROADCAST COMMUNICATIONS DICTIONARY 220 (3d ed. 1989) (“over the air broadcasting from land-based antenna”) (emphasis in original). This is distinguished from satellite broadcasting, which also transmits a signal from one earth station (aerial) to another, but the signal is relayed via an orbiting satellite. Id. at 190 (“separate television broadcast facility transmitting nearby station’s air material, increasing local coverage”) (emphasis in original).
5. The electromagnetic spectrum is composed of bands of frequencies with different characteristics. Each frequency band can accommodate a certain number of spectrum users. FCC, INFORMATION BULLETIN, FREQUENCY ALLOCATION 1-3 (1988) [hereinafter FCC, INFORMATION BULLETIN].
6. ASSOCIATION OF MAXIMUM SERVICE TELECASTERS, INC., HDTV AND THE LOCAL BROADCASTER (1988), reprinted in High Definition Television: Hearing Before the House Comm. on Science, Space, and Technology, 101st Cong., 1st Sess. 438 (1989) [hereinafter House Technology Hearing]. Cable and satellite networks can adapt their bandwidth requirements and are less subject to interference difficulties on higher frequency waves than broad-
Unlike cable and satellite communications, broadcast signals are transmitted directly via land stations and are more susceptible to weather and land obstacles. Successful implementation of a competitive HDTV terrestrial broadcast system, therefore, depends on the Federal Communications Commission’s (FCC) decision regarding spectrum allocation.

The additional spectrum needs of broadcast HDTV presents the FCC with the difficult question of how to allocate the frequency channels on the spectrum. The current spectrum allocated to broadcast television is probably insufficient to transmit the additional information necessary for a broadcast HDTV system that is both competitive and qualitatively equivalent to the HDTV systems that will be adopted by the other communication mediums. Spectrum scarcity, a recurring theme confronting the broadcast industry, exists because there are insufficient frequencies to satisfy the needs of all the competing users. Users include cellular telecasters. Id.; In re Advanced TV Sys., Initial Comments of MST to Notice of Inquiry in MM Dkt. No. 87-268, at 43 (Nov. 18, 1987) [hereinafter Initial Comments of MST] (Comments can be viewed at the FCC Dockets Reference Room, 1919 M Street, N.W., Room 239, Washington, D.C. 20554 ((202) 632-7535) or ordered from International Transcription Servs., Inc., 2100 M Street, N.W., Suite 140, Washington, D.C. 20037 ((202) 857-3900).

Maximum Service Telecasters (MST) represents more than 250 local television stations in both the UHF and VHF spectrums. Moreover, these stations vary in their size, affiliation (i.e., network or independent), and financial base (public or private). In re Degradation of TV Brdct. Serv., Petition for Inquiry of the Ass’n of Maximum Serv. Telecasters 1 (Oct. 4, 1989) [hereinafter Degradation Petition for Inquiry] (A copy of the Petition for Inquiry can be obtained from MST, infra note 30, or from the HDTV Docket, MM Dkt. No. 87-268.).


8. The FCC was created to allocate fairly the broadcast spectrum among the various users. See National Brdct. Co. v. United States, 319 U.S. 190, 213 (1943).


10. See R. STERN, THE FEDERAL COMMUNICATIONS COMMISSION AND TELEVISION 1 (1979). The portion of the frequency band allocated to a particular applicant is known as a frequency channel. Because of various interference restrictions, only a limited number of frequency channels are available for industry use. Id.; see National Brdct. Co. v. United States, 319 U.S. 190, 211, 213 (1948). Spectrum scarcity is, therefore, a term of art. The spectrum itself is not scarce; rather, suitable spectrum is scarce because each spectrum user has certain characteristics that restrict its ability to transmit signals over certain frequencies on the spectrum.
ALLOCATING & ASSIGNING THE SPECTRUM FOR HDTV

phone providers, land mobile communications systems, cable, and microwave services.

The FCC determines the “use” of spectrum space by allocating spectrum to a particular service (e.g., 54-72 MHz to TV in 3 channels, 2-4). The channels allocated are then allotted to particular geographical regions (e.g., channel 2 to Boston, New York, and Washington). Allocation and allotment are accomplished by rulemaking proceedings. The final step is to assign the allotted channels to the parties interested in being licensed for that particular channel. If two or more mutually exclusive applicants apply for a particular license, the FCC will ordinarily conduct comparative hearings before assigning the license. In making its determinations of spectrum allocation and assignment, the FCC evaluates which applicant will best serve the “public interest, convenience, or necessity” standards of the Communications Act.

During the past decade, the FCC has experimented with alternative assignment schemes in an attempt to eliminate the costs and delays of comparative hearings. These alternatives range from auctions and lot-


12. ATV Tentative Decision and Further Notice of Inquiry, supra note 7, para. 76.
14. Id.
15. Id. See 5 U.S.C. § 553 (1988) (rulemaking statute). All interested parties have the opportunity to file comments with the FCC about the suggested “use” or “allotment” before final action is taken. See also ATV Tentative Decision and Further Notice of Inquiry, supra note 7, at paras. 139 nn.14 & 160.
17. Id.; see also Ashbacker Radio Corp. v. FCC, 326 U.S. 327 (1945) (when the FCC evaluates two mutually exclusive applications for a particular spectrum use they cannot deny one applicant a permit without first providing that applicant the opportunity for a hearing).
19. See IMPLEMENTATION SUBCOMMITTEE OF THE FCC ADVISORY COMMITTEE ON ADVANCED TELEVISION SERV., WORKING PARTY 1, REPORT ON SPECTRUM ASSIGNMENT OPTIONS, IS/WP1-0023, at 17-31 (July 24, 1990) [hereinafter WP1 REPORT] (contact Gregory Schmidt, Covington & Burling, P.O. 7566, 1201 Pennsylvania Ave., N.W., Washington, D.C. 20044, (202) 662-6000, for a copy of the report). When there are many applicants for a particular portion of the spectrum, comparative hearings delay the rapid implementation of the service and require substantial monetary resources from both the FCC and the parties seeking a license. In these situations a more expedient and inexpensive method of assignment may be preferable. Id. at 13, 17-19, 23-24, 30-31.

Author’s Note: The FCC Advisory Committee on Advanced Television Service was organized to advise the FCC on all facts and circumstances regarding HDTV. A planning subcommittee was arranged to examine the characteristics of advanced television systems, including spectrum needs, interfaces, economic factors, and market analysis. To effectively perform this role, the planning subcommittee created six working parties and two advisory
This Note emphasizes the importance of the FCC's role in the development and implementation of HDTV technology. Because HDTV will have a direct impact on the public sector, private industry must not unduly influence the important decisions regarding spectrum assignment. Private entrepreneurs are significant players in the television market and their personal economic interests in HDTV development may bias their judgment concerning the primary interest of the public and local communities. Deferring this decision to market forces may also be contrary to the Communications Act, which empowers the FCC to make spectrum decisions that are commensurate with the "public interest."

This Note discusses spectrum allocation and assignment as it relates to HDTV. Part I explains the importance of HDTV, its applications, and the need for a competitive broadcast HDTV system. Part II outlines the technical issues involved in implementing HDTV, including spectrum scarcity, compatibility, potential spectrum deficiency, and competing spectrum users. Part III discusses methods of assigning spectrum. This Note then proposes a fair and expedient method of assignment should the FCC be faced with the common situation of too many applicants for the available HDTV spectrum.

I

The Importance of HDTV

During the 1940s, the National Television Systems Committee (NTSC) developed transmission standards for broadcasting conventional monochrome (black-and-white) television. "Standards," used in this context, describe the number of scan lines shown on the television screen and the frequency at which these lines appear. The number and frequency

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23. *In re Advanced TV Sys.*, *Notice of Inquiry*, 17 F.C.C.2d 5125, paras. 5-6 (1987) [hereinafter *ATV Notice of Inquiry*].
quency of lines determine the resolution and clarity of the broadcast picture.24

These standards were updated to implement color television in the 1950s25 and stereo sound in 1984.26 Although the NTSC standards facilitated the change from monochrome to color and stereo television, they may not be able to produce the improved audio and video quality necessary for HDTV.27

HDTV broadcasting will dramatically improve the resolution and clarity of the conventional broadcast picture by increasing the number and frequency of lines on the television screen.28 Two side panels are added to the television screen to appreciate the wider picture offered by HDTV.29 These innovations will bring the movie theatre experience into the consumer's home. Viewers with HDTV will see their favorite television programs with a quality equivalent to that of a 35mm photograph and hear characters sing and speak with the clarity previously available

24. The NTSC television picture is produced by the successive flashing of 525 horizontal scan lines on the television screen at the rate of 30 times per second. Elmer-DeWitt, In Case You Tuned In Late, TIME, Dec. 21, 1987, at 59.
27. See ATV First Report and Order, supra note 25, para. 7. The slow scanning process of the NTSC system often produces an unclear picture due to static, low resolution, flicker around the borders of an object, and the appearance that the lines on the screen are in constant motion. See also ATV Notice of Inquiry, supra note 23, paras. 8-12.

Peggy Brown reported that "under ideal circumstances, a good HDTV picture can be so sharp that it looks like a brilliant, 35-mm color slide, with none of the fuzzy lines and 'ghosts' that are usually part of the TV-watching experience. Seeing a broadcast by NHK, the Japanese TV network that is now the world's leader in HDTV technology, is like having a close-up on the world through a clean window. On a smog-free day." Brown, supra note 2, at 14, cols. 1-2.

28. One proposed HDTV standard more than doubles the number of conventional scanning lines from 525 (NTSC) to 1125, with a frequency of 60 Hz. Jurgen, Consumer Electronics: The FCC rules on HDTV, IEEE Spectrum, Jan. 1989, at 59.
29. The NTSC aspect ratio is 4:3, while the proposed HDTV aspect ratio is 5.3:3, a ratio similar to movie theatre screens. Pool, Setting a New Standard, SCIENCE, Oct. 7, 1988, at 29. The improved resolution and aspect ratio enables viewers to use their full peripheral vision to "scan" the program instead of watching the picture in a fixed position. The picture motivates the creation of an interactive HDTV system for browsing, research, and other resources. House Telecommunications Subcomm. Hearings, 100th Cong., supra note 11, at 206-07 (testimony of L.S. Newman Jr., Division Manager, New Service Concepts and Tate B. Jennings, Technical Staff, Bell Communications Research).
only on compact discs. Moreover, 35 mm film can be used to produce a significant number of HDTV programs.

A. Applications of HDTV

I. Private

The benefits of HDTV transmission and receiver technology go beyond improved television broadcasting. HDTV has the potential to affect everyone in the electronics industry who uses television transmission and display technology. HDTV display technology is economically related to improvements in semiconductor chips, personal computer screens, and medical equipment. HDTV technology also will be adopted by the telecommunications, office equipment, and photography industries. Moreover, HDTV will affect industries that produce television components such as receiver sets, picture tubes, electronic parts, software, VCRs, and television cabinet furniture. The list of po-

30. *House Telecommunications Subcomm. Hearings, 100th Cong.*, supra note 11, at 206-07; Letter from Joel Chaseman, Chairman of MST, to Chairman Daniel K. Inouye (June 1, 1989), at 3 (A copy of this letter can be obtained by writing or calling the Association of Maximum Service Telecasters, Inc., 1730 M Street, N.W., Suite 713, Washington, D.C., 20036 ((202) 462-4351)). The improvements in picture quality can only be realized on a large screen. Therefore, HDTV will likely require a monitor size of 28" or greater. Brown, supra note 2, at 14, col. 2.

31. 1990 Siddall Interview, supra note 1; FCC INTERIM REPORT, supra note 19, at 360. The "average consumer" buys a new television receiver every four to five years. This factor, combined with available HDTV formatted programming, will allow HDTV to infiltrate the consumer market at an early stage. *Id.* at 361.


34. *Id.* Martin Vetterli, professor of electrical engineering at Columbia University, explained that HDTV could assist computer-generated, medical imaging by enabling a doctor to "visualiz[e] a beating heart"... at 60 images a second, a speed beyond the technology of the CAT scan." Moreover, a doctor in a remote region could use an HDTV camera to film a patient with unknown symptoms and send those pictures by satellite to a specialist in a larger city for diagnostic advice. Brown, *supra* note 2, at 20, col. 2.

35. *House Telecommunications Subcomm. Hearings, 101st Cong.*, supra note 33, at 200 (statement of Fred Branfman). These include fiber-optic transmission, cablecasting, and satellite broadcasting. *Id.*

36. These products include photocopy and facsimile machines. *Id.* HDTV also shares technology with digital copiers, laser printers, and personal computers. *House Technology Hearing, supra* note 6, at 96 (statement of Dr. Craig I. Fields, Deputy Director for Research, Defense Advanced Research Projects Agency).


38. R. NATHAN, supra note 32, at 21, 22, 32.
potential applications of HDTV is seemingly endless; Europeans have already begun to use HDTV technology to make automobile travel more efficient. Successful development and implementation of HDTV technology will further the economic, technological, and professional growth of American industry.

2. Military

Advanced television technology is very important to the Defense Department. The Pentagon Defense Advanced Research Projects Agency (DARPA) strongly desires an American-based HDTV industry. HDTV will be of great value to the military because new ships, planes, tanks, and training center simulators will be equipped with high resolution monitors. HDTV will also result in improved defense technology. HDTV display monitors will be used in weapons systems to produce clearer text, video signals, and characters. “With theatre-size[d] images, a . . . pilot seated in a flight trainer can view . . . the real estate he will attack and know in precise detail the color, shape and size of the terrain and target thousands of miles away.”

3. Space

HDTV technology is important to NASA and its engineers. As Robert J. Shafer, Director of the NASA Television Development Division, explains, “Video systems are embedded in many of the communications capabilities designed and developed by NASA and its contractors to operate in space, conduct scientific investigations and disseminate information.” He also says that NASA would implement HDTV technology immediately for the “Space Station Freedom [system], which is being designed now for deployment in the mid 1990s.”

B. Economic Consequences

HDTV and related technology will allow the United States to remain a major power in electronics development. According to Profes-

41. DARPA to Fund High-Definition Television, HIGH TECH. BUS., Apr. 1989, at 33.
44. Id.
sor Jeffrey Hart, "Reentry into [the] consumer electronics markets will require a specific vehicle, that is, a decision to focus on a particular consumer product. High definition television should be that vehicle."46 A study by the Economic Policy Institute shows that if the United States controls fifty percent of the HDTV industry, it will gross more than three hundred billion dollars from related industries and create 1.1 million jobs.47 Research and development incentives will also be enhanced, facilitating the United States' ability to develop digital technology that will be the prominent communications medium in the future.48

As Fred Branfman testified before the House Telecommunications and Finance Committee,

The goal... should be to develop a U.S.-owned and controlled HDTV industry that ensures that such HDTV components... and such HDTV related products... are manufactured here by U.S.-owned companies.

.... Foreign control of an HDTV industry fails to guarantee that key technology information will diffuse out into American industry, jeopardizes the ability of American component manufacturers to win contracts, reduces long-term job security since foreign plants are often the first to be shut down in hard times, and makes this [N]ation dangerously vulnerable to all manner of harmful business decisions over which we have no control.49

If the United States fails to capture the HDTV industry, this may have severe economic consequences, including loss of potential jobs and profits, and reduction of related manufacturing of picture tubes, television cabinets, and electronic components.50 Although HDTV promises improved television, some argue that this innovation is not the same as the transition to color but is more like the transition from mono to stereo

“America may never again be the world’s undisputed industrial leader. But it cannot retain its quality of life until it at least shares the lead with its top competitors.” House Telecommunications Subcomm. Hearings, 101st Cong., supra note 33, at 199 (statement of Fred Branfman).


47. Id. at 229-30 (statement of Robert Cohen).

48. House Technology Hearings, supra note 6, at 96 (statement of Dr. Craig I. Fields).


50. R. NATHAN, supra note 32, at 20-22. If the United States controls only 10% of the HDTV market, the gross profits from HDTV and related industries might be less than $85 billion with an additional gain of only 274,000 jobs. See R. COHEN in House Telecommunications Subcomm. Hearings, 101st Cong., supra note 33, at 230-32. Contra CONGRESSIONAL BUDGET OFFICE, STAFF WORKING PAPERS, THE SCOPE OF THE HIGH-DEFINITION TELEVISION MARKET AND ITS IMPLICATIONS FOR COMPETITIVENESS 1-28 (1989) [hereinafter CBO WORKING PAPERS] (The Congressional Budget Office (CBO) contends that HDTV will affect less than 10% of the electronics industry using the most optimistic forecast. See Richards, HDTV’S Prospects Oversold, Congressional Study Says, Wash. Post, July 28, 1989, at F1, col. 1).
television reception. The Audience Research Facility of the Massachusetts Institute of Technology (MIT) conducted a study in 1987 and concluded that "if [HDTV is] pushed too hard, too fast and at too high a premium, HDTV could follow a path closer to quadrophonic sound[,] . . . the eight-track audio tape, the BETA VCR—and other unmourned 'advances' in consumer electronics." 52

C. An Alternative HDTV Transmission System

Although consumer acceptance may not be as widespread as initially desired, HDTV will likely remain important to defense, medical, research, and business industries. It has been argued that the most efficient way to transmit HDTV would be to use broadband media, such as fiber optic cables. Fiber optic cables, unlike the broadcast spectrum, have a virtually unlimited ability to transmit voice, text, and video data.

George Gilder, a commentator, argues that the diversion of political and financial resources from fiber-optic development to broadcast HDTV threatens the growth of American technology. He explains that fiber optics are the future transmission medium and will enable the creation of a digital HDTV system. Such a digital system is essential to developing interactive telecomputers so that "viewers can participate in programs and control what they see." The broadcast industry, however, has the present ability to create an all digital HDTV system. General Instrument, an American company, has created an all-digital, simulcast HDTV

51. Brown, supra note 2, at 20, col. 1.
52. Id; see CBO Working Papers, supra note 50, at 12 n.12 (citing W. Newman, The Mass Audience Looks at HDTV: An Early Experiment (1988)).
53. History indicates that after a "quality service" reaches a "foothold" and prices decline, rapid consumer acceptance will follow. In re ATV, Comments of the Nat'l Ass'n of Brdcst. to Notice of Inquiry in MM Dkt. No. 87-268, at 18 (Nov. 18, 1987) [hereinafter Comments of NAB].
54. Brown, supra note 2, at 15, col. 1.
55. House Telecommunications Subcomm. Hearings, 101st Cong., supra note 33, at 219 (statement of Jeffrey Hart); see Gladwell, HDTV Link to Let Pathologists Study Tissue From Miles Away, Wash. Post, July 3, 1989, at 5, col. 4. Corabi Telemetrics prefers fiber-optic video links and computer hookups as the method by which pathologists can analyze tissue samples from distant regions. According to Corabi, fiber-optics are more cost effective and efficient than broadcast services. See id.
58. Id.
system that can be transmitted over a standard 6 MHz television channel.59

The immediate implementation of a national, multi-media, fiber-optic system would be more difficult than the immediate implementation of a terrestrial HDTV broadcast system.60 A national, fiber-optic transmission system will be expensive,61 will require drafting a whole body of regulatory standards,62 and will not provide free programming to consumers. Controversies between the cable company and the telephone company would have to be resolved.63 Therefore, although fiber optic development is important, developing a competitive HDTV broadcast system, which will be implemented in the near future, will serve the public interest and provide consumers with viable alternatives to pay television and other non-broadcast HDTV systems.

D. Public Benefit

Terrestrial broadcasting is the only free and universal television service currently available. It is received by ninety-nine percent of American households.64 This communications medium is the primary means of informing the public of national events.65 Broadcast television is also


60. See House Telecommunications Subcomm. Hearing, 100th Cong., supra note 11, at 208-09 (statement of L.S. Newman Jr. and Tate B. Jennings). The broadcast transmission standard that is adopted should be compatible with the signals produced by the nonbroadcast media.

61. Fiber-optic wiring is expensive, and a national distribution system would cost at least $200 billion. Richards, supra note 50, at F3, col. 6.

62. Telephone companies are restricted from entering the television and video market. Farhi, supra note 56, at F1, col. 2. Moreover, the current telephone system cannot handle more than 20% of the customer base at a given time and does not have the current resources to distribute a “100% point-to-point” (wire to every home) video system. Effros, Will Users Benefit from Telco Entry into the Cable Industry?, NETWORK WORLD, July 30, 1990, at 40.

63. Restrictions preventing the telephone company from entering the video and teletext market will not be easily overcome because of the telephone companies “questionable business practices.” See Effros, supra note 62, at 40.

64. In re ATV, Joint Comments to Notice of Inquiry in MM Dkt. No. 87-268, at 2 (Nov. 30, 1988) [hereinafter Joint Comments].

65. Id.
an important source of local news and entertainment that cannot be received from direct broadcast satellite (DBS), videocassette, or cable television. Joel Chaseman, Chairman of the Association of Maximum Service Telecasters (MST), notes that "the service provided by local stations constitutes the unquestioned backbone of our national communications system. Even in cable homes seventy-five percent of the viewing is of broadcast television stations, not special cable services." Preserving broadcast television is in the public interest. As CBS commented, broadcast television "is available without charge to nearly anyone with a television set and antenna. And—by nature and by legal obligation—it is responsive to local interests, local conditions and local needs."

Broadcast television stations have always competed with other broadcast and nonbroadcast services to protect themselves from spectrum interference. Interference results when two stations are in close geographical and spectral proximity to one another, making it difficult for the television receiver to ignore the inconsistent transmission signal. Broadcasters' abilities to serve the public and to provide quality television depend upon the absence of serious interference from neighboring spectrum users. Thus, it is important that the FCC provide broadcasters with continued protection from interference. This prevention of interference requires greater physical and spectral separation between stations and subsequently results in less available spectrum for HDTV users.

The failure to develop a competitive and interference-free broadcast HDTV system will resemble the decline of AM radio popularity and result in the gradual conversion of terrestrial broadcasting into a second-class video market competitor. The Association of Independent Television Stations described the "rapid decline of AM radio and ascendancy of FM stereo radio" as resulting from the innovation of "high definition radio (i.e., FM)." After the advent of superior-quality FM radio broad-

66. Id. at 2-3.
67. See Degradation Petition For Inquiry, supra note 6, at 1.
68. Letter from Joel Chaseman to Chairman Ernest F. Hollings (May 23, 1989) (to obtain a copy of this letter, see instructions supra note 30)
69. In re ATV, Comments of CBS, Inc. to Notice of Inquiry in MM Dkt. No. 87-268, at 50 (Nov. 18, 1987); see ATV Tentative Decision and Further Notice of Inquiry, supra note 7, para. 39.
70. They have battled against interference from citizen band radios, computers, and educational FM radio broadcasts. See MST: THE ISSUES, supra note 9, at 14.
71. Degradation Petition For Inquiry, supra note 6, at 2. The Commission prevents interference by ensuring that stations are located a certain distance apart from one another.
72. In re ATV, Comments of Ass'n of Indep. TV Stations, Inc. to Notice of Inquiry in MM Dkt. No. 87-268, at 3 (Nov. 18, 1987).
casting, the AM radio audience declined from an audience of one hundred percent of all radio listeners to twenty-eight percent, while FM captured the remaining seventy-two percent of the radio audience population.\textsuperscript{73}

If television broadcasters are denied sufficient spectrum to implement competitive HDTV, they may lose a large share of the broadcast television viewing public. Many viewers will turn to alternative communications mediums, such as cable and videocassettes, where they can receive the best-quality viewing. Consequently, advertising revenues for terrestrial broadcasting will decrease, and less money will be available for equipment and personnel.\textsuperscript{74} The resulting deterioration in quality and quantity of local news and other public interest programs will make the fate of terrestrial broadcasting not unlike that of AM radio.\textsuperscript{75}

\section{II
Scarcity and the Public Interest}

\subsection{A. Spectrum Scarcity}

Prior to enactment of the Radio Act of 1912,\textsuperscript{76} no agency regulated spectrum allocation. Anyone could use any frequency channel in any band.\textsuperscript{77} Because the growth of radio-based services resulted in frequency demands that exceeded the available supply, the first Radio Act proved inadequate.\textsuperscript{78} In response, Congress enacted a new law, the Radio Act of 1927.\textsuperscript{79} These provisions were later refined when Congress enacted the Federal Communications Act of 1934.\textsuperscript{80} The Federal Communications Act established the Federal Communications Commission to supervise the users of the electromagnetic spectrum.\textsuperscript{81}

One of the principal reasons Congress created the FCC was to assign frequency channels on the radio spectrum and to allocate frequency

\textsuperscript{73.} Comments of NAB, supra note 53, at 4.
\textsuperscript{74.} Id.
\textsuperscript{75.} Id. Another example of the results of interference is the city council allowing zoning laws that result in a small merchant being surrounded by factories that massively emit pollutants and cause the merchant to lose customers to "cleaner" regions. Degradation Petition For Inquiry, supra note 6, at 45.
\textsuperscript{78.} Id.
\textsuperscript{81.} E. DESART, TELEVISION IN THE REAL WORLD: A CASE STUDY COURSE IN BROADCAST MANAGEMENT 10 (1978).
bands among users.\textsuperscript{82} FCC regulation avoids misuse of the scarce electromagnetic spectrum and ensures that the available spectrum will be used in the public interest.\textsuperscript{83} The FCC makes these allocation determinations by considering the public interest in a particular service, the frequency bandwidth required, the most technologically suitable location for the service, and the degree of interference that the service will create and tolerate.\textsuperscript{84}

The higher quality signal essential for HDTV may require an allocation of additional spectrum. HDTV systems currently being considered use 6 MHz channels as does NTSC (conventional broadcasting).\textsuperscript{85} However, for at least a transition period, there must be a simulcast NTSC signal on another channel to continue service to existing sets.\textsuperscript{86} Before additional spectrum for HDTV can be allocated, a frequency band with a suitable location and size to accommodate as many broadcasters as possible must be found.

The FCC has tentatively decided not to allocate new spectrum frequencies for HDTV.\textsuperscript{87} Instead, the FCC encourages the development of HDTV systems that are capable of co-existing with current NTSC stations on the VHF and UHF bands already allocated for television broadcasting.\textsuperscript{88} If technologically feasible, this would result in more efficient use of the existing spectrum and eliminate the need to allocate new spectrum, which might require dislocation of other radio services that are serving the public.\textsuperscript{89}

There are six separate HDTV systems scheduled for testing by the Advanced Television Testing Center (ATTC). At least two of these, the

\textsuperscript{82} R. Stern, supra note 10, at 1.
\textsuperscript{85} MST: THE ISSUES, supra note 9, at 3.
\textsuperscript{86} See ATV Tentative Decision and Further Notice of Inquiry, supra note 7, para. 124; see also ATV First Report and Order, supra note 25, para. 1.
\textsuperscript{87} ATV First Report and Order, supra note 25, para. 1.
\textsuperscript{88} ATV Tentative Decision and Further Notice of Inquiry, supra note 7, para. 4(3).
\textsuperscript{89} The frequency bands above one GHz are allocated to a variety of services, including cable TV, satellite, and microwave transmissions. This spectrum is not suitable for HDTV transmission. HDTV use of the GHz spectrum would require the relocation of present services and would result in large delays, cost, and inconvenience. Id. para. 76.

Aside from problems of relocation, there are numerous propagation difficulties in the frequencies located above one GHz. This spectrum is unsuitable for terrestrial broadcast due to its susceptibility to weather, vegetation, and physical obstructions. Initial Comments of MST, supra note 6, at 43. These propagation characteristics would impair the broadcasters' ability to provide coverage to their service areas in the absence of further technological innovations. See Comments of Hughes Comm. Galaxy, Inc., to the Petition for Notice of Inquiry in MM Dkt. No. 87-268, at 9-12 (June 10, 1987).
systems proposed by Zenith and by General Instruments Corporation, claim HDTV quality on 6 MHz channels that, to a great extent, could be created within the spectrum already established for television broadcasting.\textsuperscript{90}

1. Compatibility

Replacing traditional television broadcasting with HDTV would result in outright elimination of the one hundred sixty-two million conventional television sets currently operating in the United States.\textsuperscript{91} This is because the current receivers do not have the capability to accept and transmit the higher quality signal required for HDTV. To avoid this undesirable consequence, the FCC has tentatively decided that any terrestrial HDTV system must plan to continue service to current NTSC receivers, either by utilizing a signal that is compatible on both kinds of televisions or by transmitting two simulcast channels (one HDTV and one NTSC).\textsuperscript{92} Continued NTSC transmission is essential during the transitional period because HDTV receivers initially will be very expensive and thus available to only a small percentage of the population.

2. Maximizing Quality HDTV

Many proposed HDTV systems with various spectrum requirements are being developed or are in the experimental stages. Generally, the broader the spectrum allocated per station, the greater the quality of HDTV. Competing use applicants and scarcity considerations also restrict the number of frequency channels that can be used for HDTV. The FCC has tentatively decided that only 6 MHz of spectrum bandwidth will be allocated (in addition to the 6 MHz already assigned to each broadcaster) for HDTV broadcasting.\textsuperscript{93} The three basic types of

\textsuperscript{90} 1990 Siddall Interview, \textit{supra} note 1.

\textsuperscript{91} \textit{High-Definition TV Myths Debunked}, HIGH TECH. BUS., Aug. 1988, at 56.

\textsuperscript{92} \textit{ATV Tentative Decision and Further Notice of Inquiry}, \textit{supra} note 7, para. 4(4).

\textsuperscript{93} Megahertz (MHz) is a measure of the waves or electrical vibrations over time. Kilohertz (KHz) means 1,000 cycles per second, and MHz means 1,000 KHz. See \textit{id.} para. 4(5); FCC, \textit{INFORMATION BULLETIN}, \textit{supra} note 5, at 3. Although true HDTV requires 30 MHz, spectrum scarcity dictates the Commission’s decision that the broadcast industry will have to compress the necessary information for HDTV quality into one NTSC channel (or 6 MHz of frequency channels). See \textit{ATV First Report and Order}, \textit{supra} note 25, paras. 4(5), 8; \textit{see also} Jurgen, \textit{supra} note 28, at 59.

Requiring a compatible system to fit within a 12 MHz channel makes the Japanese Multiple Sub-Nyquist Sampling Encoding (MUSE) system inadequate for terrestrial HDTV broadcasting. MUSE needs 9 MHz of incompatible spectrum to produce the desired HDTV image. The NTSC simulcast signal requires 6 MHz. Therefore, a compatible MUSE HDTV/NTSC system would require 15 MHz, which is above the 12 MHz limit (6 MHz NTSC and 6 MHz HDTV). MST: \textit{THE ISSUES}, \textit{supra} note 9, at 2-3. The Supreme Court in \textit{Radio Corp. of Am. v. United States}, 341 U.S. 412, 416 (1950), determined that the Commission had the power
systems originally considered were those requiring 6 MHz (to broadcast both NTSC and HDTV signals),\(^4\) 9 MHz,\(^5\) and 12 MHz (2 NTSC channels).\(^6\) The FCC has decided that the best system would be the simulcast option, whereby a 6 MHz channel will continue NTSC transmission and a second 6 MHz channel will provide the simulcast HDTV signal.\(^7\)

under 47 U.S.C. § 303 to determine the required standards for color transmission, even if such determination resulted in the rejection of all but one proposed system. It is therefore within the Commission’s power to require that a simulcast HDTV/NTSC system be confined to 12 MHz of spectrum.

94. These systems would not require additional spectrum allocation and would not prevent existing broadcasters from competing for HDTV. Therefore, these systems would provide the most rapid and least expensive transition to HDTV. *ATV Tentative Decision and Further Notice of Inquiry, supra* note 7, paras. 82-88.

Although the 6 MHz proposal had many advantages, it was unlikely that quality HDTV and NTSC signals could have been received within the narrow 6 MHz bandwidth and the constraints of present technology. It was also unclear whether broadcasters could have remained competitive within current NTSC bandwidth restraints. Other services, such as VCR and cable, which do not have the same restrictions, would be able to implement superior quality HDTV and to convert their audiences from local television consumers. *Id.* para. 86. If the available broadcast spectrum were allocated to other uses, the broadcasters would be foreclosed from effectively competing in the new market or from receiving the additional spectrum if later required by technological advances. *See FCC INTERIM REPORT, supra* note 19, at 344, 346-47.

Although the FCC stated that it would not foreclose the possibilities of enhanced definition television (EDTV), commenting parties indicated that EDTV would not satisfy the improved audio and video capabilities achievable by HDTV. *ATV First Report and Order, supra* note 25, paras. 7, 12.

95. The 9 MHz approach would permit broadcasters to make an orderly transition to the new service, because it is compatible with the NTSC signal. The 6 MHz channel would continue to provide the NTSC signal, while the 3 MHz augmentation channel would be used to provide the improved signal. Two stations can potentially share a 6 MHz channel to obtain the 3 MHz needed to present the new HDTV signal. *ATV Tentative Decision and Further Notice of Inquiry, supra* note 7, para. 87. Although these systems could accommodate more applicants than the systems requiring an additional 6 MHz channel, it is unlikely that all stations could receive the augmentation spectrum contiguous to their primary channel. *ATV First Report and Order, supra* note 25, para. 10.

96. These systems need an additional 6 MHz channel, as a simulcast HDTV channel, providing the identical service as the NTSC channel. This is the approach chosen by the FCC. *ATV First Report and Order, supra* note 25, para. 1; Sukow, *FCC to Take Simulcast Route to HDTV*, Broadcasting, Mar. 26, 1990, at 38.

Simulcast allows transmission of a newly designed signal on previously unused taboo channels and is more flexible due to the HDTV or simulcast signal’s physical independence from the NTSC signal. After a transition period, NTSC channels would no longer be necessary, making their spectrum available. *See ATV First Report and Order, supra* note 25, para. 8; *IMPLEMENTATION SUBCOMMITTEE OF THE FCC ADVISORY COMMITTEE ON ADVANCED TV SERV., WORKING PARTY 1, AN ASSESSMENT OF THE ATV SYSTEMS AND TECHNOLOGIES PRESENTED AT THE NOV. 14-18, 1988 MEETING OF IS/WP1*, at 10. For an explanation of the role of the first Working Party, see *supra* note 19.

97. *ATV First Report and Order, supra* note 25, para. 1 n.1.
3. Effect on Other Uses of the Broadcast Spectrum

Although HDTV will improve the quality of television, it will impose high costs in the form of expensive broadcasting and receiving equipment.\(^{98}\) HDTV will also result in reduced spectrum available for other nonbroadcast communication uses.\(^ {99}\) Compatibility will probably necessitate allocating additional broadcast spectrum to transmit both NTSC and the improved signal necessary for an HDTV system. The FCC has found that suitable spectrum is not available for HDTV systems unless it can be obtained from the spectrum reserved for other highly demanded services, such as cellular, mobile communications, and paging services.\(^ {100}\) Terrestrial HDTV must, therefore, be deemed within the public interest and convenience requirements before it may receive additional spectrum.

Implementing HDTV over other services, such as private land mobile units, is consistent with the provisions of the Communications Act. The FCC is required to “[s]tudy new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest.”\(^ {101}\) HDTV will provide improved video and audio reception, research and development, and large economic rewards to the public. Terrestrial HDTV also will allow the public to continue receiving free television programming which is qualitatively equivalent to the programming provided by pay services. Regulatory standards that are compatible with conventional television and additional spectrum allocation are necessary to allow local broadcasters to compete effectively with the cable and direct broadcast satellite industries.

Other users of the broadcast spectrum also desire additional spectrum allocation. In particular, the Land Mobile Communications Commission (LMCC) argues that because there is no equivalent provider of land mobile and telephone services, these services are more important to the consumer than HDTV.\(^ {102}\) Allocating spectrum to mobile services

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99. Broadcast frequencies are used by ground, traffic and air control, cellular telephone, modems, and will be needed by two-way wrist telephones in the future. Gilder, supra note 57, at col. 3.
102. ATV Tentative Decision and Further Notice of Inquiry, supra note 7, para. 46. Private, land-mobile radio is used daily by all sectors of government including police and fire departments, and such service is crucial to public safety. Without additional allocation, there will be insufficient spectrum for private, land-mobile radio in many major U.S. cities by mid-1990. House Telecommunications Subcomm. Hearings, 100th Cong., supra note 11, at 68-69 (statement of John B. Richards).
providers would also end the long period that they have been seeking additional spectrum. The LMCC has significant reasons for desiring additional spectrum, technology exists which will allow mobile services to compress the required transmission information and to grow within the confines of its presently allocated spectrum. Similar compression techniques do not currently exist to allow HDTV to be implemented without using a second channel in addition to the existing NTSC channel. Without additional spectrum, the growth of terrestrial HDTV will be inhibited; therefore, it has a greater need for increased spectrum than do the mobile services.

**B. Limitations of VHF/UHF Spectrum Allocation**

The terrestrial broadcast bands are limited in their ability to supply additional broadcast spectrum due to restrictions on station and channel separation distances, which have been imposed to prevent interference. The UHF band contains the largest number of available broadcast frequencies and, theoretically, can accommodate fifty-five NTSC channels. Unfortunately, many of these channels cannot be used because of interference difficulties.

UHF tuners of television receivers have a limited ability to reject interference from other signals in the UHF band. As a result, the FCC prohibits using certain channels above and below an allocated UHF channel to ensure that the usable channels are spaced sufficiently far apart from one another. The unassigned spectrum, known as UHF taboo channels, lies idle to prevent interference with the assigned channels.

103. The Land Mobile Communications Council (LMCC) has been seeking additional spectrum for their services in major cities for more than ten years. The Commission proposed to grant additional spectrum from the available UHF frequency but this decision has been frozen pending further spectrum analysis regarding HDTV. Id. at 69-70.


105. 1989 Siddall Interview, supra note 104.

106. ATV Notice of Inquiry, supra note 23, at para. 60 n.35.

107. Id.


109. Id.
These taboo channels severely restrict the number of UHF licensees in a given geographical area.\textsuperscript{110} Reduced taboo interference and separation restrictions would permit the FCC to assign more channels in the UHF band.\textsuperscript{111} If a receiver has more tolerance to ignore undesired signals, more taboo channels can be eliminated and more HDTV applicants can be accommodated.\textsuperscript{112}

The FCC's Office of Engineering and Technology (OET) has conducted studies to determine if the additional UHF spectrum can be made available for HDTV development.\textsuperscript{113} OET found that taboo-related interference would probably occur, if at all, only during a developmental transition period leading up to improved receivers.\textsuperscript{114} However, these OET studies are only preliminary experiments concerning possible assignment of the additional terrestrial spectrum. The current freeze on allocating the broadcast spectrum to other users should, therefore, be maintained during the interim period before broadcast HDTV is implemented.\textsuperscript{115}

Even with improved technology and elimination of interference restraints, there is a possibility that not all existing broadcasters will be able to receive the additional spectrum for HDTV transmission.\textsuperscript{116}

\begin{itemize}
  \item 110. \textit{Id.} In the local television market, only 9 out of the potential 55 UHF channels are assignable. \textit{ATV Notice of Inquiry, supra} note 23, para. 60 n.35.
  \item 111. FCC, OET, \textit{INTERIM REPORT: ESTIMATE OF AVAILABILITY OF SPECTRUM FOR ADVANCED TELEVISION (ATV) IN THE EXISTING TERRESTRIAL BROADCAST BANDS}, FCC/OET TM88-1, at 4 (Aug. 1988) [hereinafter OET INTERIM REPORT]. The availability of the suitable spectrum for HDTV is dependent upon the following: (1) receiver quality and the ability to reject competing signals; (2) the adjacent channel location of differing broadcast signals within the same region; and (3) the distance between broadcast stations of different regions, which operate on the same frequency channel (cochannel separation distance). \textit{Id.}
  \item 112. \textit{Id.} Assigning TV stations within a smaller cochannel separation distance would require a receiver to operate with a signal margin of 6-10 dB as compared to the 28-45 dB typical of NTSC receivers. The lower the signal margin, the greater the ability of the television receiver to filter undesired signals from neighboring stations, and the closer the stations can be assigned. The Commission is unsure if ATV technology is sufficient to realize such low signal margin levels. \textit{OET ANALYSIS, supra} note 108, at 7.
  \item 113. \textit{OET ANALYSIS, supra} note 108, at 3.
  \item 114. \textit{Id.} at 14. This finding was based on experiments with a specially prepared RF Monolithics Improved Television Receiver. OET concluded that the improved technology necessary to avoid much receiver interference is presently available. \textit{Id.}
  \item 115. Joint Comments, \textit{supra} note 64, at 12 n.3. The Commission has frozen all new applications for UHF spectrum within 150 miles of thirty television markets as well as land mobile communication applications. \textit{Degradation Petition For Inquiry, supra} note 6, at 10.
  \item 116. Some commentators recommend that the Commission maintain the option to use other less desirable bands, such as giga hertz (GHz, one billion Hz), in case the UHF/VHF bands are inadequate to satisfy all applicants. \textit{In re ATV, Comments of MST} submitted to Subcomm. on Telecommunications and Finance of the House Comm. on Energy and Commerce, at 9 n.10 (Feb. 1, 1989) [hereinafter MST Comments]. The problem with this alternative is that it does not resolve the propagation and relocation difficulties involved with such spectrum use.
\end{itemize}
such a case, the FCC will inevitably have to determine which are the most eligible applicants for additional assignment of spectrum frequencies.

III

Eligible Applicants for HDTV Spectrum

The potential scarcity of suitable HDTV spectrum necessitates that the FCC limit the group of applicants who will be eligible for the available broadcast spectrum. Based on the scarcity of available spectrum, the FCC has tentatively decided that HDTV spectrum will be assigned only to existing licensees and applicants.\(^\text{117}\) Denying spectrum to new applicants—those without an NTSC station—is probably not unconstitutional because the first amendment affords less protection to media users since the “scarce” spectrum is not able to accommodate all applicants.\(^\text{118}\)

A. *Ashbacker Radio Corp. v. FCC*

The Supreme Court has held that before an applicant for a mutually exclusive license can be denied a license, the applicant must be granted a hearing.\(^\text{119}\) The *Ashbacker* Court concluded that the statutory right to a hearing is empty if the hearing is held after the application is denied.\(^\text{120}\)

The FCC has concluded that denying the additional spectrum to new broadcast applicants would not conflict with *Ashbacker*.\(^\text{121}\)

\(^{117}\) *ATV Tentative Decision and Further Notice of Inquiry,* supra note 7, para. 136. Existing broadcasters include, "(1) licensed stations, (2) prospective stations with valid construction permits, and (3) pending applications that have been accepted for filing" as of June 1988. *OET Interim Report,* supra note 111, at 8.

\(^{118}\) *Red Lion Brdcst. Co. v. FCC,* 395 U.S. 367, 388-89 (1969). "[I]f there is to be any effective communication by radio, only a few can be licensed and the rest must be barred from the airways." *Id.* at 389; *News Am. Publishing, Inc. v. FCC,* 844 F.2d 800, 811 (D.C. Cir. 1988) (the broadcast media do not enjoy first amendment protection identical with the print media because of the scarcity of broadcast frequencies in the present state of commercially acceptable technology).

\(^{119}\) *Ashbacker Radio Corp. v. FCC,* 326 U.S. 327, 330 (1945). This holding was based on § 309(a) of the Communications Act, which then stated in part,

[T]he Commission shall determine [in the case of each application filed with it] that public interest, convenience, or necessity would be served by the granting thereof [of such application] ... . In the event the Commission ... does not reach such decision ... , [it] shall notify the applicant thereof, shall fix and give notice of a time and place for hearing thereon, and shall afford such applicant an opportunity to be heard under such rules and regulations as it may prescribe.

*Id.* n.4.

If the Commission finds the public interest will be served, § 307(a) requires the granting of a license. Although the present statute no longer explicitly requires notice and a hearing, *Ashbacker* is still good case law. See 47 U.S.C. § 309(a) (1988).

\(^{120}\) *Ashbacker,* 326 U.S. at 330.

\(^{121}\) *ATV Tentative Decision and Further Notice of Inquiry,* supra note 7, para. 137.
Ashbacker allows the FCC to restrict the class of applicants entitled to comparative hearings. 122 Although the FCC must give all eligible applicants an opportunity to have a comparative hearing, it has discretion to determine which applications are mutually exclusive. 123 The FCC previously "found that the public interest in encouraging licensees to provide an enhanced service outweighed the interests generally to be served by permitting competing applications and, indeed, that to permit competing applications would hinder and perhaps foreclose the development of these services." 124 Moreover, the Ashbacker Court implied that the FCC could grant one of two competing applications a comparative hearing when the public interest demanded that the service be available at the earliest possible date. 125 Due to the economic and technological benefits of HDTV, immediate implementation of the advanced television system is in the public interest.

Spectrum scarcity provides the FCC with the incentive and authority to limit the class of eligible broadcasters. This ensures that applications will be processed quickly so that the public receives service as soon as possible. 126 The FCC has decided that existing broadcasters will provide the most rapid transition to HDTV, because they have already invested substantial resources and expertise into developing competitive broadcast television systems. 127

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122. Id. If new applicants were permitted to compete with existing broadcasters for the additional spectrum, it would be extremely difficult to determine the applicable criteria and the "Commission would find itself comparing 'apples' and 'oranges.'" WPI REPORT, supra note 19, at 6.

123. ATV Tentative Decision and Further Notice of Inquiry, supra note 7, para. 137; see also United States v. Storer Brdcst. Co., 351 U.S. 192, 205 (1955) (The FCC can establish standards to identify qualified applicants and to exclude those that are not qualified, because Congress did not "intend the FCC to waste time on applications that do not state a valid basis for a hearing.").


125. See Ashbacker Radio Corp. v. FCC, 326 U.S. 327, 333 (1945); La Star Cellular Tel. Co. v. FCC, 899 F.2d 1233, 1235 (D.C. Cir. 1990); CBS Comments to Further Notice of Inquiry, supra note 124, at 45.

126. See 47 U.S.C. § 303(r) (1988). "[T]he Commission from time to time, as public convenience, interest or necessity requires, shall . . . make such restrictions and conditions, not inconsistent with law, as may be necessary to carry out the provisions of this chapter." Id. (emphasis added).

127. Comments of NAB, supra note 53, at 18; In re ATV, Comments of the Nat’l Ass’n of Brdcst. to Further Notice of Inquiry in MM Dkt. No. 87-268, at 18 (Nov. 30, 1988). The Commission has previously limited the group of applicants for upgrading FM and UHF facilities based on a similar rationale. This enabled the audience to receive better service without the extra cost and delay of comparative hearings. See CBS Comments to Further Notice of Inquiry, supra note 124, at 44; In re Amendment of the Commission’s Rules Regarding the Modification of FM and TV Station Licenses, Report and Order, 98 F.C.C.2d 916, para. 13 (1984).
Making additional grants of spectrum available only to existing broadcasters does not violate Ashbacker. Granting a simulcast channel to existing broadcasters does not constitute a new service license. The additional spectrum is supplemental or in addition to the already existing NTSC service, which is a requirement for the receipt of simulcast HDTV spectrum.  

B. Assignment of Available HDTV Spectrum

Scarcity of HDTV spectrum will raise additional issues concerning allotment and assignment of the HDTV channels. If there is insufficient spectrum in the existing UHF/VHF bands to accommodate all existing broadcasters, the FCC must implement a fair and expedient method to allot the available HDTV spectrum. The allotment decision relates to the distribution of the available channels among different geographical regions. This determination will depend largely upon the results of the OET interference studies, which will determine where additional spectrum is available. The final determination of which region among neighboring regions will get additional spectrum should be made in accordance with the allotment ratios in the National Table of Allotments.

The National Table of Allotments ensures that every community receives at least one terrestrial broadcast station. One key factor used in determining the allotment of channels is the region’s population. For example, Logansport, Indiana, has a population of 21,000 and was allotted one UHF channel. Gary, Indiana, has a population of 134,000 and was originally allotted one UHF and one VHF channel.

128. CBS Comments to Further Notice of Inquiry, supra note 124, at 47. MST agrees that limiting the class to eligible broadcasters is constitutional but warns that speculators will still bring lawsuits based on their “asserted ‘right’ to a hearing.” MST Comments, supra note 116, at 10-11. MST recommends that Congress enact a law stating that “nothing in the Communications Act prohibits the Commission from awarding additional spectrum for the purpose of implementing ATV to existing licensees without comparative hearings.” Id.

129. WP1 REPORT, supra note 19, at 3.

130. See generally In re Amendment of § 3,606 of the Commission’s Rules and Regs., Sixth Report and Order, 41 F.C.C. 148, para. 60 (1952) [hereinafter Sixth Report and Order]. The Commission created this table to best comply with § 307(b) of the Communications Act, which requires the fair, efficient, and equitable distribution of services to the “several states and communities.” Id. para. 63.

131. Id. paras. 63-66.

132. Id. para. 63.

133. Id. paras. 434-37. These examples are used to understand the present procedure for allotting terrestrial broadcast spectrum. The number of stations allotted to a particular region in the National Table of Allotments may be greater or fewer today, depending on modifications in population and other criteria. Id.

134. Id. paras. 459-62.
Gary has since demonstrated its need for an educational channel and received an additional UHF channel reserved for noncommercial use. Assignment refers to the designation of an applicant within a specific region that will be licensed to use the allotted HDTV channel. Assignment methods include comparative hearings, lotteries, auctions, and private industry decisions.

These assignment methods should be restricted to commercial broadcast applicants. Applicants for noncommercial use should not be subjected to the same standards because they do not have sufficient resources and staffing to compete fairly with their commercial counterparts. The FCC should maintain the traditional system of channel reservations for noncommercial use, which grants noncommercial broadcasters a pro-rata share of the available HDTV spectrum. The only situation in which the FCC should require noncommercial applicants to satisfy the same standards as commercial applicants is when two non-commercial applicants are competing for the same reserved channel. For example, if two public university stations apply for HDTV spectrum in the same region, neither will receive preferential treatment because neither is at a disadvantage (i.e., both have limited resources and finances).

1. Comparative Hearings

A comparative hearing is the fairest method of assignment because it takes into account qualitative differences among applicants. The hearing evaluates certain factors in determining which applicant, among similar applicants, would best serve the public interest. For HDTV, these criteria may include audience population, programming, coverage areas, current channel assignment, and how soon the applicant intends to commence service. Although these comparative criteria provide the fairest assignment method, it is often very difficult to define and objectively ap-

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135. Id. para. 461.
136. See WP1 REPORT, supra note 19, at 9-10.
137. See FCC, OET, INTERIM REPORT: FURTHER STUDIES ON THE AVAILABILITY OF SPECTRUM FOR ADVANCED TELEVISION, FCC/OET TM89-1, at 10 (Dec. 1989) [hereinafter OET FURTHER STUDIES] (OET study regarding available spectrum space when the noncommercial educational reservations are taken into account). There are currently 369 vacant nonbroadcast commercial slots. Id. The traditional reservation of bandwidth for educational programs serves the public interest, as noncommercial applicants lack the necessary resources and industry support to compete adequately with commercial broadcast facilities. Sixth Report and Order, supra note 130, at paras. 36, 38. Those who wish to construct educational facilities are more able to raise sufficient funds and other support when the channels are definitely available for use. Id. para. 41.
138. WP1 REPORT, supra note 19, at 11; Comparative Broadcast Hearings, Policy Statement, 1 F.C.C.2d 393 (1965).
139. WP1 REPORT, supra note 19, at 11-12.
ply them.\textsuperscript{140} It is also difficult to adopt criteria that would be suitable to both commercial and public television.\textsuperscript{141} Comparative proceedings are lengthy and costly and would further delay implementing terrestrial HDTV.\textsuperscript{142} This delay could put broadcasters at a competitive disadvantage with the other communications media, which will implement HDTV at the first opportunity.

2. \textit{Private Industry Methods}

The FCC has considered various private industry methods of assigning the spectrum that could be expedient and efficient. It recently, and only in certain cases, permitted broadcasters and other radio users a limited right to negotiate interference among themselves and determine the geographic and qualitative characteristics of their service.\textsuperscript{143} The doctrine of flexible use and negotiated interference is based on the belief that those in the communications industry are best able to monitor and respond to market demands and, consequently, to effectively use the electromagnetic spectrum.\textsuperscript{144}

a. Private Agreement/Partial Assignment

One method of assigning HDTV spectrum involves initially assigning to all licensees a certain number of spectrum frequencies. After the initial assignment, the stations could negotiate with other licensees to acquire the broad spectrum required for HDTV transmission.\textsuperscript{145} This method is called "private agreement/partial assignment."\textsuperscript{146} Some commentators argue that this proposal is the most economically efficient method because the spectrum would be assigned in accordance with market demand and would not lie idle.\textsuperscript{147}

Although flexible use and negotiated interference is an efficient method of assigning the spectrum, some parties argue that it is contrary to the standards set forth in the Communications Act.\textsuperscript{148} First, private

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{140} \textit{Id.} at 13. \textit{See also} Johnson & Dystel, \textit{A Day in the Life: The Federal Communications Commission}, 82 \textit{YALE L.J.} 1575 (1973).
\item \textsuperscript{141} WP1 \textit{REPORT}, \textit{supra} note 19, at 12.
\item \textsuperscript{142} \textit{See id.} at 13.
\item \textsuperscript{143} \textit{How Heavy a Hand Should the FCC Wield: Broadcasting Policy}, \textit{BROADCASTING}, Sept. 12, 1988, at 70 [hereinafter \textit{How Heavy a Hand}]; 1990 Siddall Interview, \textit{supra} note 1.
\item \textsuperscript{144} \textit{How Heavy a Hand}, \textit{supra} note 143, at 70.
\item \textsuperscript{145} WP1 \textit{REPORT}, \textit{supra} note 19, at 28.
\item \textsuperscript{146} \textit{Id.}
\item \textsuperscript{147} \textit{Id.} at 30. Because market determinations are based on supply and demand economics, the licensee probably will have sufficient financial support to implement HDTV immediately.
\item \textsuperscript{148} House Telecommunications Subcommittee Chairman Ed Markey believes this doctrine is "at odds with the requirements of the Communications Act and [is] totally unprecedented in broadcasting." \textit{How Heavy a Hand}, \textit{supra} note 143, at 71.
\end{enumerate}
\end{footnotesize}
industry determinations may not comply with the public interest standards of the Communications Act.\textsuperscript{149} Private negotiations also may be deemed an unlawful delegation of the FCC's duty of assigning the spectrum among competing applicants.\textsuperscript{150} Second, granting the right to lease or sell the spectrum to other private station owners may imply that spectrum holders have a property right in the assigned spectrum.\textsuperscript{151} This "ownership" of the spectrum may violate the provisions of the Communications Act that prohibit ownership of the frequency channel.\textsuperscript{152} Third, allowing licensees to negotiate a transfer of the spectrum may have high transaction costs, including the difficulty of subdividing and distributing the transferred spectrum.\textsuperscript{153} Finally, the private agreement may not require the licensee to use the acquired spectrum for HDTV.\textsuperscript{154}

If enough licensees put the spectrum to a use other than HDTV, it may delay or prevent terrestrial broadcast transmission of HDTV. Once the equipment and infrastructure of a particular system is built, it is very difficult to use it for a different purpose.\textsuperscript{155} Other broadcasters might not implement an HDTV service if there is an insufficient base of broadcasters to ensure that they can obtain the support of advertisers and other investors to make such a service economically viable.\textsuperscript{156} Legislation requiring flexible-use broadcasters to use the acquired spectrum for HDTV transmission would not ensure that the licensee would continue service in rural areas where there are fewer viewers and less advertising support.\textsuperscript{157}

The FCC must continue to play the central role in spectrum assignment for HDTV, rather than allow private industry players to make such crucial determinations. Although no one can know the best use for the spectrum with certainty, the FCC, as a government agency, is less apt to be influenced by private industry pressures and is, therefore, better able to act in the public interest.

\textsuperscript{150} WP1 REPORT, supra note 19, at 30; see Rau, supra note 84, at 187; 47 U.S.C. § 303 (1988).
\textsuperscript{151} WP1 REPORT, supra note 19, at 31.
\textsuperscript{152} See 47 U.S.C. § 309(h) (1988). It has been argued that economically, property rights "already exist in the broadcast frequencies." R. Posner, Economic Analysis of Law 33 (2d ed. 1977). Receiving a station by comparative hearings requires a willingness to pay for legal and political representation. Moreover, the spectrum licenses are often sold to the most willing buyer since, once obtained, the right is transferrable and "for all practical purposes perpetual." Id. at 33.
\textsuperscript{153} WP1 REPORT, supra note 19, at 31.
\textsuperscript{154} Initial Comments of MST, supra note 6, at 57.
\textsuperscript{155} WP1 REPORT, supra note 19, at 35.
\textsuperscript{156} Id.
\textsuperscript{157} CBS Comments to Further Notice of Inquiry, supra note 124, at 63.
b. Auctions

Auctions typically are used to allocate scarce resources. This private industry method is expedient and inexpensive to administer. The spectrum space is awarded to the highest bidder.

The main problem with assigning spectrum through auctions is that the applicant with the most money will not necessarily serve the public interest in having universal, free, and local television service. The high cost of obtaining the equipment to implement HDTV and the added expense of paying for use of the spectrum could discourage many broadcasters from implementing this new service. Finally, auctions could be considered an unauthorized delegation of the FCC's spectrum assignment responsibility to the private marketplace. Because the private pressures affiliated with auctions could be contrary to the public interest standards of the Communications Act, auctions likely would be an improper method of assigning spectrum to HDTV.

c. Lotteries

A third private industry method of assignment is the lottery. Lotteries reduce the cost and delay associated with comparative hearings and foster rapid service to the public. The FCC has been authorized to assign spectrum by lottery where the number of applications significantly outnumbers spectrum availability and where doing so would serve the public interest. The number of prospective applicants (existing broadcasters) now being considered for additional HDTV spectrum is

158. WP1 REPORT, supra note 19, at 23.

159. R. POSNER, supra note 152, at 32 (auctions would not involve large political and lobby costs as long as the potential of rigging could be controlled).

160. See WP1 REPORT, supra note 19, at 23-24.

161. Giving spectrum to the highest bidder may prevent spectrum use by public or minority stations. Because the Commission would not restrict the amount of spectrum available to each particular use, broadcasters may be foreclosed from obtaining additional spectrum for HDTV or other uses. See MST: THE ISSUES, supra note 9, at 28. Contra R. POSNER, supra note 152, at 32 (a group of poorer persons, in the aggregate, may have greater financial resources that they are willing to expend for particular goods than a wealthy person or group).

162. "This stifling of demand for development of ATV spectrum . . . clearly would frustrate rather than advance [the] Commission's stated goal of encouraging a rapid transition to [advanced television] on a broad scale." WP1 REPORT, supra note 19, at 25.

163. Id. at 26; see also 47 U.S.C. § 309(a) (1988).


165. The Commission used the lottery system to assign 1,000 multichannel, multipoint distribution service channels among 16,000 applicants. In this situation, where the applications were sixteen times greater than the available spectrum, comparative hearings would have been unwieldy and unreasonable. See Pappas v. FCC, 807 F.2d 1019 (D.C. Cir. 1986) (The Commission gave the applicants notice of its intention to conduct lotteries and received com-
approximately 1,700, and the FCC’s goal is to accommodate all of them.\footnote{166}

According to the FCC, a lottery is an appropriate allocation method when several of four factors are present: (1) many licenses are available; (2) many mutually exclusive applicants are likely; (3) applications are backlogged; and (4) information sources are not diverse.\footnote{167} The first two factors are present in the context of HDTV. The number of licenses available will depend upon the results of the OET interference studies,\footnote{168} and there will likely be many applicants for HDTV spectrum.\footnote{169} Moreover, by statute, diversification of information sources applies to broadcast television.\footnote{170}

Lotteries are less expensive for applicants than comparative hearings or auctions because there is no need to hire an attorney, and there is less paperwork and delay. The resources conserved by using an inexpensive lottery proceeding could subsequently be used for implementing HDTV.\footnote{171}

The First Working Party of the Advanced Television (ATV) Subcommittee, which studies policy and regulation issues, is concerned that lotteries would encourage speculative applications, thereby clogging the FCC’s resources and delaying HDTV implementation.\footnote{172} Requiring due diligence approval as a prerequisite for entering a lottery would reduce this fear.

Using lotteries to choose among due diligence\footnote{173} applicants would eliminate the risks of choosing an unqualified applicant because an applicant would have to prove that it could implement HDTV service within a year before it could apply for a license. Lotteries relating to mass-media

ments from the public. The Court held that under these circumstances the use of lotteries was in the public interest.). \footnote{166} See also 47 U.S.C. § 309(i) (1988).

\footnote{167} See OET ANALYSIS, supra note 108; OET FURTHER STUDIES, supra note 137; see also ATV Tentative Decision and Further Notice of Inquiry, supra note 7, para. 82.

\footnote{168} Random Selection Final Rule, supra note 164, para. 114.

\footnote{169} There are currently 1,760 stations and 369 vacant noncommercial allotments. \emph{Id.} at 3.

\footnote{170} 1990 Siddall Interview, supra note 1.

\footnote{171} WP1 REPORT, supra note 19, at 18. Although the advantages of a lottery are many, this method of assignment may violate the requirements of the Communications Act and the statutory mandate for diversity and minority preferences. 1990 Siddall Interview supra note 1; \footnote{172} see also 47 U.S.C. § 309(i)(3)(A) (1988). The FCC wants to limit the HDTV applicant pool to existing broadcast licensees. The lottery statute addresses an open proceeding where all can apply. \footnote{173} See generally id. § 309(i).

\footnote{172} WP1 REPORT, supra note 19, at 20.

\footnote{173} Due diligence will be explained further in the following subheading.
services could provide preferential treatment to minority and noncommercial applicants, thereby potentially satisfying the requirements of the Communications Act.\footnote{Random Selection Final Rule, supra note 164, para. 13; see 47 U.S.C. § 309(i)(3)(A) (1988). This preference system could be used in addition to the reservations for noncommercial stations under the National Table of Allotments. See generally Sixth Report and Order, supra note 130.}

Although lotteries are permissible under the Communications Act,\footnote{47 U.S.C. § 309(i) (1988). The Commission must determine that the applications are acceptable for filing prior to the lottery. A complete check of an applicant's qualifications is required only after the lottery is conducted and a successful applicant is chosen. Therefore, this method is not subject to undue delays and, based on the due diligence requirements, probably will not cause postlottery problems of underqualifications. Id.} the preference, due diligence requirements, and method of carrying out the lottery could be litigated. This would delay implementing HDTV, making the value of lotteries suspect.\footnote{WP1 REPORT, supra note 19, at 22-23.} However, any assignment method the FCC adopts would likely lead to litigation because of the difficulty in satisfying all parties. An early decision on the appropriate method of allocating spectrum to HDTV would allow difficulties to be fully discussed before HDTV systems were completely developed, thereby avoiding additional delay.\footnote{Id. The target date for achieving standardized HDTV systems is the second quarter of 1993. Sukow, supra note 96, at 38.}

3. **Due Diligence**

Due diligence is another method of allocation and assignment. This alternative is used to license direct broadcast satellites. Before a license is granted, the licensee must agree to begin constructing satellites within a year after the license is received.\footnote{FCC Permits Broadcast Satellite Operators to Broaden Services, AVIATION WEEK & SPACE TECH., Feb. 9, 1987, at 149.} This procedure proves that the licensee is duly diligent in wanting to provide broadcast service to consumers.\footnote{Id. Qualification for an HDTV license may include (1) being a holder in good standing of a license for an existing NTSC station; (2) financial means; and (3) statement of intent to implement an HDTV system within a specified time period. WP1 REPORT, supra note 19, at 17.} Because due diligence does not have a preference system toward minority station applications, this allocation method would be extremely burdensome to public television and other low-income broadcasters who lack the resources for immediate implementation of HDTV. Thus, under this system, large broadcasters with the financial means to enter into immediate construction contracts could foreclose noncommercial broadcasters from later implementing HDTV.
A more efficient method would incorporate the reservations in the National Table of Allotments and subsequent hearings into the due diligence method of assignment.\textsuperscript{180} Licensees would be required to construct stations within a year of receiving the license or risk losing the license.\textsuperscript{181} This would avoid the delay in assigning the spectrum and ensure a rapid transition to HDTV because many stations that lack the resources to immediately implement HDTV would not compete for due diligence awards.\textsuperscript{182} After a certain time, advances in compression technology and the transition from NTSC to a complete HDTV system could free part of the assigned spectrum, making it available for other HDTV applicants who originally were denied licenses. Thus, an HDTV system could be established rapidly by stations with greater resources, yet smaller stations could enter the HDTV market as technology allowed and as their resources increased.

Although due diligence licensing is practical, economical, and within the restrictions of the Communications Act,\textsuperscript{183} assignment difficulties would still arise when more than one mutually exclusive and duly diligent applicant competes for the same spectrum band. Therefore, this approach would not be sufficient to solve the FCC's assignment dilemmas. Instead, this method could be used with a lottery and comparative hearing system for cases in which granting one application requires denying another.

C. Proposal for Assigning Commercial HDTV Spectrum

The best system for assigning the spectrum to HDTV services is a combination of the above methods. Due diligence would assure that the spectrum would not lie unnecessarily idle and would serve the public interest of rapid implementation. When there are several due diligence applications for one spectrum assignment, the FCC could use a proceeding similar to that used for licensing applicants for Aviation, Maritime, and the Operational Fixed Microwave Radio Services.\textsuperscript{184} Comparative hearings or paper hearing proceedings would be held only when there

\textsuperscript{180} See generally Sixth Report and Order, supra note 130 (discussing National Table of Allotments).

\textsuperscript{181} HDTV assignments could be administered in a way similar to construction permits: Nonuse within the specified time limit would result in forfeiture of the license. Id.; see also WP1 REPORT, supra note 19, at 16.

\textsuperscript{182} HDTV will require new studios, cameras, video equipment, and possibly transmission towers. Brown, supra note 2, at 12, col. 2.

\textsuperscript{183} The Commission may grant licenses through the use of random selection whenever there is more than one application for an initial license or construction permit involving use of the electromagnetic spectrum. 47 U.S.C. § 309(i)(1) (1988).

\textsuperscript{184} Random Selection Final Rule, supra note 164, paras. 100-11.
were significant differences apparent on the face of the application.\textsuperscript{185} When there did not appear to be any qualification differences, comparative hearings would be futile and licenses would be granted by lottery.\textsuperscript{186} Before the lottery, the FCC would solicit and review informal complaints against applicants by applying comparative public interest criteria decided upon in a separate proceeding.\textsuperscript{187} Applicants that fulfilled the requirements and that were superior to all others would be granted licenses. Applications that were patently inferior would be denied. All other applications would be submitted for random selection by lottery if there were frequencies still available for assignment.\textsuperscript{188} This approach would provide the fairest, least expensive, and most expeditious transition to the new HDTV services.

D. Temporary Assignment of HDTV Spectrum

It may not be possible to implement HDTV upon availability of spectrum, because the necessary advanced television systems are still in development. Once HDTV is developed, many broadcasters still may not be able to implement the system immediately due to the high costs of equipment, production, and transmission. To avoid the probability that spectrum will lie idle, the spectrum required for HDTV services should be provided to other users during the interim period.\textsuperscript{189}

Some critics argue that interim use is not within the FCC's authority.\textsuperscript{190} This argument appears counter to the provisions of the Communications Act. According to 47 U.S.C. § 307(b), the FCC is responsible for distributing licenses among communities in a manner that will "provide a fair, efficient, and equitable distribution of . . . service."\textsuperscript{191} The primary objective of section 307(b) is to distribute television assignments in a manner that maximizes use of broadcast frequencies and provides the

\textsuperscript{185} Id. para. 101.
\textsuperscript{186} Id. paras. 101-102.
\textsuperscript{187} Id. para. 103.
\textsuperscript{188} This does not violate Ashmaker Radio Corp. v. FCC, 326 U.S. 327 (1945), because all applications go through the traditional comparative hearing procedure to determine if there are significant differences among them. All the applications that are substantially the same are entitled to an informal comparative hearing. Applicants have the opportunity to state the advantages of their applications and disadvantages of competing proposals. Minority stations have an equal opportunity to state their position because an informal proceeding requires fewer resources and less delay than that normally associated with court or Commission proceedings. Also, a preference system for minority stations applies to random selection by lottery to account for any other disadvantages. See 47 U.S.C. § 309(i)(3)(A) (1988).
\textsuperscript{189} ATV Tentative Decision and Further Notice of Inquiry, supra note 7, para. 152.
\textsuperscript{190} Id. para. 150.
greatest amount of television service to the public. In situations of “extraordinary circumstances,” and where a delay in operation would prejudice the public interest, the FCC could grant temporary licenses for a maximum period of 180 days, with additional 180-day extensions. Based on these provisions of the Communications Act, it appears the FCC can legitimately assign spectrum to HDTV for interim use.

Spectrum should not be assigned to existing broadcast applicants until they can implement HDTV. The alternative of immediately assigning spectrum and then allowing broadcasters to license others for temporary interim use would be inconvenient because the spectrum needs for broadcast HDTV are presently unknown and also because such a system would be against the public interest. The FCC should license spectrum use in accordance with the 180-day temporary assignment provision of 47 U.S.C. § 307(f). The FCC could then terminate the temporary use as broadcasters become able to implement HDTV.

The history of increased applications for the limited spectrum coupled with delays expected in providing HDTV service warrant authorizing temporary spectrum use during an interim period. The public interest would best be served by allowing as many services as possible to be available at any one time. Delays in implementing HDTV would leave spectrum idle. This constitutes an extraordinary circumstance where the denial of “temporary operations would seriously prejudice the public interest.” Because of equipment costs and loss of consumer base, many services would not desire temporary 180-day authorization. Automatic renewal should, therefore, be enacted, along with provisions for denial of renewal when the service is against the public interest or when permanent HDTV authorization has been granted. The relocation of displaced services should also be provided for whenever possible.

192. See In re Deintermixture of Springfield, Ill., Report and Order, 41 F.C.C. 1130, para. 58 (1962) (Section 309 mandates a fair, efficient, and equitable distribution of television service.).


194. An interim lease would be useful to a service with low overhead and little opportunity of obtaining permanent spectrum in the near future. Id.

195. ATV Tentative Decision and Further Notice of Inquiry, supra note 7, paras. 152-153. Leasing the spectrum for non-HDTV use may be more rewarding economically for broadcasters because initial implementation of HDTV will require a significant investment of capital without a guaranteed consumer base. This reality may reduce a broadcaster’s incentive to implement HDTV at its first opportunity. If this occurred, the public would be denied improvements in free, local, terrestrial broadcasting. See PBS and NAPTS Comments, supra note 21, at Part VI, 34-35.

E. The FCC Needs Additional Staffing and Resources

For the FCC to perform its role as traffic controller of the public airwaves efficiently and to allocate and assign the available spectrum effectively,\textsuperscript{197} it must be provided additional staffing and resources. The FCC's resources have been decreasing steadily due to budgetary pressures.\textsuperscript{198} The staff was reduced approximately one-third between 1979 and 1989. In 1979, the FCC had 2,232 full-time employees, with 142 in the OET. Ten years later, in October, 1989, the FCC expected to have about 1,660 full-time employees with only ninety-eight in the OET.\textsuperscript{199}

The FCC is expected to assign spectrum among broadcasters in each community and to conduct technical studies to achieve such assignment with minimal interference to reception. This responsibility includes processing at least 1,700 UHF and VHF applications and resolving disputes and complications.\textsuperscript{200} The staffing and resource reductions have already caused delays in spectrum allocation and in approval of new licenses and broadcast services.\textsuperscript{201} Budget and staff shortages will also delay processing of more than two hundred pending FM radio and fifteen UHF television applications.\textsuperscript{202} For the FCC to continue its role of policing the airwaves, these deficiencies must be addressed.

IV
Conclusion

Because of the economic and technological implications of HDTV, legal barriers should not be difficult to overcome once a system is created. The exception is where additional spectrum for HDTV is required and insufficient spectrum is available to accommodate all existing broadcasters. The broadcast industries need a guaranteed grant of additional spectrum to compete effectively with other providers of HDTV. The maintenance of the broadcaster as a first-class communications service is crucial because the terrestrial broadcaster provides the only free, universal, and local communication service presently available to the public.

The amount of available broadcast spectrum for HDTV may be increased through compression technologies and receiver improvements.

\textsuperscript{198} See MST Comments, \textit{supra} note 116, at 7.
\textsuperscript{199} \textit{Id.} This substantial reduction in staffing is especially disheartening considering the extreme growth in the workload of the FCC during this period. The FCC is confronted with licensing dozens of new, spectrum-using services (e.g. cellular radio) and tens of thousands of new users in new and preexisting services. \textit{Id.} at 8.
\textsuperscript{200} \textit{Id.} at 6.
\textsuperscript{201} Letter from Joel Chaseman to Chairman Hollings, \textit{supra} note 68, at 2.
\textsuperscript{202} \textit{Id.} at 1-2.
If there is still insufficient spectrum available to accommodate all existing broadcasters when they desire to implement HDTV, the FCC should grant licenses using a combination of due diligence, lottery, and comparative hearing methods. This assignment method would be cost effective, would meet public interest criteria, and would foster expedient HDTV implementation.

The FCC could also grant licenses for temporary use of the broadcast spectrum in the period before HDTV implementation. This temporary licensing should not be delegated to the private marketplace, but should instead be regulated by the FCC. Other non-HDTV applications for the scarce broadcast spectrum should stay frozen until all HDTV spectrum determinations have been made. A premature allocation of spectrum, made prior to choosing the necessary transmission requirements, may deny later-needed spectrum to HDTV services, thereby reducing the competitive capabilities of terrestrial broadcasters. Based on all these factors, and on an easier assignment proceeding, it is apparent that FCC regulation would ensure the most rapid and efficient transition to terrestrial HDTV services.