Before the
Federal Communications Commission
Washington, D.C. 20554

MM Docket No. 87-268

In the Matter of
Advanced Television Systems
and Their Impact on the
Existing Television Broadcast
Service

Review of Technical and
Operational Requirements:
Part 73-E, Television Broadcast
Stations

Reevaluation of the UHF Television
Channel and Distance Separation
Requirements of Part 73 of the
Commission's Rules

FIRST REPORT AND ORDER

Adopted: August 24, 1990; Released: September 21, 1990

By the Commission:

INTRODUCTION

1. By this action, the Commission is making several policy decisions that will affect its further study of technical matters concerning the introduction of Advanced Television (ATV) service. We have determined, based on the record compiled in this proceeding, that we will select a "simulcast" high definition television (HDTV) system, that is, a system that employs design principles independent of the existing NTSC technology, for ATV service.[1] On the same basis, we also have decided not to give further consideration to transmission systems that require additional spectrum to augment the existing 6 MHz channel used for broadcast television. While we plan to select a simulcast system, we also will leave open the possibility of entertaining consideration of an extended definition television (EDTV) system.[2] In any event, we do not envision that we would adopt an EDTV standard, if at all, prior to reaching a decision on an HDTV standard. Finally, we intend to provide sufficient flexibility in our ATV study programs to consider any new technical designs that are in a sufficiently concrete state of development to be considered along with the existing candidate systems. These actions, which are based on the information that has been developed thus far in this proceeding, will enable us to move forward promptly toward the goal of bringing the benefits of ATV service to the public. We wish to emphasize that in deciding to concentrate our efforts on selection of a simulcast system we are taking no position at this time on the merits of any particular simulcast system.

BACKGROUND

2. The Commission first began to investigate the possibility of improving television service in late 1986, at a time when initial efforts were under way by several parties to develop ATV transmission systems. Shortly thereafter, the Association of Maximum Service Telecasters (MST) and 57 other parties filed a joint petition requesting that the Commission open an inquiry to explore the possible introduction of ATV service. In response, the Commission adopted the *Notice of Inquiry (Notice)* in this proceeding in July 1987. [3] The *Notice* described the known ATV system proposals and requested comment on a wide range of issues concerning technical and regulatory matters relating to the authorization of advanced television service.[4] In response to the *Notice*, the Commission received 70 comments, 26 reply comments and three petitions to file supplemental information.

3. Shortly after issuing the *Notice*, in September 1987, the Commission established the Advisory Committee on Advanced Television Service (Advisory Committee). The task of this group, which is composed of industry leaders representing diverse viewpoints, is to gather and study information and to make recommendations to the Commission on the technical, economic, and public interest issues to be decided in introducing ATV service.[5] A significant portion of the Advisory Committee's effort is devoted to the evaluation of ATV systems.

4. Based on the record developed through the *Notice* and the early work of the Advisory Committee, the Commission adopted a *Tentative Decision and Further Notice of Inquiry (Further Notice)* in September 1988.[6] Therein, the Commission began the process of narrowing and focusing the issues related to the introduction of ATV service. The Commission reached tentative decisions on six of the most fundamental issues in this proceeding. These tentative decisions are:

1) Providing for terrestrial broadcast use of ATV techniques would benefit the public;

2) The benefits of ATV technology can be realized by the public most quickly if existing broadcasters are permitted to implement ATV;

3) Any spectrum needed for a broadcast ATV system will be obtained from the spectrum currently allocated to broadcast television;

4) Existing service to viewers utilizing NTSC receivers must be continued, irrespective of the actual manner in which ATV services are delivered, at least during a transition period (this can be accomplished either by transmitting ATV signals that can be received directly by NTSC receivers or by simulcasting NTSC and incompatible ATV signals on separate channels);

5) Systems requiring more than 6 MHz to broadcast an incompatible signal will not be authorized for terrestrial broadcast service;

6) It is in the public interest not to retard the independent introduction of ATV in other services or on non-broadcast media.[7]

5. Based on the framework provided by these tentative decisions, the Commission requested additional information to aid it in addressing all of the remaining complex and interrelated technical, legal, economic, and policy

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issues surrounding authorization of use of advanced television technology by terrestrial broadcasters. The Commission also sought comment on a number of specific issues, including several related to ATV technical standards. Two of the principal technical issues addressed are: 1) how to accommodate ATV within the existing TV spectrum; and, 2) how standards should be established for ATV service.[8] In response to the *Further Notice*, the Commission received 50 comments, 23 reply comments and two supplemental reply comments.

DISCUSSION

6. Our primary goal in this proceeding is to assure the development of a technically excellent ATV service that will most efficiently meet the needs of terrestrial broadcasters, cable television operators and, most of all, consumers. In light of the future benefits that this service offers to the public, we also believe it is important to endeavor to complete our actions authorizing this service as promptly as possible. During the three years since the FCC and NTIA first began to consider ATV service, substantial progress has been made toward the selection of advanced television systems. The efforts of the Advisory Committee and other industry parties have significantly advanced our ability to assess the merits of the various technical concepts before us. System designers also have made substantial progress in developing new technical schemes for delivering HDTV service using a 6 MHz channel.[9] Based on this progress, we are making several policy decisions that will further narrow the focus of this proceeding and enable us to move forward expeditiously towards a decision on ATV technical standards.[10]

7. Consistent with our goal of ensuring excellence in ATV service, we intend to select a simulcast high definition television system. The record indicates that simulcast systems offer the potential for significantly greater improvement in the quality of television picture and audio performance than NTSC compatible systems. For example, parties filing comments in response to the *Further Notice* generally assume that the Commission will ultimately authorize a system using new technology that will provide HDTV service.[11] Commenting parties also indicate that EDTV, while it promises to provide significant improvements over the current system, falls short of the audio and video quality offered by HDTV.[12] We believe an HDTV system will be viable over the long term by permitting the introduction of future changes and improvements in a timely and non-disruptive manner. Further, simulcast systems are not constrained by the limitations inherent in the NTSC technology. Thus, a simulcast system can be designed to take full advantage of the advances in electronic technology that have been developed since 1953 when the NTSC color standard was first adopted.

8. A simulcast system also will be spectrum efficient and facilitate the implementation of ATV service. Such a system will transmit the increased information of an HDTV signal in the same 6 MHz channel space used in the current television channel plan. This ultimately will minimize the amount of spectrum needed for HDTV service and simplify the HDTV channel allocation process. Our decision to select a simulcast system also will have practical advantages for broadcasters and consumers. As discussed by North American Philips and CBS, going from the existing NTSC system to an HDTV system in one step will minimize the investment required of broadcasters, avoid the need for interim standards for transitional systems and the costs of requiring later systems to be compatible with those systems and speed HDTV implementation. Our selection of an HDTV standard will enable broadcasters to offer HTDV service at the earliest possible date, thereby allowing them to compete with the technical quality of service offered by other media and to avoid investment in equipment for an interim system. In addition, a simulcast system will provide consumers with the greatest degree of initial improvement in the quality of television picture and audio service. Finally, our selection of a simulcast system will eliminate confusion for consumers about which type of receiver to purchase. This latter factor can be expected to speed the growth of HDTV receiver penetration.

9. We do not find it useful to give further consideration to systems that use additional spectrum to "augment" an existing 6 MHz television channel to provide NTSC compatible service. While we recognize that an augmentation system could provide improvements in service quality over that of the NTSC system, such a system would be less spectrum efficient and more difficult to implement than a 6 simulcast MHz design. As MIT observes, a simulcast system ultimately will allow the NTSC and HDTV channels to be used independently. The augmentation systems before us do not appear to offer improvements in the quality of television service equal to or greater than could be provided by a 6 MHz simulcast system. This is because their operational designs are constrained by the technical limitations inherent in the NTSC system. Thus, it does not appear that there would be any gain in service from using the additional spectrum.

10. Moreover, there are disadvantages to selection of an augmentation system from an implementation standpoint. Our spectrum studies indicate that it would not be possible to provide all television stations with augmentation spectrum that is contiguous with their primary channel.[13] These studies indicate that only approximately 79 and 73 percent of the existing stations could be provided 3 or 6 MHz, respectively, of contiguous spectrum even if the NTSC to ATV transmitter spacing distances were as close as 100 miles.[14] Further, if the primary and augmentation signals were in different bands, *i.e.*, one in the UHF band and one in the VHF band, there would be propagation differences in the two signals that would require receivers to be able to process signals of significantly different levels. Receivers for an augmentation system would, therefore, be more complex and more costly for consumers than receivers for a 6 MHz system. Thomson, Sony and others recommend against such an approach on the basis of receiver concerns. They observe that the use of noncontiguous channels would require additional processors, an extra tuner and complete RF systems, and new antenna development and that in any case it might be difficult to obtain satisfactory receiver performance, especially if the channels were widely separated. These factors do not pose problems for implementation of 6 MHz simulcast systems, as there is no need to synchronize the signal of a simulcast system with an NTSC signal. Even if an augmentation system were able to offer some improvement in quality over 6 simulcast MHz systems, the disadvantages of such a system in terms of spectrum efficiency and implementation considerations would still lead us to conclude that a simulcast system is a more desirable choice.

11. At this time, the individual simulcast, or HDTV, proponent systems are still undergoing final development. We do not have full information on the performance attributes of any of these systems. Therefore, we are not taking a position on the desirability of any particular simulcast system as the standard to chose.

12. While we plan to select a simulcast system, as stated above, we do not wish to foreclose the consideration of an EDTV system. For example, it is possible that an EDTV system could prove to provide quality comparable to that of an HDTV system and be more cost effective for both broadcasters and consumers. Therefore, we will continue to examine all aspects of 6 MHz EDTV technologies, including their quality, technical attributes, potential for consumer acceptance and cost effectiveness. After the final report from the testing program is available, we will decide how to implement ATV service. At that time, if we were to find that the single step simulcast approach for implemention is not the appropriate course of action, we may consider an EDTV system or some other approach. In this regard, however, we wish to re-emphasize that the Commission presently does not expect that an EDTV standard would be selected, if at all, prior to a decision on an HDTV standard.

13. In conjunction with the above policy decisions and our goal to select a system as promptly as possible, we are undertaking to expedite the completion of our program for testing and evaluation of the candidate ATV systems. To this end, our staff has been directed to work closely with the testing laboratories and is in the process of formulating with the Advanced Television Test Center and Cable Labs a program of participation in the testing process. To facilitate this collaborative effort, we are requesting that the Advisory Committee make any test data it generates available to our staff as soon as it is produced. It is our goal that through the collective efforts of the Advisory Committee and our staff, a final report with recommendations can be completed by autumn 1992.

14. Finally, we intend to maintain a flexible position with respect to new ATV developments that offer important new benefits and which are in a sufficiently concrete state of development to be considered with the existing systems. We recognize that other parties in addition to those currently participating in the test program are working on system designs and that it is possible that one or more of these systems could offer features superior to those already scheduled for testing. For example, it is possible that a new fully digital system could be conceived that would require additional development time. We do not want to foreclose the possibility of considering any of these systems. Thus, with the assistance of the Advisory Committee, we intend to review carefully, but quickly, any such new developments early in 1992. If we find any new systems that are sufficiently developed to be tested, we will supplement the testing schedule to accommodate them on a timely basis.

ADMINISTRATIVE MATTERS

15. *Paperwork Reduction Act Statement.* The action taken herein has been analyzed with respect to the Paperwork Reduction Act of 1980, and found to impose no new or modified information collection requirement on the public.

16. *Ordering Clauses.* Accordingly, IT IS ORDERED that pursuant to 47 U.S.C. Sections 151, 154(i), (j), 301, 303(g), (r), (s), and 403, this First Report and Order IS ADOPTED and the Advisory Committee on Advanced Television Service IS TO TAKE the appropriate actions necessary to implement the decisions set forth herein.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy
Secretary

FOOTNOTES

[1] "Simulcast" is a contraction of "simultaneous broadcast" and means the broadcast of one program over two channels to the same area at the same time. The term "HDTV" indicates systems that use new technology and provide a major improvement in television service. The goals of such systems are to offer approximately twice the vertical and horizontal resolution of NTSC receivers, provide picture quality approaching that of 35mm film and sound quality approaching that of a compact disc. "NTSC" is the acronym for the National Television Systems Committee, an industry group convened first in 1940 to develop broadcast television technical standards and again in 1950 to develop standards for adding color to the earlier, monochromatic standard. In order to provide the same programming to existing NTSC receivers and HDTV receivers, a broadcaster using an ATV technology that is independent and therefore not compatible with the NTSC system would have to simulcast programs on both its NTSC channel and its ATV channel.

[2] The term "EDTV" refers to a number of different television improvements that modify NTSC emissions but are NTSC receiver-compatible in either the 4:3 standard or 16:9 "letter-box" aspect ratio formats. The aspect ratio of a television picture is the width of the display relative to its height.

[3] *See Notice of Inquiry* in MM Docket No. 87-268, adopted July 16, 1987, 2 FCC Rcd 5125 (1987).

[4] In conjunction with the *Notice*, the Commission also issued an *Order* freezing applications for new television stations and requests for television allotments in 30 major cities where a shortage of broadcast spectrum might exist if it approved an ATV system requiring more than the 6 MHz currently used by television stations. *See Order*, RM-5811, Mimeo No. 4074, released July 17, 1987. In October 1987, the Commission granted a Petition for Special Relief filed by the same parties that requested issuance of the *Notice* and deferred action on additional sharing between UHF television stations and private land mobile stations until it had time to receive comment on and to consider the ATV matter. *See Order*, 2 FCC Rcd 6441 (1987).

[5] The Advisory Committee has now issued three interim reports. *See* "Interim Report of the FCC Advisory Committee on Advanced Television Service," June 16, 1988; "Second Interim Report of the FCC Advisory Committee on Advanced Television Service," April 26, 1989; and, "Third Interim Report of the FCC Advisory Committee on Advanced Television Service," March 22, 1990.

[6] *See Tentative Decision and Further Notice of Proposed Rule Making*, MM Docket No. 87-268, adopted September 1, 1988, 3 FCC Rcd 6520 (1988).

[7] *See Further Notice, supra*, at paragraph 4.

[8] *Id.*, at paragraph 5.

[9] For example, some of the parties developing enhanced NTSC systems include NBC-Sarnoff-Thomson-North American Philips, in a joint venture, and Faroudja Research Enterprises, Inc. Similarly, some of the parties developing 6 MHz simulcast systems include MIT, NHK, Zenith, and the NBC-Sarnoff-Thomson-North American Philips group.

[10] Our action herein addresses only a limited number of issues pertaining to technical standards. We will address the other issues discussed in the *Further Notice* in subsequent actions in this proceeding.

[11] *See e.g.*, the comments of A-Vision; the 1125/60 Group, NHK, Sarnoff, TCI, and Zenith.

[12] *See e.g.*, the comments of the Land Mobile Coordinating Committee, ABC/Cap Cities, and Time, Inc.

[13] *See* "Interim Report: Estimate of the Availability of Spectrum for Advanced Television (ATV) in the Existing Terrestrial Broadcast Bands," OET Technical Memorandum, FCC/OET TM88-1, August 1988. and, "Interim Report: Further Studies on the Availability of Spectrum for Advanced Television," OET Technical Memorandum, FCC/OET TM89-1, December 1989.

[14] The 100 mile spacing is the shortest distance that appears possibly feasible for a general policy.