

allotments for new stations is effective as of the close of business on the date of adoption of this Further Notice. Any petitions that are currently on file and any rule making proceedings that are currently open will be addressed on a case-by-case basis, taking into account the impact on the draft DTV allotment table. For those pending cases in which a new NTSC channel is allotted, we will make an exception to our decision to cease accepting applications for new NTSC stations, and the accompanying allotment Report and Order will specify the period of time for filing applications.

62. Our decision to cease accepting applications for new NTSC TV stations 30 days after publication of this Further Notice in the Federal Register and new petitions for rule making to add new NTSC allotments immediately, as indicated above, is based on the need to preserve the available spectrum for use by new DTV stations during the transition. The DTV Table proposed herein was developed on the assumption that the existing vacant NTSC allotments for which no construction permit application is pending will be deleted. It is necessary to delete these allotments in order to achieve our goal of providing a DTV allotment for all eligible broadcast stations. In addition, we also believe it is necessary to terminate the licensing of new NTSC as quickly as possible in order begin the process of transitioning to DTV service. To continue to accept new applications for NTSC stations, now that we are approaching the actual start of this new service, could potentially prolong the transition process. We note that the additional 30 day period we have provided for filing new applications for NTSC construction permits will accommodate any parties who may be in the process of preparing such applications now. Accordingly, as allowed under Section 553(b) and (d) of the Administrative Procedures Act, we find that there is good cause for implementing these new policies without a notice and comment procedure and that such a procedure would be contrary to our efforts to implement DTV service.⁶³

63. With regard to modifications of existing stations, we are concerned that the service area replications to be provided by the draft Table set forth herein could be substantially affected if stations make changes to their technical operations, *i.e.*, maximum effective radiated power (ERP), antenna height above average terrain (HAAT), and transmitter locations from this point on. Furthermore, continuing changes in station operations could affect broadcasters ability to comment meaningfully on the proposed Table and our ability to finalize the DTV Table of Allotments. We are also concerned, however, that freezing modifications to existing NTSC stations could pose hardships for broadcasters. We note that in many cases it may be possible to permit modification of existing stations without affecting the DTV Table. We therefore will continue to permit the filing of applications to modify the technical facilities, *i.e.*, ERP, HAAT or transmitter location, of existing or authorized NTSC TV stations. However, in order to preserve our ability to develop the DTV Table, we will henceforth condition the grant of applications for modifications of technical facilities, including those for applications on file before the date of the adoption of this Further Notice but granted after that date, on the outcome of our final decision on the DTV Table of Allotments. To the extent that an existing station's service or potential for causing interference are extended into new areas by grant of an application, the condition may require the station's authorized facilities to be reduced or modified. We seek comment on whether

⁶³ See 5 U.S.C. 553(b) and (d).

this condition should involve different consequences for applications for modifications on file as of the date of adoption of this Further Notice, as opposed to such applications filed after that date.

C. Low Power and TV Translator Stations

64. In previous actions in the proceeding, we determined that in order to provide DTV allotments for existing full service stations, it will be necessary to displace low power TV (LPTV) and TV translator stations to some degree, especially in the major markets.⁶⁴ This determination was based on our staff studies and studies by the Advisory Committee that indicate there is insufficient spectrum available in the broadcast TV bands to factor in low power displacement considerations in making DTV assignments.⁶⁵ We observed that, in fact, it will be a challenge just to provide all full-service licensees with an additional 6 MHz for DTV. We therefore concluded that we must continue LPTV and TV translators secondary status vis-a-vis DTV stations. In view of the important benefits that LPTV and TV translators provide to the public, we also took a number of steps to mitigate the likelihood and effects of displacement on low power stations. Our decisions with regard to this issue have been upheld on judicial review. See Polar Broadcasting vs. F.C.C., 22 F.3d 1184 (D.C. Cir. 1994)(table).

65. Proposal. Consistent with our determinations and actions in the Second Report/Further Notice and based on our examination of the performance characteristics of the ATSC DTV system, we propose to continue the secondary status of LPTV and TV translator stations.⁶⁶ As indicated in the Second Report/ Further Notice, it will likely be necessary that we require a significant number of low power stations, particularly those in the more congested areas of the nation, to make changes in their operation, including the possibility of ceasing operation, to avoid interference to new digital TV stations. This is true under any allotment plan that has been suggested for the implementation of DTV. Low power stations

⁶⁴ See Second Report/Further Notice, at paras. 39-45; and Second Further Notice, at para. 41.

⁶⁵ See "Interim Report: Estimate of the Availability of Spectrum for Advanced Television (ATV) in the Existing Broadcast Television 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; and, "Preliminary Analysis of VHF and UHF Planning Subcommittee Working Party 3, Doc. 0174 (June 1991).

⁶⁶ Island Broadcasting (Island), the licensee of three low power TV stations operating in the New York City metropolitan area and on Long Island, in an earlier letter to the Commission, argued that it may be possible to provide a DTV channel for all of the existing full service TV stations in the New York market without displacing any of the existing LPTV/translator stations in the area. Island included an illustrative DTV allotment table for the New York City area that would not use any of the existing LPTV and TV translator channels. Where feasible, a number of Island's proposals were incorporated in preparing the proposed DTV Table of Allotments included herein.

operate in spectrum now unoccupied by NTSC stations. Any DTV allotment plan requires that unoccupied spectrum to accommodate over 1900 new digital TV stations.

66. In general, LPTV and TV translator stations are carefully engineered to avoid causing interference to full service TV operations. For example, almost 50 percent of LPTV stations use directional antennas to provide service and avoid such interference. Reduced power and/or antenna gain are also used to achieve satisfactory operation. Stations operating in mountainous or hilly terrain often rely on terrain obstructions as a means of preventing interference. The task of analyzing the impact of DTV on LPTV and TV translator stations is extremely complex and station specific. Because of this, we can only approximate the number of LPTV stations that would be affected or have to cease operation because of new DTV operations.⁶⁷ Based on the proposed DTV Table, we estimate that about 55 to 65 percent of existing LPTV operations and about 80 to 90 percent of all TV translators would be able to continue to operate.⁶⁸ In general, operations in or near major TV markets would be affected to a greater degree than operations in other areas. Furthermore, these estimates are based on the expected impact of new DTV operations and do not take into account our spectrum recovery proposals. We note, for example, that about 17 percent of all LPTV and TV translator stations would be affected by recovery of channels 60-69. However, it should be noted that channels 60-69 are used for DTV allotments in a number of instances and some impact on low power operations on these channels would occur even absent our spectrum recovery effort. We also note that many current TV channels have fewer than 100 LPTV or TV translator stations nationwide, while many other channels have significantly more than 100 such stations. We therefore believe that with more intensive utilization of the remaining channels, it should be possible to accommodate many LPTV and TV translator operations that are displaced. Accordingly, while we recognize that the implementation of DTV service and our spectrum recovery proposals are likely to have a significant impact on low power stations, we believe on balance that the benefits and innovations to be derived from these actions outweigh this impact.

67. At the same time, we continue to recognize the benefits that low power stations provide to the public. LPTV stations have increased the diversity of television programming and station ownership, and serve many rural and urban ethnic communities. TV translators are used to provide TV service to communities located in areas of mountainous terrain and to

⁶⁷ We note that it may be possible for some affected stations to resolve interference by changing their operation in some way (relocation, changing channel, reducing power or modifying antenna gain/pattern) rather than cease operation. Since we are not in a position to determine whether such changes are possible, we have not attempted to differentiate between these two impacts.

⁶⁸ While the actual criteria for controlling interference between LPTV and DTV will be based on specific desired to undesired (D/U) signal levels and the actual technical parameters of each station, we believe that a satisfactory estimate of impact can be derived from a more simple "separation distance" approach. Our estimates of low power impact are based on a co-channel separation distance of 70 to 80 miles and an adjacent channel separation of 60 to 70 miles.

provide "fill-in" service to shadowed areas within a full service stations service area. We therefore desire to minimize the impact of our DTV allotment and spectrum recovery proposals on low power TV operations. In view of these considerations and keeping with the decisions made in the Second Report/Further Notice, we are maintaining our proposal to continue to permit displaced low power stations to apply for a suitable replacement channel in the same area without being subject to competing applications.⁶⁹ We will extend this relief measure to LPTV and TV translator licensees and permittees whose facilities have or would be predicted to conflict with a DTV station operation. To insure the most effective use of this policy, we propose that applications for such "displacement" relief could be filed at such time as there would be a reasonable expectation of displacement; for example, upon the filing of an application by a full service broadcaster for a DTV channel that would conflict with operation of the LPTV or TV translator station. Moreover, we will permit low power stations to operate until a displacing DTV station or a new primary service provider is operational. We will also permit low power stations to file non-window displacement relief applications to change their operating parameters to cure or prevent interference caused to or received from a DTV station or other protected service.⁷⁰

68. We also propose to permit low power TV operations on channels outside the core digital TV spectrum area.⁷¹ Such operations would, however, continue to be on a secondary basis and would have to avoid interference to any full service DTV or NTSC stations or to any new primary service operations. While we are proposing that LPTV and TV translator stations remain secondary to other new primary uses of this spectrum, we also request comment on whether new service providers should be required to compensate existing LPTV and TV translator licensees for their existing investment or for their move to another channel if such a move is possible.

69. Despite these measures, a number of LPTV stations would still be forced to cease operation in order to avoid interference to new DTV channels. We seek to explore other policies that would preserve access to LPTV programming. Are there ways for low power stations to obtain carriage on new DTV stations or other video distributors? For example, in

⁶⁹ See Second Report/Further Notice, at para. 45. The Commission's rules now permit special relief for authorized stations in the LPTV service having an actual or predicted interference conflict with a TV broadcast station or protected land mobile radio service. In that event, a station licensee or permittee may immediately file an application for a change in output channel, together with other changes necessary to avoid interference. Provided, such an application is acceptable for filing, it may be granted without opportunity for the filing of competing applications. See 47 CFR. 73.3572.

⁷⁰ LPTV and TV translator stations would be allowed to continue to operate provided they protected full service DTV operations in accordance with the desired-to-undesired signal ratios used for modifications to the DTV Table of Allotments (see Appendix A).

⁷¹ In this regard, we believe that permitting such operations on these channels will provide additional relief for low power broadcasters until the end of the transition period when other spectrum within the core region will become available.

view of the ATSC DTV system's multiple programming capability, should the Commission consider incentives to encourage full-service digital stations to find ways to accommodate LPTV and TV translator stations? Similarly, should the Commission consider incentives to encourage carriage of LPTV stations on cable systems beyond the requirements set forth in Section 614(c) of the Communications Act?

70. We seek comment on any and all means of lessening the impact on low power TV and TV translator stations. In so doing, we invite the LPTV and TV translator communities to identify workable means of preserving existing LPTV service to the extent possible and providing a digital migration path for LPTV and TV translator stations. If we were to adopt the core approach described above, we could also set aside a few frequencies between channels 52 and 59 specifically for use by displaced LPTV stations. If such frequencies were used for digital services, each channel could accommodate a number of LPTV broadcasters. Use of such channels by low power stations, as a guard band, could reduce the potential for interference to any future nonbroadcast operations.⁷²

71. Currently, the rules do not permit low power and TV translator stations to operate on certain channels within specified distances of full service stations.⁷³ For example, a UHF low power or TV translator station is not permitted to operate on a channel that is seven channels above a full service station unless the low power station is located 100 kilometers or more from that station. There are similar restrictions for other UHF channels. While these restrictions are generally needed to protect against interference, in many instances interference would not occur between the stations due to terrain or other factors. The current LPTV interference protection rules, however, do not allow for terrain shielding and other mechanisms, such as co-location of adjacent channel stations. We do, however, permit applicants for LPTV and TV translator stations to request a waiver of the rules to take terrain shielding and other mechanisms into account.⁷⁴ In order to provide low power operations with additional flexibility, we propose to allow any low power operation that is adversely affected by the implementation of DTV or our spectrum recovery efforts to take terrain and other appropriate engineering factors into account in finding replacement channels. We propose to permit such low power stations to use any available channel provided interference is not caused to any authorized full service NTSC or DTV operations or to other authorized

⁷² See comments of the Community Broadcasters Association in response to the Fourth Further Notice.

⁷³ See Section 74.705 of the rules, 47 CFR §74.705.

⁷⁴ Generally, an applicant for a low power TV or TV translator station may support a terrain waiver request by obtaining the assent of a potentially affected station or, alternatively, by submitting an engineering study, based on terrain profiles, which demonstrates that interference would not occur due to the effects of the terrain. See Commission Policy Regarding Terrain Shielding, 3 FCC Rcd 2664 (1988), *recon granted in part*, 3 FCC Rcd 7105 (Terrain Shielding Policy Statement); see also, First Report and Order in MM Docket No. 93-114, 9 FCC Rcd 2555 (1994), which broadened the scope of the LPTV terrain waiver policy.

low power operations. Applications that rely on terrain shielding to avoid interference would need to be supported by the written assent of the operator of the potentially affected station or service or, alternatively, an engineering analysis showing that interference to the off-air reception of the DTV station or other primary service would not be likely due to terrain shielding. We also request comment on any other actions we could take that would provide low power stations, where necessary, with additional flexibility to find replacement channels.

72. We also ask for comment on whether, once DTV channels have been allotted to full service television broadcasters, should licensed LPTV stations be afforded a window of opportunity to seek "primary" use of DTV channels; that is, ahead of new broadcast entrants? If so, should such stations be permitted to seek full service DTV licenses or facilities that would replicate their LPTV coverage areas? How should we proceed in areas where there would be more LPTV stations than available channels? Should we allow multiple LPTV licensees to share a DTV channel, by multiplexing their signals? Given the large numbers of stations in the LPTV service, should we consider such a provision only for certain LPTV stations; for example, those which meet the programming and public interest requisites for LPTV cable must carry, as set forth in the 1992 Cable Act?

D. Use of TV Channels 3, 4 and 6

73. In the Second Further Notice, we observed that if we decide to use the VHF channels for DTV, there could be potential for interference to cable terminal devices (set-top boxes) and videocassette recorders (VCRs) if channels 3 and 4, at 60-66 MHz and 66-72 MHz respectively, were used in the same area. These devices typically use either channel 3 or 4 for their output signal and could be vulnerable to interference if there were an off-the-air signal present on the same channel as their output signal. We therefore proposed to avoid the allotment of both Channels 3 and 4 within the same community wherever possible. We also noted that we would need to protect against possible interference from TV channel 6 operations, at 82-88 MHz, to FM radio service on FM channel 253, at 98.5 MHz and to TV channel 6 from FM radio service on noncommercial educational FM channels 201-220, in the 88-92 MHz band. We therefore proposed to make DTV allotments to TV channel 6 only where there is no other readily available allotment opportunity that would meet the minimum spacing requirements.⁷⁵ For cases where it might be necessary to use channel 6, we proposed to apply an appropriate standard similar to that currently specified in the rules to protect against interference between NTSC Channel 6 and FM radio.⁷⁶

⁷⁵ The sample Table included in the Second Further Notice did not use channel 6.

⁷⁶ The rules regulating TV channel 6 and FM radio interference are set forth in 47 CFR 73.207(c), 73.525 and 73.610(f). TV channel 6 is restricted with respect to the IF separation to FM channel 253 (Section 73.610(f) of the rules). Commercial FM stations on channel 253 and noncommercial educational FM stations on FM channels 201-220 must protect TV channel 6. There are no restrictions on new TV channel 6 stations or changes with respect to FM channels 201-220.

74. Proposal. We are maintaining our proposals to avoid use of both channels 3 and 4 for DTV service in the same community wherever possible and to make DTV allotments to TV channel 6 only where there is no other readily available allotment opportunity that would meet the minimum spacing requirements. We also propose to maintain our plan to apply an appropriate standard similar to that currently specified in the rules to protect against interference between NTSC Channel 6 and FM radio. While we do not have specific data with regard to interference between DTV and FM operations, we believe that the current standards to protect against interference between FM radio and NTSC TV stations should be sufficient to avoid interference between DTV and FM service.

E. Land Mobile Sharing

75. In the Second Further Notice, we also set forth proposals for protecting against possible interference between DTV stations and land mobile operations on TV broadcast frequencies in certain areas. The rules authorize land mobile sharing operations on frequencies in the range of UHF channels 14-20, which occupy the 470-512 MHz band, in 13 urbanized areas, the Gulf of Mexico offshore region and Hawaii.⁷⁷ We therefore proposed to allow DTV stations to operate at co-channel and adjacent channel spacings to the city-center of land mobile operations as close as 250 km (155 miles) and 176 km (110 miles), respectively. We also noted that some additional conditions may be necessary in those few instances where these spacing distances cannot be met. We also noted that our existing border agreements with Canada preclude activation of land mobile stations on channels 15 and 16 in Detroit and channels 14 and 15 in Cleveland and proposed to make these channels available for allotment purposes in those markets.

76. Proposal. We believe that our earlier proposed spacing approach remains appropriate for regulating interference between DTV stations and existing land mobile

⁷⁷ See 47 CFR §2.106, Notes NG66, NG114 and NG127. The 13 urbanized areas where UHF channels may be used for land mobile operations and the channels set aside for such operations in those areas are:

	TV Channel
New York-Northeastern New Jersey	14,15
Los Angeles	14, 16, 20
Chicago-Northwestern Indiana	14, 15
Philadelphia, PA-New Jersey	19, 20
Detroit, MI	15, 16
San Francisco-Oakland, CA	16, 17
Boston, MA	14, 16
Washington, DC-Maryland-Virginia	17, 18
Pittsburgh, PA	14, 18
Cleveland, OH	14, 15
Miami, FL	14
Houston, TX	17
Dallas, TX	16

operations. Based on performance of the ATSC DTV system, the co-channel and adjacent channel spacing requirements proposed in the Second Further Notice should provide a conservative measure of protection for both DTV and land mobile operations. We will therefore continue to propose to permit DTV stations to operate at co-channel and adjacent channel spacings to the city-center of land mobile operations as close as 250 km (155 miles) and 176 km (110 miles), respectively. We will also maintain our proposal to make channels 15 and 16 in Detroit and channels 14 and 15 in Cleveland available for DTV allotment purposes. We request comment on these proposals. We specifically invite comment and suggestions regarding the additional conditions that would be applied in cases where the proposed spacing standards cannot be met and the manner in which such conditions should be applied to achieve an appropriate balance between DTV and land mobile interests.

77. The DTV Table proposed herein assumes that channel 20 would remain available for land mobile operations in Philadelphia. However, we note that the broadcast industry, in developing sample DTV plans, has assumed that the land mobile use of channel 20 in Philadelphia would be eliminated and that this frequency would be available for DTV purposes. We recognize that the elimination of channel 20 for land mobile operations in Philadelphia could significantly reduce the interference among TV stations in the congested northeast corridor. At the same time, we also recognize that there are a substantial number of land mobile operations licensed in the Philadelphia area.⁷⁸ We request comment on the impact of eliminating channel 20 use for land mobile service in Philadelphia and on whether the reduction in broadcast service interference would outweigh the benefits of maintaining channel 20 for land mobile in Philadelphia. We further request comment on what alternatives are available for accommodating the existing land mobile operations and to what extent broadcasters should be required to assist in such a reaccommodation if we were to recover channel 20 in Philadelphia for broadcast use.

F. DTV Frequency Labeling Plan

78. Under the DTV core spectrum option presented above, the core spectrum for DTV service would occupy the frequencies now used by NTSC channels 7-51. It would seem appropriate to establish a new labeling scheme for the DTV frequencies, so that TV frequencies in the future would not begin with "Channel 7." We request proposals and comments relating to an appropriate frequency labeling scheme for DTV service. We encourage interested parties to be creative in their proposals. In this regard, we do not intend to limit our consideration to approaches that only use numerical designations. In considering this matter, we note that the most obvious approach would be to simply renumber NTSC channels 7-51 as channels 1-45 for DTV service. However, it might be simpler, more appropriate and ultimately less confusing to viewers to whom the term "channel" implies a single stream of video programming to employ a different designation format for DTV channels that clearly indicated that a channel would carry DTV service.⁷⁹ For example, we

⁷⁸ Over 600 licenses have been granted for land mobile use of channel 20 in the Philadelphia area.

⁷⁹ See n. 4, supra.

could use a prefix such as "D" for digital or DTV before each channel number or we could start numbering DTV channels at 101. Another approach would be to use alphabetic designators, *i.e.*, channels A, B, C ... AA, BB, CC, etc. This would allow broadcasters to label multiplexed programming, channels A1, A2, A3, B1, B2, etc. Another approach for labeling or numbering of DTV channels could be to use a scheme similar to that used for FM radio. Such an approach would permit broadcasters to use the center frequency of the DTV channel, or an abbreviated center channel designation in combination with a call sign, *e.g.*, channels 19 and 20 might be called 503 MHz and 509 MHz or "WXXX500" and "WYYY510."

79. The establishment of a new basic designation format for DTV channels plan might also help to highlight the channels of DTV stations for viewers during the transition period. We believe it is important that the DTV channel designators be kept as brief as possible, as a matter of convenience for stations, viewers and those who provide program listings. We therefore ask that suggestions for the DTV channel numbering plan minimize both the length and complexity of the channel designators. For purposes of the DTV Table of Allotments proposed herein, we will continue to use the equivalent NTSC channel designations for DTV channels.

V. ALLOTMENT METHODOLOGY AND APPROACH

A. Technical Performance of the DTV System

80. Proposal. In the early stages of this proceeding, studies by our staff indicated that in order to accommodate all existing stations with a DTV channel it would be necessary to locate some co-channel DTV operations at distances to other NTSC and other DTV stations as close as 160 km (100 miles), with perhaps a very few stations at slightly closer spacings.⁸⁰ Our staff studies further indicated that to achieve full accommodation it will be necessary to co-locate or reduce spacings between adjacent channels in some instances and to eliminate many of the UHF taboo restrictions.⁸¹ The information from these studies was used in designing the performance capabilities and interference characteristics of the ATSC DTV system. We propose to use the performance characteristics of the ATSC DTV system in developing DTV allotments and have used these characteristics in developing the proposed

⁸⁰ See "Interim Report: Estimate of the Availability of Spectrum for Advanced Television (ATV) in the Existing Broadcast Television Bands," *supra*; and, "Interim Report: Further Studies on the Availability of Spectrum for Advanced Television," *supra*.

⁸¹ Other FCC staff studies of NTSC receiver performance and spectrum availability also indicated that it appeared possible to use the UHF taboo channels for DTV service. See "Analyses of UHF TV Receiver Interference Immunities Considering Advanced Television Service," FCC/OET TM88-2 (August 1988); see also "Interim Report: Estimate of the Availability of Spectrum for Advanced Television (ATV) in the Existing Broadcast Television Bands," *supra*.

DTV Table of Allotments set forth herein.⁸² We request comment on our proposal to use the performance capabilities and interference characteristics of the ATSC DTV system in developing the DTV Table of Allotments.

B. Methodology for Allotting DTV Frequencies

81. In the Second Further Notice, we proposed to allot DTV channels using geographical spacing criteria in the same manner that we currently allot NTSC TV and FM radio channels.⁸³ These spacing criteria would specify the minimum permissible distance between stations operating on the same or adjacent channels.

82. Proposal. We are now proposing to revise our methodology and approach for developing the DTV Table of Allotments. In particular, we are now proposing to create DTV allotments based on evaluation of service replication and interference considerations, rather than minimum spacing standards. We believe this new approach for allotting digital TV channels will better meet our policy objectives of full accommodation, spectrum recovery, and service replication/maximization. The proposed methodology first identifies a list of available candidate DTV channels for each existing NTSC station using a threshold minimum spacing measure. As noted above, our earlier studies indicated that spacings as close as 97 miles will be necessary to achieve full accommodation. Our proposed methodology therefore identifies the candidate DTV channels for each existing NTSC station as all available channels at the station's location that would have a co-channel separation of at least 97 miles. Next, each of the candidate channels is evaluated with regard to its ability to replicate the coverage of the existing station and the interference caused to other stations. The computer model selects DTV allotments from the candidate channels using an optimization process. This process optimizes the DTV allotments based on the channels that best replicate the existing service areas while minimizing interference.⁸⁴

83. The engineering evaluations for determining service coverage area and interference are computed using appropriate propagation models, technical planning factors recommended by the Advisory Committee and the measured performance characteristics of

⁸² The system performance capabilities and planning factors include: 1) the signal-to-noise ratio (S/N) defining the outer limit of service; 2) co-channel desired-to-undesired interference ratios (D/U) for DTV-to-DTV, DTV-to-NTSC and NTSC-to-DTV signals; and, 3) the upper and lower adjacent channel D/U ratios for these same signal relationships. The specific system performance characteristics of the ATSC DTV system used in the development of the proposed Table are presented in Appendix A.

⁸³ See Second Further Notice, at paras. 25-30; see also 47 CFR §§73.207 and 73.610.

⁸⁴ We note that our replication proposal automatically takes into account station differences resulting from the different spacing standards in Zones I, II and III. The use of Zones in allotting TV broadcast channels is described in Sections 73.609 and 73.610 of the rules, see 47 CFR §§73.609 and .610.

the ATSC DTV system.⁸⁵ These evaluations consider the potential for interference between stations, particularly between stations operating on the same channel (co-channel interference) and stations operating on channels one frequency apart (adjacent channel interference).⁸⁶ In addition, while our earlier studies had indicated that UHF taboo restrictions would not be needed for DTV allotments, the test results for the ATSC DTV system now indicate that certain taboo restrictions should be applied between DTV and NTSC operations.⁸⁷ In particular, these tests indicate that interference could occur from DTV to NTSC stations within a station's service area. Therefore, our evaluation takes into account possible interference from DTV service to NTSC service on channels 2, 3, 4, 5, 7, 8, 14 and 15 channels removed from the channel under evaluation. We request comment on this revised methodology for developing the DTV Table.

VI. DTV TABLE OF ALLOTMENTS

A. Allotment Computer Software

84. The development of a table of digital TV allotments is an extremely difficult and complex engineering and computational task. To handle this task, the staff of the Commission's Office of Engineering and Technology has developed sophisticated operations research methodology and computer software for optimizing the allotment of DTV channels. In addition, our staff and industry have worked together to incorporate methodologies for calculating the service area and interference considerations that are required under a service replication allotment approach. We have used the allotment capabilities provided by this methodology and computer software in preparing the proposed DTV Table of Allotments presented below.

⁸⁵ A description of the propagation models and service area planning factors are included with the system performance data in Appendix A.

⁸⁶ The degree to which television stations interfere with one another depends in part on the ability of TV receivers to reject undesired signals in favor of a desired signal. The common measure of interference between stations is the ratio of the desired signal to the undesired signal (D/U ratio). Depending on receiver characteristics, unacceptable interference will occur when the D/U ratio between signals exceeds some level that is determined through testing. The D/U level at which unacceptable interference occurs varies depending on the channel relationship of the desired and undesired signals. In general, interference between stations can be managed by limiting the power of their signals, the height of their transmitting antennas and the distance between their transmitter locations. In the case of NTSC TV service, the Commission has managed interference between stations by requiring that the locations of co-channel and adjacent stations meet minimum geographic separation standards.

⁸⁷ In addition to the co-channel and adjacent channel interference concerns, it is possible for stations operating on certain other combinations of channels, principally in the UHF band, to interfere with one another. Allocation constraints on these combinations (e.g., channels +/- 2, 3, 4, 5, 7, 8, etc.) are known as UHF taboos.

85. The computer model developed by the FCC staff and industry generates DTV allotments that optimize and balance the various policy objectives and proposals discussed above. The computer software incorporates an operations research optimization methodology known as "simulated annealing."⁸⁸ This methodology employs a system of penalties that attach to conditions that fall short of specified objectives. The simulated annealing method seeks to minimize the sum of these penalties, or "costs," to achieve an optimum condition.

86. The computer model permits the rapid computation and analysis of service area coverage provided by the NTSC and DTV systems, both on an overall cumulative basis and for individual stations. The service area of an individual NTSC station is defined as the area within the station's Grade B service contour, reduced by any interference; and is computed based upon the actual transmitter location, power, and antenna height.⁸⁹ The service area of a DTV station is defined as the area contained within the station's noise-limited contour, reduced by the interference within that contour. DTV coverage calculations assume locations and antenna heights identical to those of the replicated companion NTSC station and power generally sufficient to achieve noise-limited coverage equal to the companion station's Grade B coverage.

87. As stated in the Second Further Notice, we recognize that there may be instances where the allotment of channels in specific local situations can best be resolved on a case-by-case basis.⁹⁰ Our allotment software therefore is able to merge specific local designs into complete tables and, where necessary, make changes in other allotments to preserve a balance of the specified policy considerations. This capability will allow us to incorporate allotment/pairing agreements that broadcasters may reach in any negotiated settlements.⁹¹

⁸⁸ See David S. Johnson, Cecilia R. Aragon, Lyle A. McGeoch and Catherine Schevon, "Optimization by Simulated Annealing: An Experimental Evaluation, Part II (Graph Coloring and Number Partitioning)," Operations Research, Vol. 39, May-June 1991. In addition to the simulated annealing software, the staff has obtained software that incorporates a method known as "Lagrangian Relaxation." This method and its software implementation were developed by Decision-Science Applications, Inc. (DSA) under contract to the FCC. The DSA DTV allotment software is an extension of earlier work by DSA that produced the computer software used by the FCC to develop new FM radio allotments in MM Docket No. 80-90. The DSA software complements the simulated annealing software, and partial allotment solutions developed through either software package can be used in the other so that the two packages can be used together.

⁸⁹ The Grade B contour of TV broadcast stations is defined in Section 73.683 of our rules, see 47 CFR §73.683.

⁹⁰ See Second Further Notice, at para. 51.

⁹¹ It may not always be possible to incorporate the allotments specified in a given local agreement into the overall Table and still meet the specified policy criteria. For this reason, all negotiated allotment/pairing agreements submitted by broadcasters will be carefully reviewed and evaluated by this Commission.

B. Proposed DTV Allotments

88. A draft DTV Table of Allotments is presented in Appendix B. This Table shows DTV allotments and channels pairings for all eligible broadcast entities that would result from "core spectrum" option described above. The Table is a draft and we anticipate revisions. Our staff will work with broadcasters and other parties to revise the draft Table as appropriate. This Table is based on the allotment principles and engineering assumptions discussed above. Changes in any of these proposals may affect the individual allotments that appear on the Table. The draft DTV Table of Allotments is described below.

89. Full Accommodation. The draft Table meets our primary objective of full accommodation of all eligible broadcasters.^{92 93} The Table proposes 1578 new DTV allotments in 878 communities in the continental U.S.⁹⁴ This would provide a DTV allotment for all eligible broadcasters as defined in the Second Report/Further Notice. In addition, the proposed Table allows for 140 additional DTV allotments for non-commercial use.

90. DTV Service Areas. The draft Table also fulfills our goals of service replication/maximization. In general, existing broadcasters would be provided with a DTV allotment that is capable of providing digital TV coverage of a geographic area that is comparable to their existing NTSC coverage. In fact, during the transition period, over 50%

⁹² The single exception is Puerto Rico, where more than half the broadcasting channels are already allotted. (There are only 67 channels in the TV broadcast bands. Of these, 34 channels are operating or have been awarded construction permits and an application is on file for a 35th channel, all on an island whose size does not normally permit frequency reuse. Channel 37 is used for radio astronomy and therefore is not available for assignment to a broadcaster. This leaves 32 channels available as candidates for DTV allotments in Puerto Rico.) In developing the proposed allotments for Puerto Rico, we gave first priority to the operating stations. To make best use of the channels available, we included a DTV allotment of the same channel, 62, as that of the (ineligible) NTSC application in San Juan. The allotment is made to the station most distant (144 km or 90 miles) from San Juan, and the intervening terrain is mountainous. We were then left a small number of eligible stations having only construction permit status. Of the latter, only Fajardo channel 34 is in a multi-station community. We therefore choose, as in the Second Further Notice, to provide Fajardo with only two DTV allotments for the three stations there. In making this choice, we also considered that Fajardo is at the east end of the island, which affords the best chance of duplicating a west-end DTV channel through application of a case-by-case engineering analysis.

⁹³ We also note that some of the channels specified in the draft table are not fully compliant with the existing U.S.-Mexican agreement. We will work with the Mexican government to clarify the status of DTV allotments in border areas.

⁹⁴ The draft DTV Table also includes allotments for Alaska, Hawaii, Puerto Rico and the Virgin Islands. With these additional allotments, the Table provides a total of 1990 allotments in 979 communities.

of all existing broadcasters would receive a DTV allotment that fully replicates their existing service area; and more than 94% would receive an allotment that replicates at least 95% of their existing service area. We also believe that the draft Table meets our objective of minimizing new interference to NTSC service. For example, 96% of all NTSC stations would receive less than 10% new interference from DTV operations.⁹⁵

91. Spectrum for DTV Allotments. The draft DTV Table also meets our spectrum goals of providing all eligible broadcasters with a suitable DTV allotment and for ensuring that the spectrum is used efficiently. Based on our analysis of the proposed Table, all eligible broadcasters eventually would have access to a suitable DTV frequency within the proposed new spectrum area designated for digital TV, *i.e.*, existing TV channels 7-51 in the frequency bands 174-216 MHz and 470-698 MHz; and, a total of 138 MHz of valuable VHF and UHF spectrum could be recovered eventually.

92. Specifically, the draft Table provides for the great majority of new DTV allotments within the proposed new digital TV spectrum. 1392 of the 1578 new DTV allotments for existing eligible broadcasters in the continental U.S. are on TV channels 7 through 51. Of the 186 new allotments that are outside this core DTV spectrum area, 169 of these are paired with existing NTSC stations that are currently operating on TV channels 7 through 51. There are only 17 instances where both the new DTV allotment and the existing NTSC operation are on channels located outside the core DTV spectrum. Even in these cases, however, suitable channels within the core area will become available as NTSC operations cease and channels are recovered from other stations. We have asked above whether all costs associated with any second transition that is necessary to convert DTV operations from channels located outside of the core area to channels located in the core spectrum should be borne by the new user of the spectrum.

93. Other Allotment Considerations. The draft Table avoids use of TV channels 3, 4 and 6 for the reasons given above and no new DTV allotments are provided on these channels. With regard to land mobile sharing, all of the allotments contained in the proposed DTV Table would comply with the proposed 155 mile co-channel spacing requirement between DTV allotments and land mobile operations; but the proposed Table includes nine cases where DTV allotments would be located at distances less than 110 miles from the city-center of an adjacent channel land mobile system.⁹⁶ Nevertheless, while such geographical

⁹⁵ These estimates are based on terrain-dependent Longley-Rice propagation models and assume that all NTSC and DTV stations are in operation. As indicated previously, some interference from DTV operations to NTSC service is unavoidable. Even in the case of the MSTV Table, which omits certain considerations that would affect interference, about 2% of all NTSC stations would receive more than 10% interference from DTV operations.

⁹⁶ The nine cases where DTV allotments would be less than 110 miles from adjacent channel land mobile operations are:

Channel 15, Los Angeles, CA (land mobile channels 14 and 16 in Los Angeles, CA)
Channel 15, San Mateo, CA (land mobile channel 16 in San Francisco, CA)

separations are desirable, we believe that there are engineering solutions available to handle any adjacent channel interference concerns between land mobile and DTV.

VII. ALLOTMENT MODIFICATIONS

A. Maximum and Minimum Station Facilities

94. As indicated above, we are proposing to provide initial DTV allotments that will allow existing broadcasters to provide DTV service to a geographic area that replicates the service area of their existing NTSC station. The draft DTV Table of Allotments identifies an effective radiated power (ERP) and an antenna height above average terrain (HAAT) for each DTV station.⁹⁷ The antenna HAAT specified for each DTV allotment is the same as antenna HAAT of its associated NTSC station. The ERP for each allotment is then calculated to provide service area replication up to a maximum ERP of 5 megawatts. We also propose in the draft DTV Table the following minimum values for ERP: 1 kW for lower VHF channels, 3.2 kW for upper VHF channels, and 50 kW for UHF channels. This would ensure that smaller stations, if they desire, are able to expand their existing coverage as they transition to DTV. We request comment on this approach and on our proposed maximum and minimum ERP values.

95. We also believe that new stations that operate on DTV allotments created after the initial Table should also be authorized sufficient technical facilities to enable them to serve their communities of license as well as an area around those communities comparable to the service areas of typical NTSC stations. We are therefore proposing to specify a maximum permissible power of 316 kW effective radiated power and a maximum antenna height of 2000 feet height above average terrain for stations that operating on new DTV allotments created subsequent to the initial Table. Our proposed maximum permissible ERP and HAAT specifications for future DTV allotments would allow a station to serve a geographic area with a radius of up to 107 km (about 66 miles), which corresponds to the predicted Grade B service area of an NTSC station operating at maximum power and HAAT on a UHF channel. We observe that at antenna heights lower than the proposed 2000-foot maximum, additional power would be needed to serve a geographic area of this size. We therefore are proposing to

Channel 15, Providence, RI (land mobile channel 14 and 16 in Boston, MA)
Channel 16, Frederick, MD (land mobile channel 17 in Washington, DC)
Channel 16, Kenosha, WI (land mobile channel 15 in Chicago, IL)
Channel 17, Manchester, NH (land mobile channel 16 in Boston, MA)
Channel 18, Secaucus, NJ (land mobile channel 19 in Philadelphia, PA)
Channel 18, Stockton, CA (land mobile channel 17 in San Francisco, CA)
Channel 21, Vineland, NJ (land mobile channel 20 in Philadelphia, PA).

⁹⁷ See Appendix B.

allow DTV stations to operate with higher ERP levels at lower antenna HAAT levels in accordance with the following table:⁹⁸

Proposed Maximum Allowable ERP and Antenna Height
for Future DTV Stations

Antenna Height HAAT (feet)	Effective Radiated Power (kW)
2000	316
1900	400
1800	450
1700	500
1600	600
1500	700
1200	1000
1000	1500
700	2500
500	3000

We request comment on these proposals for the maximum technical facilities for future DTV stations.

96. Finally, we note that Section 73.614 of the rules provides formulas for calculating the maximum permissible ERP where a station's antenna exceeds the 2000 feet maximum.⁹⁹ We believe a similar approach would be appropriate for DTV stations. We request suggestions for the appropriate HAAT/power equivalency formulas to use for DTV stations. We also request comment on whether we should specify a minimum ERP for full service DTV stations in the same manner as we specify for NTSC stations in Section 73.614.

⁹⁸ For antenna heights 1600 feet and below, the proposed maximum permissible power would be slightly less than the level needed to fully serve the area within a 107 km radius. This adjustment is necessary to avoid the potential for increasing interference to neighboring co-channel stations.

⁹⁹ See 47 CFR 76.614.

B. Future Allotments and Modifications to the DTV Table

97. We request comment on what approach or approaches should be used for the purpose of adding future DTV allotments and modifying the initial DTV Table. Specifically, we request comment on whether an approach that uses minimum geographical spacing distances similar to what is now used for NTSC allotment changes or an approach that uses engineering criteria to show that the new allotment does not cause additional interference to other allotments or stations would be more appropriate for DTV.

98. Geographic Spacing Approach. Spacing standards have proven to be an efficient and effective means for managing interference between NTSC stations and we believe that such an approach could be used to determine the technical acceptability of DTV channel allotments. We note that geographic spacing approach provides considerable flexibility in the specification of station operating parameters such as power and antenna height. Based on the engineering performance characteristics used in developing the initial DTV Table proposed herein, we have developed the following DTV spacing standards. If we adopt a geographical spacing approach, we would propose to permit the addition or modification of DTV allotments provided such allotments meet the following spacing standards.¹⁰⁰

<u>Channel Relationship</u>	<u>Separation Requirement</u>
VHF Channels 7-13	
Co-channel, DTV to DTV	
Zone I	152 miles (244.6 km)
Zones II & III	170 miles (273.6 km)
Co-channel, DTV to NTSC	
Zone I	152 miles (244.6 km)
Zone II & III	170 miles (273.6 km)

¹⁰⁰ Proposals for new DTV allotments would also be subject to other requirements and standards for new allotments set forth in Sections 73.610 and 73.611 of our rules, see 47 CFR §§73.610 and 73.611. The DTV to NTSC minimum spacing requirements would apply only during the transition period.

Adjacent Channel		
DTV to DTV		No allotments permitted between:
	Zone I	25 miles (40.2 km) and 60 miles (96.6 km)
	Zones II & III	30 miles (48.3 km) and 60 miles (96.6 km)
DTV to NTSC		No allotments permitted between:
	Zone I	7 miles (11.3 km) and 71 miles (114.3 km)
	Zone II & III	11 miles (17.7 km) and 91 miles (146.4 km)
UHF Channels		
Co-channel, DTV to DTV		
	Zone I	122 miles (196.3 km)
	Zone II & III	139 miles (223.7 km)
Co-channel, DTV to NTSC		
	Zone I	135 miles (217.3 km)
	Zone II & III	152 miles (244.6 km)
Adjacent Channel		
DTV to DTV		No allotments permitted between:
	All Zones	20 miles (32.2 km) and 55 miles (88.5 km)
DTV to NTSC		No allotments permitted between:
	All Zones	6 miles (9.7 km) and 55 miles (88.5 km)
Taboo Channels, DTV to NTSC only		
(+/- 2, +/- 3, +/- 4, +/- 5, +/- 7, +/- 8, +/- 14 and +/- 15 channels)		No allotments permitted between:
	Zone I	15 miles (24.1 km) and 50 miles (80.5 km)
	Zone II & III	15 miles (24.1 km) and 60 miles (96.6 km)

99. Engineering Criteria Approach. To satisfy the engineering allotment criteria, the petitioner would have to show that a station operating at the maximum permissible ERP and antenna height on the proposed allotment would not exceed the engineering interference criteria with regard to any other existing allotment. The engineering criteria would be specified in terms of desired-to-undesired signal ratios and would include consideration of potential interference to a station operating on the proposed allotment as well as potential interference from a station operating on the allotment to stations operating on other allotments. All evaluations of interference would be made under that assumption that stations on the allotments involved would be operating at the maximum allowed power and antenna height. We would use the same propagation models, technical planning factors and DTV system performance characteristics in performing engineering evaluations of interference that

we used in developing our proposals for the DTV Table and allotment spacing criteria.¹⁰¹ The engineering evaluations would therefore examine possible interference between DTV service and between DTV and NTSC service on channels 2, 3, 4, 5, 7, 8, 14, and 15 channels removed from the channel under evaluation. We request comment all aspects of this alternative proposal for assessing the technical acceptability of additions or changes to the DTV Table of Allotments. We will also consider additional proposals for the standards by which we will assess the technical acceptability of requests for changes to the DTV Table. Such proposals should be accompanied by a description of how interference would be managed between stations, and include supporting technical analysis and data.

100. Use of Frequency Coordinators. Broadcasters have suggested that the Commission establish industry assignment coordinating committees to evaluate proposals for post-assignment changes to the table.¹⁰² They state that evaluating and accommodating proposed changes to the DTV Table is a complex and technically challenging matter and that the current allotment /assignment processes are too cumbersome and litigious for this new DTV environment. They state that the Commission has used frequency coordinating committees in other areas and that they have proven to be effective. As proposed, the assignment coordinating committees would use objective engineering criteria to evaluate proposals for post-assignment changes to the DTV Table; and, would be funded by licensee contributions. The assignment coordinators would make recommendations to the Commission about how to dispose of allotment/assignment proposals or would provide the Commission with the detailed coverage and interference data necessary to make these decisions.

101. We agree that an industry coordination process could be used effectively in the digital television broadcast area. Such committees could conserve the Commission's limited resources and could provide an efficient and effective means to resolve disputes that may arise with regard to proposed changes to the DTV Table of Allotments. We believe that having a coordinating committee evaluate proposed changes and resolve potential disputes among broadcasters prior to submission of such changes to the Commission may be appropriate. Given the dynamic changes that are likely to occur during the transition from NTSC to DTV, such a pre-coordination process by an industry assignment coordinating committee could provide for a smoother and more orderly processing of such changes by the Commission. We therefore invite industry to pursue the establishment of such a coordinating committee. We tentatively propose that such a committee would evaluate and provide advice to the Commission with regard to coordination of changes in allotments; the creation of new allotments; and, changes in authorized facilities (for both NTSC and DTV stations) that would impact other allotments/assignments. We invite comment on all aspects of this proposal. We also solicit comment on whether any statutory changes would be appropriate to facilitate our use of such committees.¹⁰³

¹⁰¹ The propagation models, technical planning factors and ATSC DTV system performance characteristics are presented in Appendix A.

¹⁰² See for example, MSTV filing in this proceeding submitted, January 13, 1995.

¹⁰³ See for example, 47 U.S.C. 332 (b).

102. The proposed new service replication allotment methodology will, like our former proposal, result in a number of DTV allotments that are at distances to other DTV allotments and existing stations that are less than our proposed spacing standards. While such "short-spaced" or non-conforming allotments are necessary to achieve our full accommodation objective, we continue to believe that it is desirable to minimize the use of short-spacing and its effect on neighboring stations. We therefore are maintaining our proposal to make short-spaced or non-conforming allotments only during the initial assignment phase for existing stations, so that subsequent additions to the DTV Table for stations to be operated by new applicants would be required to comply with the minimum spacing or engineering requirements. We are also maintaining our proposal to delete all short-spaced allotments that have not been activated by an eligible broadcaster after the initial application period. For purposes of this proposal, an allotment would be considered short-spaced if it does not meet the spacing standards or engineering criteria for new DTV allotments. We request comment on this proposal. Interested parties are specifically asked to comment on the effect our proposal to delete short-spaced allotments would have on opportunities for new digital TV broadcast stations after the initial application period or after the transition.

VIII. PROCEDURAL MATTERS

103. This action is being taken pursuant to authority contained in Sections 4(i), 7, 301, 302, 303 and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 157, 301, 302, 303 and 307. This is a non-restricted notice and comment rule making proceeding. Ex parte presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in the Commission's rules. See generally 47 CFR Sections 1.1202, 1.1203, and 1.1206(a).

104. Initial Regulatory Flexibility Analysis. As required by Section 603 of the Regulatory Flexibility Act,¹⁰⁴ the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the expected impact on small entities of the proposals suggested in this document. The IRFA is set forth in Appendix C. Written public comments are requested on the IRFA. These comments must be filed in accordance with the same filing deadlines as comments on the rest of the Further Notice, but they must have a separate and distinct heading designating them as responses to the Initial Regulatory Flexibility Analysis.

105. Submission of Comments. Pursuant to applicable procedures set forth in Sections 1.415 and 1.419 of the Commission's Rules, 47 CFR Sections 1.415 and 1.419, interested parties may file comments on or before November 22, 1996, and reply comments on or before December 23, 1996. To file formally in this proceeding, you must file an original and five copies of all comments, reply comments, and supporting comments. If you want each Commissioner to receive a personal copy of your comments, you must file an original plus nine copies. You should send comments and reply comments to Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. Comments and

¹⁰⁴ 5 U.S.C. §603.

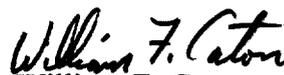
reply comments will be available for public inspection during regular business hours in the FCC Reference Center, Room 239, 1919 M Street, N.W., Washington, D.C. 20554. You may also file comments electronically via the internet at dtvallotments@fcc.gov.

IX. ORDERING CLAUSES

106. In accordance with the proposals and actions described herein, IT IS ORDERED, THAT the Commission WILL NOT ACCEPT additional applications for new NTSC stations that are filed after 30 days from the date of publication of this Further Notice in the Federal Register. The Commission will continue to process applications for new NTSC stations that are currently on file and any new such applications that are filed on or before 30 days from the date of publication of this Further Notice in the Federal Register in accordance with procedures and standards indicated herein. In addition, IT IS ORDERED THAT, effective immediately as of the close of business on the date of adoption of this Further Notice, the Commission WILL NOT ACCEPT any additional Petitions for Rule Making proposing to amend the existing TV Table of Allotments in Section 73.606(b) of its rules to add an allotment for a new NTSC station. IT IS FURTHER ORDERED THAT, effective immediately as of the close of business on the date of adoption of this Further Notice, the Commission WILL CONDITION the grant of any modifications of the technical parameters of existing full service NTSC stations on the outcome of this rule making proceeding.

107. For further information regarding this Notice of Proposed Rule Making, please send an electronic mail message via the internet to dtvallotments@fcc.gov, or contact Bruce Franca or Alan Stillwell, Office of Engineering and Technology, at (202) 418-2470.

FEDERAL COMMUNICATIONS COMMISSION


William F. Caton
Acting Secretary

APPENDIX A
TECHNICAL DATA

I. System Independent Planning Factors
Recommended by the Advisory Committee

<u>Planning Factor</u>	<u>Low VHF</u>	<u>High VHF</u>	<u>UHF</u>
Geometric mean frequency (MHz)	69	194	615
Dipole factor (dBm-dBu) dB (K_d)	-111.8	-120.8	-130.8
Thermal noise (dBm) (N_t)	-106.2	-106.2	-106.2
Antenna Gain (dB) (G)	4	6	10
Downlead line loss for 50 ft. (15 m.) of coax (dB) (L)	1	2	4
Front-to-back ratio (dB) (ratio of forward gain to maximum response over rear 180°)	10*	12*	14*
Receiver noise figure (dB) (N_R)	5**	5**	10**
Time probability factor for 90% availability (dB) (dT)	***	***	***
Location probability for (dL) 50% availability (dB)	0	0	0

* For the receiving antenna manufacturer's objectives the values are 14, 16, and 20.

** Possible changes in the VHF figures are still under consideration.

*** The time probability factor is defined as the difference $F(50,10)$ minus $F(50,50)$, where these two values are determined from the FCC charts in Section 73.699. This factor is a function of the distance between the transmitting and receiving antennas.

See "Fifth Interim Report of the Planning Subcommittee of the FCC Advisory Committee on Advanced Television Service," March, 1992

II. ATSC DTV System Performance Capabilities

See "Final Technical Report," prepared by the Technical Subgroup of the FCC Advisory Committee on Advanced Television Service, October 30, 1995. The values tabulated are the results of tests of the Grand Alliance system, except those marked with an asterisk. Estimates marked with "*" were made for the purpose of evaluating service and interference. Measurement data for these factors were not taken for the Grand Alliance DTV system. These estimates are based on measurements of the four DTV systems that preceded the Grand Alliance system.

<u>Parameter</u>	<u>Measured Value (dB)</u>
Carrier-to-Noise Ratio	+15.19
Co-channel D/U Ratio	
DTV-into-NTSC	+34.44
NTSC-into-DTV	+1.81
DTV-into-DTV	+15.27
Adjacent D/U Ratio	
Lower DTV-into-NTSC	-17.43
Upper DTV-into-NTSC	-11.95
Lower NTSC-into-DTV	-47.73
Upper NTSC-into-DTV	-48.71
Lower DTV-into-DTV	-41.98
Upper DTV-into-DTV	-43.17
Taboo D/U Ratio, DTV-into-NTSC	
N-2	-23.73
N+2	-27.93
N-3	-29.73
N+3	-34.13
N-4	-34.00 *
N+4	-24.96
N-7	-35.00 *
N+7	-34.00 *
N-8	-31.62
N+8	-43.22
N+14	-33.38
N+15	-30.58
Taboo D/U Ratio, NTSC-into-DTV	
N-2	-62.45
N+2	-59.86
N-3	< -61.79
N+3	< -62.49
N-4	-58.00 *

Taboo D/U Ratio, NTSC-into-DTV (continued)

N+4	-58.00 *
N-7	-58.00 *
N+7	-58.00 *
N-8	-58.00 *
N+8	-58.00 *
N+14	-58.00 *
N+15	-58.00 *

Taboo D/U Ratio, DTV-into-DTV

N-2	-60.52
N+2	-59.13
N-3	< -60.61
N+3	< -61.53
N-4	-58.00 *
N+4	-62.00 *
N-7	-63.00 *
N+7	-63.00 *
N-8	-63.00 *
N+8	-63.00 *
N+14	-63.00 *
N+15	-63.00 *

APPENDIX B

DRAFT DTV TABLE OF ALLOTMENTS

This appendix presents the draft DTV Table of Allotments. We emphasize that this table may differ significantly from the final DTV Table, depending on which principles are ultimately used to generate the table and the results of any broadcaster negotiated settlements.

The table allots a DTV channel to each eligible existing broadcaster, with eligibility determined by the proposed allotment principles, and existence established by presence in the FCC TV Engineering Data Base dated May 13, 1996. Technical parameters needed for calculation of the tabulated engineering quantities were taken from the same engineering data base.

ERP and Antenna Height

The tabulated value of effective radiated power (ERP) for DTV operation was calculated to replicate NTSC coverage. It is the maximum, over a set of uniformly spaced compass directions, of the ERP values required to extend noise-limited DTV coverage as far as the grade B contour of the NTSC station. This maximum is shown in the column entitled "DTV POWER."

To determine the ERP that will approximately replicate NTSC coverage in each specific direction, the distance to the existing grade B contour was first determined from information in the engineering data base, including directional antenna data, and from terrain elevation data at points separated by 3 arc-seconds of longitude and latitude. FCC curves (47 CFR §73.699) were applied in the usual way, as described in 47 CFR §73.684, to find this grade B contour distance. The replicating ERP for DTV was then calculated by a further application of FCC curves, with noise-limited DTV coverage defined as the presence of field strengths of 26.8, 31.8 and 43.8 dB μ respectively for low VHF, high VHF and UHF, at 50% of locations and 90% of the time. The specified field strengths can be calculated from the data given in Appendix A. They include an allowance of 4 dB (lowband VHF) and 1 dB (highband VHF) for electrical noise external to TV receivers.

The column entitled "ANTENNA HEIGHT" gives the height of the transmitting antenna above average terrain as found in the engineering data base for the particular station. This value represents the height above terrain of the radiation center of the station being replicated, averaged from 3.2 to 16.1 kilometers (2 to 10 miles) over 8 evenly spaced radials. In a few cases, the value found in the engineering data base is unrealistically low or negative, and the height above ground or other reasonable value has been substituted.

Evaluation of Service and Interference - Digital Television During Transition

Under the heading "DIGITAL TELEVISION SERVICE DURING TRANSITION," prospective conditions are evaluated in terms of both area and population. The values