

160. The Joint Broadcasters indicate that, as we observed in the Sixth Further Notice, making channel 20 available for DTV significantly reduces interference in the congested northeast region. In taking this position, Joint Broadcasters state that they support reallocation of land mobile channels in all markets, not just the Philadelphia area, for the transition to DTV. They submit that using for DTV at least one of the channels now allocated for land mobile use, particularly those that are lightly used, would improve interference during the transition period and simplify the DTV allotment/assignment process. The Joint Broadcasters submit that such reallocation would not impair land mobile operations. They suggest that a more efficient use of the spectrum would be to make one of the land mobile channels in each market available solely to public safety services. Under this plan, non-safety related services would make use of frequencies in the 800 MHz, 900 MHz and 2 GHz PCS spectrum.

161. In its reply comments, the Broadcasters Caucus state that the unavoidable reality of the land mobile television sharing issue is that it is necessary to use channels 14-20 in certain areas in order to accommodate all eligible broadcasters and that it is in the very regions where interservice sharing occurs that broadcast channels are most scarce.<sup>293</sup> The Caucus submits that the proposed spacing requirements are based on test data from the Advisory Committee and should provide sufficient protection for both television stations and land mobile operations on channels 14-20. It further states that, as with other aspects of the DTV Table, market-by-market adjustments can be made throughout the transition should real-world data show the need for fine-tuning.

162. UTC states that in order to protect land mobile operations, we should reconsider our proposals to make channels 15 and 16 in Detroit and channels 14 and 15 in Cleveland available for DTV operations.<sup>294</sup> It argues that although these channels are currently precluded from land mobile use due to existing border agreements with Canada, there is an existing need for spectrum in the Cleveland and Detroit areas for land mobile operations and this need is expected to increase in the near future. It therefore urges that we redouble our efforts to secure a satisfactory sharing agreement with Canada to allow use of these channels for land mobile operations. Gateway Communications Inc. (Gateway) notes that Offshore Radio Communications Services (ORTS) are permitted within specified areas within the Gulf Of Mexico and adjoining U.S. land areas on TV channels 15, 16, and 17. It submits that several allotments in the draft Table would conflict with ORTS operations and asks that we clarify and resolve this issue.<sup>295</sup>

163. Decision. In both the Second Further Notice and the Sixth Further Notice, we proposed minimum separation distances between DTV and existing land mobile operations on channels 14 to 20. We find that our proposed minimum spacing distances between co-channel

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<sup>293</sup> Broadcasters caucus comments, pp. 29-30.

<sup>294</sup> UTC comments, p. 10.

<sup>295</sup> Gateway comments, p. 8.

and adjacent channel DTV and land mobile operations are appropriate for avoiding interference and ensuring the operation of both DTV and land mobile services. We also find that these separations are appropriate given our recent changes for "refarming" in the land mobile services, as noted by UTC. Accordingly, we generally have attempted to provide allotments for DTV stations at co-channel and adjacent channel spacings to the city-center of land mobile operations of at least 250 km (155 miles) and 176 km (110 miles), respectively. We will also use these separation distances as the land mobile-to-DTV spacing standards for any future DTV allotments.

164. We recognized, however, that in developing the initial DTV Table there would be some instances in which these separation distances could not be met and that additional conditions would be necessary to avoid interference. As noted by the commenting parties, the draft Table included several instances where DTV allotments used channels adjacent to existing land mobile operations in the same area. In particular, the situations of most concern occurred in the Los Angeles, San Francisco, and New Jersey areas. In preparing the final Table, we have resolved or substantially reduced these land mobile/DTV sharing problems. In the San Francisco area, we have worked with local public safety representatives to take terrain shielding into account and thereby develop alternative allotments that will avoid interference to land mobile operations. In addition, as a result of our negotiations with the Mexican government, we have been able to provide alternative channels for the proposed DTV allotments that posed conflicts with land mobile operations in the Los Angeles area. The DTV Table of Allotments includes only one instance where our co-channel separation distance could not be met and only nine instances where our adjacent channel separation is not met. Unlike the draft Table, there are no instances of close spacings between DTV and land mobile on adjacent channels, *i.e.*, less 10 miles, that were of concern to Motorola and other land mobile parties. Given that our spacing requirements were chosen to be very conservative in protecting both DTV and land mobile operations, we believe that these ten situations should not present a significant problem for either land mobile or DTV licensees.<sup>296</sup> However, if such problems occur, it will be the initial responsibility of the DTV licensee to protect against or eliminate harmful interference to land mobile services that have commenced operations and that are operating in accordance with our rules at the time the DTV licensee goes on the air.

165. With regard to use of channel 20 for DTV purposes in the Philadelphia area, we agree with the land mobile interests that this channel should remain for land mobile use. As

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<sup>296</sup> We recognize the comments with regard to use of channel 18 for DTV service in the New Jersey. As suggested in the Broadcasters' Modified Table, the Table of Allotments included herein pairs this channel with a noncommercial station in New Brunswick, New Jersey. In providing this allotment, we recognize that the majority of the New Brunswick area is also served by the three other stations in the New Jersey public broadcast network. Thus, if some restrictions on the use of channel 18 are necessary to protect existing land mobile operations, viewers in the New Brunswick area should still be able to receive noncommercial DTV service. We will work with the New Jersey public broadcasting authorities to design a plan that will minimize any impact this allotment has on its network and services.

APCO notes, there are over 9,000 licensed public safety operations that are now providing vital services on channel 20 frequencies. Concerning UTC's request to make additional land mobile use of channels 14-16 in Cleveland and Detroit, we find that these channels are needed for DTV service, especially to allow us flexibility in completing a DTV channel arrangement with Canada. We also note that our spectrum recovery plan may provide relief for any additional land mobile spectrum needs in these markets. Finally, with regard to Gateway's concern about the impact of DTV operations on ORTS, we note that the offshore telephone service must protect TV operations on channels 15, 16, and 17.<sup>297</sup> We clarify that this will include new DTV operations on these channels. We will, however, allow ORTS operators to work out arrangements with broadcasters to protect such DTV operations and maintain ORTS services by methods other than the spacing requirements contained in the rules.

#### F. DTV Frequency Labeling Plan

166. Under our proposed DTV core spectrum plan, DTV service was to occupy the frequencies now used by NTSC channels 7-51. In the Sixth Further Notice, we stated that 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 requested proposals and comments relating to an appropriate frequency labeling scheme for DTV service.

167. Comments. The Joint Broadcasters believe that the most important aspect of any channel labeling scheme should be maintaining channel identity, so that viewers can readily identify the corresponding DTV channels and NTSC stations both during and after the transition.<sup>298</sup> They also state that DTV channel labels should be as brief and simple as possible. They submit that a labeling scheme that is easy to follow and that preserves identity over time and across carriers may alleviate station anxieties about losing viewers due to DTV assignments. The Joint Broadcasters believe this could reduce requests for channel changes and encourage stations to build DTV facilities sooner, rather than later. The Joint Broadcasters do not comment on specific suggestions for labeling DTV channels. Rather, they recommend that we allow this matter be explored by an inter-industry committee that would prepare a recommendation for the Commission. Members of this committee would include representatives of the broadcasting industry, equipment manufacturers, and cable industry. APTS supports the Joint Broadcasters' call for an industry committee to recommend a DTV frequency labeling plan.<sup>299</sup> It states that this issue deserves careful analysis and input by all affected industries.

168. The EIA believes that we should await a recommendation from the ATSC before

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<sup>297</sup> See, for example, 47 CFR §22.1013(c).

<sup>298</sup> Joint Broadcasters comments, p. 63.

<sup>299</sup> APTS comments, p. 42.

addressing DTV channel labeling issues.<sup>300</sup> It states that in promoting the transition to DTV we should take care to minimize disruption of the existing labelling scheme, and seek to ensure consistency across various transmission media. The EIA states, for example, that if the DTV labelling plan is not coordinated between broadcasters and cable operators, consumers will surely have a harder time acclimating to the DTV environment. It states that to head-off consumer frustration and speed the transition, any new scheme should be easy to assimilate and use. Mr. Smith submits that DTV channels should be labeled in such a way that they are seamless when a viewer switches between NTSC and DTV stations. He states that any labeling system that is overly complex will alienate viewers.<sup>301</sup>

169. A number of parties offer specific suggestions for labeling DTV channels. Blade, Mr. Ronald J. Brey, Gateway, Kentuckiana, and KUPN-TV recommend that DTV channels be prefixed with a "D."<sup>302</sup> KUPN-TV also states that the primary concern should be retention of call letters to maintain station identity.<sup>303</sup> LeSEA suggests a plan for labeling DTV channels with the prefixes "Q," "X," "Y," and "Z" and the numerical designations 2-13.<sup>304</sup> Cannell states that we should number the DTV channels sequentially, beginning with "1."<sup>305</sup> Mr. Brey also proposes that we specify DTV channel designations as double digits beginning with "D11." He submits that any subchannels could be designated by an alphabetical letter beginning with "A," and that we could drop the "D" prefix after the transition is complete.

170. Decision. We do not believe that it is necessary to prescribe a special DTV channel designation scheme at this time. Accordingly, we will allow this matter be explored by an inter-industry committee that would prepare a recommendation for the Commission. We encourage those organizing this committee to include membership from all interested parties, including broadcasters, equipment manufacturers, cable operators, and the public.

#### G. International Coordination.

171. As indicated in the Second Further Notice, we have been coordinating for some

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<sup>300</sup> EIA comments, pp. 5-6.

<sup>301</sup> Mr. Smith comments, p. 11.

<sup>302</sup> Blade comments, p. 2; Brey comments, p. 11; Gateway comments, p. 9; Kentuckiana comments, p. 8; and KUPN-TV comments, p. 2.

<sup>303</sup> KUPN-TV comments, p. 2.

<sup>304</sup> LeSEA comments, p. 6.

<sup>305</sup> Cannell comments, p. 5.

time now with Canada and Mexico on the allotment of DTV channels in the border areas.<sup>306</sup> We are working to complete interim agreements on DTV with both of these countries. We have also coordinated the DTV Table with the Canadian and Mexican administrations and believe that it will be generally acceptable to them. We therefore expect that only minor adjustments will be necessary to conform the Table to these agreements.

#### H. Negotiations and Frequency Coordinators

172. In the Sixth Further Notice, we stated that mechanisms are needed to consider changes to the Table of Allotments. In this regard, we stated that we intend to provide broadcasters with the flexibility to develop alternative allotment approaches and plans both before and after our adoption of a final Table of Allotments. Consistent with this view, we stated that voluntary negotiations among broadcasters should be permitted as part of the DTV allotment/assignment process. We therefore proposed to permit broadcasters within a community to negotiate among themselves their designated allotments and to develop an alternative allotment/assignment plan for their local area. We indicated, however, that all affected broadcasters, including those in neighboring geographic areas, must agree to the revised plan and the change must not result in additional interference to other stations or allotments.<sup>307</sup> We also proposed not to accept negotiated changes that would adversely limit our ability to gain the full benefits of spectrum reclamation if that approach were adopted. In addition, any changes would be subject to international coordination, as appropriate. We proposed to require that all requests for DTV channel changes among stations be signed by the licensees of all of the stations involved in the exchange. We also proposed to allow such exchanges to include agreements for compensation. We further observed that in some cases it might be advantageous for broadcasters to co-locate their DTV transmitters at a common site. We therefore requested comment on whether we should provide special incentives to encourage the broadcasters in a market to locate all of their DTV operations at a common transmitter site.

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<sup>306</sup> See Second Further Notice, at para. 49. Use of television frequencies in the Canadian and Mexican border areas currently are governed by international agreements. Use of these frequencies in the Canadian border area are governed under the "Agreement Relating to the Allocation of Television Channels," exchange of notes at Ottawa April 23, and June 23, 1952, entered into force June 23, 1952, 3 UST 4443, TIAS 2594, 207 UNTS 25, Amendment: February 26 and April 7, 1982 (TIAS 10645). Use of these frequencies in the Mexican border areas are governed under two agreements: 1) "Agreement Relating to the Assignment and Use of Television Channels Along the United States-Mexican Border," exchange of notes at Mexico April 18, 1962, 13 UST 997; TIAS 5043; 452 UNTS 3; and 2) "Agreement Relating to Assignment and Usage of Television Broadcasting Channels in the Frequency Range 470-806 MHz (Channels 14-69) Along the United States-Mexico Border," signed at Mexico June 18, 1982, entered into force January 17, 1983, TIAS 10535, Amendments: October 31, 1984 and April 8, 1985, June 22 and October 19, 1988.

<sup>307</sup> We proposed that an "affected broadcaster" would be a broadcaster whose allotment within a community would be changed or whose existing NTSC or new DTV service area would be affected technically by a proposed change to the Table.

173. In the Sixth Further Notice, we also noted that parties representing broadcasting interests suggested that we establish industry assignment coordinating committees to evaluate proposals for post-assignment changes to the table.<sup>308</sup> These parties recommended an approach under which industry coordinating committees would use objective engineering criteria to evaluate proposals for post-assignment changes to the DTV Table. 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. We tentatively agreed that an industry pre-coordination process could promote a smoother and more orderly process for modifying the DTV Table. We therefore invited industry to pursue the establishment of such coordinating committees. We proposed that such committees 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.

174. Comments. The Joint Broadcasters submit that, over the course of the transition, a significant number of changes will be needed to any DTV Table that is adopted.<sup>309</sup> Pulitzer states that the flexibility for licensees to make changes in their DTV allotments is important in view of uncertainties that remain about the feasibility of specific channels for DTV use; DTV propagation characteristics on VHF versus UHF channels; the feasibility of specific NTSC/DTV channel pairings; DTV receiver characteristics; and the appropriate DTV transmission power to achieve replication.<sup>310</sup> Grant states that flexibility is needed to ensure fairness and to permit improvements to the Table.<sup>311</sup> Pappas states that flexibility to modify allotments is particularly important to broadcasters that acquired lower-powered stations with the intent of building them into higher-powered facilities.<sup>312</sup> The Joint Broadcasters and Chris-Craft also submit that our procedures should provide for expedited processing of requests for modifications of the initial DTV Table.<sup>313</sup> The Joint Broadcasters further state that we should adopt any proposed change, whether pre- or post-adoption of a DTV Table that does not cause unacceptable additional interference to assigned NTSC or DTV channels.<sup>314</sup>

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<sup>308</sup> See for example, MSTV filing in this proceeding submitted, January 13, 1995.

<sup>309</sup> Joint Broadcasters comments, p. 48.

<sup>310</sup> Pulitzer comments, p. 2.

<sup>311</sup> Grant comments, p. 1.

<sup>312</sup> Pappas comments, p. 23.

<sup>313</sup> Joint Broadcasters comments, p. 55; Chris-Craft comments, p. 7.

<sup>314</sup> Joint Broadcasters comments, p. 50.

175. APTS states that there are numerous variables that may affect the desirability of channels in individual markets, and the affected stations should have the freedom to negotiate changes in their assignments both before and after adoption of the DTV Table.<sup>315</sup> It submits that some stations may wish to negotiate changes in both their NTSC and DTV channel assignments as part of a negotiated "re-pairing" of channels. ABA and several other submitted negotiated allotments for specific areas. As discussed below, we have considered these plans and, where feasible, included them in the DTV Table of Allotments we are adopting herein.

176. Pulitzer, VCY America and WB also advocate that we allow additional flexibility for stations to specify an alternative set of coordinates for their initial DTV allotment. Pulitzer states that, for post-adoption changes, we should permit stations to specify an alternative set of coordinates within the proposed three-mile radius of their existing transmitter site or any other distance away from the current transmitter site provided that: 1) service from the alternative site meets the requirements for coverage of the community of license; and 2) operation from the alternative site meets the allotment technical criteria to ensure that significant interference to other stations will not occur.<sup>316</sup> Pulitzer states that this type of flexibility would facilitate agreements between two or more stations in a market to use a common antenna site for their DTV operations. VCY America recommends that we encourage stations to seek co-located sites in order to minimize orientation and adjacent channel technical problems.<sup>317</sup> WB states that allowing stations to relocate to a common site more than three miles from their designated sites could avoid interference between stations that would otherwise be subject to a UHF taboo constraint.<sup>318</sup>

177. The Joint Broadcasters and others support the use of private frequency coordinating committees.<sup>319</sup> The Joint Broadcasters submit that the use of industry committees will facilitate efficient and fair resolution of proposed modifications to the DTV Table while minimizing the burden on the Commission. They recommend that the coordinating committees be permitted to review all modification requests, including channel change requests, requests for new DTV assignments, requests for transmitter site relocations and other facility changes (for both NTSC and DTV stations), co-location issues, and adjacent channel and land mobile interference concerns.<sup>320</sup> The Joint Broadcasters further state that under their

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<sup>315</sup> APTS comments, p. 28.

<sup>316</sup> Pulitzer comments, p. 6.

<sup>317</sup> VCY America comments, p. 5.

<sup>318</sup> WB comments, pp. 11-12.

<sup>319</sup> Parties specifically supporting the establishment of industry assignment coordinating committees include Harris, the Joint Broadcasters, LABCTS, Meredith, NBC, Pappas, Rural, and VCY America.

<sup>320</sup> Joint Broadcasters comments, p. 56.

plan, the Commission would retain ultimate control of the process through its ability to monitor the committee's performance and responsiveness through licensee surveys and similar studies.<sup>321</sup>

178. Other broadcasters, including the LABCTS, Pappas, and VCY America also support the use of an industry coordinating committee process to facilitate changes in DTV channel allotments/assignments. The LABCTS believes that industry coordinating committees can help to address the unique allotment problems of congested areas.<sup>322</sup> It recommends that we assign regional coordination areas centered on major metropolitan areas to regional coordinating committees that would recommend local modifications to the national DTV Table of Allotments. The LABCTS also states that the regional coordinating committees should provide for equal representation from all stations requesting representation in the region. Pappas supports the Joint Broadcasters in calling for consideration of newly-filed and pending applications for construction permits to modify such facilities on a first-come/first-served basis.<sup>323</sup> Pappas submits that broadcasters such as itself who have had modification applications on file for months prior to the adoption of the Sixth Further Notice and have expended considerable resources in prosecuting those application should be given preference over later-filed applicants.<sup>324</sup>

179. BET submits that negotiated agreements regarding DTV allotments/assignments should not be allowed to interfere with the reclamation of NTSC spectrum for new entrants.<sup>325</sup> APCO states that any changes to the DTV Table resulting from private negotiations by television stations should not be permitted to prejudice or limit the amount of spectrum available for reallocation to public safety.<sup>326</sup>

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<sup>321</sup> On January 10, 1997, the Broadcasters Caucus submitted a Petition for Further Rule Making requesting that we establish a DTV coordination process and proposing a plan for the structure, operating rules and composition of industry coordinating committees. The Caucus submits that DTV coordinating committees should function according to the basic principles established in the private land mobile radio service for frequency coordinators. In particular, it proposes that the coordinating committees: 1) be representative of the industry; 2) generally process requests in the order in which they are received; 3) provide all stations that might be affected by a proposed change notice and an opportunity to comment, object, or submit their own proposals that could be precluded by a proposal under consideration; 4) provide coordination services on a nondiscriminatory basis for reasonable fees; 5) serve in a purely advisory role to the Commission; and 6) help resolve licensee disputes. The Caucus also proposes that the committees function on a coordinated fashion nationwide, using an updated data base and the methodology described in the Joint Broadcasters' comments responding to the Sixth Further Notice.

<sup>322</sup> LABCTS comments, p. 4.

<sup>323</sup> Pappas comments, pp. 2 and 9.

<sup>324</sup> Id., pp. 23-24.

<sup>325</sup> BET comments, p. 9.

<sup>326</sup> APCO comments, p. 14.

180. Apogee, CBA and VenTech argue that full power stations should be required to include LPTV stations in any negotiations relating to allotment changes.<sup>327</sup> In statements representative of the views of these parties, VenTech argues that LPTV stations should be allowed to negotiate interference rights with broadcasters if any negotiations are allowed at all. It states that because LPTV stations compete with full service stations, full service stations will be tempted to seek channels that actually eliminate LPTV stations.<sup>328</sup> VenTech also states that stations negotiating to operate their DTV services from a common site should be allowed to do so only if they also negotiate good faith understandings to avoid interference with LPTV stations in the market.

181. CBA and others argue that private coordinating committees should not be given any authority to make changes unless the committees are required to give notice and to be open to all participants, including LPTV operators.<sup>329</sup> CBA further argues that the private coordinating committees should be directed to establish a priority for preserving LPTV service. Apogee states that the Commission must require full service stations to negotiate with low power stations.<sup>330</sup>

182. Decision. Throughout this proceeding, we have recognized that the implementation of DTV will be a dynamic process. We believe that continued industry negotiation and coordination efforts will help to facilitate this process and accommodate the inevitable changes that will occur. Accordingly, we encourage the industry to continue their current voluntary coordination efforts. We believe that an approach similar to that set forth in the Broadcasters Caucus' petition provides an appropriate model for industry coordination of DTV allotment and facility modifications.<sup>331</sup> We also believe, however, that it is important that any voluntary negotiation or coordination effort be open to all affected parties, including low power broadcasters and the public, and will require that such negotiations be open to all affected parties. In this regard, we will review all requests for modification of the DTV Table for their impact on low power stations. Industry coordinating committees therefore are strongly advised that they should consider LPTV and TV translator stations in developing proposed modifications to the DTV Table and avoid impact on such stations wherever possible. Parties coordinating proposals for changes to the DTV Table are also advised that we will not consider requests for allotment modifications that would relocate an allotment to a channel in channels 60-69, nor will we consider creating new DTV allotments in this area of the spectrum.

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<sup>327</sup> Apogee comments, p. 3; CBA comments, pp. 9-10; VenTech comments, p. .

<sup>328</sup> VenTech comments, pp. 6-7.

<sup>329</sup> CBA comments, pp. 9-10.

<sup>330</sup> Apogee comments, p. 3.

<sup>331</sup> See description of Caucus' petition in footnote above.

## V. ALLOTMENT METHODOLOGY AND APPROACH

183. On December 24, 1996, we issued a Fourth Report and Order in this proceeding in which we adopted a standard for the transmission of digital television.<sup>332</sup> This standard is a modification of the ATSC<sup>333</sup> DTV Standard and is consistent with a consensus agreement voluntarily developed by a broad cross-section of parties, including the broadcasting, consumer equipment manufacturing and computer industries.<sup>334</sup> The standard we adopted differs from the ATSC DTV Standard in that it does not include the ATSC specifications with respect to scanning formats, aspects ratios, and lines of resolution.

184. In the Sixth Further Notice, we proposed to use the performance characteristics of the ATSC DTV system in developing DTV allotments and used these characteristics in developing the draft DTV Table of Allotments set forth therein.<sup>335</sup> We also proposed to perform the engineering evaluations for determining service coverage area and interference using the terrain dependent Longley-Rice point-to-point propagation model, technical planning factors recommended by the Advisory Committee and the measured performance characteristics of the ATSC DTV system.<sup>336</sup> We indicated that 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).<sup>337</sup> In addition, while our earlier studies had indicated that

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<sup>332</sup> See Fourth Report and Order, MM Docket No. 87-268, 11 FCC Rcd 17771 (1996).

<sup>333</sup> "ATSC" is the Advanced Television Systems Committee, an industry organization whose members include television networks, motion picture and television program producers, trade associations, television and other electronic equipment manufacturers and segments of the academic community.

<sup>334</sup> See letter of Broadcasters Caucus, Consumer electronics Manufacturers Association and Computer Industry Coalition on Advanced Television Service, dated November 26, 1996.

<sup>335</sup> 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 DTV Table are presented in Appendix A.

<sup>336</sup> A description of the propagation models and service area planning factors are included with the system performance data in Appendix A.

<sup>337</sup> 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

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.<sup>338</sup> We therefore proposed to take 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.

185. In the Fifth Further Notice of Proposed Rule Making (Fifth Further Notice) in this proceeding, which addressed the DTV technical standard, we proposed to adopt an emissions mask limiting out-of-channel emissions from a DTV station transmitter.<sup>339</sup> Specifically, we proposed to require that: 1) at the channel edge, transmitter emissions must be attenuated no less than 35 dB below the average transmitted power; 2) more than 6 MHz from the channel edge, emissions must be attenuated no less than 71 dB below the average transmitted power; and 3) at any frequency between 0 and 6 MHz from the channel edge, emissions must be attenuated no less than the value determined by the following formula:

Attenuation in dB =  $35 + [(\Delta f)^2/1.44]$  ; where:  $\Delta f$  = frequency difference in MHz from the edge of the channel

To protect against interference from an upper-adjacent channel DTV signal to reception of the audio portion an NTSC signal, we proposed to require that, in such cases the ATSC DTV Standard pilot frequency be located 5.082138 MHz above the visual carrier of the lower adjacent channel NTSC station. We stated that this frequency difference would need to be maintained within a tolerance of +/- 3 Hz.<sup>340</sup>

186. Comments. The commenting parties address a variety of issues relating to our proposed methodology for allotting DTV channels. The Joint Broadcasters and the EIA support using the performance characteristics of the ATSC DTV system and the engineering planning factors recommended by the Advisory Committee.<sup>341</sup> The Joint Broadcasters also

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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.

<sup>338</sup> 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. Allotment constraints on these combinations are known as UHF taboos. In particular, these tests indicate that interference could occur from DTV to NTSC stations within a station's service area.

<sup>339</sup> See Fifth Further Notice of Proposed Rule Making, MM Docket No. 87-268, 11 FCC Rcd 6235 (1996), at para. 56.

<sup>340</sup> See Fifth Further Notice, at para. 57.

<sup>341</sup> EIA comments, p. 3; Joint Broadcasters comments, pp. 11 and 44.

state that, based on a suggestion by Broadcast Caucus Technical Committee, we should include a dipole correction factor in the planning factors.<sup>342</sup> The EIA submits that if the DTV allotment plan is to replicate existing television service areas as proposed, the ACATS planning factors represent the only thorough assessment of how the DTV transition can be accomplished without reducing consumers' access to over-the-air television service. AFCCE recommends a different set of planning factors.<sup>343</sup>

187. The Joint Broadcasters, EIA, and FOX note that while the Advisory Committee recommended 10 dB be used for both the VHF and UHF as the receiver noise figures, we used 5 dB for VHF channels.<sup>344</sup> The Joint Broadcasters contend that a 5 dB noise figure for VHF channels would underestimate the amount of "new" interference that caused to existing NTSC stations operating in the VHF band. EIA submits that a 5 dB VHF noise figure would raise the cost of DTV receivers. The Joint Broadcasters and Fox submit that we should use a 7 dB noise figure for UHF channels.<sup>345</sup> The Joint Broadcasters state that this lower UHF noise figure has been recommended by the Broadcasters Caucus Technical Committee. Fox states that we should attempt to improve the UHF noise figure to 7 dB through the ongoing regulatory and negotiation process. Island also recommends that we use a lower UHF noise figure. It notes that several manufacturers now sell preamplifiers covering the entire UHF band that have noise figures below 3 dB and sell for under \$15 in quantity.<sup>346</sup> AFCCE recommends that we assume use of a "smart antenna" that is integrated with a UHF low noise amplifier.<sup>347</sup>

188. The Joint Broadcasters support our proposal to use the terrain dependent Longley-Rice propagation methodology in measuring replication.<sup>348</sup> Sunbelt Television, Inc. (STV) argues that our plan to use the Longley-Rice method for predicting service may cost some stations the rights they currently have to provide service to their entire Grade B contour

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<sup>342</sup> Joint Broadcasters comments, p. 44.

<sup>343</sup> AFCCE comments, p. 9. These proposals are based on a paper entitled "Planning Factors for HDTV Broadcasting- A Proposal" by committee member Oded Bendov, a copy of which is included with AFCCE's comments.

<sup>344</sup> Joint Broadcasters comments, p. 19; Fox comments, p. 4; EIA comments, p. 3-4.

<sup>345</sup> Joint Broadcasters comments, p. 44; Fox comments, p. 4.

<sup>346</sup> Island comments, p. 10.

<sup>347</sup> AFCCE comments, p. 9. These proposals are based on a paper entitled "Planning Factors for HDTV Broadcasting- A Proposal" by committee member Oded Bendov, a copy of which is included with AFCCE's comments.

<sup>348</sup> Joint Broadcasters comments, p. 16.

as predicted under standard prediction methods.<sup>349</sup> It is concerned that a station could lose the right to provide service to that entire area, through "fill-in" boosters and cable must carry rights, in situations where its new DTV Grade B service area does not match with its former Grade B predicted service area.

189. The Joint Broadcasters submit that in areas where there are not enough potential DTV channels to avoid DTV allotments adjacent to NTSC channels, we should assign adjacent channels to the same licensee.<sup>350</sup> They argue that co-locating adjacent channels and assigning them to the same licensee is the only way to control interference to NTSC service. They further state that we should adopt a tight emissions mask to reduce out-of-band emissions. AFCCE argues that recent adjacent channel testing at the Advanced Television Test Center (ATTC) in Alexandria, VA, indicates that further review is needed of this issue, particularly in cases where adjacent channels are specified for paired NTSC/DTV use in the same market.<sup>351</sup> It believes that such adjacent channel use should be permitted with lower DTV power and/or significantly improved transmitter out-of-band attenuation relative to our proposed DTV transmission mask.<sup>352</sup> IBC and Mr. Smith express concern that making DTV allotments on channels adjacent to NTSC channels may not be workable.<sup>353</sup> Mr. Smith states that in such situations both transmitters will need special filtering and will need to be locked together to a common frequency reference. Because of these factors, he states that it would make the most sense if both the NTSC and DTV transmitters were operated by a single entity.

190. California Oregon Broadcasting, Inc. (COBI) argues that because the supply of potential DTV channels is limited, we should not limit adjacent channel assignments to the same licensee.<sup>354</sup> It states that adoption of appropriate interference specifications or a requirement for mutual consent of both licensees would be adequate to protect the public and broadcasters' common interest in non-interference. COBI states that at a minimum we should allow assignment of adjacent NTSC and DTV channels where the licensees of both stations have agreed to the assignment.

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<sup>349</sup> STV comments, pp. 1-2.

<sup>350</sup> Joint Broadcasters comments, pp. 21-22.

<sup>351</sup> See "An Evaluation of the FCC Proposed RF Mask for the Protection of Adjacent Channel NTSC Signals," Advanced Television Test Center (October 22, 1996). The Joint Broadcasters state that these tests indicate that use of the technical criteria recommended by the Advisory Committee with regard to allotment of adjacent channels in the same and neighboring markets will lead to significant interference to NTSC service within those markets.

<sup>352</sup> AFCCE comments, p. 11.

<sup>353</sup> IBC comments, p. 2; Mr. Smith comments, pp. 4-5.

<sup>354</sup> COBI comments, p. 6-7.

191. CBA submits that the DTV technical rules should include a tighter emission mask and improved linearity requirements to minimize out-of-band emissions.<sup>355</sup> It argues that modern transmitter technology will permit the application of techniques that allow equipment to meet more stringent limits in these areas. Acrodyne, a manufacturer of TV transmitter equipment, submits that with regard to band edge performance, filters in the traditional sense cannot be used to limit the signal level. It states that any improvement at the precise band edge must be brought about by DTV signal processing, probably at IF. It states that it would be very difficult and prohibitively expensive to require the band edge signal to be less than -35 dB.<sup>356</sup>

192. Finally, Joint Broadcasters note that an updated data base is needed to determine the most appropriate allotments for existing stations. They further observe that there are a great many inaccuracies in the data base that need to be corrected. To assist in the data correction effort, they include with their comments information on 150 corrections for the data base.

193. Decision. We are generally adopting our proposals to use the performance characteristics of the ATSC DTV system in developing DTV allotments and have used these characteristics in developing the DTV Table of Allotments adopted herein. We are also adopting the DTV allotment planning factors generally as proposed. We are, however, amending the proposed planning factors to take into account the concerns and suggestions presented by the Joint Broadcasters and other commenting parties. First, we have constructed the DTV Table of Allotments adopted herein using the new receiver noise figures recommended Broadcasters Caucus Technical Committee. That is, a 10 dB noise figure is used for the VHF band and a 7 dB noise figure is used for the UHF band. In addition, the Table takes into account the "dipole correction factor" for UHF frequencies recommended by the Joint Broadcasters.

194. As proposed, the allotments contained in the DTV Table are specified based on service area replication. Service area replication, as defined by the broadcast industry and adopted herein, is based on a broadcast station's existing Grade B service taking into account both interference and propagation, using the Longley-Rice propagation prediction model. While we recognize that this may change the rights of certain broadcasters, as suggested by STV, we believe that this is the most equitable method of developing DTV allotments. We believe that these policies will generally address the concerns raised by STV.

195. We recognize the concerns expressed in the comments with regard to use of channels adjacent to existing NTSC stations for DTV allotments. As suggested by the commenting parties, in those cases where it is necessary to use adjacent channels in the same

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<sup>355</sup> CBA comments, pp. 11-12.

<sup>356</sup> Acrodyne comments, p. 3.

area, the Table pairs and co-locates adjacent NTSC and DTV channels to the extent possible. Furthermore, we are requiring that the adjacent channel DTV and NTSC carrier frequencies be locked to a common reference frequency.<sup>357</sup> This operating requirement will help protect against interference to the NTSC signal, as recommended by the Advisory Committee.<sup>358</sup> Finally, we will require that transmitter out-of-band emissions be attenuated consistent with the emissions mask proposed in the Fifth Further Notice.<sup>359</sup> The original proposal to require 35 dB of attenuation at the band edge was based on the average power in a 500 kHz segment of the DTV channel. To correctly reference the total average power within a 6 MHz channel, we have modified this figure to 46 dB. Thus, we will require that: 1) at the channel edge, emissions must be attenuated no less than 46 dB below the average transmitted power; 2) more than 6 MHz from the channel edge, emissions must be attenuated no less than 71 dB below the average transmitted power; and 3) at any frequency between 0 and 6 MHz from the channel edge, emissions must be attenuated no less than the value determined by the following formula, which is based on a measurement bandwidth of 500 kHz:

Attenuation in dB =  $46 + [(\Delta f)^2/1.44]$  ; where:  $\Delta f$  = frequency difference in MHz from the edge of the channel.

196. Finally, we have updated the engineering data base used in generating the DTV Table to include new stations and station modifications granted as of the date of the adoption of this Report and Order. We have also made requested corrections to station data where those corrections are consistent with the authorized station facilities specified in our licensing records.

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<sup>357</sup> Specifically, we are requiring that the pilot frequency location of DTV signals with reference to the visual carrier of a lower adjacent channel NTSC station be located 5.082138 MHz above the visual carrier of the lower adjacent channel NTSC station and that this frequency difference to be maintained within a tolerance of  $\pm 3$  Hz.

<sup>358</sup> See "Final Technical Report" of the Advisory Committee on Advance Television Service (1995), at Section 5.2.8. This reports indicates that "[w]ith regard to upper adjacent-channel interference ATV-into-NTSC, the tests found a 'color stripe' artifact in the NTSC video at all NTSC power levels. Analysis shows that it is caused by the ATV pilot carrier frequency 'beating' with the NTSC color subcarrier. Analysis also suggests that another 'luminance beat,' hidden during the testing by the color beat, would be present, caused by the ATV pilot carrier beating with the NTSC visual carrier. Finally, during these tests, some NTSC receivers showed loss of color and other picture artifacts. The analysis shows that use of precision carrier offset between the ATV pilot ant the NTSC color subcarrier will eliminate visibility of both artifacts." See also Annex to "Final Report and Recommendation of the Advisory Committee on Advanced Television Service," "Record of Test Results for Digital HDTV Grand Alliance System," (October, 1995), at Section I-14-67.

<sup>359</sup> Consistent with these operating requirements, manufacturers and television station licensees are advised that DTV transmitters are subject to our equipment authorization requirements as set forth in Parts 2 and 73 of the rules.

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## VI. DTV TABLE OF ALLOTMENTS

### A. Allotment Computer Software

197. 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 used the allotment capabilities provided by this methodology and computer software in preparing both the draft and final versions of the DTV Table of Allotments.

198. The computer model developed by the FCC staff 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."<sup>360</sup> 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.

199. 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.<sup>361</sup> The service area of a DTV station is defined as the area contained within the station's noise-limited service 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.

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<sup>360</sup> 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.

<sup>361</sup> The Grade B contour of analog TV broadcast stations is defined in Section 73.683 of our rules, see 47 CFR §73.683.

200. We also recognized that there may be instances where the allotment of channels in specific local situations can best be resolved on a case-by-case basis. 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 allows us to incorporate, where feasible, allotment/pairing agreements reached by broadcasters in negotiated settlements. In evaluating the feasibility of local agreements, we considered whether incorporation of given agreements would still allow us to meet our specified policy criteria.

#### B. DTV Allotments

201. The draft DTV Table of Allotments included in the Sixth Further Notice, showed possible DTV allotments and channels pairings for all eligible broadcast entities that would result from an allotment based on our core spectrum option with channels 7-51 specified as the core. We emphasized that this Table was a draft and that we anticipated revisions. The draft Table met all of our proposed principle objectives for allotment of DTV channels

202. Comments. A number of individual broadcasters requested changes in the allotments proposed for their stations on the draft Table.<sup>362</sup> In its comments, the LABCTS provide a sample alternative allotment table for the Southern California area that incorporates

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<sup>362</sup> For example, parties requesting changes for one or more stations include: AK Media Group, Inc., Alaska Broadcasters Association, Allbritton Communications Company, Appalachian Broadcasting Corporation, Aries Telecommunication Corp., Blackstar, Channel 26, Green Bay WI, Central Missouri State University, Champlain Valley Telecasting, Inc., Channel 3 of Corpus Christi, Inc., Channel 51 of San Diego, Inc., Christian Communications of Chicagoland Inc., Coast TV, Costa de Oro Television, Inc., Dimension Broadcasting Company, L.L.C., Fouce Amusement Enterprises, Fox, Freedom Communications, Inc., Golden Orange Broadcasting Co., Inc., Grant Broadcasting Group, Great Trails Broadcasting Corporation, HSN, Inc., Hutchins Communications, Inc., Iberia Communications, L.L.C., Jovon Broadcasting Corporation, KADN Broadcasting, Inc., KLUR Television, KXII Broadcasters, Inc., Kern Educational Telecommunications Consortium, Lewis Broadcasting Corporation, Macon Urban Industries, Inc., Marsand, Inc., McGraw-Hill Broadcasting, Inc., Media Venture Management, Inc., Mid-State Television, Inc., Mountain States Broadcasting, Inc., New York Times Company, New York Times Company, Northwoods Educational Television Association, Pacific FM, Inc., Pikes Peak Broadcasting Company, Renaissance Communications Corp., Riverbank Restaurants, Inc., Santa Monica Community College District, Sarkes Tarzian, Inc., Scripps Howard Broadcasting Company, Scripps Howard Broadcasting Company, Second Generation of Iowa, Ltd., Shockley Communications Corporation, Sunbelt Communication Company, Tanana Valley Television Company, Telemundo Group, Inc., Tri-State Public Teleplex, Inc., Unicorn Communications, Univision Communications, Inc., Valley Channel 48, Inc., W. Russel Withers, Jr., WEAU License, Inc., WHDH-TV, Inc., WKYT Licensee Corp., WRNN-TV Associates Limited Partnership, WWWB-TV Company, Warwick Communications, Inc. Fox is also concerned that its stations WNYW-TV, New York, NY; WTXF-TV, Philadelphia, PA; WFLD-TV, Chicago, IL; and WJBK-TV, Detroit, MI would be short-spaced to new DTV allotments and would therefore be subject to interference from those stations. It requests that we revise allotments as necessary to resolve these interference concerns.

its policy recommendations.<sup>363</sup> It states that in this sample alternative, only one station in all of Southern California would not be in the modified core spectrum it suggests and that there would be no interference to the existing land mobile operations. The ABA proposes a modified DTV allotment plan for the communities of Anchorage, Fairbanks and North Pole, Alaska.<sup>364</sup> It states that pursuant to our suggestion, the Alaskan Broadcasters that currently operate full service TV stations in these communities have negotiated among themselves to create allotment and assignment pairings that they believe will allow them to provide future DTV service that is equal to, if not superior, in coverage to their current NTSC service. ABA further states that the broadcasters in these communities propose a cooperative co-location of their DTV transmitters. They state that the common sites for these transmitters will provide numerous benefits, including lower costs, allow orientation of receiver antennas towards a single site, minimize interference concerns, and reduce FAA and environmental concerns.

203. Cornell University, which manages and operates the Arecibo Radio Astronomy Laboratory in Arecibo, PR, requests that we revise the proposed DTV allotments of channel 38 at Christiansted, VI and channel 53 at Arecibo, PR to avoid interference to protect radio astronomy observations. In a "Technical Statement" accompanying its comments, Cornell submits that DTV operations should not be permitted on channels 36, 38, 52, 53, or 54 in the vicinity of the radio astronomy observatories at Arecibo and at St. Croix, VI. The National Radio Astronomy Observatory, Socorro, NM (NRAO) is concerned that observations made with its Very Long Baseline Array (VLBA) and Very Large Array (VLA) radio telescope systems will be degraded by several of the DTV allotments proposed in the draft Table.<sup>365</sup> The NRAO submits that its most serious concern is the proposed allotment of channel 38 at Christiansted, VI. The NRAO also submits that harmonic emissions from other DTV allotments on the draft Table present potential harmful interference conditions for its operations.<sup>366</sup> It states that channels 11, 14, 25, 27, 28, 31, 46, 47, 48, 49, 50, 51, 52, 53, 54 and 69 have second or third harmonics that fall within allocated or footnoted radio astronomy bands and urges that we avoid creating DTV allotments on these channels in certain locations.

204. Decision. Our staff has worked with broadcasters and other parties to develop a final DTV Table of Allotments that incorporates the policy decisions on the allotment principles and engineering assumptions discussed above and addresses the concerns of

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<sup>363</sup> LABCTS comments, p. 4-5.

<sup>364</sup> ABA comments, pp. 2-3.

<sup>365</sup> The NRAO indicates that the VLBA facility consists of ten automated 25-meter dishes at ten sites across the U.S. and its territories, from Mauna Kea, HI to St. Croix, VI. Data from each receiver are combined in a special computer system allowing the synthesis of a single radio telescope 5000 Miles in diameter. The VLA facility consists of twenty-seven automated 25-meter radio telescope antennas, the data from which are combined in a manner similar to that of the VLBA facility.

<sup>366</sup> NRAO comments, p. 4-5.

broadcasters and radio astronomy interests. To the extent possible, we have incorporated the allotment requests of individual broadcasters, radio astronomers, and others. The DTV Table of Allotments we are adopting is described below.

205. Full Accommodation. The DTV Table meets our primary objective of full accommodation of all eligible broadcasters.<sup>367 368</sup> The Table provides 1605 new DTV allotments in almost 900 communities in the continental U.S.<sup>369</sup> This provides a DTV allotment for all eligible broadcasters as defined above. In addition, the DTV Table establishes 39 additional vacant DTV allotments reserved for non-commercial use, as discussed above.

206. DTV Service Areas. The DTV Table also fulfills our goals of service replication/maximization. In general, existing broadcasters will 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.<sup>370</sup> In fact, during the transition period, over 50% of all existing broadcasters would receive a DTV allotment that fully replicates their existing service area; and more than 93% would receive an allotment that replicates at least 95% of their existing service area. We also believe that the DTV Table meets our objective of minimizing new interference to NTSC service. For example, 98 to 99% of all NTSC stations will receive less than 10% new interference (in terms of both area and population

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<sup>367</sup> 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 Sixth 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.

<sup>368</sup> We also note that some of the channels specified in the draft table are not fully compliant with the existing U.S.-Mexican and U.S.-Canadian agreements. We are continuing to work with these administrations to finalize the status of DTV allotments in border areas.

<sup>369</sup> The DTV Table also includes allotments for Alaska, Hawaii, Puerto Rico and the Virgin Islands.

<sup>370</sup> For each allotment, the DTV Table, in general, specifies the maximum ERP needed to replicate a station's existing service area. This power level is based on the station's existing antenna height and pattern.

served) from DTV operations.<sup>371</sup>

207. Spectrum for DTV Allotments. The 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 will have access to a suitable DTV frequency within the spectrum area ultimately designated for digital TV, e.g., existing TV channels either 7-51 or 2-46. As indicated above, the DTV Table contains 68 instances where both channels are outside of channels 7-51 and 89 instances where both channels are outside of channels 2-46. Even in these cases, however, suitable channels within the core area will become available when NTSC operations cease and channels are recovered from other stations.

## VII. ALLOTMENT MODIFICATIONS

### A. Maximum Station Facilities

208. In the Sixth Further Notice, we indicated our view 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 therefore proposed 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 operate on new UHF 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 observed 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 proposed to allow DTV stations to operate with higher ERP levels at lower antenna HAAT levels in accordance with the following table:<sup>372</sup>

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<sup>371</sup> These estimates are based on terrain-dependent Longley-Rice propagation models and assume that all NTSC and DTV stations are in operation.

<sup>372</sup> For antenna heights 1600 feet and below, the 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.

Proposed Maximum Allowable ERP and Antenna Height  
for Future DTV Stations

Antenna 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

209. Finally, we noted 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.<sup>373</sup> We stated that we believe a similar approach would be appropriate for DTV stations. We requested suggestions for the appropriate HAAT/power equivalency formulas to use for such DTV stations.

210. Comments. Only a few parties commented on this issue. Aries supports our proposals regarding maximum and minimum power levels.<sup>374</sup> Aries believes that our proposal would assist in equalizing service areas among stations. LeSEA supports limiting DTV power levels to 1500 kw at 1000 feet HAAT and pro-rating it in accordance with the proposed Maximum Allowable ERP and Antenna Height Table.<sup>375</sup> It believes this revision of the permissible power levels would help reduce the power disparities that are present in the draft Table. The Joint Broadcasters argue that limits on maximum facilities are unnecessary so

<sup>373</sup> See 47 CFR 76.614.

<sup>374</sup> Aries comments, p. 2.

<sup>375</sup> LeSEA comments, p. 5.

long as we use an allotment approach that protects DTV station service contours.<sup>376</sup> They believe that use of maximum power levels may unnecessarily cap stations' ability to achieve greater service areas. As noted above, the Broadcasters Caucus support a two-year temporary limit on maximum power. They indicate that the industry could not, however, agree on what power limit should be imposed during this period, either 500 kW or 1000 kW.<sup>377</sup>

211. Telemundo submits that we could improve service to urban audiences by permitting UHF stations to calculate maximum ERP levels at their contour edge.<sup>378</sup> Specifically, Telemundo states that UHF stations should be allowed to calculate their ERP at the depression angle to their DTV contour (43.8 dBu). Under this plan, if a station were to use a directional antenna, it would calculate its ERP at the radial to the most distant point on the DTV coverage contour. Telemundo also states that stations should be allowed to use beam tilt to improve coverage inside their coverage areas, even if it results in higher ERP levels than those specified on the draft Table.

212. The ABA urges that we adopt flexible minimum power levels for DTV operations.<sup>379</sup> The ABA states that because the small population of Alaska is concentrated in its metropolitan areas and there are vast areas with little or no human habitation, it would better serve the public interest to initially allow UHF stations to operate at a lower ERP than we proposed. It states that this would allow stations to implement DTV service at lower power levels and avoid the high costs predicted for some UHF transmitters.

213. Decision. In the Sixth Further Notice, we proposed a maximum permissible power of 316 kW effective radiated power and a maximum antenna height of 2000 feet height above average terrain for new DTV allotments in the UHF band. We proposed an equivalency table for various power (ERP) and antenna height (HAAT) combinations to permit increased power at antenna heights under 2000 feet. We indicated that these maximum facility values will enable a DTV station to serve their communities of license and provide service comparable to the service areas of typical NTSC stations. We are generally adopting these proposals. However, consistent with our service replication decision above, we are at this time limiting the maximum power to 1000 kW, regardless of antenna height, and are amending our power (ERP)/antenna height (HAAT) table accordingly, as shown in Appendix E. In addition, as set forth in the rules in Appendix E, we are adopting equivalent power and antenna height provisions for new DTV allotments for VHF channels. We are also providing different power levels for Zone I and Zones II and III, similar to our rules for NTSC service.

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<sup>376</sup> Joint Broadcasters comments, p. 44

<sup>377</sup> Broadcasters Caucus reply comments, pp. 13-16.

<sup>378</sup> Telemundo comments, p. 22.

<sup>379</sup> ABA comments, pp. 3-4.

## B. Future Allotments and Modifications to the DTV Table

214. In the Sixth Further Notice, we requested 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 requested 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.

215. Based on the engineering performance characteristics of the ATSC DTV system that we used in generating the draft DTV Table, we developed the following proposals as possible spacing standards for determining whether to permit the addition or modification of DTV allotments.<sup>380</sup>

<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)
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)

<sup>380</sup> 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.

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		
	All Zones	No allotments permitted between: 20 miles (32.2 km) and 55 miles (88.5 km)
DTV to NTSC		
	All Zones	No allotments permitted between: 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)		
	Zone I	No allotments permitted between: 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)

216. Alternatively, we proposed to require that a party requesting an addition to, or modification of, the DTV Table 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. Under this approach, 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 the 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.<sup>381</sup> 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.

217. We observed that the proposed new service replication allotment methodology would 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. We stated that 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

<sup>381</sup> The propagation models, technical planning factors and ATSC DTV system performance characteristics are presented in Appendix A.

its effect on neighboring stations. We therefore proposed 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 also proposed 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.

218. Comments. Century, KUPN-TV and Mr. Smith support the use of a geographic spacing approach for evaluating the acceptability of future DTV allotments.<sup>382</sup> KUPN-TV submits that spacing standards have proven efficient and reliable in use with NTSC service and would not impose a burden on future petitioners. Century states that we should adopt a spacing approach to remain consistent with the spacing methodology used in treaties with Canada and Mexico. It is concerned that allotments otherwise acceptable under interference standards might not be allowed due to an unwaivable geographic spacing conflict with Mexican or Canadian stations. Mr. Smith submits that we should allot DTV channels using a geographic spacing approach that would allow stations to maximize their coverage up to the current limits. He states that use of engineering studies to allot channels has in the past resulted in short-spacing of stations which in turn curtails the upgrading of stations. He believes that all stations should have the option of being able to upgrade to similar coverage.

219. The Joint Broadcasters recommend that we consider the following factors in evaluating proposals for a DTV channel or facility change: 1) spectrum and administrative efficiency; 2) preservation of NTSC service; 3) expansion of DTV service; and 4) interference to neighboring stations.<sup>383</sup> They state that these factors would also be considered by the regional industry coordinating committees in their evaluation of requests for changes. Pappas disagrees with the Joint Broadcasters' proposal to maintain the service replication principle after the transition is completed.<sup>384</sup> It argues that replication, as opposed to maximization, is a means to address the problem of accommodating all television broadcasters during the transition, when available spectrum will be at a premium. Pappas submits that once the transition is over, there should be ample spectrum available to enable broadcasters to maximize their coverage and hence to maximize their service to the public.

220. With regard to making additional channels available for new DTV stations, the Joint Broadcasters and Chris-Craft argue that we should refrain from assigning unassigned

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<sup>382</sup> Century comments, p. 3; KUPN-TV comments, p. 2; Mr. Smith comments, p. 4.

<sup>383</sup> Joint Broadcasters comments, p. 56.

<sup>384</sup> Pappas comments, p. 11-12.