

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

MM Docket No. 87-121

In the Matter of

Amendment of Part 73 of the  
Commission's Rules to permit  
short-spaced FM station assignments  
by using Directional Antennas

RM-6015

**NOTICE OF PROPOSED RULE MAKING**

Adopted: February 25, 1988; Released: March 30, 1988

By the Commission: Commissioner Quello concurring  
and issuing a separate statement.

**INTRODUCTION**

1. This *Notice of Proposed Rule Making (Notice)* proposes for consideration changes to the Commission's rules that would in certain circumstances permit the use of short-spaced FM transmitting antenna sites, use of FM directional antennas by short-spaced stations, and related matters.<sup>1</sup> This *Notice* is an outgrowth of the *Notice of Inquiry (Inquiry)* released on May 26, 1987, that inaugurated this proceeding.<sup>2</sup> After reviewing the comments received in response to the *Inquiry*, we have concluded that additional provisions in the rules to permit use of short-spaced antenna sites, including use of FM directional antennas, has merit and could provide greater flexibility in the selection of FM station antenna sites, resulting in improved service to the public.

2. The *Inquiry* explored a number of technical issues related to matters that are the subject of this *Notice*. Specifically, the *Inquiry* addressed matters related to use of short-spaced antenna sites, use of directional FM antennas in order to reduce required geographic separation between co-channel and adjacent channel stations and allotments, antenna design criteria, treatment of antenna height, and protection of existing stations.

**BACKGROUND**

3. The Commission's rules prescribe different procedures in making non-commercial FM station assignments on channels 200-220 and commercial FM stations on channels 221-300. In the case of non-commercial applications, proposed stations must provide protection to co-channel and adjacent channel stations in accordance with the standards prescribed in Section 73.509.<sup>3</sup> Generally, in applying these standards, calculations are performed to determine whether the interfering signal contours of the proposed station and neighboring adjacent and co-channel stations overlap the protected contours of each other.<sup>4</sup> Non-commercial FM stations also are routinely permitted to use directional antennas to avoid contour overlap with other stations.

4. In the case of commercial FM stations, applications to construct FM broadcast stations may be filed only for the communities and on the channels contained in the Table of Allotments in Section 73.202(b). If a channel allotment does not exist for a desired community, it is necessary to add the community to the Table through a rule making proceeding before an application may be filed. With limited exceptions (*see infra* para. 9), FM allotments and FM stations must comply with the distances of minimum geographic separation between co-channel and adjacent channel stations and allotments as prescribed in Section 73.207 of the FCC rules.<sup>5</sup>

5. The minimum separation distances that are applied to commercial FM stations and allotments were derived through calculations that assumed maximum facilities (*i. e.*, maximum power and antenna height above average terrain) using non-directional antennas for each of the commercial station classes. The distances to the protected contours and the interfering contours were calculated in a fashion similar to that which is applied for the assignment of non-commercial stations.<sup>6</sup> Although commercial stations may use directional antennas for other various reasons, they currently are not allowed to use such antenna systems for the purpose of creating new short-spacing situations.<sup>7</sup> Reasons for not allowing such short-spacing in the past were: (1) use of tables of minimum separation had the advantage of simplifying analysis of potential interference for new applications or proposed allotments since only simple calculations of distances between stations and allotments were required; and (2) more importantly, this procedure ensured that stations initially operating at less than maximum permitted facilities for their class would have the opportunity to increase to maximum facilities at a future date.

**COMMENTS**

6. In response to the *Inquiry*, the Commission received 35 comments, 28 of which generally favored some form of short-spacing provision for FM station assignment.<sup>8</sup> Many of the supporters, however, anticipate a rule making action that would fundamentally alter the current FM channel allotment process. Several broadcast station licensees support FM short-spacing because they believe that they would be allowed to use directional antenna systems to "upgrade" their stations to a higher station classification, *e. g.*, from Class A to Class B1 or C2. On the other hand, some of the opponents generally fear that such provisions might result in increased interference due to imprecision in propagation prediction methodology.

7. Commenters that favor the proposal stress the improvement in service they believe would be possible as a result of the additional flexibility for site selection. The comments of Beasley Radio Company (WPHR) and CBS, Inc. reflect this view and are characteristic of most licensees commenting in this proceeding.

8. Contrary to that support, Group M Communications, Inc., licensee of WIXL-FM, opposes the notion of short-spacing provisions. It believes that existing stations using directional antennas are inherently inferior, as reflected in broadcast audience ratings. The Hearst Corporation opposes short-spacing because of the potential for increased competition, if such short-spacing should eventually lead to the assignment of additional stations. The Association of Maximum Service Telecasters (MST) and the National Association of Broadcasters (NAB) oppose short-spacing

because of their concern of possible increased interference due to imprecision in propagation prediction methodology that would be used to "drop in" directionalized stations. MST also is concerned that the short-spacing of FM assignments will lead to the short-spacing of FM channel allotments, and that this will inevitably lead to television channel allotment short-spacing, of which it disapproves.<sup>9</sup> Doug C. McDonnell, consulting engineer, supports short-spacing on a case-by-case waiver basis rather than on a routine basis for all stations.

9. In summary, the comments generally support the proposition of additional rule provisions for use of short-spaced antenna sites.

#### DISCUSSION

10. The Commission has generally required rigid compliance with its rules prescribing the distances of minimum separation between commercial stations and allotments, except under two sets of circumstances. These exceptions concern "grandfathered" stations and use of designated "antenna farms."<sup>10</sup> In addition, site restrictions are sometimes encountered by applicants owing to matters such as FAA clearance difficulties, government ownership and restrictions on the use of desirable sites, and environmental concerns. Moreover, not all remaining potential sites may be acceptable under the Commission's current rules because they would be short-spaced to other co-channel and adjacent channel stations and allotments. Thus, for a combination of reasons, applicants may be forced to select an antenna site that does not result in optimum service to the public or that is not the most economical site on which to construct the facility.

11. Circumstances have changed substantially over the past two decades, and the general proscriptions in the rules regarding use of short-spaced antenna sites may no longer be in the public interest. There is no dispute that the FM service has matured and is, in fact, the dominant aural broadcast medium. In addition to economic or other considerations, increased flexibility to use short-spaced antenna sites could enhance and expand service to the public in some circumstances. For these reasons, we now propose to amend the rules to make general provisions for use of short-spaced antenna sites, including use of directional antennas, for the purpose of providing interference protection to adjacent and co-channel FM stations and allotments.<sup>11</sup>

12. *Short-spaced assignments.* Among the options considered here is a proposal to permit use of short-spaced antenna sites for new commercial FM stations, provided that sufficient interference protection is provided to adjacent and co-channel stations and allotments. Proposed facilities at short-spaced antenna sites would be permitted to employ either non-directional or directional antennas. In the cases where a non-directional antenna is used, restrictions on the effective radiated power or height of the antenna above average terrain (HAAT), or both, would be imposed on the proposed facility where necessary in order to provide requisite interference protection to neighboring stations and allotments. Such restrictions would have to be consistent with the class of the associated allotment for which the application is filed.<sup>12</sup> In cases in which a licensee currently operating on an allotment wants to change to a more favorable but short-spaced antenna site, and use a directional antenna, that

licensee must suppress the radiated power to avoid any overlap of the station's contours with the protected contours of neighboring stations or allotments.

13. Use of directional antennas designed to provide protection against interference in the direction of the short-spacing could offer licensees added flexibility and minimize necessary restrictions, if any, on power or HAAT. In making this proposal, however, it is not our intention to alter licensees' obligation to serve their communities of license. Accordingly, it is further proposed that such short-spaced facilities provide a minimum field strength of 3.16 mV/m (70 dBu) over the entire principal community to be served in accordance with Section 73.315 of our rules.

14. *Interference protection standards.* It is proposed that facilities that do not meet minimum spacings provide interference protection to other stations and allotments to which they are short-spaced in accordance with the prohibited signal overlap criteria outlined in the table in Appendix C. For each class of station, the table specifies the field strength values of the co-channel and adjacent channel interfering contours, which must not overlap the protected contours of adjacent and co-channel stations and allotments. In applying these criteria, protection to co-channel and adjacent channel stations and allotments would be based upon the assumption that such stations and allotments are operating with maximum permitted facilities. In the case of unused allotments, interference protection calculations would be performed assuming the use of maximum facilities for the class of allotment and a nondirectional antenna. For the station that elects to short-space, either by using a directional antenna or reduced facilities, we propose that it be so designated and will, thenceforth, be protected only to the limits of the service contour as defined by its short-spaced pattern.

15. These interference protection criteria are similar to those currently specified in Section 73.509 for non-commercial educational FM stations (NCE-FM). That section establishes the interference contours which must not overlap the 1 mV/m protection contour for NCE-FM stations. For most classes of commercial stations, i. e., classes A, C, C1, and C2, the minimum separations provide interference protection to the 1 mV/m service contour. However, for Classes B and B1, the 0.5 mV/m and 0.7 mV/m contours are protected, respectively, so as to maintain service areas consistent with those derived under the Table of Allotments.<sup>13</sup> Although rejected in BC Docket 80-90, we are now posing the question of whether circumstances are sufficiently different at this time to warrant specification of a uniform protected contour of 1 mV/m for all classes of stations, including Classes B and B1.

16. We also wish to consider the degree to which, if any, licensees electing to be short-spaced under this proposal should be permitted to accept some interference. Section 73.509 prohibits the establishment of any NCE-FM facility whose service area would be subjected to interference from other stations. Generally speaking, the minimum separations also prevent commercial stations from experiencing interference to their service areas. Under certain combinations of facilities and station classes, however, stations otherwise meeting the separation requirements will produce interference contours that overlap others' service contours. In light of this built-in overlap that already exists for some stations, it would appear desirable to allow licensees to accept some interference, so that the maximum

benefits may be obtained. We therefore question the public interest utility of incorporating a prohibition against the acceptance of interference into the regime we propose herein.<sup>14</sup>

17. *Directional antenna issues.* A number of commenters suggest that a prerequisite to authorizing routine use of directional antennas for purposes of interference protection is increased accuracy in predicting their radiated patterns. Hammett and Edison, for example, an engineering consulting firm, which filed a petition for Rule Making concerning this matter<sup>15</sup>, and others contend that the current standards are inadequate to accurately reflect the true radiation pattern of directional and non-directional antennas, particularly in accounting for the pronounced effect of antenna supporting structures. The comments suggest that accurate specification of directional antenna patterns may be of particular importance in short-spaced situations in order to control interference.

18. We tentatively propose, in accord with the Hammett and Edison petition, that radiation pattern measurements of the antenna be done in an environment that reasonably duplicates that of the antenna as mounted on its supporting structure. In accord with another of Hammett and Edison's recommendations, we further propose that applicants seeking the use of directional antennas submit only a theoretical pattern that provides the specified protection levels for other stations and the calculated coverage contours based on that pattern. Upon filing for the license, the applicant would be required, in the interests of interference protection, to include the actual pattern measurements to demonstrate that the radiation limits are not exceeded. Coverage contours would not be determined on this basis but would continue to be based on the theoretical pattern. We believe that these or similar rules would facilitate the accurate prediction of the interference potential of short-spaced stations and their actual coverage areas. Therefore, we request comment on the proposals made by Hammett and Edison, and recommendations of other antenna provisions that would ensure protection to other stations and allotments.

19. Section 73.316(b) prohibits the ratio of maximum to minimum radiation in the horizontal plane of a directional antenna from exceeding 15 dB. The desirability of continuing this proscription was addressed in the *Inquiry* and commenting parties contended that it is no longer appropriate owing to advances in the state-of-the-art. Moreover Second *Report and Order* in MM Docket 86-144, our rules for grandfathered stations had specified that the rate of change in the radiation pattern of a directional antenna should not vary more than 2 dB in any 10 degrees of azimuth.<sup>16</sup> This raises the issue of whether general use of directional antennas should warrant a provision in the rules limiting the rate of change of the antenna radiation pattern.

20. After assessing the comments, we have concluded that the rules are unnecessarily restrictive in prescribing a maximum-to-minimum ratio of 15 dB. However, while proposing to relax this restriction, we seek further comments as to what maximum level of radiation suppression should be permitted. Additionally, further comments are requested regarding the need for imposing any restriction on non-grandfathered stations as to the maximum rate of change in the horizontal radiation pattern, and what that rate should be.

21. While channel allotments are made on the basis of horizontal signal polarization, most stations employ vertical polarization in addition to horizontal polarization. We are concerned that the power of the vertically polarized component on occasion may be greater than the horizontal component, and could pose a greater interference potential than that predicted on the basis of considering the horizontal alone. Thus, we seek comment on whether the vertically polarized component should be protected in those directions where its power exceeds that of the horizontal component of the directional pattern, or should the vertical pattern be restricted to remain within the horizontal radiation pattern.

#### OTHER MATTERS

22. It is expected that the processing of applications for short spaced directional antenna systems will require implementation of automated interference analysis. To facilitate such analysis, we propose to require that applicants submit their directionalized patterns in tabulated form with values of relative field at periodic intervals of azimuth about the antenna. We solicit comments on what should be the appropriate azimuth interval, considering the cost to the applicant of having generated an adequate description of the pattern, *e. g.* 1, 5, 10 degree(s), etc. As a minimum, we are considering adoption of additional antenna pattern filing requirements similar to those required for low power television stations. (*See* subsections 74.735(c)(2)-(5)).

23. However, we are concerned that such authorizations may initially overburden our applications processing resources. Accordingly, we question whether initially we should only accept applications from certain categories of station applicants and, after a period of time, accept applications from all parties. Therefore, we seek comments as to how these categories might be established.

24. Another critical matter that must be resolved should we authorize short-spaced facilities is that of accurately reflecting the HAAT along the arc subtending the station or allotment to be protected. This is required so as to obtain as accurate an estimate of the interfering signal from the proposed short-spaced station. The HAAT used for NCE-FM stations is that of the antenna height along the radial connecting the proposed station and the existing nearby stations on relevant channels. Directional antennas are also commonly used in low power television and for that service the HAAT is determined by averaging the antenna heights along the azimuths of the arc subtending the maximum service contour of the station to be protected and at every 10 degrees between the two edges of that arc. Another method used internationally is the simple averaging of the antenna heights at two radials at either end of the arc. We propose to adopt one of these three methods or any other method that is workable, and most accurately portrays the antenna height along the arc that subtends the station(s) to be protected. Comments are invited.

25. Regarding the use of directional antennas to accommodate short-spacing of stations whose channel frequencies differ by 10.6 or 10.8 MHz, (which approximates the intermediate frequency (IF) for FM receivers), we will defer consideration of this topic at this time. This does not appear to be a significant issue at this time. Not only are there relatively few pairs of stations (less than 50), but there is also an outstanding proposal regarding adjustment

of IF spacings.<sup>17</sup> Any proposal concerning short-spaced IF-related stations, if any, will occur subsequent to a decision in that IF proceeding.

### CONCLUSION

26. In this proceeding, we have proposed procedures to permit routine authorization of non-interfering short-spaced FM station assignments. We encourage all interested parties to comment not only on the issues specifically discussed in this *Notice*, but also on any other related technical issues that are within the scope of this proceeding.

### AUTHORITY

27. Authority for this proposed rule making is contained in Sections 1.3, 4(i) and (j), 303, 308, 309 and 403 of the Communications Act of 1934, as amended. Pursuant to applicable procedures set forth in Section 1.415 and 1.419 of the Commission's Rules, interested parties may file comments on or before **May 27, 1988** and reply comments on or before **June 27, 1988**. All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. In reaching its decision, the Commission may take into consideration information and ideas not contained in the comments provided that such information or a writing indicating the nature and source of such information is placed in the public file, and provided that the fact of the Commission's reliance on such information is noted.

28. For purposes of this non-restricted notice and comment rule making proceeding, members of the public are advised that *ex parte* presentations are permitted except during the Sunshine Agenda period. See generally Section 1.1206(a). The Sunshine Agenda period is the period of time which commences with the release of a public notice that a matter has been placed on the Sunshine Agenda, and terminates when the Commission (1) releases a final order; (2) issues a public notice stating that the matter has been deleted from the Sunshine Agenda; or (3) issues a public notice stating that the matter has been returned to the staff for further consideration, whichever occurs first. Section 1.1202(f). During the Sunshine Agenda period, no presentations, *ex parte* or otherwise, are permitted unless specifically requested by Commission or staff for the clarification or adduction of evidence or the resolution of issues in the proceeding. Section 1.1203.

29. In general, an *ex parte* presentation is any presentation directed to the merits or outcome of the proceeding made to decision-making personnel which (1) if written, is not served on the parties to the proceeding, or (2), if oral, is made without opportunity for them to be present. Section 1.1202(b). Any person who submits a written *ex parte* presentation must provide, on the same day it is submitted, a copy of same to the Commission's Secretary for inclusion in the public record. Any person who makes an oral *ex parte* presentation that presents data or arguments not already reflected in that person's previously filed written comments, must provide, on the day of the oral presentation, a memorandum to the Secretary (with a copy to the commissioner or staff member involved) which summarizes the data and arguments. Each *ex parte* presentation described above must state on its face that the Secretary has been served, and must also state by docket number the proceeding to which it relates. Section 1.1206.

30. As required by Section 603 of the Regulatory Flexibility Act, the FCC had prepared an initial regulatory flexibility analysis (IRFA) of the expected impact of these proposed policies and rules on small entities. The IRFA is set forth in Appendix A. 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 Notice, but they must have a separate and distinct heading designating them as responses to the regulatory flexibility analysis. The Secretary shall cause a copy of this Notice, including the initial regulatory flexibility analysis to be sent to the Chief Counsel for Advocacy of the Small Business Administration in accordance with Section 603(c) of the Regulatory Flexibility Act, Pub. L. No. 96-354, 94 Stat. 1164 5 U.S.C. Section 601 et seq. (1982).

31. The proposals contained herein has been analyzed with respect to the Paperwork Reduction Act of 1980 and found to impose a new or modified information collection requirement on the public. Implementation of any new or modified requirement will be subject to approval by the Office of Management and Budget as prescribed by the Act.

32. To file formally in this proceeding, participants must file an original five copies of all comments, reply comments, and supporting documents. If participants want each Commissioner to receive a personal copy of their comments, an original plus eleven copies must be filed. Comments and reply comments should be sent to Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. Comments and reply comments will be available for public inspection during regular business hours in the Dockets Reference Room (Room 239) of the Federal Communications Commission, 1919 M Street, N.W., Washington, D.C. 20554.

33. For further information on this proceeding, contact Bernard Gorden, Mass Media Bureau. (202) 632-9660.

### FEDERAL COMMUNICATIONS COMMISSION

H. Walker Feaster, III  
Secretary

### APPENDIX A

#### INITIAL REGULATORY FLEXIBILITY ANALYSIS

##### I. Reason for action

The reason for this action is to propose FCC rule provisions for short-spaced commercial FM station assignments.

##### II. The objective

The objective is to allow all commercial FM stations more flexibility in selecting the most optimum antenna site to provide broadcast service to its listening public.

##### III. Legal basis

The legal basis for the Commission's engaging in rule making is contained in Sections 4(i) and (j) and 303(r) of the Communications Act of 1934, as amended.

**IV. Description, potential impact, and number of small entities affected**

There are approximately 4000 commercial FM stations licensees and 1300 FM non-commercial station licensees in the United States. While most of these licensees will probably not be inclined to modify their facilities, many future licensees may give strong consideration to using less than maximum facilities or the use of directional antennas to avail themselves of the flexibility of selecting a more favorable transmitter site, that is short-spaced. We expect no negative impact to these stations, small entities or large, as we are not mandating any new requirements. Interference should not increase as a result.

**V. Recording, Recordkeeping, and Other Complicance Requirements**

There is no additional impact.

**VI. Federal Rules which Overlap, Duplicate, or Conflict with the Proposed Rules**

There is no overlap, duplication, or conflict.

**VII. Any Significant Alternatives Minimizing Impact On Small Entities and Consistent with Stated Objective**

There are no alternatives available.

**APPENDIX B**

Comments addressing this proceeding were submitted by the following parties:

1. Arthur K. Peters, P.E. consulting engineer
2. Association for Broadcast Engineering Standards, Inc.
3. Association of Federal Communications Consulting Engineers
4. The Association of Maximum Service Telecasters
5. Beasley Radio Company
6. CBS, Inc.
7. Clear Channel Communications, Inc.
8. Cohen and Dippell, P.C.
9. Doug C. McDonell
10. Faulkner-Phillips Media, Inc.
11. Group M Communications
12. Hatfield & Dawson, Consulting Engineers
13. The Hearst Corporation
14. Interstate Broadcasting Systems, Inc.
15. Inter Urban Broadcasting Systems, Inc.
16. Jampro Antennas, Inc.
17. Joliet Broadcasting Company
18. Lamar County Broadcasters, Inc.
19. La Salle County Broadcast, Inc.
20. Malrite Radio and Television, Inc.
21. Massachusetts Class A Broadcasters Association
22. Mid-Ohio Communications, Inc.
23. National Association of Broadcasters
24. National Public Radio

25. Paradise Broadcasting, Inc
26. Peter K. Onnigian, Antenna Engineering Consultant
27. SBE Senior Broadcast Engineer
28. Serge Bergen, PE, Consulting Engineer
29. SIS Sound, Inc.
30. Superior Broadcasting, Inc.
31. Redwood Empire Stereocasters
32. Vacationland Broadcasting Services

**SUMMARY OF COMMENTS**

1. Thirty four comments and one reply comment were filed in response to the *Inquiry*. Twenty-nine of the comments generally favored our proposal to permit limited use of directional FM antennas to protect the service contours of FM stations in cases where meeting the current mileage separation criteria was unduly burdensome. Many of these commenters were Class A FM station licensees that submitted engineering statements showing how the proposed rules would permit them to upgrade their facilities (sometimes to a higher license class) without causing additional interference to other stations. Five commenters opposed the proposal, indicating their belief that it was merely the first step in the evolution of a "demand type" allotment system in which stations would eventually be "shoehorned in" to the detriment of current licensees.<sup>18</sup>

2. Those favoring the proposal stressed the improvement in service they believed would be possible as a result of the improved flexibility that would be provided in FM station siting. The majority of these commenters discussed at length the various engineering considerations relevant to expanded use of directional FM antennas.<sup>19</sup> These included the cochannel and adjacent channel protection criteria to be used in cases where the mileage separation criteria cannot be met, the method for computing signal strengths, and directional FM antenna characteristics and installation.

3. For example, those supporting our proposal favored our adopting the contour protection criteria applicable to non-commercial, educational FM station for commercial station use that was suggested in paragraph 10 of the *Inquiry*. There was also general support for the proposition that the interference protection to be afforded by short-spaced stations should extend to the maximum possible facilities of potentially affected cochannel and adjacent channel stations.<sup>20</sup> Lamar County Broadcasters, Inc. (Lamar) dissented however, arguing that only actual facilities should be protected. It noted that because of the expense involved, it is doubtful that Class C or C1 stations would upgrade in the future. Thus, Lamar suggests that licensees be given a time limit in which they must upgrade, after which only their actual facilities would be protected.

4. Some sentiment was also expressed in favor of our adopting a uniform signal strength contour that would be protected.<sup>21</sup> However, La Salle County Broadcasting, Inc. (La Salle) noted that because the various sub-categories of FM service are so inconsistent, developing a single standard would be difficult. La Salle also remarked that its use likely would be opposed by those who would be adversely affected (i.e., Class B and Class B1 station licensees). Thus, while the use of a uniform signal strength contour

(1 mV/m was the figure invariably suggested) was deemed desirable. recommendations toward achieving this result were inconclusive.

5. On the matter of protection to be afforded short-spaced stations, there was widespread agreement that only current facilities need be protected, since it was presumed that the use of greater facilities on the part of short-spaced stations would be precluded by interference considerations.<sup>22</sup>

6. Several consulting engineers filed comments pertaining to FM directional antenna performance and installation. There appeared to be agreement that if standardized directional antenna patterns were accepted as a part of the application process, they should be subsequently confirmed by measurements performed on an approved antenna range, preferably using the actual antenna and the same antenna tower type to be installed at the applicant's facility. However, this was not considered mandatory, and most of the engineers filing comments supported the use of "scaling" for determining antenna performance if it was done accurately.<sup>23</sup>

7. On the matter of FM directional antenna characteristics, Onnigian favored retaining the 15 dB limit between the maximum and minimum signal radiated in any given direction<sup>24</sup> and the 2 dB per 10 degree limit on the rate of change of pattern suppression versus azimuth.<sup>25</sup> However, Arthur K. Peters (Peters) believed these limits were too restrictive and should be eliminated. The AFCCE suggested the variant of retaining the 15 dB limit for cases such as short-spacing that involve a specific amount of interference protection. But if interference protection is not an issue, greater deviation would be permitted. The AFCCE supports Peters in favoring elimination of the 2 dB/10 degree limit on the rate of change. The comments were inconclusive on the number of radials required to define the antenna pattern. However, since there was agreement that the entire service areas of cochannel and adjacent channel stations should be protected, there was implicit agreement that the resolution should be adequate for that purpose.

8. There were also differences of opinion as to how propagation and height-above-average-terrain (HAAT) calculations should be performed. The AFCCE favored use of the Commission's "F(50,50)" and "F(50,10)" propagation curves, since their use over many years has revealed no significant flaws. However, the AFCCE noted (as did others) that various computer programs implementing these curves occasionally yielded significantly different results.<sup>26</sup> It recommended that the Commission issue a detailed table of field strength versus distance versus antenna height, and require that all other programs yield its results within a certain percentage of accuracy. Most of the engineers favored using additional radials to make HAAT calculations in the direction of a short-spaced station. With the availability of digitized terrain databases and computers, the extra calculations were not considered burdensome. National Public Radio, however, disputed this view, arguing that those resources were often beyond the means of its member stations.

9. Another technical issue raised was whether or not the Commission should protect the vertically polarized signals of FM stations.<sup>27</sup> Several commenters remarked that the vertical signals were increasingly important as a means of delivering good signals to automobile receivers. Thus, CBS, Inc. (CBS), Alan Roycroft and others argued that the vertical component should also be protected.

10. Lastly, there were some differences of opinion over what circumstances warranted the use of directional antennas. The Association for Broadcast and Engineering Standards "ABES") argued that the current allotment table should be considered the primary means of making FM assignments, and that directional FM antennas should be an option only for those with no other alternative.<sup>28</sup> CBS likewise favored directional antennas principally as a means of resolving short-spacing problems, not as an allocation tool. But the majority of those supporting the proposal favored its more general use. Lamar argued that the great demand for existing and new FM stations cries out against any regulatory provision that hinders efficient use of the spectrum. Mid-Ohio Communications and the Massachusetts Class A Broadcasters Association urged that directional FM antennas be permitted to provide coverage to currently unserved areas in addition to serving as a means of resolving short-spacing problems.

## APPENDIX C

### TABLE

#### Prohibited Overlap

Frequency Separation	Contour of Proposed Station	Contours of other Stations		
		Classes A, C, C1, and C2	Class B	Class B1
Co-channel	0.1 mV/m (40 dBu)	1 mV/m (60 dBu)		
	0.05 mV/m (34 dBu)		0.5 mV/m (54 dBu)	
	0.07 mV/m (37 dBu)			0.7 mV/m (57 dBu)
200 kHz	0.5 mV/m (54 dBu)	1 mV/m (60 dBu)		
	0.25 mV/m (48 dBu)		0.5 mV/m (54 dBu)	
	0.35 mV/m (51 dBu)			0.7 mV/m (57 dBu)
400 kHz	10 mV/m (80 dBu)	1 mV/m (60 dBu)		
	5 mV/m (74 dBu)		0.5 mV/m (54 dBu)	
	7 mV/m (77 dBu)			0.7 mV/m (57 dBu)
600 kHz	100 mV/m (100 dBu)	1 mV/m (60 dBu)		
	50 mV/m (94 dBu)		0.5 mV/m (54 dBu)	
	70 mV/m (97 dBu)			0.7 mV/m (57 dBu)

## FOOTNOTES

<sup>1</sup> A short-spaced FM station has its transmitting antenna site located at less than the required distance from the transmitting antenna site of an adjacent or co-channel station or stations or reference point of vacant channel allotments.

<sup>2</sup> See *Notice of Inquiry* in MM Docket No. 87-121, 52 FR 20430 (June 1, 1987).

<sup>3</sup> Additional considerations apply to FM channel 200 related to Class D educational stations. Also, § 73.507 states that non-commercial stations that are on channels adjacent to commercial stations on channels 221, 222, and 223 must meet minimum distance separations to those stations as specified for commercial channels.

<sup>4</sup> Administratively, objectionable interference is defined to exist within any geographic areas where prohibited overlap occurs between the contours prescribed in § 73.509 of the FCC rules.

<sup>5</sup> § 73.207 contains tables prescribing co-channel and adjacent channel minimum distance separation requirements between the various classes of stations and allotments.

<sup>6</sup> The field strengths of the protected contours for commercial stations and allotments vary depending on the class of station or allotment.

<sup>7</sup> Currently, grandfathered short-spaced commercial FM stations are allowed routinely to use directional antennas to avoid causing harmful interference. Properly spaced stations are allowed to use directional antennas to avoid wasting energy over underpopulated or unpopulated areas such as deserts and lakes. They may also use them to reduce the intensity of reflected signals. Although it has been generally preferable to choose a site where a non-directional antenna may be used, the Commission has recognized that topography, shape of the desired service area, or population distribution may make the choice of a transmitter antenna location difficult. In such cases, per § 73.315(c), directional antenna systems may be used.

<sup>8</sup> See Appendix B for a list of parties filing comments and reply comments, as well as a brief comment summary.

<sup>9</sup> While some commenting parties express concern as to how such provisions may impact the long-established Table of Allotments in § 73.202, we are not proposing in this *Notice* to permit short-spaced allotments, nor do we envision any alteration in the allotment process or the Table of Allotments.

<sup>10</sup> "Grandfathered" FM stations, *i. e.*, those stations that were short-spaced at the inception of the Table of Allotments in 1964, are permitted to remain short-spaced in accordance with § 73.213. § 73.209(c) also permits short-spaced stations at "antenna farms" designated pursuant to specified FCC procedures. (To date, however, no "antenna farms" have been designated.)

<sup>11</sup> The current FM Working Arrangement between the United States and Canada makes provision for coordinating proposed short-spaced sites. Use of FM directional antennas for the purpose of providing requisite interference protection to stations and allotments in the other country is also provided for. Negotiations are currently underway with Mexico to develop a new FM Agreement that incorporates similar provisions proposed by the United States.

<sup>12</sup> See 47 CFR § 73.211.

<sup>13</sup> See *Report & Order* in BC Docket 80-90, at paras. 59-62 and 87, 48 FR 29486, June 27, 1983; *recon on other grounds*, 49 FR 10260, March 1, 1983, in which 1 mV/m for all classes was considered but rejected because of the projected undesirable reduction of the primary service area for Class B stations. As a result, the Commission adopted a service contour for the new Class B1 stations similar to that for Class B stations.

<sup>14</sup> In other contexts we have raised the issue of whether the licensee may decide to receive interference. *AM Technical Criteria* in MM Docket No. 87-267, FCC 87-245, 52 FR 31795, para. 46-58 (August 24, 1987).

<sup>15</sup> RM-6015, *Public Notice*, Report No. 1669, released July 23, 1987.

<sup>16</sup> Despite the amendment to § 73.213, eliminating this requirement, it has been a longstanding Commission policy and remains a current practice to specify on construction permits of grandfathered short-spaced stations using directional antennas that the increase in radiation off the line between the stations shall not exceed 2 dB per 10 degrees of azimuth.

<sup>17</sup> See *Further Notice of Proposed Rule Making* in MM Docket No. 86-144, FCC No. 88-87, adopted March 1, 1988. As we indicated in that proceeding, we shall not consider alleged discrepancies between the separation distances in the rules and contour overlap calculations presumed to underlie them as sufficient grounds for a waiver of § 73.207.

<sup>18</sup> In the FM broadcast service, station assignments are made on the basis of a pre-determined allotment table designed to provide various grades of FM service to different geographical areas of the country. This contrasts with the "demand" nature of the AM service, where application for a station may be made anywhere provided its signal would meet the interference protection criteria applicable to stations already in operation. The maximum possible quantity of stations is higher in the latter case.

<sup>19</sup> As the Association of Federal Communications Consulting Engineers (AFCCE) mentions in its comments, the use of directional FM antennas is not new. Currently, they are employed by about 530 stations (many of these non-commercial, educational FM stations) for interference protection and service area optimization purposes.

<sup>20</sup> For various reasons, not all FM stations use the maximum possible power or antenna height for their particular class of station. However, if interference protection is based on the maximum possible facilities, sub-maximum stations may be free to upgrade at some time in the future.

<sup>21</sup> Currently, the service areas of Class A and Class C FM stations are considered to extend to their 1 mV/m contours. However, in the case of Class B and Class B1 FM stations, the service areas are considered to extend to their 0.5 and 0.7 mV/m contours, respectively.

<sup>22</sup> See, for example, the comments of Peter K. Onnigian and William V. Tranavitch, Jr., and the AFCCE.

<sup>23</sup> "Scaling" is a technique in which measurements are performed with the antenna, mounting structure and operating frequency proportionally reduced in frequency. It is presumably more convenient and less expensive than making actual measurements.

<sup>24</sup> See 47 CFR § 73.316(b).

<sup>25</sup> See 47 CFR § 73.213(c).

<sup>26</sup> However, Malrite Radio and TV, Inc. (Malrite) contradicted the AFCCE view, indicating that the FCC's propagation curves needed improvement, particularly where the antenna height exceeded 2000 feet, and argued that the curves needed to incorporate a realistic correction for terrain roughness.

<sup>27</sup> In the case of commercial FM stations we have traditionally considered only the horizontal signal component (the horizontal component tends to propagate better than the vertical component and the latter is expected to not exceed the former in terms of radiated power) for purposes of interference determination. This is not the case with the respect to noncommercial, educational

stations, however, which often radiate increased power in the vertical plane to reduce interference to television stations that operate on channel 6.

<sup>28</sup> As an example, use of a directional FM antenna would be appropriate where an applicant was unable to obtaining a zoning permit for any other site, or for other similar reasons beyond the applicant's control.

**CONCURRING STATEMENT OF  
COMMISSIONER JAMES H. QUELLO**

Re: *Notice of Proposed Rule Making* to permit short-spaced FM transmitter sites.

I generally support the notion that a more flexible approach to the problem of short-spaced antenna sites may be beneficial to the public as well as some FM broadcasters. The additional flexibility given to FM licensees in site selection will, in some cases, allow them to provide service to areas that may not receive adequate service because of our short-spacing rules. There are many broadcasters that, for legitimate reasons, are unable to meet the minimum distance requirements.

The *Notice of Proposed Rule Making* adopted by the Commission correctly observes that our short-spaced rules are enforced strictly. As a proposed solution, the Commission suggests that we adopt procedures that would permit routine authorization of short-spaced FM assignments. I would have preferred a more modest proposal that employed case-by-case approach. In this regard, applications involving short-spaced sites or directional antennas would be treated as waivers to our existing rules.

I believe we should move cautiously. As several of the comments point out, problems with interference have not been completely resolved. Given these concerns, I believe a case-by-case approach is preferable to the routine authorization of short-spaced transmitter sites. Such an approach would provide the necessary flexibility without endangering the integrity of our table of allocations. Moreover, while the *Notice* does not propose to consider directional antennas and short-spaced facilities at the allotment stage, I am concerned that the routine use of these techniques is merely the first step in the elimination of the table of allocations.

Therefore, I concur with issuing this *Notice of Proposed Rule Making*. I would welcome any comments addressing the concerns I have raised.