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

MM Docket No. 86-144

In the Matter of

Review of Technical Parameters
for FM Allocation Rules of Part 73,
Subpart B, FM Broadcast Stations

THIRD REPORT AND ORDER
(Proceeding Terminated)

Adopted: February 15, 1989; Released: April 10, 1989

By the Commission: Commissioner Quello dissenting and issuing a statement; Commissioner Dennis issuing a separate statement at a later date.

INTRODUCTION

1. The Commission has under consideration the last of a number of proposed FM Broadcast technical rule revisions that became necessary as a result of the creation of three new station classes in BC Docket 80-90. This *Third Report and Order (Third Report)* amends Part 73 of the Commission's Rules to provide a uniform level of protection for FM receivers from intermediate frequency (IF) interference.[1] Specifically, we are adjusting the minimum distance separation requirements for IF-related FM stations[2] to prevent overlap of their predicted 36 mV/m median field strength contours, regardless of the classes of the two stations. Also, we are adding a new minimum distance separation requirement applicable only to FM Channel 253 (98.5 MHz) and TV Channel 6, based on this same protection criterion.[3] We believe that these requirements constitute a reasonable standard that will preclude only those channel allocations and station assignments likely to result in IF interference.

BACKGROUND

2. The Commission initiated this proceeding in 1986 by adopting a *Notice of Proposed Rule Making (Notice)* [4] proposing to refine certain rules that were affected by its previous action in BC Docket No. 80-90,[5] but were not given detailed consideration in that proceeding.[6] In 1987, we adopted a *First Report and Order* [7] resolving two of the issues raised in the *Notice*. The five remaining proposals were addressed in a *Second Report and Order*.[8] Four of these were resolved in the *Second Report*, but action on the fifth, concerning IF distance separation requirements for the newly created station classes, was deferred pending procurement of additional information necessary to assist us in making a decision.

3. IF distance separation requirements are contained in Section 73.207 of the Commission's Rules. This section specifies, by station class, the minimum distance that each FM station must be spaced from other FM stations that operate on frequencies separated by 10.6 or 10.8 MHz (53 or 54 channels apart). The required spacings are intended to reduce the likelihood of IF interference ocurring in broadcast FM receivers that employ 10.7 MHz as their first IF.[9] Requiring such stations to be located at least as far apart as the specified distances limits the geographical area within which a receiver would be likely to encounter two relatively strong FM broadcast signals from IF-related stations. The current spacings specified for Classes A, B, and C (the original classes) were intended to avoid the overlap of 20 mV/m field strength contours.[10] However, as we recognized in the *Notice*, the specified distances are insufficient to prevent such overlap. Nevertheless, evidence of IF interference is limited to allegations made by several parties to this proceeding, which is contradicted by the experiences of others. We are not aware of complaints by the public or broadcasters which can be attributed to IF interference. This suggests that the existing lesser spacings are adequate.

4. In BC Docket 80-90, the Commission simply took the existing IF distance separation requirements for the large Class B and C stations and applied them to the new intermediate size classes B1, C2, and C1. Consequently, stations in these new classes must currently meet the same requirements as the largest stations, even though they generally operate with lower ERP and HAAT. For these new classes, it seems that some reduction in IF spacings is appropriate. Therefore, in the *Notice* we proposed to reduce the spacings for the new classes to those necessary to prevent the overlap of the 30 mV/m field strength contours.[11] We based this proposal on the current rules for the old classes, which prevent the overlap of field strength contours varying approximately from 24 mV/m to 36 mV/m (30 being halfway between 24 and 36). Our purpose in proposing the reduced spacings for Class B1, C1 and C2 stations was simply to adjust the rules to provide approximately the same protection for these new classes as has existed for Class A, B and C stations since 1965.

5. However, in the *Second Report*, we found the record developed in response to the *Notice* with regard to the issue of IF spacings to be inconclusive. Several of the commenters had indicated that there is no interference problem and that IF spacing requirements should be abolished or relaxed for all of the station classes, new and old. Others stated that IF interference is a serious problem and that we should not change any of these requirements. Although IF interference results primarily from receiver inadequacies, we had received no comments or information from receiver manufacturers or trade organizations representing receiver manufacturers. Additionally, our laboratory was then in the process of evaluating IF interference susceptibility in various categories of consumer FM broadcast receivers, and had not yet reported its findings.

6. Considering these factors, we concluded in the *Second Report* that adoption at that time of minimum distance separation requirements based on the 30 mV/m protection level would have been premature. However, we stated our belief that we should not indefinitely hold the new station classes to a stricter standard than the one that has produced no public complaints over a period of 22 years. We also stated that a more complete record might enable us to determine an appropriate standard that could

be used to develop minimum distance separation requirements for all of the various class relationships, providing a consistent level of protection.

7. Thus, in March of 1988, we issued a *Further Notice of Proposed Rule Making (Further Notice)* [12] with the goal of developing a more comprehensive record concerning the IF issue. The *Further Notice* also expanded the scope of the proposal to include consideration of existing IF distance separation requirements applicable to the pre-BC Docket 80-90 FM station classes (A, B and C) and possible new IF minimum distance separation requirements applicable to TV Channel 6 allotments and assignments in the vicinity of FM Channel 253 allotments and assignments (and vice versa).

8. In the *Further Notice* we proposed IF minimum distance separation requirements for all FM station classes and for TV Channel 6 and FM Channel 253 stations based on a uniform protection level of 36 mV/m. Noting that the available test reports and the existing record in this proceeding did not support the choice of any particular protection level, we selected 36 mV/m because it is the least restrictive level with which we have satisfactory long-term operating experience. We invited interested parties, particularly receiver manufacturers or organizations representing receiver manufacturers, to submit further data or test results that support or oppose on technical grounds our choice of 36 mV/m, or to suggest an alternative protection level.

9. The comment period for the *Further Notice* was extended (pursuant to requests filed by interested parties)[13] to provide sufficient time for commenters to examine the technical data in a report prepared by our laboratory (OET Report) on the susceptibility of commercial FM receivers to IF interference.[14] The period for reply comments was also extended in order to permit a complete and full record to be developed.[15]

COMMENTS

10. Fourteen parties filed formal comments in response to the *Further Notice* and five submitted replies to these initial comments.[16] The majority of the commenters support our proposal generally, but several oppose it or suggest modifications. Three commenters, Educational FM Associates (EdFM), Edens Broadcasting, Inc. (Edens) and WEDR, Inc. (WEDR) suggest that the Commission abandon IF distance separation requirements in favor of a rule or rule waiver policy allowing station locations that do not cause overlap of the predicted median 36 mV/m contours of IF-related stations, taking into account average terrain and directional antenna characteristics. Doing so, they claim, would provide greater site location flexibility, particularly for non-commercial educational stations which EdFM alleges do not usually operate at the commercial class maximums. Chapman S. Root Revocable Trust (Root) filed a reply opposing Edens' comments. Root argues that IF minimum distance separation requirements should be strictly adhered to rather than using a contour overlap method.

11. Key Broadcasting, Inc. (Key), although supporting the Commission's proposal, suggests that it does not go far enough. Key states that it has operated a Baltimore, Maryland station (WQSR) short-spaced to an IF-related station for many years and has never received a complaint attributable to IF interference. Key believes that IF distance separation requirements should be abolished entirely, but that if the Commission retains them, the protection level should be no more restrictive than 40 mV/m.[17] Timothy C. Cutforth, P.E. (Cutforth), a consulting engineer, and the Association of Federal Communications Consulting Engineers (AFCCE) both support the concept of a uniform protection level for all station class relationships. These commenters believe that the level proposed, 36 mV/m, seems about right, however, AFCCE states that additional laboratory testing should be conducted in order to verify this.

12. Greater Media, Inc. (Greater Media) opposes any change in the current IF rule on the grounds that it would cause "new IF interference to millions of receivers currently in use and likely to remain in use for many, many years." To support this contention, Greater Media supplied a statement by it's Vice President of Radio Engineering, Mr. Milford K. Smith, Jr., which relates his experiences with IF interference while serving as Chief Engineer (1967-1970) of WHMP-FM, Northampton, Massachusetts. Mr. Smith recalls receiving many complaints of IF interference during that time, resulting from the operation of a nearby IF-related station, WFCR. Mr. Smith further states that he returned to the area on July 8, 1988 with ten consumer grade FM receivers of types that he feels are likely to be used by the general public. At eight locations, Mr. Smith measured and recorded the field strengths of the two aforementioned IF-related stations and noted, for each of the receivers, whether any IF interference was experienced. Because about half of the receivers did experience interference, Mr. Smith concludes that IF interference continues to be a problem and that the Commission would therefore be ill advised to change the current IF distance separation requirements. Key, in reply, asserts that the Greater Media (Smith) study is flawed because, among other things, the measured signal strengths from the two stations were not equal or nearly equal at the locations where the trials were conducted, suggesting that the interference reported by Smith was not IF interference, but interference of some other type.

13. The Association for Broadcast Engineering Standards (ABES) and Greater Media believe that the OET Study underestimates the IF interference susceptibility of FM receivers typically used by consumers, and therefore should not serve as a basis for the proposed 36 mV/m protection level. ABES also submitted an engineering statement that contains histograms showing the number of IF-related licensed FM station pairs as a function of separation distance. ABES notes that, according to this data, there are relatively few IF-related pairs separated by distances near the current minimums. From this it concludes that there is little benefit (in terms of site location flexibility) to be realized if the Commission's proposal were to be adopted. The ABES engineering statement postulates that the current disparity in protection level between the various class combinations is a result of gross rounding of the originally calculated distances and changes in the class maximum facilities over the intervening two decades.

14. The National Association of Broadcasters (NAB) recommends that the Commission "go slow" in adjusting the IF distance separation requirements. NAB states that the problem of IF interference rests in "current receiver design practice," and that "the receiver industry should be allowed time to embark upon a standardization process," the outcome of which would determine the protection

level to be used.[18] NAB claims that no specific protection level is likely to protect all receivers currently in use, and urges the Commission to retain the current IF spacing requirements pending receiver industry efforts to establish standards that would allow determination of an appropriate protection level.

15. The Electronics Industries Association/Consumer Electronics Group (EIA/CEG) in its comments supplied manufacturers' test data for FM receivers described as "small inexpensive receivers without an antenna connection." This data, according to EIA/CEG, shows that receivers of this type would be "severly penalized" if the Commission's proposal were implemented. EIA/CEG states that there is a technical basis for the disparate protection levels, but does not explain this contention. EIA/CEG recommends that the Commission retain the current IF distance separation requirements.

16. The matter of IF interference resulting from proximity of an FM Channel 253 station and a TV Channel 6 station was addressed in five comments and two replies. 222 Corporation (222), licensee of FM station WCKW in Laplace, Louisiana, reports that it has experienced interference problems within its service area for years as a result of the assignment of both a TV 6 and FM 253 in the New Orleans area. 222 suggests that the Commission solve this particular situation by moving the FM station to a different channel. EIA/CEG comments that its manufacturers have reported no interference to TV 6 reception caused by FM 253 operations.[19] NAB supports the proposed TV 6-FM 253 requirement but suggests a tighter standard -- preventing overlap of the 30 mV/m contours -- until the receiver industry develops its standard. ABES recommends that the Commission study the matter further before taking action. AFCCE states that there is no documented need for the proposed TV 6-FM 253 requirement. The Association of Maximum Service Telecasters (MST), in reply, comments that although the TV 6-FM 253 proposal is a "welcome demonstration of Commission concern over maintaining the quality of over-the-air broadcast services", it believes that the record does not show a need for the proposed requirement.

DISCUSSION

17. Currently, our rules and policies with regard to FM IF interference result in arbitrarily varying levels of protection and thus are technically inconsistent. As noted earlier, the minimum spacings now required in Section 73.207 of our rules for IF-related stations provide different protection levels for various FM station class combinations.[20] The distances for Classes B1 and C1 were not based on any calculated standard but were simply taken from the next larger classes (Class B and C, respectively) as a temporary measure in BC Docket 80-90. Licensees of grandfathered short-spaced stations and other applicants requesting a waiver of the IF distance separation requirements currently must show, among other things, that a proposed modification would not cause the overlap of the 20 mV/m predicted median field strength contours of IF-related stations. Finally, there are currently no requirements at all for the TV Channel 6-FM Channel 253 IF relationship, which presents at least as much potential for IF interference as do the pure FM requirements.

18. We stated in the *Further Notice* that there is no technical justification for the disparate treatment of these similar situations. We have seen nothing in the record in this proceeding to persuade us otherwise. An FM receiver does not need more protection from two IF-related Class B1 stations than from two IF-related Class A stations. Nor does this same receiver need less protection from TV 6 - Channel 253 IF interference than it does from two IF-related Class C1 stations. We believe that it is good public policy for our technical allotment and assignment requirements to be based upon reasonably derived and consistently applied technical standards. As some commenters mentioned, we may consider waivers of our technical rules in cases wherein special unique or unusual circumstances may so dictate, however, even in these cases we believe that a clear understanding by all parties of the technical principles underlying the rule for which the waiver is sought is essential to the proper disposition of such requests.[21] In view of the foregoing, we conclude that *one specific protection level for IF interference should be selected and applied uniformly.*

19. In the *Further Notice*, we requested data or test results, particularly from receiver manufacturers or organizations representing them, that would quantitatively support or oppose our choice of a uniform 36 mV/m protection level, or would suggest an alternative level. EIA/CEG did submit some data bearing on this matter, but we received no separate comments from receiver manufacturers. In spite of the helpful reports submitted by Greater Media, 222, ABES and others, the record still does not point to any one particular protection level as an optimum choice.

20. A few of the commenters made considerable effort to interpret the OET Report in various, sometimes contradictory, ways. Others challenged or criticized its methodology or conclusions. Boiled down to its essentials, however, the OET Report says only that given two undesired IF-related FM signals of a given equal strength, the "average" commercial FM receiver[22] will provide satisfactory reception (free of objectionable IF interference) of a desired signal only if that desired signal has a certain minimum strength. Expressed another way, if the desired signal is strong enough, it can override the interference.[23] Converting the signal levels from dBm at the antenna terminals of the "average" receiver to corresponding field strength values in mV/m (which involves certain assumptions about the antenna that would be used), the approximate quantitative results are as follows:

Undesired Strength (Protection level)	**Minimum necessary desired signal strength for satisfactory reception**
36 mV/m	3 to 25 mV/m depending on frequency
20 mV/m	1 to 8 mV/m depending on frequency

21. Obviously, there is a trade-off between protection level (risk of interference) and site flexibility. That is, a lower level of protection permits shorter separation distances, which in turn allow a greater number of potential transmitter sites. Greater Media states in its comments that such a trade-off "should never favor the latter policy consideration unless it can be proven that restrictions on licensees have in fact substantially reduced opportunities for service to the public." ABES in its comments states that the vast majority of FM stations are now separated from IF-related stations by much more than the current minimum distance separation requirements, and therefore the benefits to be gained, in terms of site flexibility, are limited.[24]

22. We believe, however, that licensees of certain classes of FM stations should not be unnecessarily constrained by an inconsistent technical standard, while others, operating under a less restrictive standard, do not appear to have experienced any significant problems over the years. Class A stations are the most numerous and therefore most likely to be involved in an IF situation. Class C stations are the most powerful and thus are the stations that would cause the largest overlap area. Yet the current IF distance separation requirements for both the Class A to A and Class C to C combinations produce a protection level of 36 mV/m. No commenter suggested tightening the requirements for these station combinations. Furthermore, we find no justification in the record for setting or maintaining a more restrictive protection level for the other station class combinations.

23. In summary, because we consider it important that our assignment rules have a consistent technical foundation, we believe that our IF separation requirements should be based on a uniform protection level. In view of years of actual operation by some classes of FM stations under requirements resulting in a protection level of 36 mV/m, we believe that this level is sufficient to protect FM broadcast receivers currently in use. We encourage receiver manufacturers to attempt to design receivers that are immune to IF interference, as the record indicates this can be done without making such receivers significantly more expensive. We reject the contention of Greater Media and others that increased interference will result from this minor revision of our rules. Although NAB and EIA/CEG recommend that we retain the current distances, we see no public benefit to retaining the technically inconsistent distances. Accordingly, we are revising the required minimum FM IF spacings as we proposed in the *Further Notice*. Furthermore, because the aural transmitter of a TV station operating on Channel 6 is similar to an FM station with regard to potential for IF interference, we are adding a new requirement to address this interference potential.[25]

24. Some of the commenters suggested that we abandon distance separation requirements in favor of a prohibition on overlap of the predicted median field strength contours at the selected protection level. This approach could be useful in short-spaced cases, where the intent is to provide the required protection by using a directional antenna.[26] In fact, it is our long-standing policy to use contour overlap procedure in cases involving IF-related stations that are already short-spaced. However, we believe we should not expand on this policy at this time, since we did not contemplate doing so in the *Further Notice*.

25. In view of our recent proposal to increase the maximum permitted effective radiated power of Class A FM stations[27], licensees of these stations should be aware that, although we are not herein increasing the minimum IF distance separation requirements for Class A stations, we will do so in order to maintain the 36 mV/m protection level if the proposed power increase is ultimately adopted.

26. An analysis of our FM licensing records reveals that there are currently 22 pairs of IF-related licensed FM stations that are short-spaced under the current rule. Under the revised rule, 12 of these 22 station pairs will no longer be short-spaced, and will be subject to applicable IF distance separation requirements. The remaining short-spaced stations may continue to operate as authorized, however, applications to modify these stations in ways that increase the area of overlap of the stations' 36 mV/m median field strength contours will not be accepted.

27. A similar analysis using both the TV and FM engineering databases reveals 7 locations where a TV Channel 6 and and FM Channel 253 are short-spaced under the new requirement. (*See* Appendix B.) These stations may continue to operate as authorized, however, applications to modify these stations in ways that increase the area of overlap of the FM station's 36 mV/m median field strength contour and the 36 mV/m contour of the TV station's aural transmitter will not be accepted.

CONCLUSION

28. Some of the comments in this proceeding expressed a concern that the Commission has embraced a policy generally promoting toleration of increased interference in the FM service simply to increase the number of stations, and that these FM IF spacing revisions are merely part of that philosophy. This is not the case. Although we do seek to remove unnecessary regulatory barriers that stand in the way of opportunities for new or expanded service to the public, we remain committed to preserving or improving the quality of all of the broadcast services.

29. In this *Third Report and Order*, we are establishing a uniform protection level to serve as a basis for IF distance separation requirements, adjusting some of the existing requirements to meet the uniform protection level, and establishing a new requirement to address a previously unidentified potential source of IF interference. The new uniform protection level is not an untried standard, but rather it is one that has been in use for some FM station classes for many years without significant problems. Its expansion to include the other classes of FM stations will result in more reasonable and consistent treatment of FM station applications, with no significant likelihood of additional interference.

30. We have previously determined that Section 605(b) of the Regulatory Flexibility Act of 1980 (Pub. L. 96-354) does not apply to this rule making proceeding because it will not have a significant economic impact on a substantial number of small entities.

31. The actions contained herein have been analyzed with respect to the Paperwork Reduction Act of 1980 and found to contain no new or modified form, information collection and/or record keeping, labeling, disclosure, or record retention requirements, and they will not increase or decrease burden hours imposed on the public.

ORDERING CLAUSES

32. Authority for the action taken herein is contained in Sections 4(i), 303(f) and 303(r) of the Communications Act of 1934, as amended.

33. Accordingly, IT IS ORDERED That Part 73 of the Commission's Rules and Regulations ARE AMENDED, effective **May 17, 1989,** as set forth in Appendix A. IT IS FURTHER ORDERED That this proceeding IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy
Secretary

APPENDIX A

47 CFR Part 73 is amended as follows:

1. The authority citation for Part 73 continues to read as follows:

Authority: 47 U.S.C. 154 and 303.

2. 47 CFR 73.207 is amended by revising TABLE A in paragraph (b)(1), and by adding a new paragraph (c). In TABLE A, the first three columns, entitled "Co-channel", "200 kHz", and "400/600 kHz" remain unchanged. The fourth column, entitled "10.6/10.8 MHz", is revised to read as follows:

§ 73.207 Minimum distance separation between stations.

* * * * *

(b) * * *

(1) * * *

TABLE A - MINIMUM DISTANCE SEPARATION REQUIREMENTS IN KILOMETERS (MILES)

Relation	Co - channel	200 kHz	400/600 kHz	10.6/10.8 MHz
A to A	* * *	* * *	* * *	8 (5)
A to B1	* * *	* * *	* * *	11 (6)
A to B	* * *	* * *	* * *	14 (9)
A to C2	* * *	* * *	* * *	14 (9)
A to C1	* * *	* * *	* * *	21 (13)
A to C	* * *	* * *	* * *	28 (17)
B1 to B1	* * *	* * *	* * *	14 (9)
B1 to B	* * *	* * *	* * *	17 (11)
B1 to C2	* * *	* * *	* * *	17 (11)
B1 to C1	* * *	* * *	* * *	24 (15)
B1 to C	* * *	* * *	* * *	31 (19)
B to B	* * *	* * *	* * *	20 (12)
B to C2	* * *	* * *	* * *	20 (12)
B to C1	* * *	* * *	* * *	27 (17)
B to C	* * *	* * *	* * *	35 (22)
C2 to C2	* * *	* * *	* * *	20 (12)
C2 to C1	* * *	* * *	* * *	27 (17)
C2 to C	* * *	* * *	* * *	35 (22)
C1 to C1	* * *	* * *	* * *	34 (21)
C1 to C	* * *	* * *	* * *	41 (25)
C to C	* * *	* * *	* * *	48 (30)

* * * * *

(c) The distances listed below apply only to allotments and assignments on Channel 253 (98.5 MHz). The Commission will not accept petitions to amend the Table of Allotments, applications for new stations, or applications to change the channel or location of existing assignments where the following minimum distances (between transmitter sites, in kilometers) from any TV Channel 6 allotment or assignment are not met:

MINIMUM DISTANCE SEPARATION FROM TV CHANNEL 6 (82-88 MHz)

FM Class	TV Zone I	TV Zones II & III
A	16	20
B1	19	23
B	22	26
C2	22	26
C1	29	33
C	36	41

3. 47 CFR 73.213 is amended by redesignating the existing text as paragraph (a) and adding a new paragraph (b) to read as follows:

§ 73.213 Grandfathered short-spaced stations.

* * * * *

(b) Stations at locations authorized prior to [insert date 30 days after date of publication in the Federal Register] that did not meet the IF separation distances required by §73.207 and have remained short-spaced since that time may be modified or relocated provided that the overlap area of the two stations' 36 mV/m field strength contours is not increased.

4. 47 CFR 73.610 is amended by adding a new paragraph (f) to read as follows:

§ 73.610 Minimum distance separations between stations.

* * * * *

(f) The distances listed below apply only to allotments and assignments on Channel 6 (82-88 MHz). The Commission will not accept petitions to amend the Table of Allotments, applications for new stations, or applications to change the channel or location of existing assignments where the following minimum distances (between transmitter sites, in kilometers) from any FM Channel 253 allotment or assignment are not met:

MINIMUM DISTANCE SEPARATION FROM FM CHANNEL 253 (98.5 MHz)

FM Class	TV Zone I	TV Zones II & III
A	16	20
B1	19	23
B	22	26
C2	22	26
C1	29	33
C	36	41

APPENDIX B

CHANNEL 6 TV STATIONS AND CHANNEL 253 FM STATIONS LICENSED IN THE SAME AREA

KRMA-TV	Denver, Colorado
KYGO-FM	Denver, Colorado
WDSU-TV	New Orleans, Louisiana
WYLD-FM	New Orleans, Louisiana
WOWT	Omaha, Nebraska
KQKQ-FM	Council Bluffs, Iowa
KOTV	Tulsa, Oklahoma
KVOO-FM	Tulsa, Oklahoma
KOIN-TV	Portland, Oregon
KUPL-FM	Portland, Oregon
WIPR-TV	San Juan, Puerto Rico
WPRM-FM	San Juan, Puerto Rico
KFDM-TV	Beaumont, Texas
KHYS	Port Arthur, Texas

APPENDIX C

In response to the *Further Notice of Proposed Rule Making* in MM Docket 86-144, comments were filed by:

Department of Aeronautics, State of Nebraska

Timothy C. Cutforth, P.E.

Educational FM Associates

Key Broadcasting Corporation

WEDR, Inc.

Peter and John Radio Fellowship, Inc. (withdrawn)

Association for Broadcast Engineering Standards, Inc.

Edens Broadcasting, Inc.

Greater Media, Inc.

National Association of Broadcasters

Consumer Electronics Group/Electronic Industries Association

Association of Federal Communications Consulting Engineers

222 Corporation

Bromo Communications, Inc.

Replies were filed by:

Association of Maximum Service Telecasters

Chapman S. Root Revocable Trust

Greater Media, Inc.

Key Broadcasting Corporation

Peter and John Radio Fellowship, Inc. (withdrawn)

FOOTNOTES

[1] IF interference to FM broadcast receivers causes increased background noise which degrades reception of a desired signal. In more severe cases, it is characterized by reception of the audio, often distorted, of one or both of two stations, regardless of the position of the receiver's tuner dial. Thus, when it occurs, this phenomenon can prevent reception by the affected receiver of most or all of the FM stations in the area.

[2] Two FM stations are considered to be IF-related when their assigned frequencies are separated by 10.6 or 10.8 MHz (53 or 54 channels).

[3] The aural carrier (at 87.75 MHz) from a TV station on Channel 6 is IF-related to FM channel 253 (98.5 MHz).

[4] *See Notice of Proposed Rule Making* in MM Docket 86-144, 104 FCC 2d 160 (1986), 51 Fed. Reg. 15927, published April 29, 1986.

[5] *See Report and Order*, 94 FCC 2d 152 (1983); *recon., granted in part and denied in part*, 97 FCC 2d 279 (1984).

[6] In BC Docket 80-90, the Commission amended its Rules to expand FM service to the public by increasing the number of station classes, thereby providing new opportunities for additional stations and upgrading of existing stations. The Commission now authorizes six classes of commercial FM broadcast stations: A, B1, B, C2, C1, and C. Three of these classes, B1, C2, and C1, were created in BC Docket 80-90. At that time, certain existing rules were modified merely to accomodate the new classes. In general, the approach was to apply existing rules to new Classes B1 and C2 as if they were Class B, and likewise to treat new Class C1 as though it was Class C. The Commission indicated that these rules could be refined later, based upon a record addressing them in greater detail.

[7] *See First Report and Order* in MM Docket 86-144, 2 FCC Rcd 660 (1987), 52 Fed. Reg. 8259, published March 17, 1987. The Commission amended the rules to permit any class of station to be allotted on 20 channels which were previously restricted to Class A operation. Also, the Commission declined to amend the rule which provides for the classification of stations by zone based on transmitter location rather than the location of the community of license.

[8] *See Second Report and Order* in MM Docket 86-144, 2 FCC Rcd 5693 (1987), *recon. granted in part and denied in part*, 3 FCC Rcd 2477 (1988). The Commission (1) adopted a specific method for classifying FM stations according to their effective transmitting power and antenna height, (2) modified the required procedures for predicting FM station coverage to accomodate beam-tilt transmitting antennas, (3) modified the formula used for calculating the distance between FM stations to improve its accuracy, and (4) restricted modifications to grandfathered short-spaced stations to those which will not increase the potential for interference.

[9] Most consumer FM broadcast receivers use 10.7 MHz as their first IF.

[10] *See Report and Order* in Docket No. 15934, FCC 65-575, 30 Fed. Reg. 8680, July 9, 1965, 5 RR 2d 1679 (adopted June 30, 1965).

[11] For the sake of brevity, the Commission refers in this document to the criterion of preventing overlap of two equal contours of IF-related stations as a particular "protection level". For example, preventing overlap of two stations' 30 mV/m contours is referred to as a "30 mV/m protection level."

[12] *See Further Notice of Proposed Rule Making* in MM Docket 86-144, 3 FCC Rcd 1661 (1988).

[13] *See Order Granting Motion for Extension of Time for Filing Comments*, DA 88-704, 3 FCC Rcd 2818 (1988).

[14] *See* "Laboratory Test Results of the FM-IF Interference in Broadcast Receivers, Project EEB-86-8", OET Technical Memorandum, FCC/OET TM87-4, June 1987, prepared by J. Ray Hallman and Kenneth R. Nichols.

[15] *See Order Granting Request for Extension of Time to File Reply Comments,* DA 88-1184, 3 FCC Rcd 4773 (1988).

[16] A list of the parties filing comments and replies is attached as Appendix C.

[17] When viewed in the context of protection levels, higher signal strengths correspond to less protection from interference but greater site flexibility. This is because the higher signal strengths are found closer to the transmitting site, therefore the required separation distances can be shorter.

[18] NAB indicates that the National Radio Systems Committee (NRSC) is currently forming a subgroup to consider and make recommendations on issues such as the IF susceptibility of receivers.

[19] IF interference that is the subject of this proceeding is interference to FM receivers only. Channel 253 FM stations do not cause IF interference to television reception.

[20] The following are examples of the protection levels that result if maximum facility IF-related FM stations are located at the current minimum spacings contained in §73.207:

CLASS RELATIONSHIP	PROTECTION LEVEL
A to A	35.6 mV/m
B1 to B1	11.5 mV/m
B to B	24.6 mV/m
C1 to C1	17.5 mV/m
C to C	36.7 mV/m

[21] Notwithstanding our use, in this proceeding, of contour overlap calculations to define protection levels, meeting or exceeding the required separation distances continues to constitute the only measure of compliance with §73.207. Applicants seeking a waiver of §73.207 are advised that alleged discrepancies between the separation distances in the revised rule and the contour overlap calculations presumed to underlie them, do not in themselves constitute sufficient grounds for such a waiver. Other factors germane to each individual case *(e.g.,* lack of an alternative antenna site) must be considered when such waiver requests are evaluated.

[22] By average performance with 90% confidence, the OET Report means that if a receiver is selected at random from the universe of all FM receivers, one can be 90% sure that it will perform at least as well as the data indicates.

[23] This information is expressed graphically as Figure 5 in the OET Report. Note however that the lines drawn between the points probably do not express the true curve of the susceptibility characteristic of the "average" receiver because measurements were made at only four "desired" frequencies.

[24] If few FM stations have chosen locations where the IF minimum distance separation requirements are an important factor, there is no reason to expect many to decide to do so in the future simply because the Commission revises §73.207. Furthermore, assuming that only a few stations relocate as a result of our application of a uniform standard, the already unlikely possibility of IF interference occuring as a result of such relocations is even less probable.

[25] The new and revised distances are calculated to prevent overlap of the predicted median 36 mV/m contours, based upon the FM F(50,50) field strength curves *(see* §73.333, Figure 1) and assuming the use of maximum facilities by both stations. Consistent with the practice employed for the other minimum distance separation requirements in §73.207, all distances are rounded to the nearest kilometer.

[26] *See Report and Order* in MM Docket 87-121, FCC 88-406, adopted December 12, 1988. The Commission adopted rules to permit applicants for commercial FM broadcast stations to request authorization of antenna sites that are nominally short-spaced to other co-channel and first, second, and third adjacent channel facilities, provided that the service of these other facilities is protected in accordance with well established criteria. However, those rules do not allow short-spacing for IF-related stations. The Commission indicated that the technical matters underlying IF distance separation requirements are different from those considered in MM Docket 87-121, in that reception of signals from other nearby FM stations (as well as the two IF-related stations) may be affected. *See also* footnote 21, *supra.*

[27] *See Notice of Proposed Rule Making* in MM Docket 88-375, FCC 88-251, released September 12, 1988.

DISSENTING STATEMENT OF COMMISSIONER JAMES H. QUELLO

In re: Review of Technical Parameters for FM Allocation Rules of Part 73, Subpart B, FM Broadcast Stations (Minimum Distance Separations for IF Related Stations)

I dissent ot the majority's adopting a uniform IF interference standard. The record does *not* demonstrate that the 36 mV/m standard is sufficient to prevent additional interference in the FM band. On the contrary, data in the record compel a more cautious approach. The burden in the instant proceeding should be placed squarely on those parties seeking to change our current IF separation requirements. Indeed there is presumption against changing existing policies unless the modifications are supported by record evidence.[1]

Data submitted in this proceeding examining various types of receivers demonstrate that the Commission should not relax its IF spacing requirements. The Consumer Electronics Group of the Electronics Industry Association studied inexpensive Class I type receivers and concluded that "adoption of the proposed uniform level of protection from IF interference would result in increased interference and a consequent reduction in the quality of the FM broadcast service."[2] Similarly, data submitted by NAB argues against relaxing our IF interference standards.[3] A significant number of parties suggested that the Commission retain its existing rules until further study is conducted or standards for receiver design are improved.[4] Even the OET report, which examined the potential interference on higher quality Class II-IV receivers, concluded that relaxing current IF separations may lead to increased interference in the band.[5] OET's analysis concerned an increase from a 20 mV/m to a 30 mV/m protection criterion. The study noted that such an increase may be feasible, depending on the policy trade-off of the additional degradation versus additional FM broadcast service.[6] It should be noted however, that OET's report examined the potential for interference using a 30 mV/m protection standard. The majority's disregard for the potential adverse interference is, therefore, exacerbated by the fact that the item adopts a more relaxed standard -- 36 mV/m -- than that employed in OET's policy analysis.

Despite the evidence in the record, the majority supports a more relaxed standard on three principal grounds: (1) there is a trade off between IF interference protection and site flexibility; (2) the existing rules are inconsistent, restricting Class B1, B and C1 stations more than Class A or Class C stations; and (3) lack of complaints concerning separations between Class A and Class C stations that currently employ the 36 mV/m IF protection standard.[7]

I agree there are inconsistencies in the present rules. Generally, the commission should endeavor to develop consistent uniform rules whenever possible. However, the desire to create a uniform set of rules should not override countervailing public interest concerns, especially where interference is involved.

The policy trade off between interference protection and site flexibility does not justify a uniform relation of the rules. Given the potential increase in interference, I believe we should treat site problems on a specific case-by-case basis. Such an approach would minimize the risk of additional interference that is associated with a blanket relaxation of the IF protection rules. Moreover, a study submitted by the Association for Broadcast Engineering Standards, Inc. demonstrates that existing IF separation standards do not seriously impact stations in their choice of transmitter sites.[8] Accordingly, there is little or no benefit to offset the harm of increased interference.

The inconsistencies in IF spacing between Class B1, B, C1 stations and Class A and C stations is neither contrary to the public interest nor arbitrary. The IF standards were established at the time each service was created. Basic administrative law requires that the Commission provide reasoned analysis for changing its position.[9] The data demonstrate that IF interference occurs in a variety of situations and at different protection levels, depending on the quality of receiver. In this regard, lack of a uniform receiver standard makes the selection of a uniform IF standard even more arbtrary than the status quo. At least we have real world experience with our existing rules. Given the uncertainty in this area, maintenance of the status quo is justified if the Commission is to avoid the risk of increased interference across the FM bank. I submit that the administrative need for uniformity is not sufficient to justify changing the present rules.

Finally, assuming *arguendo,* that a uniform standard is in the public interest, there is no reason to adopt the more relaxed 36 mV/m protection standard. The majority states that stations operating under this standard (Class A and Class C stations) "do not appear to have experienced any significant problems over the years."[10] I believe it is bad policy to make interference decisions on the ground that no one has complained. Most radio listeners that encounter interference will simply switch stations without reporting the problem. Moreover, because interference varies depending on receiver quality, the majority has no idea whether the 36 mV/m standard is appropriate. The Commission has the responsibility to avoid policies that merely create additional interference. We should not delegate our responsibility by establishing a "public grumbling" standard for frequency management. It is worth remembering that the majority's decision for the first time adopts a more relaxed standard for all stations, thereby increasing the potential for IF interference across the entire band. In this regard, the problem may be exacerbated depending on the outcome of our pending proceeding concerning increases in power for Class A stations. On balance, I do not believe that the lack of complaints affords sufficient assurance that degradation in the band will not occur. This is especially true where there is data on the record demonstrating that relaxed standards may create additional IF interference. In any event, it certainly does not justify lessening the protections for other classes of FM stations. Simply stated, the Commission lacks the hard data that is necessary to justify a change from the status quo.

Of course, the perfect solution lies with improving the design of FM receivers. The data demonstrate that interference problems will vary considerably, depending on the quality of receiver. Most commenters agree that improved design will significantly reduce the IF interference problem. Accordingly, I support the idea that the broadcast and consumer electronics industries should adopt new receiver performance standards. In this regard, the Commission should take the lead by endorsing an industry developed standard that will balance the need for additional IF protection against increased costs to consumers from higher quality radio receivers. At this point in time, however, we should craft our interference rules to be consistent with the realities of the radio receiver marketplace. Our decision today runs the risks of increased interference to a significant number of existing receivers.

On balance, there is little or no evidence to justify relaxing the IF interference standard to 36 mV/m protection level. The record in this proceeding supports a cautious approach to this problem, perhaps a case-by-case examination of each potential IF interference situation. The blanket, uniform protection standard adopted in this proceeding is anything but cautious. I agree that the majority's decision will provide a consistent standard for all classes of FM facilities. However, our public interest concerns should encompass far more than an administrative uniformity. Given the lack of evidence in this proceeding that would justify such a change, I must dissent to the majority's decision.

FOOTNOTES FOR STATEMENT

[1] *See Motor Vehicle Manufacturers Association v. State Farm Automobile Insurance Co.,* 463 U.S. 29, 41, 42 (1983).

[2] *Comments of the Consumer Electronics Group of the Electronic Industries Association,* filed in MM Docket No. 86-144, July 12, 1988, at 1. The test primarily involved inexpensive receivers without an antenna connection. These receivers constitute a large segment of the exsiting radio market. The results indicated the level of interference expected with present separations would increase with 30 mV/m. However, the standard adopted by the Commission, 36 mV/m is even more relaxed, thereby increasing the potential for interference.

[3] National Association of Broadcasters, Department of Science and Technology, *A Review of the FM IF Taboo in Contemporary FM Broadcast Receivers in Laboratory Tests,* filed in Comments of the National Association of Broadcasters, filed in MM Docket No. 86-144, August 26, 1986. The study found that "there is amply evidence from these tests that the IF taboo exists and that rules to control such station configurations that contribute to is occurrence must be maintained." *Id.* 1. The report concludes that further tests are warranted because of the wide range in receiver models and general lack of information. *Id.*

[4] *See, e.g.,* Comments of the Association of Federal Communications Consulting Engineers, filed in MM Docket No. 86-144, July 12, 1988 at 3 (more definitive test data necessary to support relaxation of IF relaxation); Reply Comments of the Association

of Maximum Service Telecasters, filed in MM Docket No. 86-144, July 27, 1988 at 3 (further studies necessary before adopting new standard); Comments of the National Association of Broadcasters, filed in MM Docket No. 86-144, July 12, 1988 at 6 (retain existing protection until receiver industry establishes standard); Comments of Greater Media, Inc., filed in MM Docket No. 86-144, July 12, 1988 at 9-10 (test data and real world experience support retaining existing separations); Comments of Association for Broadcast Engineering Standards, Inc., filed in MM Docket No. 86-144, July 12, 1988 at 5, Appendix I (engineering report by Moffet, Larson & Johnson, Inc. supports retaining existing separations); Comments of National Public Radio filed in MM docket 86-144, August 26, 1986 at 11 (relaxation of rule would cause significant increase in interference); Reply Comments of A.D. Ring & Associates, P.C., filed in MM docket No. 86-144, September 9, 1986 at 7 (separation requirements should be changed only after receiver performance standards adopted).

[5] "Laboratory Test Results of the FM-IF interference in Broadcast Receivers, Project EEB-86-8," FCC/OET TM 87-4, June 1987.

[6] *Id.* at 7.

[7] *Third Report and Order* in MM Docket No. 86-144, FCC 89-62 adopted February 15, 1989 at para. 21.

[8] Comments of American Association for Broadcast Engineering Standards, *supra* note 4 at 2.

[9] *See Greater Boston Television Corporation v. FCC,* 444 F.2d 841, 852 (D.C. Cir. 1970) *clarified* 463 F.2d 268 (D.C. Cir. 1971).

[10] *Third Report and Order, supra* note 7 at para. 21.