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**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC 20554**

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| In the Matter of | ) | |
| | ) | |
| Creation of a | ) | MM Docket No. 99-25 |
| Low Power Radio Service | ) | RM-9208 |
| | ) | RM-9242 |

To: The Commission

# COMMENTS OF NATIONAL PUBLIC RADIO, INC.

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To: The Commission

# COMMENTS OF NATIONAL PUBLIC RADIO, INC.

Pursuant to Section 1.415 of the Commission's Rules, 47 C.F.R. § 1.415, National Public Radio, Inc. ("NPR") hereby submits its Comments on the Commission's Notice of Proposed Rulemaking in the above-captioned proceeding proposing the establishment of a low power radio broadcast service.[1]

## Introduction and Summary

NPR is a non-profit membership corporation that produces and distributes noncommercial educational programming through more than 600 public radio stations nationwide. In addition to broadcasting award winning NPR programming, including *All Things Considered®*, *Morning Edition®*, *Talk Of The Nation®*, and *Performance Today®*, NPR's Member stations originate significant amounts of news, informational, and cultural programming. NPR also operates the Public Radio Satellite Interconnection System and provides representation and other services to its Member stations.

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[1] Notice of Proposed Rulemaking, MM Docket 99-25, RM-9208, RM-9242, 14 FCC Rcd 2471, rel. Feb. 3, 1999 [hereinafter "NPRM"].

At the outset, NPR is compelled to correct the Commission's mischaracterization of NPR's position on the petitions that spawned this proceeding as "oppos[ing] the petitions."[2] The low power initiative raises a number of difficult and complex policy and technical issues, and the public interest requires a critical examination of those issues. Shining a light on those issues and asking hard questions is not tantamount to opposing low power broadcasting or the idea of increasing the number and diversity of broadcast voices. Indeed, if the Commission's proposal is to further the public interest, it will only be after the questions associated with achieving the Commission's lofty objective are asked and answered.

Given the history and mission of public radio, there should be no question about NPR's support for programmatic and ownership diversity. Established in the early part of this century through the pioneering efforts of educational institutions, public radio has since evolved as a national system of local stations, offering unique and compelling news, information, and cultural programming of local, regional, and national interest and scope. This evolution has occurred in large measure through a sustained and substantial Federal investment in the construction and operation of the public radio infrastructure and supportive Commission rules and policies over the past four decades. While we applaud the Commission's pursuit of greater diversity, we urge the Commission not to upset existing service in its wake.

The NPRM represents an important step in fashioning a low power broadcast service. Much remains to be done, however, to assure that diversity and opportunities for media ownership are enhanced without sacrificing the diversity of ownership and voices that already exist. First and foremost, establishment of a new low power FM service requires a

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[2] Id. at ¶ 9. In addition, the reasoning the NPRM ascribes to NPR does not reflect the position of NPR or the comments it expressed.

comprehensive understanding of the potential for interference to the reception of full-service stations. Because the Commission had not conducted any such tests prior to issuing the NPRM, NPR joined with the Consumer Electronics Manufacturers Association ("CEMA") and the Corporation for Public Broadcasting ("CPB") to commission a detailed laboratory testing of the issue. The final test report is attached to these Comments.

The testing demonstrates that the Commission's blanket proposal to eliminate second-and-third adjacency protections in licensing LPFM stations is untenable. Indeed, minimum standards of sound quality justify even greater protection for full-service stations operating on co-and first-adjacent channels and retention of at least the existing second- and third-adjacent channel protections. In addition, the Commission should at least maintain its existing standards regarding intermodulation ("IM") interference.

Based on this testing, the manner in which frequencies in the reserved portion of the FM band have been allocated, and other adjacent channel interference issues, the reserved portion of the FM band poses unique obstacles to the introduction of new LPFM stations. Additional testing is warranted both to examine the test findings under real world conditions and to assess the potential impact of LPFM stations on the various In-band, On-channel ("IBOC") digital audio broadcast systems.

Finally, the Commission must reconsider its proposal to establish LPFM stations on a primary basis. Aside from the preclusive effect such stations would have on the establishment of new, full-service stations, they are likely to disrupt public radio service to a substantial segment of the public that relies on auxiliary translator and booster stations as, in many cases, the sole source of public radio programming and, in some cases, the sole source of radio service. While the NPRM considers protecting existing auxiliary facilities from primary LPFM stations, it is not

enough to "grandfather" existing auxiliary facilities because grandfathering will not address the displacement of such facilities by full service stations and the difficulty of reestablishing auxiliary service in competition with other full service stations and primary LPFM stations. Thus, any LPFM stations that the Commission authorizes must protect existing and new auxiliary facilities to avoid serious harm to public radio and the important public service it provides.

## I. In The Pursuit Of Greater Diversity, The Commission Must Not Undermine The Important Public Service Public Radio Affords The American People And The Long-standing And Substantial Federal Investment In Public Radio

In proposing the creation of one or more classes of low power FM broadcast stations, the NPRM articulates three public policy objectives: "to address unmet needs for community-oriented radio broadcasting, foster opportunities for new radio broadcast ownership, and promote additional diversity in radio voices and program services."[3] NPR and its Member stations appreciate and value the public policy objective of fostering a diversity of broadcast voices to ensure the availability of programming responsive to local needs and interests. Since its origins in the first part of this century, public radio has pursued a mission of producing and disseminating programming to meet the needs of audiences un-served and under-served by commercial media.

The pursuit of this mission, and public radio's success in its achievement, have validated a coordinated Federal policy of promoting the development and expansion of locally-oriented public radio. Following enactment of the Communications Act of 1934, and an examination of the need for a noncommercial service mandated by the Act, the Commission first reserved

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[3] Id. at ¶ 1.

channels for noncommercial educational broadcast use in 1940. The Commission reserved additional channels several years later in the process of permanently allocating the lower 20 channels of the FM band for noncommercial educational broadcast use.

Congress first provided direct Federal financial support to public broadcasting through the Educational Television Facilities Act,[4] the progenitor of the current Public Telecommunications Facilities Program ("PTFP"). Since enacting the Public Broadcasting Act of 1967 a few years later,[5] Congress has devoted substantial federal resources to funding the construction of radio stations to serve as local outlets of community expression. Since 1967, Congress has appropriated more than $5 billion to support the basic operations of public radio and television stations and to foster the production of programming.[6] Since 1962, Congress has invested nearly $600 million for the construction of public broadcast facilities through the PTFP program.[7] Just in the last few months, Congress appropriated $48 million towards the replacement of public radio's satellite transponder capacity prematurely lost as a result of last year's Galaxy IV satellite failure.[8]

The quintessential element underlying the Federal policy supporting public broadcasting has been the role of public broadcast stations as community resources and as outlets of community expression. As envisioned in the Public Broadcasting Act of 1967: "Local stations

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4 Pub. L. No. 87-447, 76 Stat. 65 (1962).

5 Pub. L. No. 90-129, 81 Stat. 368 (1967).

6 See Appendix A.

7 See Appendix B.

8 1999 Emergency Supplemental Appropriations Act, P.L. 106-31, 106th Cong., 1st Sess., 113 Stat. 57 (1999).

are the bedrock of this system [of public radio broadcasting] and as such must be responsive to the needs and desires of the public which they serve."[9] Since that time, public broadcast stations have fulfilled this important role:

> [S]tations are playing an increasingly important role in their communities. Through its news and information programming, public radio has embarked on a new mission to present a more inclusive vision of American culture so as to respond effectively and creatively to the growing diversity of the Nation. Public radio is providing a forum for discussion of important issues and often serves as the nexus of outreach activities to various segments of the community.
>
> * * *
>
> Public . . . radio stations and public telecommunications services constitute valuable local community resources for utilizing electronic media to address national concerns and solve local problems through community outreach programs and services. In addition, local public television and radio stations can bring together organizations, businesses, State and local agencies, parents and other individuals to examine problems and seek solutions through the use of electronic media.[10]

In short, Congress has articulated and consistently pursued "a policy of broad access to public broadcast services in order to advance the compelling governmental interest in increasing the amount of educational, informational, and local public interest programming available to the Nation's citizens."[11]

Given that, "[o]ver the years, Congress repeatedly and unequivocally has supported public telecommunications services,"[12] the Commission's ambiguous characterization of this

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[9] S. Rep. No. 222, 90th Cong., 1st Sess. 7 (1967).

[10] S. Rep. No. 221, 102d Cong., 2d Sess. 2, 7, *reprinted in* 1992 U.S. Code Cong. & Admin News 834, 835, 840 (1992).

[11] Id. at 7, *reprinted in* 1992 U.S. Code Cong. & Admin News at 840.

[12] Id.

Congressional policy -- "it appears that Congress is concerned with the opportunity for and continuation of noncommercial educational broadcast service" -- is puzzling.[13] Nonetheless, there is no doubt that the Commission has predicated its regulatory oversight of public radio on the unique role of public radio stations as community institutions.

Indeed, the Commission long ago justified the elimination of any formal ascertainment requirements "in light of the special direct contact that public stations have with the public by virtue of their noncommercial status . . . ."[14] The Commission also relied on "social forces" to "serve as a reliable substitute" for formal ascertainment requirements. Among these social forces are representative governing boards, community advisory boards, and public meetings. Public meetings permit and encourage community involvement in the programmatic and operational decisions of noncommercial educational licensees.[15] Similarly, the Commission has identified community advisory boards as a critical means by which noncommercial educational licensees ascertain the needs of the public in deciding important operating matters.[16]

Thus, the history of public radio has been the evolution of public radio stations as

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[13] See NPRM at ¶ 19.

[14] Revision of Programming Policies and Reporting Requirements Related to Public Broadcasting Licensees, 98 F.C.C.2d 746, 752 (1984) [hereinafter "Public Broadcasting Deregulation Order"].

[15] See H.R. Conf. Rep. No. 1774, 95th Cong, 2d Sess. 30-31 (1978) [hereinafter "H.R. Conf. Rep. No. 1774".].

[16] See Public Broadcasting Deregulation Order, 98 F.C.C.2d at 754. See also H.R. Conf. Rep. No. 1774, at 32 ("The conferees believe that the establishment of community advisory boards should assist the stations in developing programs and policies that address the specialized needs of the communities that they endeavor to serve.")

community-based resources and sources of locally-responsive programming.[17] It has accomplished these important public service objectives as the result of concerted Federal policies and with the assistance of a substantial Federal investment of resources over the past half century.

Accordingly, the Commission must take special care to assure that the pursuit of diversity through the establishment of a low power broadcast service does not undermine the service provided by public radio stations. Achievement of the Commission's objectives cannot simply be a matter of justifying the loss of existing public radio service based on the addition of some quantum of new LPFM service.

One point must be clear: NPR is not suggesting, as the NPRM avers, that "existing radio stations are already serving the myriad needs and interests of their communities and must do so in order to remain competitive, thus making low power radio unnecessary."[18] Rather, public radio is an invaluable community resource, and it must not be sacrificed as a consequence of the Commission's desire to establish new, low power FM broadcast stations. Further, public radio exists as an invaluable national resource because of a sustained Federal communications policy and a substantial Federal capital investment. NPR urges the Commission to be mindful that its efforts in this proceeding not undermine the long-standing Federal commitment to public radio and

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[17] Not surprisingly, public radio ownership as a whole is unconcentrated and predominantly local, with stations licensed to the following categories of organizations: universities (362), non-profit community organizations (236), state governments (63), or local governments (33). See Corporation for Public Broadcasting, Frequently Asked Questions About Public Broadcasting, www.cpb.org/research/faq.

[18] NPRM at ¶ 9.

waste the substantial Federal investment that has made it possible.

## II. Under The Commission's Proposal, The Establishment Of A Low Power FM Service Is Likely To Pose Substantial Interference To Existing Broadcast Stations And, As A Result, Undermine Existing Service

Two years ago the Commission reiterated its determination that the existing interference protection criteria remained necessary to assure at least a minimum technical quality of public radio service and the continued viability of FM broadcasting generally.[19] In that the proceeding, the Commission relaxed the second-adjacent and third-adjacent interference protection criteria for a "very limited group of stations" -- second-adjacent and third-adjacent channel grandfathered stations that were short-spaced in 1964 and, in decreasing numbers, have remained short-spaced since then.[20] Otherwise, the Commission asserted, "we have 'no intention of relaxing second-adjacent-channel and third-adjacent channel spacing requirements as allotment and application criteria.'"[21] Eighteen months later, the Commission initiated this proceeding proposing to establish several classes of low power FM band stations, accomplished largely through the elimination of second-adjacent and third-adjacent channel interference protections.[22]

While there are many potential explanations for this fundamental change in the proposed allotment and application criteria, it appears that the Commission's proposal is

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[19] See In The Matter Of Grandfathered Short-Spaced FM Stations, Report and Order, MM Docket No. 96-120, 12 FCC Rcd 11,840 (1997).

[20] See id. at 11,848.

[21] Id. at 11848 (quoting In The Matter Of Grandfathered Short-Spaced FM Stations, Notice of Proposed Rulemaking, MM Docket No. 96-120, 11 FCC Rcd 7245 (1996)).

[22] See NPRM at ¶¶ 46, 48.

not based on any laboratory, field, or other engineering testing.[23] Rather, the Commission appears to have arrived at its proposal based on abstractions and through a process of elimination.[24] Indeed, without having conducted any technical examination of the likelihood for significant degradation of the FM band, the Commission remarkably concludes, "[r]elaxed interference standards for low power FM stations may be the only way to 'find' sufficient spectrum" to create a viable service.[25]

Moreover, while virtually ignored in the NPRM, the Commission has yet to resolve several pending matters from its proceeding concerning the streamlining of its technical rules that relate to the implementation of a low power FM band radio service.[26] The Commission has taken no action on its proposals to downgrade certain Class C FM stations, to permit negotiated interference agreements, and to adopt a point-to-point ("PTP") contour prediction methodology.[27]

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23 See id., Dissenting Statement of Commissioner Furchtgott-Roth at 1 ("It especially troubles me that the Commission has made no effort to assess, much less quantify, the effect on existing stations of eliminating these safeguards.")

24 See id. at ¶ 15 (declining to allocate new spectrum because of the attendant need for consumers to purchase new equipment); id. at ¶¶ 15, 17 (declining to authorize any LPFM stations on AM band frequencies because of "significant interference and degraded reception" across that band); id. at ¶ 16 (declining to locate new LPFM stations on a small number of particular channels because the lack of uniform availability across the country).

Having overseen the demise of the AM band as a medium for high fidelity audio programming, it is ironic that the Commission has proposed an exclusively FM band low power service because of the "significant interference and degraded reception" across the AM band.

25 Id. at ¶ 44.

26 See In the Matter of 1998 Biennial Regulatory Review -- Streamlining of Radio Technical Rules in Parts 73 and 74 of the Commission's Rules, First Report and Order, MM Docket No. 98-93 (rel. Mar. 30, 1999).

27 See id. at ¶ 1 & n.1.

With regard to the contour prediction issue in particular, all of the modeling of where LPFM stations may be located is based on the existing contour prediction methodology. Since the final contour prediction methodology may be (1) the existing contour prediction methodology, (2) PTP, or (3) Longley-Rice, the Commission's modeling assumptions are conjectural. The Commission can only assure the accuracy of its contour predictions by settling on a definitive standard before assigning frequencies to LPFM stations.[28]

Even assuming the adoption of a single contour prediction methodology, the Commission's LPFM proposal is premised on the notion that contour prediction alone will guarantee an interference free service. However, contour prediction does not determine the design integrity of consumer radios or the quality of their performance in the presence of LPFM radio stations on previously protected channels. Ultimately, the ability of any broadcast station to serve its listeners depends on the ability of the public actually to receive the broadcast signal.

Because the Commission had not examined reception characteristics of audio receivers,[29] NPR joined with CEMA and CPB to commission an analysis of a wide range of commonly used radio receivers under a variety of laboratory conditions.[30] The testing was conducted by

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[28] For the reasons NPR has previously set forth in the Commission's "technical streamlining" proceeding, the Longley-Rice methodology is the most appropriate contour prediction approach. See Comments of National Public Radio, Inc., MM Docket No. 98-93, at 8, filed Oct. 20, 1998; Reply Comments of National Public Radio, Inc., MM Docket No. 98-93, at 6, filed Dec. 4, 1998. See also Comments of the Association of Federal Communications Consulting Engineers, MM Docket No. 98-93, at 4, filed Oct. 20, 1998; Comments of du Treil, Lundin & Rackley, MM Docket No. 98-93, at 5-6, filed Oct. 20, 1998.

[29] See NPRM at ¶ 46.

[30] Radio receivers of the types used in the testing are representative of those currently in use in the market. See Comments of the Consumer Electronics Manufacturers Association, MM Docket 99-25, RM-9208, RM-9242, filed August 2, 1999.

engineering consultant Thomas B. Keller at the RMC Technologies test laboratory in North Olmsted, Ohio. As set forth in the attached report,[31] this testing examined the performance of sixteen radio receivers across all categories of such equipment in the presence of "undesired" radio signals at co-channel, first-adjacent, second-adjacent, and third-adjacent frequencies. The testing also examined the effect of intermediate frequency-related ("I.F.") intermodulation interference.

The consultant also recorded the audio results of the second- and third-adjacent tests to provide real world illustrations of the actual impact on the listening public. Copies of these recordings are being filed on compact disc with the Test Report.[32]

Finally, NPR engaged Robert D. Culver, P.E., of the engineering consulting firm of Lohnes & Culver, to conduct an independent analysis of the data. As part of his analysis, Culver graphed linear trend lines for the tested receivers that portrayed best and worst apparent SNR performance with the varying d/u ratios.[33]

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[31] FM Receiver Interference Tests, Laboratory Test Report, National Public Radio, Consumer Electronics Manufacturers Association, Corporation for Public Broadcasting (July 27, 1999) [hereinafter "Test Report"]. A copy of the Test Report is appended hereto as Attachment C.

[32] See id. The recordings were made by mixing the desired signal with one interfering signal at various d/u ratio, while measuring signal-to noise ratios and making DAT tape recordings of the quality of audio produced by the various receivers. Copies of the CDs, with accompanying recording logs, are included at Exhibits B and E of the Test Report.

[33] See Statement of Robert D. Culver, P.E., Attachment D [hereinafter "Culver Statement"].

### A. The Comprehensive Laboratory Testing Demonstrates That Even Maintenance of The Existing Interference Protection Standards Would Be Inadequate To Prevent Harmful Interference From The Proposed LPFM Stations

The testing is based on a threshold audio signal-to-noise ratio ("SNR") for quality radio reception. This was determined by listening to a variety of program material while observing the level of intrusive interference. An SNR ratio of 45 dB (CCIR weighted quasi peak) was determined to represent a "target" noise level -- one that is minimally acceptable for diverse types of programming broadcast by public radio stations.[34] Significantly, the 45 dB target is also comparable to the transmission quality proof of performance standard the Commission previously required of AM stations and worse than the standard for FM stations.[35]

For co-channel protection, the testing showed that the Commission's +20 dB d/u co-channel contour protection standard yielded an average of 25 dB SNR among the 16 receivers tested. This is 20 dB below the target SNR of 45 dB. With the transmitter signal level set at -50

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[34] While NPR has been known for the superb sonic quality of its programming for many years, NPR and its Member public radio stations now represent one of the largest station groups, offering a tremendous diversity of programming. NPR's technical facilities and those of its Member stations typically utilize minimum loudness processing to preserve the natural dynamic range of the programming, particularly in the case of jazz and classical music, news/talk, and special programming that is rich in natural, on-location sound recordings. The best examples of this programming -- both in terms of content and timbre -- have been described as "The NPR Sound."

Nonetheless, the 45 dB SNR standard achieves a minimum level of audio reception across the full range of programming types. CD Recording No. 006, Track No. 4 provides a sample of the 45 db SNR. See Test Report, Attachment C, Exhibit E.

[35] See 47 C.F.R. §§ 73.40(a) , 73.617(a) (1984). The Commission eliminated its AM and FM transmission proof of performance standards based on its view that competitive marketplace pressures would induce radio broadcasters to continue to meet or exceed the existing standards and, therefore, assure quality reception. See A Re-Examination of Technical Regulations, GEN Docket No. 83-114, 99 F.C.C.2d 903 (1984).

dBm, the laboratory measurements for the receiver equipment showed a 45 dB SNR was achievable when an average d/u ratio of 42 dB was maintained. To sustain a co-channel 45 dB SNR, the 16 receivers tested required d/u ratios ranging from 34 dB to 51 dB, a 17 dB range. Based on the testing, a +30 dB d/u co-channel protection contour standard, which would provide an average SNR of 34 dB, would provide a higher quality of reception by today's radio receivers.[36] Notably, this d/u ratio results in an SNR that is 8 dB worse than the target.

For first adjacent protection, the testing showed that the Commission's +6 dB d/u first adjacent contour protection standard yielded an average of 36 dB SNR among the 16 receivers tested. This is 9 dB worse than the 45 dB SNR target. Moreover, 5 of the 16 receivers tested yielded an SNR below 30 dB, or 15 dB worse than the 45 dB SNR target.[37]

For second adjacent protection, the testing demonstrated that at the -40 dB d/u ratio, the average receiver SNR was 29 dB. At -30 dB d/u, the receiver SNR averaged 36 dB. Based on these results, the existing -20 dB d/u protection ratio must be maintained to protect the existing analog service.[38]

For third adjacent protection, the testing demonstrated that at -30 dB d/u, the receiver SNR averaged 42 dB. This noise level falls just below the 45 dB SNR target. Thus, while a more protective (-30 dB d/u) standard is appropriate, the current -40 dB d/u protection ratio must be maintained to protect the listening quality of the existing analog FM radio service.[39]

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36 See Test Report, Attachment C, Section B.1.4.

37 See id., Section B.2.4.

38 See id., Section B.3.4.

39 See id., Section B.4.3

As Culver observed, these test results challenge what may be the central premise underlying the contention that substantial numbers of new radio stations can safely be introduced into the FM band in any given geographic area -- that receiver design improvements over time have rendered obsolete the existing interference protections.

> Conventional wisdom has it that FM radio receivers have improved over the years. These tests, however, disclose that, on the whole, they have not. The addition of stereo modulation to the FM system, an addition broadly adopted after the FCC made their allocation separation decisions in the early 1960's, imposes approximately a 26 dB noise penalty. This contemporary 'improvement' in FM transmission appears to have completely off-set the monaural noise advantage used in the early FCC allocation planning factor tests. The technical FM receiver improvements that may have been made over the intervening years have not made up the difference.[40]

In terms of noise rejection, selectivity, and immunity to overload, the basic assumption that modern receivers outperform those in use at the time the current protection criteria were established is unfounded.[41]

### B. Retention Of The Existing Second And Third Adjacency Protections Is Essential

The Commission acknowledges that the only way in which to authorize significant numbers of LPFM stations is by eliminating the second-adjacent and third-adjacent protections.[42] The receiver testing demonstrates that, rather than eliminating these interference protection criteria for the proposed LPFM stations, such criteria are essential to assure a "viable" service for all users of the FM radio spectrum.[43] Specifically, the laboratory measurements and subjective

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40 Culver Statement, Attachment D, at 6.

41 As noted below and in the Culver analysis, automobile receiver performance generally has improved. See note [46], infra, and accompanying text; Culver Statement, Attachment D, at 7.

42 See NPRM at ¶ 48.

listening demonstrate that the 45 dB SNR threshold is not achievable when interfering signals are introduced on second- and third-adjacent channels.[44]

In the case of second-adjacent interference in particular, the audio performance of the receivers ranged from 1 dB WQP SNR (44 dB below the target) to +60 dB WQP SNR (15 dB above the target), based on the existing -20 dB d/u protection. The Culver graph of these results provides a striking illustration of the tremendous disparity in performance among the various receivers.[45] The CD audio samples also demonstrate that unacceptable noise is likely to be much more noticeable on stationary home radio receivers, where full power and low power station signals will have a constant interfering contour overlap.[46] As Culver explains:

> The potential for this rulemaking to eliminate the second and third adjacent channel protections creates considerable concern for serious interference in the future. . . . [While] automobile receivers are [], as a class, . . . quite tolerant of second and third adjacent channel interference . . . the personal portable and the fixed Hi-Fi receivers are less tolerant."[47]

As a result, individuals who reside within an LPFM station's signal contour area will experience the greatest difficulty receiving the LPFM station's signal as well as the signals of all full-service stations on second- and third-adjacent channels.[48]

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43 See Test Report, Attachment C, Section B.3.4.

44 See, e.g., id., CD Recording No. 001, Tracks 2 and 4.

45 Culver Statement, Attachment D.

46 See Test Report, Attachment C, Exhibits B and E.

47 Culver Statement, Attachment D, at 7.

48 Id.

### C. The Commission Must Avoid Intermediate Frequency Interference

The receivers used in the testing were observed for several intermodulation ("IM") distortion design factors common in consumer radio receivers.[49] These included inadequate selectivity in the receiver input RF amplifier and overload intolerance that induces non-linear operation at the receiver front end. The Commission's rules ameliorate IM distortion in radio receivers by limiting the assignment of receiver I.F. channels and maintaining strict minimum distance separation requirements between IF related stations. These separations establish necessary protection for distortion free reception of stations that may be separated by the fundamental and harmonics of the standard receiver I.F. frequencies of 10.6 MHz and 10.8 MHz.[50]

In addition, maintaining minimum distance separation requirements reduces interference to the receiver's local oscillator ("LO").[51] The laboratory testing revealed that 7 of the 16 receivers measured were sensitive to LO interference.[52]

Current Commission rules minimize IM and LO interference, and NPR urges the Commission to maintain these protections. Maintaining second and third adjacent protections is also necessary to avoid the additional IM and LO distortion and to ensure continued usefulness of consumer radios. Otherwise, the presence of many more stations fairly close in frequency to

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[49] Intermodulation refers to the mixing (addition and subtraction) of one frequency with other frequencies, and occurs as a result of non-linearities in the input stages of receivers prior to the main I.F. filtering.

[50] See 47 C.F.R. § 73.207, Table C.

[51] See id. § 73.207(b).

[52] See Test Report, Attachment C, Appendix D, at 2.

each other is likely to cause third order intermodulation to reception of adjacent stations within the radio receiver.

### D. While Public Radio Stations Operate Throughout The FM Band, The Reserved Portion Of The Band Is Particularly Unsuited To The Elimination Of Existing Interference Criteria And The Introduction Of New LPFM Stations

As the NPRM acknowledges, the Commission historically has employed different frequency allocation methodologies in the reserved and the non-reserved portions of the FM band.[53] Noncommercial educational stations in the reserved band are protected according to signal strength contour methodology.[54] Stations in the non-reserved portion of the FM band, including noncommercial educational stations, are generally protected according to a distance separations methodology.[55]

As a result of this difference, reserved spectrum stations are generally packed more closely together, resulting in fewer opportunities to place LPFM stations. In the case of statewide networks,[56] moreover, individual stations in the network are typically sited to achieve maximum signal coverage based on actual receipt of a quality signal rather than predicted contour overlap. Indeed, public radio stations often have significant audiences outside their predicted coverage areas. Therefore, introducing new LPFM stations, particularly based on the

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53 See NPRM at ¶ 27 n.38.

54 Id.

55 Id. Some stations are protected according to a combination of distance and contour based-restrictions. See 47 C.F.R. § 73.215.

56 The Commission's rules historically have encouraged and supported such networks. Since 1963, the Commission's rules have required consideration of the extent to which each application seeking assignment of a channel for a noncommercial educational FM broadcast station meets the requirements of any state-wide plan for such stations. See 47 C.F.R. § 73.502.

elimination of the second and third-adjacency protections and particularly in the reserved portion of the FM band, is likely to pose significant interference to existing public radio service.

The reserved portion of the FM band is less suited to new LPFM stations for an additional reason. As the Commission is aware, adjacent channel interference between noncommercial FM stations and analog channel 6 TV stations is a long-standing problem.[57] Nonetheless, while the NPRM states that LPFM stations would have to avoid causing interference to television channel 6 stations,[58] the Commission fails to acknowledge a number of unresolved technical issues.

As discussed above,[59] the issue of contour prediction methodology for radio-to-radio interference is still pending. Resolution of this issue is particularly critical to the proposed introduction of LP1000 stations, which can be equated to a Class A radio service,[60] in the reserved band. Thus, it is unclear how the Commission will determine contour protection for reserved band LPFM stations, when the Longley-Rice prediction methodology is the standard for television and is a possible standard for FM radio, the current FM band predicted contour methodology remains in place, and PTP is the Commission's proposed new methodology for full

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[57] See Changes in the Rules Relating to Noncommercial Educational FM Broadcast Stations, Memorandum Opinion and Order, 58 R.R.2d 629 (1985); Petition for Reconsideration of National Public Radio, Inc., Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, MM Docket No. 87-268, filed June 13, 1997.

[58] See NPRM at ¶ 28 n. 39 (noting that the proposed LP1000 stations "operating on channels 201-220 would be required to protect TV Channel 6"); id. at ¶ 31 (noting that the proposed LP100 stations "operating on channels 201-220 would also have to protect TV Channel 6").

[59] See supra notes [26]-[28] and accompanying text.

[60] See 47 C.F.R. § 73.211.

service FM radio stations.

The NPRM also fails even to mention the issue of television channel 6-to-reserved FM band radio interference, and, in particular, such interference in the case of DTV channel 6 stations.[61] NPR commissioned a laboratory analysis of this issue and submitted the resulting test report in the Advanced Television proceeding.[62] That report details the potential for increased interference between noncommercial FM and new digital television ("DTV") Channel 6 stations. While there has been an effort to minimize DTV Channel 6 assignments, the ability of existing analog Channel 6 stations to return to their Channel 6 assignment after the DTV conversion could affect as many as 60 markets.[63] According to the DTV Channel 6 Interference To FM Band Reception Report, the mask density of a DTV signal presents an even greater risk of interference to noncommercial FM stations sharing the lower FM channels.[64] Thus, adding LPFM stations to the reserved band is likely to increase the interference potential among FM

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[61] See Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order, MM Docket No. 87-268, 13 FCC Rcd 6060, at ¶ 45 (1998) [hereinafter "Reconsideration of Sixth Report and Order"].

[62] DTV Channel 6 Interference To FM Band Reception, Final Report, Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, MM Docket No. 87-268, filed October 20, 1998 [hereinafter "DTV Channel 6 Interference Study"].

[63] See Reconsideration of Sixth Report and Order, Appendix B (Table of DTV Allotments); 47 C.F.R. ¶ 73.606 (Table of NTSC allotments); Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, Memorandum Opinion and Order on Reconsideration of the Fifth Report and Order, MM Docket No. 87-268, 13 FCC Rcd 6860, at ¶45 (1998) (requiring the return of one of the two (NTSC and DTV) 6 MHz channels at the end of the DTV transition).

[64] DTV Channel 6 Interference Study, Section 1.2.3 DTV Emission Mask; Figure 18, Section 4, Undesired Signal Emission Levels; Appendix A, Narrowband Noise Sensitivity Test Results.

stations, and between analog TV/DTV and noncommercial FM stations.

### E. Because The Prospect Of In-band, On-channel ("IBOC") Digital Audio Broadcasting ("DAB" Is Both Too Important And Uncertain At This Time, The Commission Should Defer Taking Any Action That Might Undermine The Development And Implementation Of A Robust IBOC Transmission Standard

NPR has a long-standing and significant interest in DAB, dating to the initiation of the Commission's Advanced Television proceeding,[65] in which NPR urged the Commission to consider the spectrum needs of advanced radio systems.[66] In response to the Notice of Inquiry that followed,[67] NPR urged the Commission to utilize its resources to support and facilitate the transition to digital radio broadcasting.[68] The Commission, in turn, recognized the importance of digital technology to the long term viability of radio broadcasting and pledged its support.[69] While the development of an in-band, on- channel ("IBOC") approach to DAB has taken longer than NPR or the Commission might have hoped, there has been strong interest among a number

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[65] Advanced Television Systems and Their Impact on the Existing Television Broadcast Service, Notice of Inquiry, MM Docket No. 87-268, 2 FCC Rcd. 5125 (1987).

[66] Comments of National Public Radio, Advanced Television Systems and Their Impact on the Existing Television Broadcast Service, MM Docket No. 87-268, at 2-7, filed Nov. 18, 1987.

[67] Amendment of the Commission's Rules with Regard to the Establishment and Regulation of New Digital Audio Radio Services, Notice of Inquiry, GEN Docket No. 90-357, 5 FCC Rcd. 5237 (1990).

[68] See Comments of National Public Radio, Amendment of the Commission's Rules with Regard to the Establishment and Regulation of New Digital Audio Radio Services, GEN Docket 90-357, filed Nov. 13, 1990.

[69] Amendment of the Commission Rules With Regard To The Establishment And Regulation Of New Digital Audio Radio Services, Notice of Proposed Rulemaking and Further Notice of Inquiry, GEN Docket No. 90-357, 7 FCC Rcd 7776, 7778 (1992).

of technology companies and considerable progress, particularly in the last year.[70]

In the course of the IBOC development efforts, a number of NPR Member stations have participated in the field testing of one or more of the competing systems. NPR Member station WILL-FM, Urbana, Illinois was one of the first radio stations to perform on-air testing of IBOC DAB radio in 1992. More recently, WBJB-FM, Lincroft, NJ, has participated in on-air testing of the Lucent FM IBOC system. WNYC-AM, New York, NY, is anticipated to participate in testing Lucent's AM IBOC DAB system. Finally, WETA-FM, Washington, DC, is currently applying for test authorization with USA Digital Radio Partners.

In light of public radio's interest in DAB and IBOC, NPR appreciates the Commission's support for the conversion to digital radio[71] and its expressed desire to avoid proceeding in a way that would impair the transition to digital radio broadcasting.[72] With virtually every other means of electronic mass media transitioning to or otherwise deploying digital technology, it is essential for public radio broadcasters, in particular, to be able to exploit the benefits of digital technology to further their Congressionally sanctioned, public interest mission.[73]

While we anxiously await further technical information regarding the competing IBOC systems, we caution the Commission that the compatibility of whatever is the final IBOC system with a system of LPFM stations cannot be assured until significantly more research, analysis, and

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70 See Statement Of National Public Radio, Inc., In the Matter of Amendment of Part 73 of the Commission's Rules To Permit the Introduction Of Digital Audio Broadcasting in the AM and FM Broadcast Services, RM 9395, filed Dec. 23, 1998.

71 See NPRM at ¶ 47.

72 See id. at ¶ 49.

73 See 47 U.S.C. § 396(a).

testing is conducted. Even if the Commission initiates an IBOC rulemaking proceeding this summer, as it has promised,[74] laboratory and preliminary on-air test results of the competing IBOC systems are not due until December 15, 1999. It is entirely possible, moreover, that the results of that field testing will not assure the compatibility of IBOC operations with existing broadcast stations under current interference protection criteria. Therefore, regardless of the conclusions that may be drawn at this time, it is premature to establish a low power service as proposed by the Commission and assure the conversion to IBOC DAB.

## III. The Establishment Of LPFM Stations On A Primary Basis Would Eliminate The Public Radio Service Provided By Auxiliary Broadcast Facilities And Otherwise Undermine The Offering Of Public Radio Services To Un-served And Under-served Portions Of The Country

The Commission's LPFM proposal not only threatens the service provided by full-service stations, it jeopardizes the service more than 9 million Americans receive via auxiliary translator and booster facilities.[75] As a technical matter, the likelihood of harm addressed in Section II, above, is compounded by the potential for disruption to either the input or the output signals of FM translator stations from adjacent channel LPFM stations. Even assuming LPFM stations can be coordinated to avoid interference, however, the establishment of LPFM stations on a primary basis threatens completely to eliminate auxiliary translator and booster facilities wherever any applicant desires to establish an LPFM station.[76]

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[74] See In the Matter of Creation of a Low Power Radio Service, MM Docket No. 99-25, at ¶ 6 (rel. May 20, 1999) (Order Granting Extension of Time).

[75] See Attachment E, at 1.

[76] See NPRM at ¶ 29. While the Commission describes the proposed LP100 class of stations as a "secondary service", id. at ¶ 30, it is apparently at least contemplating authorizing 100 watt low power, or LP100, stations on a primary basis. See id., Appendix D.

Such a consequence would be particularly harmful to public radio stations, which often rely on auxiliary broadcast facilities to reach un-served areas or to maintain existing service. Yet, such a consequence is inevitable under the Commission's proposal. Indeed, NPR would expect prospective LPFM applicants to specifically target existing translator and booster sites to locate LPFM transmitters because such facilities are already coordinated to avoid interference to existing full service stations.

Auxiliary broadcast facilities typically serve sparsely populated areas that often lack a sufficient economic base to support a full service station. These facilities are usually established only as a result of the community's desire to receive first or additional public radio service, and are funded through Federal and/or state grants or as a result of capital campaigns funded by the future listeners. Attached to these Comments is a list of the auxiliary facilities established with the assistance of PTFP funding during the period 1992-1998.[77] Following are but a few examples of the significant Federal investment in these facilities:

- In New Mexico, a PTFP grant of $23,647 (towards a total project cost of $31,530) enabled the University of New Mexico to construct four new translators to provide a first public radio signal to a total of 13,439 persons in the Cuba, Dzilth-na-o-dith-hle, Socorro, and Eagle Nest/Cimarron areas.

- NTIA provided WWNO-FM, New Orleans, LA with a grant of $25,948 (towards a total project cost of $34,597) to fund the construction of a 200 watt repeater station to bring a first signal to the cities of Houma and Thibodaux and surrounding communities in Lafourche and Terrebonne Parish and a combined population of 59,103 previously un-served residents.

- To extend first public radio service to 450 persons in Hooper Bay, Alaska and to improve public radio service to 1,900 currently-served persons in Chevak, Alaska, NTIA awarded KCUK-FM, Chevak, Alaska $67,500 (toward a total project cost

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[77] Attachment F.

of $90,032) to replace an obsolete and worn-out transmitter and to upgrade a solar-powered translator to a wind-powered translator at Scammon Bay.

- To construct a repeater FM transmitter which will extend public radio service to an additional community in New Jersey, NTIA awarded WNJM(FM), Manahawkin, NJ a grant of $39,641 to provide first public radio service to 35,512 people.

Many stations also fund the construction of translator and booster facilities through other, community-based means. For instance, capital campaigns conducted in four different communities in Oregon enabled KSOR-FM, Ashland, Oregon to establish translators to provide first public radio service to 32,000 people in Port Orford, Brookings, Gold Beach and Coos Bay.[78] A subsequent fund drive raised $6,300 to fund the construction of two translators that brought public radio to approximately 8,000 people in adjacent communities in Northern California.[79] In the case of WNMU-FM, Marquette, Michigan, a grant of $11,174 from an area philanthropic organization enabled the station to establish a translator to enhance reception within the station's coverage area.[80]

In some cases, state funding has helped stations to establish translator service to un-served and under-served areas. In the case of KUNM-FM, noted above, state funds amounting to $10,000 were made available, via the station's state university licensee, to offset the difference between the amount of the PTFP grant and the project cost.[81] Likewise, since 1973 the Florida Department of Education has maintained a policy of providing matching funds for PTFP grants

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78 See Attachment G.

79 See id.

80 See Attachment H.

81 See Attachment I.

received by affiliates of the state's public broadcast network.[82]

Based on the foregoing, NPR submits that the authorization of a new service of primary LPFM stations would be contrary to the Federal interest in extending public telecommunications services to as much of the public as possible.[83] If the Commission is inclined to proceed with its proposal, merely grandfathering existing translator and booster facilities, as it has suggested,[84] is inadequate. Inevitably, the establishment of new full service stations will dislocate existing translators and boosters, and the presence of primary LPFM stations will make it more difficult, if not impossible, to find new sites for the displaced facilities.[85]

We also urge the Commission not to categorically differentiate between fill-in and other translators and between satellite and terrestrially-fed translators for purposes of deciding which translators and booster facilities should be sacrificed in the interest of promoting its LPFM initiative. There is no questioning the importance of auxiliary facilities used to overcome terrain or other physical obstacles to fill in a station's signal coverage area. Nonetheless, the value of an auxiliary facility to extend a signal cannot simply be measured in terms of mileage. Indeed, many auxiliary facilities have been established, in some cases even many miles from the full

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82 See Attachment J.

83 See, e.g., 47 U.S.C. § 396(a)(7) ("[I]t is necessary and appropriate for the Federal Government to complement, assist, and support a national policy that will most effectively make public telecommunications services available to all citizens of the United States.")

84 NPRM at ¶ 13.

85 See Joint Comments of National Public Radio, Inc., The Association of America's Public Television Stations And The Corporation For Public Broadcasting, Reexamination Of The Comparative Standards For Noncommercial Educational Applicants, MM Docket No. 95-31, at 35, filed Jan. 28, 1999 [hereinafter "Joint Comparative Standards Comments"].

service station it retransmits, because of the distant community's need and desire for public radio service.

Similarly, a satellite-fed translator or booster can, but need not, be equated with a "non-local" service. In the case of Colorado Public Radio, for instance, the Silverton Arts Council contributed the cost of a satellite dish so that the community (population: 500) could receive a clear signal in place of the weak signal received via a terrestrially fed translator. The Gunnison County Metropolitan Recreation District paid the full $15,000 cost to add a second, satellite-fed translator to supplement an existing terrestrially fed translator to relay KPRN-FM from Grand Junction to Gunnison (population: 12,000).

The services these facilities provide are no less valuable because they are provided with the aid of satellite technology. Nor are they necessarily less "local" because they do not originate from a studio within the community or they extend a full service station's coverage area. Therefore, absent some practical and meaningful way of measuring and assuring the continuation of public radio services on which significant portions of the public have come to rely, the Commission should not establish LPFM stations on a primary basis, simply "grandfather" existing auxiliary facilities, or protect only terrestrially-fed or "local" auxiliary facilities.

## IV. The Commission Faces An Extremely Difficult Challenge In Fashioning Rules To Achieve Its Stated Objective Of Increasing Programmatic And Ownership Diversity Through A Low Power Broadcast Service

Notwithstanding NPR's support for programmatic and ownership diversity, it is compelled to comment briefly on the challenge of developing administrative rules to implement a new low power broadcast service. This is particularly evident from the Commission's quandary

over whether to license LPFM stations on a commercial or noncommercial basis.[86] As a policy matter, it is difficult to justify licensing LPFM stations on a commercial basis given the statutory mandate to auction mutually exclusive applications. As in the case of public radio, the value of low power broadcasting is measured in public interest rather than economic terms.[87]

On the other hand, licensing stations on a noncommercial basis raises both implementation and enforcement issues. The Commission's obvious difficulty in developing a comparative methodology to decide among mutually exclusive full service noncommercial stations bodes ill for the establishment of a comparative methodology to decide among competing LPFM applicants, including those competing to operate 1-10 watt stations.[88] Unfortunately, the vastly simpler alternative of utilizing lotteries to award licenses among competing low power applicants, or even a first-to-file approach, would hardly serve to advance

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86 See NPRM at ¶¶ 69 & 103-08.

87 See Joint Comments of National Public Radio, Inc., the National Federation of Community Broadcasters, and the Corporation for Public Broadcasting, Implementation of Section 309(j) of the Communications Act -- Competitive Bidding for Commercial Broadcast and Instructional Television Fixed Service Licenses Reexamination of the Policy Statement on Comparative Broadcast Hearings Proposals to Reform the Commission's Comparative Hearing Process to Expedite the Resolution of Cases, MM Docket No. 97-234, GC Docket No. 92-52, GEN Docket No. 90-264, at 15, filed Jan. 26, 1998.

88 Following the invalidation of the integration criterion in Bechtel v. FCC, 957 F.d 873 (D.C. Cir. 1992), the Commission opened an inquiry into possible changes to the commercial and noncommercial broadcast selection processes. See Reexamination of the Policy Statement on Comparative Broadcast Hearings, GC Docket No. 92-52, 7 FCC Rcd. 2664 (1992); Further Notice of Proposed Rulemaking, 8 FCC Rcd. 5475 (1993); Second Further Notice of Proposed Rulemaking, GC Docket No. 92-52. 9 FCC Rcd 2821 (1994). The Commission separated this inquiry into separate proceedings for reserved-frequency and non-reserved-frequency licenses in 1995. See Notice of Proposed Rulemaking, MM Docket No. 95-31, 10 FCC Rcd. 2877 (1995). On October 21, 1998, the Commission issued a Further Notice of Proposed Rulemaking in this proceeding. See Further Notice of Proposed Rulemaking, MM Docket No. 95-31, 13 FCC Rcd 21167 (1998). That proceeding remains outstanding.

the Commission's public policy objectives.[89]

Thus, the Commission's laudable vision of empowering churches, schools and other community based organizations is likely to be realized only with extensive administrative processing and qualitative analysis of prospective LPFM licensees, or not at all.

It is also not clear how Commission regulation or oversight would assure, or even encourage, service responsive to the needs of the public residing within a particular station's service area. A full service public radio station depends on continued support from individual listeners in order to remain on the air.[90] A publicly funded full service radio station depends both on individual listener support and on Federal and state appropriations that, in turn, can be assured only by providing a broadcast service that continues to meet the public's needs. There is no similar incentive for an LPFM licensee to serve the public interest, particularly in the case of the "very inexpensive" 1-10 Watt secondary "microradio" service,[91] but also to the extent the Commission succeeds in its efforts to minimize costly regulatory burdens for the other classes of LPFM stations.[92]

If there can be some assurance that prospective licensees will serve the community and the public interest, it is by maintaining the current eligibility criteria for any LPFM station licensed to operate on a reserved frequency or elsewhere as a

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89 See Joint Comparative Standards Comments at 7-10; Joint Reply Comments of National Public Radio, Inc., The Association of America's Public Television Stations And The Corporation For Public Broadcasting, Reexamination Of The Comparative Standards For Noncommercial Educational Applicants, MM Docket No. 95-31, at 3-7, filed Mar. 15, 1999.

90 Public Broadcasting Deregulation Order, 98 F.C.C.2d at 754 (1984).

91 NPRM at ¶ 34.

92 See id. at ¶ 32.

noncommercial educational station.[93] As the Commission previously found, a change as seemingly simple as awarding reserved frequency licenses to tax-exempt organizations without regard to their specific exempt purpose would constitute a radical departure from the Commission's consistent past practice and Congressional intent.[94] NPR submits that a fundamental revision of the basic eligibility qualifications for noncommercial educational broadcast licensees or the establishment of multiple classes of such licensees is neither appropriate nor warranted.

* * *

In the end, while the Commission's vision may be as virtuous as it is likely to prove elusive, NPR and its Member stations share both the vision of greater diversity and the commitment to its achievement. The public interest will be ill-served, however, if the Commission implements its proposed LPFM service and fatally undermines public radio as a result.

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[93] Id. at ¶ 18.

[94] As the Commission explained,

> One possible approach would be to delete the current requirement in the commission's rules which limits these reserved channels to noncommercial educational purposes. Instead, they could be used by any non-profit organization recognized as such by the Internal Revenue Service, and could therefore be used for other noncommercial purposes not previously permitted by the Commission. . . . In effect then, in exchange for its simplicity of accomplishment, this alternative represents the most profound departure from past practice and the premises on which other agencies and the Congress have acted.

NCE Licensee Eligibility, 43 Fed. Reg. 30,841, 30,843 (1978).

## Conclusion

For the foregoing reasons, and as more fully set forth above, NPR urges the Commission to avoid establishing a low power FM broadcast service in a way that undermines the public's access to existing public radio services and to reexamine its proposal in light of the test data showing the likelihood of substantial interference to the reception of existing full and auxiliary service public radio stations.

Respectfully Submitted,

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