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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

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

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

To: The Commission

Further Comments of the National Association of Broadcasters

The National Association of Broadcasters ("NAB")[1] submits these Further Comments in the above-referenced proceeding. The Commission, in its May 20, 1999 *Order* partially granting NAB's request for an extension of the comment dates, stated that, while it was granting less time than NAB had requested, "we expect that the parties conducting further technical studies will keep us apprised of relevant developments that we may need to consider as we analyze the record in the low power proceeding."[2] These Further Comments are filed in response to that invitation by the Commission.

The *Rappaport Study*

The United Church of Christ ("UCC") attached to its Reply Comments a study that purported to compare and evaluate the four technical studies which were submitted at the initial

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1 NAB is a nonprofit, incorporated association of radio and television stations and broadcasting networks. NAB serves and represents the American broadcastin

2 *Low Power Radio*, MM Docket No. 99-25, FCC 99-112 (May 20, 1999) p

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comment stage.[3] The *Rappaport Study* concluded that the Commission should discount the results of the studies submitted by NAB and by the Corporation for Public Broadcasting and the Consumer Electronics Manufacturers Association. Although the *Rappaport Study*'s conclusions differ markedly from the technical study that UCC, *et al.* relied on in their initial comments, it nonetheless argues that the record provides a basis on which the Commission can authorize at least some form of low power service.

NAB asked Professor Raymond Pickholtz and Dr. Charles Jackson, who had also evaluated the four original technical studies,[4] to examine the *Rappaport Study* to evaluate its conclusion that the Commission should authorize at least some form of LPFM service. Their report is attached. It describes the numerous inconsistencies in the *Rappaport Study*, as well as its failure to apply the same standards both to studies that concluded that LPFM stations would cause interference and to studies that did not.

Most significantly, the *Rappaport Study*, at bottom, agrees with the technical conclusions reached in NAB's studies – the introduction of new LPFM stations without maintaining the existing protections for second and third adjacent channel interference, will diminish the quality of FM service. The *Rappaport Study* concludes (p. 19) that the Commission must maintain full second and third adjacent channel protection for the proposed LP 1000 service. The reason for doing so is, of course, because adding those stations would create objectionable interference. It argues that the Commission can dispense with those protections for LP 100 stations – not

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3 Rappaport, Carter & Skidmore, *Technical Analysis of the Low Power FM Service*, attached to the Reply Comments of the Office of Communication of the United Church of Christ, *et al.* [hereinafter *Rappaport Study*].

4 *See*, Dr. Raymond L. Pickholtz & Dr. Charles L. Jackson, A Review of Four Studies of FM Receiver Adjacent-Channel Immunity, attached as Appendix B of NAB's Reply Comments in MM Docket No. 99-25 (filed November 15, 1999).

because those stations would not create objectionable interference, but because the area in which that interference would be felt would be smaller, and the claimed benefits of LPFM service would outweigh the harm to existing service. *Rappaport Study* at 72.

As Pickholtz and Jackson (Attachment at 6) point out, the *Rappaport Study* makes no attempt to quantify either the level of harm to existing service or the benefits which might be derived from LPFM and, therefore, the policy judgment it reaches has no foundation. Moreover, not only has the Commission already compromised the technical quality of FM service in an effort to introduce new service in Docket 80-90,[5] it was precisely the type of analysis advocated in the *Rappaport Study* of repeatedly valuing new service greater than protecting existing service that lead to the present condition of the AM radio service.

Indeed, the *Rappaport Study's* recognition that LPFM service would introduce new interference into the FM band should be fatal to the Commission's proposal, for all five Commissioners have stated that they would not support an LPFM proposal that creates interference to existing service.[6] Moreover, the *Rappaport Study* entirely discounts the evidence submitted by NAB and others demonstrating that new LPFM stations would be subject themselves to high levels of interference from existing stations.[7] Whatever value the *Rappaport Study* or the Commission might speculate LPFM service would have, if low power stations cannot be heard within their listening area, that value would disappear. Thus, the *Rappaport Study* demonstrates that a decision authorizing LPFM service would be arbitrary and capricious.

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5 *See* NAB Reply Comments at 38-39.

6 *See* Comments quoted at NAB Comments, Volume One at 37 n.93.

7 *See* NAB Reply Comments at 28-30.

Pickholtz and Jackson also point out a fundamental inconsistency in the *Rappaport Study*. First, it concludes that current radios provide adequate protection against second and third adjacent signals. At the same time, it suggests that any problems that LPFM creates could be resolved by consumers moving their radio. *Rappaport Study* at 20. Pickholtz and Jackson note that "[I]f current radios provide adequate interference protection, why must consumers move them to avoid interference?" Attachment at 3.

The *Rappaport Study* also simply ignores facts that are inconsistent with its policy conclusions. Pickholtz and Jackson point out (Attachment at 4) that its calculations of the population that could be affected by interference from LPFM stations simply omits *all* harms from interference caused by stations on second or third adjacent channels. Since even the OET study showed some level of new interference from adding LPFM stations on second or third adjacent channels, the *Rappaport Study's* calculations are simply misleading.

While the *Rappaport Study* criticized NAB's use of a quality standard of degradation to either 50-dB SNR or by 5 dB, Pickholtz and Jackson demonstrate that the reasoning in the *Rappaport Study* is both internally inconsistent and flies in the face of the Commission's own earlier conclusions about audio signal quality. They point out that the signal level the *Rappaport Study* characterizes as "extraordinary quality" is the same level the Commission deemed merely to be "good audio" in 1977. Attachment at 4. Surely, there could be no basis on which the Commission could conclude that consumer expectations of audio quality have *declined* in the last two decades, particularly given the popularity of CDs and other audio media that provide higher sound quality.

Pickholtz and Jackson (Attachment at 5) debunk the argument that most of the receivers tested by NAB failed to meet the standard employed by NAB. The *Rappaport Study* also

complained that, when receivers performed at higher than 50-dB SNR levels, NAB did not regard them as suffering from interference until their performance dipped to the 50-dB SNR level. Pickholtz and Jackson point out that – if NAB had instead concluded that those receivers suffered from objectionable interference when their SNR performance was degraded by only 5 dB – the results would have shown that they were even more susceptible to interference than NAB reported. Attachment at 5.

The Pickholtz and Jackson analysis shows, as did their initial study, that sound engineering principles allow only one conclusion – relaxing second or third adjacent channel interference protections to establish LPFM service would result in substantial amounts of new interference to FM service. Thus, the Commission lacks a technical foundation to reach a decision that LPFM service can exist as proposed without harming current FM listeners.

IBOC DAB

On November 1, 1999, the Commission adopted a *Notice of Proposed Rule Making* concerning terrestrial digital radio.[8] Initial comments in that proceeding are not due until January 24, 2000. In the *DAB NPRM*, the Commission recognized that:

- *Field testing* of earlier In-Band On-Channel (IBOC) DAB systems had revealed that their initial promise was not borne out in practice (*DAB NPRM* ¶ 9);
- Laboratory and field testing of new IBOC DAB systems is just beginning, with an agreement that the results of initial testing would be submitted to the National Radio Systems Committee (NRSC) on December 15, 1999 (*Id.* ¶ 10);

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[8] *Digital Audio Broadcasting Systems*, MM Docket No. 90-325 (Nov. 1, 1999).

- LPFM service could affect the ability of stations to use IBOC DAB technology, and asked for comments on how LPFM would affect IBOC DAB and whether IBOC DAB receivers could be designed to accommodate LPFM (*Id.* ¶ 25).

On December 15, the NRSC received a submission from one of the two remaining IBOC DAB system proponents – USA Digital Radio, Inc. (USADR). The other proponent – Lucent Digital Radio, Inc. – was unable to complete its testing and committed to submitting its data by the January 24 comment date in the *DAB* proceeding. The NRSC has begun an evaluation of the USADR report but this evaluation is not expected to be completed until at least the end of the first quarter of this year, under a very aggressive evaluation schedule. Thus, at this point, data is available from only one of the IBOC DAB proponents, and that data has not yet been evaluated.

Since the *DAB NPRM* reflects an appropriate understanding of the relationship between LPFM and the potential for IBOC DAB service in the United States, the absence of even a partial record of the IBOC DAB proponents' initial testing means that the Commission at this point has no foundation on which it could rationally arrive at a decision in the LPFM proceeding. Moreover, even USADR was unable in its first round of testing to complete the tests that are most relevant to reaching an understanding of the impact that LPFM service could have on IBOC DAB. For example, in the portion of its NRSC submission dealing with subjective evaluation of the USADR FM IBOC DAB system, USADR states, on pg. 8 of Appendix E, that "[d]ue to limitations in the dynamic range of the multipath simulator, results could not be obtained for those scenarios that contain either *lower or upper second adjacent channel interferers*." (emphasis added). In other words, there is no information contained in this report (or available anywhere else, for that matter) on the subjective impact of second adjacent channel IBOC

interferers to analog receiver performance, a matter of great importance when considering the LPFM service.

Moreover, while the IBOC DAB proponents and the *DAB NPRM* have focused primarily on the impact on IBOC DAB service of a reduction in second adjacent channel interference protections, the Commission is not in a position to assume that reducing third adjacent channel protection would not affect IBOC development. As the *DAB NPRM* reflects, field testing of earlier IBOC DAB systems revealed weaknesses that laboratory testing and computer simulations had not predicted. Since it has no results from field testing of actual IBOC DAB systems, the Commission cannot simply assume that reducing or eliminating third adjacent channel protection will have no impact on IBOC DAB. Indeed, since comments in the DAB proceeding are not yet even due, the Commission should await the development of that technical record, including the NRSC's submission of its evaluation of the testing results, *before* it attempts to develop any conclusions about potential LPFM service.

Conclusion

The Commission's LPFM proposal raised a large number of issues that were addressed in the comments. NAB challenged the basis of the Commission's assumption that an LPFM service was needed or would serve the public interest, and that evidence has largely remained unrefuted in the record. In addition to these questions about the need for LPFM service, and other questions about how such a service could be implemented, the two overarching issues clearly are whether LPFM service could be introduced without degrading consumers' reception of existing FM stations and whether LPFM stations would harm the development of IBOC DAB service in the United States.

As NAB has shown in its Comments and Reply Comments, and in these Further Comments, the record could not at present support a decision to authorize LPFM service. The overwhelming weight of the technical evidence – including the most recent conclusions filed by LPFM supporters – is that LPFM would create new objectionable interference in the FM band.[9]

Similarly, while the Commission has commenced a DAB proceeding to examine IBOC DAB systems and the impact that LPFM stations would have on them, not even initial comments in that proceeding have been filed. Further, test data from only one of the two IBOC DAB proponents has even been submitted to the NRSC, and that proponent was unable to complete all of the tests needed to determine the impact that new LPFM stations could have on DAB service.

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9 There has been some suggestion in informal comments by Commission staff members that the Commission has engaged in additional technical studies since the OET study was completed in July. NAB submitted a supplemental Freedom of Information Act request in August seeking details of any such further studies, and was informed that no documents responsive to NAB's request existed. Should additional tests or other studies have been performed since that time, it is incumbent upon the Commission to place those studies in the record and seek comment on them *before* reaching any decision. The D.C. Circuit has "cautioned that the most critical factual material that is used to support the agency's position on review must have been made public *in the proceeding* and exposed to refutation." *Air Transport Assn. v. FAA*, 169 F.3d 1, 7 (D.C. Cir. 1999).

The record before the Commission, therefore, does not support a conclusion that LPFM service can be authorized at this time. Any decision by the Commission at this time which authorizes LPFM service would be – virtually by definition – arbitrary and capricious.

Respectfully submitted,

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January 5, 2000

A Review of Rappaport et al.'s *Technical Analysis of the Low Power FM Service*

By Dr. Raymond L. Pickholtz and Dr. Charles L. Jackson
December 1999

On November 15, the Office of Communications of the United Church of Christ attached a report by Dr. Theodore Rappaport, Kirk Carter, and Roger Skidmore entitled *Technical Analysis of the Low Power FM Service* to their Reply Comments in FCC MM Docket 99-25. Those Reply Comments rely heavily on the findings in that report (hereinafter, Rappaport study). Although the Rappaport study contains some sound observations, it is fundamentally a flawed document, and its conclusions and policy recommendations cannot be relied upon. It confounds technical analysis with policy promotion. It contains elementary mistakes that undercut its conclusions. In this short report, we point out some of the weaknesses in the Rappaport study.

- The Rappaport study lacks balance. It identifies flaws in the NAB and CEMA studies yet is silent with regard to similar or identical flaws in the OET and BSL studies.

- The study mixes policy analysis with technical analysis in a fashion that prevents the reader from understanding the justification for the policy conclusions.

- The Rappaport study mistakenly advocates using the performance of car radios in static tests as a measure of their performance on the road. The authors do this even though elsewhere in the study they observe that automobile radios operate in a far more difficult environment than do tabletop radios.

- The authors ignore inconvenient facts and leave out critical facts. For example, in their interference analysis they decide that 2nd and 3rd adjacent channel interference is negligible, so they leave 2nd and 3rd adjacent channel interference out of their detailed analysis—even though their software tools permit including it. Similarly, they fail to observe that the distortion criterion measured by OET and BSL corresponds to a substantially degraded signal. They also characterize the performance criterion selected by the NAB—one once characterized by the FCC as "good audio quality"—as extraordinary quality.

- The authors even commit mathematical mistakes—mistakes that expand the calculated benefits of the low-power FM service. The authors provide information in the appendix that allows one to correct their calculation error.

The Rappaport study is not a technical analysis. Rather, it is a jumble of technical criticisms of the NAB and CEMA studies, together with naïve support for the adoption of a low-power FM service. They provide no systematic evaluation of the costs and benefits of such a service, however. On the following pages we offer more detail on these criticisms of the Rappaport study. Our earlier work, *A Review of Four Studies of FM Receiver Adjacent-Channel Immunity*, compares the four studies and establishes that all four studies support the NAB's claim that the bulk of the current population of FM receivers do not perform better than is assumed by the FCC's 2nd- and 3rd-adjacent channel separation requirements.

Balance

The Rappaport study purports to respond to three studies of FM receiver performance (NAB, NPR/CEMA, and BSL) that were filed in the initial comment round and one that was done by the FCC's OET. In fact, the authors focus all their effort on the NAB and CEMA studies and fail to identify flaws in the BSL or OET studies. Indeed, they take NAB and CEMA to task for flaws—such as not weighting analysis by sales volume or listening volume—that are contained in the other studies. They fail to observe that the performance criterion used by BSL is the point where added interference causes substantial decreases in sound quality (technically speaking, the onset of FM threshold). This criterion reflects severely degraded receiver performance.

Mixing Policy Advocacy with Technical Analysis

The authors state, "The benefit of each new LPFM station far outweighs the potential for interference."[1] This statement may be true or it may be false, but it certainly is not any part of an engineering analysis. It betrays the authors' biases. They offer no explanation of why they think the benefits to consumers will exceed the costs to consumers caused by added interference. The benefits of an LPFM station to its audience depend upon what it broadcasts and to the extent that the audience values that programming. If the audience wants professional sports, news, and weather, the LPFM stations will probably not deliver benefits because their small scale would probably prevent them from achieving the necessary economies. If the LPFM station is licensed to an activist who uses it to promote his view of the evils of fluoridated water, we judge that few, if any, in the listening audience will benefit. On the other hand, an LPFM station broadcasting local highway congestion information may benefit travelers. Engineering analysis in this case should inform the decision makers as to the interference potential of LPFM service. It is incumbent upon the decision makers to balance those interference costs against their assessment of the projected benefits from LPFM service. In the quoted statement above and in many other places in their study, the authors have gone far beyond technical engineering analysis.

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[1] Rappaport study, p. 23.

Mistaken Use of Car Radios

On page 31, the authors observe, "The better performance of car radios would raise the overall performance of radios if the measurement data were weighted by sales and listening figures." On page 68, the authors state, "Car radios face a more challenging reception environment because they move at high speed through the peaks and valleys of FM signal power. To provide acceptable reception quality, they must incorporate more expensive filtering and better-performing circuit designs." Car radios and home radios operate in different environments and tests appropriate to home radios are misleading when applied to car radios. But, the authors of the Rappaport report want to combine the test results from car radios with the test results from other radios even though they understand the physics that set car radios apart. Our earlier study discusses car radios in some detail and explains more fully the folly of using test results on car radios to judge FM receivers generally.

The authors also claim "The listener would be able to "tune" out the LPFM interference by moving the receiver" and note that consumers already do so today.[2] The physics are simple—more or less the opposite of the car radio case. One can move a tabletop radio around seeking a location where the interference effects are lessened. Of course, the authors also claim that the FCC's rules are overprotective and that the current population of receivers provide adequate interference protection. If current radios provide adequate interference protection, why must consumers move them about to avoid interference?

Magic Results

The study authors criticize the CEMA/NPR study, saying "Therefore this sample is not representative, and invalidates **any** conclusions drawn about the total population of FM receivers from the results."[3] Their critique seems to be that too many high-quality radios were tested in the CEMA study. Of course, one would expect that testing high-quality radios would tend to result in showing more resistance to interference, not less. We cannot see any reason, other than an appeal to magic, why the alleged flaws in the choice of units tested prohibits **any** conclusion regarding the population of receivers. If all of the tested receivers had rejected 2nd and 3rd adjacent channel interference better than is

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2 Rappaport study, p. 20.

3 Rappaport study, p. 29, emphasis added.

assumed in the FCC rules, we could conclude that it is reasonably likely that consumer products outperform the FCC rules. Of course, almost the opposite happened. We can reasonably conclude that a large fraction of consumer receivers do not perform at the level of the FCC's rules.

Ignoring Inconvenient Facts

When they calculate the population that would be affected by interference from low-power FM stations (Table 3, p. 24), they omit all harms from interference on 2nd- and 3rd-adjacent channels. Even the BSL and FCC reports (read on their own terms) show some such interference.

Leaving out Important Facts

The report's authors are consistently critical of the NAB and CEMA studies but are almost silent on the OET and BSL studies. For example, they offer no discussion—let alone criticism—of the fact that BSL and OET used distortion rather than SNR as a criterion. They fail to observe that OET's criterion of an added 3% distortion corresponds to a SNR of about 30 dB.

Quality Criteria: Study Says that the NAB Wants "Extraordinary Quality"

The Rappaport study takes the NAB to task for choosing the 50-dB SNR as the standard of performance—a standard that the NAB study established is used in ITU standards and previous FCC analysis of FM broadcasting service. They characterized this as "an extraordinarily high standard for sound quality from FM broadcasts" (p. 36). They also provide calculations that let one observe that 66% of the radios tested by all four groups reach this standard. (p. 37). Seventy percent of the radios tested by the FCC perform at or better than the Rappaport study's extraordinary quality level. My dictionary says that extraordinary means "highly exceptional or remarkable." A performance level achieved by a substantial majority of receivers is neither exceptional nor remarkable. We also note that the FCC, back in 1977 when it authorized small satellite dishes, characterized the quality of a home television receiver with an audio SNR of 49.4 dB as that "which is considered good audio quality."[4] What the FCC thought was good in 1977, the Rappaport study considers extraordinary in 1999!

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4 See 62 FCC 2d 934.

The fact that consumers have switched to CDs also puts the claim of "extraordinary quality" in perspective. CD players routinely deliver audio quality far in excess of 50-dB SNR.

They also assert, "over half the radios chosen by the NAB did not meet the 50 dB signal to noise criteria for acceptable audio quality in perfect reception conditions with zero interference." In fact, Table 2—*Signal to Noise Ratio without Interference* of the NAB report—shows that more than half of the receivers tested **do** meet the 50-dB SNR criterion at a received signal level of –45 dBm. The authors of the Rappaport study selected the lower performance associated with the coverage edge levels of –55 dBm. There is not necessarily anything wrong with such selection, but it may be misleading to label this the "perfect reception condition" given that the adjacent column in the NAB report considered better reception conditions.

Quality Criteria: Heads I Win, Tails You Lose

The Rappaport study criticizes the NAB study for applying a quality criterion (5-dB degradation in SNR) to define the limit of acceptable service degradation for those receivers that did not achieve a 50-dB SNR in the absence of interference. They state that the NAB's mixing of criteria (degradation to either 50-dB SNR or by 5 dB) would be considered flawed and would be discarded in an academic setting. In contrast, the authors praise the FCC for using a similar variable criterion (p. 40).

Receiver 28 in the NAB tests delivered 59.6-dB SNR in the absence of interference. Using the suggested criterion, Receiver 28 would have been regarded as degraded when interference pushed its performance down to 54.6 dB. Of course, if the NAB study had done this, the authors of the Rappaport study would have claimed that the NAB was defining a receiver to be degraded even though it was performing better than extraordinarily well—a full 55 dB SNR.[5] The fact is that the NAB defined a reasonable criterion and used it consistently for all the radios tested.

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[5] The Rappaport study states, "Or, NAB could have chosen to test all receivers for a 5 dB decrease in SNR. The fact that they held onto the 50 dB SNR threshold whenever possible indicates it had an importance to them outside it's [sic] utility as a test

Quality Criteria: Far beyond Consumer Needs

The Rappoport study states, "A commercial FM receiver designed using the FCC protection ratio would produce an extremely expensive radio, far beyond the needs of FM radio consumers." Yet, in the same paragraph the study's authors imply that a proportion of CEMA's and NAB's tested receivers perform as the FCC interference protection ratios predict. If the authors are correct in their critique of the FCC standards, then why do any radios perform so well? Are these radios all far beyond the needs of FM radio consumers?

Non Sequiters and Contradictions.

On page 16, the authors stated "Given the FCC's care in assigning primary FM radio licenses, and the good quality of FM radio reception experienced by citizens, it is clear that the present state of FM radios is well matched to consumer expectations. . ." Yet, on page 47, the authors concluded that the real world is more benign than FCC rules suggest, therefore we can relax the rules.

The fact is, that receivers are built for the real-world environment. If you change the rules, you change the environment, and changes in interference will occur. The question is where and how much. The Rappaport study gives no quantitative guide to the changes that can be expected.

They conclude that consumers will benefit from requiring LP1000 stations to observe the existing rules, including 2nd- and 3rd- adjacent channel protection. They also conclude that consumers do not need similar protection from 2nd- and 3rd-adjacent channel LP100 signals. They do not claim that such stations will not create interference. Rather, they say, "The benefit of such stations far outweighs the small potential for 2nd and 3rd adjacent channel interference to incumbent stations" (p. 72). Essentially, their position is that whatever the harm created by 2nd- and 3rd-adjacent channel interference, the benefits are greater. They quantify neither the harms nor the benefits. One cannot base sound policy decisions on this report.

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benchmark." No. It shows that the NAB was not trying to cook the results by considering degradation from 60 to 55 dB to be unacceptable interference.

Exchanging Linear and Nonlinear Operators

Every electrical engineer knows that it is bad mathematics to move nonlinear functions across an averaging operator. It usually is not the case that the average of x^2 is the same as the square of the average of x. But, the authors commit this error on page 23 when they calculate the average population density in 60 cities by calculating the average density in each city and then averaging these 60 density figures. A simple counterexample will show how misleading such a procedure can be. Consider two cities. City 1 has 1 square mile of area and a population of 10, and city 2 has 10 square miles of area and a population of 1. The two cities together have a population of 11 and an area of 11 square miles, for an average population density of 1 person per square mile. But, city 1 has an average of 10 people per square mile and city 2 has an average of 0.1 people per square mile. Averaging these two figures, we get an average density of 5 people per square mile—a number far from the actual average density.

In this case, the mistake appears to be misleading—and in favor of low-power FM. In Table 3, the authors of the Rappaport report assert that a single LP100 station will serve 186,512 people and that only 2,912 people will receive interference. (Of course, their interference calculation omits any harm from 2nd and 3rd adjacent channel interference.)

They have provided sufficient information to check the results in Table 3. In the attached materials, Table B2, they calculate that the top 60 cities could support 626 LP100 stations and would serve 81,066,457 people, or 129,499 people per LP100 station. That is, the rough estimate in their main text is a full 44% larger than their own more detailed calculation of the same quantity.

That's not All Folks

We could go on, but this short report is already seven pages long. You get the idea. The Rappaport study is one-sided advocacy, wrapped in a veneer of technical jargon. It is not even-handed technical analysis, and it does not provide a sound basis for informed policy making. We urge the reader who wishes to understand the tradeoffs associated with LPFM to examine our earlier study that reconciled the conflicting claims of the four studies and showed that the measurements in the four studies are consistent with the receiver measurements and analysis reported in the NAB comments in Docket MM 99-25.

CERTIFICATE OF SERVICE

I, Lori Holy, hereby certifies that a true and correct copy of the foregoing Further Comments of the National Association of Broadcasters was sent this 5th day of January, 2000, by first-class mail, postage prepaid, to the following:

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