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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
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In the Matter of	)	
	)	
Petition for a Microstation Radio Broadcasting Service	)	RM No. 9208
	)	
	)	
	)	
Proposal for Creation of the Low Power FM (LPFM) Broadcast Service	)	RM No. 9242
	)	
	)	
	)	
Amendment of Part 73 of the Rules and Regulations to Establish Event Broadcast Stations	)	RM No. 9246
	)	
	)	

COMMENTS OF THE NATIONAL ASSOCIATION OF BROADCASTERS

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April 27, 1998

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EXECUTIVE SUMMARY

The National Association of Broadcasters ("NAB") submits these Comments in opposition to RM-9208, RM-9242 and RM-9246. NAB believes that any petition requesting a rulemaking proceeding to establish a "microradio," low power radio or event broadcasting service must be denied.

Any low power radio service would be contrary to existing and well-founded Commission policies. The FCC has firmly established that low power radio is not an efficient use of spectrum. Current minimum power levels were imposed to further the Commission's goal of providing stable, efficient and diverse radio service to the public. A microradio service, such as the proposal in RM-9208, would create small islands of usable coverage in an ocean of interference.

Any change to the current FCC allocation rules would be detrimental to the evolution of in-band, on-channel ("IBOC") digital radio. None of the petitions addressed what effect a low power service would have on an IBOC system. IBOC developers have relied on the current channel allocation criteria as they develop a viable system. New IBOC digital signals will have to be inserted into the already crowded AM and FM bands. Adding a new service that could allocate hundreds – or even thousands – of new low power stations would likely prevent radio broadcasters from ever implementing IBOC digital technology.

The Commission has already licensed over 12,000 commercial and noncommercial radio stations in the U.S. Each full-power station provides a unique service to its community. Although the radio industry has undergone consolidation due to changes made by the Telecommunications Act of 1996, this consolidation has not decreased the diversity of formats in

the industry. In fact, due to greater efficiencies, it may be possible for existing stations to offer new and distinct niche programming that was otherwise unavailable before consolidation.

The Commission must keep in mind that a low power station would not be able to serve communities as well as a larger station. Low power stations would only be heard by a small number of people, and for all practical purposes, would be unavailable to mobile audiences. Low power stations would not be able to provide consistent and reliable service.

Supporters of the petitions may have other outlets for their viewpoints without resorting to establishing a new broadcasting service – such as seeking out available time on full-power commercial and noncommercial stations, applying for a noncommercial frequency or expressing their views over the Internet. Most importantly, the Commission should not establish a new service for low power radio in order to curb the proliferation of pirate broadcasters. A new service would only exasperate the situation by adding newly licensed low power stations to the mix of licensed full-power stations and those pirate broadcasters who do not want FCC involvement in their activities.

Finally, the Commission would face many administrative burdens that would stretch limited FCC resources if it were to consider a new service. The FCC would have to establish new allocation rules and new regulatory rules for low power stations. Currently, the Commission depends on full-power broadcasters to be self-policing. Low power stations would not have the same incentive to abide by any regulations because they have less to lose. The Commission does not have the resources to watch over these small stations, some of which may already be broadcasting illegally, in complete disregard of the law.

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COMMENTS OF THE NATIONAL ASSOCIATION OF BROADCASTERS

I. INTRODUCTION

The National Association of Broadcasters ("NAB")[1] submits the following Comments in response to the above-captioned *Petition for a Microstation Radio Broadcasting Service* ("Leggett petition"),[2] *Proposal for Creation of the Low Power FM (LPFM) Broadcast Service* ("Skinner petition")[3] and *Amendment of Part 73 of the Rules and Regulations to Establish Event*

[1] NAB is a non-profit, incorporated association of radio and television stations and broadcast networks which serves and represents the American broadcasting industry.

[2] *Petition for a Microstation Radio Broadcasting Service,* RM No. 9208 (June 26, 1997), placed on Public Notice on February 5, 1998 [hereinafter *Leggett petition*].

[3] *Proposal for Creation of the Low Power FM (LPFM) Broadcast Service*, RM No. 9242 (February 20, 1998), placed on Public Notice on March 10, 1998 [hereinafter *Skinner petition*].

Broadcast Stations ("Deieso petition").[4] The petitions propose the establishment of a "micropower" and/or a "low power" broadcasting service, and a limited "event" broadcasting service. The FCC should not issue a *Notice of Proposed Rule Making* to establish any microbroadcasting, low power FM or event broadcasting service.

The petitions should be denied for several reasons. As the Commission already concluded, minimum power limits are necessary to ensure the maximum efficient use of the spectrum. Additionally, interference problems to current radio services, as well as the potential effect of a microradio/low power service on the future of in-band, on-channel (IBOC) digital radio service, warrant denying the petitions seeking the establishment of a microradio/low power service. Further, current radio broadcast services serve virtually every need in the United States and there is no need for new radio services. Finally, the Commission would be faced with extraordinary burdens if a microradio/low power service were established. The Commission does not have the resources to establish and license, or the ability to control, a new broadcast service that could potentially add hundreds, if not thousands, of new micro- or low power broadcast stations, whether the stations operate during a special event, a few hours a day or 24 hours a day.

II. BACKGROUND

A. Leggett Petition

On June 26, 1997, the Leggett petition was filed with the Commission. It proposes establishment of a service that would provide for very low power radio stations, serving an area

[4] *Amendment of Part 73 of the Rules and Regulations to Establish Event Broadcast Stations,* RM No. 9246 (June 24, 1996), placed on Public Notice on March 18, 1998 [hereinafter *Deieso petition*].

of one to several square miles.[5] It requests that the FCC designate one AM and one FM channel for the microradio service, with one microradio station per geographic "cell."[6] Petitioners contend the microstations would have "very modest equipment requirements,"[7] and request that microstation operators be allowed to build and maintain their transmitters without any formal FCC approval process.[8] Petitioners request that the microstation antennas be limited to fifty (50) feet above the ground or supporting building structure.[9] The petition outlines proposed license terms of five (5) years with a license fee of fifty (50) dollars, and requests a low annual fee and smaller fines for rule violations.[10]

B. Skinner Petition

On February 20, 1998, the Skinner petition was filed with the FCC. It proposes a more complex low power FM service comprised of three separate levels, each with varying degrees of allowable power and obligations. The first level would license "special event" stations for a limited time period (LPFM-3 Special Event).[11] The second level of licensing would encompass those stations that operate at a minimum of one watt and a maximum of 50 watts (LPFM-2).[12] LPFM-2 stations would offer a "loosely structured form of broadcasting, often without set hours of operation, sometimes depending on who shows up to broadcast when scheduled."[13] The third

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[5] *Leggett petition* at 1.

[6] *Id.* at 6-8.

[7] *Leggett petition* at 2.

[8] *Id.* at 8.

[9] *Id.* at 9.

[10] *Id.*

[11] *Skinner petition* at 12.

[12] *Id.*

[13] *Id.* at 10.

level closely mirrors a full-power station (LPFM-1). An LPFM-1 station would have a local owner and be subject to many of the same regulations as a full-power station.[14] The LPFM-1 power limits would be from 50 watts up to 3 kilowatts.[15] The petition also proposes to eliminate the second and third adjacent channel spacing restrictions.[16]

C. Deieso Petition

The Deieso petition was filed with the Commission on June 24, 1996. It requests that the FCC modify the rules to establish an event broadcast service similar to the request in the Skinner petition. The petition requests temporary authorization for a discrete defining event.[17] The petition suggests that the FCC allocate channel 200 for use by event broadcast stations.[18] The petition does not suggest specific power limits, it only suggests that "one to ten watts of effective radiated power might seem adequate to do just about any job."[19] However, the petition notes that the particular power level would depend on the event.[20]

III. ESTABLISHMENT OF A MICRO- OR LOW POWER RADIO SERVICE IS UNWARRANTED.

A. Micro- or Low Power Radio Is An Inefficient Use Of Spectrum.

1. FCC rules regarding power limits are reasonable.

The Commission's rules and policies license broadcast stations only if they operate above specified minimum power levels. Currently, FCC rules require that a Class A FM station must

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[14] *Skinner petition* at 11.

[15] *Id.*

[16] *Id.* at 15.

[17] *Deieso petition* at 6.

[18] *Id.* at 8.

[19] *Id.*

[20] *Id.*

operate with a minimum effective radiated power of 100 watts.[21] The Commission has determined that operation below the minimum power level is an inefficient use of spectrum.[22] The FCC chose to set the power level minimum to ensure that stations can serve a substantial number of listeners. A full-power radio station can provide music, news or information of value to an entire community, not just those listeners in a confined area. The FCC's policy is supported by the fact that many people listen to radio in cars or other places outside the home – and most likely outside the listening area of a micro- or low power service. On weekdays, 61.7 percent of all radio listening by persons 12 years of age or older takes place outside the home.[23]

The Leggett petition proposes that a microradio service should be established that limits microstations to a power level of one watt.[24] The Skinner petition asks that a multi-layer low power FM service be established with the maximum power of the highest level at 3 kW.[25] The petitions, and the event broadcasting petition currently on public notice, propose power limits that are well below the minimum power levels required by current FCC rules.[26]

The Commission has addressed the issue of minimum operating power in a series of Report and Orders changing its rules in relation to 10-watt, noncommercial educational FM

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[21] 47 C.F.R. § 211 (1996).

[22] *See Changes in the Rules Relating to Noncommercial Educational FM Broadcast Stations*, 69 FCC 2d 240 (1987).

[23] Radio Advertising Bureau, Radio Marketing Guide and Fact Book for Advertisers (1995).

[24] *Leggett petition* at 8.

[25] *Skinner petition* at 11.

[26] The Skinner petition does propose a Low Power FM service (LPFM-1 status stations) that would exceed the FCC's 100 watt minimum power for some of the low power stations. NAB believes that any proposal to operate above the FCC's power minimum is no longer a low power station, thus an individual should be required to apply for a full-power license under existing FCC procedures.

broadcast stations.[27] It concluded that the low power operations could not be permitted to "function in a manner which defeats the opportunity for other more efficient operations which could serve larger areas, and bring effective noncommercial educational radio service to many who now lack it."[28]

The Commission's decision was based on "its goal of providing, on a nation-wide basis, a stable, efficient, and diverse radio communications service."[29] It recognized that the 10-watt stations had some value; however, it had to weigh the value and service provided by a low power station against efficient channel usage.[30] Thus, the FCC decided not to accept any additional 10-watt applications, and allowed the existing 10-watt stations time to increase their power to 100 watts or seek to move the station before it was displaced by a larger station and forced to move to a different channel in the commercial portion of the band.[31] Additionally, the 10-watt stations were given less protection if they remained in the educational band.[32] They also were considered secondary operations once they moved to the commercial band.[33] The Commission made a reasonable decision to establish minimum power levels in order to provide the most efficient use of the spectrum to the public.

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[27] *See First Report and Order*, 70 FCC 2d 972 (1978); *Second Report and Order*, 69 FCC 2d 240 (1978); *Third Report and Order*, 57 RR 2d 107 (1984).

[28] *Second Report and Order*, 69 FCC 2d para. 24.

[29] *Stephen Paul Dunifer*, 11 FCC Rcd 718, 722 (1995).

[30] *Second Report and Order*, 69 FCC 2d 240 at para. 23.

[31] *Id.* at para. 30-31.

[32] *Id.* at para. 26. Ten-watt stations were only afforded protection from interference caused by other 10-watt stations. The Commission reasoned that any gains in the efficient use of the spectrum would be lessened if 10-watt stations were given full protection.

[33] *Id.* at para. 27.

In addition to the minimum power limits, the FCC refuses to allow stations to operate with unlimited power because it would reduce the number of stations, and consequently the number of voices.[34] Thus, the FCC has licensed a very large number of stations that have the capability of reaching large amounts of people. The potential listener reach of any micro- or low power station would be inconsistent with the FCC's reasonable policy regarding the efficient use of the spectrum.

2. FCC has upheld policies that support the efficiencies provided by full-power stations in lieu of the services that could be provided by a low cost translator service.

In 1990, the Commission was faced with the issue of allowing local program origination authority for FM translators. The Commission denied program origination authority for FM translators because it stated that it was committed "to provide FM radio broadcast service in a manner that promotes program diversity while enhancing the incentives for efficient broadcast station development."[35] The Commission upheld its commitment on reconsideration of the FM translator decision, stating that it was the Commission's preference to provide service through more efficient radio broadcast stations than the services provided by low cost translators.[36]

The petitioners in the instant proceeding request the establishment of a service that is not unlike the program origination issue regarding FM translators. FM translators are secondary services that operate on a low power basis.[37] If the Commission had allowed program origination for FM translators, the result would have been similar to the requests by the current

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[34] *Stephen Paul Dunifer*, 11 FCC Rcd at 724.

[35] *Amendment of Part 74 of the Commission's Rules Concerning FM Translator Stations*, 5 FCC Rcd 7212, 7219 (1990).

[36] *Amendment of Part 74 of the Commission's Rules Concerning FM Translator Stations*, 8 FCC Rcd 5093, 5097, para. 28 (1993).

[37] 5 FCC Rcd at 7212, para. 2.

petitioners. A new service of low power broadcasting would have been established. The FCC was reasonable in its determination that a low power radio service is inefficient – whether the service is provided by FM translators or otherwise -- and there is no evidence that would make that determination unreasonable now.

3. The Leggett petition's plan is an inefficient and wasteful use of scarce spectrum resources.

The Leggett petition proposes to assign one AM and one FM broadcast channel to a new "microstation broadcasting service."[38] It says that, ideally, the same two channels should be allocated to this new service nationwide.[39] In order to achieve this objective one AM and one FM channel would have to be cleared of all existing full-service broadcasters throughout the country. This is clearly not feasible because in highly populated areas, particularly along the east and west coasts of the continental United States, there are no available channels to which the displaced full-service broadcasters could relocate.

The inability to find a new channel for each of the displaced full-service broadcasters under the petitioners' plan is reason enough to reject their petition. However, it seems appropriate here to note some of the other reasons that make this, or any other proposal for a microstation broadcasting service, untenable.

In general terms, the facts that make micropower broadcast stations inefficient spectrum users apply similarly to both AM and FM frequencies. An example involving only an FM frequency is used to illustrate the inefficiency of these stations because, to the best of NAB's knowledge, all of the Commission's recent enforcement actions against illegal low power broadcast stations have involved unlicensed operations on FM frequencies.

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[38] *Leggett petition* at 6.

[39] *Id.* at 7.

In order to institute a microstation broadcasting service like the one proposed in the Leggett petition, the Commission would have to remove full-service broadcasters from their existing channels and allow microstations to operate in their places. It is therefore appropriate to consider how the area served by the new microstations would compare with the area served by an existing full-service broadcaster. Even if the specific channel is vacant and a full-power station would not have to be relocated, the example reveals the inefficient use of spectrum by a microradio service. The example will compare the protected service area of a Class A FM facility, the lowest powered full-service class of FM operations, with the accumulated protected service area of all of the micropower broadcast stations that could fit in the same area.

This example is illustrated in Figure 1. It shows that a Class A FM station with an effective radiated power (ERP) of 6 kW and an antenna height above average terrain (HAAT) of 100 meters (328 feet) will provide a signal strength of at least 1 mV/m up to 28.5 km (17.7 miles) from the transmitter.[40] It also shows that a micropower station with an ERP of one watt and a HAAT of 30 meters[41] would provide a signal strength of 1 mV/m up to 1.8 km (1.1 miles) from the transmitter. The shaded area that surrounds each micropower station's 1 mV/m coverage area is the area where the interference to that station's signal from nearby co-channel micropower stations exceeds the maximum level of acceptable interference specified by

[40] These are the baseline ERP and HAAT values upon which Class A FM channel allocations are based. 47 C.F.R. § 73.211 (1996).

[41] A HAAT of 30 meters was selected for this example because the Leggett petition asks that each antenna "be limited in height to 50 feet above the ground or supporting building structure." *Leggett petition* at 9. NAB arbitrarily estimated the average total HAAT (building height plus maximum 50-foot tower) of each micropower station under this scheme to be 100 feet (approximately 30 meters). As proposed in the Leggett petition there is, in theory, no limit to the HAAT of a micropower station.

the Commission.[42] In order to comply with the Commission's requirements regarding the maximum amount of interference that may be caused to a nearby co-channel FM station; each micropower station must be separated from the nearest co-channel micropower station by at least 7.5 km (4.6 miles).

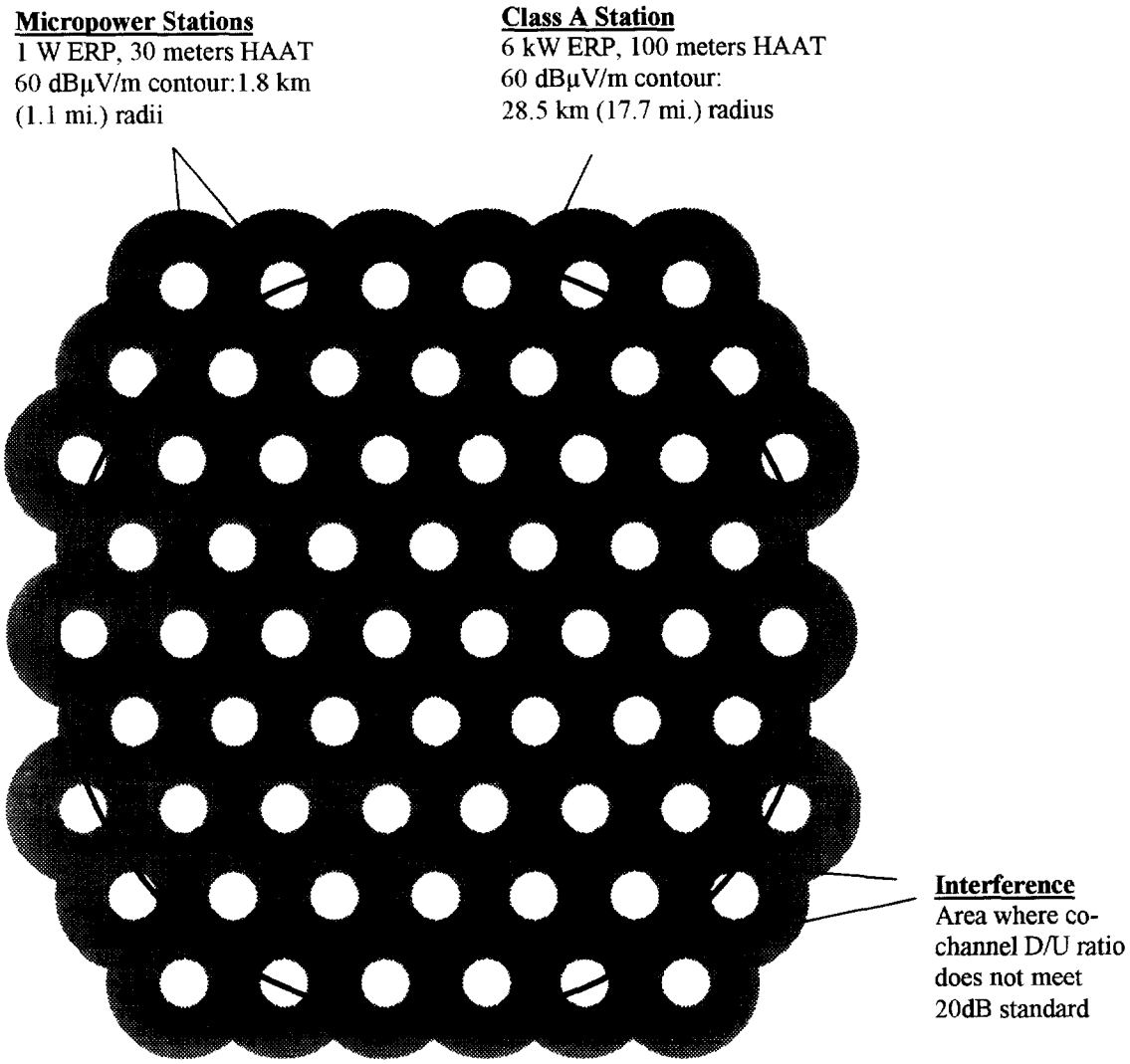

Figure 1

[42] The maximum level of interference specified by the Commission for co-channel FM stations is a desired-to-undesired signal (D/U) ratio of 20 dB, where the distance to the desired station's contour is determined using the F(50,50) curves in 47 C.F.R. § 73.333, and the distance to the undesired station's contour is determined using the F(50,10) curves in § 73.333.

As is evident from examining Figure 1, when these micropower stations are packed as close together as possible, approximately 50 stations can fit within the 1 mV/m contour of a single Class A FM station. The area served by the 1 mV/m contour of a Class A FM station is approximately 984 square miles. The area served by the 1 mV/m contour of a one watt micropower station is only about 3.8 square miles. So, if a Class A FM station were replaced by 50 one -watt micropower FM stations, the total geographic area to which interference-free service is provided to the public would be reduced by 81%.

The above discussion illustrates that a micropower broadcasting scheme like the one proposed in the Leggett petition would create small islands of usable coverage in an ocean of interference. And these small islands of usable coverage, when added together would only provide broadcast service to about 19% of the geographic area served by the typical full-service broadcaster that would be displaced. Clearly, a micro- or low power service is contrary to the Commission's long held policy of utilizing the spectrum in the most efficient manner to provide quality service to the public.

4. Micro- or low power radio authorization would preclude full power stations.

Additionally, permitting low power radio stations would run counter to the Commission's policies because a micro- or low power service would result in the preclusion of full-power station authorizations. Distances far greater than the station's service area must separate full-power stations operating on the same channel.[43] Stations operating on adjacent channels must also be separated to avoid interference.[44] These separation requirements were established to

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[43] For example, FCC rules require that Class A FM stations be separated from other class A stations on the same frequency by at least 71 miles. 47 C.F.R. § 73.207 (1996).

[44] FCC rules require that first adjacent channel class A FM stations be separated by at least 45 miles. 47 C.F.R. §73.207 (1996).

ensure the efficient use of the broadcast spectrum with the smallest amount of interference. Low power FM service would prevent authorization of full-power FM stations for many miles outside the area in which the low-power station could be heard. The FCC has explained these constraints on low-power broadcasting as follows:

> "A simple example shows how preclusion and service are related. A 10 watt station with a 100 meter antenna has a service radius of 5.9 kilometers and a service area of 109 square kilometers. To protect this hypothetical low power station from interference by a co-channel Class A FM station operating at 6 kilowatts, we would need to preclude the establishment of that Class A station within a distance of 92.6 kilometers from the transmitter for the low power station. In contrast, one Class A station would preclude another co-channel Class A station within a distance of 115 kilometers. A Class A station, however, operating at 6 kilowatts with a 100 meter antenna has a service radius of 28.3 kilometers and a service area of 2,516 square kilometers. Therefore, while the preclusive effect of a Class A station is 24 percent greater than the 10 watt station ... the service radius of a Class A station is almost 500% greater than the smaller station.... If we treat preclusion as a cost and service as a benefit, the cost/benefit ratio improves with power; but the ratio is very poor for low powered stations."[45]

The Leggett and Skinner petitions for a new micro- or low power FM service would open the doors for hundreds – if not thousands – of new small radio stations. With each new authorized micro- or low power station, the area of interference-free radio service would be diminished. Additionally, the public would be disserved because it would be deprived of the great benefits provided by full-power stations that would be precluded in order to provide interference protection for low power stations that only a few people could hear.[46]

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[45] *Stephen Paul Dunifer*, 11 FCC Rcd at 725 (footnotes omitted).

[46] In 1992, NAB petitioned the FCC to suspend new station allotments pending Commission completion of an overall review of its radio licensing policies. *See* NAB Petition for Rule Making (filed February 10, 1992), and NAB Request for Temporary Suspension of New Commercial FM Station Allotment and Application Processing (filed February 10, 1992). The FCC did not act on NAB's requests and continues to allocate new stations. NAB believes that if the Commission continues to allocate new FM frequencies, it should do so for full-power stations only in order to ensure the efficient use of the spectrum.

B. A Micropower Broadcasting Service Would Prevent The Radio Broadcasting Industry From Implementing In-Band, On-Channel (IBOC) Digital Audio Broadcasting

The radio industry is testing the viability of digital radio systems as the industry advances into the digital age. Authorization of any low power radio service jeopardizes the future of IBOC and the research and development conducted to date.

The petitioners have completely disregarded any impact a new service would have on existing and future radio services. Just as the capacity of the television broadcast band is not large enough to permit the continued operation of all LPTV stations when full service television stations convert to digital, neither is the capacity of the FM band large enough to permit the continued operation of potential LPFM stations when full service FM stations convert to digital, even on their existing channels. In fact, the Skinner petition's suggestion that LPTV licensees be granted LPFM licenses, and given primary status in the FM band, would not only cause unacceptable interference to existing analog operations, but it would also prevent in-band, on-channel (IBOC) digital radio from being implemented in the FM band.

Spectrum congestion in the FM band is much worse than the congestion in the television band. In the television band there are 1,576 full service stations[47] and 67 different channels. The average number of stations on each channel is 25. In the FM band there are 7,552 full service stations[48] and 100 different channels, so the average number of stations per channel is 76. Even if the Commission's actions in MM Docket 87-268 are taken into account and only television

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[47] *Broadcast Station Totals as of March 31, 1998*, FCC News Release (April 22, 1998).

[48] *Id.*

channels 2-51 (the DTV "core spectrum") are considered available for television broadcasting,[49] there are still only 32 full service television stations per channel, less than half the ratio of the FM band.

Because the FM band is vastly more congested than the television band, FM broadcasters are unable to transition to digital transmission technology in the same manner as television broadcasters. There are simply far too few vacant channels to permit FM broadcasters to turn on new digital transmitters on newly allocated channels as is now happening with digital television.

The same is true for AM broadcasters. Although the AM band has somewhat fewer licensees per channel[50] ($4{,}724 \div 117 \approx 40$) than the FM band, it actually suffers more adjacent channel interference because first adjacent AM band channels overlap one another to a much greater degree than first adjacent FM band channels. Figure 2 illustrates this point.

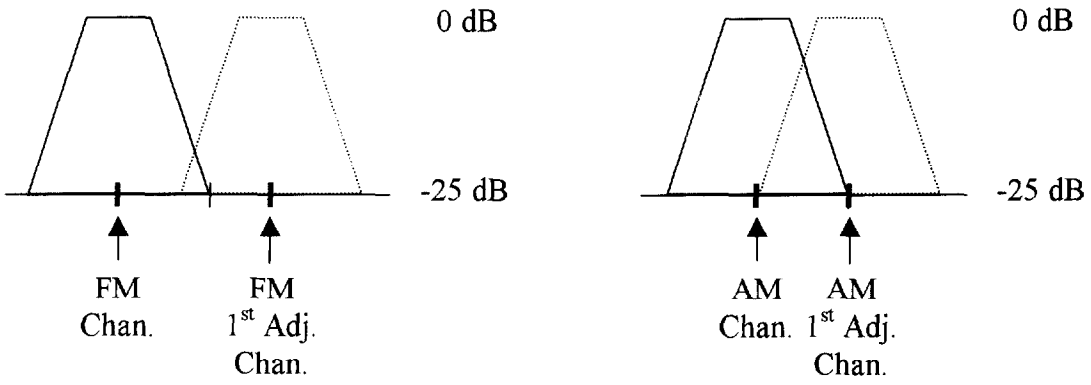

Figure 2

[49] *See Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order*, MM Docket No. 87-268, FCC 98-24, ___ FCC Rcd ____, at 42 (1998). Note that television channel 37 is reserved for radio astronomy and is therefore not available for television broadcasting.

[50] *Broadcast Station Totals as of March 31, 1998*, FCC News Release (April 22, 1998).

For illustrative purposes, the horizontal scale in Figure 2 has been adjusted so that the AM and FM channel bandwidths appear equal. In reality, of course, the AM channel is approximately one tenth the width of the FM channel. The important point to remember is that the signals from AM stations overlap their neighbors on the dial to a much greater degree than the signals from FM stations. In fact, if the channel spacing of AM stations were adjusted so that the 25 dB bandwidth defined by the Commission's AM emissions mask resulted in the same amount of adjacent channel overlap as occurs in the FM band, each AM station would have to be 17 kHz apart, and there would only be room for 68 AM channels.[51] If there were only 68 AM channels (*i.e.* if the amount of adjacent channel overlap in the AM band were reduced to a level more comparable to the FM band) then the average number of stations per channel in the AM band would be $4,724 \div 68 \approx 69$, which is very close to the average number of stations per channel in the FM band (76).

The AM and FM bands are very congested, far more so than the television band prior to the commencement of digital television transmissions. Television broadcasters benefited tremendously when the Commission, with great foresight, instituted a freeze on the allocation of new television stations pending a Commission decision concerning migration to a digital television standard. By limiting congestion in the television band the Commission enabled the television broadcast industry to make a smooth and orderly transition to digital broadcasting. This smooth transition is being accomplished by temporarily allocating to each television broadcaster a second channel on which to begin digital broadcasts.

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[51] A 17 kHz channel spacing is derived by taking the distance in frequency from an FM carrier to its -25 dB point and then dividing this by the frequency separation between FM stations (120 kHz ÷ 200 kHz = 0.6), and then using this ratio to solve for the frequency separation between AM stations given the AM -25 dB point of 10.2 kHz defined in 47 C.F.R. § 73.44 (10.2 kHz ÷ 0.6 = 17 kHz).

Both the AM and FM bands are so crowded that it is just not possible to allocate a second, temporary channel to every radio broadcaster for the purpose of commencing digital broadcasts. In light of these facts, the radio broadcasting industry has invested millions of dollars toward the development of an in-band, on-channel (IBOC) method of transmitting digital radio signals. An IBOC system would enable radio broadcasters to simulcast digital signals within the FCC-defined emissions mask in the spectrum around their existing analog transmissions.

The Skinner petition contends that it is not necessary to consider IBOC technology when contemplating modifications to the second and third adjacent channel geographic spacing requirements. It says that broadcasters "will naturally oppose this petition claiming everything from unfair competition to interfering with plans for in-band on-channel (IBOC) digital conversion, neither of which is true as shown herein."[52] However, the Skinner petition *does not mention* IBOC digital broadcasting anywhere else – nor does it explain why low power radio stations would not increase interference to IBOC digital transmissions. It is very clear that there has not been any serious thought by any of the petitioners as to the adverse impact that the proposals, if implemented, would have on radio broadcasters' transition to digital.

Broadcasters, on the other hand, have been studying IBOC technology in great depth for a number of years. A great deal has been learned about this technology during this time. One of the most important things about IBOC technology, and something that is very pertinent to the Commission's consideration of petitions for low power broadcasting, is that the existing channel allocation criteria used by the Commission have played an integral role in the development of

[52] *Skinner petition* at 5-6.

IBOC technology. Tampering with these allocation criteria at this point could severely jeopardize the viability of IBOC digital radio.

An IBOC system would make very efficient use of the radio spectrum by enabling radio broadcasters to offer digital transmissions to the public without the need for new broadcast spectrum. It would also enable most radio broadcasters, many of whom have limited financial resources, to deploy digital transmission equipment without the need to construct completely new transmission facilities. And, it would conserve Commission resources by avoiding the need to create a "digital radio allocation table" similar to the DTV table that was recently finalized.

Once implemented, IBOC technology will have many benefits including the ones listed above. However, all of these benefits do not come without a price. In order to commence digital broadcasting in the AM and FM bands, new digital signals will have to be squeezed into this already crowded spectrum. These new signals will result in new emissions in these bands – this cannot be avoided. The objective of the IBOC system designers is to create a digital transmission system that, while adding new emissions to the AM and FM bands, will not cause interference to existing analog signals. The method by which they aim to achieve this is to insert the digital signal transmitted by a particular station into the spectrum above and below its analog signal. This concept is illustrated in Figure 3.[53]

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[53] The following figures and discussion illustrate the general concept of IBOC technology. IBOC testing is ongoing and a "final" system has yet to be tested and approved by the FCC. The system ultimately submitted to the Commission for approval may have digital bandwidths and emission levels that differ slightly from those described in these comments. There is no way to know exactly what the final parameters will be until testing and development is completed. Regardless of whether the specific IBOC proposals ultimately presented to the FCC vary from the technical specifications we discuss, the nub of our argument remains – the introduction of hundreds, or thousands, of new low power stations would effectively preclude the adoption of IBOC technology.

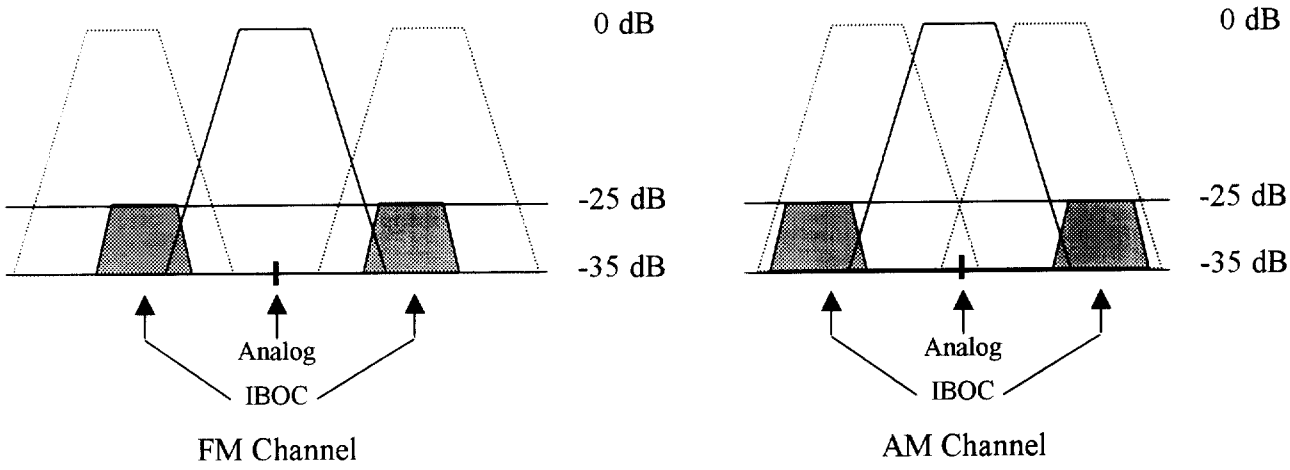

Figure 3

In Figure 3, the analog radio signal is centered where noted, and a solid line outlines the general shape of the signal. The shaded areas to the left and right of the analog signal are the areas where the digital IBOC signal will be inserted. The dashed lines represent the lower first adjacent and upper first adjacent analog signals, respectively.

One of the objectives of the IBOC system designers has been to create digital signals that can be inserted on frequencies above and below a station's analog signal yet still meet the emissions limitations specified in 47 C.F.R. §§ 73.44 (for AM) and 73.317 (for FM) of the Commission's rules. Figure 4 shows how the IBOC signals illustrated in Figure 3 would meet these emissions limitations.

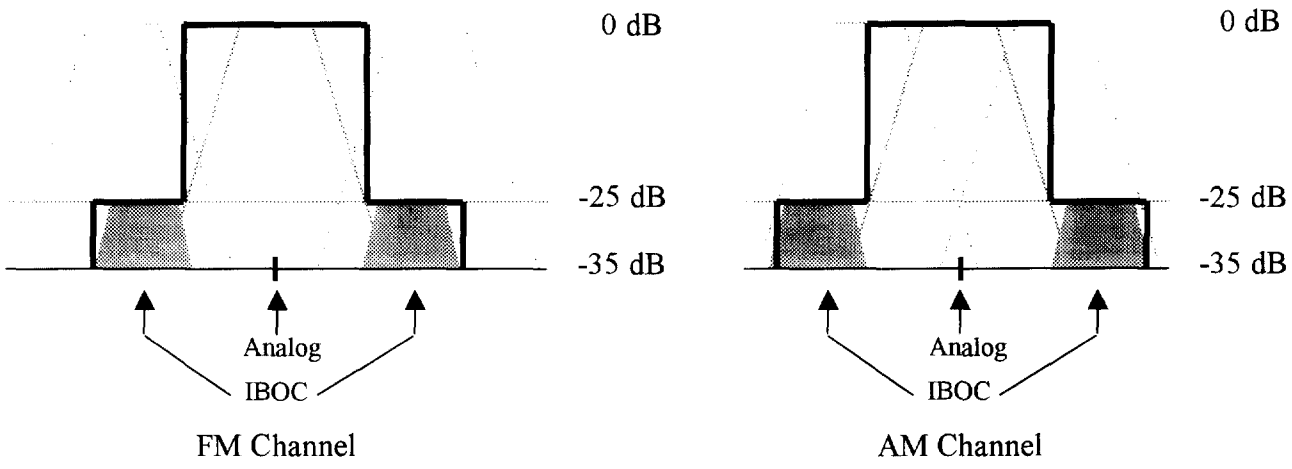

Figure 4

A very important point is illustrated in Figure 3 and Figure 4. The Commission's emissions masks for the AM and FM bands permit energy from analog radio signals to occupy spectrum as far away as 20 kHz from an AM carrier, and 240 kHz from an FM carrier, provided that this energy is at least 25 dB below the level of the unmodulated carrier.[54] However, analog radio transmitters do not produce much energy at this high a level this far away from the carrier. A typical analog AM radio signal will be 25 dB below the level of the unmodulated carrier 10.2 kHz away from the carrier. Its level will diminish continuously the farther in frequency it gets away from the carrier until it is attenuated much more than 35 dB below the level of the unmodulated carrier 20 kHz away from the carrier. A typical analog FM radio signal will be 25 dB below the level of the unmodulated carrier 120 kHz away from the carrier. Its level will diminish continuously as it gets farther in frequency away from the carrier until it is attenuated much more than 35 dB below the level of the unmodulated carrier 240 kHz away from the

[54] See 47 C.F.R. §§ 73.44 and 73.317 (1996).

carrier. This is important because the Commission's existing geographic separation criteria for co-channel and adjacent channel radio stations are based on the assumption that the two signals involved are both analog. These assumptions will no longer be valid when IBOC technology is implemented because the addition of the digital IBOC signal will dramatically increase a station's potential to interfere with adjacent channel stations. Therefore, any claim, such as the one made in the Skinner petition – that it is not necessary to consider IBOC technology when contemplating modifications to the second and third adjacent channel geographic spacing requirements – must be dismissed as invalid.

The Skinner petition requests that FM band "second-adjacent and third-adjacent, as well as 10.6 MHz and 10.8 MHz intermediate frequency (IF) restrictions [should be] eliminated due to vast improvements in receiver technology."[55] This idea is not feasible even in the all-analog radio world that exists today.[56] However, the performance of existing analog radios notwithstanding, such a change in the Commission's allocation criteria would wreak havoc on the IBOC digital radio world of the future. In fact, it would likely prevent radio broadcasters from ever implementing IBOC digital technology.

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[55] *Skinner petition* at 14.

[56] In his petition, Skinner asserts that "NAB would have us believe that interference will not occur on second and third adjacent channels, but only for a certain class of stations covered in [MM Docket 96-120], namely grandfathered short-spaced FM stations." *Skinner petition* at 17. This is a misrepresentation of NAB's comments in MM Docket 96-120 which, in reality, argued in favor of allowing grandfathered short-spaced second and third adjacent channel stations *which are already causing unacceptable interference in the FM band* to modify their facilities in a manner that would not increase the amount of interference – and in some cases would actually decrease interference. In fact, we argued that several showings should be made by grandfathered short-spaced stations desiring to move their transmitters, including showings demonstrating that the proposed move would result in a net *decrease* in the number of listeners experiencing interference caused by the station, and that the proposed move would result in a net *decrease* in the land area of interference caused by the station. See, NAB Reply Comments in MM Docket 96-120 (filed October 4, 1996) at 11.

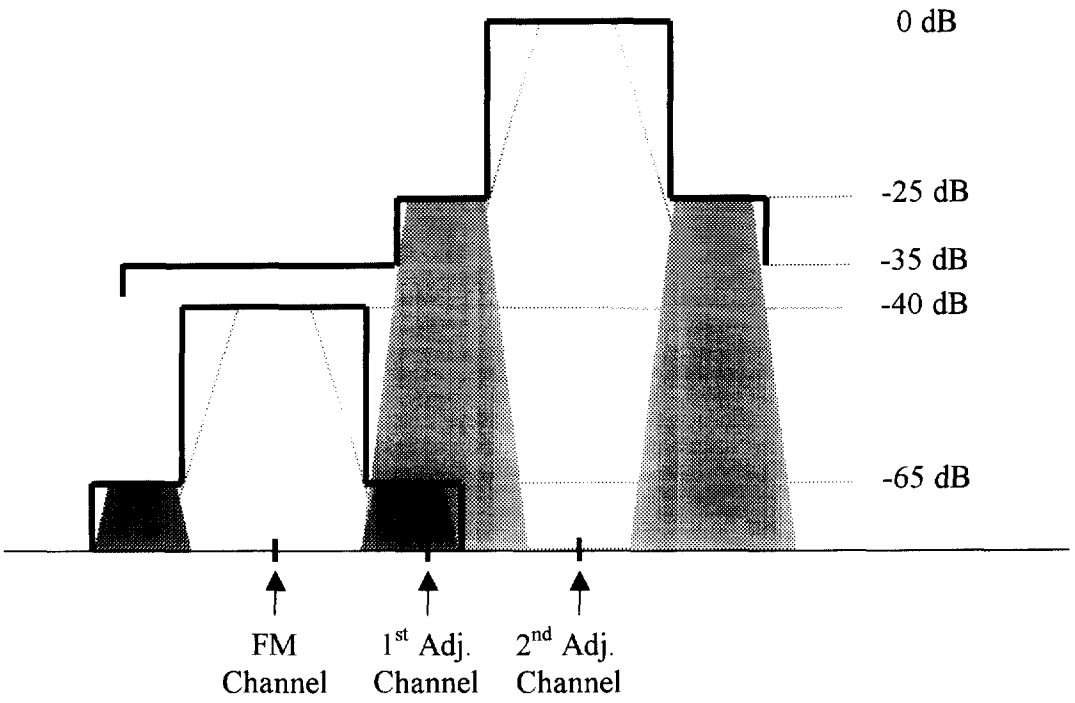

Figure 5

Figure 5 illustrates why separation between second adjacent channel stations will be even more critical in the future than it is today. It illustrates the relationship between the signal strength of a hypothetical desired FM IBOC station and an interfering second adjacent channel IBOC station at the edge of the desired station's protected service area.[57] The tick marks on the horizontal axis in this drawing mark the center frequencies of analog FM signals. The shaded areas show where the digital IBOC energy could be if it were to occupy the entire "-25 dB wing" of the FM emissions mask – the darker shading represents the desired station's IBOC signal and the lighter shading represents the interfering station's IBOC signal. Note that IBOC energy from

[57] This is a "worst case" example where the IBOC energy is shown to occupy the entire "-25 dB wing" of the FCC's FM emissions mask. It is used here to illustrate how the second adjacent channel "wings" overlap. In reality, the IBOC system developers do not intend to use the entire –25 dB wing, as will be discussed later in these comments.