

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

In the Matter of )  
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Digital Audio Broadcasting Systems and their ) MM Docket No. 99-325  
Impact on the Terrestrial Radio Broadcast Service )  
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**COMMENTS OF DONALD E. MUSSELL JR. NCE-CBT  
DBA BROADCAST ENGINEERING SERVICES OF BONNY DOON, INC.**

Don Mussell (“BESBD”)<sup>1</sup> submits these comments in response to the Commission’s *Public Notice*<sup>2</sup> seeking comment on the National Association of Broadcasters’ (“NAB”) recommendations filed in this proceeding concerning nighttime operation of AM In-Band/On Channel (“IBOC”) digital radio. The NAB recommendations were the result of the review of various technical reports filed by the iBiquity Digital Corporation<sup>3</sup> by the NAB’s Ad-Hoc Technical Group on AM IBOC Nighttime Performance (the “Technical Group”)<sup>4</sup>

For the reasons set forth below, BESBD does not support the NAB recommendation that the Commission authorize AM broadcasters to commence nighttime IBOC broadcasts with appropriate interference resolution mechanisms. BESBD further questions the NAB recommendation that this authorization be granted on a blanket basis to all AM broadcasters that are licensed for nighttime analog service.

BESBD strongly supports the FCC’s efforts to encourage development of improved audio quality of AM broadcast signals, but feels that this proposed rulemaking is putting the cart in front of the horse, so to speak. AM radio in the continental United States has suffered for many years with increasingly strong interference from so many signals in competition with each other. Coverage areas have been reduced despite increased power, complex directional antenna patterns, and reduced audio bandwidth (in an effort to reduce “monkey chatter” and adjacent channel interference).

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<sup>1</sup> Don Mussell is a Broadcast Consulting Engineer with over 35 years of experience in the broadcast engineering community. His history in front of the Commission is a matter of public record.

<sup>2</sup> *Public Notice* DA 04-1007 released April 14, 2004 (“*Public Notice*”).

<sup>3</sup> “AM Nighttime Compatibility Study”, iBiquity Digital Corporation, May 23, 2003; “Field Report AM Nighttime Compatibility” iBiquity Digital Corporation, October 31, 2003 and “Field Report AM Nighttime Performance”

iBiquity Digital Corporation, October 20, 2003.

<sup>4</sup> See NAB Recommendations dated March 5, 2004.

Real world testing of AM nighttime digital operations suggests that existing nighttime analog signals were more adversely affected by existing reception conditions than adjacent IBOC digital signals. What is disingenuous is the implication that adding an IBOC carrier to the existing analog signals already on the air will somehow either reduce interference or solve reception problems for the majority of radio listeners in the United States. One cannot reduce noise and interference by adding more noise and interference to the mix.

When the NRSC 10khz mask was made mandatory over a decade ago, sideband interference was reduced and should have resulted in better coverage and higher perceived fidelity for a majority of radio broadcasters and listeners. What happened instead was the continued narrowing of the bandwidth of new receivers, especially car radios, by manufacturers of receivers. Public perception of AM radio quality was and is controlled by what the end user hears on his or her own receiver, and what that user now hears is audio quality equal to the public telephone system. Many improvements to the transmission systems of AM broadcast facilities, including broad banding of antenna tuning units and phasing systems have resulted in a vast improvement in audio quality of AM broadcast transmissions throughout the United States. But all of the funds spent in these improvements fall on deaf ears (literally) if nobody in the general public has the equipment to hear those improvements.

The addition of IBOC signals to an existing AM broadcast facility results in the need to further reduce the bandwidth of the analog audio to around 5 khz, half of the currently authorized bandwidth. Only radios with a wide or even moderate bandwidth can perceive this reduction. So it is no wonder that a digital transmission with 15 or 20 khz bandwidth is superior to the typical listener. But the addition of the IBOC signal produces adjacent channel sideband noise that is receivable on every currently available receiver. The irony here is that the NRSC audio limit of 10 khz was mandated to reduce this very same kind of adjacent channel analog interference. The transition period of analog transmission to all digital transmission could take as long as ten years, perhaps longer. During this transition period, increased levels of interference will result, likely further eroding the viability of medium wave broadcasting here in the United States. This seems counter-intuitive.

In examining the iBiquity AM Nighttime Compatibility Study, it remains unclear if two or three (or more) adjacent-channel IBOC signals can co-exist and still provide a useful service area on the edge of each station's theoretical coverage area. The AM Nighttime Compatibility Study did not address the potential that all of these signals may suffer from even further reduced digital night coverage because of the mixing of the IBOC signals in the sidebands. There is no explanation of the ability of IBOC receivers to separate and demodulate two equal-strength IBOC sideband signals. I consider this a serious and untested potential problem, especially for local and regional stations making considerable investments in their facilities, hoping for better coverage during all hours of the broadcast day. As an example, I can travel on Interstate 40 in Southern California between the communities of Mojave and Needles, a distance of nearly 200 miles, and monitor both KPLS (830 khz Orange, California) and KXNT (840 khz North Las Vegas,

Nevada). On this heavily traveled interstate highway, the coverage of each station is reduced to noise over the entire length of the road during daytime hours due to the presence of IBOC carriers on each facility. The sideband hash inherent in the IBOC system effectively eliminates these two stations from being heard on a typical car radio for a distance of over 150 miles. And this is ground wave coverage only. Without the IBOC carrier, both stations have useful coverage on this Interstate highway, despite being on adjacent channels. Judging from the daytime results, the addition of the IBOC signal to the nighttime mix of skywave signals will reduce the effective range of every adjacent-channel station on the band, due to increased noise levels across the band. I fail to see any proposed regulatory process in this PRM that will mitigate this after the fact.

A cursory examination of the history of improvements to the AM broadcast signal in the United States leads to the conclusion that despite vast sums of money and thousands of hours devoted to these technical improvements, the public could not and cannot benefit from them if they cannot hear them. Which is why it seems ironic that instead of addressing the other half of the problem of AM broadcast quality (reception and receivers), the effort is once again focused on making further changes to the transmission end of the technology. The only difference at this point is that receiver manufacturers see an opportunity to sell an entirely new technology requiring an eventual replacement of over 200 million receivers. Both the receiver manufacturers and HD Radio could indeed be in a position to make a large profit on the sales of these new receivers over a long time period. It is questionable that the public will buy any new receivers if there is no programming or financial incentive. That is the risk in this very sizable investment by both broadcasters and receiver manufacturers. But the risk for the listening public is a potential for greatly reduced viability of medium wave broadcasting in near-fringe and fringe reception areas.

At this early stage in the implementation of digital broadcasting, the FCC must recognize that there is a greater risk of interference to existing analog signals from nighttime operation of the HD Radio system. AM broadcasters must understand that any increased interference will occur primarily at the edge of a station's protected coverage area, but will not extend their broadcast coverage, and may actually reduce that coverage. HD Radio technology is only one potentially viable solution to many of AM radio's problems, but there is no guarantee that it will ensure the continued success of AM broadcasting in general. Many broadcast stations may be willing to tolerate some increased interference in the short run to derive the potential benefits of digital, but the short run could turn into a long, expensive haul if these technical questions are not addressed honestly and quickly.

An honest and thorough exploration of the potential alternatives to the HD Radio system is warranted. One is the CAM-D system, developed by Kahn Communications, Inc., which claims to not add any sideband noise while adding all of the features of HD Radio. Another is opening up an examination of the AM broadcast receiver technology currently employed by receiver manufacturers. Dramatic advances in receiver design and chip manufacturer techniques have allowed these manufacturers to inexpensively

incorporate new digital features and selectivity enhancements in analog radios, and should be seriously considered as an alternative to the proposed HD Radio modifications to the transmission side of the equation. To ignore these options is short-sighted, and irresponsible in the light of the huge investment the public already has in its existing base of radio receivers.

I concur with the NAB that the FCC should structure its rules to encourage innovation absent evidence of interference to other users. By further examining other transmission systems, as well as potential improvements in receiver technology, as it did with the UHF spectrum in the 1960's and 1970's, the FCC may find that there is a way to accomplish both improved fidelity and service to the greater public. If the effect is to simply accept new interference as a solution to existing interference, I fear that this whole expensive experiment is a huge waste of both public and private time and funds.

In conclusion, I encourage the Commission to be brave, and further examine the alternative possibilities currently available in the marketplace that would not cause this destructive interference to further erode existing authorized analog AM nighttime operations.

RESPECTFULLY SUBMITTED,

A handwritten signature in black ink, appearing to read 'D. Mussell Jr.', with a stylized, cursive flourish extending to the right.

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