

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

In the matter of)	
)	
Interference Immunity Performance Specifications for Radio Receivers)	ET Docket No. 03-65
)	
Review of the Commission’s Rules and Policies Affecting the Conversion to Digital Television)	MM Docket No. 00-39
)	

COMMENTS OF iBIQUITY DIGITAL CORPORATION

iBiquity Digital Corporation (“iBiquity”), by its attorneys, hereby submits these Comments in response to the Commission’s recent Notice of Inquiry (“NOI”) in this proceeding.¹ As is set out in greater detail below, iBiquity supports the Commission’s overall goal in this proceeding of enhancing efficiency of radio services. Moreover, iBiquity endorses the Commission’s attempts to identify innovative means to extract greater efficiency from the existing uses of the radio spectrum. In many cases, improved receiver interference immunity potentially could enhance this effort. In the case of terrestrial AM and FM broadcasting, however, iBiquity believes the Commission’s ongoing proceedings in MM Docket No. 99-325 provide the best means for considering the need for more efficient receivers and use of the AM and FM frequency bands. The Commission has an extensive record in that proceeding about In-Band On-Channel Digital Audio Broadcasting (“IBOC DAB”) technology and its ability to enhance efficient use of the AM and FM broadcasting bands. iBiquity encourages the Commission to focus its analysis of AM and FM issues in that proceeding and to use this Notice

¹ *Interference Immunity Performance Specifications for Radio Receivers*, ET Docket No. 03-65, *Notice of Inquiry* (March 24, 2003).

of Inquiry to consider the impact of receiver specifications for other services regulated by the Commission.

I. Introduction

iBiquity is the sole developer of IBOC DAB technology, which allows AM and FM broadcasters to upgrade their existing broadcasts from analog to digital. iBiquity's HD Radio™ system enables broadcasters to transmit simultaneously in an analog and digital format by inserting digital carriers on either side of the existing analog AM and FM signal. The HD Radio system enables broadcasters to upgrade the audio quality and reliability of their signals and offers the ability for broadcasters to introduce a range of new data services. This can be accomplished without the need for new spectrum for the digital signal and without causing harmful interference to existing analog broadcasts in the vast majority of cases.² Based on a broad industry consensus from broadcasters, receiver manufacturers and other interested parties that the HD Radio system offers numerous benefits for consumers while minimizing any impact on existing analog broadcasts, the Commission authorized in October 2002 the commencement of digital broadcasting for both AM and FM radio.³

II. AM and FM Radio Issues Are Being Addressed Fully in MM Docket No. 99-325

The Commission's ongoing proceeding in MM Docket No. 99-325 contains an extensive record, including significant technical information concerning the AM and FM broadcasting bands as well as the capabilities of IBOC DAB technology. In contrast to many of the other services the Commission discussed in the NOI, there is an extensive up-to-date record at the Commission on the capabilities of AM and FM receivers and innovative use of the broadcast

² Additional details about iBiquity's HD Radio system and the extensive industry evaluation of this technology can be found in MM Docket No. 99-325.

³ *Digital Audio Broadcasting Systems And Their Impact on the Terrestrial Radio Broadcast Service*, MM Docket No. 99-325, *First Report and Order* (October 10, 2002) ("IBOC Report and Order").

radio bands. Moreover, in Docket No. 99-325 the Commission has been able to evaluate the needs of listeners, broadcasters and manufacturers and their roles in the transition to more efficient digital technology. Given the extensive record already before the Commission, it is unnecessary to examine AM and FM issues in the context of this proceeding. Therefore, iBiquity believes the Commission should continue its efforts in MM Docket No. 99-325 and exclude the AM and FM bands from this proceeding.

The Commission's NOI implies that the Commission proposes to analyze receiver performance as a basis for recommendations on minimum specifications for future receivers. By encouraging an improvement in receiver performance, the Commission hopes to facilitate the introduction of new services using spectrum allocated for existing services. iBiquity already has used receiver studies to bring this type of innovation to the AM and FM bands with the introduction of digital broadcasting and new data services.

iBiquity's early development efforts included detailed studies of a variety of commercially available receivers. In particular, iBiquity considered the interference immunity of typical analog receivers commonly used by the listening public. Instead of using its understanding of receiver performance to improve analog receivers, iBiquity used its receiver studies, as well as companion studies of the transmission environment, to design a digital system that could exist with these typical analog receivers.⁴ iBiquity was able to use these receiver studies to maximize the digital coverage of the HD Radio system while minimizing the potential impact of the digital energy to existing analog receivers.

⁴ In order for a digital radio system to be successful in the United States, a critical design goal was to insure that the digital system was backward compatible. Given the enormous importance of radio as a communication service, the introduction of digital radio could not be successful unless there was a transition from analog to digital and the tens of millions of existing analog radios remained operational during the transition phase.

iBiquity's development of the HD Radio system demonstrates voluntary industry efforts driven by market opportunities can create the innovation and promote the efficiencies the Commission seeks to achieve through this proceeding. Industry evaluation of the HD Radio system provides further evidence of the effectiveness of voluntary industry efforts in this area. The National Radio Systems Committee ("NRSC"), an industry standards setting body sponsored by the National Association of Broadcasters and the Consumer Electronics Association, developed a comprehensive test program to analyze the performance and compatibility of IBOC DAB technology.⁵ Before the test program was designed, the NRSC selected a number of typical radio receivers, representing various classes of receiver products based on the performance of those receivers.⁶ The NRSC selected receivers with both high and low interference immunity performance. By selecting appropriate test receivers based on performance in the presence of interference, the NRSC was able to conduct a real world evaluation of the impact IBOC might have on existing analog services. Based on the NRSC's test program, the broadcast and consumer electronics industries were able to make a determination that any potential impact from IBOC was outweighed by the consumer benefits of iBiquity's technology.⁷

Based on this record of voluntary industry collaboration to analyze receiver specifications in the AM and FM bands and promote new technology designed specifically to offer more efficient use of broadcasting spectrum, iBiquity believes MM Docket No. 99-325 adequately addresses and promotes the goals the Commission will consider in the present proceeding.

⁵ Detailed information about the NRSC and its evaluation of IBOC technology can be found at www.nrsstandards.org.

⁶ National Radio Systems Committee DAB Subcommittee Evaluation of the iBiquity Digital Corporation IBOC System, Part 1 – FM IBOC dated November 29, 2001 at 18.

⁷ *Id* at 9.

Given this background, it would be inefficient for the Commission to focus on the AM or FM bands in ET Docket No. 03-65. Rather, MM Docket No. 99-325 is where AM and FM receiver efficiency should be addressed.

III. Response to Specific Questions from the NOI

- A. What minimum interference immunity parameters should be established for analog and analog/digital (hybrid) AM and FM receivers?

Analog receivers vary widely in their performance characteristics in areas such as adjacent channel selectivity, sensitivity, front end overload performance and recovered audio quality. Generally, higher cost receivers demonstrate better interference rejection than lower cost receivers. Even for similarly priced receivers, however, consumers may find wide variation in performance as a result of the intended use of the receiver. For example, an automobile radio receiver designed for mobile reception and severe multipath interference may experience very different performance than a similarly priced home Hi-Fi receiver.⁸

iBiquity believes existing industry practices adequately address interference immunity for analog receivers. Consumers are not surprised to receive better interference rejection from higher end automobile radio receivers than low cost portable receivers. Moreover, iBiquity believes the introduction of IBOC technology, which may present a small increase in the risk of adjacent channel interference in limited situations, will encourage receiver manufacturers to voluntarily improve analog interference immunity in order to better coexist with digital broadcasts.

iBiquity believes it is unnecessary for the Commission to mandate receiver characteristics for HD Radio receivers. Existing market forces are promoting sufficient improvements in

⁸ Automobile radio receivers tend to exhibit a greater ability to reject adjacent channel interference and have better front end overload characteristics than home receivers. This may come at the cost of other elements of quality such as frequency response and dynamic range.

receiver performance. HD Radio receivers must use technologically advanced linear front ends with a high degree of dynamic range and low noise characteristics. In order to promote a successful introduction of the HD Radio system, iBiquity and its receiver manufacturing partners have recognized high quality products are a predicate for consumer acceptance of this technology. As a result, iBiquity has worked with receiver manufacturers to develop performance specifications for HD Radio receivers that will ensure high quality. iBiquity expects that those types of industry efforts will be the most effective means to ensure the quality of hybrid digital receivers.

- B. What would be the additional cost to consumers of radio receivers that would provide interference immunity based on such established guidelines?

Initial HD Radio receivers will be introduced for higher cost market segments such as automobile and home Hi-Fi systems. These receivers already incorporate or can be economically upgraded to provide a front end with sufficient dynamic range and a wide range of automatic gain control to avoid nonlinearity and to protect the analog-to-digital converter from overload. iBiquity is working with its partners in the receiver industry to reduce costs to allow the necessary front end performance to be introduced in lower cost receiver models. Although this may reduce performance in some cases, iBiquity remains confident that high quality can be maintained for lower cost receivers to be introduced in the future.

- C. What protection, if any, should be afforded the millions of analog radio receivers now in use and available for sale?

The HD Radio system was designed to introduce digital broadcasting without causing harmful interference to existing analog radios. The NRSC's evaluation of IBOC led to the conclusion that the introduction of IBOC would not cause harmful interference within the

protected service area of existing stations.⁹ Based on this conclusion, the NRSC endorsed the introduction of IBOC and encouraged the FCC to authorize the commencement of digital broadcasting.¹⁰ As the NRSC's report on IBOC and comments to the Commission in MM Docket No. 99-325 note, the broadcast and consumer electronics industries are comfortable with the limited number of situations where IBOC has the potential to increase interference to analog receivers.¹¹ The Commission's IBOC Report and Order also acknowledges this limited risk but accepts the industry's conclusion that any interference risk is outweighed by the consumer benefits of IBOC.¹² Based on this record before the Commission, there is no need to consider the adoption of new protection requirements for analog receivers.

D. How should consumers be informed of differences in radio receiver immunity performance? Would a recognizable label or symbol on a receiver assist consumers in identifying equipment with improved performance?

As was noted above, consumers frequently are aware of the different performance characteristics of radio receivers. Few consumers would expect an inexpensive portable or tabletop receiver to provide the same level of interference immunity as a high performance auto or home receiver or a high end portable or tabletop receiver. Nonetheless, to the extent there is an industry consensus on a uniform method of providing additional information to consumers, promoting the availability of such information should advance consumer satisfaction with their receiver selections.

⁹ NRSC Evaluation, *supra* n.5 at 55.

¹⁰ *Id* at 9.

¹¹ *E.g. id.* at 57.

¹² IBOC Report and Order at 6.

IV. Conclusion

For the foregoing reasons, iBiquity Digital Corporation respectfully submits that any issues concerning receivers for AM and FM broadcasting are being adequately addressed by the industry and in MM Docket No. 99-325. iBiquity encourages the Commission to use ET Docket No. 03-65 to focus on other wireless services.

Respectfully submitted,

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