

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

In the Matter of)
)
Petition for Rulemaking to Authorize Digital) MM Docket No. _____
FM Asymmetric Sideband Operation) RM-_____

To: Office of the Secretary
Attn: Audio Division, Media Bureau

PETITION FOR RULEMAKING

National Association of Broadcasters

Xperi Corporation

National Public Radio, Inc.

December 9, 2019

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Petition for Rulemaking

The National Association of Broadcasters (“NAB”), Xperi Corporation (“Xperi”)¹ and National Public Radio, Inc. (“NPR”) (collectively, “Petitioners”), pursuant to Section 1.401(a) of the Commission’s Rules, 47 C.F.R. §1.401(a), hereby petition the Commission to initiate a rulemaking proceeding to advance the nation’s voluntary deployment of digital audio broadcasting (“DAB”) by amending the agency’s DAB rules to authorize FM radio stations to utilize asymmetric sideband power levels without the need for separate or experimental authorization. As explained in greater detail below, authorization of asymmetric sidebands as an established means of HD Radio broadcasting will enable stations to improve digital FM service for their listeners.

I. Background

In November 1999, the FCC initiated a proceeding in furtherance of its desire to provide all broadcasters with “the opportunity to provide DAB service.”² Although the

¹ Through a series of corporate transactions in 2015 and 2016, iBiquity Digital Corporation (“iBiquity”), the original developer of the in-band/on-channel technical system supporting the digital audio broadcasting service, is now a subsidiary of Xperi Corporation. HD Radio™ is a trademark of iBiquity.

² *Digital Audio Broadcasting Systems And Their Impact on the Terrestrial Radio Broadcast Service*, 15 FCC Rcd. 1722 ¶ 16 (1999).

Commission recognized the long-term benefits of establishing an all-digital terrestrial radio service, the agency committed to “foster[ing] a rapid and non-disruptive transition to DAB for broadcasters and listeners,”³ and reiterated its view that in-band/on-channel (“IBOC”) digital radio technology “may be able to facilitate a seamless transition to an all-digital radio broadcast environment by affording all broadcasters a concurrent digital and analog broadcast opportunity.”⁴ Accordingly, in October 2002, the Commission authorized AM and FM digital broadcasts using the IBOC technology developed by iBiquity,⁵ and in June 2007, the FCC established service, operational and technical rules to “foster the development of a vibrant terrestrial digital radio service for the public and to ensure that radio stations successfully implement” digital radio technology.⁶

As Figure 1 below shows, 20 years after the FCC’s first step toward bringing digital radio services to the public, consumer interest in, and adoption of, HD Radio broadcasting is strong. The vast majority of digital receiver sales are tied to the purchase of new passenger vehicles. Forty-one automobile manufacturers offer a combined 298 vehicle models with factory installed HD Radio receivers.⁷ Indeed, more than half of all new vehicles delivered nationally in 2018 contained a factory-installed HD Radio receiver (see Figure 3), and in 2019, the number of HD Radio-equipped cars (“HDEC”) in some radio markets is approaching (or exceeding) 33 percent (see Figure 2). Moreover, in the first nine months of 2019, 51.3 percent of new vehicles were delivered with HD Radio in the

³ *Id.* ¶¶ 17-18.

⁴ *Id.* ¶ 19.

⁵ See *Digital Audio Broadcasting Systems And Their Impact on the Terrestrial Radio Broadcast Service*, 17 FCC Rcd. 19990 (2002) (“First Report and Order”).

⁶ *Digital Audio Broadcasting Systems and Their Impact on the Terrestrial Radio Broadcast Service*, 22 FCC Rcd. 10344 ¶ 2 (2007).

⁷ Source: Xperi Corporation.

dash (see Figure 3). To date, almost 59.1 million vehicles have been manufactured with digital receivers (see Figure 1).

Broadcasters, meanwhile, are continuing to innovate and look for opportunities to incorporate the digital broadcast system into their future business plans. To date, over 2,500 radio stations have been converted to digital broadcasts and offer in excess of 2,190 additional multicast channels using digital technology.⁸ In July 2018, the FCC granted an experimental license for AM radio station WWFD to transmit an all-digital signal,⁹ and the Commission recently adopted a Notice of Proposed Rulemaking to authorize a voluntary transition to the MA3 all-digital mode of HD Radio operation for AM stations based on a Petition for Rulemaking filed by Bryan Broadcasting Corporation¹⁰.

⁸ Source: Xperi Corporation.

⁹ BSTA-20180628AAI.

¹⁰ See *In the Matter of All-Digital AM Broadcasting and Revitalization of the AM Radio Service*, Notice of Proposed Rulemaking, MB Docket Nos. 19-311; 13-249, FCC 19-123 (rel. Nov. 25, 2019) (“All Digital AM NPRM”); Bryan Broadcasting Corporation, *In the Matter of Petition for Rulemaking to Allow the MA3 All-Digital Mode of HD Radio for AM Stations*, RM-11836 (filed Mar. 25, 2019).

HD RADIO BY THE NUMBERS

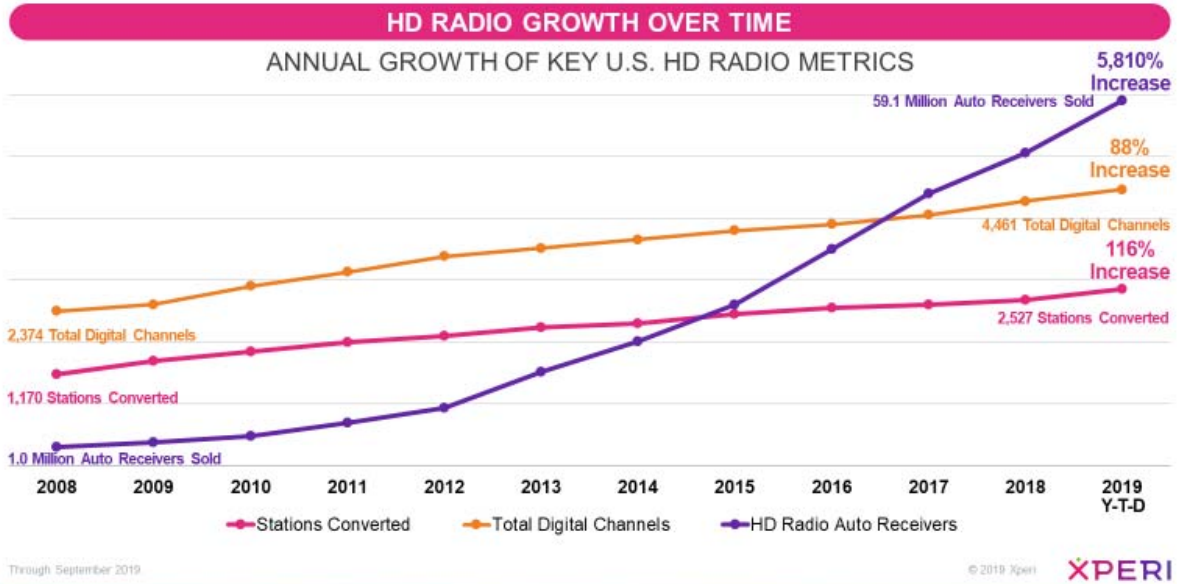


Figure 1. HD Radio rollout (Source: Xperi Corporation)

HD RADIO BY THE NUMBERS



TOP 10 HIGHEST HD RADIO AUTO PENETRATION DMAS

Geography Measured	Total# HDEC* In DMA	Total % HDEC* In DMA
New York DMA	5,147,718	36.5%
Miami DMA	1,385,751	35.1%
Los Angeles DMA	4,396,508	33.4%
Detroit DMA	1,354,643	33.3%
West Palm Beach DMA	605,515	32.9%
Burlington DMA	252,872	32.6%
San Francisco DMA	1,724,676	30.2%
Boston DMA	1,663,257	28.5%
Baltimore DMA	612,101	28.5%
Springfield DMA	104,257	27.6%

Through September 2019. *HDEC = HD Radio-equipped cars. © 2019 Xperi XPERI

Figure 2. HD Radio top 10 vehicle market penetration (Source: Xperi Corporation)

HD RADIO AND THE BATTLE FOR THE DASHBOARD

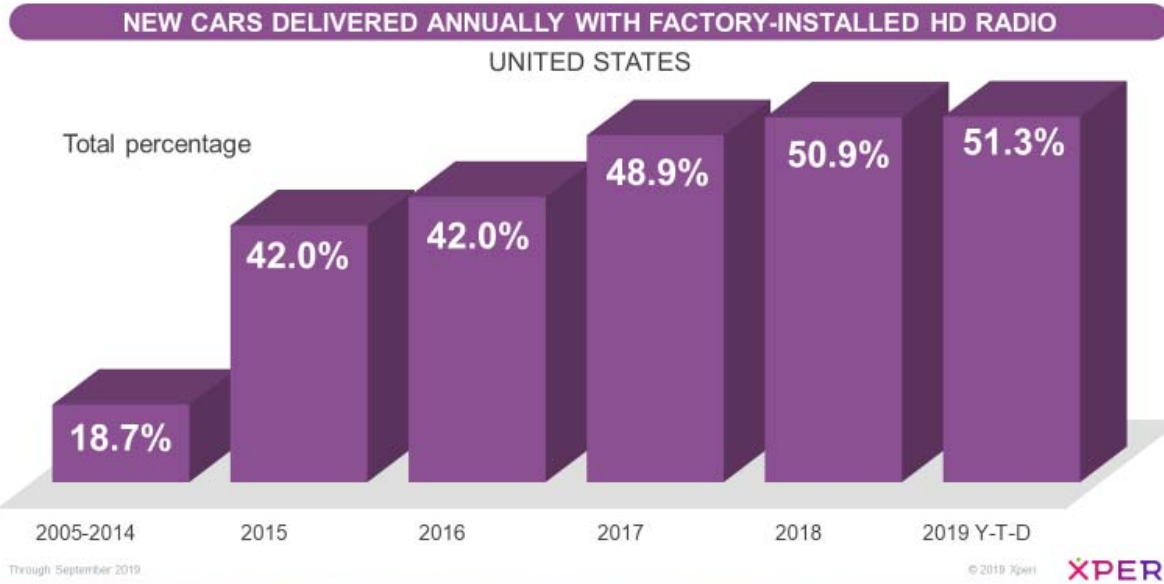


Figure 3. HD Radio new automobile receiver penetration (Source: Xperi Corporation)

While broadcast adoption of digital radio technology continues to grow, authorizing asymmetric sideband operation on a routine basis would enable individual stations to maximize HD Radio service coverage areas to replicate their analog coverage as much as possible within existing digital power limits.

In the FCC’s First Report and Order in the DAB proceeding, the Commission authorized FM stations to operate with digital effective radiated power (“ERP”) equal to one percent of analog power or -20 dBc.¹¹ In 2010, the Media Bureau adopted an Order (the “2010 Order”) modifying Section 73.404(a) of the Commission’s Rules to allow all FM IBOC stations to operate at -14 dBc and for stations that meet certain guidelines to

¹¹ See First Report and Order at 20004 ¶ 40; 47 C.F.R. §73.404(a).

increase further to -10 dBc.¹² To operate above -14 dBc, stations must submit an informal request to the Media Bureau.¹³ The informal request must include an analysis of the station's potential to cause harmful interference to adjacent channel analog signals using the following formula that is defined for dual sideband power:¹⁴

$$\text{Allowable IBOC power} = [2.27 * (60 - \text{IBOC station F}(50,10) \text{ dB}\mu) - 33.6]$$

A modification of this formula allows for determination of asymmetric sideband power levels where the formula is applied to each sideband independently:

$$\text{Allowable IBOC power} = [2.27 * (60 - \text{IBOC station F}(50,10) \text{ dB}\mu) - 36.6]$$

Consistent with the Advanced IBOC Coverage and Compatibility Study ("AICCS") Project Report, the FCC mandates that all stations calculate the formula using the station's analog F(50,10) field strength at all points on the 60 dB μ F(50,50) contour of the desired station without regard to the actual class of station or protected contour for the station.¹⁵ Once the most restrictive (that is, strongest) analog F(50,10) field strength of the proponent station has been determined, the licensee uses the following table to determine the proponent station's maximum permissible FM digital power:¹⁶

¹² *Digital Audio Broadcasting Systems And Their Impact on the Terrestrial Radio Broadcast Service*, 25 FCC Rcd. 1182, 1189-90 ¶¶ 16-20 (MB 2010) ("2010 Order"). See also 47 C.F.R. §73.404(a).

¹³ *Id.*

¹⁴ See Report to the CPB and FCC on the Advanced IBOC Coverage and Compatibility Study, National Public Radio (Nov. 24, 2009) at Appendix J ("AICCS Project Report"). See also 2010 Order at 1189 ¶ 19.

¹⁵ 2010 Order at 1190 ¶ 20.

¹⁶ *Id.*

Proponent Analog F(50,10) Field Strength at Protected Analog 60 dBμ F(50,50) Contour	Maximum Permissible FM Digital ERP
51.2 dBμ and above	-14 dBc
50.7 dBμ -51.1 dBμ	-13 dBc
50.3 dBμ -50.6 dBμ	-12 dBc
49.6 dBμ -50.2 dBμ	-11 dBc
49.5 dBμ or less	-10 dBc

This approach assumes symmetric rather than asymmetric digital sidebands. The use of symmetric sidebands for all calculations eliminates a viable path for many stations to increase power on at least one sideband, which would improve digital coverage.

In 2011, the Commission sought comment on a request by iBiquity and NPR to permanently authorize voluntary asymmetric digital sideband power for FM stations so that broadcasters would not have to seek temporary, experimental authority to operate with asymmetric sidebands.¹⁷ Such authorization of asymmetric sideband operation would encourage greater station adoption of digital radio technology and enable broadcasters to keep up with both the growth in receiver sales and the public's interest in high quality radio service. Yet, after the comment cycle closed in January 2012, and with virtually no opposition to the permanent authorization of asymmetric digital sideband operation, the FCC has taken no further action on the matter.

As the Commission considers the next steps toward its goal of creating an all-digital radio broadcast environment, it can strengthen the existing digital radio ecosystem and facilitate the continued growth of digital radio by addressing an important matter left unresolved in the prior rulemaking. Authorization of asymmetric sidebands will help

¹⁷ Public Notice, *Comment Sought on Request for FM Asymmetric Sideband Operation and Associated Technical Studies*, 26 FCC Rcd. 15309 (rel. Nov. 1, 2011).

stations improve reception of HD Radio services at minimal cost to them or to the Commission. It will also encourage transmission equipment and receiver manufacturers to continue to invest in research and development of HD Radio equipment, thereby reducing equipment costs and facilitating further adoption of HD Radio broadcasting. Adoption of this Petition will benefit all sectors of the digital radio ecosystem, particularly the public.

II. The Commission Should Authorize Asymmetric Sideband Operation As A Routine Matter

The Petitioners propose a modification of the requirements contained in the 2010 Order by authorizing FM stations to use asymmetric sidebands on a permanent basis, thus making it possible for stations to calculate maximum allowable power *per sideband*. This rule change would provide stations with greater flexibility to achieve the best balance between maximizing digital signal coverage and building penetration while protecting adjacent channel analog signals. Moreover, adoption of this proposal would advance the goals the Media Bureau articulated in the 2010 Order: “to improve FM digital coverage and to eliminate regulatory impediments to FM digital radio’s ability to meet its full potential and deliver its promised benefits.”¹⁸

The most effective way for stations to increase digital coverage is to increase digital power. However, the Commission has always balanced the desire to increase power (and thus coverage) with the need to protect adjacent channel analog signals from harmful interference. Asymmetric sidebands provide an effective tool for broadcasters to optimize this balance.

¹⁸ 2010 Order at 1187 ¶ 13.

Permanent authorization of asymmetric sidebands would allow additional stations to increase power and avoid harmful interference using the formula in the 2010 Order. Currently, if the interference potential from each digital sideband differs due to variations in geographic spacing or power levels of the upper and lower first adjacent stations, the digital station must set its digital power based on the most restrictive interference scenario. This constrains overall digital power for many stations that have potential interference issues on only one sideband. If stations were able to calculate the potential interference on a per-sideband basis, a station could, for example, maintain one sideband at -14 dBc and increase the other sideband to -10 dBc. Or the station could increase one sideband to -10 dBc and the other sideband to a level above -14 dBc but below -10 dBc. This would result in an overall increase in digital power, even if it is below the full -10 dBc level.

To help quantify the benefit of asymmetric sidebands, NAB and Xperi conducted an analysis in 2017 that looked at every full-power FM station in the United States and, for each of those stations, the three worst first adjacent interferers. Using that data, the study concluded that only sixty percent of FM stations can qualify to raise power to the -10 dBc level (-13 dBc per sideband) under the existing formula using symmetric sidebands. In many cases, the stations that cannot increase power are located in urban and suburban areas with greater population density and more tall buildings. A power increase for those stations would enhance building penetration and significantly improve their listeners' ability to receive a strong digital signal. As can be seen in Figure 4, of the 10,875 FM stations in the study, only 6,120 are eligible to increase power to -10 dBc (-13 dBc per sideband -- classified as "Hi/Hi" in Figure 4). However, if stations were authorized

to operate using asymmetric sidebands, an additional 3,496 stations would be able to increase one digital sideband to -10 dBc (-13 dBc per sideband – classified as “Low/Hi” and “Med/Hi” in Figure 4), and an additional 532 stations would be able to increase at least one sideband above -14 dBc (-17 dBc per sideband) but not to the full -10 dBc level (-13 dBc per sideband) (classified as “Lo/Med” and “Med/Med” in Figure 4). As Figure 4 demonstrates, authorizing asymmetric sidebands on a blanket basis would significantly increase the number of stations eligible to boost power and improve their coverage without causing new host analog or adjacent channel interference.

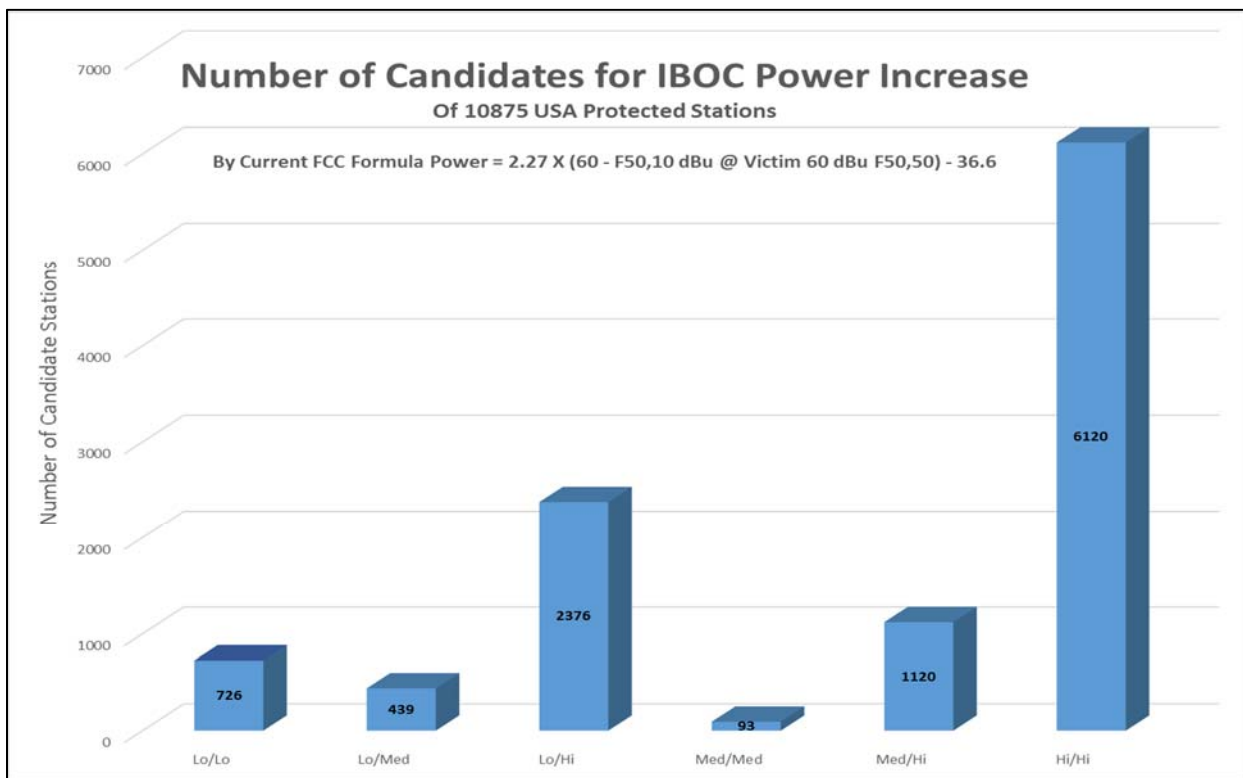


Figure 4. Number of candidate stations for IBOC power increase, where:

Lo/Lo	Stations may not increase either sideband above -17 dBc per sideband (-14 dBc total power)
Lo/Med	Station may increase one sideband to an incremental value between -17 and -13 dBc per sideband (-14 and -10 dBc total power)
Med/Med	Station may increase both sidebands to an incremental value between -17 and -13 dBc per sideband (-14 and -10 dBc total power)
Lo/Hi	Station may increase only one sideband to the -13 dBc limit (-10 dBc total power), other must remain at -17 dBc (-14 dBc total power)
Med/Hi	Station may increase one sideband to -13 dBc (-10 dBc total power), the other can increase to an incremental value between -17 and -13 dBc
Hi/Hi	Station may increase both sidebands to -13 dBc (-10 dBc total power)

Although stations currently can request an experimental authorization to operate with asymmetric sidebands, FM stations have demonstrated they will not make the capital investment in equipment needed to increase power if the station's operations are tied to experimental (*i.e.*, temporary or revocable) authorizations. Fully authorizing the use of asymmetric sidebands on a standard basis would provide greater regulatory certainty for stations to promote use of this mechanism for raising power while minimizing potential harmful interference to adjacent channel stations.¹⁹ This also would reduce the administrative burden of processing and tracking experimental authorizations. Asymmetrical operation should be permitted as needed for all stations of all classes, including grandfathered superpowered stations.

Implementing the permanent authorization of asymmetric sidebands operation would only necessitate modest revision to the Form 335-FM used to notify the Commission that a station has commenced digital operations.²⁰ Instead of specifying

¹⁹ An analysis of the technical viability of asymmetric sidebands is already a matter of record before the Commission. See *Letter from iBiquity Digital Corporation to Marlene H. Dortch*, MM Docket No. 99-325 (Oct. 4, 2011) (containing a report entitled "FM HD Radio™ Field Performance With Unequal Digital Sideband Carrier Levels" (Feb. 22, 2011)) and *Letter from National Public Radio to Marlene H. Dortch*, MM Docket No. 99-325 (Oct. 24, 2011) (containing a report entitled "PAPR and Asymmetrical Sidebands Field Results: HD Radio™ Coverage Technologies" (June 11, 2011)).

²⁰ See Form FCC 335-FM, Section I, Question 6.

single values for the analog and digital Effective Radiated Powers (“ERPs”), the Form could be modified to accommodate separate ERP values for each sideband as follows:

Digital LSB _____ kilowatts

Digital USB _____ kilowatts

For Transmitter Output Power, a combined power would be supplied as follows:

Digital LSB (...) _____ kilowatts

Digital USB (...) _____ kilowatts

Digital Total (...) _____ kilowatts

Stations wishing to operate asymmetric digital sidebands would simply submit the form so the Commission can update its records accordingly.

III. Conclusion

For the reasons stated above, the Petitioners respectfully request that the Commission grant this Petition for Rulemaking to allow FM stations to operate with asymmetric sidebands. Providing permanent authorization for asymmetric sidebands is consistent with the Commission’s broader effort to remove unnecessary regulatory barriers in the broadcast industry and promote broader adoption of DAB systems.²¹ Furthermore, because the transition to digital radio will remain voluntary, there is little downside to providing broadcasters with the flexibility and certainty that they need to best serve their communities.

²¹ See *Commission Launches Modernization of Media Regulation Initiative*, Public Notice, 32 FCC Rcd. 4406 (2017) (initiating a review of rules applicable to media entities to eliminate or modify regulations that are outdated, unnecessary, or unduly burdensome); All Digital AM NPRM ¶ 3 (reiterating “the potential for all-digital transmission to benefit both AM and FM services and to serve the public interest in spectrum efficiency”).

Respectfully submitted,

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