

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

In the Matter of)
)
)
Modifying Rules for FM Terrestrial Digital) MB Docket No. 22-405
Audio Broadcasting Systems)

**PETITION FOR RULEMAKING
ADDENDUM REQUEST FOR CLARIFICATION**

The National Association of Broadcasters (“NAB”)¹ and Xperi Inc. (“Xperi”)² (collectively, “Petitioners”), submitted a Petition on October 26, 2022, requesting that the Commission initiate a rulemaking proceeding to amend its rules governing in-band/on-channel (“IBOC”) digital audio broadcasting (the “Power Increase Petition”).³ Petitioners requested that the FCC adopt an updated formula to determine FM power levels for stations seeking to exceed the currently authorized FM digital ERP of -14 dBc.⁴ The Petition demonstrated that approving this request will serve the public interest by improving digital FM coverage and digital FM signal penetration of buildings while continuing to minimize the probability of harmful interference to adjacent channel stations.⁵ The Commission subsequently issued an Order and Notice of Proposed Rulemaking (the “NPRM”) granting the Petition and proposing rule changes that would permit additional FM stations to increase

¹ NAB is a nonprofit trade association that advocates on behalf of local radio and television stations and also broadcast networks before Congress, the Federal Communications Commission and other federal agencies, and the courts.

² 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 Inc. HD Radio™ is a trademark of iBiquity.

³ Petition for Rulemaking of NAB and Xperi Inc., MB Docket No. 22-405 (filed Oct. 26, 2022).

⁴ *Id.* at 1.

⁵ *Id.*

FM hybrid digital effective radiated power beyond the existing levels without the need for individual Commission authorization.⁶

NAB and Xperi have been engaged in ongoing discussions with stakeholders regarding the proposed FM digital power increase. Through these discussions, NAB and Xperi recently identified an important ambiguity that requires clarification regarding the maximum allowable operating power of a digital FM signal. This ambiguity results from an unstated—but nonetheless critical—assumption in the Power Increase Petition, the NPRM, the National Radio Systems Committee Standard 5-E (“NRSC 5-E”), and elsewhere regarding the allowed maximum power level for digital FM service: that digital FM carrier levels are established by the primary HD Radio MP1 hybrid service mode of operation.⁷ As additional partitions are added for the extended hybrid service modes, their individual subcarriers are set to the same amplitude as the P1 main subcarriers, increasing the total integrated power above that of service mode MP1. Petitioners therefore request the Commission to clarify the maximum digital FM power levels permitted for hybrid and extended hybrid service modes, as detailed below.

I. Background

MP1 is the primary hybrid (analog plus digital) service mode of operation of the FM-band HD Radio system and the service mode most commonly employed by digital broadcasters. The Commission’s initial digital audio broadcasting (“DAB”) rules adopted in 2002 were crafted based on the MP1 primary service mode of operation.⁸ The Commission

⁶ *Modifying Rules for FM Terrestrial Digital Audio Broadcasting Systems, Order and Notice of Proposed Rulemaking*, FCC 23-61 (rel. Aug. 1, 2023) (“NPRM”).

⁷ Note that digital FM carrier levels are characterized by total integrated digital power.

⁸ *Digital Audio Broadcasting Systems and Their Impact On The Terrestrial Radio Broadcast Service*, First Report and Order, 17 FCC Rcd 19990 (2002), at Appendix B.

subsequently authorized and designated certain additional “extended hybrid modes of operation,” including MP2 and MP3 service modes.⁹ These extended hybrid modes provide for increased digital capacity by adding additional orthogonal frequency division multiplex (or “OFDM”) subcarriers between the MP1 digital subcarriers and the analog host, as depicted in the figure below (from the NRSC-5-E standard).

⁹ *Digital Audio Broadcasting Systems and Their Impact on the Terrestrial Radio Broadcast Service*, Second Report and Order, 22 FCC Rcd. 10344 at ¶¶ 18-19 (2007).

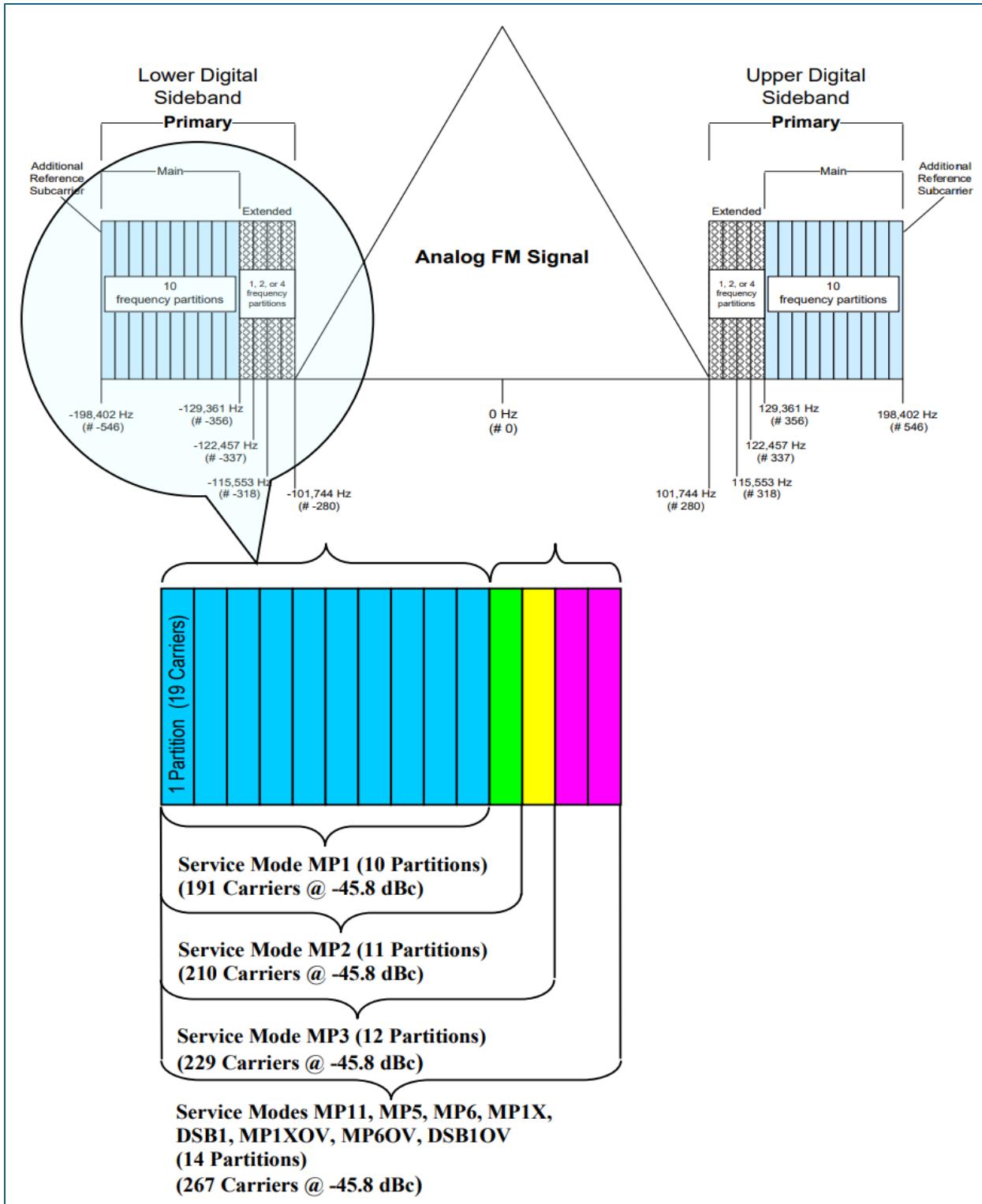


Figure showing the various FM band HD Radio service modes and the corresponding spectral occupancy. (Source: NRSC-5-E, ref. doc. 1026, Figure 4-3)

An important aspect of the individual extended hybrid subcarriers is that they operate at the same power level as the MP1 individual hybrid subcarriers, as shown in the table below (also from the NRSC-5-E standard).

| Nominal Digital-to- Analog Power Ratio (dBc) Service Mode MP1 | Single Subcarrier Power (dBc) | Total Integrated Power of Both Sidebands (dBc) | | | | Total Integrated Power of One Sideband (dBc) | | | |
|---|--|--|-----------------------------------|-----------------------------------|--|--|-----------------------------------|-----------------------------------|--|
| | | MP1 100% of MP1 Power | MP2 110% of MP1 Power | MP3 120% of MP1 Power | OTHER ¹ 140% of MP1 Power | MP1 100% of MP1 Power | MP2 110% of MP1 Power | MP3 120% of MP1 Power | OTHER ¹ 140% of MP1 Power |
| -20.0 | -45.8 | -20.0 | -19.6 | -19.2 | -18.5 | -23.0 | -22.6 | -22.2 | -21.5 |
| -14.0 | -39.8 | -14.0 | -13.6 | -13.2 | -12.5 | -17.0 | -16.6 | -16.2 | -15.5 |
| -13.0 | -38.8 | -13.0 | -12.6 | -12.2 | -11.5 | -16.0 | -15.6 | -15.2 | -14.5 |
| -12.0 | -37.8 | -12.0 | -11.6 | -11.2 | -10.5 | -15.0 | -14.6 | -14.2 | -13.5 |
| -11.0 | -36.8 | -11.0 | -10.6 | -10.2 | -9.5 | -14.0 | -13.6 | -13.2 | -12.5 |
| -10.0 | -35.8 | -10.0 | -9.6 | -9.2 | -8.5 | -13.0 | -12.6 | -12.2 | -11.5 |

¹OTHER service modes include MP11, MP5, MP6, MP1X, DSB1, MP1XOV, MP6OV, DSB1OV

Table showing the sideband power for various service modes and digital-to-analog power ratios. (Source: NRSC-5-E, ref. doc. 1026, Table 4-4).

One consequence of this circumstance is that, if a broadcaster is operating in MP1 service mode at, for example, -14 dBc, and decides to switch to operating in the MP3 service mode (i.e., more digital subcarriers), then the total power in the digital signal will be increased relative to an MP1 reference power level. Note that MP1 subcarriers by themselves achieve a -14 dBc digital power level. Therefore, adding the MP3 extended hybrid subcarriers to the MP1 subcarriers will result in additional total digital power. The actual increase, as a function of (original) MP1 digital power and extended hybrid service mode is shown in the table above. For this example, the table shows that the digital power level in MP3 mode will increase from -14 dBc to -13.2 dBc.

The Commission has recognized this result. For example, in a recent letter authorizing operation for station WRDG (Bowdon, Georgia; Facility ID No. 777236) at the

maximum allowable operating level of -10 dBc, the Commission included a footnote acknowledging that “. . . the licensee must adjust the station’s total digital sideband ERP in accordance with NRSC-G202-A if operating using a service mode other than MP1.”¹⁰ In other words, the station was required to increase its total digital power in the event it decided to switch to an extended hybrid service mode.

II. Request for Clarification

In the NPRM, the Commission “propose[s] to change the methodology used by digital FM stations to determine whether they are eligible to increase digital FM power up to -10 dBc, or 10% of analog power.”¹¹ To clarify the discrepancy described above, NAB and Xperi propose the following text to clarify that the -10 dBc value applies to the primary MP1 mode of operation, while a higher digital FM power level would be permitted for extended hybrid service modes:

Specifically, we propose to change the methodology used by digital FM stations to determine whether they are eligible to increase digital FM power up to -10 dBc, or 10% of analog power (for operation in hybrid service mode MP1); maximum digital FM power in extended hybrid service modes will be greater in accordance with Table 4-4, NRSC-5-E ref. doc. 1026.

Without this clarification, a strict reading of the current wording in the NPRM would result in an incorrect power level setting when applied to extended hybrid modes of operation, and one that is inconsistent with—and lower than—the power levels specified in the NRSC-5-E standard. Moreover, operation at these lower power levels would reduce coverage of both extended hybrid operations and hybrid MP1 service mode operations.

¹⁰ Letter from Rodolfo F. Bonacci, Audio Division, Media Bureau, to iHM Licenses, LLC, FCC File No. 0000224401 (Dec. 15, 2023) (granting request for increased digital power hybrid IBOC digital operation), available at <https://enterprisefiling.fcc.gov/dataentry/api/download/lm/authorization/25076ff38b63e0c4018b875e83980f3f>. Note that NRSC-G202-A is derived from (and is an expanded version of) NRSC-5-E ref. doc 1026 Table 4-4, shown below.

¹¹ NPRM at ¶ 8.

Additionally, the proposed rule 47 C.F.R. §73.404(e) should be amended to read as follows (with the new text proposed to be added to the revised rule originally proposed in Petitioners' initial comments submitted in this proceeding shown in **bold blue underline**):

§73.404 IBOC DAB Operation

* * * * *

(e) All FM stations transmitting hybrid IBOC signals may operate with total digital effective radiated power of up to -14 dBc. No station may operate its digital carriers with a total effective radiated power in excess of -10 dBc when operating in hybrid service mode MP1. A station using symmetric sidebands planning to operate with a total digital effective radiated power in excess of -14 dBc must confirm compliance with Table 1 below by calculating the F(50,10) signal strength of its analog signal at the first adjacent station's F(50,50) 60 dB μ contour. Compliance with Table 1 must be established for upper and lower IBOC digital sidebands separately. All calculations must be made using the standard FCC contour prediction methodology. Stations operating with extended hybrid service modes may operate with total integrated digital power levels specified in Table 4-4 of NRSC-5-E ref. doc. 1026.

Table 1 to Paragraph (e) - Maximum Permissible FM Digital ERP ~~for Symmetric Sideband Operation~~ per Sideband

| <u>Proponent Analog IBOC Station's F(50,10) Field Strength at the Upper or Lower First-Adjacent Station's Analog 60 dBμ F(50,50) Contour (Symmetric Sideband Operation)</u> | <u>Maximum Permissible FM Digital ERP for the Respective (Upper or Lower) Sideband</u> |
|---|---|
| 57.9 dB μ and above | <u>-14 dBϵ -17 dBc</u> |
| 56.5 dB μ to 57.8 dB μ | <u>-13 dBϵ -16 dBc</u> |
| 55.6 dB μ to 56.4 dB μ | <u>-12 dBc -15 dBc</u> |
| 54.1 dB μ to 55.5 dB μ | <u>-11 dBϵ -14 dBc</u> |
| 54.0 dB μ or less | <u>-10 dBϵ -13 dBc</u> |

This table depicts the "Per-Sideband Power Expressed Using Specific Ranges of IBOC Station F(50,10) Field Strength at the Desired Station's F(50,50) 60 dB μ Contour," initially proposed in Petitioners' comments on the NPRM.¹²

¹² Comments of Xperi, Inc., and the National Association of Broadcasters, MB Docket No. 22-405 (Sep. 21, 2023), at Appendix 1, Table 2.

III. Conclusion

Accordingly, NAB and Xperi respectfully request that the Commission clarify the maximum digital FM power levels permitted for hybrid and extended hybrid service modes as indicated above.

Respectfully submitted,

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