

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, DC 20554

In the Matter of )  
 )  
All-Digital AM Broadcasting ) MB Docket No. 19-311  
 )  
Revitalization of the AM Radio Service ) MB Docket No. 13-249  
 )

**COMMENTS OF HUBBARD RADIO, LLC**

Hubbard Radio, LLC (“Hubbard”), parent company of Washington DC FCC License Sub, LLC, licensee of WWFD(AM), Frederick, Maryland (“WWFD”), pursuant to Section 1.415 of the rules of the Federal Communications Commission (“FCC” or “Commission”), 47 C.F.R. § 1.415, hereby submits these comments on the *Notice of Proposed Rulemaking* (“*NPRM*”) in the above-captioned rulemaking proceeding.<sup>1</sup> As discussed herein, as well as in Hubbard’s comments on the Petition for Rulemaking filed by Bryan Broadcasting Corporation,<sup>2</sup> Hubbard fully supports the Commission’s proposal to permit AM licensees to have the option to operate in an all-digital format. Providing this option to AM licensees is consistent with other efforts the Commission has taken to revitalize AM radio and is in the public interest.

**I. INTRODUCTION AND SUMMARY**

In the *NPRM*, the Commission proposes to allow AM broadcasters, on a voluntary basis, to broadcast an all-digital signal using the HD Radio in-band on-channel (“*IBOC*”) mode known as MA3. The Commission has tentatively concluded that a voluntary transition to all-digital AM

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<sup>1</sup> *All-Digital AM Broadcasting; Revitalization of the AM Radio Service*, Notice of Proposed Rulemaking, 34 FCC Rcd 11560 (2019) (“*NPRM*”).

<sup>2</sup> See Comments of Hubbard Radio, LLC, RM-11836 (filed May 10, 2019).

broadcasting has the potential to benefit AM stations and provide improved AM service to the listening public. The *NPRM* seeks comment on the proposed operating standards for all-digital AM stations and the potential impact of such operations on existing analog stations and listeners.<sup>3</sup> Given the extremely positive experiences with WWFD’s experimental digital operations for the past two years, Hubbard is uniquely qualified to comment on these issues.

## **II. THERE ARE NUMEROUS CONSUMER BENEFITS OF ALL-DIGITAL AM BROADCASTING**

### **A. IMPROVED AUDIO QUALITY AND CHOICE**

Since July 2018, Hubbard has been operating WWFD pursuant to an experimental license to broadcast in all-digital using the MA3 mode.<sup>4</sup> Since that time, Hubbard has noticed significant improvement to WWFD’s audio quality.<sup>5</sup> In Hubbard’s experience, the data conclusively confirm that all-digital MA3 operation provides an improved, consistently high-quality listener experience, in terms of audio fidelity and signal robustness. While additional studies of MA3 would be welcomed, Hubbard believes that there is sufficient data in the record now to confirm the superiority of MA3 to other AM transmission standards, and that the Commission should move forward with permitting AM stations to transition to MA3 operations on a voluntary basis.

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<sup>3</sup> *NPRM* ¶ 1.

<sup>4</sup> See Letter from Jerome J. Manarchuck, Audio Division, Media Bureau, to Kenneth E. Satten, counsel to Washington DC FCC License Sub, LLC, licensee of WWFD(AM), File No. BSTA-20180628AA1 (July 6, 2018); Letter from Joseph Szczesny, Audio Division Media Bureau, to David A. Jones, File No. BESTA-20190605ABK (July 12, 2019) (extending WWFD’s experimental authority to July 12, 2020); see also *NPRM* ¶ 7.

<sup>5</sup> See also Comments of Durand Broadcasting, LLC, RM-11836 (filed Apr. 27, 2019) (“I have been following the full digital test from WWFD in Washington DC and have been impressed not only with its sound, but also that it is not interfering with adjacent channels like the digital hybrid mode has caused.”).

All-digital operations also will provide AM broadcasters with a greater range of programming choices to serve their communities. For many years, music programming formats have been difficult for standard AM stations to sustain due to poor audio fidelity in the AM service and vulnerability to noise from power lines and other electrical sources. With MA3 and the significant audio enhancements it brings, new programming formats will be available for AM stations. For example, WWFD broadcasts an Adult Album Alternative music format. The station had no ratings in its home market of Frederick, Maryland for the five years it was an analog station with that format, but now that it is operating in MA3, the station is ranked by Nielsen in the market.

**B. ADDITIONAL OPPORTUNITIES TO TRANSMIT AUXILIARY DATA**

As a result of the MA3 transmission technology, WWFD has a newfound ability to transmit additional data and metadata to listeners. The secondary and tertiary carriers of WWFD can provide stereo audio information, data services such as station logo, album artwork, and other artist experience information, as well as multicast channels.<sup>6</sup>

The *NPRM* notes that WWFD previously reported reliability issues with its secondary and tertiary carriers.<sup>7</sup> Importantly, however, those reliability issues have been resolved favorably. The station installed a replacement transmitter (a Nautel NX-5) with a pulse duration modulator that runs at a sufficiently high rate to pass the secondary and tertiary carriers, allowing

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<sup>6</sup> See also Comments of Xperi Corporation at 3, RM-11836 (filed May 6, 2019) (“The MA3 service mode greatly expands the capability of AM broadcasters to offer better quality audio and new data services through a robust transmission service.”).

<sup>7</sup> *NPRM* ¶ 12.

the full MA3 waveform to be transmitted. These solutions will be documented in more detail in a forthcoming technical paper.<sup>8</sup>

In addition, in December 2019, WWFD tested an HD-2 multicast channel, transmitting musical track data and a station logo image as well. Future versions of enhanced EAS alerting will use the secondary and tertiary carriers to supplement the data transmitted on the Primary IBOC Data Service Logical Channel (“PIDS”) carriers. Hubbard believes that these continued improvements in the MA3 delivery system will mitigate any concerns about secondary and tertiary carrier issues, and that these technologies will continue to be expanded to better serve listeners.

These trends will place digital AM on a more level playing field with other broadcast services that have the ability to broadcast music formats and program metadata.<sup>9</sup> Trends in vehicle entertainment system receiver designs are converging on “tuning by visual metadata,” where listeners select an audio program by pressing a thumbnail image of the desired program. MA3 allows AM broadcasters to have both aural and visual parity with other broadcast services in the automobile dashboard.

AM broadcasters will be able to use their additional digital capacity in other ways, including multicast channels that can be either programmed by the licensee or used to provide programming opportunities for underserved communities. The ability to multicast puts AM stations on par with FM stations that frequently provide HD-2 and HD-3 channels for listeners.

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<sup>8</sup> David Kolesar and Mike Raide, “A Case Study in All-Digital HD AM Broadcasting: Refinements, Performance Tests, and Lessons Learned” (forthcoming in the 2020 BEIT Conference Proceedings) (“Kolesar/Raide 2020 Paper”).

<sup>9</sup> *NPRM* ¶ 12.

Broadcasters also can use the additional capacity for data services, including for traffic updates and navigation guides.

### C. IMPROVED SIGNAL COVERAGE

MA3 has proven to be superior to both the hybrid (MA1) mode of HD AM and standard analog AM transmissions in terms of signal coverage. WWFD previously reported reliable signal coverage to its 0.5 mV/m predicted contour (including critical hours),<sup>10</sup> with reception up to its 0.1 mV/m contour under ideal circumstances.<sup>11</sup>

These results still hold true after further testing, and it should be noted that these are daytime observations. Primary, secondary, and tertiary carrier reception generally has been observed to the daytime 0.5 mV/m contour, while primary carrier reception alone has been measured to the 0.1 mV/m contour.<sup>12</sup> During critical hours, reception can vary but is usually robust within the 0.5 mV/m contour. Nighttime reception varies as well, but is always present within half the value of the night interference-free (“NIF”) contour (calculated to be 5.4 mV/m for WWFD). Beyond this contour, reception will vary based upon conditions. On some evenings immediately after nighttime pattern change, primary carrier reception was confirmed to the nighttime 0.5 mV/m groundwave contour.<sup>13</sup>

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<sup>10</sup> Critical hours are the two hours after local sunrise and the two hours before local sunset. 47 C.F.R. § 73.187(a)(1).

<sup>11</sup> David Kolesar and Mike Raide, “Facility Upgrades for Full-Time All-Digital HD AM Broadcasting: A Case Study,” published in 2019 NAB BEITC Proceedings (2019) at 397 (“Kolesar/Raide 2019 Paper”).

<sup>12</sup> Indeed, the MA3 signal is far more robust than the MA1 mode, given that an MA3 signal can be decoded to the daytime 0.1 mV contour, whereas an MA1 signal is typically decoded to the daytime 2.0 mV contour (and can be even worse, depending upon transmission antenna capabilities).

<sup>13</sup> WWFD, as a Class B station, has no protected skywave service, so Hubbard cannot comment on the skywave performance of MA3.

While the total effective throughputs for MA3 and MA1 are similar (40.2 kbps for the former, 36.4 kbps for the latter), the reception area for all carriers (primary, secondary, and tertiary) leading to full audio quality<sup>14</sup> is much larger for MA3 than MA1. As a result, MA3 provides superior sound quality over the station's entire service area, in contrast to MA1, which provides superior audio quality over only a portion of a station's service area. The MA3 sound quality is in stark contrast to the scratchy audio quality of standard analog AM broadcasting.

MA3 also provides a listenable signal even at relatively low signal strength levels. Beyond the daytime 0.5 mV/m contour, typically only the primary carriers are decoded. This translates to 20.2 kbps mono audio, which is still superior to analog AM broadcasts.

#### **D. SPECTRUM AND ENERGY EFFICIENCY**

The *NPRM* seeks comment on whether all-digital operation would offer greater energy efficiency and thus utility cost savings for AM broadcasters.<sup>15</sup> In WWFD's experience, the power consumption of an MA3 transmitter is approximately the same as that of an analog transmitter broadcasting with the same power without MDCL ("Modulation Dependent Carrier Level"). Notably, there were no changes to WWFD's electric bill before or after the transition to MA3 broadcasting.

In terms of spectrum efficiency, all-digital AM is superior to analog AM. Because MA3 transmissions stay entirely within a 20 kHz channel, any adjacent-channel interference that may have been experienced by stations operating in the MA1 mode will be reduced or eliminated. Co-channel stations that are both operating in the MA3 mode will observe a "capture effect" similar to that of co-channel FM stations, where only one station (the stronger one) is heard.

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<sup>14</sup> 20 Hz-15 kHz, 72 dB of dynamic range, and 70 dB of stereo separation.

<sup>15</sup> *NPRM* ¶ 14.

Additionally, stations may choose to transmit in the primary carrier-only mode of MA3, which occupies a 10 kHz channel. This reduces the bitrate to 20.2 kbps, but is adequate for talk radio programming. This option may also be considered by stations with antenna systems severely constricted in bandwidth, such as a large number of towers, tight filtering, and closely-spaced RF channel diplexing.

### **III. INTERFERENCE ISSUES ASSOCIATED WITH ALL-DIGITAL AM BROADCASTING ARE MANAGEABLE**

The *NPRM* seeks comment on whether all-digital operation fits within the existing framework for interference protection or whether there are concerns unique to all-digital broadcasting that should be accounted for in the Commission's rules governing both groundwave and skywave protection of AM stations.<sup>16</sup> Hubbard notes that MA3 was designed to fit within the existing AM allocation scheme, and thus no changes to any existing rules would be required if all-digital operations are authorized. As a technical matter, MA3 occupies a 20 kHz channel, whereas MA1 occupied a 30 kHz channel. On that basis, any interference issues with MA3 should be far more manageable than was the case with MA1.

Notably, WWFD has not received any interference complaints from any co-channel or adjacent channel stations. Hubbard also agrees with the Commission's tentative conclusion that adjacent interference is less of a concern in all-digital operation than co-channel interference, due to the relocation of the digital carriers to the center of the channel.<sup>17</sup> With respect to potential co-channel interference, Hubbard concurs with the NAB Labs testing which found that

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<sup>16</sup> *NPRM* ¶ 16.

<sup>17</sup> *Id.* ¶ 17.

impairment to analog co-channel stations was essentially equivalent whether a station is operating with an analog or an all-digital AM signal.<sup>18</sup>

In terms of striking an appropriate balance between protecting reception of analog AM stations outside their protected contours and maximizing all-digital coverage,<sup>19</sup> Hubbard believes that, in order to avoid disincentivizing a station from voluntarily transitioning to all-digital, the current AM allocation scheme should not be altered to protect analog stations beyond the contours to which they are currently entitled.

Finally, the Commission should allow AM all-digital operation at night. As the *NPRM* notes, WWFD's experimental license authorizes it to operate at night.<sup>20</sup> WWFD does not appear to have caused any objectionable interference to co-channel or adjacent channel signals at night, and may have improved reception of such services due to listener perceptions of intelligibility in the presence of "white noise" (MA3 signal) as compared to an analog interfering station.

#### **IV. OPERATING RULES**

##### **A. POWER LIMITS AND EMISSIONS MASK COMPLIANCE**

The *NPRM* tentatively concludes that the allowed operating power (nominal power) limits for AM stations should be applied to the unmodulated analog carrier signal for stations that have converted to all-digital operation.<sup>21</sup> Hubbard agrees with this tentative conclusion. The forthcoming Kolesar/Raide 2020 Paper will outline various methods of verifying digital power based on the use of unmodulated carrier power as a reference.<sup>22</sup> In addition, that paper will discuss findings that the use of thermocouple RF ammeters for base current and common

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<sup>18</sup> David H. Layer, "NAB Labs All-digital AM Test Project," published in 2015 NAB Broadcast Engineering Conference Proceedings at 37 (2015).

<sup>19</sup> *NPRM* ¶ 20.

<sup>20</sup> *Id.* ¶ 22.

<sup>21</sup> *Id.* ¶ 23 (citing 47 C.F.R. § 73.21).

<sup>22</sup> *See supra* n.8.



point power measurements yielded the same results, which may eliminate the need for continuous wave measurements.

Based on WWFD's experiences, Hubbard believes that no adjustments to all-digital power limits are necessary. WWFD's operations have demonstrated that a similar coverage area to analog (in the absence of increased noise) is achieved with MA3 operations. While it is possible that, over time and with more real-world data to analyze, the Commission may want to examine possible adjustments to these power limits, it is likely premature to make any such changes now.

The *NPRM* also tentatively concludes that the HD radio emissions mask, which is incorporated by reference into the NRSC-5-D standard, should determine the allowable power for the digital sidebands.<sup>23</sup> Hubbard notes that the NRSC-5-D emissions mask is likely to be modified somewhat in the future, as even optimally-configured transmitters may slightly exceed the mask in the sidebands when operating with a typical AM broadcast antenna. It should be noted that the legal emissions mask for analog AM stations is much more relaxed than the HD Radio emissions standard. Hubbard believes that as long as an MA3 station remains within the current emissions mask for analog AM stations as set forth in Section 73.44 of the Commission's rules, there should not be any reason to delay digital adoption. The NRSC-5-D standard is a much more restrictive mask, and an updated version of that standard may be appropriate in the future.<sup>24</sup>

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<sup>23</sup> *NPRM* ¶ 23.

<sup>24</sup> Thus, while Hubbard agrees that the Commission should adopt the NRSC-5-D standard for digital stations, hybrid and all-digital, and incorporate the standard into the rules, *NPRM* ¶ 31, the NRSC-5-D emissions mask likely needs to be relaxed to accommodate real-world experiences with MA3 transmissions.

Finally, the *NPRM* seeks comment on appropriate tools to measure signal power in all-digital mode.<sup>25</sup> Hubbard believes that the preferred method is the thermocouple RF ammeter.<sup>26</sup> However, any of the methods outlined in the *NPRM* will provide accurate results. The majority of digital transmitters should include measurement tools capable of accurately monitoring compliance with the proposed operating power and emissions mask limitations. For example, WWFD's current main transmitter, a Nautel NX-5, contains a power measurement circuit, and independent measurements have confirmed its accuracy.

### **B. CARRIER FREQUENCY TOLERANCE STANDARD**

The *NPRM* tentatively concludes that it should impose a carrier frequency tolerance standard on AM stations of 1 Hz, as a way to improve all-digital reception.<sup>27</sup> Hubbard agrees with this tentative conclusion, and believes that compliance generally will not be burdensome for AM stations. Digital AM stations (MA1 and MA3) typically require a transmitter that is linked to GPS, and thus a frequency tolerance linked to GPS should not be difficult for digital stations to implement. Analog-only transmitters may not be linked to GPS, but Hubbard believes there are sufficient cost-effective solutions in the marketplace. The Commission could consider a waiver or grandfathering process for any analog AM stations that would face difficulties complying with a 1 Hz frequency tolerance standard.

### **C. ELECTRONIC FILING/EAS PARTICIPATION**

Finally, the *NPRM* proposes to allow licensees to electronically file an FCC Form 335-AM within ten days of commencing all-digital operations.<sup>28</sup> Hubbard agrees with this proposal.

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<sup>25</sup> *NPRM* ¶ 26.

<sup>26</sup> Kolesar/Raide 2020 Paper.

<sup>27</sup> *NPRM* ¶ 27.

<sup>28</sup> *Id.* ¶ 28.

Hubbard also agrees that all-digital stations should be required to participate in the Emergency Alert System.<sup>29</sup>

## V. CONCLUSION

Hubbard is excited about the prospects for the adoption of a voluntary transition to all-digital AM operations. The experiences of WWFD and field testing by NAB Labs and others have shown that MA3 operations bring the potential for significant improvements to the AM service in terms of audio fidelity and signal reach. The *NPRM* has outlined sufficient protections for existing analog AM service, and WWFD's experimental operations have shown that any concerns about co-channel or adjacent-channel interference have been addressed. Hubbard encourages the Commission to move forward with allowing AM stations to transition to MA3 operations should they choose to do so.

Respectfully submitted,

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<sup>29</sup> *Id.* ¶ 29.