

**FCC FACT SHEET**\*

**All-Digital AM Broadcasting; Revitalization of the AM Radio Service**  
Notice of Proposed Rulemaking – MB Docket Nos. 19-311 and 13-249

**Background:** Currently, AM stations may broadcast using either traditional analog or a hybrid analog/digital signal. Bryan Broadcasting submitted a petition for rulemaking to allow AM stations to also broadcast using an all-digital signal on a voluntary basis. This petition for rulemaking has received broad support from other commenters and is also supported by data from a series of performance tests conducted by NAB Labs. In addition, one AM station—WWFD(AM), Frederick, Maryland—has been operating successfully for more than a year under an experimental all-digital license. This record indicates that all-digital AM broadcasting has the potential to provide significant benefits to broadcasters and listeners as compared to analog and hybrid operations. For example, all-digital broadcasting could bring improved reliability and enhanced audio quality as well as address impairments that have plagued the AM service and constrained many AM stations to voice-only programming. All-digital broadcasting could also allow AM stations to transmit additional information, including song and artist information. Any transition to all-digital service would be optional, with each broadcaster individually assessing its own circumstances as well as the readiness of the relevant market. This Notice of Proposed Rulemaking is consistent with our ongoing efforts to revitalize and modernize the AM service.

**What the NPRM Would Do:**

- Seek comment on the tentative conclusion that the Commission should authorize all-digital AM broadcasting on a voluntary basis—specifically, the HD Radio in-band on-channel (IBOC) system.
- Propose technical standards for all-digital AM stations, including adoption of the NRSC-5-D Standard, and seek comment on the impact of such operations on existing analog stations and listeners.
- Establish a notification procedure for stations converting to or from all-digital operation equivalent to the current 10-day notification requirement for commencement of hybrid operations.

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\* This document is being released as part of a "permit-but-disclose" proceeding. Any presentations or views on the subject expressed to the Commission or its staff, including by email, should be filed in MB Docket No. 19-311, which may be accessed via the Electronic Comment Filing System (<https://www.fcc.gov/ecfs/>). Before filing, participants should familiarize themselves with the Commission's *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. *See* 47 CFR § 1.1200 *et seq.*

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

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

NOTICE OF PROPOSED RULEMAKING\*

Adopted: []

Released: []

Comment Date: [60 days after date of publication in the Federal Register]
Reply Comment Date: [90 days after date of publication in the Federal Register]

By the Commission:

I. INTRODUCTION

1. In this Notice of Proposed Rulemaking (NPRM), we propose to allow AM broadcasters to broadcast an all-digital signal using the HD Radio in-band on-channel (IBOC) mode known as MA3.1 We tentatively conclude that a voluntary transition to all-digital broadcasting has the potential to benefit AM stations and provide improved AM service to the listening public. We seek comment on proposed operating standards for all-digital stations and the impact of such operations on existing analog stations and listeners. This proceeding was initiated by a petition for rulemaking (Petition) filed on March 25, 2019, by Bryan Broadcasting Corporation (Bryan).2 This proceeding continues the Commission’s efforts

\* This document has been circulated for tentative consideration by the Commission at its November 2019 open meeting. The issues referenced in this document and the Commission’s ultimate resolutions of those issues remain under consideration and subject to change. This document does not constitute any official action by the Commission. However, the Chairman has determined that, in the interest of promoting the public’s ability to understand the nature and scope of issues under consideration, the public interest would be served by making this document publicly available. The Commission’s ex parte rules apply and presentations are subject to “permit-but-disclose” ex parte rules. See, e.g., 47 CFR §§ 1.1206, 1.1200(a). Participants in this proceeding should familiarize themselves with the Commission’s ex parte rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission’s meeting. See 47 CFR §§ 1.1200(a), 1.1203.

1 HD Radio is the brand name of the digital broadcasting technology owned and licensed by Xperi Corporation (Xperi). See infra, paragraph 3. In 2015, DTS Inc. acquired iBiquity Digital Corporation, the original developer and licensor of the HD Radio digital system. In 2016, Xperi acquired DTS Inc. Xperi Comments at 1, n.1.

2 The Petition was placed on public notice on April 11, 2019 (RM-11836). See Consumer & Governmental Affairs Bureau Reference Information Center Petition for Rulemakings Filed, Public Notice, Report No. 3123 (CGB Apr. 11, 2019). A list of commenters in the RM-11836 docket, as of October 4, 2019, is included at Appendix A. These comments are incorporated into the record of the proceeding initiated by this NPRM. Seventy commenters supported the proposal to allow digital AM broadcasting. See infra, paragraph 8. Ten commenters opposed the proposal, and one did not oppose or support it.

to improve and update the AM radio service to provide a better listening experience for consumers and enhanced service offerings, as part of our continuing effort to revitalize AM broadcasting.<sup>3</sup>

## II. BACKGROUND

2. The AM service has struggled for decades with a steady decline in listenership caused by interference and reception issues and the availability of higher fidelity alternatives.<sup>4</sup> Due to the propagation characteristics of AM signals, many AM stations are unable to operate at night or must operate at reduced power or with complex directional antenna systems to avoid interference to other AM stations.<sup>5</sup> In addition, AM stations are susceptible to electromagnetic emissions from various sources such as power lines, phone chargers, fluorescent and LED light bulbs, computer monitors, and flat-screen TVs (also known as the “noise floor”).<sup>6</sup> These well-documented issues affecting the audio quality of AM signals result in AM radio being largely dominated by low-fidelity voice formats such as talk radio (including foreign language programming), sports, religious programming, and news.<sup>7</sup> However, AM signals can cover vast geographic areas and many AM broadcasters provide unique, community-based programming that distinguishes them from other media sources in an increasingly competitive mass media market.<sup>8</sup>

3. The Commission has long recognized the potential for all-digital transmission to benefit both AM and FM services and to serve the public interest in spectrum efficiency.<sup>9</sup> As a general rule, digital signals are less susceptible to interference and other impairments—i.e., are more “robust”—than

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<sup>3</sup> See, e.g., *Revitalization of the AM Radio Service*, First Report and Order, Further Notice of Proposed Rule Making, and Notice of Inquiry, 30 FCC Rcd 12145 (2015) (*AMR First Report and Order*).

<sup>4</sup> See *Revitalization of the AM Radio Service*, Notice of Proposed Rulemaking, 28 FCC Rcd 15221, 15223, para. 5 (2013) (*AM Revitalization NPRM*); Kintronic Comments at 1 (explaining that the transition of listeners to the FM band is due to high noise floor and decline in the performance specifications of automobile AM receivers); Carl T. Jones Comments at 1 (stating that increased noise levels over the last several decades has “significantly impaired the audio quality” of the AM service).

<sup>5</sup> See generally, Federal Communications Commission, “Why AM Stations Must Reduce Power, Change Operations, or Cease Broadcasting at Night,” <https://www.fcc.gov/media/radio/am-stations-at-night> (last visited July 3, 2019).

<sup>6</sup> See Petition at 2; Crawford Comments at 1; Mendenhall Engineering Comments at 1; Randall Miller Comments at 1 (claiming that AM analog coverage of its station has been reduced by half over the past 20 years due to the high noise floor); NAB Comments at 1-2; Carl T. Jones Comments at 1; Gary Pfrehm Comments at 1; Trignition Comments at 1-2; Anthony Ricketts Comments at 1.

<sup>7</sup> See *AM Revitalization NPRM*, 28 FCC Rcd at 15223, para. 3; California and Missouri Broadcasters Comments at 2 (claiming that “of 268 California AM radio stations, 34% serve specific minority communities, including 33 Spanish language, 13 Asian format, 4 Korean format, 21 Asian or South Asian format and 20 programmed “Mexican” as distinguished from Spanish. Notably, 41 of those stations, 15%, are located outside all markets.”).

<sup>8</sup> See *AM Revitalization NPRM*, 28 FCC Rcd at 15223, para. 3 (noting that “[l]ocal programming is also prevalent on the AM dial, including discussions of local news, politics and public affairs, traffic announcements, and coverage of community events such as high school athletic contests.”); California and Missouri Broadcasters Comments at 2 (discussing examples of community-oriented AM stations, including a community discussion station in Baltimore, a Navajo language station in Arizona, a rural farm station in Nebraska, and a Cajun culture station in Louisiana).

<sup>9</sup> See, e.g., *Digital Audio Broadcasting Systems and Their Impact on the Terrestrial Radio Broadcast Service*, Notice of Proposed Rulemaking, 15 FCC Rcd 1722, 1730, para. 7 (1999) (“[W]e believe that a transition to an all-digital service is an appropriate public policy goal, because the spectrum efficiencies and related new service opportunities inherent in such systems can be realized fully only in an all-digital operational mode.”) (*First Digital NPRM*); *Digital Audio Broadcasting Systems and their Impact on the Terrestrial Radio Broadcast Service*, Second Report and Order, 22 FCC Rcd 10344, 10352-53, paras 20-22 (2007) (*Digital Radio Second Report and Order*) (“The ultimate goal of this proceeding is to establish a robust and competitive all-digital terrestrial radio system”).

analog signals and therefore can improve a station's audio quality and useable signal range. In addition, digital broadcasting offers AM broadcasters the potential ability to transmit auxiliary information, such as song and title information, to accompany the main audio programming.<sup>10</sup> In 2002, the Commission approved a digital radio system for use in the United States: the IBOC digital radio system originally developed by iBiquity, tested by the National Radio Systems Committee (NRSC),<sup>11</sup> and currently owned and licensed by Xperi under the brand name "HD Radio."<sup>12</sup> By selecting a single digital transmission technology, the Commission hoped to "ensure the rapid and efficient development of [terrestrial digital] service."<sup>13</sup>

4. The HD Radio system has two AM service modes: hybrid (MA1) and all-digital (MA3).<sup>14</sup> A hybrid transmission consists of a combination of analog and digital signals, with the analog signal typically occupying a center band of 5 kHz and digital carriers on either side of and underneath the analog signal.<sup>15</sup> In all-digital mode, there is no modulated analog carrier signal, and the digital carriers are moved toward center frequency with increased power, resulting in a "more robust digital signal that is less susceptible to adjacent channel interference."<sup>16</sup> An analog receiver cannot receive an all-digital MA3 signal.<sup>17</sup> Both modes permit operation within the existing allocations and channel spacing framework authorized by the Commission<sup>18</sup> and are designed to fit within the relevant Commission emissions

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<sup>10</sup> See *Digital Audio Broadcasting Systems and Their Impact on the Terrestrial Radio Broadcast Service*, First Report and Order, 17 FCC Rcd 19990, 19991, para. 3 (2002) (*Digital Radio First Report and Order*); Kintronic Comments at 3 ("[W]e expect to see a continual improvement in the number of program channels and related services that can be broadcast via one AM frequency allocation [using digital]").

<sup>11</sup> *Digital Radio First Report and Order*, 17 FCC Rcd 19990, paras. 1 and 44. The current IBOC standard is available to the public for free online at NRSC, NRSC-5-D In-band/on-channel Digital Radio Broadcasting Standard, <https://www.nrsstandards.org/standards-and-guidelines/documents/standards/nrsc-5-d/nrsc-5-d.pdf>. (Apr. 2017) (last visited July 17, 2019) (NRSC-5-D Standard). The NRSC is a standards-setting body for technical aspects of terrestrial over-the-air radio broadcasting systems in the United States and is jointly sponsored by the Consumer Technology Association and the National Association of Broadcasters. *Id.* at 3.

<sup>12</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 19990, para. 1; Xperi Comments at 1.

<sup>13</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 20002, para. 35. Although HD Radio IBOC is the exclusive digital technology approved for medium wave (AM) broadcasting in the United States, the Commission has adopted another digital standard, the DRM system, for certain long-distance short-wave broadcasting services operating within the HF frequency range (3-30 MHz). *Amendment of Parts 2, 25, and 73 of the Commission's Rules to Implement Decisions from the World Radiocommunication Conference (Geneva, 2003) (WRC-03) Concerning Frequency Bands between 5900 kHz and 27.5 GHz and to Otherwise Update the Rules in this Frequency Range*, Report and Order, 20 FCC Rcd 6570, 6599-600, para. 73 (2005) (*WRC Implementation Order*); 47 CFR § 73.758. In the *WRC Implementation Order*, the Commission stated that the selection of DRM for the HF band "in no way disturbs" the transition to HD Radio in the AM (535-1705 kHz) and FM (88-108 MHz) bands. *WRC Implementation Order*, 20 FCC Rcd at 6572, n.10.

<sup>14</sup> 2001 HD Radio Specifications at 8. For convenience, we use the terms "hybrid" and "MA1" interchangeably, as well as "all-digital" and "MA3." Similarly, the terms "digital carrier" and "digital sideband" are used interchangeably.

<sup>15</sup> 2001 HD Radio Specifications at 7; NRSC-5-D Standard at 14. In hybrid mode, the power of the digital sidebands is limited to prevent self-interference with the analog carrier signal and to prevent interference with first-adjacent stations.

<sup>16</sup> iBiquity Digital, "IBOC AM Transmission Specification" (Nov. 2001) (2001 HD Radio Specifications) at 7. For the purposes of this *Notice of Proposed Rulemaking*, "adjacent channel" means any first-, second-, or third-adjacent channel.

<sup>17</sup> NRSC-5-D Standard at 9.

<sup>18</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 20003, para. 37.

limits.<sup>19</sup> The NRSC has not tested or evaluated the MA3 mode, although all-digital operation is included in the NRSC-5 IBOC standard.<sup>20</sup> The HD Radio digital technical operating parameters are set out in the NRSC-5 standard and in periodic publications issued by iBiquity/HD Radio (HD Radio Specifications).<sup>21</sup>

5. In 2002, the Commission authorized the hybrid MA1 mode for daytime AM broadcasting and the hybrid MP1 mode for FM broadcasting.<sup>22</sup> At the time, the Commission declined to also adopt the all-digital mode for either the AM or FM service, explaining that “[a]lthough we recognize that a fully digital terrestrial radio service is the ultimate goal, it would be premature to endorse systems that have not been subject to comprehensive and impartial testing.”<sup>23</sup> Therefore, under the current rules, an AM broadcaster wishing to broadcast an all-digital signal must obtain an experimental license from the Commission.

6. From 2012 to 2014, the not-for-profit industry organization NAB Labs (now PILOT) conducted a series of AM all-digital performance field tests at nine radio stations, followed by laboratory testing of potential all-digital interference.<sup>24</sup> This work was summarized in two technical papers published in the 2015 and 2016 NAB Broadcast Engineering Conference Proceedings.<sup>25</sup> As discussed in

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<sup>19</sup> NRSC-5-D Standard at 14; *see* 47 CFR § 73.44 (AM transmission system emission limitations).

<sup>20</sup> NRSC-5-D Standard at 14, n.3. We note that NRSC-5 does not include specifications for audio source coding and compression (i.e., the means by which the audio data to be transmitted on a radio wave is encoded or compressed prior to transmission). In the iBiquity system, audio source coding and compression are handled by iBiquity’s HD codec (encoding software). iBiquity has committed to license all patents necessary to implement NRSC-5, either with or without the HD codec. It is also possible within the NRSC-5 standard to use audio source coding and compression schemes other than iBiquity’s HD codec. *See* Letter from Michael Petricone (Consumer Electronics Association) and Valerie Schulte (NAB) to Marlene Dortch, Secretary, FCC, dated May 18, 2005, in MM Docket No. 99-325.

<sup>21</sup> *See, e.g.*, iBiquity/ HD Radio, “HD Radio AM Transmission System Specifications” (Rev. G) (Mar. 13, 2017) at 7 (Section 4.5) (2017 HD Radio Specifications); iBiquity Digital Corporation, “HD Radio AM Transmission System Specifications,” Doc. 1082s, Rev. F, (Aug. 24, 2011) (2011 HD Radio Specifications); 2001 HD Radio Specifications.

<sup>22</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 19990, para. 1. In 2007, the Commission authorized nighttime AM digital broadcasting. *Digital Radio Second Report and Order*, 22 FCC Rcd at 10380, para. 90.

<sup>23</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 20003, para. 37; *see also Digital Radio Second Report and Order*, 22 FCC Rcd at 10352-53, paras 20-22 (“Moreover, adoption of an all-digital standard requires the consideration of novel and more complex technical and policy issues that arise only when the constraints of ‘designing around’ the legacy analog transmission standard are eliminated, *e.g.*, placement of the main digital signal, power levels, interference standards, etc. Accordingly, we will defer any action on these matters until a complete record has been developed.”).

<sup>24</sup> NAB Labs, “All Digital AM Radio Testing,” <https://nabpilot.org/work/projects/all-digital-am-radio-testing/> (last visited June 28, 2019). The stations that participated in the NAB Labs All-Digital AM Test Project were: WBCN, Charlotte, North Carolina; WNCT, Greenville, North Carolina; WBT, Charlotte, North Carolina; WD2XXM, Frederick, Maryland; KTUC, Tucson, Arizona; WDGY, Hudson, Wisconsin; WSWW, Charleston, West Virginia; KKXA, Snohomish, Washington; and KRKO, Everett, Washington.

<sup>25</sup> *See* David H. Layer, “NAB Labs All-digital AM Test Project,” published in 2015 NAB Broadcast Engineering Conference Proceedings at 19 (2015) (NAB Labs All-digital AM Test Project I); David H. Layer, Michael D. Rhodes, and Daniel G. Ryson, “NAB Labs All-digital AM Test Project – Part II, Co-Channel Laboratory Test Results,” published in 2016 NAB Broadcast Engineering Conference Proceedings at 50 (2016) (NAB Labs All-digital Test Project II). Digital copies of the entire 2015 and 2016 NAB Broadcast Engineering Conference Proceedings are available for purchase at [http://www.nabstore.com/NAB\\_Broadcast\\_Engineering\\_Conference\\_Proceedings\\_p/cp150.htm](http://www.nabstore.com/NAB_Broadcast_Engineering_Conference_Proceedings_p/cp150.htm) and [https://www.nabstore.com/NAB\\_Broadcast\\_Engineering\\_Conference\\_Proceedings\\_p/cp160.htm](https://www.nabstore.com/NAB_Broadcast_Engineering_Conference_Proceedings_p/cp160.htm), respectively, and available in ECFS under proceeding RM-11836 (see letter submitted by NAB on Oct. 23, 2019. This letter includes a predecessor study of a single station, WBCN, Charlotte, North Carolina, entitled Layer et al., “WBCN All-digital

(continued....)

more detail below, the NAB Labs field testing concluded that all-digital transmission results in a clearer, more robust signal, with greater daytime coverage than a hybrid signal. However, the laboratory testing phase raised concerns about possible co-channel interference and the ability of all-digital signals using standard AM transmission equipment to stay within the emissions mask set out in the HD Radio Specifications (HD Radio Emissions Mask).<sup>26</sup>

7. On July 16, 2018, station WWFD(AM), Frederick, Maryland, became the first AM broadcast station in the country to transmit a music format using the HD Radio all-digital MA3 mode full-time under an experimental license.<sup>27</sup> With most of its listeners having migrated to its FM translator W232DG, Frederick, Maryland (acquired in the AM Revitalization proceeding), the WWFD licensee, Hubbard, decided to experiment with the possibility of higher audio fidelity and increased reception area using an all-digital signal. It then promoted its all-digital AM station on the FM translator. Detailed information regarding the technical aspects of the WWFD facility modifications were presented at the 2019 NAB Broadcast Engineering and Information Technology Conference and published in the WWFD Paper.<sup>28</sup> Hubbard reports that it has experienced significant improvement in WWFD's audio quality and signal robustness in the all-digital mode (testing indicated reliable daytime coverage to at least the 0.5 mV predicted contour and nighttime coverage to the nighttime interference free (NIF) contour).<sup>29</sup> However, the WWFD facilities had to undergo considerable upgrades to broadcast an all-digital signal, and the station continues to experience transmission issues that limit all-digital capabilities, such as the ability to transmit song and artist visual metadata.<sup>30</sup> Nonetheless, the WWFD experiment illustrates the potential benefits of all-digital broadcasting for AM stations and their listeners, particularly regarding audio quality and signal coverage area. WWFD continues to operate under its experimental all-digital license. Citing the WWFD experiment, Bryan filed the instant Petition proposing to allow AM licensees the option to transition to the MA3 all-digital mode of HD Radio.<sup>31</sup>

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AM IBOC Field Test Project," published in 2013 NAB Broadcast Engineering Conference Proceedings at 183 (2013)).

<sup>26</sup> The Commission's rules impose limits on the power of a station's signal at various frequencies inside and outside its assigned channel, known as an "RF mask," "emissions mask," or "spectral occupancy limits." See 47 CFR §§ 73.44 (AM), 73.317 (FM); NRSC RF Mask Compliance Guide at 11. Together with protection requirements, the emissions mask prevents interference by limiting a station's signal strength relative to other, nearby stations operating on co- and adjacent channels. Although an IBOC system is designed to fit within the Commission's analog emissions mask, the Commission's rules do not specify emissions limits for digital carriers. Rather—for hybrid stations—the Commission directs licensees to operate within the power spectral density and spectrum emissions limits developed by iBiquity and tested by the NRSC. *Digital Radio First Report and Order*, 17 FCC Rcd at 20000, para. 28.

<sup>27</sup> See File No. BSTA-20180628AAI (granted on July 6, 2018) (WWFD Experimental Application), extended by BESTA-20190605ABK (granted on July 12, 2019). WWFD is owned by Hubbard Broadcasting, through its licensee subsidiary Washington DC FCC License Sub, LLC (collectively, Hubbard).

<sup>28</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 393 (WWFD Paper). Digital copies of the 2019 NAB Broadcast Engineering Conference Proceedings are available for purchase at [https://www.nabstore.com/NAB\\_Broadcast\\_Engineering\\_Conference\\_Proceedings\\_p/cp175.htm](https://www.nabstore.com/NAB_Broadcast_Engineering_Conference_Proceedings_p/cp175.htm). A detailed webinar entitled "All Digital AM in the Real World," which describes the WWFD experiment and technical aspects of all-digital AM broadcasting, is available on the Nautel website at <https://www.nautel.com/resources/webinars/am-transmitters/all-digital-am-in-the-real-world/> (last visited August 27, 2019), and available in ECFS under RM-11836 (see letter submitted by NAB on Oct. 23, 2019).

<sup>29</sup> Hubbard Comments at 2; WWFD Paper at 397.

<sup>30</sup> WWFD Paper at 398.

<sup>31</sup> Petition at 6.

### III. DISCUSSION

8. We propose to allow AM broadcasters, at their discretion, to transmit an all-digital signal using the HD Radio MA3 mode as set out in the NRSC-5-D Standard.<sup>32</sup> We find that Bryan has provided in its Petition sufficient reasons to support the initiation of a rulemaking proceeding to facilitate all-digital service. As discussed in greater detail below, we believe all-digital broadcasting has the potential to benefit AM stations by allowing them to reach more listeners with a better-quality signal, as well as improving power usage and spectrum efficiency. Likewise, listeners tuning into all-digital broadcasts should experience a wider selection of format choices (music as well as talk), clearer audio quality, and a more reliable signal than is provided by hybrid broadcasts. Proponents of all-digital AM broadcasting maintain that it represents a unique opportunity for AM broadcasters to improve their ability to reach the listening public and thus may be the single greatest hope for AM revitalization.<sup>33</sup> NAB, for example, contends that “the benefits of authorizing all-digital AM service will be widespread and immediate for broadcasters and listeners alike,”<sup>34</sup> and that “a voluntary transition to all-digital AM service could help to reverse [waning AM audience share and advertising revenues] by enabling broadcasters to provide a pristine signal, free of the interference that plagues analog AM service and deters listeners.”<sup>35</sup> Other commenters, however, oppose the proposal, generally on the basis that allowing all-digital AM operation might cause undue interference to analog AM stations or result in a loss of service for analog AM listeners.<sup>36</sup>

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<sup>32</sup> See *supra*, note 11. Numerous commenters support this proposal. See, e.g., REC Comments at 3, 7; Xperi Comments at 1; Mendenhall Engineering Comments at 1; Cavell Mertz Comments at 1; Hubbard Comments at 1; California and Missouri Broadcasters Comments at 1; Fybush Comments at 7; Kintronic Comments at 1-2; NAB Comments at 1; Carl T. Jones Comments at 2; Cromwell Group Comments at 1; University of Massachusetts Comments at 1; SSR Communications Comments at 1; Trignition Comments at 1; Digital Radio Mondiale Comments at 1.

<sup>33</sup> See, e.g., Trignition Comments at 2 (“[D]igital modulation offers a leap forward in audio quality and data service potential that traditional AM cannot achieve.”); Anthony Ricketts Comments at 1 (“[All-digital] appears to be the only path forward in providing better quality and maintaining our coverage area”); California and Missouri Broadcasters Comments at 1 (“Of all the various proposals for revitalization of AM broadcasting considered and adopted [in the AM Revitalization proceeding], voluntary MA-3 service mode for all-digital AM broadcasting may prove to be the most effective and useful”); REC Comments at 2 (arguing that a transition to all-digital would address many fundamental issues with the AM service and should thus be considered as an option for “final revitalization”); Crawford Comments at 1-2 (“The noise floor at medium-wave frequencies is what it is, and the only way to get around it is to either increase signal levels or go the all-digital route”); Mark and Arlene Bohach Comments at 1 (arguing that all-digital operation would “dramatically improve the audio quality of AM signals as well as provide a “powerful promotional tool to attract and retain listeners”); Cavell Mertz Comments at 2 (“[T]echnology has advanced to the point where [improved sound quality] is an achievable goal using presently available all-digital MA3 AM transmission methods”); McCarthy Comments at 2 (arguing that AM licensees should be permitted to broadcast in all-digital “to recover from the ever increasing levels of harmful electro-magnetic interference (EMI)”); Kintronic Comments at 3 (“[The] introduction of AM all-digital service could well be a fast-track means whereby AM broadcasters can re-capture lost listeners and revitalize the AM service in the U.S.”); Carl T. Jones at 2 (arguing that early conversion to all-digital could be the “catalyst needed at this critical time to further a technology which would allow AM stations to overcome the devastating impact of ever-increasing noise levels and thereby further Commission’s goal of revitalizing the AM radio service”); Gary Pfrehm at 1 (suggesting that all-digital operation will “render AM receivers immune from these RF radiation sources”).

<sup>34</sup> NAB Comments at 4.

<sup>35</sup> *Id.* at 2.

<sup>36</sup> See Eric S. Bueneman Comments at 1; Jerome J. Goodell Comments at 1; Paul Dobosz Comments at 1; Lawrence M. Cohen Comments at 1; John C. Goller Comments at 1; Dennis Banker Comments at 1; Robert Sillett Comments at 1; American Association of Information Radio Operators Comments at 1; Scottie Rice Comments at 1; Thomas Tompkins Comments at 1.



9. Below, we invite review and analysis of the data and conclusions set out in the NAB Labs All-Digital AM Test Projects and WWFD Paper.<sup>37</sup> We seek comment on the predicted benefits of all-digital AM broadcasting, such as improved audio quality, auxiliary data, improved useable signal coverage, increased programming choices (such as music) and energy and spectrum efficiency. We also seek comment on the interference potential of all-digital stations, including adjacent-channel, co-channel, digital-to-digital, and nighttime interference. We set out proposed operating standards, including power limits, emissions mask requirements, a new carrier frequency tolerance standard, a notification requirement for stations converting to all-digital, and EAS requirements. We seek comment on the costs of conversion for AM licensees and the readiness of the public to transition to all-digital reception. Finally, we seek comment on the rule changes needed to implement the proposed all-digital operation and the costs and benefits associated with doing so.

#### **A. Record Data**

10. We tentatively conclude that an adequate record regarding all-digital AM broadcasting has developed since we approved hybrid operations in 2002. As described above, from 2012 to 2014, NAB Labs conducted all-digital field testing of coverage at nine stations nationwide, followed by laboratory testing of the interference potential of the all-digital mode.<sup>38</sup> This testing was followed by the WWFD experiment starting in 2018 and continuing to the present. The data presented in these studies confirms the overall value and feasibility of all-digital broadcasting, which has also been expressed in the petition and by the overwhelming record support. At the same time, however, none of the all-digital test results available to date have been evaluated by the NRSC, and both NAB Labs and Kolesar and Raide suggest that there may be certain areas that warrant further investigation, such as RF mask compliance and the effects of noise on useful all-digital coverage area.<sup>39</sup> Similarly, Kintronic Laboratories, which participated in the WWFD conversion, believes that further testing of potential co-channel and adjacent-channel interference is necessary before the Commission authorizes all-digital AM broadcasting.<sup>40</sup> Despite these concerns, we agree with NAB and others who argue that these tests “validate the successful performance of all-digital AM radio service and certainly justify the Commission’s consideration of rules to allow broadcasters to transition to this mode on a voluntary basis.”<sup>41</sup> We seek comment on this view. We also seek comment on what additional information, if any, would be helpful in evaluating the full benefits and potential risks and/or costs of all-digital broadcasting. We also invite commenters to place any other relevant data or studies that might be or become available in the record in this proceeding for public review.

#### **B. Potential Benefits of All-Digital Broadcasting**

11. **Audio Quality.** We tentatively conclude that all-digital operation would improve the audio quality of AM broadcasts and seek comment on this conclusion. The NAB Labs studies and WWFD experimental license indicate that all-digital AM broadcasting has the potential to significantly

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<sup>37</sup> These documents are available in ECFS under proceeding RM-11836.

<sup>38</sup> Prior to the publication of the NAB Labs All-Digital Test Project II, which tested all-digital interference, the Commission again noted that “the record is not yet established on the technical standards need to establish interference protection . . .” *AMR NOI*, 30 FCC Rcd at 12179, para. 84.

<sup>39</sup> See NAB Labs All-Digital AM Test Project I at 43, 67; WWFD Paper at 398.

<sup>40</sup> Kintronic Comments at 1-2 (“We believe that until any potential co-channel and adjacent-channel interference has been fully characterized with the MA3 mode involving primary and secondary digital carriers or the MA3 core mode involving primary carriers only, a new AM all-digital service should be introduced only under a formal Experimental license, with detailed documentation of test results provided to the Commission (and publicly available) on the performance of the MA3 signals in the current noisy, mixed-mode AM environment.”).

<sup>41</sup> NAB Comments at 2-3; Carl T. Jones Comments at 2; Mendenhall Engineering Comments at 1.



improve audio quality compared to hybrid or analog, with relief from ambient noise and interference.<sup>42</sup> Compared to hybrid mode, all of the modulated transmitter power is dedicated to the digital carriers, in theory resulting in a significantly more robust reception even in the presence of a stronger analog co-channel signal.<sup>43</sup> Commenters who have tuned into WWFD using a car radio confirm that the station's MA3 signal is clear and listenable.<sup>44</sup> However, NAB Labs reported some interference from bridges and power lines that caused the all-digital signal to drop out and one instance of apparent nighttime interference to all-digital reception from first-adjacent channel stations operating in hybrid mode.<sup>45</sup> In addition, WWFD experienced signal impairment in its nighttime directional null "due to the directional antenna system suppressing the center of the channel more than the sidebands."<sup>46</sup> Kolesar and Raide suggest that further study on the effect of noise sources on listenable coverage area would "contribute to the body of knowledge of 'real-world' MA3 implementation."<sup>47</sup> Therefore, we seek comment on whether the data on record establish that all-digital MA3 operation will provide an improved, consistently high-quality listener experience and relative relief from interference and other signal impairments. Would all-digital AM operation provide better audio quality than analog or hybrid AM operation? Would all-digital operation provide listenable signals even at relatively low signal strength levels? What is likely to be the listener experience at the outer listenable fringes of the all-digital signal coverage, particularly where a co-channel signal is encountered? Was there a strong co-channel interferer in the WWFD experiment that might have affected the range of the listenable signal? How detrimental to an all-digital signal would interference from power lines, other stations, or other sources be? Are digital receivers better equipped to receive a listenable AM signal than their current analog counterparts?<sup>48</sup> Would all-digital operation provide AM broadcasters a greater range of programming choices, including music formats?

12. **Auxiliary data.** We tentatively conclude that all-digital operation would provide AM broadcasters the opportunity to provide additional services such as stereo audio, song and artist identification, as well as emergency notifications that include text and images (such as missing person photos or emergency evacuation maps). However, we note that NAB Labs did not report on auxiliary data transmission and that the WWFD secondary and tertiary carriers—which transmit program metadata

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<sup>42</sup> See Cavell Mertz Comments at 2; California and Missouri Broadcasters Comments at 3-4; Kintronic Comments at 1; Trignition Comments at 1-2 (stating that all-digital broadcasting can tolerate a much higher RF noise level while maintaining high quality audio delivery); WWFD Paper at 393 ("The effective data throughput increases to approximately 40 kbps over the 20 kbps achieved with the MA1 waveform, resulting in higher-fidelity stereo audio, and opens up the possibility of multicasting and data services such as "Artist Experience.") "Artist Experience" is the synchronous transmission, delivery, and display of images on the HD Radio receiver that are related to the specific audio segment, such as cover art, sponsor logos, and advertisements. See HD Radio, "HD Radio Technology—Artist Experience," <https://hdradio.com/broadcasters/engineering-support/artist-experience/> (last visited July 11, 2019).

<sup>43</sup> WWFD Paper at 393; NAB Labs All-Digital AM Test Project I at 28; NAB Labs All-Digital AM Test Project II at 63.

<sup>44</sup> Kevin Fitzgerald Comments at 2; Fybush Comments at 4-5.

<sup>45</sup> NAB Labs All-Digital AM Test Project at 28. WWFD, on the other hand, appears to have "reasonable robustness to obstacles that impede analog AM reception: Power lines, electrical storms, and passing underneath bridges." WWFD Paper at 397.

<sup>46</sup> WWFD Paper at 398. A directional null refers to the portion of an AM signal that radiates the least amount of energy and, typically, the direction of weakest signal strength. For example, if a station's directional null is oriented due south, all other things being equal, its predicted signal contours will extend the least distance in the southern direction.

<sup>47</sup> WWFD Paper at 398.

<sup>48</sup> Kintronic reports, for example, that current HD Radio receivers incorporate noise filtering that is not included with current analog AM receivers. Kintronic Comments at 1.

such as song and artist information—are reportedly not always reliable.<sup>49</sup> Therefore, we seek comment on whether all-digital operation, as a practical matter, would put AM stations on a more level playing field with other broadcast services that have the ability to broadcast music formats complete with program metadata. We also seek comment on how broadcasters might use their additional digital capacity in other ways. According to Xperi, the all-digital MA3 mode provides flexibility in allowing tradeoffs between audio quality and the amount of data devoted to auxiliary services. For hybrid stations, we allow a great deal of flexibility regarding the use of additional channel capacity with the requirement that the station provide one stream of free audio programming.<sup>50</sup> Should we follow a similar approach for any auxiliary services that may be provided by all-digital AM stations and require that all digital broadcasters transmit a single stream of free audio programming comparable in audio quality to a standard analog broadcast?<sup>51</sup> How are all-digital broadcasters likely to use such flexibility? How do hybrid AM broadcasters currently use their auxiliary capacity? Are secondary and tertiary digital carriers likely to be primarily used for metadata relating to the primary audio broadcast or are there other possible applications? Specifically, is there the potential in the AM service for future multicast channels?

13. **Signal coverage.** We tentatively conclude, based on the data on record, that an all-digital signal offers the potential of greater useable signal coverage compared to existing AM stations—whether analog or hybrid.<sup>52</sup> The primary goal of the field test portion of the NAB Labs All-Digital AM Test Project was to determine the real-world coverage performance of the all-digital AM signal.<sup>53</sup> This field testing demonstrated reliable all-digital daytime reception beyond the subject stations’ analog predicted 0.5 mV/m contour and generally out to the 0.1 mV/m contour or beyond.<sup>54</sup> In some cases, the all-digital daytime signal was listenable at considerable distances from the transmitter (the WDGY signal, for example, was received as far as 78 miles from the transmitter).<sup>55</sup> With one exception, nighttime reception was reliable to or beyond the test stations’ analog predicted night interference-free (NIF) contours.<sup>56</sup> WWFD reports similar results: reliable signal coverage to its 0.5 mV/m predicted contour (including critical hours), with reception up to its 0.1 mV/m contour under ideal circumstances.<sup>57</sup> Nighttime reception is generally reduced to WWFD’s nighttime interference free (NIF) contour, due to co-channel skywave interference.<sup>58</sup> We seek comment on these test coverage results and our tentative conclusion. We also seek comment on whether the Commission should monitor whether an individual station’s digital coverage corresponds to its previous analog coverage, and if not, whether we should take steps to ensure that the station’s digital coverage is not significantly less than its previous analog coverage.

14. **Energy efficiency.** We seek comment on whether all-digital operation would offer greater energy efficiency and thus utility cost savings for AM broadcasters. As noted by Walker, the

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<sup>49</sup> WWFD Paper at 397.

<sup>50</sup> See *Digital Radio Second Report and Order*, 22 FCC Rcd at 10362, para. 48; 47 CFR § 73.403(a).

<sup>51</sup> See proposed 47 CFR § 73.403(a), Appendix B.

<sup>52</sup> See Brian W. Walker, “Transmission Challenges and Solutions for All-Digital AM IBOC,” <https://www.nautel.com/resources/white-papers/am-transmitters/transmission-challenges-and-solutions-for-all-digital-am-iboc/> (2014) (Walker Paper) at 1; NAB Labs All-Digital AM Test Project I at 19, 37.

<sup>53</sup> NAB Labs All-Digital AM Test Project I at 41.

<sup>54</sup> *Id.* at 24; Kintronic Comments at 2.

<sup>55</sup> NAB Labs All-Digital AM Test Project I at 28.

<sup>56</sup> *Id.* at 24, 37 (explaining that the anomaly might have been due to unaccounted-for low ground conductivity in the region and that if the actual ground conductivity were taken into account than the observed all-digital coverage would have occurred outside the NIF for that station as well).

<sup>57</sup> WWFD Paper at 397.

<sup>58</sup> *Id.*

recent adoption of modulation dependent carrier level (MDCL) control in the United States would indicate that there is industry interest in saving power to lower costs.<sup>59</sup> How much power would an all-digital AM HD Radio system use compared to analog AM? Would all-digital operation lower power costs for broadcasters compared to analog or hybrid coverage of the same area?

15. **Spectrum efficiency.** We tentatively conclude that all-digital operation would help realize the full potential of digital technology for spectrum efficiency and seek comment on this conclusion. The HD Radio system allows digital broadcasts within the current AM spectrum allocations and analog emissions mask. In all-digital mode, the analog signal present in hybrid operation is replaced with primary digital carriers at  $\pm 5$  kHz from center frequency. In “reduced bandwidth” configuration, the secondary and tertiary subcarriers are disabled and only the primary carriers are used, for a total overall bandwidth of 10 kHz. In contrast, in “enhanced mode,” all three digital sideband groups are used, for a total overall bandwidth of 20 kHz.<sup>60</sup> We seek comment on the spectrum efficiency of the all-digital mode of HD Radio transmission and the implications of using the current 20 kHz AM channel assignments in all-digital mode.

### C. Interference

16. We seek 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>61</sup> A number of commenters express concern that all-digital operation could cause interference to co- and adjacent-channel analog stations.<sup>62</sup> The potential for all-digital operations to create interference is discussed below. In this respect, we note that an all-digital signal has fewer emissions at the outer limits of the occupied bandwidth and therefore should present fewer interference concerns in general than the hybrid mode. We seek comment on this determination.

17. **Adjacent channel interference.** As a threshold matter, we tentatively conclude that co-channel interference is more of a concern with all-digital broadcasting than adjacent channel interference. By design, all-digital AM is less likely to cause interference to adjacent channel signals than hybrid operation, due to the relocation of the digital carriers to the center of the channel.<sup>63</sup> For this reason, NAB Labs concluded that no further testing of adjacent-channel interference was needed for all-digital operation, since the “exhaustive hybrid AM tests already conducted [for hybrid mode] represent the

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<sup>59</sup> Walker Paper at 1; *see also Revitalization of the AM Radio Service*, First Report and Order, 30 FCC Rcd 12145, 12163, para. 39 (2016); 47 CFR § 73.1560. MDCL (modulation dependent carrier level) transmitter control techniques allow AM licensees to reduce power consumption by varying either the carrier power level or both the carrier and sideband power levels as a function of the modulation level. *See Revitalization of the AM Radio Service*, Notice of Proposed Rule Making, 28 FCC Rcd 15221, 15235, para. 32 (2013). At the time the Commission authorized MDCL control technologies, more than 60 stations were using MDCL under waivers or experimental authorizations. *AMR First Report and Order*, 30 FCC Rcd at 12162, para. 36.

<sup>60</sup> *See* NAB Labs All-Digital AM Test Project I at 20.

<sup>61</sup> AM propagation characteristics vary markedly between daytime and nighttime. During the day, when ionospheric reflection does not occur to any great degree, AM signals travel principally by conduction over the surface of the earth (“groundwave” propagation). During nighttime hours, however, the ionosphere reflects AM signals back to the earth’s surface, allowing them to travel hundreds of miles through “skywave” propagation. If every AM station kept its daytime operating power at night, massive interference would result. *See supra*, note 5. For this reason, many AM stations are unable to operate at night or must operate at reduced power or with complex directional antenna systems to avoid interference to other AM stations.

<sup>62</sup> *See* REC Comments at 5, 7; McCarthy Comments at 4; Jerome J. Goodell Comments at 1; Paul Dobosz Comments at 1; Kintronic Comments at 2; SSR Communications at 1.

<sup>63</sup> *See, e.g.*, NAB Labs All-Digital AM Test Project I at 41; California and Missouri Broadcasters Comments at 4.

worst-case adjacent-channel interference conditions for the HD Radio AM system.”<sup>64</sup> Therefore, the focus of the NAB Labs laboratory testing was all-digital co-channel interference. We tentatively agree with NAB Labs that all-digital operation is not likely to create additional interference to adjacent channel signals. We seek comment on this tentative conclusion and on the likelihood of all-digital adjacent channel interference. Would all-digital operation cause less adjacent-channel interference than hybrid operation?

18. **Co-channel interference.** We seek comment on co-channel interference and ask for specific comments addressing NAB Labs-conducted laboratory testing of all-digital co-channel interference based on the procedures developed by the NRSC to test the HD Radio hybrid system.<sup>65</sup> Such testing was necessary, according to NAB Labs, because co-channel interference from an all-digital AM signal is expected to be greater than experienced from a hybrid signal, primarily because in all-digital mode the digital signal at the center of the channel has a higher power than in hybrid mode.<sup>66</sup> The co-channel interference testing carried out by NAB Labs confirmed that all-digital interference typically degrades analog signal-to-noise ratios approximately 10.5 dB more than an equal amount of analog interference.<sup>67</sup> However, the NAB Labs field testing of one subject station, WSWW, indicated that impairment to analog co-channel stations was essentially equivalent irrespective of whether WSWW was operating with an analog or an all-digital AM signal.<sup>68</sup> We seek comment on these lab results and on the potential impact of all-digital signals on co-channel analog stations both in and outside their protected contours.

19. As a matter of allocations policy, we note that when the Commission adopted hybrid operation in 2002, it accepted a certain amount of interference potential (in that case, mostly adjacent-channel) in return for the benefits of digital operation.<sup>69</sup> In doing so, the Commission observed that “[o]ur AM and FM technical regulatory schemes are designed, with certain minor exceptions not relevant here, to protect the reception of analog signals only where those signals meet or exceed certain signal strengths, i.e., within a station’s protected service contour (or interference-free contour)... We conclude that the tradeoffs that hybrid mode operations may require are consistent with well-established broadcast interference policies.”<sup>70</sup> Similarly, when it authorized nighttime operation for AM stations, the Commission stated that “[t]he benefits of full-time IBOC operation by AM stations outweigh the slightly increased risk of interference . . . the greatest potential for interference occurs at the extremities of the nighttime coverage area of the desired station, primarily at locations where substantial interference from existing analog operations is already present. We do not anticipate increased interference within AM stations’ core service areas. Furthermore, the interference management procedures established in the [*Digital Radio First Report and Order*] provide a mechanism whereby particular instances of interference can be readily resolved.”<sup>71</sup> Does this reasoning apply equally to the potential for co-channel interferences as a result of all-digital operation?

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<sup>64</sup> NAB Labs All-Digital AM Test Project I at 41.

<sup>65</sup> NAB Labs All-Digital AM Test Project II at 50.

<sup>66</sup> NAB Labs All-Digital AM Test Project I at 41.

<sup>67</sup> NAB Labs All-Digital AM Test Project II at 61, 63.

<sup>68</sup> NAB Labs All-Digital AM Test Project I at 37.

<sup>69</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 19998, para. 24 (noting that, according to the NRSC, “first adjacent compatibility is a significant issue for [hybrid] AM IBOC,” particularly under nighttime skywave propagation conditions).

<sup>70</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 19995, para. 15.

<sup>71</sup> *Digital Radio Second Report and Order*, 22 FCC Rcd at 10380, para. 90; see 47 CFR § 73.404(a).

20. We seek comment on ways to minimize the likelihood of co-channel interference from all-digital stations and to resolve impermissible interference if it occurs. For currently-authorized AM hybrid stations, if interference is anticipated or occurs, the licensee may adjust the power level of the primary digital subcarriers downward by as much as 6 dB.<sup>72</sup> If actual interference occurs within another station's protected service contour and the respective licensees are unable to reach agreement on a voluntary power reduction, the Commission staff may order power reductions for the primary digital carriers or, in extreme cases, termination of IBOC operation.<sup>73</sup> Is this streamlined procedure effective; and, if so, should it govern claims of all-digital interference within the protected contours of the affected station?<sup>74</sup> Should we consider adopting additional protections and/or complaint procedures to allow affected stations to object to all-digital interference even outside their protected contours? How can we best gather information regarding instances of excessive interference in the event that a future power reduction might be required? What is the appropriate balance between protecting reception of analog stations outside their protected contours and maximizing all-digital coverage?

21. **Digital-to-digital interference.** We seek comment on the potential of digital-to-digital interference. An all-digital AM signal has a greater interference potential to other all-digital AM signals than does an analog AM interferer; however, it is still a much lower threshold of interference than analog-to-analog.<sup>75</sup> This suggests that if all AM stations were digital, co-channel interference would be less, thus potentially increasing groundwave coverage for a given power level and carrier frequency.<sup>76</sup> We seek comment on this observation and on digital-to-digital interference generally. We note that the all-digital mode increases the power and bandwidth occupancy of the digital carriers. How might this increase affect adjacent channel digital transmissions?<sup>77</sup> What would be the impact of all-digital stations on hybrid stations? Would all-digital operation be more likely to affect co-channel all-digital stations but not adjacent hybrid stations?

22. **Nighttime operations.** We seek comment on whether to allow AM all-digital operation at night. AM propagation characteristics vary markedly between daytime and nighttime. In the *Digital Radio First Report and Order*, the Commission initially did not approve nighttime hybrid broadcasting due to the increased potential for interference through skywave propagation.<sup>78</sup> The NAB Labs Test Project did not evaluate potential nighttime interference by all-digital stations; however, it determined that all-digital nighttime reception was reliable to or beyond most test stations' analog predicted night interference-free (NIF) contours.<sup>79</sup> In addition, WWFD's experimental license authorizes it to operate at night. One commenter is concerned that "there are still questions yet to be fully answered about real-world deployment of MA3 all-digital, particularly the effects of nighttime skywave on interference among multiple MA3 all-digital signals and between digital and analog co-channel signals."<sup>80</sup> We seek comment

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<sup>72</sup> 47 CFR § 73.404(b); *Digital Radio First Report and Order*, 17 FCC Rcd at 20000, para. 29.

<sup>73</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 20000, para. 29.

<sup>74</sup> *Id.*

<sup>75</sup> NAB Labs All-Digital AM Test Project II at 63; *see generally*, NRSC RF Mask Compliance Guide at 11.

<sup>76</sup> NAB Labs All-Digital AM Test Project II at 63.

<sup>77</sup> In 2004, iBiquity asserted that the all-digital mode "will not affect adjacent channel digital transmissions" although it may result in greater interference to first-adjacent analog signals. iBiquity Comments in Docket 99-325 at 6 (filed June 17, 2004).

<sup>78</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 20003, para. 37. After additional nighttime testing, the Commission allowed nighttime AM hybrid operation. *Second Report and Order*, 22 FCC Rcd at 10379-80, paras. 89-90 (noting that the greatest potential for interference occurred at the extremities of the nighttime coverage area of the desired station, and that it did not "anticipate increased interference within AM stations' core service areas.").

<sup>79</sup> NAB Labs All-Digital AM Test Project I at 24, 37.

<sup>80</sup> Fybush Comments at 6.

on this issue. How would all-digital operation affect potential interference caused by skywave propagation?<sup>81</sup> What additional study and testing might be needed to assess AM all-digital performance under nighttime propagation conditions?

#### D. Operating Rules

23. **Power limits.** We tentatively conclude that: (1) the allowed operating power (nominal power) limits for AM stations, as set out in section 73.21 of our rules and individual station authorizations,<sup>82</sup> should be applied to the unmodulated analog carrier signal for stations that have converted to all-digital HD Radio operation;<sup>83</sup> and (2) 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>84</sup> We seek comment on this tentative conclusion. This approach minimizes the interference potential of all-digital stations by limiting an all-digital station's unmodulated carrier to the same maximum power levels as hybrid and analog stations and ensuring that its digital emissions will not exceed the existing analog emissions mask. The HD Radio Emissions Mask is designed to conform to the analog AM emission mask specified in section 73.44 of the Commission's rules, which is integrally related to the Commission's allocations rules, which in turn rest on certain assumptions concerning tradeoffs between coverage and interference.<sup>85</sup> Would reliance on the HD Radio Emissions Mask for digital sidebands preserve our existing allocations priorities? Should we adjust all-digital power limits in an effort to replicate existing analog coverage, and if so, what would be the appropriate power levels? If we were to adjust such power limits, how would that impact other stations, including analog and hybrid stations? Protected service contours reflect a balance between providing adequate service areas for each station while maximizing the potential number of station assignments.<sup>86</sup> How should this balance be struck as the AM service transitions to an all-digital environment? Would a change in nominal power limits encourage or discourage digital adoption?

24. **Emissions mask compliance.** As stated above, we propose to require all-digital AM stations to comply with the relevant emissions masks set out in the Commission's rules and the NRSC-5-D standard.<sup>87</sup> We seek comment on the ability of all-digital stations to comply with these requirements. The HD Radio Emissions Mask was originally developed prior to the widespread development and deployment of AM HD Radio transmission equipment and is based on a theoretical analysis designed to minimize out-of-band emissions while not "overly constraining the signal."<sup>88</sup> The NRSC has not tested or evaluated the MA3 mode, including the emissions mask, although the all-digital specifications are included in the NRSC-5 standard.<sup>89</sup> In its NRSC RF Mask Compliance Guide, the NRSC explains that it will incorporate guidelines for all-digital MA3 emissions mask compliance "when such transmissions are

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<sup>81</sup> See McCarthy Comments at 5.

<sup>82</sup> 47 CFR § 73.21. Directional antenna patterns would also remain as currently authorized.

<sup>83</sup> The analog carrier is necessary when operating in all-digital HD Radio mode to serve as a reference point for the correct tuning and operation of the digital sidebands. See Dave Kolesar and Mike Raide, "Upgrading an AM to All-Digital: Why, How and Lessons Learned," Radio World, available at <https://www.radioworld.com/tech-and-gear/upgrading-an-am-to-all-digital-why-how-and-lessons-learned> (last visited Oct. 25, 2019).

<sup>84</sup> The MA3 mode includes an unmodulated analog carrier signal (i.e., one that is transmitted with the digital sidebands but does not carry information as a regular modulated analog carrier would). We propose to treat the unmodulated analog and digital carriers separately for power limitation purposes.

<sup>85</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 20000, para. 28.

<sup>86</sup> *First Digital NPRM*, 15 FCC Rcd at 1735, para. 33.

<sup>87</sup> NRSC-5-D Standard at 26 *et seq.*; para. 31, *supra*.

<sup>88</sup> NAB Labs All-Digital AM Test Project I at 19-20.

<sup>89</sup> NRSC-5-D Standard at 14, n.3.

authorized by the Commission.”<sup>90</sup> The nine radio stations that underwent field testing as part of the NAB Labs All-Digital AM Test Project had some difficulty meeting the HD Radio Emissions Mask limits.<sup>91</sup> For this reason, NAB Labs suggests that a possible future study regarding emissions compliance could be appropriate.<sup>92</sup> We seek comment on whether these compliance issues also implicate the test stations’ ability to comply with section 73.44 of the rules. In general, are there specific characteristics of all-digital AM operation, particularly using existing AM facilities, that pose challenges to emissions mask compliance, and if so, how should these issues be approached?<sup>93</sup>

25. We seek comment on the advisability of mandating compliance with the HD Radio Emissions Mask, given that the NRSC has not evaluated it and the NAB Labs testing indicated that all-digital stations might have difficulty complying with it. NAB Labs states that the HD Radio Emission Mask is “likely to be re-evaluated to take into account operational information and an assessment of the realizable performance of AM facilities.”<sup>94</sup> Should the Commission wait to approve all-digital operation until the HD Radio Emissions Mask as it relates to MA3 all-digital operation has been evaluated and/or formally endorsed by the NRSC?

26. Finally, we seek comment on how signal power should best be measured in all-digital broadcasting mode, for the purposes of compliance with sections 73.44, 73.51, 73.1590, and the HD Radio Emissions Mask.<sup>95</sup> What procedures and equipment would give the most accurate results?<sup>96</sup> The NRSC states that it anticipates that “instrument manufacturers may develop innovative methods for evaluating signals and achieving compliance.”<sup>97</sup> Should the Commission specify what types of measurements will be acceptable to demonstrate compliance with the Commission’s rules? Due to the peak-to-average ratio of the MA3 mode, which is significantly higher than that of standard amplitude modulation, the power level meter on some transmitters may not read accurately.<sup>98</sup> Do the majority of digital transmitters include measurement tools capable of accurately monitoring compliance with the operating power and emissions mask limitations proposed herein?

27. **Carrier frequency tolerance standard.** We tentatively conclude that we should impose a carrier frequency tolerance standard on AM stations of 1 Hz,<sup>99</sup> as a way to improve all-digital reception. NAB Labs observes that undesired analog signals that are further off-frequency (e.g., 2 and 5 Hz) were found to have a greater impact on the all-digital signal.<sup>100</sup> In contrast, if desired and undesired carriers are

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<sup>90</sup> NRSC, “NRSC-5 RF Mask Compliance: Measurement Methods and Practice,” NRSC-G201-B, <https://www.nrscstandards.org/standards-and-guidelines/accept.asp?name=documents/guidelines/g201-b.pdf> (Apr. 2016) (last visited July 18, 2019) at 7 (NRSC RF Mask Compliance Guide).

<sup>91</sup> NAB Labs All-Digital AM Test Project I at 20 (citing the 2011 HD Radio Specifications).

<sup>92</sup> NAB Labs All-Digital AM Test Project I at 43.

<sup>93</sup> See, e.g., Walker Paper at 2-7.

<sup>94</sup> NAB Labs All-Digital AM Test Project I at 43, 67.

<sup>95</sup> See Walker Paper at 3; WWFD Paper at 397-98; HD Radio Specifications at 13 (“[M]easurements of the All Digital signal shall be made by averaging the power spectral density in a 300-Hz bandwidth over a minimum time span of 30 seconds and a minimum of 100 sweeps); 47 CFR § 73.44, 73.51, 73.1590.

<sup>96</sup> See NRSC RF Mask Compliance Guide at 53.

<sup>97</sup> *Id.* at 46.

<sup>98</sup> See WWFD Paper at 397.

<sup>99</sup> See 47 CFR § 73.1545(a) (imposing a  $\pm 20$  Hz carrier frequency departure tolerance on AM stations). Carrier frequency tolerance standard refers to the amount, in hertz, that a carrier’s actual operating frequency may depart from its assigned frequency.

<sup>100</sup> NAB Labs All-Digital AM Test Project II at 63.



locked or within 1 Hz of one another, the undesired analog signal amplitude can be as great as 6 dB less than the desired all-digital signal before any degradation is detected in the digital audio signal.<sup>101</sup> This is a significant improvement over the 26 dB desired-to-undesired (D/U) interference standards for analog AM.<sup>102</sup> We seek comment on the proposed benefits and feasibility of a 1 Hz carrier frequency tolerance standard. What would be the burden for existing analog AM stations to comply with a stricter frequency tolerance standard as proposed?

28. **Notification procedure.** We propose that any station commencing all digital operation must inform the Commission using substantially the same notification procedure currently applicable to hybrid IBOC operations (i.e., electronically filing an FCC Form 335-AM within ten days of commencing all-digital operation).<sup>103</sup> We seek comment on this proposal. We tentatively conclude that we should likewise be notified when an all-digital station reverts to analog operation, because—unlike a hybrid station simply dropping the digital portion of its signal—conversion from all-digital to analog operation would introduce a new signal that was previously absent. We seek comment on this tentative conclusion.

29. **EAS requirements.** We tentatively conclude that all-digital AM stations should be subject to the section 73.1250 requirement for all free digital stations to participate in the nationwide emergency alert system (EAS).<sup>104</sup> Some commenters express concern about the effect of all-digital conversions on the EAS and emphasize the historic record of AM stations providing essential communications during times of crisis, such as natural disasters or other emergencies.<sup>105</sup> As noted above, all-digital stations are anticipated to cover the same broadcast area with a clearer, more listenable signal—including during emergencies—and will be required to broadcast EAS alerts. Nonetheless, analog-only listeners would only receive EAS alerts from local stations that broadcast an analog signal. We seek comment on the effect of a voluntary transition to all-digital broadcasting on the EAS system and how best to maximize consumer access to emergency information if local AM stations are allowed to convert to all-digital broadcasting.

30. **Travelers' information stations.** We seek comment on the effect of all-digital operations on travelers' information stations (TIS, also called highway advisory radio), which are operated by some state or local governments to disseminate local traffic and weather advisories. TIS facilities are limited to a 10 watt transmitter output power, antenna height no greater than 15 meters, and a coverage radius of 3 km.<sup>106</sup> Some commenters express concern that these low-power stations are particularly vulnerable to interference from other broadcast stations, power lines, and ambient noise, which would be exacerbated by digital radio signals.<sup>107</sup> What would the effect of all-digital operation be on the TIS service?

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<sup>101</sup> *Id.*

<sup>102</sup> *Id.*

<sup>103</sup> See 47 CFR § 73.404(e) and proposed rule 47 CFR § 73.406 in Appendix B; Joseph Fiorini Comments at 1 (suggesting that licensees notify the Commission either before or within ten days of converting to all digital); Kevin Fitzgerald Comments at 1 (advocating a simplified application and approval process for all-digital operations).

<sup>104</sup> 47 CFR § 73.403 (applying the emergency information requirements of 47 CFR § 73.1250 to all free digital audio broadcasting programming streams).

<sup>105</sup> See Paul Dobosz Comments at 1 (arguing that analog AM is more useful in an emergency because noisy analog systems can still be heard whereas weak digital signals drop out completely); Frank Hertel Comments at 1; See California and Missouri Broadcasters Comments at 3; McCarthy Comments at 6; Thomas Tompkins Comments at 2 (arguing that all-digital would eliminate consumer's ability to use simplified, unpowered equipment such as "foxhole radios" during times of war or other disaster).

<sup>106</sup> See 47 CFR § 90.242.

<sup>107</sup> See American Association of Information Radio Operators at 1.

31. **Adopting NRSC-5-D Standard to all digital audio broadcasting stations.** We propose to adopt the NRSC-5-D Standard for all digital stations, hybrid as well as all-digital.<sup>108</sup> In accordance with the Office of the Federal Register (OFR) requirements for any document that is to be incorporated by reference,<sup>109</sup> the discussion in this paragraph summarizes and indicates the availability of the NRSC-5-D Standard. The NRSC-5-D Standard provides technical specifications for IBOC transmission systems. It includes various IBOC transmission system characteristics and transport and service multiplex characteristics, including the iBiquity emissions masks and other technical specifications, which are in turn incorporated by reference into the Standard.<sup>110</sup> The NRSC-5-D Standard is free and available to the public at <https://www.nrscstandards.org/standards-and-guidelines/documents/standards/nrsc-5-d/nrsc-5-d.pdf>. Adoption of the NRSC-5-D Standard would codify the existing *de facto* technical parameters for hybrid and all-digital IBOC operation and thus provide greater operational and business certainty to both broadcasters and equipment manufacturers. We do not anticipate that adoption of the NRSC-5-D Standard will change, for practical purposes, the technical guidelines applicable to AM and FM hybrid stations or require stations to change their operations in any way. We seek comment on this proposal.

32. **Other rules.** In general, the Commission has established that radio stations operating in a digital format must comply with the service rules and public interest obligations applicable to analog stations, such as rules relating to station logs, public file, political broadcasting, contests, sponsorship identification, and so on.<sup>111</sup> Are there any service, programming, operational, or technical rules applicable to digital services generally that should be reconsidered or modified for all-digital operation?<sup>112</sup> AM stations are currently authorized to operate with the hybrid AM IBOC system as tested by the NRSC.<sup>113</sup> Other than the HD Radio Emissions Mask, are there other technical aspects to the NRSC-5-D Standard that should be re-examined for all-digital operation?

#### **E. Conversion Costs and Receiver Availability**

33. **Licensing and equipment costs.** We tentatively conclude that the costs of conversion to all-digital, while variable by station, do not appear to be prohibitive and emphasize that such costs will be entirely voluntary. Commenters express concern regarding the cost of conversion given that the only all-digital system available to broadcasters is a proprietary, fee-based system.<sup>114</sup> At present, Xperi charges a one-time licensing fee of around \$10,000 for single main channel broadcasting and additional annual fees based on a percentage of revenues for each additional subchannel. We seek comment on the licensing costs of the HD Radio system and whether this fee presents an obstacle to the adoption of all-digital broadcasting. Are HD Radio license fees a disproportionate burden on smaller broadcasters, as argued by

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<sup>108</sup> See proposed 47 CFR § 73.405 at Appendix B. We note that the Media Bureau previously issued a Public Notice seeking comment on the NRSC-5-A Standard. See *Comment Sought on National Radio Systems Committee's "In-Band/On-Channel Digital Radio Broadcasting Standard NRSC-5,"* 20 FCC Rcd 10712 (MB, 2005). If we adopt the NRSC-5-D Standard in this proceeding, we propose to dismiss the 2005 Public Notice as moot. We seek comment on this.

<sup>109</sup> See, e.g., *Structure and Practices of the Video Relay Service Program*, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 687 (CGAB 2017).

<sup>110</sup> NRSC-5-D Standard at 7-8.

<sup>111</sup> *Digital Radio Second Report and Order*, 22 FCC Rcd at 10371, paras. 65-66.

<sup>112</sup> See generally, *Digital Radio Second Report and Order*, 22 FCC Rcd at 10354-84, paras. 23-101; see also McCarthy Comments at 5-6 (suggesting limitations to the extent of directional antenna nulls or minimas to avoid digital drop-out in these areas).

<sup>113</sup> *Digital Radio First Report and Order*, 17 FCC Rcd at 20000, para. 29.

<sup>114</sup> See Chuck Conrad Comments at 1; WTRW Comments at 1; Hatfield & Dawson Comments at 2; Robert Sillett Comments at 2; Digital Radio Mondiale at 1; Anthony Ricketts Comments at 1.

REC?<sup>115</sup> We also ask commenters to provide any relevant experience with Xperi in licensing the required technology.

34. In addition to the HD Radio license, AM operators converting to all-digital broadcasting will have equipment and installation costs. The Commission has stated that it favors digital systems that do not require burdensome investments in new broadcast transmission equipment.<sup>116</sup> AM stations that are already broadcasting in hybrid mode will need minimal equipment changes to convert to all-digital and thus will be able to do so at relatively little cost.<sup>117</sup> Similarly, California and Missouri Broadcasters estimate that the cost for converting an analog AM station has fallen from \$45,000 in 2002 to around \$12,000 for current equipment.<sup>118</sup> Xperi states that transmitter equipment sold by several manufacturers is compatible with the MA3 mode.<sup>119</sup> We seek comment on the cost and availability of digital transmission equipment. Has the average cost of acquiring the equipment and licensing to convert to digital operation, in total, gone down in the years since adoption?

35. In the case of WWFD, extensive upgrades, repairs, and modifications were necessary to prepare the station's physical plant for digital operation.<sup>120</sup> The WWFD modifications were carried out by a team of experts, including Kintronic and Cavell, Mertz, and Associates for the antenna system and Broadcast Electronics, Nautel, and GatesAir for the transmitters.<sup>121</sup> Even so, ongoing transmitter issues "prevent the full benefits of MA3 transmission from being demonstrated at WWFD."<sup>122</sup> Specifically, even after considerable testing and upgrades, undiagnosed carrier-to-noise ratios impaired reception of the secondary and tertiary carriers.<sup>123</sup> How likely is it that AM broadcasters, particularly early adopters, will encounter similar technical obstacles? What technical support will be available to converting AM broadcasters and/or their engineering consultants? Is extensive site rehabilitation likely to be necessary for other (particularly older) AM facilities? If so, what level of expertise and expense is likely to be required to duplicate the WWFD experiment? On the other hand, will some legacy AM antenna systems that are unable to pass digital carriers in the MA1 mode be capable of doing so using MA3?

36. **Loss of listener base.** Also factored into the cost of conversion borne by any station opting to go all-digital is any loss of existing analog listeners who do not either migrate to an associated translator or acquire an all-digital receiver. In the case of WWFD, this loss was minimized by migrating most listeners to an FM channel, converting the AM station to all-digital, and then promoting the all-digital AM signal on the FM translator. Currently, over half of AM stations now have FM translators. We invite comment on whether the acquisition of FM translators resulting from the AM Revitalization proceeding will allow AM broadcasters greater freedom to experiment with their AM signals as Hubbard has done. If successful, would a transition to all-digital AM ease the industry pressure to enhance

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<sup>115</sup> See REC Comments at 6.

<sup>116</sup> 1999 NPRM, at 1730, para. 18.

<sup>117</sup> See Chuck Conrad Comments at 1. All but one of the stations participating in the NAB Labs All-Digital AM Test Project were already capable of digital transmissions in hybrid mode. NAB Labs All-Digital AM Test Project I at 35.

<sup>118</sup> California and Missouri Broadcasters Comments at 4.

<sup>119</sup> Xperi Comments at 4.

<sup>120</sup> WWFD Paper at 394-95 ("Many of the above modifications resembled site rehabilitation, counteracting decades of site neglect and poor practices that are likely all too common across the industry").

<sup>121</sup> *Id.* at 393.

<sup>122</sup> *Id.* at 398. In contrast, the conversion of one station conducted as part of the NAB Labs Test Project (WSWW, Pittsburgh, Pennsylvania) "proceeded without incident and was accomplished in a single day." NAB Labs All-Digital AM Test Project at 35.

<sup>123</sup> WWFD Paper at 397.

protections for FM translators despite their well-established status as a secondary service? We also seek comment on whether all-digital translator rebroadcasting or digital synchronous booster stations would further improve the reliability and coverage of MA3 signals.

37. Overall, regarding the cost of conversion, we anticipate that a voluntary conversion process would allow each AM broadcaster to make the determination whether to assume the associated risks and expenses based on their own assessment of the state of the individual market and the future viability of their analog AM signal.<sup>124</sup> We seek comment on this conclusion. Xperi reports that there are currently 2300 HD Radio stations nationwide;<sup>125</sup> however, adoption of the hybrid HD Radio system by AM broadcasters has been relatively lukewarm compared to FM,<sup>126</sup> with fewer than 250 AM stations broadcasting in hybrid mode. This low rate of hybrid adoption is due to multiple factors, including reception issues with the hybrid analog signals,<sup>127</sup> limited signal robustness and reception range caused by the relatively low amplitude of the digital sidebands in relation to the analog carrier,<sup>128</sup> and adjacent channel interference caused by the wider bandwidth of hybrid signals.<sup>129</sup> In addition, the hybrid mode is more likely to require replacement of the entire antenna system than all-digital.<sup>130</sup> We seek comment on the technical and economic factors that might encourage more widespread adoption of all-digital broadcasting within the AM service.

38. **Receiver availability and consumer impact.** Although we propose to give broadcasters the flexibility to determine on a case-by-case basis whether their particular market will support all-digital broadcasting, we seek comment on the overall state of readiness of AM listeners to transition to digital broadcasting. While some commenters argue that HD Radio technology has not been widely accepted by the public,<sup>131</sup> others contend that there are a significant number of HD Radio receivers in the market, especially in cars.<sup>132</sup> Xperi reports that there are more than 55 million HD Radio-equipped cars in the United States, and “[a]ll major auto brands offer factory-installed HD Radio receivers, with HD Radio technology a standard feature in over 170 vehicle models.”<sup>133</sup> Similarly, Kintronic Laboratories states that most new automobiles, and 18% of total U.S. vehicles, are equipped with HD Radio receivers.<sup>134</sup> According to Xperi, existing HD Radio receivers will support all-digital AM functionality, including the main audio program and any accompanying data.<sup>135</sup> To determine the overall likelihood of successful

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<sup>124</sup> See Fybush Comments at 6.

<sup>125</sup> Xperi Comments at 2.

<sup>126</sup> NAB Labs All-Digital AM Test Project at 1 (“[W]ithin the broadcasting industry there has been more interest in the all-digital version of the AM system than the all-digital version of the FM system because, for a variety of reasons, the hybrid AM system has not been widely deployed by broadcasters and has not received the same level of market acceptance as has the hybrid FM system”).

<sup>127</sup> WWFD Paper at 393.

<sup>128</sup> *Id.*

<sup>129</sup> Dave Kolesar and Mike Raide, “Upgrading an AM to All-Digital: Why, How and Lessons Learned,” Radio World, available at <https://www.radioworld.com/tech-and-gear/upgrading-an-am-to-all-digital-why-how-and-lessons-learned> (last visited Oct. 25, 2019).

<sup>130</sup> *Id.*

<sup>131</sup> American Association of Information Radio Operators at 1; WTRW Comments at 1.

<sup>132</sup> See Chuck Conrad Comments at 1; Fred Morton Comments at 1; Mendenhall Engineering Comments at 1 NAB Comments at 3; Carl T. Jones Comments at 2; Bristol County Comments at 1; Kevin Fitzgerald at 1-2; Trignition Comments at 2.

<sup>133</sup> Xperi Comments at 2.

<sup>134</sup> Kintronic Comments at 1.

<sup>135</sup> Xperi Comments at 4.

AM conversion to all-digital, we seek additional comment on the degree of market penetration of digital receivers nationwide, including car and portable receivers, as well as information regarding the quality and cost of such receivers.<sup>136</sup> Are portable (non-vehicle) HD receivers readily available and affordable? How many HD Radio receivers that have been sold in the past are currently still in operation?

39. We seek comment on the impact that stations converting to all-digital operations could have on listeners with analog-only receivers. What is the estimated size of this audience, and their estimated frequency of use of such receivers? In a market with very few stations, a single station's conversion to all-digital could reduce options for analog-only listeners.<sup>137</sup> For this reason, REC suggests that we require any station converting to all-digital to show that it is not the only full-service aural service within its community of license county.<sup>138</sup> NAB contends, however, that the "optional nature of [Bryan's] approach should allay any concerns about the effect of transitioning to all-digital AM on listener access," because each broadcaster will determine whether a critical mass of listeners in the local market has access to digital receivers.<sup>139</sup> We anticipate that an all-digital stations' ability to serve the public would be strengthened by having this path to improved technical and economic viability. In short, we seek comment on whether preserving the long-term economic viability of an AM station and the public benefit of improved service to some listeners would justify the present-day loss of service to other listeners. What steps, if any, could the Commission or broadcast industry take to minimize service disruption and the impact of all-digital conversion on consumers? For example, should we require a station converting to all-digital to notify its listeners that it will be converting to all digital and additional information such as when the transition will take place, what the new service area will be, and what type of receiver will be necessary to continue receiving broadcasts from that station? If so, what should be the timing and frequency of such on-air announcements? Are there any analogies from other broadcast transitions that would be instructive in this regard?<sup>140</sup>

40. By this *NPRM*, the Commission proposes to adopt rules to permit voluntary all-digital operation of AM stations. We seek comment on the specific issues raised herein as well as input on any other rule changes relevant to our proposal to allow all-digital AM broadcasting.<sup>141</sup> We also seek

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<sup>136</sup> See REC Comments at 2 (suggesting that there are limited AM tabletop digital receivers available); Alan Peterson Comments at 1 (arguing that AM digital receivers should be able to automatically switch between analog and digital); Paul Dobosz Comments at 1 (suggesting that digital receivers may be more expensive and difficult to obtain than analog receivers).

<sup>137</sup> See Thomas Tompkins Comments at 2 (arguing that all-digital operation would render many analog radios obsolete).

<sup>138</sup> REC Comments at 3.

<sup>139</sup> NAB Comments at 4.

<sup>140</sup> See, e.g., *DTV Consumer Education Initiative*, Report and Order, 23 FCC Rcd 4134 (2008) (requiring television broadcasters to fulfil certain consumer education requirements regarding the digital television transition, including on-air public service announcements).

<sup>141</sup> This proceeding proposes only all-digital broadcasting for AM stations. Therefore, the following matters raised by commenters (but not included in the Petition) are outside the scope of this proceeding: (1) lowering emissions from Part 15 and Part 18 devices or increasing enforcement of existing emissions limits; (2) increasing protections for FM translators operated by AM licensees; (3) raising power levels for AM stations generally; (4) creating a new "all digital" band at 40-50 MHz; (5) mandating receiver quality standards; (6) reinstating pre-NRSC-2 wideband transmission and reception; (7) mandating reduced analog bandwidth; (8) terminating licenses of analog translators obtained in Auctions 99 or 100 five years after the primary AM station commences all-digital operations; and (9) mandating universal all-digital operation. In addition, we decline to revisit our earlier conclusion that HD Radio IBOC is the exclusive digital technology approved for AM radio. *Digital Radio First Report and Order*, 17 FCC Rcd 19990, paras. 1 and 44. Finally, the Petition does not include the FM service in its proposal for all-digital operation, and the testing and experiments on the record have not included FM stations. Without more data and industry interest in all-digital FM, we will consider only all-digital AM authorization at this time.

comments on the costs and benefits associated with this proposal, as well as the costs and benefits of any other alternative approaches to addressing the issues raised in this *NPRM*. To the extent possible, commenters should quantify the claimed costs and benefits and provide supporting information. We also ask for comment on the effect of these proposals on AM broadcasters that are small entities and seek comment as to alternatives that would minimize burdens on such small entities.

#### IV. PROCEDURAL MATTERS

41. *Ex Parte Rules – Permit-But-Disclose*. The proceeding this *NPRM* initiates shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules.<sup>142</sup> Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. Memoranda must contain a summary of the substance of the *ex parte* presentation and not merely a listing of the subjects discussed. More than a one or two sentence description of the views and arguments presented is generally required. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter’s written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with Section 1.1206(b) of the Rules.<sup>143</sup> In proceedings governed by Section 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (e.g., .doc, .xml, .ppt, searchable.pdf).<sup>144</sup> Participants in this proceeding should familiarize themselves with the Commission’s *ex parte* rules.

42. *Initial Regulatory Flexibility Act Analysis*. As required by the Regulatory Flexibility Act of 1980 (RFA),<sup>145</sup> the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA). The IRFA is attached as Appendix C. Written public comments are requested on the IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the first page of this document. The Commission will send a copy of this document, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).

43. *Initial Paperwork Reduction Act Analysis*. This document contains proposed new or modified information collection requirements. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget (OMB) to comment on the information collection requirements contained in this document, as required by the Paperwork Reduction Act of 1995, Public Law 104-13. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. 3506(c)(4), we seek specific comment

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<sup>142</sup> 47 CFR §§ 1.1200 *et seq.*

<sup>143</sup> 47 CFR § 1.1206(b).

<sup>144</sup> 47 CFR § 1.49(f).

<sup>145</sup> *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601, *et seq.*, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 847 (1996). The SBREFA was enacted as Title II of the Contract with America Advancement Act of 1996 (CWAAA).

on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees.

44. **Comment Filing Procedures.** Pursuant to Sections 1.415 and 1.419 of the Commission's rules,<sup>146</sup> interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS).<sup>147</sup>

- **Electronic Filers:** Comments may be filed electronically using the Internet by accessing the ECFS: <http://apps.fcc.gov/ecfs/>
- **Paper Filers:** Parties who choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12<sup>th</sup> St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. Eastern Time. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12<sup>th</sup> Street, SW, Washington DC 20554.

45. **People with Disabilities:** To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to [fcc504@fcc.gov](mailto:fcc504@fcc.gov) or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

46. **Availability of Documents.** Comments and reply comments will be publicly available online via ECFS.<sup>148</sup> These documents will also be available for public inspection during regular business hours in the FCC Reference Information Center, which is located in Room CY-A257 at FCC Headquarters, 445 12<sup>th</sup> Street, SW, Washington, DC 20554. The Reference Information Center is open to the public Monday through Thursday from 8:00 a.m. to 4:30 p.m. and Friday from 8:00 a.m. to 11:30 a.m.

47. **Additional Information.** For additional information on this proceeding, contact Christine Goepp, [christine.goepp@fcc.gov](mailto:christine.goepp@fcc.gov), of the Media Bureau, Audio Division, at (202) 418-7834, or James Bradshaw, [james.bradshaw@fcc.gov](mailto:james.bradshaw@fcc.gov) of the Media Bureau, Audio Division, at (202) 418-2739.

## V. ORDERING CLAUSES

48. Accordingly, **IT IS ORDERED** that, pursuant to the authority contained in section 1.407 of the Commission's rules, 47 CFR § 1.407, the Petition for Rulemaking filed by Bryan Broadcasting Corporation **IS GRANTED** to the extent specified herein.

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<sup>146</sup> See 47 CFR §§ 1.415, 1419.

<sup>147</sup> See *Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

<sup>148</sup> Documents will generally be available electronically in ASCII, Microsoft Word, and/or Adobe Acrobat.



49. **IT IS FURTHER ORDERED** that, pursuant to the authority contained in Sections 1, 4(i), 4(j), 301, 303, 307, 308, 309, 316, and 319 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 154(j), 301, 303, 307, 308, 309, 316, and 319, this Notice of Proposed Rulemaking **IS ADOPTED**.

50. **IT IS FURTHER ORDERED** that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, **SHALL SEND** a copy of this Notice of Proposed Rulemaking, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch  
Secretary

**APPENDIX A**  
**List of Commenters**

Alan Peterson  
Anthony L. Ricketts  
Benjamin P. Smith  
Beth A. Mann  
Blackbelt Broadcasting Inc.  
Bradford Caldwell  
Brett Paradis  
Brian Winnekins  
Bristol County Broadcasting, Inc./SNE Broadcasting, Ltd. (Bristol County)  
California Broadcasters Association and Missouri Broadcasters Association  
Carl T. Jones Corporation  
Cavell, Mertz & Associates, Inc.  
Choice Radio Corporation  
Chuck Conrad  
Clifton G. Moor  
Crawford Broadcasting Company  
Cromwell Group, Inc.  
Daniel Brown  
Daniel C. Fischer  
David M. Radigan  
David R. LePage, President of O-N Radio, Inc.  
David Webster  
Delta Radio Network LLC  
Dennis Banker  
Dennis Switzer  
Don Grassman  
Eric S. Bueneman  
Frank Hertel  
Fred R. Morton  
Gary Pfrehm  
Gene Bender  
Hal Widsten  
Hatfield & Dawson Consulting Engineers, LLC  
Hubbard Radio, LLC  
James R. Kitchens Jr.  
Jay M. Philippone  
Jerome J. Goodell  
Joe Divito  
John Butler  
John C. Goller  
Joseph Fiorini  
Julie Hein  
Kenneth Kuenzie  
Kentucky Mountain Bible College

Kevin M. Fitzgerald  
Kintronic Laboratories, Inc.  
Lance Parr  
Lawrence M. Cohen  
American Association of Information Radio Operators (AAIRO)  
Louis Vito  
Mark and Arlene Bohach  
Mark Osmundson  
McCarthy Radio Enterprises, Inc  
Mendenhall Engineering, LLC  
National Association of Broadcasters (NAB)  
Paul Anderson  
Paul Dobosz  
Paul Gardner  
Randal J. Miller  
Randall Lindsey  
REC Networks  
Rex Tackett  
Robert Meisse  
Robert Sillett  
Scott Briggs  
Scott Fybush  
Scott Poese  
Scottie Rice  
SSR Communications, Inc.  
Stephen Woodward  
Susan Ernest  
Terry L. Barber  
Thomas H. Tompkins  
Timothy Parry Jr.  
Tom McAuliffe II  
Trignition Media, LLC  
University of Massachusetts  
Walt Pruiksma  
Will Payne  
William H. Traue  
William Saluk  
WTRW Incorporated and Metro North Communications, Inc (WTRW)  
Xperi Corporation

**APPENDIX B****Proposed Rule Changes**

Part 73 of Chapter 5 of Title 47 of the Code of Federal Regulations is amended as follows:

1. The authority citation for part 73 continues to read as follows:

Authority: 47 U.S.C. 154, 155, 301, 303, 307, 309, 310, 334, 336, 339.

2. In § 73.402, add new paragraph (h) to read as follows:

**§ 73.402 Definitions.**

\* \* \* \* \*

(h) All-digital AM station. An AM station broadcasting an IBOC waveform that consists solely of digitally modulated subcarriers and the unmodulated AM carrier.

3. In § 73.403, revise paragraph (a) to read as follows:

**§ 73.403 Digital audio broadcasting service requirements**

(a) Broadcast radio stations using IBOC must transmit at least one over-the-air digital audio programming stream at no direct charge to listeners. In addition, a hybrid broadcast radio station must simulcast its analog audio programming on one of its digital audio programming streams. The DAB audio programming stream that is provided pursuant to this paragraph must be at least comparable in sound quality with a standard analog broadcast.

\* \* \* \* \*

4. In § 73.404, revise paragraphs (a) – (d) and remove paragraph (e) to read as follows:

**§ 73.404 IBOC DAB operation.**

(a) The licensee of an AM or FM station, or the permittee of a new AM or FM station which has commenced program test operation pursuant to § 73.1620, may commence interim hybrid IBOC DAB operation with digital facilities which conform to the technical specifications specified for hybrid DAB operation in the First Report and Order in MM Docket No. 99–325, as revised in the Media Bureau's subsequent Order in MM Docket No. 99–325. In addition, the licensee of an AM station, or the permittee of a new AM station that has commenced program test authority pursuant to § 73.1620, may commence all-digital IBOC operation with digital facilities that conform to the requirements set out in the First Report and Order in MB Docket No. 19-311 and MB Docket No. 13-249. An AM or FM station may transmit IBOC signals during all hours for which the station is licensed to broadcast.

(b) In situations where interference to other stations is anticipated or actually occurs, hybrid or all-digital AM licensees may, upon notification to the Commission, reduce the power of the primary DAB sidebands by up to 6 dB. Any greater reduction of sideband power requires prior authority from the Commission via the filing of a request for special temporary authority or an informal letter request for modification of license.

(c) Hybrid IBOC AM stations must use the same licensed main or auxiliary antenna to transmit the analog and digital signals.

(d) FM stations may transmit hybrid IBOC signals in combined mode; i.e., using the same antenna for the analog and digital signals; or may employ separate analog and digital antennas. Where separate antennas are used, the digital antenna:

- (1) Must be a licensed auxiliary antenna of the station;
- (2) Must be located within 3 seconds latitude and longitude from the analog antenna;

(3) Must have a radiation center height above average terrain between 70 and 100 percent of the height above average terrain of the analog antenna.

5. Add § 73.405 to subpart C to read as follows:

**§ 73.405 Digital Audio Broadcasting Standard**

Unless expressly authorized otherwise, all DAB stations must conform to the technical specifications set out in the NRSC-5-D In-band/on-channel Digital Radio Broadcasting Standard (Apr. 2017), which is hereby incorporated by reference in § 73.8000 of this Part.

6. Add § 73.406 to subpart C to read as follows:

**§ 73.406 Notification**

Licensees must provide notification to the Commission in Washington, DC, within 10 days of commencing IBOC digital operation or reverting from all-digital to analog operation.

(a) Every digital notification must include the following information:

- (1) Call sign and facility identification number of the station;
- (2) Date on which IBOC operation commenced;
- (3) Name and telephone number of a technical representative the Commission can call in the event of interference;
- (4) A certification that the operation will not cause human exposure to levels of radio frequency radiation in excess of the limits specified in § 1.1310 of this chapter and is therefore categorically excluded from environmental processing pursuant to § 1.1306(b) of this chapter. Any station that cannot certify compliance must submit an environmental assessment (“EA”) pursuant to § 1.1311 of this chapter and may not commence IBOC operation until such EA is ruled upon by the Commission.

(b) Every AM digital notification must also include the following information:

- (1) Certification that the IBOC DAB facilities conform to the NRSC-5-D standard.
- (2) Transmitter power output; if separate analog and digital transmitters are used, the power output for each transmitter;
- (3) If applicable, any reduction in an AM station’s primary digital carriers;

(c) Every FM digital notification must also include the following information:

- (1) Certification that the IBOC DAB facilities conform to the NRSC-5-D standard;
- (2) FM digital effective radiated power used and certification that the FM analog effective radiated power remains as authorized;
- (3) If applicable, the geographic coordinates, elevation data, and license file number of the auxiliary antenna employed by an FM station as a separate digital antenna;
- (4) If applicable, for FM systems employing interleaved antenna bays, a certification that adequate filtering and/or isolation equipment has been installed to prevent spurious emissions in excess of the limits specified in § 73.317;

7. In § 73.1545, revise paragraph (a) to read as follows:

**§ 73.1545 Carrier frequency departure tolerances.**

(a) AM stations. The departure of the carrier frequency for monophonic transmissions or center frequency for stereophonic transmissions may not exceed  $\pm 1$  Hz from the assigned frequency.

\* \* \* \* \*

8. In § 73.8000, add new paragraph (e) to read as follows:

**§ 73.8000 Incorporation by reference.**

\* \* \* \* \*

(e) The National Radio Systems Committee, NRSC-5-D In-band/on-channel Digital Radio Broadcasting Standard (Apr. 2017) (NRSC-5-D Standard), is available at <https://www.nrsstandards.org/standards-and-guidelines/documents/standards/nrsc-5-d/nrsc-5-d.pdf>.

**APPENDIX B****Proposed Rule Changes**

Part 73 of Chapter 5 of Title 47 of the Code of Federal Regulations is amended as follows:

1. The authority citation for part 73 continues to read as follows:

Authority: 47 U.S.C. 154, 155, 301, 303, 307, 309, 310, 334, 336, 339.

2. In § 73.402, add new paragraph (h) to read as follows:

**§ 73.402 Definitions.**

\* \* \* \* \*

(h) All-digital AM station. An AM station broadcasting an IBOC waveform that consists solely of digitally modulated subcarriers and the unmodulated AM carrier.

3. In § 73.403, revise paragraph (a) to read as follows:

**§ 73.403 Digital audio broadcasting service requirements**

(a) Broadcast radio stations using IBOC must transmit at least one over-the-air digital audio programming stream at no direct charge to listeners. In addition, a hybrid broadcast radio station must simulcast its analog audio programming on one of its digital audio programming streams. The DAB audio programming stream that is provided pursuant to this paragraph must be at least comparable in sound quality with a standard analog broadcast.

\* \* \* \* \*

4. In § 73.404, revise paragraphs (a) – (d) and remove paragraph (e) to read as follows:

**§ 73.404 IBOC DAB operation.**

(a) The licensee of an AM or FM station, or the permittee of a new AM or FM station which has commenced program test operation pursuant to § 73.1620, may commence interim hybrid IBOC DAB operation with digital facilities which conform to the technical specifications specified for hybrid DAB operation in the First Report and Order in MM Docket No. 99–325, as revised in the Media Bureau's subsequent Order in MM Docket No. 99–325. In addition, the licensee of an AM station, or the permittee of a new AM station that has commenced program test authority pursuant to § 73.1620, may commence all-digital IBOC operation with digital facilities that conform to the requirements set out in the First Report and Order in MB Docket Nos. 19-311 and 13-249. An AM or FM station may transmit IBOC signals during all hours for which the station is licensed to broadcast.

(b) In situations where interference to other stations is anticipated or actually occurs, hybrid or all-digital AM licensees may, upon notification to the Commission, reduce the power of the primary DAB sidebands by up to 6 dB. Any greater reduction of sideband power requires prior authority from the Commission via the filing of a request for special temporary authority or an informal letter request for modification of license.

(c) Hybrid IBOC AM stations must use the same licensed main or auxiliary antenna to transmit the analog and digital signals.

(d) FM stations may transmit hybrid IBOC signals in combined mode; i.e., using the same antenna for the analog and digital signals; or may employ separate analog and digital antennas. Where separate antennas are used, the digital antenna:

- (1) Must be a licensed auxiliary antenna of the station;

- (2) Must be located within 3 seconds latitude and longitude from the analog antenna;



(3) Must have a radiation center height above average terrain between 70 and 100 percent of the height above average terrain of the analog antenna.

5. Add § 73.405 to subpart C to read as follows:

**§ 73.405 Digital Audio Broadcasting Standard**

Unless expressly authorized otherwise, all DAB stations must conform to the technical specifications set out in the NRSC-5-D In-band/on-channel Digital Radio Broadcasting Standard (Apr. 2017), which is hereby incorporated by reference in § 73.8000 of this Part.

6. Add § 73.406 to subpart C to read as follows:

**§ 73.406 Notification**

Licensees must provide notification to the Commission in Washington, DC, within 10 days of commencing IBOC digital operation or reverting from all-digital to analog operation.

(a) Every digital notification must include the following information:

- (1) Call sign and facility identification number of the station;
- (2) Date on which IBOC operation commenced;
- (3) Name and telephone number of a technical representative the Commission can call in the event of interference;
- (4) A certification that the operation will not cause human exposure to levels of radio frequency radiation in excess of the limits specified in § 1.1310 of this chapter and is therefore categorically excluded from environmental processing pursuant to § 1.1306(b) of this chapter. Any station that cannot certify compliance must submit an environmental assessment (“EA”) pursuant to § 1.1311 of this chapter and may not commence IBOC operation until such EA is ruled upon by the Commission.

(b) Every AM digital notification must also include the following information:

- (1) Certification that the IBOC DAB facilities conform to the NRSC-5-D standard.
- (2) Transmitter power output; if separate analog and digital transmitters are used, the power output for each transmitter;
- (3) If applicable, any reduction in an AM station’s primary digital carriers;

(c) Every FM digital notification must also include the following information:

- (1) Certification that the IBOC DAB facilities conform to the NRSC-5-D standard;
- (2) FM digital effective radiated power used and certification that the FM analog effective radiated power remains as authorized;
- (3) If applicable, the geographic coordinates, elevation data, and license file number of the auxiliary antenna employed by an FM station as a separate digital antenna;
- (4) If applicable, for FM systems employing interleaved antenna bays, a certification that adequate filtering and/or isolation equipment has been installed to prevent spurious emissions in excess of the limits specified in § 73.317;

7. In § 73.1545, revise paragraph (a) to read as follows:

**§ 73.1545 Carrier frequency departure tolerances.**

(a) AM stations. The departure of the carrier frequency for monophonic transmissions or center frequency for stereophonic transmissions may not exceed  $\pm 1$  Hz from the assigned frequency.

\* \* \* \* \*

8. In § 73.8000, add new paragraph (e) to read as follows:

**§ 73.8000 Incorporation by reference.**

\* \* \* \* \*

(e) The National Radio Systems Committee, NRSC-5-D In-band/on-channel Digital Radio Broadcasting Standard (Apr. 2017) (NRSC-5-D Standard), is available at <https://www.nrscstandards.org/standards-and-guidelines/documents/standards/nrsc-5-d/nrsc-5-d.pdf>.

## APPENDIX C

## Initial Regulatory Flexibility Act Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),<sup>1</sup> the Commission has prepared this Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies proposed in the *Notice of Proposed Rulemaking (NPRM)*. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *NPRM* provided on the first page of the *NPRM*. The Commission will send a copy of this entire *NPRM*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).<sup>2</sup> In addition, the *NPRM* and the IRFA (or summaries thereof) will be published in the Federal Register.<sup>3</sup>

**A. Need for, and Objectives of, the Proposed Rule Changes.**

2. The Commission initiates this rulemaking proceeding to obtain comments regarding its proposal to allow AM broadcasters to broadcast an all-digital signal using the HD Radio in-band-on-channel (IBOC) mode known as MA3. Specifically, the Commission seeks comment on the following issues relating to all-digital operation: (1) audio quality and signal coverage; (2) digital carrier power limits and emissions mask compliance; (3) interference potential; (4) spectrum efficiency and auxiliary digital services; (5) conversion costs and procedures; (6) availability of digital receivers and industry demand for digital broadcasting; (7) emergency alert and travelers' information systems; (8) adoption of the NRSC-5-D Standard for digital broadcasting; and (9) a stricter carrier frequency tolerance standard for all AM stations. The new rules proposed are designed to improve the economic viability of many AM stations by providing the option to convert to all-digital broadcasting, including an improved audio signal and the ability to provide other digital information to consumers. This option is seen as a natural outgrowth of the fact that—due to the AM Revitalization proceeding—more than half of AM stations are now able to reach their traditional analog audience by means of an FM translator.

**B. Legal Basis.**

3. The proposed action is authorized pursuant to sections 1, 4(i), 4(j), 301, 303, 307, 308, 309, and 316 of the Communications Act, 47 U.S.C. §§ 151, 154(i), 154(j), 301, 303, 307, 308, 309, and 316.

**C. Description and Estimate of the Number of Small Entities to Which the Proposed Rules Will Apply.**

4. The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.<sup>4</sup> The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”<sup>5</sup> In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.<sup>6</sup> A small business

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<sup>1</sup> See 5 U.S.C. § 603. The RFA, see 5 U.S.C. §§ 601-612, was amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

<sup>2</sup> See 5 U.S.C. § 603(a).

<sup>3</sup> See *id.*

<sup>4</sup> 5 U.S.C. § 603(b)(3).

<sup>5</sup> *Id.* § 601(6).

<sup>6</sup> *Id.* § 601(3) (incorporating by reference the definition of “small business concern” in 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.” *Id.* § 601(3).

concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.<sup>7</sup> The rules proposed herein will directly affect small television and radio broadcast stations. Below, we provide a description of these small entities, as well as an estimate of the number of such small entities, where feasible.

5. *Radio Stations.* This Economic Census category “comprises establishments primarily engaged in broadcasting aural programs by radio to the public.”<sup>8</sup> The SBA has created the following small business size standard for this category: those having \$41.5 million or less in annual receipts.<sup>9</sup> Census data for 2012 show that 2,849 firms in this category operated in that year.<sup>10</sup> Of this number, 2,806 firms had annual receipts of less than \$25 million, and 43 firms had annual receipts of \$25 million or more.<sup>11</sup> Because the Census has no additional classifications that could serve as a basis for determining the number of stations whose receipts exceeded \$41.5 million in that year, we conclude that the majority of radio broadcast stations were small entities under the applicable SBA size standard.

6. Apart from the U.S. Census, the Commission has estimated the number of licensed commercial AM radio stations to be 4,406<sup>12</sup> and the number of commercial FM radio stations to be 6,726 for a total number of 11,132, along with 8,126 FM translator and booster stations. As of September 2019, 4,294 AM stations and 6,739 FM stations had revenues of \$41.5 million or less, according to Commission staff review of the BIA Kelsey Inc. Media Access Pro Television Database (BIA). In addition, the Commission has estimated the number of noncommercial educational FM radio stations to be 4,179.<sup>13</sup> NCE stations are non-profit, and therefore considered to be small entities.<sup>14</sup> Therefore, we estimate that the majority of radio broadcast stations are small entities.

#### **D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements.**

7. The *NPRM* proposes to adopt new rules to permit AM stations to broadcast using an all-digital signal. Such operation will be entirely voluntary. Stations converting to all-digital operation would be required to notify the Commission of the commencement of such operation by filing existing Form 335-AM (currently used to report commencement of hybrid operations). In the *NPRM*, the Commission also seeks comment on a complaint procedure for all-digital operation substantially similar to the existing procedure for hybrid stations. Because the type of information to be filed (i.e., information required to be included in notifications) is already familiar to broadcasters, the additional paperwork burdens would be minimal.

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<sup>7</sup> *Id.* § 632. Application of the statutory criteria of dominance in its field of operation and independence are sometimes difficult to apply in the context of broadcast television. Accordingly, the Commission’s statistical account of television stations may be over-inclusive.

<sup>8</sup> U.S. Census Bureau, 2012 NAICS Definitions, “515112 Radio Stations,” at <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>. This category description continues: “Programming may originate in their own studio, from an affiliated network, or from external sources.”

<sup>9</sup> 13 CFR § 121.201; NAICS code 515112.

<sup>10</sup> U.S. Census Bureau, Table No. EC0751SSSZ4, *Information: Subject Series – Establishment and Firm Size: Receipts Size of Firms for the United States: 2012* (515112), [http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN\\_2007\\_US\\_51SSSZ4&prodType=table](http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ4&prodType=table).

<sup>11</sup> *Id.*

<sup>12</sup> This number is derived from subtracting the total number of noncommercial educational AM stations (204) from the total number of licensed AM stations (4610).

<sup>13</sup> *Id.*

<sup>14</sup> 5 U.S.C. § 601(4), (6).

**E. Steps Taken to Minimize Significant Impact on Small Entities and Significant Alternatives Considered**

8. The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.<sup>15</sup>

9. In the *NPRM*, the Commission proposes to allow AM stations to broadcast using all-digital transmissions. This proposal offers the flexibility to AM licensees, many of whom are small entities, to assess their own market and resources to decide what form of transmission, analog or digital, would work best for them. If an AM station chooses to continue broadcasting in analog mode, no further reporting or compliance steps are required. Should a licensee opt to broadcast using an all-digital signal, no prior approval by the Commission is needed. Rather, the all-digital station licensee must file a notification within 10 days of the commencement of all-digital operation. This notification uses an existing form and can be submitted online. Therefore, the burden on small entities will be minimal. Alternatives considered by the Bureau include retaining the existing rules, under which no all-digital operation is permitted. The Commission seeks comment on the effect of the proposed rule changes on all affected entities, including the cost and potential technical difficulties of all-digital conversion. The Commission is open to consideration of alternatives to the proposals under consideration, including but not limited to alternatives that will minimize the burden on AM broadcasters, many of whom are small businesses.

**F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rule**

10. None.

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<sup>15</sup> 5 U.S.C. § 603(c).