

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

In the matter of )  
)  
Facilitating the Provision of Spectrum-Based )  
Services to Rural Areas and Promoting ) WT Docket No. 02-381  
Opportunities for Rural Telephone Companies )  
To Provide Spectrum-Based Services )

**JOINT REPLY COMMENTS OF  
SIRIUS SATELLITE RADIO INC. AND XM RADIO INC.**

Sirius Satellite Radio Inc. (“Sirius”) and XM Radio Inc. (“XM Radio”) (collectively, the “Satellite Radio Licensees”) hereby file these Reply Comments in the above-captioned proceeding in which the Commission is considering how to modify its current spectrum policies to promote the deployment of terrestrial wireless services to rural areas.<sup>1</sup> The Satellite Radio Licensees object to any increase in the power of unlicensed devices in rural areas without an appropriate reduction in out-of-band emissions in the satellite radio band because of the potential for increased interference to satellite radio.

**Background**

In 1995, the Commission allocated spectrum in the S-band to the Satellite Digital Audio Radio Service (“SDARS” or “satellite radio”). XM Radio and Sirius were the winning bidders in the SDARS auction held in April 1997, together committing nearly \$170 million to the U.S.

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<sup>1</sup>*Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services, Notice of Inquiry*, WT Docket No. 02-381, FCC 02-325 (rel. December 20, 2002) (“*NOI*”). Although Comments were due in this proceeding on February 18, 2003, the Commission was closed on February 18, 2003 due to inclement weather. Thus, these Comments are timely filed on February 19, 2003. See 47 C.F.R. § 1.4(e)(1); see also *FCC Public Notice, “FCC Closed February 18, 2003”* (rel. Feb. 19, 2003).

Treasury.<sup>2</sup> XM Radio was awarded the license to provide satellite radio service in the 2332.5-2345 MHz band and Sirius was awarded the license for the 2320-2332.5 MHz band. Both of these bands are close in frequency to the 2.4 GHz unlicensed device band (2400-2483.5 MHz).

As the Commission has repeatedly recognized, this new consumer-based mass media service promises enormous public interest benefits for the U.S. public.<sup>3</sup> Since their licensing, XM Radio and Sirius have made extraordinary progress in the development of their satellite radio systems. Both licensees have successfully launched their satellites, deployed in-band terrestrial repeaters in some markets to fill gaps in satellite coverage, and have initiated commercial service. The Satellite Radio Licensees are now providing high-quality, continuous digital multichannel audio service, from downtown urban cores to the most rural and remote parts of the nation's land mass.

*Protection of Satellite Radio from Interference from Adjacent-Band Services.* As the Satellite Radio Licensees have explained in a number of Commission proceedings, satellite radio is unique among services the Commission regulates because it is the only service that possesses four characteristics – satellite, mobile, mass media, likelihood to be used in close proximity to potential sources of interference -- that make interference from unlicensed devices of greater potential and greater concern.<sup>4</sup> First, as a satellite service, satellite radio is necessarily more

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<sup>2</sup>*American Mobile Radio Corporation*, 13 FCC Rcd 8829 (Int'l Bur., 1997); *Satellite CD Radio*, 13 FCC Rcd 7971 (Int'l Bur., 1997).

<sup>3</sup>*See, e.g., Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band, Report and Order, Memorandum Opinion and Order*, 12 FCC Rcd 5754, ¶ 1 (1997) (“SDARS Order”).

<sup>4</sup>Sirius and XM Radio have discussed the susceptibility of satellite radio to interference from out-of-band emissions in the following proceedings: *Amendment of Part 18 of the Commission's Rules to Update Regulations for RF Lighting Devices, Notice of Proposed Rulemaking*, 13 FCC Rcd 11307, ET Docket 98-42 (1998) (“RF Lighting Proceeding”); *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, Notice of Proposed Rulemaking*, ET Docket 98-153 (May 11, 2000) (“UWB Proceeding”); *Review of*

vulnerable to interference than terrestrially based services, but no more vulnerable than other mobile satellite service systems in existence today.<sup>5</sup> Reception of satellite radio signals depends on the transmission of a signal from a satellite thousands of miles away to a very small aperture, low gain antenna.<sup>6</sup> While the SDARS satellites are state-of-the-art and among the most powerful communications satellites ever manufactured, the downlink signal power available to the receiver is much lower than terrestrial-based communications systems.<sup>7</sup> Like most satellite receivers, SDARS receivers operate near the noise floor, with a link margin just sufficient to protect against outages from blockage, multi-path fading, and foliage attenuation. As a result, satellite radio receivers are very sensitive to interference from nearby emissions into the SDARS band. Second, satellite radio is primarily a mobile service.<sup>8</sup> This eliminates the ability to enter

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*Part 15 and Other Parts of the Commission's Rules, Notice of Proposed Rulemaking and Order, ET Docket No. 01-278 (Oct. 15, 2001) ("Part 15 Review Proceeding"); Amendments to Parts 1, 2, 27 and 90 of the Commission's Rules to License Services in the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands, WT Docket No. 02-08 (petitions for reconsideration pending).*

<sup>5</sup>See Petition for Reconsideration of XM Radio Inc., WT Docket No. 02-8, at 2 (July 22, 2002); Joint Petition for Partial Reconsideration of XM Radio and Sirius, ET Docket No. 98-153, at 2 (June 17, 2002); Comments of XM Radio, ET Docket No. 01-278, at 3 and Exhibit A (Feb. 12, 2002); Comments of Sirius, ET Docket No. 01-278, Exhibit A at 20-26 (Feb. 12, 2002); Comments of XM Radio, ET Docket No. 98-153, at 3 (Sept. 12, 2000).

<sup>6</sup>Terrestrial repeaters do not solve the problem of interference to satellite radio from out-of-band emissions. The satellite radio licensees have deployed only a modest number of terrestrial repeaters to provide service in urban areas and elsewhere where the satellite signal is blocked by buildings and other obstacles. The satellite radio licensees provide service to subscribers directly with satellites in over 99% of the coverage areas.

<sup>7</sup>See Comments of XM Radio Inc., ET Docket No. 01-278, at Exhibit A; Letter from Sirius to Ms. Marlene H. Dortch, FCC, ET Docket No. 01-278 (April 19, 2002); Comments of Sirius Satellite Radio, ET Docket No. 01-278, Exhibit A at 20-26.

<sup>8</sup>See Petition for Reconsideration of XM Radio, Inc., WT Docket No. 02-08, at 2-3; Joint Petition for Partial Reconsideration of XM Radio and Sirius, ET Docket No. 98-153, at 2, 9-10; Reply Comments of XM Radio, ET Docket No. 01-278, at 8 (March 12, 2002); Comments of XM Radio, ET Docket No. 01-278, at 3, 18; Comments of Sirius, ET Docket No. 01-278, Exhibit A, at 20.

into prior coordination agreements with sources of interference. Satellite radio receivers also use omnidirectional antennas that eliminate the ability to “point” an antenna away from a source of interference.<sup>9</sup> Third, satellite radio providers must achieve 99.9% availability to satisfy consumer expectations for quality of service.<sup>10</sup> For some services, such as cellular service, intermittent interference, some dropped calls, and other annoyances have become commonplace and generally accepted by consumers. For a service such as satellite radio, however, consumers demand nothing less than near perfect, continuous, uninterrupted service. Even intermittent interference is unacceptable for consumers who are paying for high-quality, digital audio entertainment. Fourth, satellite radio receivers are likely to be used in close physical proximity to the very devices that are the most likely sources of interference. When used in a car, satellite radio receivers will come close to RF lights illuminating a road way, Bluetooth-enabled cell phones, family radios, 2.4 GHz WiFi internet access points, and ultra-wideband (“UWB”) outdoor devices and surveillance systems, among others. When used on a windowsill in a home, a satellite radio will be used near 2.4 GHz cordless phones, 2.4 GHz WiFi internet access devices, various Bluetooth and HomeRF devices, and indoor UWB devices, among others.

In adopting out-of-band emission (“OOBE”) limits for Wireless Communications Service (“WCS”) licensees, which operate in the 2305-2320 MHz and 2345-2360 MHz bands adjacent to satellite radio, the Commission accounted for these unique features of satellite radio. The Commission concluded that “[i]n authorizing DARS, it was our desire to ensure a high quality

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<sup>9</sup>See Petition for Reconsideration of XM Radio, Inc., WT Docket No. 02-08, at 3; Joint Petition for Partial Reconsideration of XM Radio and Sirius, ET Docket No. 98-153, at 2; Reply Comments of XM Radio, ET Docket No. 01-278, at 8; Comments of XM Radio, ET Docket No. 01-278, at 18; Comments of XM Radio, ET Docket No. 98-153, at 3.

<sup>10</sup>See Petition for Reconsideration of XM Radio, Inc., WT Docket No. 02-08, at 3; Comments of XM Radio, ET Docket No. 01-278, at 3, 18; *see also* Joint Petition for Partial Reconsideration of XM Radio and Sirius, ET Docket No. 98-153, at 20-21.

radio service” and that if satellite radio “is subject to excessive interference, the service will not be successful and the American public will not benefit from the service.”<sup>11</sup> The rules adopted require the power of any emission into the SDARS band from a mobile and most portable WCS transmitters to be attenuated below the transmitter power (p) by a factor of  $110 + 10 \log (p)$  dB. *See* 47 C.F.R. §27.53(a)(2). Assuming a 1 Watt WCS mobile transmitter, this equates to a signal level of -80 dBm at the source ( $5.8 \mu\text{V/m}$  at 3 meters). The limit also requires the power of any emission into the SDARS band from a fixed WCS transmitter to be attenuated below the transmitter power (p) by a factor of  $80 + 10 \log (p)$  dB. *See* 47 C.F.R. §27.53(a)(1). Assuming a 1 Watt WCS fixed transmitter, this equates to a signal level of -50 dBm at the source ( $180 \mu\text{V/m}$  at 3 meters). The Commission has also negotiated for similar limits in international coordination agreements.<sup>12</sup>

*Notice of Inquiry on Facilitating Spectrum-Based Services to Rural Area.* In the above-captioned *Notice of Inquiry* (“*NOI*”), the Commission seeks comment on the effectiveness of its current regulatory tools in facilitating the delivery of terrestrial wireless services to rural areas and how it should modify its policies to further promote terrestrial wireless services to rural areas. Among other things, the Commission seeks comment on whether increased use of unlicensed spectrum in rural areas will facilitate wireless services to rural communities. *NOI* at ¶ 29. The Commission notes that unlicensed devices are limited to very low power levels to avoid

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<sup>11</sup>*Amendment of the Commission’s Rules to Establish Part 27, the Wireless Communications Service, Memorandum Opinion and Order*, 12 FCC Rcd 3977, ¶ 25, 27 (1997) (“*WCS Order*”).

<sup>12</sup>The limit for new Canadian fixed systems into the SDARS band is  $-155 \text{ dBW/m}^2/4\text{kHz}$ , which is equivalent to  $5.5 \mu\text{V/m}$ . *See United States and Canada Agree on Conditions for Implementation of U.S. Satellite Digital Audio Radio Services (DARS) and Canadian Terrestrial Digital Radio Broadcast Services (T-DRB) along the U.S./Canada Border Area*, Report No. IN 98-50, *News Release* (Sept. 3, 1998) at 4 (“*Canadian Coordination Agreement*”).

interference with licensed services. *Id.* The Commission then concludes that “the interference potential of unlicensed devices may be low or negligible in rural communities” and thus asks whether unlicensed devices should be permitted to use higher output power levels in such environments. *Id.*

Some Commenters supported the Commission’s proposal to increase the power of unlicensed devices in rural areas.<sup>13</sup> Microsoft, for example, stated that “[t]here is no reason why higher-power unlicensed operations should not be allowed in rural areas.” Comments of Microsoft at 4. Redline Communications, Inc. (“Redline”), an equipment manufacturer for the Wireless Internet Service Provider (“WISP”) industry, supported maintaining current effective isotropically radiated power (“EIRP”) levels for subscriber-end unlicensed equipment but allowing an increase in EIRP for unlicensed base stations used in point-to-multipoint networks.<sup>14</sup> The PART-15 Organization supported increasing the power of unlicensed devices used outdoors but not for devices used indoors. *See* Comments of PART-15 Organization at 7-8.

Other Commenters, however, expressed concern with any proposal to increase power of unlicensed devices.<sup>15</sup> For example, WaveRider Communications Inc. (“WaveRider”), a manufacturer of equipment for the 900 MHz and 2.4 GHz unlicensed bands, noted that it would be extremely difficult for the Commission to monitor and enforce different power levels for different types of environments, especially considering that there is no clear definition of a

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<sup>13</sup>*See* Comments of License-Exempt Alliance (Feb. 3, 2003), Exhibit 1 at 9; Comments of Microsoft (Feb. 3, 2003) at 4; Comments of PART-15 Organization (Feb. 3, 2003) at 8.

<sup>14</sup>*See* Comments of Redline Communications, Inc. (Feb. 3, 2003) at 5.

<sup>15</sup>Comments Cellular Telecommunications & Internet Association (Feb. 3, 2003) at 11 (noting that an increase in transmitter power would accomplish nothing if subscriber equipment did not also increase in power and that it is unlikely that manufacturers would make higher power subscriber equipment for rural areas due to the small size of the market); Comments of WaveRider Communications Inc. (Feb. 3, 2003).

“rural” area. Comments of WaveRider at 4. WaveRider also noted that higher power unlicensed equipment designed for a rural environment would no doubt find its way into an urban environment, thus increasing the potential for interference. *Id.*

## Discussion

### I. INCREASING THE POWER OF UNLICENSED DEVICES USED IN RURAL AREAS MAY CAUSE INCREASED INTERFERENCE TO LICENSED SERVICES

The Satellite Radio Licensees currently provide the same digital multichannel audio service in rural communities that they offer in urban areas. The Commission has recognized that one of the key public interest benefits of satellite radio is its ability to provide nationwide programming, including to the most rural and remote parts of our country.<sup>16</sup> Given the importance of rural consumers to the satellite radio industry, the Satellite Radio Licensees disagree with the Commission’s statement that “the interference potential of unlicensed devices may be low or negligible in rural communities” and with Microsoft’s view that “[t]here is no reason why higher-power unlicensed operations should not be allowed in rural areas.” *NOI* at ¶ 29; Comments of Microsoft at 4. In fact, it is in rural areas where satellite radio receivers are most vulnerable to interference because they rely exclusively on satellite reception and not terrestrial repeaters in such areas. Allowing for an increase in the EIRP of unlicensed devices used in rural areas may create an even greater potential for such devices to interfere with satellite radio and other licensed services. Indeed, allowing for increased EIRP of unlicensed devices in

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<sup>16</sup>*SDARS Order* at ¶ 12 (“It is our view that satellite DARS will particularly benefit communities where terrestrial broadcast service is less abundant. The record shows that counties with smaller populations have fewer radio stations and that smaller markets have fewer radio formats.”); *id.* at ¶ 13 (noting that “[w]ith its national reach, satellite DARS could provide continuous radio service to the long-distance motoring public [and] persons living in remote areas”); *id.* at ¶ 90 (noting that “applicants have proposed new choices in audio programming which may be beneficial for the mobile public and for unserved and underserved communities, particularly in rural or remote areas”).

rural areas may limit the ability of rural consumers to receive high-quality satellite radio reception, one of the key segments of the American population intended to benefit from satellite radio.

The Satellite Radio Licensees are particularly concerned that allowing an increase in power of 2.4 GHz unlicensed devices will lead to such devices emitting even greater out-of-band energy into the SDARS band. As the Satellite Radio Licensees have demonstrated in other proceedings, 2.4 GHz unlicensed devices are permitted to emit out-of-band energy into the SDARS band at a level that far exceeds the out-of-band emission limits established for other services to protect satellite radio.<sup>17</sup> This energy falls outside of the bands in which unlicensed devices are permitted to operate, but falls directly in the band where satellite radios are licensed to operate. The Satellite Radio Licensees have also explained that the out-of-band emission limits applicable to 2.4 GHz unlicensed devices were adopted at a time when there were no consumer-oriented mass media services operating above 1000 MHz and relatively few unlicensed devices operating at 2.4 GHz.<sup>18</sup> Allowing for an increase in the power of such unlicensed devices may lead to even greater out-of-band energy spilling into the SDARS band in the same areas where satellite radios are most susceptible to interference because of their reliance on satellite-only coverage.

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<sup>17</sup>For example, the current out-of-band emission limit for Part 15 devices operating in the 2.4 GHz band equates to a level of 500  $\mu\text{V}/\text{m}$  at 3 meters into the SDARS band (*see* 47 C.F.R. §§ 15.209, 15.247) while the out-of-band emission limit at 3 meters into the SDARS band equates to 5.62  $\mu\text{V}/\text{m}$  for WCS mobile devices (*see* 47 C.F.R. § 27.53(a)(2)); 50  $\mu\text{V}/\text{m}$  for outdoor, handheld UWB devices (*see* 47 C.F.R. § 15.519(c)); and 159  $\mu\text{V}/\text{m}$  for indoor UWB systems (*see* 47 C.F.R. § 15.517(c)). *See* Comments of XM Radio, ET Docket No. 01-278; Comments of Sirius, ET Docket No. 01-278.

<sup>18</sup>Comments of XM Radio, ET Docket No. 01-278 at 13-16 (noting that the last time the Commission updated its OOB limits for unlicensed devices operating above 1000 MHz was 1989).

For these reasons, the Satellite Radio Licensees object to any proposal to increase the power of unlicensed devices, whether used in indoor, outdoor, urban, or rural environments, without an appropriate reduction in out-of-band emissions into the SDARS band. The Commission must ensure that any increase in the power of unlicensed devices does not violate the fundamental rule that unlicensed devices may not cause harmful interference to licensed service.<sup>19</sup>

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<sup>19</sup>*See Amendment of Part 15 of the Commission's Rules Regarding Spread Spectrum Devices, First Report and Order*, 15 FCC Rcd 16244, ¶ 25 (August 31, 2000) (noting that “the most basic principle of Part 15 operation is the requirement to function in a non-interfering manner in the midst of licensed devices”); *see also* 47 C.F.R. § 15.5(b) (“Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator.”); 47 C.F.R. § 18.111(b) (“the operator of ISM equipment that causes harmful interference to any authorized radio service shall promptly take whatever steps may be necessary to eliminate the interference”).

## Conclusion

Sirius and XM Radio urge the Commission to act consistently with the views expressed herein.

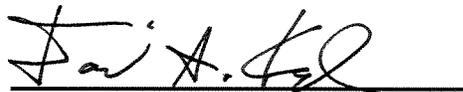
Respectfully submitted,



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