

Proposed Modification
Call Sign E110172

In the instant application, Sirius XM Radio Inc. (“SiriusXM”) seeks to modify the license issued under Call Sign E110172 (the “License”). The License provides blanket authority for SiriusXM to operate terrestrial repeaters in the Satellite Digital Audio Radio Service (“SDARS”), subject to the conditions specified in the License. SiriusXM herein seeks to modify the License to add authority to operate a new type of terrestrial repeater, which would be used primarily for interference mitigation (“IM Repeaters”), as described further herein.

The Commission long ago recognized that satellite radio operators also need to operate terrestrial repeaters to provide consumers with high-quality service nationwide.¹ The Commission granted SiriusXM the License in early 2012 (following years of authorizing SDARS terrestrial repeaters under Special Temporary Authority), and SiriusXM continues to successfully operate a network of repeaters under the License, supplementing service from SiriusXM’s satellite fleet.² Granting this application would not impact the operating parameters of the repeaters already authorized under the License.

SiriusXM seeks to add a new type of repeater to the License, as part of its continuing effort to remediate external interference to the SiriusXM network. As the Commission is well aware, the SDARS band has been subject to interference from adjacent Wireless Communications Services (“WCS”) operations.³ AT&T Corp. (“AT&T”), the primary licensee of WCS spectrum, has been rapidly constructing its WCS network, resulting in interference that SiriusXM and AT&T are endeavoring to resolve. As certain wireless carriers have built out their wireless networks, intermodulation—including between operations in the Advanced Wireless Services (“AWS”) spectrum and Personal Communications Services (“PCS”) spectrum—has also created interference to satellite radio.⁴ Interference from some or all of these sources causes SiriusXM subscribers to experience degradation of the SiriusXM signal, limiting their ability to receive satellite radio programming. Unless remedied, this harmful interference will grow in scope and magnitude, and spread across additional markets, as wireless carriers build out their relatively high power ground cellular networks nationwide in frequency bands that can affect satellite radio operations.

SiriusXM has been working to mitigate these external interference issues, including by cooperating with AT&T and other wireless carriers on joint efforts to find solutions. SiriusXM

¹ See *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, and Further Notice of Proposed Rulemaking, 12 FCC Rcd 5754, at ¶ 37 (1997).

² SiriusXM currently provides service to over 33 million subscribers.

³ See, e.g., Letter from Sirius XM Radio Inc. to FCC, WT Docket No. 07-293 (Feb. 14, 2017).

⁴ See, e.g., *Applications of Cellco Partnership d/b/a Verizon Wireless and T-Mobile License LLC*, FCC File Nos. 0006867447 *et al.*; Letter from Sirius XM Radio Inc. to FCC, RM-11750 (Aug. 7, 2015).

and AT&T believe that one practical solution may be collocating SiriusXM and AT&T transmissions at the same physical site. This approach would facilitate the operations of both services, allowing AT&T to operate its WCS facilities at higher power levels while protecting SiriusXM subscribers' ability to receive SiriusXM programming without interference. SiriusXM obtained a Part 5 experimental license in May 2016, Call Sign WI2XJC (the "Experimental License," as modified May 2, 2018, File No. 0066-EX-CM-2018), to verify the value of collocated operations by testing an initial version of an IM Repeater. This IM Repeater and future versions are intended to improve subscribers' reception of SiriusXM services where muting is or may be caused by interference from nearby wireless transmissions.

Testing the initial IM Repeater operating under the Experimental License has proved successful in mitigating interference. Based on the results from that testing, SiriusXM herein seeks to modify the License to authorize the operation of this and future versions of IM Repeaters on a permanent basis. In addition to reducing the potential for interference with the SiriusXM service, IM Repeaters would also benefit wireless carriers by enabling them to operate at higher power levels without creating such interference. Although SiriusXM believes wireless base station modifications are a necessary and appropriate method for remediating interference, wireless carriers would rather not make such modifications at certain locations due to the possible customer impact of those modifications. IM Repeaters offer another solution by mitigating interference without requiring changes to wireless carriers' networks or impacting their customers.

SiriusXM is currently working with AT&T to implement an arrangement under which the initial models of IM Repeaters will be located at AT&T's WCS base stations where interference is identified or anticipated.⁵ In consultation with AT&T, a manufacturer of the initial IM Repeater has been identified and has obtained the necessary equipment authorization for its device. AT&T has encouraged the development of IM Repeaters and SiriusXM has worked with AT&T in the preparation of this application. In the event AT&T provides a more concerted indication of its support for this application, SiriusXM will so inform the Commission.

SiriusXM proposes to add this new class of repeaters to the License without modifying the repeaters currently authorized by the License. Although IM Repeaters share some parameters with the currently authorized repeaters, other parameters differ as explained in Attachment 1. Significantly, SiriusXM received no complaints or other concerns about the IM Repeater during testing under the Experimental License and, as noted above, AT&T – the primary user of the adjacent WCS band – has indicated its support of this application.

SiriusXM faces the immediate and pressing need to ensure the continued reception of satellite radio service by subscribers whose reception has been or may be interrupted due to

⁵ The basis for this cooperative arrangement is the 2012 coordination agreement between SiriusXM and AT&T and related documents implementing that agreement. SiriusXM and AT&T jointly filed the 2012 agreement with the Commission as part of a package of compromise proposals to resolve open issues in WT Docket 07-293.

Sirius XM Radio Inc.
Call Sign E110172
Modification Application

interference caused by certain operations in the WCS and AWS/PCS bands. SiriusXM has kept the Commission apprised of these interference concerns and its cooperative efforts with wireless carriers to resolve the problem. IM Repeaters appear to be a solution that, when deployed at certain locations, should mitigate interference while allowing wireless carriers to optimize their broadband networks. Accordingly, expeditious grant of this application would serve the public interest.

**ATTACHMENT 1
TECHNICAL PARAMETERS**

Section 25.144(e) Requirements

(e) SDARS Terrestrial Repeaters. (1) Only entities holding or controlling SDARS space station licenses may construct and operate SDARS terrestrial repeaters and such construction and operation is permitted only in conjunction with at least one SDARS space station that is concurrently authorized and transmitting directly to subscribers.

SiriusXM is the sole license holder of SDARS space station licenses and it will be the sole entity responsible for constructing and operating SDARS terrestrial repeaters. IM Repeaters would be located at or adjacent to the transmit locations of wireless carriers that are creating or may be creating interference to satellite radio operations. In all cases however, SiriusXM would retain ultimate authority and control over the IM Repeaters.

(2) SDARS terrestrial repeaters will be eligible for blanket licensing only under the following circumstances:

(i) The SDARS terrestrial repeaters will comply with all applicable power limits set forth in §25.214(d)(1) of this chapter and all applicable out-of-band emission limits set forth in §25.202(h)(1) and (h)(2).

Confirmed.

(ii) The SDARS terrestrial repeaters will meet all applicable requirements in part 1, subpart I, and part 17 of this chapter. Operators of SDARS terrestrial repeaters must maintain demonstrations of compliance with part 1, subpart I, of this chapter and make such demonstrations available to the Commission upon request within three business days.

Confirmed. See also response to Section 25.144(e)(1).

(iii) The SDARS terrestrial repeaters will comply with all requirements of all applicable international agreements.

Confirmed.

(3) After May 20, 2010, SDARS licensees shall, before deploying any new, or modifying any existing, terrestrial repeater, notify potentially affected WCS licensees pursuant to the procedure set forth in §25.263.

Confirmed, pursuant to the coordination and notification procedures established in Section 25.263(b)(5) and (b)(6) of the Commission's Rules.

Sirius XM Radio Inc.
Call Sign E110172
Modification Application

(4) SDARS terrestrial repeaters are restricted to the simultaneous retransmission of the complete programming, and only that programming, transmitted by the SDARS licensee's satellite(s) directly to the SDARS licensee's subscribers' receivers, and may not be used to distribute any information not also transmitted to all subscribers' receivers.

Confirmed. IM Repeaters would be located at or near wireless carriers' transmit sites where interference will be mitigated by the presence of SiriusXM transmissions. Receiving signals by satellite is often impractical at these locations because satellite transmissions are blocked from view or otherwise unavailable. Therefore, IM Repeaters may receive transmissions via internet protocol ("IP") delivery using a direct feed from SiriusXM's satellite transmission facility or by transmissions from other SiriusXM terrestrial repeaters, rather than directly by satellite. In all cases however, the IM Repeaters would simultaneously transmit the complete programming, and only that programming, transmitted by SiriusXM's satellites to Sirius subscribers' receivers, and would not distribute any content not also transmitted directly by satellite to subscribers' receivers. If necessary, a waiver of Sections 25.144(e)(4) is requested for the IM Repeaters to the limited extent stated above.

(5) Operators of SDARS terrestrial repeaters are prohibited from using those repeaters to retransmit different transmissions from a satellite to different regions within that satellite's coverage area.

Confirmed.

(6) Operators of SDARS terrestrial repeaters are required to comply with all applicable provisions of part 1, subpart I, and part 17 of this chapter.

Confirmed.

(7)(i) Each SDARS terrestrial repeater transmitter utilized for operation under this paragraph must be of a type that has been authorized by the Commission under its certification procedure.

IM Repeaters would be certified as necessary.

(ii) In addition to the procedures set forth in subpart J of part 2 of this chapter, power measurements for SDARS repeater transmitters may be made in accordance with a Commission-approved average power technique. Peak-to-average power ratio (PAPR) measurements for SDARS repeater transmitters should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that the PAPR will not exceed 13 dB for more than 0.1 percent of the time or another Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

SiriusXM expects manufacturers of IM Repeaters to use permissible measurement procedures during the certification process.

Sirius XM Radio Inc.
Call Sign E110172
Modification Application

(iii) Any manufacturer of radio transmitting equipment to be used in these services may request equipment authorization following the procedures set forth in subpart J of part 2 of this chapter. Equipment authorization for an individual transmitter may be requested by an applicant for a station authorization by following the procedures set forth in part 2 of this chapter.

See above.

(8) Applications for blanket authority to operate terrestrial repeaters must be filed using Form 312, except that Schedule B to Form 312 need not be filed. Such applications must also include the following information as an attachment:

(i) The space station(s) with which the terrestrial repeaters will communicate, the frequencies and emission designators of such communications, and the frequencies and emission designators used by the repeaters to re-transmit the received signals.

IM Repeaters would operate on the frequencies and with the emissions designators currently listed on the License.

As discussed above in response to Section 27.144(e)(4), IM Repeaters may not communicate directly with any space stations but in all cases would simultaneously transmit the complete programming transmitted by SiriusXM's satellites.

(ii) The maximum number of terrestrial repeaters that will be deployed under the authorization at 1) power levels equal to or less than 2-watt average EIRP, and 2) power levels greater than 2-watt average EIRP (up to 12-kW average EIRP).

SiriusXM would deploy (1) up to 10,000 IM Repeaters at a power level equal to or less than 2-watt average EIRP; and (2) up to 50,000 IM Repeaters at a power level between 2-watt and 12-kw average EIRP.

(iii) A certification of compliance with the requirements of §25.144(e)(1) through (7).

SiriusXM certifies compliance with the requirements of Section 25.144(e)(1) through (7) in the manner described above.