

S2118 SAT-STA-20140321-00033 IB2014000524  
XM Radio LLC  
XM-1



\*with conditions

File # SAT-STA-20140321-00033  
Call Sign S2118 Grant Date 04/30/14  
(or other identifier)  
Term Dates period of  
From 05/31/14 To: 180 days  
Approved: Stephen J. Duall

Approved by OMB  
3060-0678

Date & Time Filed: Mar 21 2014 3:35:31:320PM  
File Number: SAT-STA-20140321-00033  
Callsign:

FEDERAL COMMUNICATIONS COMMISSION  
APPLICATION FOR SPACE STATION SPECIAL TEMPORARY AUTHORITY  
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APPLICANT INFORMATION

Enter a description of this application to identify it on the main menu:  
XM-1 (S2118) STA for License Exten and Maneuvers Prior to Orbit Raising

1. Applicant

<b>Name:</b>	XM Radio LLC	<b>Phone Number:</b>	202-380-1383
<b>DBA Name:</b>		<b>Fax Number:</b>	202-380-4981
<b>Street:</b>	1221 Avenue of the Americas 36th Floor	<b>E-Mail:</b>	james.blitz@siriusxm.com
<b>City:</b>	New York	<b>State:</b>	NY
<b>Country:</b>	USA	<b>Zipcode:</b>	10020 -
<b>Attention:</b>	James S. Blitz		

**XM Radio LLC**  
**IBFS File No. SAT-STA-20140321-00033**  
**Call Sign S2118**

The application of XM Radio LLC (XM Radio) for special temporary authority, IBFS File No. SAT-STA-20140321-00033, is granted. Specifically, XM Radio is authorized, for a period of 180 days, commencing on May 31, 2014, to conduct Telemetry, Tracking, and Command (TT&C) operations necessary to drift its Satellite Digital Audio Radio Service (SDARS) space station, XM-1, from its current orbital location of 115.25° W.L. to the 27° W.L. orbital location and to maintain it at that location with an east-west stationkeeping tolerance of +/- 0.1 degrees. XM Radio is authorized to conduct such TT&C operations using the following center frequencies: 2339.2 MHz, 2339.7 MHz, 2344.0 MHz, and 2344.5 MHz (space-to-Earth); 7049.0 MHz and 7074.0 MHz (Earth-to-space). Additionally, we grant XM Radio's request to operate beyond the current license term for the XM-1 space station during this 180-day period to allow XM Radio sufficient time to complete its planned maneuvers for XM-1 in preparation for the space station's removal to a disposal orbit.<sup>1</sup> All operations of the XM-1 space station must be in accordance with the technical specifications set forth in its application, XM-1's current authorization, the Commission's rules, and the conditions set forth below.

1. All operations under this grant of special temporary authority must be on an unprotected and non-harmful interference basis, i.e., XM Radio shall not cause harmful interference to, and must not claim protection from interference caused to it by, any other lawfully operating radiocommunication system.

2. In the event of any harmful interference as a result of the operations under this grant of special temporary authority, XM Radio must cease operations immediately upon notification of such interference and shall immediately inform the Commission, in writing, of such an event.

3. XM Radio must coordinate the operations of XM-1 with existing geostationary space stations to ensure that no unacceptable interference results from its operations during drift to the 27° W.L. orbital location.

4. XM Radio must operate only the TT&C frequencies on XM-1 during the space station's drift to and operations at the 27° W.L. orbital location.

5. We grant XM Radio's request for a waiver of Section 25.210(j) of the Commission's rules, 47 C.F.R. § 25.210, to allow operation of XM-1 at 27° W.L. with an east-west stationkeeping tolerance of +/- 0.1 degrees instead of the +/- 0.05 degree tolerance required by the rule. XM Radio was previously granted a waiver of Section 25.210(j) to permit XM-1 to operate with an east-west stationkeeping tolerance of +/- 0.1 degrees at 115.25° W.L. See IBFS File No. SAT-MOD-20101216-00262 (Call Sign S2118), grant-stamped Mar. 8, 2011. We grant this waiver for the same reasons as provided for the previous waiver at 115.25 W.L.


6. Any action taken or expense incurred as a result of operations pursuant to this grant of special temporary authority is at XM Radio's own risk.

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<sup>1</sup> XM-1's current authorization expires on May 31, 2014. XM Radio states that in order to deorbit XM-1 successfully, it must first drift the space station east to the 27° W.L. orbital location so that the westward drift of the space station that will occur during the planned orbit-raising maneuver will not take XM-1 out of the range of XM Radio's TT&C earth stations and thus lose control over the space station. Narrative at 3. Additionally, XM Radio states that the deorbit of XM-1 and its companion space station XM-2 will be the first known use of xenon propulsion engines to complete an orbit-raising maneuver, so the time frame for completion of this maneuver is speculative. *Id.* at 2. XM-2 was recently granted authority to perform the same maneuvers that are requested for XM-1 in the instant application. See IBFS File No. SAT-STA-20140204-00018, granted Mar. 28, 2014.

**XM Radio LLC**  
**IBFS File No. SAT-STA-20140321-00033**  
**Call Sign S2118**

7. This action is taken on delegated authority pursuant to 47 C.F.R. § 0.261 and is effective upon release. Petitions for reconsideration under 47 C.F.R. § 1.106 or applications for review under 47 C.F.R. § 1.115 may be filed within 30 days of the date of the Public Notice announcing this action.

 <b>GRANTED*</b> International Bureau *with conditions	File # <u>SAT-STA-20140321-00033</u>
	Call Sign <u>S2118</u> Grant Date <u>04/30/14</u>
	(or other identifier)
	Term Dates period of From <u>05/31/14</u> To: <u>180 days</u>
	Approved: <u>Stephen J. Duall</u> Stephen J. Duall Chief, Satellite Policy Branch

2. Contact	
<b>Name:</b> Karis A. Hastings	<b>Phone Number:</b> 202-599-0975
<b>Company:</b> SatCom Law LLC	<b>Fax Number:</b>
<b>Street:</b> 1317 F Street, N.W. Suite 400	<b>E-Mail:</b> karis@satcomlaw.com
<b>City:</b> Washington	<b>State:</b> DC
<b>Country:</b> USA	<b>Zipcode:</b> 20004 -
<b>Attention:</b>	<b>Relationship:</b> Legal Counsel
(If your application is related to an application filed with the Commission, enter either the file number or the IB Submission ID of the related application. Please enter only one.)	
3. Reference File Number or Submission ID	
4a. Is a fee submitted with this application?	
<input checked="" type="radio"/> If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).	
<input type="radio"/> Governmental Entity <input type="radio"/> Noncommercial educational licensee	
<input type="radio"/> Other (please explain):	
4b. Fee Classification    CRY - Space Station (Geostationary)	
5. Type Request	
<input type="radio"/> Change Station Location <input checked="" type="radio"/> Extend Expiration Date <input type="radio"/> Other	
6. Temporary Orbit Location	7. Requested Extended Expiration Date 2014-11-27 00:00:00.0

8. Description (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

XM Radio LLC requests special temporary authority for 180 days beginning on May 31, 2014, to extend the license term for the XM-1 (S2118) space station and permit relocation of the satellite to 27 deg. W.L. +/- 0.1 deg., where it will be positioned for up to four months in preparation for its removal to a disposal orbit.

9. By checking Yes, the undersigned certifies that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes.  Yes  No

10. Name of Person Signing  
James S. Blitz

11. Title of Person Signing  
Vice President, Regulatory Counsel

12. Please supply any need attachments.

Attachment 1: STA Narrative

Attachment 2:

Attachment 3:

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT  
(U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION  
(U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

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**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of Request of )  
 )  
XM RADIO LLC ) Call Sign S2118  
 )  
For Special Temporary Authority to )  
Extend the XM-1 License Term and )  
Permit Relocation in Preparation for Retirement )

*Expedited Action Requested*

**REQUEST FOR SPECIAL TEMPORARY AUTHORITY**

XM Radio LLC (“XM Radio”) respectfully requests special temporary authority (“STA”) for a period of 180 days commencing on May 31, 2014, to extend the license term for the XM-1 space station and permit relocation of the satellite in preparation for its removal to a disposal orbit. Specifically, XM Radio seeks authority to drift XM-1 eastward to 27° W.L. and to maintain it there with an east-west stationkeeping tolerance of +/- 0.1 degrees before beginning orbit raising. Grant of the requested authority will serve the public interest by facilitating the orderly retirement of XM-1.

**Background**

XM-1 commenced operations at 85° W.L. on May 31, 2001, with an initial eight-year license term. XM-1 was replaced as a primary operational satellite at 85° W.L. in April 2005, when XM-3 commenced operations.<sup>1</sup> Since that time, XM-1 has served as an in-

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<sup>1</sup> When launched, XM-1 had an expected useful life of fifteen years. In late August 2001, Boeing Satellite Systems (“BSS”), the satellite manufacturer, advised XM Radio of a progressive degradation problem with the solar array output power of the first generation BSS 702 class satellites, including XM-1. XM Radio accelerated the replacement of XM-1 in response to this issue.

orbit spare at the nominal 85° W.L. and the nominal 115° W.L. orbital locations. XM-1 is currently positioned at 115.25° W.L. with a +/- 0.1 degree east-west stationkeeping tolerance, where it flies in formation with the active XM-4 satellite and XM-2, another in-orbit spare.<sup>2</sup> In 2009, the Commission extended the XM-1 license by five years, to May 31, 2014.<sup>3</sup>

During 2013, XM Radio began to plan for retirement of both XM-1 and XM-2, working closely with BSS. A number of factors have made this planning process especially complex and have extended the time required to complete a detailed strategy for removal of the spacecraft to a disposal orbit. These are the first satellites in the XM Radio fleet and the first spacecraft in the BSS 702 product line to be removed to a disposal orbit. These BSS 702 satellites rely for their on-station propulsion on an electric xenon ion propulsion system (“XIPS”), but also have a traditional liquid bi-propellant system that was used for initial orbit raising following the satellite launch. Either system can be used for the deorbit maneuvers, and both systems must be vented of remaining fuel or gas as part of decommissioning the satellite. Neither Boeing itself nor any other satellite operator has experience with performing maneuvers to remove a BSS 702 model satellite to a disposal orbit using XIPS or with venting the XIPS and bi-propellant systems at the conclusion of the maneuvers.

Ground resources to support the necessary maneuvers are also very limited. XM Radio has access to ground stations in the U.S. and Canada that are equipped to communicate with the satellites in the XM Radio fleet. However, a limited number of ground stations have the tracking capabilities needed to support the satellite orbit raising and decommissioning process.

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<sup>2</sup> See File No. SAT-MOD-20101216-00262 (Call Sign S2118) (the “XM-1 Modification”), grant-stamped Mar. 8, 2011 (the “XM-1 Modification Grant”).

<sup>3</sup> See File No. SAT-MOD-20090217-00024 (Call Sign S2118), grant-stamped May 5, 2009.



This limitation is particularly significant because XM-1 is currently positioned over the western U.S., and maneuvers to raise it to a higher disposal orbit will induce a westward drift rate. If XM Radio were to begin the orbit-raising process from XM-1's current orbital location, the satellite would move beyond the range of XM Radio's western ground facilities early in the timeline, and XM Radio would be unable to maintain communications with the spacecraft during critical aspects of the procedure.

To avoid this loss of ground contact, XM Radio proposes to drift XM-1 significantly eastward prior to initiating orbit-raising maneuvers. XM Radio intends to commence relocation of XM-1 eastward following the completion of the orbit-raising process for XM-2.<sup>4</sup> This will allow XM Radio to assess the results of the XM-2 satellite decommissioning and make any appropriate adjustments to the XM-1 plan. In addition, it will permit XM Radio to use the same ground facilities to support the maneuvers of both satellites.

The Commission has previously approved XM Radio's plan to remove XM-1 to a disposal orbit, and nothing has changed in that plan. Specifically, XM Radio still intends to raise the satellite's orbit at least 313 km above the geostationary arc, which is the altitude derived by application of the IADC standard.<sup>5</sup> XM Radio has calculated that the remaining fuel on board the spacecraft is more than sufficient to perform the necessary maneuvers to reach this altitude.<sup>6</sup>

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<sup>4</sup> See File No. SAT-STA-20140204-00018 (Call Sign S2119) (requesting authority for extension of XM-2 license term and for maneuvers in preparation for orbit raising).

<sup>5</sup> See File No. SAT-AMD-20080129-00031 (Call Sign S2118), Attachment 1 at 3, grant-stamped Feb. 14, 2008.

<sup>6</sup> XM Radio has made the decision to retire XM-1 not because of any fuel constraints but because the performance capabilities of the spacecraft have been detrimentally affected by the issue with its solar arrays. As a result, the satellite has reached the end of its utility to XM Radio as an in-orbit spare.

Because the planned disposal orbit altitude complies with the IADC standard, no Commission authority is required for the orbit-raising maneuvers.<sup>7</sup>

XM Radio is not seeking authority to use XM-1 for communications services during the period of the requested STA. The instant STA requests authority solely to permit XM Radio to continue to communicate with XM-1 past its current license term to perform telemetry, tracking and command (“TT&C”) and to relocate the satellite in preparation for orbit-raising maneuvers.<sup>8</sup>

### **Extension Request**

As discussed above, the planning process for removal of XM-1 to a disposal orbit has been unusually protracted, and XM Radio needs to relocate the satellite eastward before orbit raising can begin. Due to these considerations, the steps necessary to place XM-1 in a disposal orbit cannot be completed in advance of May 31, when the satellite’s current license term expires. XM Radio requests STA to extend the XM-1 license authority for a period of 180 days. Grant of the requested extension will facilitate the orderly removal of XM-1 by allowing XM Radio to complete the decommissioning of XM-2, finalize its plans for XM-1’s retirement, and implement the eastward drift of XM-1 necessary in preparation for the maneuvers to remove the satellite to a disposal orbit.

### **Relocation Request**

As discussed above, XM Radio also seeks authority to relocate XM-1 to the east in preparation for commencing orbit-raising. The plans and timeline for this maneuver have not

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<sup>7</sup> See 47 C.F.R. § 25.283(b).

<sup>8</sup> The TT&C frequencies for XM-1 are as follows:  
Command frequencies: 7049.0 MHz and 7074.0 MHz  
Telemetry frequencies: 2339.2 MHz, 2339.7 MHz, 2344.0 MHz, and 2344.5 MHz

yet been finalized, but XM Radio currently anticipates that it will drift XM-1 to 27° W.L. over a period of approximately 45 days beginning in November 2014. XM Radio will communicate with XM-1 during the relocation using a Canadian-licensed ground station. Once XM-1 arrives at 27° W.L., it will remain there for up to four months with an east-west stationkeeping tolerance of +/- 0.1 degrees. This will allow time to vent onboard propellant and otherwise prepare the satellite for decommissioning. Once those processes are complete, it may be necessary to continue to hold the satellite in position so that the orbit raising maneuvers can begin after the eclipse season.

Grant of relocation authority will allow XM Radio to maintain ground contact with XM-1 for a longer period during orbit-raising maneuvers and will therefore serve the public interest. No other operations will be adversely affected. XM Radio will conduct the eastward drift of the spacecraft consistent with industry practice, providing advance notification of the relocation to operators of satellites that will be passed by XM-1 during its relocation and ensuring adequate separation between XM-1 and other spacecraft.<sup>9</sup> Because the 27° W.L. location is unoccupied, XM-1 will not be collocated with any other spacecraft while it remains at this position prior to the commencement of orbit-raising maneuvers.

XM Radio seeks any waiver of Section 25.210(j) of the Commission's rules necessary to permit XM-1 to be maintained at 27° W.L. with a +/-0.1 degree east-west stationkeeping tolerance. Grant of this waiver is consistent with Commission precedent.<sup>10</sup> The

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<sup>9</sup> See XM-1 Modification, Technical Appendix at 5 (describing measures to ensure safe operation during satellite relocation).

<sup>10</sup> See XM-1 Modification Grant at 1-2, ¶ 5 (granting waiver of Section 25.210(j) to permit XM-1 to be operated with an east-west stationkeeping tolerance of +/- 0.1 degrees at the 115.25° W.L. orbital location).

requested stationkeeping volume for XM-1 will not overlap with that of any other satellite. Intelsat, which provides TT&C support for XM-1, also operates the satellites on either side of 27° W.L., simplifying coordination of the positions of the three satellites. Thus, authorizing a 0.1 degree east-west stationkeeping tolerance for XM-1 will not adversely affect the operations of any other spacecraft.

For the foregoing reasons, XM Radio respectfully requests special temporary authority for a period of 180 days commencing on May 31, 2014, to extend the XM-1 license term and permit an eastward relocation of the satellite in preparation for retirement. Grant of the requested authority will serve the public interest by allowing the orderly removal of XM-1 to a disposal orbit.

Respectfully submitted,

XM Radio LLC

/s/ James S. Blitz

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Dated: March 21, 2014