

Sirius XM Radio Inc.
Request for Extension of Special Temporary Authority

Satellite CD Radio LLC, a wholly-owned subsidiary of Sirius XM Radio Inc. (“Sirius XM”), herein requests an extension of Special Temporary Authority (“STA”) for an additional 180-days, beginning February 29, 2016, to operate the FM-1, FM-2, and FM-3 non-geostationary satellite orbit (“NGSO”) spacecraft (call sign S2105, collectively the “Sirius NGSO Satellites”) with relaxed orbital parameters as a result of suspension of certain station-keeping maneuvers.¹ Sirius XM will continue operations consistent with the terms and conditions of its existing STA pending action on this request.²

Grant of this STA is in the public interest because it will allow Sirius XM to extend the life of the Sirius NGSO Satellites while conserving the propellant necessary to comply with end-of-life maneuvers previously approved by the Commission.³ The suspension of certain station-keeping maneuvers for the Sirius NGSO Satellites is similar to inclined orbit operations for geostationary satellites: there will be a gradual growth of some of the orbital parameters but the orbit variations will not increase physical or radio interference with other satellite operators. Because the Commission has no inclined orbit rule for NGSO satellites,⁴ Sirius XM files the instant STA request out of an abundance of caution.

¹ Sirius XM is currently operating with relaxed operating parameters pursuant to STA. *See Policy Branch Information; Actions Taken*, Report No. SAT-01105, DA 15-1000, SAT-STA-20150722-00051 (Sept. 11, 2015). Sirius XM anticipates operating pursuant to these relaxed operating parameters until de-orbit of each of the NGSO satellites, which is currently anticipated to occur in the second half of 2016. Sirius XM has a pending application to relocate the FM-5 satellite (call sign S2710) to 86.15° W.L. to transition from a hybrid constellation to a geostationary satellite constellation consisting of FM-5 and FM-6. To ensure continuous coverage and a smooth transition of Sirius XM’s satellite architecture, Sirius XM plans for the FM-5 satellite to be relocated and operational at 86.15° W.L. prior to the retirement of the three non-geostationary satellites. *See Policy Branch Information; Satellite Space Applications Accepted for Filing*, Report No. Report No. SAT-01128, File No. SAT-MOD-20151211-00081 (Jan. 15, 2016).

² 47 C.F.R. § 1.62.

³ *See* Satellite CD Radio, Inc., Application for Modification to Extend License Term and to De-Orbit the FM-1, FM-2 and FM-3 Satellites, File No. SAT-MOD-20091119-00123 (stamp grant Feb. 4, 2010).

⁴ *Compare* 47 C.F.R. § 25.280 (inclined orbit operations rule for geostationary satellites).

The following table details the revised orbital parameters for the Sirius NGSO Satellites:

| | As Listed on 1998 FCC Application ⁵ | Typical Parameters as Listed on the 2009 Application for Modification ⁶ | Parameters with Relaxed SK Requirements |
|--|--|--|---|
| Perigee Altitude | 24,469 km | - | 24,469 ± 1200 km |
| Apogee Altitude | 47,102 km | - | 47,102 ± 1200 km |
| Ascending Equatorial Crossing | 65.6 W ±2° | - | 60.0 W ±7.6° |
| Descending Equatorial Crossing | 126.4 W ±2° | - | 122.4 W ±6° |
| Perigee Radius | - | 30,847 ± 211 km | 30,847 ± 1200 km |
| Apogee Radius | - | 53,841 ± 211 km | 53,841 ± 1200 km |
| Eccentricity | 0.2684 | 0.2684 ± 0.005 | 0.2684 ± 0.03 |
| Inclination | 63.4 +/-7° | 63.4 ± 2° | 63.4 +/-7° |
| Argument of Perigee | - | 270 ± 2° | 267 ± 5° |
| Right Ascension of Ascending Node (RAAN) | X, X+120°, X+240° | 120 ± 0.5° | X, X+120°, X+240° |
| Nominal Apogee Longitude | 96° W | - | 96° W |

The revised orbital parameters will not increase the risk of collision with geostationary satellite orbit (“GSO”) satellites. Although eccentricity will drift beyond its nominal station-keeping range resulting in variation of the nominal apogee and perigee altitudes, the apogee and perigee altitude changes do not coincide with the equatorial crossings and thus will not impact safe physical separation distances with GSO satellite operators. The relaxation of the eccentricity and argument of perigee control will result in the equatorial crossings drifting from the nominal 65.6° and 126.4°W longitude, but the altitudes of the equatorial crossings will not change significantly and will remain a safe distance below the GSO altitude. GSO satellite operators are typically concerned at proximities of less than 10 km and the Sirius NGSO Satellites will remain at least 1300 km below the GSO altitude at the equatorial crossings. There is no increase in risk of collision with a geostationary satellite because the Sirius NGSO Satellites altitude at the equatorial crossings will be more than two orders of magnitude higher than a typical “close approach” threshold defined by a geostationary satellite operator. Moreover, the inclination, Right Ascension of the Ascending Node (RAAN), and nominal apogee longitude will not change from the currently licensed limits.

⁵ Satellite CD Radio, Inc., Application to Launch and Operate a Digital Audio Radio Satellite Service in the 2320.0-2332.5 MHz Frequency Band, File No. SAT-MOD-19981211-00099 (filed Dec. 11, 1998).

⁶ Satellite CD Radio, Inc., Application for Modification to Extend License Term and to De-Orbit the FM-1, FM-2 and FM-3 Satellites, File No. SAT-MOD-20091119-00123 (filed Nov. 19, 2009).

In addition, there is no increase in risk of radio frequency interference with a GSO satellite because the Sirius NGSO Satellites will continue to turn off the 4 GHz telemetry transmitter and prohibit commanding in the 6 GHz band within 2° of the equatorial crossing. Furthermore, the Sirius NGSO Satellites do not transmit S-band payload service near the equatorial crossings. Sirius XM will continue to coordinate and communicate with other satellite operators and will increase the frequency of its fleet coordination letter from bi-annually to quarterly. These notifications will cover U.S. operators within $\pm 5^\circ$ and non-U.S. operators within $\pm 10^\circ$ of a Sirius NGSO Satellite's equatorial crossing. Sirius XM will continue to monitor close approach limits and should a Sirius NGSO Satellite get inside those limits, Sirius XM will notify any affected operator and take necessary corrective actions.

In light of the above, Sirius XM respectfully requests Commission approval of this STA extension request.