

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 August 27, 2016, to operate the FM-1 non-geostationary satellite orbit (“NGSO”) spacecraft (call sign S2105) 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 continue to conserve 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 FM-1 satellite 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.

The following table details the revised orbital parameters for the FM-1 satellite:

	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

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 was authorized to operate pursuant to these relaxed operating parameters for all three satellites in the NGSO constellation, FM-1, FM-2, and FM-3. Sirius XM recently completed the de-orbit of the FM-2 and FM-3 satellites. Sirius XM plans to commence de-orbit of the FM-1 satellite in September 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).

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).

Ascending Equatorial Crossing	65.6 W $\pm 2^\circ$	-	60.0 W $\pm 7.6^\circ$
Descending Equatorial Crossing	126.4 W $\pm 2^\circ$	-	122.4 W $\pm 6^\circ$
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 $\pm 7^\circ$	63.4 $\pm 2^\circ$	63.4 $\pm 7^\circ$
Argument of Perigee	-	270 $\pm 2^\circ$	267 $\pm 5^\circ$
Right Ascension of Ascending Node (RAAN)	X, X+120°, X+240°	120 $\pm 0.5^\circ$	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 FM-1 satellite 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 FM-1 satellite 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.

In addition, there is no increase in risk of radio frequency interference with a GSO satellite because the FM-1 satellite will continue to coordinate the 4 GHz and 6 GHz telemetry and command transmissions with all potentially affected geostationary satellite operators within 10° of the equatorial crossing. Furthermore, the FM-1 satellite does 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 FM-1 satellite’s equatorial crossing. Sirius XM will continue to monitor close approach limits and should the FM-1 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.