

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)
) IB Docket No. 18-313
Mitigation of Orbital Debris in the)
New Space Age)

To: The Commission

COMMENTS OF SIRIUS XM RADIO INC.

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Sirius XM Radio Inc. (“Sirius XM”) submits these comments in response to the Commission’s Notice of Proposed Rulemaking on Mitigation of Orbital Debris in the New Space Age.¹ Although Sirius XM recognizes the importance of orbital debris mitigation and supports the NPRM’s goals, it urges the Commission to consider the impact that its proposals will have on the competitiveness of U.S.-licensed satellite operators like Sirius XM and the disparate impact that several of its proposals will have on Satellite Digital Audio Radio Service (“SDARS”) operators.

I. INTRODUCTION AND SUMMARY

Sirius XM operates a fleet of four operational satellites and one in-orbit spare in geostationary orbit (“GSO”) and provides SDARS to over 34 million subscribers and over 100 million vehicles equipped with satellite radios. Sirius XM is committed to maintaining a safe and debris-free operating environment in space and over the years has worked with the Commission to ensure that its satellites, both operational and retired, do not pose a risk to current or future satellites. Sirius XM appreciates the Commission’s efforts to update its rules in this

¹ *Mitigation of Orbital Debris in the New Space Age*, Notice of Proposed Rulemaking and Order on Reconsideration, FCC 18-159 (rel. Nov. 19, 2018) (“NPRM”).

proceeding to reflect its experience with regulating orbital debris and changes in the satellite market.

While many of the NPRM's proposals are focused on NGSO satellites, several proposals have significant implications for the operation of GSO satellites, including Sirius XM's. If adopted, these proposals could impose significant and unnecessary economic burdens on GSO operators without meaningfully improving orbital debris mitigation efforts. Additionally, some proposals do not adequately account for the differences between SDARS and other types of satellite operations. As such, Sirius XM recommends that the Commission take the following actions with regard to the NPRM:

- Modify the GSO license extension proposal to account for the shorter SDARS license term;
- Decline to adopt a 0.999 design reliability requirement;
- Clarify that the proposal to deploy satellites initially to 650 km does not apply to satellites in transit to GSO;
- Decline to adopt a coordination requirement for GSO orbit raising maneuvers;
- Adopt an ephemeris data sharing requirement for all satellites;
- Decline to adopt an encryption requirement for tracking, telemetry, and command signals;
- Decline to adopt indemnification and insurance requirements; and
- Decline to consider limits on the number of launches or dictate satellite design as a means of mitigating orbital debris.

II. DISCUSSION

A. The Commission Should Modify its GSO Satellite License Extension Proposal to Account for SDARS and Other Services with Shorter Initial License Terms

Although Sirius XM generally supports the Commission's proposal to limit license extensions for GSO satellites to no more than five years in a single modification application for

licensees originally issued a 15-year license term,² this limit on license extensions is appropriate only where a satellite's initial license term was the standard fifteen years or its license term was based on the expected life of the satellite.

The Commission's rules limit the initial license terms of Sirius XM's SDARS satellites to only eight years.³ A five-year cap on license extensions would result in Sirius XM having to file multiple license extension applications before reaching the standard license term that the Commission allows for other satellite services,⁴ despite the fact that the design life of each Sirius XM SDARS satellite is no different than that of GSO spacecraft used for other services.⁵ Because of the unique burden that the five-year limit on license extensions would place on SDARS operators, the Commission should adopt an exception for SDARS and other satellite licensees having initial license terms of under fifteen years. Such licensees should be permitted to request a first license extension of up to eight years and thereafter be subject to the same license extension cap applied to other satellite services.

While Sirius XM does not oppose a requirement that GSO operators supply certain information regarding the satellite's operations to support an application to extend the license term,⁶ the Commission must use caution when codifying the information that GSO licensees

² *Id.* ¶ 65.

³ 47 CFR § 25.121(a)(2); 47 USC § 307(c)(1).

⁴ While Sirius XM recognizes that license terms are otherwise beyond the scope of this rulemaking, the Commission should consider increasing the standard license term for SDARS systems from 8 years to 15 years in a separate rulemaking, similar to the Commission's proposal to increase the license term for DBS systems to 15 years. *See Amendment of the Commission's Policies and Rules for Processing Applications in the Direct Broadcast Satellite Service*, Second Notice of Proposed Rulemaking, FCC 18-157, ¶¶ 18-19 (rel. Nov. 13, 2018).

⁵ Sirius XM previously alerted the Commission to this concern in a letter filed in this docket on Nov. 7, 2018. Letter from Karis A. Hastings, Counsel for Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, Federal Commission, IB Docket No. 18-313 (filed Nov. 7, 2018).

⁶ NPRM ¶¶ 63, 65.

must provide in connection with such a request. In particular, the FCC should avoid wording like “single point of failure” and “fully functional” in limiting its consideration of extension requests. A simple loss of redundancy should not be the sole basis for a decision to deny a license extension for an otherwise healthy satellite. There are many examples of satellites continuing to provide service for years on a single control processor or a single command receiver, even though such satellites could potentially be characterized as having experienced a “single point of failure.” The Commission should not limit a satellite’s on-orbit life as long as the satellite is healthy and sufficient fuel remains to deorbit.

Satellite designs include redundancy to improve their reliability and ensure their ability to operate and deorbit safely. If the failure of such redundant systems prompts an automatic denial of license renewal, an operator would have an incentive to forego redundancy in its design, thereby increasing the risk of a single point failure resulting in orbital debris. When determining whether to extend a satellite’s license term, the Commission must take a holistic approach to license extensions that accounts for the actual risk of future failures, rather than relying on generalized criteria.

Sirius XM also opposes any proposal to subject certain satellite buses to higher scrutiny than others for purposes of license extensions.⁷ Design variations among buses do not significantly impact their reliability and even within a particular design there is no way to predict the likelihood or severity of an anomaly in advance of an event. One size does not fit all and no operator should be forced to deorbit a satellite which can still be operated safely for many years.

⁷ *Id.* ¶ 67.

B. The Commission Should Not Adopt its Proposed Design Reliability Requirement

The Commission should not adopt a satellite design reliability requirement for NGSO systems or extend its proposal to GSO satellites. The NPRM seeks comment on whether the Commission should adopt a design and fabrication reliability requirement – for example, 0.999 per spacecraft – if an NGSO satellite constellation involves a large number of satellites or will initially be deployed at higher altitudes in low-Earth orbit.⁸ As an initial matter, the Commission appears to be proposing this number based on comments NASA filed on recent NGSO applications before the FCC, specifically in the context of the SpaceX application for a constellation of over 4,000 satellites.⁹ Regardless of the merits of adopting this metric for such a large satellite system, the Commission provides no justification for extending it to smaller NGSO constellations. For most satellite systems, a reliability requirement of 0.999 is far too strict, and it is unlikely that satellite manufacturers could satisfy this standard without incurring significant additional expense for testing and implementing redundant systems. While not proposed in the NPRM, the 0.999 fabrication reliability metric should not be applied to GSO satellites.

Even if the Commission adopts the 0.999 metric or any other number only for NGSO satellite systems, the Commission's proposal still requires additional clarification. For example, the Commission provides no explanation for how the reliability metric would be measured or enforced and it also specifies no timeframe over which an operator would be obligated to satisfy the reliability requirement. Building a satellite that satisfies a 0.999 standard over the first month or year of its life is a much different proposition than building a satellite that meets this standard over the satellite's typical operational life, which often exceeds 15 years. Additionally, the

⁸ *Id.* ¶ 43.

⁹ *Id.* n.107.

Commission should apply any reliability metric only to tracking, telemetry, and command (“TT&C”) and maneuverability systems, not to payload systems that have no role in generating or mitigating debris.

C. The Commission Should Clarify and Reconsider Some of its Proposals Related to Launch of Satellites Operating in Low-Earth Orbit

The NPRM proposes applicants certify that any satellites intended to operate at an altitude of 650 km or above will initially be deployed below 650 km and will be moved to a higher orbit only after the satellite is determined to be fully functional.¹⁰ Sirius XM takes no position on this proposal with regard to its potential application to NGSO systems, but cautions the Commission not to apply this requirement to GSO satellites during transit to GSO. Orbit raising for satellites destined for GSO often begins below 650 km. If the Commission adopts this proposal for NGSO systems, it should clarify that the requirement will not be applied to GSO systems during their transit to GSO.

As to NGSO satellites, the Commission should be cautious about what degree of functionality it will require satellite operators to demonstrate during initial deployment below 650 km. For example, many satellites will not deploy solar arrays or deploy reflectors until they are on station, and a requirement that such systems must be deployed prior to reaching the satellite’s final orbit would significantly change satellite design. Additionally, the Commission should limit any functionality demonstration only to TT&C and maneuverability systems, not to payload systems that have no role in generating or mitigating debris. NGSO operators could be severely limited in design opportunities if the Commission does not appropriately narrow the scope of what it requires for a satellite to be deemed to have “full functionality.”

¹⁰ *Id.* ¶ 48.

D. The Commission Should Not Apply its Proposed Orbit Raising Rule to GSO Satellites

The FCC proposes that TT&C conducted during orbit raising should be coordinated to avoid interference, rather than simply requiring operation during orbit raising on a non-harmful-interference, unprotected basis.¹¹ This proposal is unnecessary for GSO satellites. Operators have conducted orbit raising for GSO satellites on a non-harmful-interference, unprotected basis for decades without issue. The vast majority of orbit raising activities can be planned in advance to avoid interference.

Regardless of how the Commission addresses this issue, in-service satellites should never be subject to interference from satellites engaged in orbit raising except on an emergency basis. As Sirius XM has discussed extensively in other proceedings, the unique characteristics of SDARS make it highly vulnerable to interference.¹² Sirius XM invests substantial resources into its network to ensure the quality of the service it provides to subscribers, yet interference remains a real, constant, and rapidly growing concern, made even more significant by the inability to modify a satellite after it has been launched and the impracticality of upgrading a satellite radio after it has been installed in a vehicle. There is no reason why anything other than completely non-harmful-interference operations should be expected of satellites engaged in orbit-raising.

E. The Commission Should Require All Operators to Share Ephemeris Data, Including GSO Satellites

The Commission should adopt its proposal requiring that accurate ephemeris data for NGSO satellite systems be made available to other operators.¹³ As popular orbits grow more crowded, accurate ephemeris data will become critical for orbit raising and collision avoidance

¹¹ *Id.* ¶ 70.

¹² See Comments of Sirius XM Radio Inc., ET Docket No. 18-295 (filed Feb. 15, 2019); Reply Comments of Sirius XM Radio Inc., ET Docket No. 18-295 (filed Mar. 18, 2019).

¹³ NPRM ¶¶ 72-73.

efforts in addition to helping avoid harmful interference. Additionally, while the NPRM proposes to apply this requirement only to NGSO systems, GSO operators would similarly benefit from having access to accurate ephemeris data about other GSO satellites. The Commission should extend the scope of this data sharing requirement accordingly.

F. The Commission Should Not Require Encryption of Telemetry, Tracking, and Command Communications

The Commission should not adopt its proposal to require encryption of TT&C communications.¹⁴ As an initial matter, the Commission confuses the issue when describing “encrypted” versus “secure” operations. Encryption is one type of security, but is not the only means of maintaining secure communications and operational control of a satellite. If the Commission’s concern is only that satellite TT&C be kept “secure,” the Commission should rephrase the proposed certification to say just that. Sirius XM does not object to requiring operators to certify that TT&C communications are “secure.” Most satellites are equipped with command security, but “encryption” refers to a higher level of security that is not typically used by commercial operators.

However, to the extent the Commission intended to specifically require “encryption,” this proposal raises several significant concerns. Contrary to the FCC’s assertions, many commercial satellites today do not operate with command encryption. True encryption requires specific hardware to be built into the satellite, as well as specific ground equipment to be compatible with the satellite, and not all commercial satellites in orbit were built with this capability. Even those satellites having such capabilities, including the Sirius XM satellites, will rarely use them on a regular basis since the encryption processing time can cause commanding delays. Moreover, the capability of encrypting telemetry has become commercially available only in the past few years

¹⁴ *Id.* ¶¶ 74-75.

and is still relatively expensive. Requiring encrypted TT&C for all satellites would be a significant and expensive change to satellite and earth station design. If the Commission nevertheless adopts its TT&C encryption proposal, it must grandfather all in-orbit and under-construction satellites.¹⁵

As a final point, the encryption proposal seems premised specifically on the presence of a propulsion system on the satellite. The presence or absence of a propulsion system should have no bearing on whether to impose encryption or other security requirements, since a rogue operator could potentially create significant harm to other satellites by causing interference or physical damage, even without a propulsion system on the target satellite.

G. The Commission Should Not Adopt its Proposals Related to Indemnification and Insurance

The Commission should not adopt its proposals related to insurance and indemnification for satellite operators,¹⁶ which would effectively require operators to maintain insurance for the life of a satellite rather than being a commercial decision based on each operator's business needs as it is today. This change would significantly increase an operator's costs while offering little benefit from a debris mitigation perspective. Moreover, if the Commission imposes this requirement on U.S. licensees, it will effectively penalize domestic satellite operators and will drive companies towards other licensing administrations.

If the Commission imposes this requirement, it must not adopt its proposed timeline for signing an indemnification agreement. Requiring operators to sign such an agreement within 30 days of the grant of the license is neither practical nor necessary, given that a satellite may not be

¹⁵ There is precedent for the Commission to grandfather satellites when it adopts orbital debris mitigation rules that will potentially have a significant financial impact on operators. *See Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567, 11599-600 (2004).

¹⁶ NPRM ¶¶ 76-81.

launched until several years after the Commission grants its license. A requirement that the operator sign an indemnification agreement within 30 days of *launch* would be sufficient, if such an agreement is required at all. Additionally, the Commission should exempt GSOs and other operators who have provided detailed debris mitigation plans from the indemnification requirement.

The Commission should also decline to adopt a requirement that operators obtain insurance for on-orbit or reentry liability.¹⁷ An insurance requirement only penalizes responsible operators while doing little to encourage good behavior. The Commission’s objectives would be better served using a “carrot-stick” approach by rewarding responsible operators – such as through reductions in filing fees or other benefits – and penalizing rogue operators that fail to comply with the Commission’s debris mitigation rules. Fees obtained from such penalties could then be used to fund debris removal efforts.

H. The Commission Should Not Restrict the Number of Launches or Dictate Satellite Design

The NPRM also discusses several alternative means of reducing orbital debris through regulatory incentives, including potentially reducing the number of launches and dictating satellite design.¹⁸ Sirius XM agrees with the Commission’s tentative conclusion that reducing the number of launches is not an effective method for reducing orbital debris. This approach would drive space business away from the U.S. without actually reducing or mitigating orbital debris concerns. This approach is also inconsistent with the Administration’s stated goal of making the U.S. the “flag of choice” for satellite operators.¹⁹

¹⁷ *Id.* ¶ 80.

¹⁸ *Id.* ¶¶ 92-98.

¹⁹ See Wilbur Ross, *President Trump wants my department to keep space safe. We’re ready*, Wash. Post (June 19, 2018), [https://www.washingtonpost.com/opinions/president-trump-wants-my-department-to-](https://www.washingtonpost.com/opinions/president-trump-wants-my-department-to-keep-space-safe-we-re-ready/)

The Commission also should not dictate satellite design. Not only does the Commission lack adequate resources and information necessary to decide how operators should design and manufacture their satellites, but such an approach would negatively impact the business decisions and innovation of satellite operators. Rather than getting into the satellite design business, the Commission should instead continue its current approach to debris mitigation, relying on a combination of disclosure requirements and general operational requirements that satellite operators must satisfy. Operators should be required to show only that a satellite can be safely removed from orbit within a reasonable amount of time and that the satellite will not generate debris, but the specific means of achieving those ends should be left to the operator.

III. CONCLUSION

Sirius XM recognizes the importance of effective orbital debris mitigation and generally supports the Commission's ongoing efforts in this area. However, the Commission must ensure that whatever rules it adopts do not unnecessarily burden U.S. satellite operators and that such rules are fairly and equitably applied to all satellite services.

Respectfully submitted,

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