

**BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, DC 20554**

In the Matter of	)	
	)	
Revision of the Big LEO Spectrum	)	RM-11975
Sharing Plan to Encourage Productive	)	
MSS Use of 1.6/2.4 GHz Frequencies	)	

**COMMENTS OF TECHFREEDOM IN SUPPORT OF SPACEX  
PETITION FOR RULEMAKING**

Pursuant to the Public Notice (“Notice”) released by the Commission on March 26, 2024,<sup>1</sup> TechFreedom submits the following comments in support of the SpaceX Petition for Rulemaking, filed on February 21, 2024 (“Petition”).<sup>2</sup> By these Comments, TechFreedom echoes SpaceX’s call for a rulemaking to update the 30-year-old rules for this spectrum.

**I. Introduction and Background**

In its Petition, SpaceX requests that the Commission commence a rulemaking proceeding to update its rules surrounding shared use of the 1.6/2.4 GHz spectrum in the Mobile Satellite Services (“MSS”),<sup>3</sup> first adopted in 1994.<sup>4</sup>

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<sup>1</sup> Public Notice, DA 24-298 (released Mar. 26, 2024). The Notice set the comment date as April 25, 2024, and the reply comment date as May 10, 2024. These comments are timely filed.

<sup>2</sup> See Revision of the Big LEO Spectrum, Petition for Rulemaking (filed Feb. 21, 2024), <https://www.fcc.gov/ecfs/document/102211948918123/1> (“Petition”).

<sup>3</sup> The band includes spectrum between 1610-1617.775 MHz and 2483.5-2500 MHz. For simplicity, the 1.6/2.4 GHz Band will be referred to in these comments as the 1.6 GHz Band.

<sup>4</sup> Amendment of the Commission’s Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, CC Docket No. 92-166, Report and Order, 9 FCC Rcd. 5936, FCC 94-261 (released Oct. 14, 1994) (“1994 Big LEO Report & Order”).

## A. History of Big LEO Systems and the 1.6 GHz Band

The early 1990s were a heady time for the satellite industry. Grandiose plans were hatched for constellations of LEO satellites both by traditional powerhouses such as Motorola,<sup>5</sup> TRW,<sup>6</sup> and Loral,<sup>7</sup> as well as a cadre of smaller companies and startups.<sup>8</sup> The future seemed boundless, and the FCC agreed: “This new mobile satellite service—the ‘MSS Above 1 GHz’ or ‘Big LEO’ satellite service—has the potential to provide not only a variety of new services to users in the United States, but to provide integrated communication services to all parts of the world, including those that are now grossly underserved.”<sup>9</sup> The Commission envisioned all manner of 1990s telecommunications services being delivered via Big LEO systems.<sup>10</sup>

The Commission also clearly contemplated multiple operators sharing the band, given the pending applications at the time, the interest in the rulemaking, and the four commercial operators who signed a joint proposal recommending spectrum sharing.<sup>11</sup> The

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<sup>5</sup> See 1994 Big LEO Report & Order, ¶ 6.

<sup>6</sup> *Id.* ¶ 7.

<sup>7</sup> *Id.* The Loral applicant later became Globalstar. *Globalstar*, WIKIPEDIA, <https://en.wikipedia.org/wiki/Globalstar> (last visited Apr. 22, 2024).

<sup>8</sup> 1994 Big LEO Report & Order, ¶ 7 (Ellipsat, Constellation Communications, Inc. (Constellation), and AMSC Subsidiary Corporation (AMSC)).

<sup>9</sup> *Id.* ¶ 1.

<sup>10</sup> *Id.* ¶ 3 (“[T]he Big LEO service can offer an almost limitless number of services, including ubiquitous voice and data mobile services, position location services, search and rescue communications, disaster management communications, environmental monitoring, paging services, facsimile transmission services, cargo tracking, and industrial monitoring and control.”). Services may change, but the need for spectrum does not.

<sup>11</sup> *Id.* ¶ 9, n. 23. See also *id.* ¶ 57 (“We need not decide now on a course of action to be taken in the event that only one Big LEO system is implemented, whether it is a CDMA or TDMA/FDMA system.

Big LEO Report and Order references “sharing” more than 60 times.<sup>12</sup> The Commission also stressed the need for the new systems to be spectrally efficient.<sup>13</sup>

But establishing rules for the 1.6 GHz band in the United States had to wait until after the 1992 World Administrative Radio Conference, when the ITU allocated frequencies for MSS in February 1992.<sup>14</sup> Once that occurred, in less than a year,<sup>15</sup> the Commission went from an NPRM<sup>16</sup> to the 1994 Big LEO Report and Order, and the Commission moved forward to grant four CDMA NGSO MSS systems, authorizing use of the 1610-1621.35 MHz band for service uplinks and 2483.5-2500 MHz for service downlinks, and one TDMA system to

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If and when that occurs, we will weigh a variety of factors in a rulemaking, *including our preference for multiple entry*, constraints on the assigned spectrum due to international coordination agreements, system efficiency, and system loading, when considering a spectrum adjustment for that system.” (emphasis added)).

<sup>12</sup> See, e.g., *id.* ¶ 41 (“Because the spectrum sharing plan we adopt today accommodates up to five systems . . .”); ¶ 59 (“We recognize that if all six of the pending applicants are found qualified under our Big LEO rules, our five-system sharing plan will not be able to accommodate all of them.”).

<sup>13</sup> See, e.g., *id.* ¶ 19 (prior satellite system deployment is “not sufficient to preclude embracing a new and potentially more efficient technology, notwithstanding its substantial risks and costs. On the contrary, the Commission has a mandate to encourage new technologies and services. While both LEO and GSO systems portend substantial opportunities for employment growth and export of U.S. technologies worldwide, LEO systems have greater potential to serve more uniformly the United States and international locations with smaller, more ubiquitous and lower power equipment. This leads us to conclude that the primary use of the subject spectrum should be by LEO systems.” (footnote omitted)); ¶ 24 (“We indicated in the Notice that the public interest would be served if LEO systems provided efficient and ubiquitous voice service to users throughout the United States. We therefore proposed to require each LEO system to have at least one satellite at an elevation angle of at least 5 degrees at any given time in all areas of the United States.”).

<sup>14</sup> *Id.* ¶ 8.

<sup>15</sup> See *infra* Section II.C for a discussion of the need for a speedy rulemaking process to update the current 1.6 GHz rules.

<sup>16</sup> Amendment of the Commission’s Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, CC Docket No. 92-166, Notice of Proposed Rulemaking, 61 Fed. Reg. 9944 (released Feb. 15, 1996), <https://www.fcc.gov/document/amendment-commissions-rules-establish-rules-and-policies-1> (“Big LEO NPRM”).

Iridium, authorizing bi-directional TDMA operation in the 1621.35-1626.5 MHz band.<sup>17</sup> The Big LEO Report and Order specifically stated that the FCC would review the sharing plan in the event that only one CDMA system came online.

We need not decide now on a course of action to be taken in the event that only one Big LEO system is implemented, whether it is a CDMA or TDMA/FDMA system. If and when that occurs, we will weigh a variety of factors in a rulemaking, including our preference for multiple entry, constraints on the assigned spectrum due to international coordination agreements, system efficiency, and system loading, when considering a spectrum adjustment for that system.<sup>18</sup>

Ultimately, only one CDMA system was built and launched (Globalstar), and only one TDMA system was deployed (Iridium). The other proposed systems (and other high-profile Big LEO systems),<sup>19</sup> withered on the technological vein. Even Globalstar and Iridium only narrowly escaped extinction, both going through bankruptcies.<sup>20</sup>

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<sup>17</sup> See Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands, Report and Order, ¶ 19, 69 Fed. Reg. 48157 (released July 16, 2004), <https://docs.fcc.gov/public/attachments/FCC-04-134A1.pdf> (“2004 Big LEO Report & Order”).

<sup>18</sup> 1994 Big LEO Report & Order, ¶ 57.

<sup>19</sup> Teledesic became the poster child for Big LEO, founded by cellular mogul Craig McCaw and Microsoft’s Bill Gates. See *Teledesic*, ASTRONAUTIX, <http://www.astronautix.com/t/teledesic.html> (last visited Apr. 22, 2024). We’ve written about the demise of Teledesic and other such grandiose systems. James E. Dunstan, *Bring on the Space Barons*, MEDIUM (Sept. 14, 2021), <https://medium.com/@TechFreedom/bring-on-the-space-barons-e425129bfff6>. See also Sharon Pian Chan, *The Birth and Demise of an Idea: Teledesic’s ‘Internet in the Sky’*, SEATTLE TIMES (Oct. 7, 2022), <https://archive.seattletimes.com/archive/?date=20021007&slug=teledesic070> (“[T]he pairing was akin to Elvis and the pope on tour together. They were Seattle’s most prominent business leaders, both having defied conventional wisdom in their industries to build billion-dollar companies.”).

<sup>20</sup> As the 2004 Big LEO Report & Order attests (¶ 22), the Iridium system was barely saved during a bankruptcy petition (“In August 1999, the Motorola subsidiary with principal financial responsibility for Iridium operation filed for protection from creditors under Chapter 11 of the Bankruptcy Code. The Iridium system ceased commercial operation in the spring of 2000, and Motorola prepared to remove the satellites from orbit, but a bankruptcy sale of the Iridium assets shortly before the scheduled starting date for de-orbiting preserved the system from imminent destruction. The

## **B. Present Day Utilization of the 1.6 GHz Band**

According to the SpaceX Petition, the Globalstar constellation has withered to just seven satellites,<sup>21</sup> and Globalstar has requested authorization to construct and fly 26 new satellites that would utilize the entire band, further entrenching itself as the single CDMA operator at 1.6 GHz.<sup>22</sup> The Iridium constellation consists of 66 satellites that utilize the 1.6 GHz spectrum for customer links, 29.1 to 29.3 GHz for gateway uplink and 19.1 to 19.6 GHz for gateway downlinks.<sup>23</sup> End user data speeds are between 176-704 Kbps.<sup>24</sup>

## **II. The Commission Should Commence a Rulemaking Proceeding Immediately**

### **A. Space Spectrum Is Precious and Must Be Used Efficiently**

While the 1990s were for space dreamers, today there are space doers. With an order of magnitude drop in launch costs,<sup>25</sup> and a multiple orders of magnitude drop in satellite manufacturing costs (on a dollar-per-megabit throughput basis), we are experiencing an

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purchaser was Iridium, a newly-formed company that had entered into a contract with the Department of Defense (DOD) for provision of service for up to 20,000 users.” (footnote omitted)). Globalstar also went through a bankruptcy reorganization. *Id.* ¶ 23.

<sup>21</sup> See Petition, p. 1, n.4.

<sup>22</sup> Application for Modification, ICFS File No. SAT-MOD-20230804-00192, Technical Attachment (Aug. 4, 2023) (“Globalstar Modification”).

<sup>23</sup> See *What frequency does the Iridium satellite system use?*, EVERYTHINGRF (Apr. 12, 2022), <https://www.everythingrf.com/community/what-frequency-does-the-iridium-satellite-system-use>.

<sup>24</sup> *Broadband*, IRIDIUM, <https://www.iridium.com/service-type/broadband/> (last visited Apr. 24, 2024).

<sup>25</sup> See, e.g., AIR UNIVERSITY, MAXWELL AFB, FAST SPACE: LEVERAGING ULTRA LOW-COST SPACE ACCESS FOR 21ST CENTURY CHALLENGERS 33–34 (2017), [https://www.airuniversity.af.edu/Portals/10/Research/Space-Horizons/documents/Fast%20Space\\_Public\\_2017.pdf](https://www.airuniversity.af.edu/Portals/10/Research/Space-Horizons/documents/Fast%20Space_Public_2017.pdf) (declassified version) (undersigned counsel headed the regulatory group for this study).

entirely new revolution in satellite communications.<sup>26</sup> FCC Chairwoman Rosenworcel put it succinctly: “the new space age needs new rules.”<sup>27</sup> Those new rules must include more than updating the application process.<sup>28</sup> They must address the underlying spectrum use. In short, the satellite revolution needs space spectrum, and that spectrum must be used efficiently.

We’ve written for decades about this need.<sup>29</sup> TechFreedom has filed comments in numerous proceedings stressing the importance of freeing up additional spectrum for space uses,<sup>30</sup> and in particular, protecting space spectrum from being syphoned off by terrestrial

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<sup>26</sup> See DUNSTAN, *Bring On the Space Barons*, *supra* note 19 (“What Musk has going for him is not only SpaceX’s much cheaper launches, but the price of space hardware itself. Each Starlink satellite costs only \$500,000. That represents a 98 percent reduction of the cost on a price-per-kilogram basis as compared to traditional telecommunications satellites—a two-orders of magnitude reduction.”).

<sup>27</sup> Statement of Chairwoman Jessica Rosenworcel, *Expediting Initial Processing of Satellite and Earth Station Applications* at 1, IB Docket Nos. 22-411, 22-271, NPRM, 37 FCC Rcd. 15167 (released Dec. 22, 2022).

<sup>28</sup> See, e.g., *Transparency Initiative*, FCC, <https://www.fcc.gov/space/transparency-initiative> (last visited Apr. 24, 2024) (“The goal is to provide interested parties with user-friendly information and guidance regarding the Commission’s space station and earth station application and authorization procedures. The initiative covers a variety of topics, including application completeness, orbital debris requirements, and inter-bureau and inter-agency coordination.”).

<sup>29</sup> James E. Dunstan, *Earth To Space: I Can’t Hear You; Selling Off Our Future To The Highest Bidder*, 11 SPACE MANUFACTURING 247 (1997), <https://techfreedom.org/wp-content/uploads/2020/10/SSI-1997-Earth-to-Space-I-cant-Hear-You.pdf>.

<sup>30</sup> TechFreedom’s submitted comments include *Revising Spectrum Sharing Rules*, IB Docket No. 21-456 (Aug. 7, 2023); *Single Network Future*, GN Docket No. 23-65 (May 12, 2023); *Expediting Initial Processing*, IB Docket No. 22-411 (Mar. 3, 2023); *Space Innovation*, IB Docket No. 22-271 (Oct. 31, 2022); *Rural Digital Opportunity Fund*, WC Docket No. 19-126 (Sept. 26, 2022); *Revising Spectrum Sharing Rules*, IB Docket No. 21-456 (Apr. 25, 2022); *Reply Comments in Modernizing and Expanding Access*, WT Docket No. 20-133 (Jan. 3, 2022); *OSTP National Orbital Debris Research and Development Plan* (Dec. 31, 2021); *Modernizing and Expanding Access*, WT Docket No. 20-133 (Dec. 2, 2021); *Reply Comments in Allocation of Spectrum*, ET Docket No. 13-115 (Sept. 10, 2021).

users.<sup>31</sup> In this proceeding, the issue is whether the Commission will hold fast to its prior conclusion that multiple operators should share the 1.6 GHz band, or allow incumbent users to back themselves into monopoly licenses just by surviving over the years, continuing to limp along with a small number of satellites offering slow speeds, often employing inefficient technologies. According to a 2017 presentation, for example, Globalstar lists the data speeds of its first generation system at 9.6 kbps.<sup>32</sup> Iridium fares hardly better, touting data speeds of “176 Kbps to 704 Kbps.”<sup>33</sup>

## **B. The Commission Should Require the Same Level of Innovation in the Satellite Services as It Has with Broadband**

Imagine a world where terrestrial access to the Internet was limited to 9.6 kbps (or 9600 baud) or even 704 kbps. There was such a world—it was called the 1990s. When it comes to terrestrial broadband, however, the FCC has mandated improved speeds over the years. In its 1999 Section 706 Report to Congress,<sup>34</sup> the FCC defined broadband as 200 kbps in both directions. In subsequent Reports over the years, the FCC has continually redefined

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<sup>31</sup> Reply Comments in Expanding Flexible Use of the 12.2-12.7 GHz Band, WT Docket No. 10-443 (July 7, 2021); Expanding Flexible Use of the 12.2-12.7 GHz Band, WT Docket No. 20-443 (May 7, 2021); Use of the 12.2-12.7 GHz Band for Two-Way Mobile Broadband Service at 3, RM Docket No. 11768 (Oct. 8, 2020) (“The FCC has made 5G a priority . . . But that should not mean that every time someone asks for more spectrum to deploy 5G systems, the FCC should genuflect and pull that spectrum from any other use.” (footnotes omitted)).

<sup>32</sup> GLOBALSTAR OVERVIEW (2017), <https://www.globalstar.com/Globalstar/media/Globalstar/Downloads/Spectrum/GlobalstarOverviewPresentation.pdf>.

<sup>33</sup> *Broadband*, IRIDIUM, <https://www.iridium.com/service-type/broadband/> (last visited Apr. 24, 2024).

<sup>34</sup> Fed. Comm’n’s Comm’n, Inquiry Concerning the Deployment of Advanced Telecommunications Capability, CC Docket No. 98-146, Report (released Feb. 2, 1999), [https://transition.fcc.gov/Bureaus/Common\\_Carrier/Orders/1999/fcc99005.txt](https://transition.fcc.gov/Bureaus/Common_Carrier/Orders/1999/fcc99005.txt).

what constitutes broadband,<sup>35</sup> until just last month, where the FCC redefined broadband to be 100/20 Mbps, a more than two order of magnitude (100 times) increase in speed from 1999. The federal government has pushed terrestrial broadband providers to be more efficient and deliver higher speeds, only allowing federal funds to flow to those that do.<sup>36</sup>

But satellite speeds seem stuck in the 1990s, mainly because the Commission has not required operators to become more efficient in their spectrum and technology use. It is indeed ironic that space technology, which conjures up images of humans walking on the Moon, now lags so far behind. That needs to change, and this proceeding can usher in a new era of technological advancement in the public interest.

### **C. Time Is of the Essence**

While the U.S. satellite rules are stuck in the 1990s, other nations are not waiting. They're moving forward with new systems that compete with and far outperform American providers, especially the current 1.6 GHz offerings. Continued inaction by the FCC to require more efficient use of the 1.6 GHz spectrum rewards foreign competitors. As such, the

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<sup>35</sup> The Commission refined the definition of broadband from 200/200 Kbps in 1996, *see Sixth Broadband Progress Report*, FCC, <https://www.fcc.gov/reports-research/reports/broadband-progress-reports/sixth-broadband-progress-report> (last visited Apr. 24, 2024), to 4/1 Mbps in 2010, *id.*, and then to 25/3 Mbps in 2015, *see 2015 Broadband Progress Report*, FCC (Feb. 4, 2015), <https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2015-broadband-progress-report>.

<sup>36</sup> To qualify for funding under the Rural Digital Opportunity Fund, for example, providers must meet a minimum threshold speed of 25/3. *See* Rural Digital Opportunity Fund, Report & Order, 35 FCC Rcd 686 (2020). To qualify for BEAD funding, providers must offer speeds in underserved areas of at least 100/20. *See* NTIA, INTERNET FOR ALL BEAD FAQ, [https://broadbandusa.ntia.doc.gov/sites/default/files/2022-09/BEAD-Frequently-Asked-Questions-%28FAQs%29\\_Version-2.0.pdf](https://broadbandusa.ntia.doc.gov/sites/default/files/2022-09/BEAD-Frequently-Asked-Questions-%28FAQs%29_Version-2.0.pdf).



Commission should recall its quick action in 1994 and immediately begin an expedited rulemaking process, with a goal of moving from an NPRM to rules by the end of 2024.

### **III. New Sharing Rules Should Require Efficient Spectrum Use**

#### **A. New Sharing Rules Should Reward Performance**

At the heart of this rulemaking should be an effort to craft rules that speed up throughput in the 1.6 GHz band. The new sharing rules should require licensees to improve the efficiencies of their systems as a condition of continued rights to use this spectrum. Indeed, the current rules appear to encourage and reward the reverse—less efficient systems, requiring more spectrum, are allowed to flourish and keep out new entrants. The 1.6 GHz NPRM could fix this in two ways: (1) specify minimum performance standards that require licensees to improve their systems over time (similar to what the FCC has done by redefining broadband speeds); or (2) provide sharing preferences based on system throughput—those licensees demonstrating better and more efficient systems would be allowed access to more spectrum.

#### **B. New Sharing Rules Can't Adopt the "Gym Membership" Model**

A fundamental problem can arise with spectrum sharing. We've dubbed this the "gym membership" model: a sharing plan is developed on the assumption, or at least the hope, that so few licensees end up using the frequencies that coordination is easy.<sup>37</sup> The gym membership business model is clear: Invite as many people as possible to sign up for a monthly fee, and hope that only a small fraction of those paying actually use the facilities, or

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<sup>37</sup> See Comments of TechFreedom in Revising Spectrum Sharing Rules, IB Docket No. 21-456, (Aug. 7, 2023), <https://techfreedom.org/wp-content/uploads/2023/08/Satellite-Spectrum-Sharing-8-7-23-TechFreedom-Comments.pdf>.

if they show up at all, they don't stay long.<sup>14</sup> The Commission seems to favor a similar approach: craft detailed sharing rules that invite as many users as possible to share spectrum—and hope most NGS0 satellite systems are never deployed.

There's another aspect of the gym membership model lurking here. Say you decide to join the local gym, but once your membership is paid for, you find that every time you visit, all the lockers are taken (sometimes with locks that look like they've been untouched for years), and all the machines are constantly in use by the regular attendees, who seem to be the only ones that know the queuing system. Chances are you'd find a different gym, or just stop trying to exercise at all. That's exactly what happened following the 1994 Big LEO Report and Order, and why a new spectrum sharing approach is warranted.

#### **IV. Conclusion**

Thirty years might as well be a millennium when it comes to communications technology. Somehow, while terrestrial data throughput has increased more than 100-fold, satellite systems languish at 1990s speeds because the Commission has not updated its rules and required satellite licensees to become more efficient. The “new rules” that Chair Rosenworcel spoke of must include a requirement that satellite operators up their game. TechFreedom supports a rulemaking to make that happen in the 1.6 GHz band.

Respectfully submitted,

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