

August 2, 2021

BY ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
45 L Street, N.E.
Washington, DC 20554

Re: *WT Docket No. 20-443; GN Docket No. 17-183*

Dear Ms. Dortch:

The Commission issued a Notice of Proposed Rulemaking in January that unanimously rejected efforts by DISH Network (“DISH”) to evict next-generation satellite operators from the 12.2-12.7 GHz Band (the “12 GHz Band”). Instead, the Commission concluded that it would only act if DISH—already holding a treasure trove of unused truly mid-band spectrum—and those it supports could propose rules that would protect existing satellite services in the band.¹ In response, neither DISH nor any of its paid supporters submitted any proposed rules. Instead, one—and only one—of DISH’s allies (RS Access) submitted a “technical study” that dramatically failed to clear the high bar the Commission set for action.

Space Exploration Holdings, LLC (“SpaceX”) had a conference call with representatives from the Wireless Telecommunications Bureau and the International Bureau on July 29, 2021, to discuss the attached presentation and explain the many ways that RS Access’s advocacy piece was fatally flawed.² RS Access’s submission demonstrates a disturbing lack of understanding of how customers are actually served using the 12 GHz Band. But even more troubling, the piece callously concludes that the Commission should give DISH and RS Access new rights for free, even if such a donation would deny next-generation satellite broadband service to tens of thousands of otherwise unserved Americans across the country.

Five years after DISH first hatched its scheme to expropriate spectrum for itself, the record consists of two technical showings addressing next-generation satellites. The first, submitted by DISH and its MVDDS allies, conclusively shows that the new rights DISH seeks are fundamentally incompatible with service for customers of next-generation satellite systems. The second, submitted by RS Access, belatedly tries and utterly fails to contradict DISH’s study on this very point. Given this record, the Commission should swiftly remove the MVDSS

¹ See *Expanding Flexible Use of the 12.2-12.7 GHz Band*, 36 FCC Rcd. 606, ¶ 2 (2021) (expressly restricting the proceeding to only those changes that could be made “without causing harmful interference to incumbent licensees”).

² Participants on the call are listed in Attachment 1 hereto.

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encumbrances from the 12 GHz Band and close the proceeding. By simply following the evidence in the record, the Commission can accelerate the provision of high-quality next-generation satellite broadband to otherwise unserved Americans.

Sincerely,

/s/ David Goldman

David Goldman

Director, Satellite Policy

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Attachments

cc: FCC participants

EXHIBIT 1
CALL PARTICIPANTS

Wireless Bureau

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International Bureau

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SpaceX

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David Goldman

SpaceX Review of:

Assessment of Feasibility of Coexistence between NGSO FSS Earth Stations and 5G Operations in the 12.2 – 12.7 GHz Band, May 2021, RKF Engineering Solutions, LLC

No Proposal for New Terrestrial Rights

- No proposed rules for new terrestrial services in the band.
 - No geographic areas, power levels, geographic limitations, etc.
 - No proposal to evaluate or put out for further notice
 - MVDDS advocacy is self-contradictory
- MVDDS supporters produced only a single technical advocacy piece to try to rebut DISH's technical study that properly found that new terrestrial rights are incompatible with NGSO services.
 - Claims analysis for DBS still valid
 - Completely contradicts NGSO analysis in the *same study*.
- RKF advocacy piece is riddled with flaws and faulty assumptions that render its conclusions meaningless.

RKF model of terrestrial 5G and NGSO FSS networks overlap is fatally flawed

Principal assumption misunderstands the deployment strategy for both 5G *and* next-generation satellite

- **Assumes that 12 GHz 5G build out will occur only in urban areas**
 - “[T]he 5G deployment is weighted to the high population density areas within PEAs.”
 - Contradicts other claims—including by the RS Access’s economic study—that suburban and rural build out will be a major benefit of new rights
- **Would limit or prevent NGSO FSS use in urban areas**
 - “The primary markets for NGSO user terminals are in less densely populated areas, whereas terrestrial 12 GHz systems will be primarily deployed in areas of greater population density.”
 - While SpaceX’s system is designed to optimize for rural areas initially, it will provide service in urban areas. Already had extensive demand for urban service.
 - Received significant support to serve urban areas as part of RDOF.
 - Other authorized next-gen satellite services also indicated business plans for urban deployment.
- **Demonstrates that additional rights will block service for tens of thousands of customers**
 - Increase in long-term harmful interference of up to 50-60dB
 - Even in areas with no overlap, the model predicts that 0.888% of NGSO FSS user terminals will receive more than -8.5dB long term harmful interference
 - Implies that areas with overlapping deployments will have significant interference

Effectively Caps Otherwise How Many Unserved Americans Can Be Served

"RKF then models a generous deployment of 2,500,000 fixed-satellite service user terminals throughout the contiguous United States (CONUS) receiving on 10.7-12.7 GHz from an NGSO FSS system modeled on the most recently authorized constellation of space stations licensed to Space Exploration Holdings, LLC (SpaceX)."

- At least 30 million Americans are currently unserved and many more who are underserved
- Starlink's architecture can scale to support America's unserved and underserved population, rural, suburban, and urban
- Starlink has over half a million back orders in just the first 6 months of beta testing with no marketing and only a third of its satellites deployed. Demand will grow rapidly as system deploys. SpaceX has already applied to increase the number of blanket licensed user terminals to 5,000,000.
- As the constellation matures, user density will increase.
- Completely ignores other authorized NGSO FSS systems that will add many more users.

Faulty Technical Assumptions Led to Wrong Conclusions

Garbage In → Garbage Out

- **Wrongly assumes that NGS0 FSS satellite user terminal operations are “typically limited to comparatively high elevation angles”**
 - SpaceX – 25°
 - OneWeb – 35° (ignored by RKF)
 - Kepler – 10° (ignored by RKF)
- **Wrongly assumes next-gen satellite systems can be designed to operate in an undefined interference-prone environment**
 - Next-gen satellite systems must operate below noise floor, meaning interference risk is only from terrestrial harming or blocking satellite customers.
 - Next-gen satellite systems must operate with predictable, known interference (GSOs, FSS links, other NGS0s).
 - Interference from GSO/NGS0 systems at levels close to the desired signal (around -148...-146 dBW/m²/4kHz) from known directions and generally constant for a given location
 - In contrast, 5G systems cause a highly variable, unpredictable interference environment; NGS0 systems are not able to operate in such environment

RKF maintains long-debunked claims about next-gen satellite spectrum

RKF continues the completely false and debunked assumptions that next-gen satellite has unfettered access to alternative spectrum. Demonstrates a deep and fundamental misunderstanding of FSS NGSO spectrum.

- Unlike DISH that has over 100 MHz of unused exclusive-use spectrum, next-gen satellites systems have ***no exclusive spectrum in any band.***
- Every megahertz to which Starlink has access is shared with multiple NGSOs and other services.
- As RS Access frequently notes, the 12 GHz Band is nearly the only spectrum that next-gen satellites do not share with Federal users.
- NGSO FSS systems do not have primary status in the bands to which they have access.
 - 10.7-10.95 GHz – currently unusable to protect Radio Astronomy
 - 10.7-11.7 GHz – NGSO on non-interference, non-protected basis with microwave links (>880,000 fixed links)
 - 10.7-12.2 GHz – NGSO secondary to GSO in and must share with other NGSOs
 - 12.2-12.7 GHz – NGSO secondary to GSOs (BSS) and have to share with MVDDS and other NGSOs

RKF uses unrealistic 5G deployment assumptions and no commitments

Provides conspicuously little detail about how it assumes 5G will operate in the band

- *“The base station beamforming 3D pattern is modeled consistent with 3GPP specifications pertaining to 5G New Radio operations in the 7 to 24 GHz frequency range, 3GPP TR 38.820, and assumes 256 elements with a peak gain of 27.7 dBi.”*

According to *Table 5.6.5-1: NR deployment scenarios for 7 – 24 GHz frequency range* in 3GPP TR 38.820 V16.1.0 (2021-03), the maximum number of elements in a Base Station antenna array is 256.

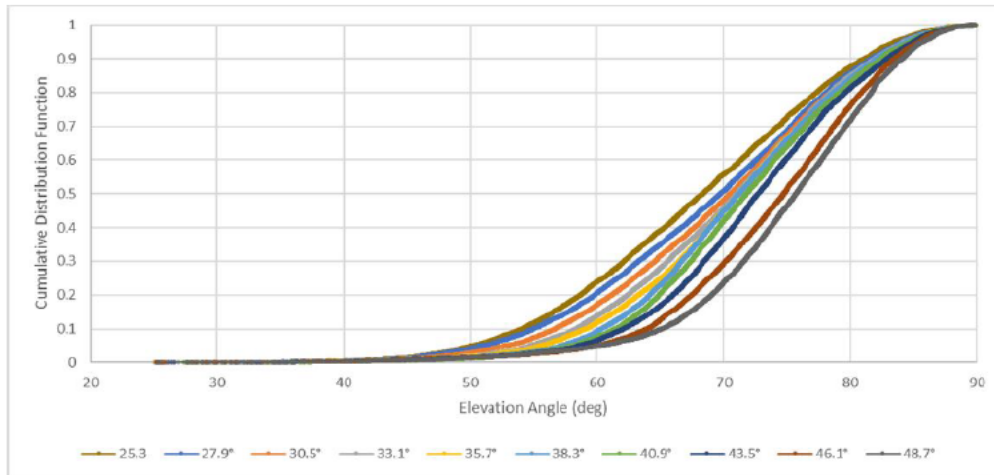
- RKF simulate the most optimistic scenario for interference (highest gain, narrowest beamwidth Base Station antenna).
 - The minimum gain assumed in the simulation (-30dBi, see *Figure 2-12: Base station 3D Antenna Pattern*) is unrealistic (looks like a phased array mathematical model, not accounting for real life imperfections).
- RS Access carefully avoids making any commitment to actually operate consistent with the unrealistic assumptions in the RKF advocacy piece.

False assumptions about Starlink users

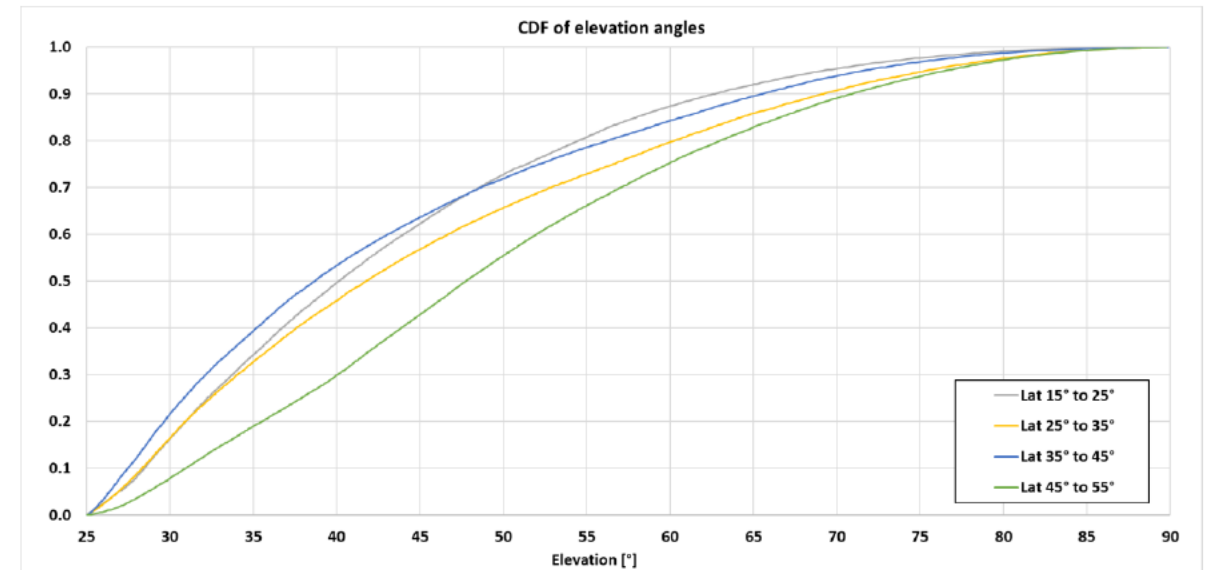
- “80% of the terminals are assumed to be on the ground with an above ground level (AGL) height of 1.5 meters”
 - Most current users install antennas as high as possible (typically rooftop) to enhance reception
 - RS Access had previously called this the “internet of rooftops”
- Table 2.2: Starlink Terminal Receiver Operating Characteristics
 - Ch. 1 is not used to protect Radio Astronomy
 - Antenna pattern ITU-R Rec. S.1428-1 recommends 1 is completely unrealistic for a small phased array UT. From our ETSI user terminal specification https://www.etsi.org/deliver/etsi_en/303900_303999/303981/01.01.00_20/en_303981v010100a.pdf Section 4.2.8.2.2 Class B WBES: For Class B WBES, the maximum antenna gain of each of the co-polarized components in any direction ϕ degrees from the antenna main beam axis shall not exceed the following limits: $G = 40 - 25 \log \phi$ dBi for $6^\circ \leq \phi < 48^\circ$ $G = -2$ dBi for $48^\circ \leq \phi \leq 180^\circ$
- Figure 2-7: Distribution of Starlink Terminal Elevation Angles at Ten Latitudes (as labeled) over CONUS
 - Completely false:

RKF Myth

Figure 2-7: Distribution of Starlink Terminal Elevation Angles at Ten Latitudes (as labeled) over CONUS



Reality



Conclusion

- RKF used a series of inaccurate and flawed assumptions to skew findings toward incorrect results
- RKF fails to rebut Dish's technical study.
- DISH and RS Access have not—and cannot—propose any way to protect incumbent next-gen satellite users or satellite TV viewers from harmful interference that would essentially block service.
- While SpaceX remains open to other services like low-power indoor use, RKF provides no support for permitting 5G terrestrial use in the 12 GHz band