COMMENTS OF MICROSOFT CORPORATION

May 7, 2021
# Table of Contents

Introduction and Summary .................................................................................................................. 1

I. Microsoft’s Spectrum Policy Objective Across Bands and Across Technologies is to Expand Broadband Connectivity ................................................. 4

II. The Commission Should Reject Proposals to Expand Terrestrial Rights at the Expense of 12 GHz NGSO Operations .......................................................... 5

III. It Is Unlikely that New Terrestrial Operations Can Simultaneously Protect NGSO Operators from Harmful Interference While Supporting a Useful 12 GHz Terrestrial Service ................................................................. 12

IV. Adding a New Mobile Allocation in the Band Would Fail to Meet Statutory Standards ................................................................................................................. 18

V. The Mechanisms for Assigning New Terrestrial Rights Discussed in the NPRM Will Either Impair NGSO Services or Fail to Support Viable Terrestrial Service ............................................................................................................. 19

Conclusion ..................................................................................................................................... 22
Introduction and Summary

Microsoft appreciates the Commission’s long-standing policy of exploring rule changes that will “maximize efficient use”¹ of different frequency ranges. We agree that spectrum should be put to its highest and best use and have participated in numerous proceedings considering rule changes to improve spectrum use in low-, mid-, and high-frequency bands. We share the Commission’s commitment to this pursuit because it furthers Microsoft’s core goal of promoting universal access to broadband.

Finding rules that maximize efficient use overall in a band depends on that band’s propagation characteristics, incumbent landscape, and situation relative to proximate bands. There is no one-size-fits-all approach to promoting optimal spectrum use. In most of the proceedings where Microsoft has participated, we have championed rule changes that would add new technologies or services through spectrum sharing between incumbent licensees and new entrants. Microsoft supports increased spectrum sharing where such sharing would improve, rather than undermine, overall spectrum utilization. But Microsoft’s goal is not to promote spectrum sharing, or any specific technology or service, for its own sake. Sharing must be based on the particular characteristics of each band. The Commission should not adopt rules that add a new technology or service to a band if doing so would reduce its overall utility or undermine the goal of increasing broadband access across the country.

The rule changes sought by Multichannel Video Distribution and Data Service (“MVDDS”) licensees in their 12 GHz band petition for rulemaking represent such a case.² The

---


MVDDS proposal would be a step backward; it would diminish rather than enhance genuine availability of broadband. The MVDDS proposal would reduce or eliminate interference protections for non-geo-stationary satellite orbit (“NGSO”) fixed satellite service (“FSS”) licensees by deleting or making secondary their primary allocation, or would reduce the frequency range in which these satellite licensees may continue to operate. At best, this might result in marginally more terrestrial service—but, overall, it would compromise rather than advance both efficient use of the band and the expansion of broadband availability. The Commission should therefore reject these proposals.

Two features specific to the 12 GHz band are central to Microsoft’s position. First, incumbent licensees, especially NGSO FSS operators, are already using the band to provide uniquely valuable and rapidly expanding rural connectivity. This new category of broadband service could hold the potential to shrink, or even eliminate, the rural broadband gap. Thus, the Commission must take care not to undermine the foundation of this important and growing service by increasing harmful interference risks or reducing spectrum availability at this critical moment. Doing so would both jeopardize the progress existing licensees have already made toward deploying widespread rural service and chill future wireless investment by increasing the perceived regulatory risks of all future licensees.

Second, these NGSO operations are, by necessity, very susceptible to harmful interference. Operators use the band for satellite downlinks to user terminals, which must receive and decode signals from satellites hundreds of kilometers away in space. Terrestrial interference could easily overwhelm these very faint satellite signals. Moreover, to track satellites as they move overhead, these user terminals point in different directions at different times, including toward locations relatively near the horizon. Thus, unlike some other bands, the Commission
cannot rely on the directionality of user terminal antennas to reduce harmful interference. As a result, the technical rules required to ensure adequate interference protection from any new 12 GHz terrestrial service would likely require that the Commission mandate a combination of very low power levels and very large exclusion zones. This means that the rules necessary to protect the real and growing broadband gains of today’s NGSO FSS operations would render a theoretical future terrestrial 12 GHz service so constrained that it would be unlikely to improve broadband access.

Section 303(y) of the Communications Act requires the Commission to adopt rules that serve the public interest and protect existing licensees from harmful interference before allocating a new mobile service.3 Unfortunately, none of the regulatory approaches outlined in the NPRM would adequately address the twin challenges of protecting existing NGSO FSS operators from harmful interference while facilitating a meaningful 12 GHz terrestrial service. Whether the Commission expands the terrestrial rights of existing licensees, conducts an overlay or underlay auction, or establishes a new unlicensed service, any new terrestrial service would likely either undermine NGSO FSS service or be undermined itself by extremely restrictive technical rules. Indeed, the MVDDS Coalition’s own technical study concluded that “coexistence between MVDDS 5G operations and NGSO FSS operations is not possible without severe operational constraints on MVDDS, NGSO FSS, or both services.”4

4 Tom Peters, MVDDS 12.2-12.7 GHz Co-Primary Service Coexistence 35 (2016) (“MVDDS Coexistence Study”), as attached to Comments of MVDDS 5G Coalition, RM-11768 (filed June 8, 2016) (“MVDDS Comments”).
I. Microsoft’s Spectrum Policy Objective is to Expand Broadband Connectivity.

Microsoft supports pragmatic policies that would expand broadband connectivity, including rules that encourage new services to share spectrum with incumbent licensees where doing so would create a net expansion of broadband access. This is why Microsoft has encouraged the Commission to:

- Support rural broadband through the adoption of TV White Spaces rules that promote investment;\(^5\)
- Allow point-to-multipoint operations alongside licensed mobile and satellite operations in the C-Band;\(^6\)
- Adopt rules to allow Wi-Fi and other unlicensed technologies to share spectrum with incumbent licensees in the 6 GHz band;\(^7\) and
- Improve broadband mapping to more accurately identify and direct resources to underserved areas.\(^8\)

Microsoft has supported these measures because expanded connectivity is both good for the country and for our business. Expanded availability of broadband improves education, economic opportunity, and access to government services for all Americans. It also increases Microsoft customers’ access to our cloud services. Microsoft’s business interests are therefore well-aligned with the Commission’s public interest objective of expanding broadband connectivity. Just as broadband connectivity is a precondition for full participation in modern economic and cultural life, it is also a precondition for the use of Microsoft’s cloud services.

---

\(^5\) Comments of Microsoft Corporation, ET Docket No. 20-36 (filed Mar. 29, 2021); Comments of Microsoft Corporation, ET Docket No. 20-36 (filed May 4, 2020).

\(^6\) Comments of Microsoft Corporation, GN Docket No. 18-122 (filed Oct. 29, 2018).


But adding new services in a band is not always in the public interest. Where Microsoft has supported spectrum sharing in the past, it has done so on the basis of compelling technical evidence demonstrating that the new service would result in a real-world expansion of broadband access without causing harmful interference to existing licensees. Layering a new technology or new service in an existing band is only in the public interest if it would result in greater utility for consumers overall.

Microsoft has carefully reviewed the record developed in response to the MVDDS Coalition’s 12 GHz petition for rulemaking with a particular focus on the technical landscape and has concluded that adopting any of the MVDDS Coalition’s proposals would reduce the net utility of the 12 GHz band and undermine broadband access across the country. Unlike TV White Spaces and the 6 GHz proceeding, petitioners and other proponents of expanded terrestrial use of the 12 GHz band have yet to provide a convincing explanation of how the Commission could expand terrestrial use without undermining NGSO FSS operations. As detailed below, the available evidence suggests that such an expansion would do more harm than good.

II. The Commission Should Reject Proposals to Expand Terrestrial Rights at the Expense of 12 GHz NGSO Operations.

NGSO operations are integral to meeting the Commission’s goal of providing high-quality, ubiquitous broadband coverage, especially to remote communities. Satellite services have already brought broadband to hard-to-reach rural communities and underserved people in urban communities, benefitting tribal lands, first responders, and overburdened schools and libraries. SpaceX alone already serves over 10,000 customers, and has begun preregistration of
many more, just six months since announcing its public beta program. Rural populations across the country have already begun to benefit from Starlink connectivity.

As Microsoft has worked to expand coverage in unserved and underserved communities around the country through our Airband program, we have concluded that NGSO coverage is an important complement to terrestrial wireline and wireless communications technologies. For example, terrestrial fixed wireless access largely depends on (1) mid-band or low-band frequencies to transmit the many miles necessary to reach rural communities and provide coverage and (2) supporting terrestrial infrastructure such as backhaul, power, and towers. The 12 GHz band is not a good candidate for terrestrial broadband access due to the significant environmental attenuation at these frequencies. NGSO FSS broadband providers, however, can use the 12 GHz band to transmit from space to Earth, meaning that attenuation due to buildings, foliage, and other environmental factors are greatly reduced. And satellite licensees do not require the extensive local supporting infrastructure of terrestrial 5G networks—they can

---


transmit directly from space to rural communities. This allows 12 GHz satellite licensees to provide connectivity in places that are hard to reach by terrestrial providers.

Continued investment in NGSO technology is critical to improving broadband coverage, especially in rural areas. Microsoft has long committed itself to investing in policies and technologies that improve access to quality internet connectivity. In keeping with this principle, Microsoft has identified and invested in opportunities at the intersection of satellite services and the cloud. Microsoft’s Azure Space division recently announced an expansion of its work with satellite companies including SES and SpaceX to deliver connectivity to both the public and private sector.11 This program will help realize the full potential of Microsoft’s modular datacenter, a self-contained mobile datacenter that can be transported anywhere in the field.12 The modular datacenter can be deployed to support mobile command centers, humanitarian assistance during times of natural disaster, military mission needs, mineral exploration, and other use cases requiring high-intensity, secure computing on Azure. Microsoft’s satellite partners will provide essential connectivity—in many cases using the 12 GHz band—and will allow customers to augment and enhance datacenter capability with cloud resources that enable artificial intelligence and data analytics.

The market for NGSO services is maturing rapidly, but changing rules mid-stream—especially after the design and launch of thousands of satellites—is likely to undermine future


investment in an industry serving the most rural parts of the country. Satellite broadband is projected to represent between 50-70% of the projected growth of the global space economy by 2040, and these services rely heavily on unimpeded use of the 12 GHz band. NGSO operators in the 12 GHz band, and their investors, have already dedicated hundreds of millions of dollars to building satellite constellations. SpaceX has already launched more than 1,300 satellites that are in orbit and serving consumers in reliance on the Commission’s existing rules. NGSO operators rely on continued investment in their programs to maintain their launch schedules and meet their goals of providing connectivity to underserved communities.

Although every Commission licensee, including NGSO operators, understands that they hold their licenses subject to the theoretical possibility that their rights may be modified or reduced, the public interest weighs strongly in favor of preserving a stable regulatory environment. This is especially true for licensees that already have made substantial investments to deploy new networks serving the public. In a regulatory system characterized by instability, licensees would be reluctant to invest in innovative, capital-intensive projects, especially those with infrastructure like satellites that have long lifespans. Fortunately, the Commission has already recognized the need to ensure a predictable interference environment for NGSO operators. Indeed, the need to “protect existing expectations and investments” forms the core of

14 See Letter from David Goldman, Director of Satellite Policy, SpaceX, to Marlene H. Dortch, Secretary, FCC, RM-11768 (filed Nov. 6, 2020).
the Commission’s approach to spectrum sharing between NGSO satellite operators. The Commission should maintain that same principle here, preserving the existing interference protections that NGSO licensees used to design their systems, and refrain from placing new limits on future deployments by NGSO operators or stripping these licensees of access to a portion of the band after they have already deployed thousands of satellites.

By contrast, the 12 GHz band is not integral to DISH’s long-awaited terrestrial 5G network deployment. In fact, the band is unlikely to be successful as a global 5G band even if the Commission were to adopt proposals to expand terrestrial use. First, existing license holders have not demonstrated that expanded terrestrial rights in the 12 GHz band will produce significant public interest benefits, either through 5G deployments or otherwise. DISH in particular possesses significant spectrum holdings in other bands that benefit from existing baseband chip markets and international harmonization. But, so far, neither DISH nor any other proponent of expanded terrestrial use of the 12 GHz band has provided any compelling evidence that altering the technical rules applicable to its MVDDS licenses, which are ill-suited to terrestrial broadband service, as discussed above, would actually result in new 5G deployment activity serving the public interest.

Second, and relatedly, productive use of new terrestrial 12 GHz authorization would be limited by the fact that neither the International Telecommunications Union ("ITU") nor 3GPP has adopted or even begun work on rules or international standards for 5G use of the 12 GHz band. Even if these bodies began work today to facilitate internationally harmonized 5G service

---

in 12 GHz, the creation of an International Mobile Telecommunications (“IMT”) designation to
globally deploy 5G technologies in the 12 GHz band would take several years. But it is unlikely
that 5G rules and standards for the 12 GHz band will ever emerge because existing international
use of the band makes it an especially unattractive candidate for global 5G harmonization.

For example, the European Space Agency (“ESA”) reserves the 12 GHz band for public
sector uses, such as the military, and satellite communications.17 Singapore,18 Japan,19 the United
Kingdom,20 and Canada21 reserve the 12 GHz band for satellite services. In the U.K., Sky is the
leading provider of direct-to-home satellite video programming, and the 12 GHz band is central
to this service. Sky, owned by Comcast, uses the 9.75-12.5 GHz band for downlink and the
12.75-14.50 band for uplink.22 The combination of government and direct-to-home use of the
band makes it extremely unlikely that EU or U.K. regulators or standard-setters will convert
these frequencies for terrestrial services in the foreseeable future. This alone suggests that
terrestrial 12 GHz service will not achieve international harmonization. The lack of international

17 The European Space Agency, Satellite Frequency Bands (last accessed Apr. 8, 2021),
https://www.esa.int/Applications/Telecommunications_Integrated_Applications/Satellite_freq
uency_bands.
18 Infocomm Media Development Authority, Spectrum Management Handbook (June 2020),
https://www.imda.gov.sg/-/media/Imda/Files/Regulation-Licensing-and-
Consultations/Frameworks-and-Policies/Spectrum-Management-and-
Coordination/SpectrumMgmtHB.pdf?la=en.
19 MIC: The Radio Use Website, Spectrum Charts: Above 10 GHz (last accessed Apr. 8, 2021),
20 Ofcom, UK Frequency Allocation Table (UKFAT) (last updated Jan. 8, 2020),
21 Government of Canada, Canadian Table of Frequency Allocations – 6 GHz (last updated Apr.
22 Sky’s Response to OFCOM’s Strategic Review of Satellite and Space Science Use of
Spectrum: Call for Input, ¶ 4.10,
support for allocating 12 GHz spectrum for terrestrial service combined with the dearth of
demonstrated 12 GHz terrestrial use cases for 5G raises serious doubts about the viability of any
hypothesized 12 GHz terrestrial service.

Like any new terrestrial wireless band, the success of a new 12 GHz terrestrial service
will largely depend on decisions by chipmakers whether to invest the large sums necessary to
develop 12 GHz radio transmitters and decisions by device manufacturers whether to integrate
these radios into consumer products. The costs of adding support for a new band cause both chip
and device manufacturers to strive for global scale. The lack of internationally harmonized rules
for a 12 GHz terrestrial service will likely deter manufacturers from making such investments.
Moreover, unlike other bands the Commission has recently authorized for licensed mobile use,
the 12 GHz band would be an “orphan” band—it would be separated by 8 GHz from the top of
the C-Band and over 10 GHz from the bottom of the 24 GHz band. Thus, the barriers to
integrating 12 GHz into future chips and devices will be especially high. Given these factors, a
manufacturer would be taking a major risk by investing to build semiconductors and devices that
would only work on a single mobile operator’s network—especially when that operator has no
track record of deploying meaningful mobile service. Further, the 12 GHz band is ill-suited for
terrestrial 5G deployment as a technical matter—especially for rural coverage. There is no
evidence that propagation or other important technical characteristics of 12 GHz spectrum make
it comparable to the low- and mid-band frequencies that are far more likely to support
meaningful 5G services or point-to-multipoint broadband access. In reality, propagation
characteristics of 12 GHz spectrum virtually ensure that, at most, it could only be used for
extremely short-range terrestrial connectivity, perhaps suitable for expanding capacity through
deployments of very small cells in urban cores, but totally unsuitable for terrestrial rural
coverage and unlikely to provide a platform for a meaningful 5G mobile voice competitor in these regions. And even here, given that the Starlink network will provide national high-speed broadband coverage, short-range outdoor terrestrial connectivity is by no means assured so long as NGSO FSS operators remain protected from harmful interference. The band is well suited, however, for NSGO licensees’ existing efforts to bring broadband to unserved communities, as their downlinks do not suffer from the same challenges that a potential terrestrial provider would face.

Accordingly, the Commission should not undermine an existing, operating, and expanding NGSO broadband service that is reaching rural communities today in favor of a riskier and yet-to-be-built terrestrial service that is best suited for adding capacity in urban areas. This would contravene the Commission’s goal of expanding broadband to all Americans.

III. It Is Unlikely that New Terrestrial Operations Can Simultaneously Protect NGSO Operators from Harmful Interference While Supporting a Useful 12 GHz Terrestrial Service.

NGSO operators require robust protection against harmful interference in order to provide high-quality, reliable service to consumers. The basic reason for this is very simple: a satellite earth station in the 12 GHz band must receive a signal transmitted hundreds or, in some cases, thousands of miles away in space. Because the received power of a signal decreases proportionally to distance squared, signals from NGSO and DBS satellites are faint when they reach an earth station antenna, making them vulnerable to harmful interference. The use of high-gain receive antennas allows these signals to be received and decoded, but satellite link budgets remain extremely tight. Moreover, this gain can also amplify interference depending on the physical location of the source.
The Commission’s interference protection rules for NGSO systems reflect this sensitivity to interference. For instance, NGSO satellite operators are required to protect one another from situations where a satellite or earth station receiver experiences a noise increase of -12 dB I/N (6% ΔT/T). This threshold is necessarily four times lower than the -6 dB I/N limit the Commission recently adopted for protection of terrestrial fixed-service links by the 6 GHz Automated Frequency Coordination System, because of the substantial differences between the incumbents in these two bands. Similarly, the Commission’s rules for siting MVDDS transmitters prohibit transmitters within 10 km of earlier-in-time NGSO FSS earth stations, without the NGSO operator’s consent, even though MVDDS transmit powers are limited to 0 dBm/MHz (24 dBm/14 MHz)—about fifty times lower than the power allowed for the most common Wi-Fi devices.

In other words, the existing MVDDS rules reflect the Commission’s determination that a device operating at a tiny fraction of the power of a typical Wi-Fi device could cause harmful interference to an NGSO earth station 10 km away. This conclusion accounts for the fact that NGSO earth station antennas physically track satellites as they move overhead, meaning that interference analyses must account for the fact that the NGSO earth station antenna could be pointed at or near a source of terrestrial interference, a situation which the Commission

---

23 NGSO Order ¶ 49.
24 Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd. 3852 (2020).
25 47 C.F.R. § 101.129(b).
26 47 C.F.R. § 101.113 n.10.
concluded “generally cannot be readily mitigated.”\textsuperscript{27} Such interference concerns are even more salient today than when those words were written, now that 12 GHz NGSO systems are widely deployed.

Based on Microsoft’s experience with many different technologies in many different bands, it is doubtful that a terrestrial mobile service could provide this level of protection while still offering a useful licensed mobile service. Indeed, advocates for a 12 GHz mobile service have long claimed that coexistence between these operations and NGSO earth stations “is not viable in the 12 GHz Band.”\textsuperscript{28} The original petition for rulemaking in this proceeding observed that “[it does not] appear that concurrent sharing of spectrum between co-primary 5G and NGSO FSS operations is even viable in the band.”\textsuperscript{29} The MVDDS Coalition’s comments on that petition attached an extensive study which concluded that “coexistence between MVDDS 5G operations and NGSO FSS operations is not possible without severe operational constraints on MVDDS, NGSO FSS or both services.”\textsuperscript{30} That study properly emphasized the robust interference protection requirements of NGSO systems described above, concluding that 1) “even if MVDDS base stations are limited to the current maximum EIRP level of 14 dBm per 24 MHz, an NGSO receiver located within 11 kilometers of an MVDDS base station would suffer interference”\textsuperscript{31}


\textsuperscript{28} Letter from Alison Minea, DISH Network LLC, to Marlene H. Dortch, Secretary, FCC, RM-11768, at 3 (filed Dec. 2, 2019).

\textsuperscript{29} MVDDS Coalition Petition at 23.

\textsuperscript{30} MVDDS Coexistence Study at 35.

\textsuperscript{31} MVDDS Comments at 8.
and 2) “even with the best case assumption of a mobile device transmitting at the lowest power level possible, NGSO devices will still receive interference when they are located within 22 meters of a 5G mobile device.”32

More recently, some advocates for terrestrial mobile service use have changed their position and begun to assert that some form of coexistence is possible.33 However, no party has yet provided any concrete proposal or technical analysis to demonstrate how their proposed operations could coexist with NGSO earth stations without causing harmful interference while providing a commercially valuable service.

One option that parties may raise is the use of a database or other dynamic spectrum sharing technique. Such approaches have shown great promise in TV White Spaces, the 3.5 GHz Citizens Broadband Radio Service (“CBRS”), and the 6 GHz band, each of which uses a database-like approach. In all those bands, the Commission imposed exclusion zones to protect incumbents—in either geographic or spectral terms. Here, the evidence suggests that any exclusion zone would have to be many kilometers across, far larger than the exclusion zones in the CBRS and 6 GHz bands. And these zones would apply to the entirety of the 12 GHz band because the entire band is licensed to multiple NGSO operators, making the spectral range of exclusions far larger than those found in the TV White Spaces, CBRS, or 6 GHz bands. Unlike in those other bands, these far more expansive exclusion zones would greatly limit, or entirely

32 MVDDS Coexistence Study at 34.
33 See, e.g., Letter from Jeffrey Blum, Executive Vice President, External and Legislative Affairs, DISH Network LLC, to Marlene H. Dortch, Secretary, FCC, RM-11768 (filed Nov. 12, 2020).
preclude, any meaningful new terrestrial service. These exclusion zones will also multiply as new NGSO FSS customers are signed up and new user terminals are deployed.

In addition, the locations of NGSO earth stations will be dynamic. While some will be used in predictable, static locations, such as those used for broadband connectivity at homes and businesses, others will exhibit different patterns of use. User terminals used by Microsoft modular datacenters, for example, are operated at fixed locations but are designed to be transported and will be deployed to respond to evolving customer needs. For example, modular datacenters are expected to support rural industries in locales where there is limited terrestrial infrastructure for connectivity. Additionally, we expect these terminals to support rescue operations during natural disasters when terrestrial services are rendered unavailable or deployed in instances when identifying their location could compromise mission-critical operations, similar to the “cell on wheels” used by mobile network operators to add mobile capacity where and when it is needed. Each of these possibilities—which are already permitted under existing NGSO FSS authorizations—could make the use of a 12 GHz spectrum access database ineffective unless it included a dynamic protection system akin to that required for wireless microphones in TV White Spaces frequencies. Such a dynamic protection system, as Microsoft understands well, can substantially increase costs and reduce the channels available to a terrestrial service.

Finally, some have suggested that the Commission should consider the possibility of very-low-power, indoor-only unlicensed operations in the 12 GHz band. In general, Microsoft strongly supports efforts to expand access to spectrum on an unlicensed basis wherever it is possible without causing harmful interference to incumbents. We have advocated for new unlicensed use in several other bands. Our firsthand experience with unlicensed operations in the TV White Spaces, portions of the 5 GHz band, and the 6 GHz band is that, in those cases, unlicensed advocates provided the Commission with an initial technical analysis regarding the potential viability of the band for unlicensed use vis-a-vis protecting incumbents. Even so, it still took several years of technical back and forth with other stakeholders and the Commission before rules were put in place.

The idea of unlicensed indoor 12 GHz operations at present can be best characterized as an unformed concept. To our knowledge, proponents have not identified potential use cases that would create interest on the part of the unlicensed ecosystem or provided even a preliminary technical analysis that can be used to assess the potential of sharing spectrum with incumbents. But, as with the creation of a licensed mobile service, based on what is known today, the Commission should carefully consider whether an indoor unlicensed service in the 12 GHz band would still be useful under the strict technical conditions that would be required to protect incumbents. It is, however, premature for the Commission to consider this idea at this time.

The framework that the Commission recently adopted in the 6 GHz band to protect fixed-service receivers and FSS uplinks, for example, would not be effective in 12 GHz for NGSO FSS downlinks, where protected receivers are far more vulnerable to harmful interference, dynamically change their antenna orientation to track overhead satellites, and are much more likely to be located directly adjacent to homes and businesses across all geographies.
Here too, the Commission should consider whether manufacturers are ever likely to produce unlicensed 12 GHz equipment even if the Commission authorizes some form of service. As discussed above, the 12 GHz band will be isolated both geographically and spectrally. Unlike other bands the Commission has recently made available for unlicensed use, such as 6 and 5.9 GHz, the 12 GHz band will be many gigahertz away from any other major unlicensed band. It will also only be usable in the U.S.—and even there it is likely to be burdened with very restrictive technical rules to protect incumbents from harmful interference.

IV. Adding a New Mobile Allocation in the Band Would Fail to Meet Statutory Standards.

A decision to add a new 12 GHz mobile allocation would likely fail to satisfy statutory requirements. In particular, Section 303(y) of the Communications Act requires that, in order to “allocate electromagnetic spectrum so as to provide flexibility of use,” the Commission must find that doing so would be in the public interest, it would not deter investment, and it would not cause harmful interference among users.\(^\text{35}\)

The proposals advanced thus far for expanded terrestrial service in the 12 GHz band would satisfy none of these requirements for the reasons discussed above. They would run contrary to the public interest by limiting NGSO operators’ ability to deploy rural broadband connectivity. While they would benefit those that seek to use a new 12 GHz terrestrial mobile service, such a service appears unlikely to succeed commercially and unlikely to contribute significantly to closing the digital divide.

Proposals to expand terrestrial service in the 12 GHz band would also deter future investment by undermining the substantial investments already made in deploying satellites that

\(^\text{35}\) 47 U.S.C. § 303(y).
rely on 12 GHz spectrum, as well as investment by companies like Microsoft that are using or deploying broadband technologies that depend on those satellites. Thus, it would both discourage investment by these operators directly, and discourage it more broadly by reducing regulatory certainty for any other user of spectrum. If the Commission sets the precedent that it will reduce operators’ spectrum rights even after they have invested considerably in reliance on the stability of the Commission’s band plan, then every licensee will internalize the risk that their operations could also be undermined by future Commission decisions and hedge their investments accordingly.

Finally, it is likely that any commercially viable mobile terrestrial service in the band will cause harmful interference to NGSO earth stations. MVDDS advocates have yet to provide evidence or a proposal to suggest otherwise. The fact that no credible proposal has been advanced confirms Microsoft’s technical judgment that sharing between NGSO operators and terrestrial mobile users is not possible without severely compromising both systems. Without reliable and specific record evidence that a new set of MVDDS rules will not cause harmful interference, any Commission action to adopt such rules would violate Section 303(y).

V. The Mechanisms for Assigning New Terrestrial Rights Discussed in the NPRM Will Either Impair NGSO Services or Fail to Support Viable Terrestrial Service.

The NPRM seeks comment on three possible strategies for assigning any new terrestrial rights, should it decide to take that step. However, none of the possibilities the Notice discusses would support a viable commercial service without compromising the important services offered by NGSO providers. This provides further confirmation that any decision to expand terrestrial use of the 12 GHz band would likely be contrary to the public interest.
Expansion of Terrestrial Rights for Existing Licensees. The NPRM seeks comment on the possibility of assigning any new terrestrial rights to existing licensees, including NGSO, DBS, and MVDDS licensees. However, no mechanism is proposed for coordinating between new terrestrial licensees or, crucially, providing interference protection for NGSO FSS operators. Worse still would be any approach where the Commission assigns terrestrial licenses with higher coordination and interference protection priority to any particular group of licensees, such as DBS or MVDDS providers. This would effectively strip NGSO operators of crucial interference protection for earth stations and adversely affect their ability to offer service. It would also constitute an unjust windfall, which could encourage future spectrum speculation—especially if it results in a dramatic expansion of rights for licensees that have not yet made any significant investments or deployed meaningful service.

Overlay Auction. As an alternative, the NPRM seeks comment on the possibility of auctioning 12 GHz “overlay” licenses. In general, spectrum rights assigned via an overlay auction supersede those of incumbent “underlay” licensees and lock them in place to prioritize the future growth of the overlay service. This would effectively freeze any future NGSO user terminal deployments, which is of particular harm to the unique benefits afforded by the satellite-based connectivity for modular datacenters. It also would hamstring new entrants or prevent existing operators from gaining new customers, thereby destroying the business case on which these systems—and the large investments already made—were premised. Moreover, protecting these incumbent operations from harmful interference would still require exclusion zones so large and so numerous as to make any expanded 12 GHz terrestrial use impractical. In essence, one would have degraded the dynamic growth in satellite-based connectivity without affording a meaningful terrestrial alternative.
This may be why the Commission also seeks comment on mechanisms to voluntarily or involuntarily relocate existing NGSO operators. We recommend against relocation because of the significant negative impact it would have on the expansion of broadband service to hard-to-reach areas through NGSO operators, and because of how poorly suited the 12 GHz band is for expanded terrestrial use. Involuntarily relocating existing operators is plainly contrary to the public interest, as detailed above. It would severely undermine existing, and rapidly expanding, rural broadband connectivity provided by NGSO operators only to facilitate the growth of an entirely hypothetical 12 GHz terrestrial service that is unlikely to provide meaningful rural coverage, if it develops at all.

*Underlay Auction.* Finally, the Commission seeks comment on an underlay auction. Unlike an overlay auction, an underlay auction would be premised on the preservation of existing NGSO operations with ongoing priority for these systems to grow and add customers. While such an approach might avoid undermining NGSO-based services—depending on the technical rules adopted to prevent harmful interference—it is doubtful that it could support a viable terrestrial service. Protecting NGSO operators from harmful interference again would require a large and rapidly growing number of exclusion zones, resulting in, at best, “Swiss cheese” 12 GHz coverage—likely with more holes than cheese in areas where terrestrial service would have been most lucrative. And the necessarily low power levels needed to avoid harmful interference, combined with the difficult attenuation challenge in the 12 GHz band, would be unlikely to support a viable service.
Conclusion

Microsoft shares the Commission’s commitment to adopting spectrum policies that produce net increases to broadband availability. Unfortunately, the particular characteristics of the 12 GHz band make it a poor candidate for expanded terrestrial broadband access. In this instance, the proposals of MVDDS proponents would undermine the Commission’s overall broadband goals by undermining existing NGSO services that are poised to meaningfully address the digital divide and to offer innovative new means of connectivity for remote operations, disaster relief, and humanitarian assistance, like that afforded by Microsoft’s modular datacenters. The harm would be undertaken to benefit a purely hypothetical 12 GHz service that even under the best of circumstances has very little chance of expanding rural connectivity.

Respectfully submitted,

MICROSOFT CORPORATION

/s/ Paula Boyd

Paula Boyd
Senior Director
Government & Regulatory Affairs, CELA
901 K Street, N.W., 11th Floor
Washington, DC 20001
(202) 263-5900
Paula.Boyd@microsoft.com

Dated: 7 May 2021