

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

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In the Matter of )	
)	
Expanding Flexible Use of the )	WT Docket No. 20-443
12.2-12.7 GHz Band )	
)	
Expanding Flexible Use in Mid-Band )	GN Docket No. 17-183
Spectrum Between 3.7 and 24 GHz )	
)	
_____ )	

**REPLY COMMENTS OF MICROSOFT CORPORATION**

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## INTRODUCTION AND SUMMARY

Microsoft has a long history of supporting Commission proceedings to introduce band sharing when it produces a net increase in spectrum utilization. We have championed, invested in, and partnered with others to deploy sharing technologies throughout the country and around the world. The Commission should not, however, pursue band sharing proposals that would decrease the overall use of a band, or that lack the minimum technical justification to permit the FCC to ensure new services will not cause harmful interference to existing users.

Microsoft has closely reviewed the comments filed in reply to the Commission's 12 GHz NPRM. Commenters proposing to add a new terrestrial mobile use to the band fail to provide the Commission with necessary basic technical elements to support new rules. In fact, proponents of such a change have yet to propose any concrete parameters for a 12 GHz mobile service, including power levels, antenna requirements, or any specific coordination mechanism that would protect incumbents—although they have been advocating for the creation of a new 12 GHz mobile service for many years. This leaves parties and the FCC without the basic information that they need to assess the costs and benefits of the rule changes that they are requesting. This omission, as well as the lack of a proposal in the NPRM initiating this proceeding, results in an inadequate record for Commission action and would present other significant statutory impediments were the Commission to move forward with authorizing some form of 12 GHz mobile service.

The limited material submitted by petitioners, though vague, nonetheless reveals that their proposal (1) is unlikely to result in a meaningful expansion of terrestrial broadband capabilities and (2) is likely to cause harmful interference to an unacceptably high percentage of the incumbent licensees' broadband service customers. The interference analysis submitted by

RS Access is based on assumptions that render it unreliable and that mask higher risks of harmful interference than it reports. But even this flawed analysis admits that non-geostationary satellite orbit fixed satellite service (“NGSO FSS” or “NGSO”) user terminals will experience harmful interference nearly 1% of the time—enough to impair the operation of key NGSO use cases and Microsoft’s own planned services. Moreover, the study did not address use cases with NGSO FSS user terminals located in urban areas outside of the portions of the metropolitan areas included in the Commission’s Rural Digital Opportunity Fund (“RDOF”) program, where interference would likely be even more frequent and widespread.

As a result, the study provides a clear answer to the NPRM’s most fundamental question: whether it is possible to support 12 GHz mobile operations “without causing harmful interference to incumbent licensees.”<sup>1</sup> RS Access’s study answers this in the negative, confirming that licensees will experience harmful interference, even under highly favorable assumptions. Correcting the study’s reliance on several improper assumptions, and its unsupported claims about potential interference mitigation techniques, would reveal that the true risk of harmful interference is higher still.

RS Access’s economic study is also unreliable. It appears to significantly overstate the benefits of authorizing 12 GHz terrestrial mobile operations. A key error is that the study extrapolates the potential value of the 12 GHz band from C-band auction revenues rather than the millimeter wave bands, which would have been the appropriate comparison. Additionally, the study (1) fails to account for the cost of harmful interference in its calculations by incorrectly assuming that little or no harmful interference to 12 GHz incumbents will occur, (2) fails to

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<sup>1</sup> *FCC Seeks Comment on Maximizing Efficient Use of 12 GHz Band*, Notice of Proposed Rulemaking, 36 FCC Rcd. 606, ¶ 2 (2021) (“12 GHz NPRM”).

demonstrate that there will be market demand for 5G service in this band, or to properly discount its value calculation based on limited demand, (3) fails to consider the impact of substitutes (e.g. Wi-Fi 6E) that would affect its valuation, and (4) incorrectly assumes that mobile handset manufacturers will universally incorporate new 12 GHz radios into devices, which is far from certain given that the 12 GHz 5G ecosystem is non-existent, the business model is unclear, and the band is unlikely to be available for 5G in other countries, among other things.

**I. Proponents of terrestrial use still have not put forward an actionable proposal for expanded terrestrial use of the 12 GHz band.**

RS Access, DISH, and a limited number of other commenters assert that mobile terrestrial uses can share the 12 GHz band with NGSO systems without causing harmful interference.<sup>2</sup> Unfortunately, these parties have failed to provide a concrete proposal for 12 GHz mobile operations, either in their comments or in earlier *ex parte* letters. With no proposal, many core technical parameters of any sharing environment are simply unknown. The result is a record that does not permit the Commission to engage in reasoned decision making and that prevents other 12 GHz stakeholders from providing the technical analysis that the FCC requires to move ahead with this proceeding.

For instance, with no proposal to analyze, 12 GHz incumbents and other stakeholders have no way of conducting studies to assess the risk of harmful interference from these proposed operations. As the Commission knows, basic technical characteristics like power levels and antenna patterns are essential to any meaningful assessment of interference risk. Although RS

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<sup>2</sup> Comments of RS Access, LLC at 32-45, WT Docket No. 20-443, ET Docket No. 17-183 (filed May 7, 2021); Comments of DISH Network Corporation at 68, WT Docket No. 20-443, GN Docket No. 17-183 (filed May 7, 2021).

Access, DISH, and others have filed hundreds of pages of argumentation, the record still lacks a concrete proposal on these and other fundamental issues.

The lack of a concrete technical proposal also prevents the Commission from assessing the *benefits* of 12 GHz mobile service, if any, relative to its costs. Characteristics like power levels are key to understanding not just a system's interference potential, but also its potential to add capacity to existing networks, to extend coverage to rural areas, and the relative costs of such deployments. Without any of this information, the Commission lacks the minimum record needed to make non-arbitrary rule changes.

The statistical interference analysis attached to RS Access's comments does not remedy this deficiency. Although that study makes certain technical assumptions about 12 GHz terrestrial mobile operations, no commenter—including RS Access—has endorsed those assumptions as constituting their proposal or connected them to the claimed public interest benefits of 12 GHz mobile operations. In fact, some of that paper's assumptions contradict the assumptions of the economic study also attached to RS Access's comments. For instance, while the economic study envisions that terrestrial 12 GHz operations could generate significant value by relieving capacity-constrained urban C-band deployments, the interference study assumes that 12 GHz networks will only be 50% utilized, apparently during the busiest times of day.<sup>3</sup> Moreover, as discussed below, that study confirms that operations with its assumed parameters will cause widespread harmful interference, but the economic study does not account for the cost of this harmful interference in its analysis.

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<sup>3</sup> See RKF Engineering Solutions, *Assessment of Feasibility of Coexistence between NGSO FSS Earth Stations and 5G Operations in the 12.2 – 12.7 GHz Band* 33 n.61 (May 2021) (“RKF Report”), as attached to RS Access Comments.

The public interest groups considering unlicensed 12 GHz terrestrial operations also do not propose specific rules for unlicensed use, suggest a power level, or explain how these devices could coexist with NGSO (and DBS) user terminals without causing harmful interference. Notably, no chipmaker, equipment manufacturer, or other participant in the unlicensed technology ecosystem commented in support of unlicensed 12 GHz operations. Microsoft is a strong supporter of unlicensed technologies and has advocated for unlicensed use in several other bands. At this stage, though, there is insufficient technical information to assess the viability of potential commercially interesting use cases for indoor unlicensed operations in the 12 GHz band under the strict technical conditions required to protect incumbents.

The Commission provided a platform for these parties to provide specific technical proposals so it could consider sharing on the merits. But the Commission itself declined to propose any rule changes in its Notice of Proposed Rulemaking. Without such a proposal, the failure of terrestrial mobile proponents compounds an already serious procedural problem with the proceeding. The D.C. Circuit has made clear that the Commission must provide adequate notice of its proposed rule changes in order:

(1) to ensure that agency regulations are tested via exposure to diverse public comment, (2) to ensure fairness to affected parties, and (3) to give affected parties an opportunity to develop evidence in the record to support their objections to the rule and thereby enhance the quality of judicial review.<sup>4</sup>

The lack of a concrete proposal by the Commission means that the NPRM and this proceeding cannot satisfy these obligations.

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<sup>4</sup> *Int'l Union, United Mine Workers of Am. v. Mine Safety & Health Admin.*, 407 F.3d 1250, 1259 (D.C. Cir. 2005).

First, any regulation the Commission might ultimately adopt based on the NPRM would be *untested* “via exposure to diverse public comment,”<sup>5</sup> because no party can anticipate what regulation the Commission might adopt. Rather, the parties are impermissibly left “to divine the Agency's unspoken thoughts.”<sup>6</sup> Comments on the NPRM do nothing to constrain these possibilities, with advocates of 12 GHz terrestrial mobile use discussing everything from a low-power indoor-only unlicensed service,<sup>7</sup> to high-power licensed mobile use on a coequal basis with existing licensees,<sup>8</sup> to wholesale eviction of NGSO licensees from the band so that the band may be cleared and auctioned.<sup>9</sup> Some commenters even attempt to add new bands to this proceeding.<sup>10</sup> With such a range of issues under consideration, an NPRM with no proposed rules, and no specific proposal from any party, 12 GHz stakeholders have no way to know what proposals, if any, are under serious consideration and are unable to present any responsive technical evidence to test any new regulations that might be under consideration.

Second, the lack of a meaningfully formed proposal renders the proceeding unfair to affected parties. There is no specific technical proposal for terrestrial mobile operations in the 12 GHz band and no explanation of how these operations will affect incumbent NGSO operators

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<sup>5</sup> *Id.*

<sup>6</sup> *Id.* at 1260 (citing *Arizona Public Service Company v. EPA*, 211 F.3d 1280, 1299 (D.C. Cir. 2000)).

<sup>7</sup> Comments of Public Interest Organizations at 23-26, WT Docket No. 20-443, GN Docket No. 17-183 (filed May 7, 2021).

<sup>8</sup> Comments of DISH Network Corporation at 45, WT Docket No. 20-443, GN Docket No. 17-183 (filed May 7, 2021).

<sup>9</sup> Comments of T-Mobile USA, Inc. at 4-13, WT Docket No. 20-443, GN Docket No. 17-183 (filed May 7, 2021). Because the NPRM specifically invites comment only on proposals that would protect incumbent licensees, such suggestions are outside the scope of this proceeding. *See* 12 GHz NPRM ¶ 2.

<sup>10</sup> *Id.* at 14-15.



and other licensees. Consequently, parties are unfairly left in the dark about the possible effects on their future operations, what they should discuss in their comments, or even what to analyze with regard to this proceeding.

Third, the lack of a specific proposal prevents affected parties from “develop[ing] evidence in the record to support their objections to the rule.”<sup>11</sup> Even the most basic parameters of potential mobile operations remain unspecified, including power levels, antenna requirements, and coordination procedures. In the absence of such information, incumbents and other interested parties have no way to present their own evidence in response. Reliable technical studies take time and depend on these unknown technical parameters. This is why the Commission publishes proposals in the Federal Register and then provides substantial time periods to potential commenters to use the proposal to undertake this work. Without a proposal or even basic information about a proposed service, this was impossible in this proceeding.

Notably, given the state of the record and the lack of a proposal in the NPRM, a change to the Commission’s 12 GHz rules could not satisfy the Commission’s statutory duties to provide notice by way of the D.C. Circuit’s “logical outgrowth” doctrine. “[T]he premise of the ‘logical outgrowth’ doctrine is that the agency has alerted interested parties to the possibility of the agency’s adopting a rule different than the one proposed.”<sup>12</sup> But this only provides that the statutory notice requirement can be satisfied when the rule adopted is a logical outgrowth of the rule *proposed*. Here, however, there was no proposal.

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<sup>11</sup> *Id.* at 1259.

<sup>12</sup> *Id.* at 1260.

**II. The RS Access statistical study confirms that additional 12 GHz spectrum sharing would severely limit the utility of both satellite and terrestrial mobile service.**

While proponents of a new terrestrial mobile service did not provide a proposal for such a service for parties to react to, RS Access did submit a statistical interference analysis accompanying its comments. This submission attempts to assess the probability of interference between an incompletely described terrestrial mobile system and NGSO user terminals in the 12 GHz band.<sup>13</sup> In the absence of a proposal, the study is of limited utility. But it is nonetheless important to recognize that the report makes a number of flawed assumptions that render even this generic study unreliable and cause it to substantially understate the risk of harmful interference.

Furthermore, even with its inappropriate assumptions, the study predicts an unacceptably high likelihood of harmful interference: it predicts that NGSO customers will experience harmful interference nearly 1% of the time.<sup>14</sup> Even if the study did not underestimate harmful interference, and this were an accurate estimate of the risk, this rate of harmful interference would already disrupt important NGSO use cases. These include Microsoft's Modular Datacenter, which are portable and will use NGSO connectivity for critical disaster-recovery and other mission-critical applications.

Correcting the study's mistakes would show that the actual risk of harmful interference is even higher. First, the geographic distribution of simulated devices in the RS Access study almost certainly masks significant interference problems. The study simulated only 140,000 terrestrial mobile base stations and 2.5 million NGSO user terminals (rather than the 5 million

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<sup>13</sup> See RKF Report at 34.

<sup>14</sup> *Id.* at 2.

user terminals Starlink has applied for at the Commission)<sup>15</sup> across all 8 million square kilometers of the continental United States. It concentrates the former in more densely populated areas and distributed the latter primarily across rural areas.

The design of a study with such an artificially limited number of mobile base stations spread across such a large area makes it unjustifiably uncommon for one of its simulated NGSO user terminals to be anywhere near a mobile base station. The urban/rural weighting applied to this distribution of devices reduces the study's probability to an even lower and more unjustifiable level.

The fact that the RS Access study predicts a rate of harmful interference as high as 1% *even with these improbable device-distribution assumptions* is troubling. It suggests that the risk of harmful interference will be far higher in areas where NGSO and terrestrial mobile systems are most likely to be deployed in close proximity, such as important urban and suburban markets.

While it may be true that rural service is an important NGSO use case, it is far from the only application for NGSO broadband systems. The ability to deploy user terminals in urban and suburban areas will also be critical. The study ignores this fact and attempts to impose a business model on NGSO FSS operators—an unrealistically limited consumer retail business model principally in rural areas—which severely understates the risk of harmful interference. In so doing, RS Access greatly underestimates the number of user terminals in urban areas and obscures the effect on the few urban user terminals it does include.

In fact, by limiting itself to Starlink user terminals assigned in RDOF metropolitan areas, RKF considers only 27,000 Starlink user terminals in metropolitan areas across the entire

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<sup>15</sup> See Application of SpaceX Services Inc., SES-MOD-20300731-00807 (filed July 31, 2020).

continental United States, a gross underestimation.<sup>16</sup> As Starlink is approaching nationwide coverage in the 12 GHz band, it is also taking steps to increase system capacity and thus has the ability to better manage capacity in local markets, including urban and suburban markets, to provide broadband services to a mix of customers. The study's assertion that an even more urbanized configuration of Starlink terminals would likely reach capacity limits before a change in the statistically significant result would occur<sup>17</sup> is unsupported, artificially removes geographies where the potential for harmful interference is logically the highest, and represents a limitation of a statistical study of this nature.

Microsoft's Modular Datacenter, for example, is designed to be deployed in urban, suburban, and rural areas to respond to natural disasters and for other use cases requiring high reliability and robust security. Even RS Access's study, despite the errors and limitations described above, suggests that the probability of interference in these cases could be very significant, disrupting mission-critical connectivity supporting first responders and government agencies in times of crisis. As a result, 12 GHz terrestrial mobile operations would undermine the investment-backed expectations of not only NGSO providers, but also their partners such as Microsoft that plan to use this connectivity as an integral part of their own services.

The simulation's incorrect assumptions about NGSO systems' use of spectrum also caused it to underestimate the risk of harmful interference. The simulation assigns each Starlink user terminal a channel selected at random from the eight NGSO FSS channels in the 10.7-12.7

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<sup>16</sup> See RKF Report at 21 (Table 2-1 assumes a total of 14,621 Starlink user terminals in Metropolitan areas where SpaceX is receiving RDOF support and a total of 12,194 Starlink user terminals in Metropolitan areas where other bidders are receiving RDOF support).

<sup>17</sup> See RKF Report at 9.

GHz band.<sup>18</sup> In fact, however, the channel selection should be weighted based on encumbrances and other constraints. As OneWeb explains, the 11.7-12.7 GHz band is especially valuable for NGSO systems as this is currently the least constrained portion of the larger 10.7-12.7 GHz band. “[C]ertain geographical areas in the United States have large deployments of fixed links that significantly constrain the use of the 10.7-11.7 GHz band, thus limiting that band segment’s utility in OneWeb’s design. Additionally, the requirement to protect the Radio Astronomy Service in the 10.6-10.7 GHz band constrains NGSO systems from using the lower part of the 10.7-11.7 GHz band over all of the United States.”<sup>19</sup> As a result, RS Access’s random weighting means that for over 75 percent of the FSS NGSO FSS channel selections, the probability of harmful interference is incorrectly assumed to be zero. In fact, however, NGSO user terminals are disproportionately likely to use channels in 11.7-12.7 GHz and, therefore, will be exposed to harmful interference from a co-channel terrestrial service.

In addition to underestimating the probability of co-channel interference, this approach also appears to ignore adjacent-band interference. As OneWeb has explained, adjacent-band interference will be a very significant issue because “the amplifier of the satellite user terminal, which was designed to receive in the entire 10.7-12.7 GHz band, would become saturated by the 5G transmissions in the 12 GHz band even if the satellite user terminal is using different frequencies in the 10.7-12.2 GHz range.”<sup>20</sup> Therefore, “introducing two-way terrestrial mobile services in the 12 GHz band would not only prevent NGSO operators from deploying services

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<sup>18</sup> See RKF Report at 15.

<sup>19</sup> See Comments of OneWeb at 17-18, WT Docket No. 20-443, GN Docket No. 17-183 (filed May 7, 2021).

<sup>20</sup> *Id.* at 14.

via the 12 GHz band, but would also have a detrimental impact on the use of adjacent frequencies by NGSO FSS operators in the 10.7-12.2 GHz portion of the Ku-band.”<sup>21</sup>

Finally, while RS Access and others fail to propose enough of an interference-mitigation plan for commenters to analyze, they do make high-level references to various types of interference-mitigation mechanisms that could be used in the band. However, they fail to provide adequate explanations of these mechanisms, and what they do provide suggests that the mechanisms are unlikely to be effective. For example, RS Access’s interference study speculates that other spectrum bands available to NGSO operators will “provide an operational safe harbor for Starlink users.”<sup>22</sup> But as NGSO operators have explained, users cannot simply be moved to different channels to avoid harmful interference. Although NGSO operators have some access to other spectrum, their ability to use these other bands is greatly constrained. In addition to the interference protection needs of other existing services discussed above, NGSO operators’ use of spectrum is also constrained by the need to facilitate coordinated spectrum sharing between NGSO operators. This combination of interlocking coordination requirements already presents challenges for NGSO operators and highlights the important role of 12 GHz spectrum, where existing rules impose many fewer restrictions. New limitations imposed by interference from 12 GHz mobile users will greatly complicate and restrict NGSO spectrum planning and could result in situations where existing restrictions cannot be reconciled with these new limitations.

Advocates for a new 12 GHz terrestrial service also claim that mobile operators can prevent harmful interference using “case-by-case mitigation measures that operators routinely

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<sup>21</sup> *Id.*

<sup>22</sup> RKF Report at 55.

employ.”<sup>23</sup> But parties have yet to describe any standards for this type of coordination and they do not attempt to explain how it could be applied, in practice, to provide reliable protections for NGSO consumers, given that NGSO providers may sign up new customers anywhere, at any time. In addition, as Microsoft explained in its opening comments, the separation distances required to prevent harmful interference are likely to be so large that they may sharply limit the utility of the 12 GHz band for terrestrial mobile operations—consistent with the Commission’s own previous decisions regarding, e.g., coordination with MVDDS.<sup>24</sup> Moreover, these assertions ignore applications such as Microsoft’s Modular Datacenter that are transportable and designed to be used dynamically in the field. It is, at best, unclear how a “case-by-case” coordination approach could account for this type of operation.

### **III. The RS Access economic study exaggerates the benefits of making 12 GHz available for terrestrial mobile use by omitting important factors.**

RS Access claims that making 12 GHz spectrum available for terrestrial mobile use might produce “a trillion dollars or more worth of consumer benefit.”<sup>25</sup> This analysis fails to account for the cost of harmful interference to incumbent NGSO (and DBS) operations. Further, RS Access’s asserted benefit figure is likely to be greatly inflated because it (1) erred in choosing the C-band as the “market-comparable” for the 12 GHz band; (2) incorrectly assumed a worse

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<sup>23</sup> *Id.*

<sup>24</sup> See Comments of Microsoft Corporation at 14-18, WT Docket No. 20-443, GN Docket No. 17-183 (filed May 7, 2021) (“Microsoft Comments”).

<sup>25</sup> RS Access Comments at v. It is worth noting at the outset that the Brattle Report does *not* predict a one trillion dollar consumer surplus. Rather, that value is the very top of a wide range of possible values starting at \$270 billion. But even that amount would still be subject to each of the criticisms below. See The Brattle Group, *Valuing the 12 GHz Spectrum Band with Flexible Use Rights* at 35 (May 2021) (“Brattle Report”), as attached to RS Access Comments.

case of only “limited interference” to incumbents where “the costs from harmful interference would be extremely low.”<sup>26</sup>; (3) relied upon invalid assumptions about demand for 12 GHz spectrum and failed to account for the effects of substitutes such as Wi-Fi; (4) erroneously assumed that all mobile phone equipment will incorporate a 12 GHz chip; and (5) disregarded the Commission’s efforts to make part of the, or the entire, 3.1–3.55 GHz frequency range available for 5G mobile services.

The study erred in choosing the C-band as the “market-comparable” for the 12 GHz band. The more appropriate “market-comparable” would be one of the licensed millimeter wave bands (24 GHz, 28 GHz, lower 37 GHz, or 39 GHz) based on spectral properties and use cases. Auction 101 (28 GHz band) raised \$0.0113 per MHz-pop.<sup>27</sup> Auction 102 (24 GHz band) raised \$0.0091 per MHz-pop.<sup>28</sup> Auction 103 (upper 37 GHz band, 39 GHz band, and 42 GHz band) raised \$0.0071 per MHz-pop.<sup>29</sup> In contrast, RS Access used the C-band’s fully loaded price of \$1.10 per MHz-pop—more than 100 times greater than the more appropriate figures from the millimeter wave bands.<sup>30</sup> If the study had used the proper market comparable, the predicted economic benefits and consumer surplus would have been considerably less.

Second, the study fails to properly account for the cost of harmful interference to incumbents. Even its worst-case analysis assumes only “limited” interference to DBS and NGSO

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<sup>26</sup> Brattle Report at 34.

<sup>27</sup> *Winning Bidders Announced for Auction of 28 GHz Upper Microwave Flexible Use Service Licenses (Auction 101)*, Public Notice, 34 FCC Rcd. 4279 (2019).

<sup>28</sup> *Auction of 24 GHz Upper Microwave Flexible Use Service Licenses Closes; Winning Bidders Announced for Auction 102*, Public Notice, 34 FCC Rcd. 4294 (2019).

<sup>29</sup> *Wireless Telecommunications Bureau Grants Auction 103 Upper Microwave Flexible Use Service Licenses*, Public Notice, 35 FCC Rcd. 9549 (2020).

<sup>30</sup> Brattle Report at 19.



FSS incumbents where “the costs from harmful interference would be extremely low.”<sup>31</sup> As explained above, this assumption is incorrect, even using the underestimations of RS Access’s own engineering study. The study should have performed a sensitivity analysis that examined the impacts of moderate and significant 5G interference levels to incumbents. At a minimum, the potential economic loss to satellite TV operators and viewers, and satellite broadband operators and users, should be quantified. The study also should have accounted for the costs to terrestrial mobile operators of implementing mechanisms to protect 12 GHz incumbent users from harmful interference, including the impact of low maximum power restrictions and exclusion zones.

Third, the study provides no evidence to support its assumption that there is adequate demand for 12 GHz spectrum resources for terrestrial mobile operations, especially given new C-band capacity. Notably, RS Access’s own technical study assumes that 12 GHz networks will be, at most, only 50% utilized,<sup>32</sup> but the economic study fails to conform to this assumption. The study also fails to provide any indication of the time frame in which additional capacity in the 12 GHz band could be required, or to discount its value calculation to account for this timeline.

The study also appears to assume all 5G networks will use licensed spectrum end-to-end and ignores the fact that 5G networks will also use unlicensed bands and technologies such as Wi-Fi and 5G New Radio-Unlicensed to meet a portion of their demand. Unlicensed devices are a core part of the 5G ecosystem. Recognizing this, last year, the FCC authorized unlicensed low power indoor devices to operate across the entire 6 GHz band (5.925–7.125 MHz), enabling seven contiguous 160 MHz-wide channels for Wi-Fi 6E operations, among other things. This newly available band will substantially address indoor wireless capacity demand which,

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<sup>31</sup> Brattle Report at 34.

<sup>32</sup> See RKF Report at 33 n.61.

according to the assumptions in RS Access’s technical study, would constitute 80% of 12 GHz mobile use.<sup>33</sup> In fact, coverage area in the 6 GHz band is greater than that in the 12 GHz band by virtue of its lower frequency. Furthermore, 6 GHz standard-power indoor or outdoor access points will soon become available, once automated frequency coordination systems are certified. Most 5G networks already combine licensed and unlicensed spectrum and the new 6 GHz band will ensure that this trend continues. Unlicensed technologies operating in the 6 GHz band therefore represent a substitute for several of the petitioners’ key proposed uses of the 12 GHz band, but RS Access’s economic analysis fails to account for this 1.2 GHz of new capacity in any way. If it had, the reported value of the 12 GHz band for terrestrial mobile operation would be substantially lower.

Fourth, RS Access makes the unfounded assumption that all mobile phone equipment will incorporate a 12 GHz chip, without any demonstration that this will actually occur. It is more likely that most mobile phones will not include 12 GHz capabilities in the foreseeable future, even if the Commission were to adopt RS Access’s proposal. Currently, Microsoft knows of no plans to develop the necessary industry standards, baseband chips, or other components to make 12 GHz mobile equipment a reality. Furthermore, if the Commission were to adopt RS Access’s proposal, the United States would be the only country in the world to license 5G mobile use in the 12 GHz band. Without international economies of scale, it would be unlikely that mobile phone manufacturers, who rely on scale, would incorporate 12 GHz radios into their devices for many years, if ever. But RS Access’s economic study fails to account for these facts and instead baselessly assumes every phone will include a 12 GHz radio.

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<sup>33</sup> RKF Report at 37.

Finally, the study claims that no new 5G spectrum will be coming available in the near and mid-term. It is choosing to ignore the Commission’s efforts to make part of the, or the entire, 3.1–3.55 GHz frequency range available for 5G services. The potential future availability of the more desirable mid-band spectrum should lead to a reduction in the economic valuation of the 12 GHz band for terrestrial mobile use.

### CONCLUSION

Although Microsoft strongly supports efficient spectrum use through spectrum sharing, the Commission is right not to adopt a “one-size-fits-all approach.” The appropriate methodology is the one the Commission described in the very first paragraph of its NPRM: it should “carefully examine the characteristics of each spectrum band under consideration—including its propagation and capacity characteristics, the nature of in-band and adjacent-band incumbent use, and the potential for international harmonization.”<sup>34</sup> Here, each of these considerations weighs against 12 GHz terrestrial mobile use. The 12 GHz band is a key band for incumbent NGSO operators which have made considerable investments deploying innovative satellite constellations. These systems have the potential to support transformative new services and meaningfully address the digital divide.

Proponents of rule changes to create terrestrial mobile service fail to provide the basic elements of a proposal to add such a service without causing harmful interference to incumbents. These parties’ comments in response to the NPRM continue to provide scant detail about how mobile operators would take advantage of new 12 GHz authorizations or even the basic technical characteristics of the proposed service. What they have filed, however, suggests that shared use

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<sup>34</sup> 12 GHz NPRM ¶ 2.

of the band would decrease the overall utility of the band for consumers, impairing NGSO use and offering little in the way of a truly usable mobile service—in addition to reducing effective use of the spectrum and disrupting established business plans. This would strand significant investments made in reliance on existing Commission rules both by NGSO operators themselves, and their partners, such as Microsoft, which have begun to develop new innovative offerings based on these satellite systems. Under these circumstances, authorizing a new 12 GHz mobile service would be contrary to the public interest.

Respectfully submitted,

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