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

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz for Mobile Radio Services	)	GN Docket No. 14-177
	)	
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
	)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664
	)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95 and 101 to Establish Uniform License Renewal, Discontinuance of Operations, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
	)	
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95

REPLY COMMENTS OF XO COMMUNICATIONS, LLC

Lisa R. Youngers
Vice President, Federal Affairs
XO Communications, LLC
13865 Sunrise Valley Drive
Herndon, VA 20171

February 26, 2016

EXECUTIVE SUMMARY

XO Communications, LLC ("XO") hereby replies to comments filed on the Federal Communications Commission's ("Commission's") proposal for a new flexible licensing and regulatory framework that will permit the deployment of 5G mobile radio services in commercial spectrum bands above 24 GHz (the "upper microwave bands").

Like XO, a large number of commenters support most elements of the Commission's proposed Upper Microwave Flexible Use Service ("UMFUS") framework, while urging the Commission to make a number of important modifications to those proposed rules and policies. The Commission should take action in this proceeding consistent with these comments. First, nearly all wireless industry commenters favor the inclusion of the 27.5-28.35 GHz band ("28 GHz band") and 39 GHz bands in the UMFUS framework, and a number of commenters agree with XO that the Commission should also include the other portions of the LMDS band in this framework. In addition, there is near consensus among wireless industry commenters that the Commission should assign flexible use rights to existing licensees and reject the assignment of overlay mobile licenses that would risk interference to current fixed wireless operations and diminish existing licensees' rights.

With respect to geographic area licensing, commenters agree with XO that the Commission should maintain the existing license areas for UMFUS spectrum rather than assign county-based licenses, an approach that would undermine administrative and operational flexibility in these bands. Numerous parties also oppose a strict population coverage requirement for the UMFUS bands, given the limited propagation of UMFUS signals and the likely variety of 5G spectrum uses. These commenters instead favor a flexible performance requirement focusing on network usage and service levels. Finally, there is broad support in the record for adopting an initial license term of at least ten or more years, applying secondary

market policies to UMFUS spectrum, and giving licensees flexibility to use either Frequency Division Duplex or Time Division Duplex technology.

With respect to the *NPRM*'s spectrum sharing proposals, the Commission should reject calls to transform the 28 GHz band into a primary band for satellite communications, an outcome that could frustrate UMFUS licensees' future 5G build-out efforts. Rather than elevate Fixed Satellite Service ("FSS") gateways to co-primary status at 28 GHz, numerous commenters agree with XO that FSS gateway operators should be able to secure interference protection for their facilities by acquiring UMFUS licenses either on the secondary market or at auction. If an FSS operator only needs a small geographic license area to gain the necessary interference protection, it should be able to obtain a partitioned UMFUS license or lease the requisite amount of UMFUS spectrum. The Commission should also reject "opportunistic" secondary sharing of the 28 GHz band by FSS user terminals and devices, since, as numerous commenters point out, such secondary usage could complicate licensees' wireless deployment, disrupt customer relationships, and impede 5G mobile development. The Commission's reliance on an untested spectrum access system or other unproven sharing techniques would create unnecessary complexity and impose administrative and operational burdens on licensees. Similarly, as numerous commenters argue, the Commission should not permit unlicensed operations in the UMFUS bands or terrestrial sharing of UMFUS spectrum under a "use or share" framework. Such secondary terrestrial uses would introduce significant risk and uncertainty that could undercut the development and deployment of 5G services, potentially even threatening the commercial viability of mobile operations in the UMFUS bands.

TABLE OF CONTENTS

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

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz for Mobile Radio Services	)	GN Docket No. 14-177
	)	
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
	)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664
	)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95 and 101 to Establish Uniform License Renewal, Discontinuance of Operations, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
	)	
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95

REPLY COMMENTS OF XO COMMUNICATIONS, LLC

XO Communications, LLC ("XO") hereby replies to comments filed on the Federal Communications Commission's ("Commission's") proposal for a new flexible licensing and regulatory framework that will permit the deployment of 5G mobile radio services in commercial spectrum bands above 24 GHz (the "upper microwave bands").[1]

---

[1] *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services; Establishing a More*

Like XO, a large number of commenters support most elements of the Commission's proposed Upper Microwave Flexible Use Service ("UMFUS") framework, while urging the Commission to make a number of important modifications to those proposed rules and policies. The Commission should take action in this proceeding consistent with these comments. First, nearly all wireless industry commenters favor the inclusion of the 27.5-28.35 GHz band ("28 GHz band") and 39 GHz bands in the UMFUS framework, and a number of commenters agree with XO that the Commission should also include the other portions of the LMDS band in this framework. There is also near consensus among wireless industry commenters that the Commission should assign flexible use rights to existing licensees and reject the assignment of overlay mobile licenses that would risk interference to current fixed wireless operations and diminish existing licensees' rights.

With respect to geographic area licensing, commenters agree with XO that the Commission should maintain the existing license areas for UMFUS spectrum rather than assign county-based licenses, an approach that would undermine administrative and operational flexibility in these bands. Numerous parties also oppose a strict population coverage requirement for the UMFUS bands, given the limited propagation of UMFUS signals and the likely variety of 5G spectrum uses. These commenters instead favor a flexible performance

---

Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands; Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band; Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services; Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations, Notice of Proposed Rulemaking, 30 FCC Rcd 11878 (2015) ("*NPRM*").

requirement focusing on network usage and service levels. Finally, there is broad support in the record for adopting an initial license term of at least ten or more years, applying secondary market policies to UMFUS spectrum, and giving licensees flexibility to use either Frequency Division Duplex ("FDD") or Time Division Duplex ("TDD") technology.

With respect to the *NPRM*'s spectrum sharing proposals, the Commission should reject calls to transform the 28 GHz band into a primary band for satellite communications, an outcome that could frustrate UMFUS licensees' future 5G build-out efforts. Rather than elevate Fixed Satellite Service ("FSS") gateways to co-primary status at 28 GHz, numerous commenters agree with XO that FSS gateway operators should be able to secure interference protection for their facilities by acquiring UMFUS licenses either on the secondary market or at auction. If an FSS operator only needs a small geographic license area to gain the necessary interference protection, it should be able to obtain a partitioned UMFUS license or lease the requisite amount of UMFUS spectrum. The Commission should also reject "opportunistic" secondary sharing of the 28 GHz band by FSS user terminals and devices, since, as numerous commenters point out, such secondary usage could complicate licensees' wireless deployment, disrupt customer relationships, and impede 5G mobile development. The Commission's reliance on an untested spectrum access system or other unproven sharing techniques would create unnecessary complexity and impose administrative and operational burdens on licensees. Similarly, as numerous commenters argue, the Commission should not permit unlicensed operations in the UMFUS bands or terrestrial sharing of UMFUS spectrum under a "use or share" framework. Such secondary terrestrial uses would introduce significant risk and uncertainty that could undercut the development and deployment of 5G services, potentially even threatening the commercial viability of mobile operations in the UMFUS bands.

I. THE COMMISSION SHOULD INCLUDE ALL LMDS AND 39 GHz SPECTRUM IN ITS NEW UMFUS FRAMEWORK

Virtually all wireless industry commenters support the Commission's inclusion of the 28 GHz and 39 GHz bands spectrum in its new UMFUS framework. These parties agree that wireless operators can overcome limited signal propagation in the LMDS and 39 GHz bands and successfully deploy high-capacity 5G mobile facilities in this spectrum. Intel states that "[w]ith 850 MHz of bandwidth, the 28 GHz band has great potential for bringing new 5G services to the marketplace," and notes that the 28 GHz band "has been the focus of academic research into channel models, and industry prototyping efforts."[2] On the issue of technical viability, Samsung indicates that its testing at 28 GHz and 39 GHz "has evidenced that mobile services can be accommodated in these bands."[3] While the International Telecommunication Union's World Radiocommunication Conference 2015 did not identify the 28 GHz band for 5G study, Cisco argues that "the United States should not be deterred in its efforts to promote the 28 GHz band for mobile use, as the rest of the world will likely see the benefits of the 28 GHz band once the United States moves forward."[4] As Straight Path points out, "[b]ecause an exclusive licensing framework already exists in the 28 GHz and 39 GHz bands, the addition of mobile services in these bands will be relatively straightforward."[5] For all of these reasons, XO agrees with

---

[2] Comments of Intel Corp., GN Docket No. 14-177, at 3 (dated Jan. 26, 2016; filed Jan. 27, 2016) ("Intel Comments").

[3] Comments of Samsung Electronics America, Inc. and Samsung Research America, GN Docket No. 14-177, at 3 (dated Jan. 26, 2016; filed Jan. 27, 2016) ("Samsung Comments").

[4] Comments of Cisco Systems, Inc., GN Docket No. 14-177, at 4 (Jan. 28, 2016) ("Cisco Comments").

[5] Comments of Straight Path Communications, GN Docket No. 14-177, at 5 (Jan. 27, 2016) ("Straight Path Comments").

commenters that these bands are "particularly attractive for 5G innovation and investment"[6] and that "it would benefit marketplace developments if the FCC were to expeditiously make these proposed frequencies available for 5G."[7]

A number of commenters also agree with XO that the Commission should incorporate the entire LMDS band into its UMFUS framework. As XO has described and other parties point out, there should be enough contiguous spectrum in the LMDS A2, A3, and B Blocks to support 5G mobile operations. Nokia and Samsung agree that the 24-29 GHz and 31 GHz bands are suitable for 5G mobile services,[8] while T-Mobile specifically proposes that "the 29/31 GHz bands should not be eliminated from consideration," because bandwidths smaller than 500 megahertz such as "150 megahertz and 300 megahertz could prove much more effective [when millimeter wave technology matures] than what may be attainable today."[9] Commenters also recognize that there are sound spectrum policy reasons for extending the UMFUS framework to the remaining portions of the LMDS band, with Mobile Future observing that "[i]dentifying more bands is necessary to ensure the realization of the National Broadband Plan's call to make 500 megahertz of additional spectrum available for mobile broadband by 2020."[10] Finally, as Verizon points out, when the Commission established LMDS, it "made clear it anticipated authorizing mobile operations in [all LMDS bands, not just the A1 sub-band] if presented with a

---

6 Comments of AT&T Services Inc., GN Docket No. 14-177, at 12 (Jan. 28, 2016) ("AT&T Comments").

7 Comments of 4G Americas, GN Docket No. 14-177, at 3 (dated Jan. 26, 2016; filed Jan. 27, 2016) ("4G Americas Comments").

8 *See* Samsung Comments at 15; Comments of Nokia, GN Docket No. 14-177, at 13 (Jan. 27, 2016) ("Nokia Comments").

9 Comments of T-Mobile USA, Inc., GN Docket No. 14-177, at 7-8 (Jan. 27, 2016) ("T-Mobile Comments").

10 Comments of Mobile Future, GN Docket No. 14-177, at 9-10 (Jan. 27, 2016) ("Mobile Future Comments").

record supporting such an authorization."[11] Approximately twenty years later, the record in this proceeding supports the extension of flexible use rights to all LMDS spectrum.

II. THE COMMISSION SHOULD ASSIGN FLEXIBLE USE RIGHTS TO EXISTING LICENSEES AND REJECT OVERLAY LICENSING IN THE UMFUS BANDS

Almost all wireless industry commenters agree with XO that the Commission should provide existing upper microwave licensees with the flexibility to operate 5G mobile facilities under the new UMFUS framework. As these parties point out, the Commission's proposed assignment of flexible use rights to existing licensees is the most straightforward and expeditious way to make spectrum above 24 GHz available for 5G mobile use. The Consumer Technology Association observes that this regulatory approach "will enable the fastest transition to expanded use of the band,"[12] while Qualcomm emphasizes that "the quickest means of enabling expanded use of the 28 GHz LMDS and 39 GHz bands is to provide current active licensees flexible use rights that include mobile rights to allow them to immediately deploy mobile and fixed services throughout the geographic areas covered by their licenses."[13] CTIA also believes that this regulatory approach "is particularly appropriate in light of the fact that the Commission contemplated such rights when these initial licenses were auctioned, but the technology did not

---

[11] Comments of Verizon, GN Docket No. 14-177, at 6, n.4 (Jan. 28, 2016) ("Verizon Comments").

[12] Comments of the Consumer Technology Association, GN Docket No. 14-177, at 10 (Jan. 27, 2016) ("CTA Comments").

[13] Comments of Qualcomm Incorporation, GN Docket No. 14-177, at 10 (Jan. 27, 2016) ("Qualcomm Comments"). *See also* Intel Comments at 3 ("[T]his is the most streamlined and expeditious means for completing this rulemaking and for bringing the 28 GHz band to market for mobile services."); Verizon Comments at 5 ("Granting existing licensees flexible use rights promotes the Commission's goal of repurposing mmW spectrum to support new technologies in an efficient and simple way.").

yet exist to permit such operations."[14] Overall, XO agrees with commenters that the Commission's proposal for the assignment of flexible use rights will "promot[e] innovation and investment in millimeter wave technologies and services"[15] and "benefit U.S. consumers and the U.S. economy."[16]

Consistent with these views on the treatment of existing LMDS and 39 GHz licensees, wireless industry commenters and other parties oppose the assignment of overlay 5G licenses in the proposed UMFUS bands. Nothing in the record supports this alternative approach. As XO described in its comments, 5G overlay licensing in the 28 GHz and 39 GHz bands would create a significant risk of interference to current fixed wireless operations and would diminish existing licensees' rights.[17] EchoStar states that "splitting mobile and fixed rights would create complicated sharing and interference issues between the services,"[18] while Qualcomm observes that "allowing separate bundles of 'fixed' and 'mobile' rights in the same geographic area would create troubling interference issues that would make the deployment of mobile services unduly complex."[19] Calling this licensing approach "an invitation to disaster," the Telecommunications Industry Association ("TIA") states that, "[a]t best, the spectrum will be used inefficiently because of the compromises required for both licensees to avoid interference to one another, and

---

14 Comments of CTIA, GN Docket No. 14-177, at 14-15 (Jan. 28, 2016) ("CTIA Comments").

15 *Id*. at 12. CTIA further states that the Commission's proposed approach "will minimize transaction costs and enable rapid expansion of services in the band." *Id*. at 15.

16 Verizon Comments at 5.

17 Comments of XO Communications, LLC, GN Docket No. 14-177, at 17 (Jan. 28, 2016) ("XO Comments").

18 Comments of EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, and Alta Wireless, Inc., GN Docket No. 14-177, at 15 (Jan. 27, 2016) ("EchoStar Comments").

19 Qualcomm Comments at 10. Qualcomm states that, in contrast, "[a] single license that covers both fixed and mobile rights avoids this issue and provides the licensee with the ability to evaluate the tradeoffs between different uses and manage successful deployments." *Id.* at 10-11.

at worst the Commission will find itself constantly refereeing interference disputes."[20] According to Cisco, the complexity of overlay licensing "would discourage[e] participation by bidders who otherwise are ready, willing and able to deploy new services in the 28 GHz and 39 GHz bands."[21] The Commission should confirm its rejection of overlay licensing in the UMFUS bands.[22]

III. THE COMMISSION SHOULD MAINTAIN THE EXISTING LMDS AND 39 GHz LICENSE AREAS AND APPLY FLEXIBLE PERFORMANCE REQUIREMENTS IN THE UMFUS BANDS

Commenters on the *NPRM* strongly oppose the Commission's proposed county-based licensing scheme for the 28 GHz and 39 GHz UMFUS bands. They agree with XO that the Commission should maintain the existing license areas in the upper microwave bands – Basic Trading Areas ("BTAs") in the LMDS band and Economic Areas ("EAs") in the 39 GHz band – in order to promote administrative and operational efficiency. Mobile Future argues that "[e]stablishing a licensing scheme at the county level would create substantial administrative burdens for the Commission and licensees, thereby decreasing the potential value and usability of the spectrum."[23] AT&T notes that "a county-based licensing approach would require extensive and burdensome interference coordination efforts as licensees would be forced to

---

20 Comments of the Telecommunications Industry Association, GN Docket No. 14-177, at 16 (Jan. 27, 2016) ("TIA Comments").

21 Cisco Comments at 5, n.11.

22 While the Commission has previously applied overlay licensing in some circumstances, in those cases, "the incumbent licensees were authorized to operate only in a localized area that could be clearly defined so as to allow an auction winner to operate freely outside the protected zone. LMDS licensees are already entitled to operate throughout a large geographic area and cannot similarly be restricted to a specific service area within that territory." EchoStar Comments at 15.

23 Mobile Future Comments at 13.

coordinate across numerous neighboring counties,"[24] while SkyRiver points out that "at a minimum county-based licensing will require the negotiation of far more [licensee] agreements than would be required with larger services areas."[25] In addition, while the UMFUS bands will support ultra-high data rates and expanded capacity in densely-populated urban areas, 4G Americas observes that "dense urban areas like Chicago and Washington, D.C. often sprawl across several counties, putting county-based licensing at odds with mmW spectrum bands' most valuable potential."[26]

County-based licensing would certainly increase the Commission's administrative costs. As Straight Path describes, "there would be 3,143 licenses in the 28 GHz band and 44,002 licenses in the 39 GHz band," meaning that, as it implements its performance requirements, the Commission would have "to assess over 47,000 such demonstrations for the two bands, a daunting, resource-intensive administrative task."[27] In contrast, retaining BTAs and EAs in these bands will "spark investment and create administrative and operational efficiencies"[28] and "provide the flexibility for UMFUS licensees to tailor their buildouts as necessary to most effectively respond to market demand."[29] Given the virtual industry consensus on this issue, the Commission should maintain BTA and EA licensing in the new flexible-use UMFUS bands.

Commenters in this proceeding also oppose the Commission's proposed performance requirement of 40% population coverage in each license area for UMFUS licensees at 28 GHz

---

24 AT&T Comments at 18.

25 Comments of SkyRiver Communications, Inc., GN Docket No. 14-177, at 11 (Jan. 27, 2016).

26 4G Americas Comments at 7-8.

27 Straight Path Comments at 18.

28 Verizon Comments at 10.

29 Cisco Comments at 11-12.

and 39 GHz. Numerous parties point out that a rigid population coverage requirement is not an appropriate measure of service in the upper microwave bands, where signal propagation is limited and operators are likely to provide coverage to relatively small geographic areas. Cisco states:

> Propagation at mmW frequencies is inherently shorter range and quasi-optic in character, and thus the UMFUS bands are unlikely to be used for ubiquitous large-area wireless coverage. Many deployments may instead be focused towards small cells, perhaps with less ubiquity due to the stronger shadowing behavior of higher frequency cells deployed in amongst the clutter.[30]

UMFUS deployments will likely be in "locations with high levels of commercial activity, *e.g.*, public plazas, public transportation hubs, malls, stadiums, businesses, etc."[31] Given the likely nature of 5G UMFUS operations, 4G Americas posits that "there are better metrics to ensure use of the new spectrum bands than the proposed 40% population coverage performance metric and associated milestones."[32] TIA observes that, "[w]hile existing metrics have made sense for lower band services where coverage tends to be ubiquitous and subscribers are looking for service that includes their residences, the same is not going to be true of the mmW bands."[33]

Instead of the proposed population coverage rule, many commenters favor a flexible UMFUS performance requirement that accounts for the specific characteristics of these bands, the uncertainty surrounding future 5G uses, and the likely divergence of UMFUS operations from traditional cellular service models.[34] Qualcomm states that "any new performance metrics

---

30 *Id*. at 13.

31 *Id*.

32 4G Americas Comments at 9.

33 TIA Comments at 26.

34 Verizon states that "future technologies and deployment paradigms may be different than past ones," and that in the UMFUS bands, "no one can know what use cases will emerge, let alone how to measure the scope of operators' deployments of new technologies in these bands." Verizon Comments at 18-19.

should be as flexible as the underlying service rules to account for the broad range of 5G services, usage models, and applications,"[35] while Cisco argues that the Commission's metrics must be flexible "so that they accommodate the considerable variety of 5G applications presently being discussed in the relevant standards bodies and industry fora."[36] Multiple commenters posit that the Commission's UMFUS performance standard should be based on "network usage and/or service levels,"[37] including metrics such as the "number of connected devices, carried traffic, and/or session count."[38] Similarly, some parties argue that the Commission should avoid a "one size fits all" approach[39] and adopt substantial service safe harbors for the UMFUS bands that provide "non-exhaustive examples of what will be deemed substantial service."[40]

In its own comments, XO stated that the Commission for now should require only 20% population coverage in UMFUS license areas (coverage equal to the current substantial service safe harbor for point-to-multipoint operations in these bands).[41] Like other commenters, however, XO would also support a flexible, usage-based performance requirement that accounts for the wide variety of future uses, services, and applications likely to develop in UMFUS spectrum. Such a flexible approach would enhance licensee certainty and foster increased innovation and investment in the UMFUS bands.

---

35 Qualcomm Comments at 13.

36 Cisco Comments at 14.

37 *Id*.; *see also* 4G Americas Comments at 10; Qualcomm Comments at 13; Nokia Comments at 19.

38 Cisco Comments at 14. Similarly, Nokia states that an appropriate performance metric "might be number of transmitters in service, number of connected devices, carried traffic, etc." Nokia Comments at 20.

39 TIA Comments at 27.

40 *See*, *e.g*., Verizon Comments at 19. *See also* CTIA Comments at 25; TIA Comments at 27.

41 XO Comments at 22.

IV. OTHER ELEMENTS OF THE COMMISSION'S UMFUS REGULATORY FRAMEWORKS

A. Band plans in the 28 GHz and 39 GHz bands

XO agrees with Samsung, TIA, and others that the Commission should maintain a single 850 megahertz license in the 28 GHz band at 27.5-28.35 GHz.[42] Rather than mandate the division of this spectrum block into two or more separately licensed bands, the Commission should leave it to licensees to determine if such spectrum disaggregation advances the development of their wireless networks and services. In the event the Commission concludes that the division of this spectrum block would provide some benefits, it should apply this approach only to newly auctioned 28 GHz band licenses. Imposing a spectrum disaggregation on current 28 GHz licensees could disrupt existing business arrangements and customer relationships.

With respect to the 39 GHz band, XO in its comments supported the retention of the existing band plan, which features 14 licensed channel pairs with 50 megahertz by 50 megahertz of spectrum.[43] XO acknowledges, however, that a number of parties in this proceeding support the reconfiguration of the 39 GHz band into wider channels, typically 200 megahertz or wider.[44] In response, XO now clarifies that it is open to such a re-banding at 39 GHz, as long as such changes do not delay an order in this proceeding and there is an appropriate transition plan that enables XO to continue fully serving its customers in that band.

B. Length of UMFUS license terms

Commenters express broad support for adopting license terms of at least ten years for UMFUS authorizations at 28 GHz and 39 GHz. This approach would advance "the public

---

42 *See* Samsung Comments at 14; TIA Comments at 30.

43 XO Comments at 24.

44 *See*, *e.g.*, CTIA Comments at 22; Nokia Comments at 21-22; Samsung Comments at 14.

interest and principles of regulatory parity"[45] and "strike[] an appropriate balance between allowing the marketplace to develop and avoiding spectrum warehousing."[46] AT&T and Verizon agree with XO's view that the *initial* license term for UMFUS licenses should be longer than ten years. AT&T states that "[i]f, for example, the standards process is delayed, longer initial license terms may be necessary to allow licensees sufficient time to develop the spectrum and realize a return on investment,"[47] while Verizon points out that a longer initial license term would be beneficial "given the need for certainty and the costs of network densification."[48] As Verizon observes, reasonably long terms "will encourage investment and innovation by improving the expectations of returns on capital expenditures to build out the spectrum and maintain current accounting and tax rules that come with renewal expectancy."[49] Accordingly, XO urges the Commission to adopt initial UMFUS license terms greater than ten years.

C. Secondary market policies: License disaggregation/partitioning and spectrum leasing

XO and a variety of other commenters agree that the Commission should apply its established secondary market policies, including its spectrum leasing, disaggregation, and partitioning rules, to UMFUS spectrum. These rules provide essential flexibility to licensees, enabling them to customize their spectrum holdings and license areas to further their specific business plans. Cisco argues that "[t]he flexibility inherent in these options assures that service providers and other prospective licensees can tailor their authorized service area to their own

---

45 CTIA Comments at 22.

46 TIA Comments at 25.

47 AT&T Comments at 20.

48 Verizon Comments at 10.

49 *Id.*

particular business needs,"[50] while CTA notes that "[g]iving industry the freedom to determine the correct size of licenses through partitioning and leasing . . . allow[s] the marketplace to size the licenses for the most productive deployments."[51] Moreover, Ericsson agrees that such flexibility enables licensees "to provide the coverage and capacity needed in their particular licensed markets."[52] Application of these well-established policies will maximize spectrum efficiency and provide necessary certainty to potential UMFUS licensees and Commission staff during the transition to the new UMFUS licensing framework.[53]

D. Technical rules: Flexible duplexing and increased power limits

Commenters generally support licensee flexibility to use either FDD or TDD technology for their 5G operations and agree that the Commission should not mandate a duplexing option at this stage of 5G mobile development. Intel states that "[b]oth TDD and FDD (and any future duplexing scheme) should be permitted by the rules, and private parties should be permitted to decide on the most appropriate duplexing scheme at any point in the future, without the delays associated with a future regulatory proceeding to broaden or change the duplexing scope."[54] Similarly, Nokia argues that "the Commission should not mandate TDD for mmW systems, but should leave the door open to FDD and other new types of duplexing that may be available in the future."[55] As FiberTower describes in its comments, "[t]he flexible use rights granted in the UMFUS should support allowing the licensee to decide when to deploy full duplex versus other

---

50 Cisco Comments at 11.

51 CTA Comments at 14-15.

52 Comments of Ericsson, GN Docket No. 14-177, at 6 (dated Jan. 26, 2016; filed Jan. 27, 2016) ("Ericsson Comments").

53 Mobile Future Comments at 16.

54 Intel Comments at 20.

55 Nokia Comments at 26. *See also* Samsung Comments at 17 ("Samsung supports flexibility in the Commission's rules to permit both TDD and FDD.").

configurations, in keeping with the requirements of the particular deployment scenario facing that licensee."[56] Consistent with these comments, the Commission should affirm its proposal to allow either TDD or FDD in the UMFUS bands.

With respect to other technical rules, several commenters support a higher power limit for UMFUS base station operations than the limit proposed in the *NPRM*. Samsung states that "the power limits proposed for the millimeter wave bands are too restrictive for fixed base stations" and argues that "increasing the power limits for the millimeter wave bands will allow for more robust services to consumers and allow licensee flexibility to develop and deploy innovative new services."[57] Verizon, meanwhile, asserts that the Commission should not impose the same power limits in the UMFUS bands as applied to traditional commercial mobile spectrum bands. Specifically, it says that "applying the same maximum transmission power limit used for base stations in PCS and AWS spectrum to mmW bands would restrict power levels too much because power would likely be spread over much wider bandwidths, resulting in much lower EIRP-per-MHz levels and correspondingly lower ranges."[58] Verizon contends that the Commission "consider[ed] neither the increased propagation losses nor beamsteering and antenna gain effects for future mmW technologies in proposing the power limit."[59] In effect, says Ericsson, "what [the Commission] actually did was limit UMFUS licensees to a much lower power spectral density than is applicable in the other services."[60] To address this power issue and ensure that "equipment manufacturers and network operators [have] greater flexibility to

---

56 Comments of FiberTower Spectrum Holdings, LLC, GN Docket No. 14-177, at 9 (Jan. 27, 2016).

57 Samsung Comments at 18-19.

58 Verizon Comments at 16.

59 *Id*.

60 Ericsson Comments at 12.

manage power and engineer innovative technical improvements," the Commission should adopt an EIRP limit of 82 dBm (for the channel bandwidth of 100 MHz) for 5G base stations in the 28 GHz and 39 GHz UMFUS bands.[61]

V. THE COMMISSION SHOULD MAINTAIN THE SECONDARY ALLOCATION FOR FSS AT 28 GHz AND REJECT OPPORTUNISTIC FSS SHARING IN THIS BAND

Since the Commission established its LMDS allocation in 1997,[62] there has been a successful balance of services in the 28 GHz band at 27.5-28.35 GHz. Through the coordination process, primary LMDS operators and secondary FSS gateway earth stations have enjoyed a stable coexistence, and, in the future, coordination between 5G UMFUS systems and FSS gateway operations should be similarly routine.[63] The Commission should reject calls from the satellite community to upset the successful balance at 28 GHz by transforming this spectrum into a *primary* band for satellite communications.[64]

---

61 *Id.* at 13.

62 *See Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services; Petitions for Reconsideration of the Denial of Applications for Waiver of the Commission's Common Carrier Point-to-Point Microwave Radio Service Rules; Suite 12 Group Petition for Pioneer Preference*, Second Report and Order, Order on Reconsideration, and Fifth Notice of Proposed Rulemaking, 12 FCC Rcd 12545 (1997).

63 XO expects that its 5G mobile facilities will be located predominantly in core urban areas. 5G mobile deployments will be low-power, highly directional systems with limited range and aggressive downward angles. Given these factors, there should be no interference issues between these 5G mobile operations and secondary FSS gateways primarily in rural and suburban locations. As it does today, XO will coordinate its 5G mobile services with secondary FSS operators under a cooperative approach. *See* XO Comments at 32-33.

64 *See*, *e.g.*, AT&T Comments at 12-13; Comments of EMEA Satellite Operators Association, GN Docket No. 14-177, at 5-6 (Jan. 27, 2016); EchoStar Comments at 19; Comments of Inmarsat Mobile Networks, Inc., GN Docket No. 14-177, at 10-11 (Jan. 28, 2016) ("Inmarsat Comments"); Comments of O3b Limited, GN Docket No. 14-177, at 13 (Jan. 28, 2015) ("O3b Comments"); Comments of SES Americom, Inc., GN Docket No. 14-177, at

First, contrary to arguments from satellite interests, the Commission should not elevate FSS gateway or other FSS operations to co-primary status at 28 GHz. Like Ericsson, XO believes that "it would not serve the public interest to automatically grant co-primary status for FSS operations in the 27.5-28.35 GHz band at this time,"[65] and it agrees with Intel that co-primary status for FSS systems "would undercut the development of a terrestrial mobile service in this band."[66] As XO explained in its comments, co-primary status for FSS gateways would potentially frustrate UMFUS licensees' future efforts to build out their licenses. This change could result in substantial geographic areas where it would be impossible to implement terrestrial service, because of the presence of previously licensed, co-primary FSS gateway earth stations.[67] In addition, the Commission should bear in mind that satellite operators have deployed their systems in the 28 GHz band with full knowledge of their secondary status. As Samsung points out, "these FSS systems were authorized on a non-interference basis and the incumbents invested at their own risk with these facts disclosed prior to their commencement of operations."[68] FSS operators were also aware that the Commission had previously contemplated permitting mobile services in this band. There is nothing in the record to justify a reversal of the Commission's

---

11(Jan. 28, 2016); Comments of the Satellite Industry Association, GN Docket No. 14-177, at 18-19 (Jan. 28, 2016) ("SIA Comments").

65 Ericsson Comments at 20.

66 Intel Comments at 5. *See also* Comments of the Information Technology Industry Council, GN Docket 14-177, at 5 (Jan. 27, 2016) ("Automatically granting FSS operations co-primary status could impede the development of terrestrial mobile service in this band.").

67 XO Comments at 33.

68 Samsung Comments at 22.

tentative decision in the *NPRM* to maintain the secondary allocation for FSS in the 28 GHz band.[69]

While private coordination agreements between primary LMDS licensees and secondary FSS gateway licensees have efficiently and effectively facilitated these operators' coexistence at 28 GHz, XO continues to support the Commission's proposal to permit FSS gateway licensees to acquire UMFUS licenses in the vicinity of their gateway earth station facilities. This proposal appears to be a reasonable means for FSS operators to obtain interference protection for their satellite operations in those geographic areas. XO agrees with CTIA that there is "no reason why a FSS licensee, if it employs the same mechanisms a wireless licensee would to obtain spectrum access, should not be permitted to purchase co-primary usage rights."[70] As Verizon indicates, this "market-based approach would be an efficient, innovative way to authorize earth station operators to achieve heightened quality of service assurances, if and where they need them and to the extent that the economic value of their operations necessitates such assurances."[71] If FSS operators place a sufficiently high value on such interference protection, they should be able to acquire UMFUS licenses at auction or on the secondary market.

---

69 In their comments, a number of FSS interests claim that 5G mobile operations at 28 GHz would threaten aggregate interference to FSS satellite receivers. *See* Comments of Avanti Communications Group PLC, GN Docket No. 14-177, at 6 (dated Jan. 26, 2016; filed Jan. 27, 2016); Inmarsat Comments at 7; O3b Comments at 20; *see also*, *e.g.*, SIA Comments at 19. XO does not believe that these technical concerns are a legitimate basis for limiting 5G operations in the 28 GHz band. Given the level of isolation between the satellite receivers and 5G mobile devices and base stations – including the large path loss resulting from substantial transmit-receiver separation and the typical non-alignment of 5G transmit beams with satellite beams – tens of millions of 5G transmitters will be able to operate simultaneously without degrading satellite receiver performance.

70 CTIA Comments at 31-32.

71 Verizon Comments at 22-23.

The Commission should reject complaints from some FSS interests that terrestrial UMFUS licenses are a poor fit for FSS gateways that do not occupy significant geographic territory. As a number of commenters point out, FSS licensees should be able to lease, partition, and disaggregate just the right amount of UMFUS spectrum and geographic area to protect their gateway operations from interference. As TIA describes:

> The availability of partitioning as proposed in the *NPRM* will allow FSS licensees who require smaller terrestrial licenses (because, for example, they are seeking to deploy just a few isolated gateway earth stations and not more ubiquitous user stations) to tailor their license area to their needs. They will be able to do so by either securing the terrestrial license for the larger area and partitioning off all but what they need, or entering into a secondary market transaction with the terrestrial licensee to partition off the area needed by the FSS licensee.[72]

In its order, the Commission should adopt this market-based approach to FSS interference protection.[73]

The Commission should also reject "opportunistic" secondary sharing of the 28 GHz band by FSS user terminals and devices other than satellite gateway earth stations. The presence of widely distributed FSS equipment at 28 GHz would encumber XO's licensed spectrum and impede 5G mobile development. As Ericsson points out, "[a]llowing deployment of fixed FSS user equipment on a secondary basis would subject primary terrestrial service to greater

---

[72] TIA Comments at 13. *See also* Verizon Comments at 23 ("As a practical matter, an earth station operator who purchases a terrestrial license to avoid interference problems with terrestrial operators would likely only need to use a small portion of the license's service area. The earth station owner would thus be incented to partition its license and transfer unneeded portions to, or to enter into a leasing arrangement with, a terrestrial operator."); Comments of the Fixed Wireless Communications Coalition, GN Docket No. 14-177, at 14 (Jan. 27, 2016) ("FWCC Comments") ("[T]o increase its own security for future expansion, the earth station operator could negotiate with the incumbent UMFUS licensee for a partition that lets the earth station operator become a licensee in its own right.").

[73] XO believes that, going forward, FSS operators obtaining UMFUS licenses should not have to construct terrestrial systems in order to retain those authorizations.

complexity and reduced availability and reliability."[74] FSS user equipment would pose a substantial threat of interference to mobile users and create the risk that licensees would not be able to use their authorized frequencies where and when they are needed, potentially disrupting relationships with numerous customers.[75] This compulsory spectrum sharing would thereby "reduc[e] the attractiveness of [UMFUS] licenses for next generation use cases and their value at auction."[76] XO agrees with Ericsson that "[t]he Commission should allow the introduction of one ubiquitous service in the band – flexible terrestrial operations – and avoid the complexity and risks of introducing two such services."[77]

Counter to the claims of some FSS proponents, spectrum access systems ("SAS") and other sharing techniques are not yet viable and do not justify opportunistic FSS sharing at 28 GHz. As T-Mobile points out, "SAS remains an untested concept. While there are rules that permit its use in the 3.5 GHz band, there are no current SAS or similar database-driven operations."[78] XO agrees with other commenters that, until SAS is technically and operationally established in the 3.5 GHz band under a wide variety of usage conditions, the technology can

---

74 Ericsson Comments at 22. *See also* T-Mobile Comments at 15 ("Additional use of the millimeter wave bands by satellite stations should be constrained, as such use would inhibit and complicate full use of the band for mobile terrestrial operations.").

75 XO agrees with FWCC that the Commission should not allow fixed satellite uplinks on moving platforms in the UMFUS bands. As FWCC points out, the *NPRM* "overlooks the problem of interference into terrestrial services that share the same frequencies." FWCC Comments at 15.

76 Verizon Comments at 24.

77 Ericsson Comments at 22.

78 T-Mobile Comments at 17. Verizon points out that, "[t]hree years after the 3.5 GHz proceeding was initiated, not only is there no commercial SAS in operations, but there are ongoing discussions among stakeholders about how the SAS will work, what information will be inputted into it, and what security protocols will be in place to ensure that lower-tier users adhere to the SAS's instructions with sufficient dispatch." Verizon Comments at 25.

only be viewed as an experimental concept and cannot support FSS sharing at 28 GHz.[79] At this early stage of 5G development in the 28 GHz band and elsewhere, only "tried and true techniques should be applied" to manage the use of UMFUS spectrum.[80]

In any event, the adoption of an SAS requirement at 28 GHz would impose substantial administrative and operational burdens on UMFUS licensees. As Verizon states, "developing a SAS for the sole purpose of granting opportunistic access to licensed spectrum would overcomplicate licensees' use of that spectrum and delay getting this attractive spectrum into the hands of companies that will deploy it."[81] Under an SAS approach, XO would likely have to devote substantial time and resources to developing a web database for sharing FSS systems. XO and other licensees would have to collect and monitor extensive technical and administrative information about these FSS systems, and would have to make this data accessible to its partners and spectrum lessees. UMFUS licensees might even be required to submit or otherwise make public the technical parameters and locations of their individual transmitters and receivers, in order to enhance spectrum sharing. XO agrees with CTIA that the "[p]rovision of commercially sensitive information of this nature runs counter to the exclusive use, flexible licensing regime that has been the hallmark of the Commission's successful mobile broadband regulatory framework."[82]

Nor can other spectrum sharing techniques such as beacon signaling, elevation angle limits, and signal cancellation technologies serve as the basis for opportunistic FSS sharing in the

---

79 *See* Intel Comments at 22; CTIA Comments at 33 ("CTIA opposes the use of a SAS for the 28 GHz spectrum band when it has yet to be tested and operated in intensively used spectrum. . . . Until the 3.5 GHz SAS experiment develops and can be evaluated, the Commission should not attempt to import it to other spectrum bands.").

80 Qualcomm Comments at 14.

81 Verizon Comments at 25.

82 CTIA Comments at 33.

28 GHz band. These techniques are either untested or overly complex, and, if any of these approaches were implemented, "substantial operational and economic burdens would be placed on the terrestrial licensee to facilitate the ability of secondary satellite users to expand their services."[83] As explained in XO's comments, such techniques would likely deter 5G build-out in this band.[84] Rather than impose such "complex, top-down mechanisms" for spectrum sharing at 28 GHz,[85] the Commission should leave it to voluntary, private negotiations between UMFUS licensees and FSS operators to determine the terms of any secondary FSS access to this spectrum.

VI. THE COMMISSION SHOULD NOT ADOPT A "USE OR SHARE" FRAMEWORK THAT PERMITS SECONDARY TERRESTRIAL OPERATIONS IN UMFUS SPECTRUM

As numerous commenters agree, the Commission should not allow unlicensed operations in the UMFUS bands or permit terrestrial sharing of UMFUS spectrum under its proposed "use or share" framework. Like opportunistic FSS operations, unlicensed systems or a terrestrial "use or share" policy for UMFUS spectrum in the LMDS and 39 GHz bands would introduce unwarranted uncertainty and risk at a time when the industry should be encouraged to develop and eventually deploy 5G services. As commenters point out, UMFUS licensees and other wireless industry participants will need time, flexibility, and certainty to "explore different types of uses and technologies"[86] and make "the investments necessary to make millimeter wave

---

83 TIA Comments at 7, n.18.

84 *See* XO Comments at 35.

85 Ericsson Comments at 22.

86 Mobile Future Comments at 16 (further noting that adopting a "use or share" requirement "would ultimately restrain development of these bands and 5G").

mobile deployments successful."[87] XO agrees with CTIA that licensees should be permitted to have "unfettered access to their licensed service area to test equipment and services" and warns that "[r]equiring licensees to share their spectrum with other uses while deploying or expanding their networks would undermine and/or delay the provision of service."[88]

As commenters describe, a "use or share" policy could ultimately threaten the commercial viability of 5G in UMFUS spectrum. As with the opportunistic satellite services discussed above, the introduction of secondary terrestrial services would complicate licensees' use of UMFUS spectrum and create a risk that licensees would not be able to use their licensed frequencies when and where needed. Verizon agrees that a licensee subject to sharing "may not be able to clear . . . opportunistic users when it expands its service (or when it brings online new channels to increase capacity). The licensee also faces the risk that . . . opportunistic uses . . . [may] undermine its ability to meet quality of service requirements."[89]

At a minimum, accommodating these secondary uses would be unduly burdensome for UMFUS licensees. As XO noted in its comments, adoption of a "use or share" policy would increase the risk of harmful interference both to existing services and new 5G mobile services in the UMFUS bands.[90] This approach would also require UMFUS licensees to engage in a resource-intensive coordination process with what might be thousands of service types and

---

87 Qualcomm Comments at 14; *see also* AT&T Comments at 21 (arguing that "it would be premature to redistribute 'unused' spectrum for shared uses a mere five years into a license term . . . [because] it will still require additional research and development to leverage mmW bands to support 5G systems in the first place").

88 CTIA Comments at 27.

89 Verizon Comments at 21; *see also id*. at 20 (expressing concern that UMFUS licensees' "investments may become impaired by third parties using the spectrum").

90 XO Comments at 30.

facility locations.[91] In addition, commenters agree that a "use or share" framework would in effect constitute a second performance requirement for UMFUS licensees, penalizing licensees that do not use all of their licensed spectrum throughout their license areas within five years.[92] As Intel points out, "[s]ince the use-or-share requirements would necessitate a regulatory pre-judgment of what constitutes an inappropriate pace and geographic scope of deployment and adoption, it effectively becomes a second form of build-out and performance requirements."[93]

Certainly, it would be unwise for the Commission to adopt a "use or share" policy that relies on unproven sharing techniques. As described above, the Commission should not rely on SAS or other sharing techniques proposed for the 3.5 GHz band until they are "proven technically and operationally under a broad range of user and usage conditions, and also proven for scalability to other bands."[94] If a sharing "system is not managed properly, it could cause harmful interference and undermine integrated network design deployments."[95] Given the potential public interest benefits of 5G technology, the stakes are too high for the Commission to engage in an unnecessarily complex "use or share" experiment at this time.[96]

Instead, XO agrees with other commenters that the Commission should encourage parties to access UMFUS spectrum through proven secondary market transactions and spectrum leasing

---

91 *Id*.

92 *See* Verizon Comments at 20 (noting that "establishing buildout requirements" and "also applying a 'use-it-or-share it' standard would create two penalties—one for not meeting the performance requirement objective after the initial term and another for having left 'unused' (an undefined and vague term) spectrum after 5 years").

93 Intel Comments at 21.

94 *Id.* at 22; *see also* Qualcomm Comments at 14 (arguing against application of "the 3.5 GHz band spectrum management model to these bands until that model is shown to successfully manage spectrum access in that band").

95 AT&T Comments at 21.

96 *See* Verizon Comments at 20-21; AT&T Comments at 20-21.

mechanisms. As Intel points out, even parties wishing to access UMFUS spectrum may prefer secondary markets policies over a "use or share" approach, because "the uncertain timing of when the licensee might reclaim the spectrum from the sharing party makes for an impractical and uncertain business case."[97]

VII. CONCLUSION

For the aforementioned reasons, XO continues to urge the Commission to expeditiously adopt an order that establishes its proposed UMFUS framework and permits the provision of 5G mobile services in the upper microwave bands. By maximizing the flexible use of this spectrum and enabling existing LMDS and 39 GHz licensees to provide a full variety of wireless services, the Commission can deliver extraordinary benefits to American consumers.

Respectfully submitted,

/s/ Lisa R. Youngers
Lisa R. Youngers
Vice President, Federal Affairs
XO Communications, LLC
13865 Sunrise Valley Drive
Herndon, VA 20171
(703) 547-2258
Lisa.R.Youngers@xo.com

February 26, 2016

[97] Intel Comments at 21. Intel also points out that "a use-it-or-share-it mandate undercuts the efficient operation of secondary markets." *Id*.