

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Expanding Flexible Use of the 3.7 to 4.2 GHz)	GN Docket No. 18-122
Band, <i>et al.</i>)	RM-11778
)	RM-11791

COMMENTS OF CTIA

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CTIA¹ submits these comments in response to the *Public Notice*² inviting parties to supplement the record to address issues raised in response to the Federal Communications Commission’s (“FCC” or “Commission”) July 2018 *Notice of Proposed Rulemaking* exploring opportunities for terrestrial, flexible use of mid-band spectrum between 3.7-4.2 GHz (the C-band).³ As discussed below, CTIA reiterates its support for the Commission’s commitment to repurpose mid-band spectrum – including hundreds of megahertz in this proceeding – for

¹ CTIA[®] (www.ctia.org) represents the U.S. wireless communications industry and the companies throughout the mobile ecosystem that enable Americans to lead a 21st-century connected life. The association’s members include wireless carriers, device manufacturers, suppliers as well as apps and content companies. CTIA vigorously advocates at all levels of government for policies that foster continued wireless innovation and investment. The association also coordinates the industry’s voluntary best practices, hosts educational events that promote the wireless industry, and co-produces the industry’s leading wireless tradeshow. CTIA was founded in 1984 and is based in Washington, DC.

² *Wireless Telecommunications Bureau, International Bureau, Office of Engineering and Technology, and Office of Economics and Analytics Seek Focused Additional Comment in 3.7-4.2 GHz Band Proceeding*, Public Notice, DA 19-678 (rel. July 19, 2019) (“*Public Notice*”).

³ *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Report and Order and Notice of Proposed Rulemaking, 33 FCC Rcd 6915 (2018) (“*NPRM*”).

flexible use while protecting or accommodating the delivery of content currently provided by C-band satellite services.

I. INTRODUCTION AND SUMMARY

Chairman Pai recently observed that “5G could be one of the great moonshots of this generation” – creating a world where every sector of the economy and every aspect of our day-to-day lives is transformed, from healthcare to transportation, education and more.⁴ Mid-band spectrum – and the 3.7-4.2 GHz band in particular – is integral to U.S. leadership on 5G, as it offers both coverage and capacity.

According to a recent survey of more than a dozen countries that the United States competes with on the global stage, our global competitors will each make an average of 300 megahertz of licensed mid-band spectrum available by the end of 2020.⁵ While the FCC plans to auction 70 megahertz of licensed spectrum in the 3.5 GHz band, the service rules are not optimized for 5G: providers are limited to holding licenses for only 40 megahertz each; operations will be subject to low power limits short of the levels necessary for macro broadband deployments; and the band will be made available under a complex and untested sharing arrangement. The FCC’s decision on the 3.7-4.2 GHz band, with its potential to make available hundreds of megahertz of spectrum under 5G-focused rules, has the potential to have a dramatic

⁴ See FCC Chairman Ajit Pai, Remarks at a Workshop on 5G During the 7th Congreso Latino Americano de Telecomunicaciones in Córdoba, Argentina, at 1 (Jul. 4, 2019), <https://www.fcc.gov/document/chairman-pai-remarks-5g-argentina>.

⁵ See David Abecassis, Janette Stewart, Michael Kende & Chris Nickerson, *5G Mid-Band Spectrum Global Update*, ANALYSYS MASON, at 1 (Nov. 2018), <https://api.ctia.org/wp-content/uploads/2018/12/XCTI005-mid-band-5G-spectrum-update-2019-edition.pdf>.

impact on American consumers and businesses, the U.S. economy, our global competitiveness, and whether the U.S. will continue to lead the world in wireless.⁶

The latest *Public Notice* seeks comment on specific filings in the record.⁷ CTIA welcomes the Commission's efforts to repurpose the C-band for 5G and other flexible-use terrestrial services and urges the Commission to move promptly to resolve outstanding issues. In particular, the Commission should:

- Clear hundreds of megahertz of C-band spectrum for 5G;
- Adopt reasonable interference protection rules that will protect earth station operations while allowing for robust 5G deployments; and
- Reject calls to introduce point-to-multipoint ("P2MP") fixed services into the portion of the C-band to be repacked with FSS earth stations.

By taking these steps and those recommended in CTIA's prior filings in the record,⁸ the Commission will help America's efforts to lead in the race to 5G and will help meet consumer

⁶ A recent study by Analysis Group predicts that making 400 megahertz of mid-band spectrum available for 5G over a seven-year period will result in \$150 billion in wireless investments, 1.3 million new jobs on a direct and spillover effect basis, and a contribution of \$274 billion to America's GDP. See David W. Sosa & Greg Rafert, *The Economic Impacts of Reallocating Mid-Band Spectrum to 5G in the United States*, ANALYSIS GROUP (Feb. 2019), <https://api.ctia.org/wp-content/uploads/2019/02/The-Economic-Impacts-of-Reallocating-Mid-Band-Spectrum-to-5G-1.pdf>.

⁷ See Letter from ACA Connects, CCA, and Charter, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 2, 2019) ("ACA Connects Coalition Proposal"); Letter from Henry Hultquist, Vice President, Federal Regulatory, AT&T Services, Inc., to Marlene Dortch, Secretary, FCC, GN Docket No. 18-122 (filed May 23, 2019) ("AT&T May 23 *Ex Parte*"); Letter from Wireless Internet Service Providers Association, Google LLC, and Microsoft Corp. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 15, 2019) ("WISPA July 15 *Ex Parte*"), appending Jeffrey H. Reed et al., *3.7-4.2 GHz FSS and Fixed Wireless Access Co-Channel Coexistence Study*, Reed Engineering (July 2019) ("WISPA Study").

⁸ See, e.g., Comments of CTIA, GN Docket No. 18-122 (Oct. 29, 2018) ("CTIA Comments"); Reply Comments of CTIA, GN Docket No. 18-122 (Dec. 11, 2018) ("CTIA Reply Comments").

demand, promote competition, and ensure a vibrant, innovation-based mobile economy in the 5G world.

II. CTIA, ALONG WITH FCC LEADERS, SUPPORT REPURPOSING HUNDREDS OF MEGAHERTZ OF 3.7-4.2 GHz SPECTRUM.

The *Public Notice* highlights the Commission’s goal of “maximizing the terrestrial use of [3.7-4.2 GHz] spectrum while protecting incumbent earth station users,”⁹ and asks about spectrum clearing goals.¹⁰ CTIA’s *National Spectrum Strategy to Lead in 5G* highlights the global emphasis on mid-band spectrum and underscores the importance of U.S. policymakers acting quickly to “release hundreds of megahertz for the U.S. as soon as possible.”¹¹

FCC leaders are likewise emphasizing the importance of mid-band spectrum and calling for hundreds of megahertz of C-band spectrum to be cleared too. Commissioner O’Rielly, for example, recently testified to Congress that he remains “hopeful that the satellite incumbents recognize the great need for [C-band] frequencies and are willing to part with closer to 300 or more megahertz, assuming the requisite technology can accommodate this amount.”¹²

Elsewhere Commissioner O’Rielly has made clear that “an adequate amount of spectrum – at least 200 or 300 megahertz to start – needs to be made available.”¹³ Commissioner Carr is

⁹ *Public Notice* at 3.

¹⁰ *See id.*

¹¹ CTIA, A NATIONAL SPECTRUM STRATEGY TO LEAD IN 5G, at 7 (Apr. 2019), <https://api.ctia.org/wp-content/uploads/2019/04/A-National-Spectrum-Strategy-to-Lead-in-5G.pdf>.

¹² FCC Commissioner Michael O’Rielly, Statement before the United States Senate Committee on Commerce, Science, & Transportation, Hearing on *Oversight of the Federal Communications Commission*, at 2 (June 12, 2019), <https://docs.fcc.gov/public/attachments/DOC-357955A1.pdf>.

¹³ FCC Commissioner Michael O’Rielly, Remarks before the American Enterprise Institute, at 2 (Apr. 19, 2018), <https://docs.fcc.gov/public/attachments/DOC-350335A1.pdf>.

likewise focused on “clear[ing] more than 200 MHz, at least in big cities where demand for high-capacity, mid-band spectrum is greatest.”¹⁴ In addition, Commissioner Rosenworcel has observed that mid-band airwaves “offer the mix of capacity and coverage we need” for 5G to be deployed nationwide.¹⁵ And Commissioner Starks has noted that “[i]t is going to be essential that we continue to have more and more spectrum” that can be brought to market, including C-band.¹⁶

The reasons for this focus on mid-band spectrum, and the 3.7 GHz band in particular, are well-documented. Mid-band frequencies provide an ideal mix of coverage and capacity that will facilitate the key attributes that make 5G a break-through enabler of innovation – speeds up to 100 times faster than 4G networks and single digit latency, which are fueled by wider channels of contiguous spectrum.¹⁷ The FCC should ensure that licensees have an opportunity to assemble 100 megahertz holdings, as countries like China, South Korea, and Japan have already

¹⁴ FCC Commissioner Brendan Carr, Keynote Remarks at the WISPAMERICA Convention, Cincinnati, Ohio, *Grain Elevators, Water Towers, and Other Ways to Connect Americans*, at 4 (Mar. 20, 2019), <https://docs.fcc.gov/public/attachments/DOC-356655A1.pdf>; see also Mike Dano, *FCC Commissioners Waver Over C-Band Details for 5G*, LIGHT READING (Apr. 26, 2019) (“[W]hat I’m focused on right now are options that are going to get us more than 200 MHz in big cities or in places where population density puts a lot of capacity constraint on networks. So what are our paths to getting more than 200 MHz in those big cities?”), <https://www.lightreading.com/mobile/5g/fcc-commissioners-waver-over-c-band-details-for-5g/d/d-id/751061>.

¹⁵ See *Allocation and Service Rules for the 1675-1680 MHz Band*, Notice of Proposed Rulemaking, WT Docket No. 19-116, Statement of Commissioner Jessica Rosenworcel (rel. May 13, 2019), <https://docs.fcc.gov/public/attachments/FCC-19-43A4.pdf>.

¹⁶ See Monica Allevan, FCC nominee Starks says spectrum, deployment key to 5G leadership, FIERCE WIRELESS (June 21, 2018), <https://www.fiercewireless.com/wireless/fcc-nominee-starks-says-spectrum-deployment-key-to-5g-leadership-0>.

¹⁷ See CTIA Comments at 9.

prioritized providing 100 megahertz of mid-band spectrum each to national operators.¹⁸ To put U.S. operators on an even footing with foreign carriers, the Commission should “set an aggressive benchmark in the hundreds of megahertz so multiple licensees will have an opportunity to deliver on the full promise of 5G in the mid-band range.”¹⁹

The *Public Notice* cites a recent proposal by the ACA Connects Coalition that would transition multichannel video-programming distributor (“MVPD”) earth station users and programmers to fiber delivery to clear 370 megahertz of the 3.7-4.2 GHz spectrum.²⁰ Separate from any comment specific to the ACA Connects Coalition proposal, CTIA’s previous comments in this proceeding have urged consideration of fiber as a reasonable alternative medium that could transition content distribution from satellite delivery.²¹ Any repurposing of the C-Band should recognize that fiber can and does provide programming connectivity, and that not all traffic currently delivered via C-band satellites needs to be delivered via satellite in perpetuity. Accordingly, CTIA supports considering fiber as a solution to help transition existing C-band traffic to facilitate repacking where feasible, in addition to other means of freeing up spectrum, including repacking existing satellite users and modernizing outdated and inefficient equipment.

¹⁸ See *id.* at 9-10 n.29 (citing Comments of Nokia, GN Docket No. 18-122, at 4-5 (filed May 31, 2018)).

¹⁹ *Id.* at 10.

²⁰ See ACA Connects Coalition Proposal at 1-5, 8.

²¹ See CTIA Comments at 17-18; CTIA Reply Comments at 8-10.

III. THE FCC SHOULD ADOPT REASONABLE INTERFERENCE PROTECTION RULES THAT WILL PROTECT EARTH STATION OPERATIONS AND ALLOW FOR ROBUST 5G DEPLOYMENTS.

The *Public Notice* seeks comment on “ways to increase efficient shared use of the C-band,” including through “appropriate interference thresholds and protection criteria” for earth stations.²² CTIA urges the FCC to adopt reasonable interference protection rules that will protect earth station operations while allowing for robust 5G deployments.

In this proceeding, the Commission’s interference protection rules will address how 5G operations in the repurposed portion of the C-band could affect existing earth station operations in the repacked, upper portion of the band, as well as any remaining Telemetry, Tracking and Command (“TT&C”) operations in the repurposed, lower portion of the band. The Commission must carefully evaluate technical proposals in the record to ensure that next-generation services can flourish in the 3.7-4.2 GHz band, while providing suitable protection.

As the Commission considers these issues, it should be informed by the fact that the C-Band Alliance’s (“CBA”) proposal for earth station interference protection is overly conservative and applies multiple worst-case scenarios that would result in overly restrictive technical rules hindering the deployment of 5G.

Regarding protection criteria for registered earth stations, CBA calls for a 150-meter radius of protection around each registered earth station to preserve an area for the addition of potential future earth station antennas,²³ which is overly conservative and would needlessly

²² See *Public Notice* at 5.

²³ See C-Band Alliance, Further Technical Statement, at 2, 4-6, 8 (Mar. 4, 2018) (“CBA Further Tech. Stmt.”), appended to Letter from Jennifer D. Hinden, Counsel for C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Mar. 4, 2019).

expand predicted interference levels to protect areas where no registered earth stations exist – and in the process have an adverse effect on 5G deployments in urban and dense suburban areas. It also proposes to use an antenna diameter up to 13 meters for their receiver protection calculations,²⁴ but this worst-case assumption is unnecessary because the FCC’s ULS database contains readily available real-world antenna data for each registered earth station receiver. CBA similarly proposes full-arc protection at every earth station site (*e.g.*, protection of earth station antennas pointing as low as 5 degrees above the horizon),²⁵ but wireless providers can take into account real-world information – including the range of actual earth station elevation angles at the particular latitude/longitude of the earth station location – to provide accurate, but not unnecessary, protection.²⁶ In addition, CBA recommends a protection level for TT&C operations (-133 dBm/MHz) that is 5 dB more conservative than the level proposed for other operations (-128 dBm/MHz),²⁷ even though in the 3.5 GHz CBRS proceeding, the Commission determined that the same protection level should apply to *both* TT&C and C-band earth station receive operations.²⁸

²⁴ See CBA Further Tech. Stmt. at 2.

²⁵ See CBA Further Tech. Stmt. at 2, 4, 8-9.

²⁶ See AT&T May 23 *Ex Parte* at 13-14.

²⁷ See CBA Further Tech. Stmt. at 4.

²⁸ See *Commercial Operations in the 3550-3650 MHz Band*, Order on Reconsideration and Second Report and Order, 31 FCC Rcd 5011, 5099 ¶ 298 (2016) (finding that “the same protection criteria for in-band FSS earth stations and C-Band TT&C earth stations is in the public interest”).

Further, CBA's proposed out of band emission ("OOBE") limits would hamstring the deployment of 5G in the C-band.²⁹ CBA's proposed limits would require wireless providers to vastly reduce mobile transmit power levels, to the point that the deployment of 5G in the band would be put in jeopardy.³⁰ Indeed, CBA's proposed OOBE limits of -65 dBm/MHz for user equipment and -50 dBm/MHz for base stations³¹ are significantly more stringent than even the general emission limit that applies to unintentional transmissions from a computer or a digital device under Part 15 of the Commission's rules, which is set at -41.3 dBm/MHz.³² 5G equipment in the 3.7-4.2 GHz band cannot be expected to operate with lower emissions levels than a printer. Nor is it necessary for emission limits to be that stringent in order to protect existing earth station operations. The Commission should reject protection criteria driven by overly conservative assumptions and worst-case-scenario design, and instead adopt reasonable interference protections.

Critically, the Commission can couple a reasoned and balanced interference protection approach with a crucial backstop: it can require 5G operators to modify their operations in the event that an earth station experiences harmful interference. Throughout this proceeding, CTIA has made clear that earth stations must be protected and made whole.³³ This approach – reasonable rules with a requirement, in the unlikely event of harmful interference, for prompt 5G

²⁹ See Comments of the C-Band Alliance, GN Docket No. 18-122, Technical Annex at 10-11 (filed Oct. 29, 2018) ("CBA Comments"); Letter from Jennifer D. Hinden, Counsel for C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Att. at 13 (filed May 13, 2019) ("Overview of CBA-Proposed Rules").

³⁰ See, e.g., ACA Connects Coalition Proposal at 7.

³¹ See Overview of CBA-Proposed Rules at 12-13.

³² See 47 C.F.R. § 15.109; see also CTIA Reply Comments at 14-15.

³³ See, e.g., CTIA Comments at 3, 10-11; CTIA Reply Comments at 1-6.

network modification – offers a better result that ensures the most efficient use of spectrum, rather than across-the-board overly restrictive rules.

Finally, the FCC should expressly state that flexible-use licensees and earth station operators may engage in negotiations that may result in more permissive 5G operations than the technical rules would otherwise allow. As the FCC has noted in other spectrum proceedings, “[p]rivate negotiations between expert parties with their business interests at heart are more likely to produce the most efficient interference levels than regulations.”³⁴ The same principle should be applied here.

IV. THE FCC SHOULD REJECT CALLS TO INTRODUCE P2MP FIXED SERVICES ON A CO-PRIMARY BASIS WITH FSS EARTH STATIONS IN THE REPACKED PORTION OF THE C-BAND.

Given the importance of mid-band spectrum to U.S. leadership on 5G, and in light of the complex nature of repurposing 3.7-4.2 GHz spectrum for flexible-use services like 5G, the Commission should refrain from introducing a separate P2MP service into this band.

A. Introducing Fixed P2MP Services in the Repacked Portion of the C-Band Is Unnecessary and Will Undermine the Transition to Flexible Use.

As a threshold matter, multiple spectrum opportunities are becoming available for P2MP and other services in the near-term. First and foremost, P2MP operators can compete for

³⁴ See *Flexibility for Delivery of Communications by MSS Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands*, Memorandum Opinion and Order and Second Order on Reconsideration, 20 FCC Rcd 4616, 4633 ¶ 47 (2005). In the “MSS/ATC” proceeding, the FCC adopted rules to prevent harmful interference to existing Mobile Satellite Service (“MSS”) operations while permitting the introduction of ancillary terrestrial component service, or “ATC,” in the same spectrum. The FCC established baseline interference limits for MSS/ATC operations, while “support[ing] and encourage[ing] private coordination agreements among the interested parties in the band” that would permit interference levels above the baseline. See *id.* at 4629-33 ¶¶ 37-47 (discussing the MSS L-Band).

flexible-use licenses that will be made available in the repurposed portion of the C-band, which allows use of the repurposed spectrum based on consumer demand and market forces rather than subjective judgments. In addition, General Authorized Access use of the 3.5 GHz CBRS band will begin soon, and Chairman Pai indicated that both the 3.5 GHz and 2.5 GHz bands will be auctioned next year.³⁵ Many P2MP advocates are eager to access the 6 GHz spectrum as well.³⁶ The availability of these bands that are suitable for P2MP operations counsels against allocating any portion of the C-band for fixed P2MP, especially given the importance of the band for 5G and the problems that P2MP operations in the band could cause.

Moreover, the WISPA, Microsoft, and Google study (“WISPA Study”) continues to incorrectly assert that introducing a new P2MP service will not harm repurposing of the band for flexible-use services. As CTIA has previously observed, inserting a new fixed broadband service into the C-band would undermine the goal of clearing existing users and maximizing the amount of spectrum to be repurposed.³⁷ The record is filled with earth station operators, satellite operators, and wireless operators expressing serious concerns about the ramifications of proposals to create an allocation for fixed P2MP operations in the C-band.³⁸

³⁵ *Transforming the 2.5 GHz Band*, WT Docket No. 18-120, Statement of Chairman Pai (rel. Jul. 11, 2019), <https://docs.fcc.gov/public/attachments/FCC-19-62A2.pdf>; see also CTIA Comments at 26 (explaining that the U-NII-1 and U-NII-3 bands offer other P2MP opportunities and the Commission is also exploring opening up the 4.9 GHz band to commercial use).

³⁶ See, e.g., Reply Comments of the Dynamic Spectrum Alliance, ET Docket No. 18-295, at 13 (filed Mar. 18, 2019).

³⁷ CTIA Comments at 25-27; CTIA Reply Comments at 10-13.

³⁸ See, e.g., CTIA Reply Comments at 10, n.44; Reply Comments of AT&T, GN Docket No. 18-122 at 6 n.15 (filed July 18, 2019); Reply Comments of the Satellite Industry Association, GN Docket 18-122, at 2-3 (filed July 28, 2019) (“P2MP operations will not protect the tens of thousands of ubiquitously deployed C-band receive earth stations.”).

Introducing new fixed broadband operations into the repacked portion of the C-band could make it more difficult to repack the satellite-delivered content distribution service, as repacking the C-band is enough of a challenge without the introduction of a new service and new pieces that must be fit into the picture.³⁹ And importantly, adding new P2MP fixed operations into the repacked portion of the band creates further encumbrances to any future repurposing of the band.

B. The WISPA Study Is Unreliable and Its Faulty Analysis Cannot Support Claims of Expansive New, Non-Interfering Broadband Coverage.

While satellite interests will no doubt respond to the interference-related claims in the WISPA Study, CTIA flags here that the flawed analysis is used to support claims that introducing a new fixed service in 300 megahertz of C-band spectrum will make broadband available to more than 80 million Americans, “particularly those in underserved communities,”⁴⁰ and 78 percent of U.S. geography.⁴¹ The WISPA Study seeks to show non-interference from a new fixed P2MP service to remaining FSS operations by making use of a 3GPP mobile service propagation model designed for an entirely different purpose and relying on parameters that are

³⁹ To the extent that one or two commenters continue to ask the Commission to authorize shared fixed P2MP operations throughout the C-band, including in the cleared spectrum, the Commission should reject such proposals. *See* Comments of the Dynamic Spectrum Alliance, GN Docket No. 18-122 at 19 (filed Jul. 3, 2019); Comment of the Open Technology Institute at New America, GN Docket 18-122 at 14 (filed July 5, 2019). Proposals to introduce the new fixed operations into the spectrum to be cleared for flexible-use services make no sense, as an untested opportunistic sharing regime will create interference risks and limit the value of this spectrum at a time when the U.S. government should be maximizing the opportunity for 5G.

⁴⁰ *See* WISPA Study at 3.

⁴¹ *Id.*

inconsistent with the 3GPP model's range of inputs. For these reasons, the Commission should not rely upon the study's findings.

As a threshold matter, the WISPA Study misapplies a 3GPP propagation model that is designed to predict mobile coverage in a rural macro-cell area.⁴² Mobile operators use this type of modeling tool to design their networks to build strong links that provide robust service to users – in other words, to ensure that a signal transmitted from a base station is *sufficiently high at a mobile receiver* to provide a level of service highly available at all locations. But the WISPA Study uses the model to try to show that a signal transmitted from a P2MP station will be *sufficiently low at a fixed satellite earth station receiver* such that interference to the satellite operations is likely to be limited to smaller areas.⁴³ It uses this flawed application of the model as the foundation for limited exclusion zones around fixed satellite earth stations, which are the predicate for its claim that P2MP services in the repacked C-band spectrum could serve 78 percent of the country and 80 million people.

Further, the WISPA Study uses only the 3GPP Rural Macro Non-Line of Sight (“NLOS”) model without any Line of Sight (“LOS”) model, and makes assumptions about key technical parameters that are outside of the 3GPP model's range of valid inputs, resulting in optimistic – but faulty – claims of expansive, non-interfering coverage. For example, the 3GPP model relies

⁴² See *id.* at 4, 13 (citing ITU/3GPP Rural Macro Non-LOS model); 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Study on channel model for frequencies from 0.5 to 100 GHz (Release 15), 3GPP TR 38.901 v.15, § 7.2 (June 2018) (explaining that the Rural Macro model “focuses on larger and continuous coverage” and that “[t]he key characteristics of this scenario are continuous wide area coverage supporting high speed vehicles”), http://www.3gpp.org/ftp/Specs/archive/38_series/38.901/38901-f00.zip (“3GPP Model”).

⁴³ See WISPA Study at 7, 42.

on a 1.5 meter mobile user antenna height to determine when NLOS propagation conditions exist.⁴⁴ That height makes sense when using the 3GPP model as intended – for predicting service to mobile user equipment (*i.e.* handsets) – but does not make sense for predicting interference to much taller earth station antennas that can have a height of 5 meters or more. Further, the WISPA Study ignores LOS modeling that is part of the 3GPP model and would likely predict higher levels of interference, which in turn would lead to reduced P2MP coverage and service areas.⁴⁵ The 3GPP model also requires a distance between the base station and the user terminal of no more than 5 kilometers,⁴⁶ but the study ignores this limitation and uses the model out to 19.5 kilometers⁴⁷ – well beyond its intended use. Using the NLOS model at these greater ranges may underestimate P2MP interference into fixed satellite earth stations.

In sum, the 3GPP model is useful for modeling mobile coverage, but here the WISPA Study misapplies the model, relies on invalid input parameters, and fails to consider the LOS portion of the model. Because the proponents’ claims that the proposed new P2MP service can deliver broadband to more than 80 million Americans and 78 percent of the country’s geography are based on the flawed results of the WISPA Study, those claims are also invalid. As the study itself notes, “[p]ropagation models are key to any interference analysis,”⁴⁸ and the flawed modeling here undermines the study’s findings. The Commission should reject the WISPA Study as not grounded in technical reality and deny the P2MP proposal.

⁴⁴ 3GPP Model at Table 7.2-3.

⁴⁵ The WISPA Study argues that a NLOS propagation model is the “[m]ost applicable to this study.” *See* WISPA Study at 13. But evaluation parameters in the 3GPP model include both LOS and NLOS, not just NLOS. *See* 3GPP Model at Table 7.2-3.

⁴⁶ 3GPP Model at Table 7.4.1-1.

⁴⁷ *See* WISPA Study at 16.

⁴⁸ WISPA Study at 14.

V. CONCLUSION

For the foregoing reasons, the Commission should swiftly repurpose hundreds of megahertz of spectrum in the 3.7-4.2 GHz band for new flexible-use licenses and refrain from adopting policies that will further encumber the band and complicate the process of rapidly getting important mid-band 5G spectrum to market.

Respectfully submitted,

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