

**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**

Thomas C. Power  
Senior Vice President and General Counsel

Scott K. Bergmann  
Senior Vice President, Regulatory Affairs

Thomas K. Sawanobori  
Senior Vice President and Chief Technology  
Officer

Jennifer L. Oberhausen  
Director, Regulatory Affairs

Kara Graves  
Director, Regulatory Affairs

**CTIA**  
1400 Sixteenth Street, NW  
Suite 600  
Washington, DC 20036  
(202) 785-0081

October 29, 2018

## TABLE OF CONTENTS

<b>I.</b>	<b>INTRODUCTION AND SUMMARY.</b>	1
<b>II.</b>	<b>THE COMMISSION SHOULD QUICKLY REPURPOSE HUNDREDS OF MEGAHERTZ OF 3.7-4.2 GHZ SPECTRUM.</b>	5
A.	Nations Around the World Are Accelerating 5G Deployment by Streamlining Access to Mid-Band Spectrum.	5
B.	Making Spectrum Available in the 3.7-4.2 GHz Band Is Critical for the United States to Maintain Wireless Leadership as the World Shifts to 5G.	7
C.	The Commission Should Transition Hundreds of Megahertz of Spectrum in the Band to Terrestrial, Licensed, Flexible-Use Service.	9
<b>III.</b>	<b>THE COMMISSION SHOULD PROTECT EXISTING SATELLITE USES IN THE 3.7-4.2 GHZ BAND WHILE LIMITING OTHER OPERATIONS.</b>	10
A.	Changes to the Commission’s Earth Station Rules are Necessary to Facilitate the Repurposing of Spectrum in the 3.7-4.2 GHz Band.	10
1.	Adopting the Proposed Definition of “Protected Incumbent” Strikes the Correct Balance between Protecting Incumbents and Facilitating New Uses.	10
2.	Extending the Freeze on New Earth Stations is Necessary to Create a Stable Spectrum Environment.	11
3.	Deleting Uncertified Earth Stations from IBFS Will Promote Continued Data Integrity.	12
4.	Reexamining the Full-Band, Full-Arc Policy is Appropriate.	13
5.	Collecting Additional Information about Incumbent Earth Station Operations Will Provide Further Clarity about Incumbent Uses.	14
B.	The Commission Should Sunset Existing Point-to-Point Fixed Service Use.	15
C.	The Commission Should Limit New Space Station Operations.	16
<b>IV.</b>	<b>ALTERNATIVE TRANSMISSION MEDIA OR TECHNOLOGIES MAY BE USED TO ENSURE SOME EXISTING 3.7-4.2 GHZ FSS NEEDS CAN BE MET.</b>	16
A.	Fiber Provides an Alternative, Particularly in Urban and Suburban Areas.	17
B.	Other Satellite Spectrum Can Replace Services Traditionally Provided in the 3.7- 4.2 GHz Band.	18

C.	Compression Technology Advancements Enable the Same Amount of Traffic to be Delivered Using Less Spectrum.....	19
<b>V.</b>	<b>THE COMMISSION SHOULD ADOPT SERVICE AND TECHNICAL RULES THAT WILL SPEED BUILDOUT AND DEPLOYMENT OF 5G NETWORKS..</b>	<b>20</b>
A.	The Commission Should License 3.7-4.2 GHz Spectrum on an Exclusive, Geographic Area Basis. ....	20
B.	Terrestrial Use in the Band Should Be Configured in an Unpaired Mode. ....	21
C.	A 15-Year License Term with an Expectation of Renewal Will Best Promote Robust Deployment in the Band. ....	21
D.	Performance Requirements Should be Robust and Flexible.....	22
E.	The Power and OOB Limits Should Offer Suitable Protection Without Stifling Innovative Operations in the Band. ....	23
<b>VI.</b>	<b>REPURPOSING 3.7-4.2 GHZ SPECTRUM FOR FLEXIBLE-USE SERVICES WILL HELP MEET THE REQUIREMENTS OF THE MOBILE NOW ACT.....</b>	<b>24</b>
<b>VII.</b>	<b>NO DEDICATED, P2MP FIXED SERVICE SHOULD BE AUTHORIZED IN ANY PORTION OF THE BAND. ....</b>	<b>25</b>
<b>VIII.</b>	<b>CONCLUSION. ....</b>	<b>27</b>

**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**

CTIA<sup>1</sup> respectfully submits these comments in response to the Order and Notice of Proposed Rulemaking released by the Federal Communications Commission (“Commission”) seeking to identify opportunities for additional terrestrial use of mid-band spectrum between 3.7-4.2 GHz.<sup>2</sup>

**I. INTRODUCTION AND SUMMARY.**

CTIA commends the Commission for initiating a rulemaking to make 3.7-4.2 GHz spectrum available for licensed, flexible wireless use – and in particular, for 5G and other advanced wireless services. As the recent Presidential Memorandum made clear, “it is imperative that America be first in fifth-generation (5G) wireless technologies . . . that can

---

<sup>1</sup> CTIA® ([www.ctia.org](http://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.

<sup>2</sup> *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Report and Order and Notice of Proposed Rulemaking, GN Docket No. 18-122, FCC 18-91 (rel. July 13, 2018) (“*Notice*” or “*Order*”).

unleash innovation broadly across diverse sectors of the economy[.]”<sup>3</sup> Even as America’s wireless providers move forward with 5G deployments, we face a key national challenge in the global race to 5G: our mid-band spectrum deficit. The 3.7-4.2 GHz band is a unique and critical opportunity to make much-needed mid-band spectrum available for 5G.

CTIA has long supported a mix of low-, mid-, and high-band spectrum to fuel investment and innovation in terrestrial mobile wireless services, and to that end supports the Commission’s efforts to make spectrum available to help meet the demand for mobile broadband and to put the United States on the path to 5G. The Commission, for example, made available an additional 70 megahertz of low-band spectrum for licensed, flexible-use service as part of the 600 MHz incentive auction; modified the Citizens Broadband Radio Service (“CBRS”) 3.5 GHz band rules just last week to foster increased investment opportunities in the 70 megahertz of licensed spectrum; and to date, has repurposed more than five gigahertz of high-band, millimeter wave (“mmW”) spectrum, with auctions beginning next month followed by the auction of additional bands in 2019.

The next step in U.S. spectrum policy is to identify a substantial block of mid-band spectrum for licensed, flexible-use wireless service so the United States can remain at the forefront of 5G spectrum policy, consistent with the goals of Chairman Pai’s 5G FAST Plan.<sup>4</sup>

---

<sup>3</sup> See Presidential Memorandum on Developing a Sustainable Spectrum Strategy for America’s Future, Section 1 (issued Oct. 25, 2018), <https://www.whitehouse.gov/presidential-actions/presidential-memorandum-developing-sustainable-spectrum-strategy-americas-future/>.

<sup>4</sup> See, *The FCC’s 5G FAST Plan* (rel. Sept. 28, 2018), <https://docs.fcc.gov/public/attachments/DOC-354326A1.pdf> <https://docs.fcc.gov/public/attachments/DOC-354326A1.pdf> (describing the Commission’s comprehensive strategy to facilitate America’s superiority in 5G technology – including making mid-band spectrum available for 5G).

Increasingly across the globe, mid-band spectrum in the 3 GHz to 5 GHz band range is viewed as a key component to unlocking the economic and societal benefits of 5G connectivity.<sup>5</sup> In the United States, the 3.7-4.2 GHz band offers a sizable swath of spectrum that presents the U.S. with the opportunity to allocate spectrum in this range, which can enable global economies of scale, global 5G roaming, and other scale benefits.

In order to facilitate operations for advanced wireless services in this critical mid-band range, CTIA urges the Commission to:

- Move quickly to make available hundreds of megahertz of terrestrial, licensed flexible-use spectrum in the 3.7-4.2 GHz band – spectrum that is critical to U.S. operators in the race to 5G.
- Protect existing satellite uses in the 3.7-4.2 GHz band (“C-band”) while extending the freeze on new operations.
- Repack the remaining satellite portion of the C-band and explore alternative transmission media or technologies that may be able to meet the needs of some existing C-band uses – including the use of fiber, the Ku- and Ka- bands, and compression technology.
- Adopt service and technical rules that will speed buildout and deployment of 5G networks – including a 15-year, renewable license term, robust performance requirements, and power limits that drive innovation while adequately protecting services from interference.

---

<sup>5</sup> See, e.g., Comments of the Mid-Band Spectrum Coalition, GN Docket No. 17-183, at 10-12 (filed Oct. 2, 2017); Comments of Nokia, GN Docket No. 17-183, at 5 (filed Oct. 2, 2017) (“Nokia NOI Comments”); Letter from John Giusti, Chief Regulatory Officer, GSM Association, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183, at 4 (filed Aug. 8, 2017); Comments of CTIA, GN Docket No. 17-183, at 7 (filed Oct. 2, 2017) (“CTIA NOI Comments”); Comments of Verizon, GN Docket No. 17-183, at 13-14 (filed Oct. 2, 2017) (“Verizon NOI Comments”); Comments of T-Mobile USA, Inc., GN Docket No. 17-183, at 7-10 (filed Oct. 2, 2017) (“T-Mobile NOI Comments”); Comments of the Computing Technology Industry Association (CompTIA), GN Docket No. 17-183, at 2 (filed Oct. 2, 2017); Comments of Ericsson, GN Docket No. 17-183, at 4 (filed Oct. 2, 2017) (“Ericsson NOI Comments”); Reply Comments of the Computer & Communications Industry Association, GN Docket No. 17-183, at 2-3 (filed Nov. 15, 2017).

- Decline to authorize a point-to-multipoint (“P2MP”) fixed service (“FS”) in the 3.7-4.2 GHz band.

Through these actions, the Commission can “enabl[e] innovations and investment to keep pace with technological advances” and maintain America’s leadership in deployment of next-generation services.<sup>6</sup>

Our nation’s wireless industry is expected to invest \$275 billion to deploy next-generation 5G networks – creating three million new jobs and adding \$500 billion to the U.S. economy. U.S. wireless providers are already moving ahead with 5G deployments: Verizon turned on the first 5G commercial service in four cities in October;<sup>7</sup> AT&T remains on track to introduce mobile 5G services in 12 cities this year;<sup>8</sup> and T-Mobile, using its 600 MHz spectrum, has lit up Extended Range LTE in 36 states – paving the way for its nationwide 5G network by 2020.<sup>9</sup> CTIA applauds the Commission, Congress, and the Administration for supporting policies that have allowed U.S. wireless operators to step up to meet the 5G challenge, but there is still more work to do. Mid-band spectrum is critical in the race to 5G, and the nation must double-down to open 3.7-4.2 GHz spectrum for terrestrial, flexible-use services. CTIA looks

---

<sup>6</sup> *Expanding Flexible Use in Mid-Band Spectrum between 3.7 and 24 GHz*, Notice of Inquiry, 32 FCC Rcd 6373 ¶ 1 (2017) (“*Mid-Band NOI*”).

<sup>7</sup> Press Release, Verizon turns on world’s first 5G network, Verizon (Oct. 1, 2018), <https://www.verizon.com/about/news/verizon-turns-worlds-first-5g-network>.

<sup>8</sup> Press Release, AT&T Completes the World’s First Millimeter Wave Mobile 5G Browsing Session with a Standards-Based Commercial Mobile 5G Device, AT&T (Oct. 26, 2018), [https://about.att.com/newsroom/2018/first\\_5G\\_connection.html](https://about.att.com/newsroom/2018/first_5G_connection.html).

<sup>9</sup> Press Release, T-Mobile 600 MHz Extended Range LTE Now Live in More Than 1,250 Cities & Towns, Laying the Foundation for 5G (Sept. 10, 2018), <https://www.t-mobile.com/news/600-mhz-update-puerto-rico>.

forward to working with the Commission on executing on its 5G agenda and delivering 5G to American consumers and businesses.<sup>10</sup>

## **II. THE COMMISSION SHOULD QUICKLY REPURPOSE HUNDREDS OF MEGAHERTZ OF 3.7-4.2 GHz SPECTRUM.**

### **A. Nations Around the World Are Accelerating 5G Deployment by Streamlining Access to Mid-Band Spectrum.**

Across the globe, there is significant interest in spectrum in the 3 GHz to 5 GHz band range as a promising home for new wireless services that can help unlock the benefits of 5G connectivity. Here in the United States, despite significant commercial investment in 5G technologies and services, we rank only sixth with respect to mid-band spectrum availability, even accounting for forthcoming access to the 3.5 GHz band.<sup>11</sup> To win the race to 5G, the United States must have a robust mid-band spectrum play.

Other nations vowing to lead on 5G are plowing ahead. China is expected to release 300 megahertz of spectrum in the 3.5 GHz range, enough to provide 100 megahertz to each of its national operators, which are already deploying early 5G equipment for testing in multiple cities.<sup>12</sup> And 2018 has been an active year for 5G auctions – in April, the United Kingdom

---

<sup>10</sup> Race to 5G Report, CTIA, at 2 (Apr. 2018), <https://api.ctia.org/wp-content/uploads/2018/04/Race-to-5G-Report.pdf>.

<sup>11</sup> David Abecassis, Chris Nickerson, and Janette Stewart, Global Race to 5G – Spectrum and Infrastructure Plans and Priorities, ANALYSYS MASON, at 35 (Apr. 2018), [https://api.ctia.org/wpcontent/uploads/2018/04/Analysys-Mason-Global-Race-To-5G\\_2018.pdf](https://api.ctia.org/wpcontent/uploads/2018/04/Analysys-Mason-Global-Race-To-5G_2018.pdf) (“Analysys Mason Report”) (comparing the 5G-readiness of 10 countries and finding the United States to be behind, particularly with regard to making mid-band spectrum available to operators for 5G).

<sup>12</sup> Analysis Mason Report at 17.



auctioned 150 megahertz of spectrum in the 3.4 GHz band for 5G;<sup>13</sup> Ireland auctioned 350 megahertz of spectrum in its 3.6 GHz auction in May;<sup>14</sup> South Korea auctioned 280 megahertz of 3.5 GHz spectrum in June;<sup>15</sup> and Spain and Italy auctioned 200 megahertz between 3.6 -3.8 GHz range for 5G in July and October, respectively.<sup>16</sup> Meanwhile, Australia is set to auction spectrum in the 3.6 GHz band next month;<sup>17</sup> Japan committed to release up to 500 megahertz of spectrum in the 3.6-4.2 GHz and 4.4-4.9 GHz ranges by March 2019;<sup>18</sup> and Belgium committed to auction spectrum in the 3.6 GHz range in spring 2019.<sup>19</sup> And other nations such as Lithuania

---

<sup>13</sup> Press Release, Results of principal stage of auction for mobile airwaves, Ofcom (Apr. 5, 2018), <https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2018/results-auction-mobile-airwaves>.

<sup>14</sup> Results of the 3.6 GHz Band Spectrum Award, Commission for Communications Regulation, ComReg 17/38 (May 22, 2017), [https://www.comreg.ie/media/dlm\\_uploads/2017/05/ComReg-1738.pdf](https://www.comreg.ie/media/dlm_uploads/2017/05/ComReg-1738.pdf).

<sup>15</sup> Monica Allevan, South Korea wraps 5G auction for 3.5, 28 GHz, FIERCE WIRELESS (June 20, 2018), <https://www.fiercewireless.com/wireless/south-korea-wraps-5g-auction-for-3-5-28-ghz>.

<sup>16</sup> Juan Pedro Tomás, Spanish 5G spectrum auction raises \$469 million after four rounds, RCR WIRELESS (July 25, 2018), <https://www.rcrwireless.com/20180725/5g/spectrum-auction-spain-tag23>; Press Release, TIM Secures 3700 MHz Band Frequencies With An Investment Of 1,694 Million Euros To Lead Development Of The Networks Of The Future In Italy, Telecom Italia Group (Oct. 2, 2018), <https://www.telecomitalia.com/tit/en/archivio/media/comunicati-stampa/telecom-italia/corporate/istituzionale/2018/PR-TIM-5G-Auction-21018.html>.

<sup>17</sup> Press Release, Australia's 5G spectrum auction on its way, ACMA (Aug. 6, 2018), <https://www.acma.gov.au/theACMA/australias-5g-spectrum-auction-on-its-way>.

<sup>18</sup> 5GMF White Paper, 5G Mobile Communications System for 2020 and beyond, ver.1.1, at 9.2.3 (Sept. 29, 2017) (describing a Ministry of Internal Affairs and Communications – Japan – report announcing a plans to allocate the 3.6-4.2 GHz and 4.4-4.9 GHz bands to 5G systems by the end of FY 2018), <https://5gmf.jp/en/whitepaper/5gmf-white-paper-1-1/>.

<sup>19</sup> Belgium hopes 5G auction will tempt new entrant, MOBILE EUROPE (June 14, 2018), <https://www.mobileeurope.co.uk/press-wire/belgium-hopes-5g-auction-will-tempt-new-entrant>.

and France have recently taken steps to prepare for auctions that will foster 5G in the 3 GHz range.<sup>20</sup>

As other countries focus on the 3 GHz band for 5G deployments, the band is quickly becoming globally harmonized across a tuning range.<sup>21</sup> Global harmonization drives robust equipment markets, enables global roaming, and reduces costs for consumers. A harmonized approach to spectrum in the 3 GHz band will fuel 5G and ultimately benefit U.S. consumers of mobile broadband goods and services. The standards for 5G terminals and base stations covering spectrum in the 3 GHz range are being finalized now.<sup>22</sup> And the world is marching toward deployment this year. The United States should be a key player in this rollout.

**B. Making Spectrum Available in the 3.7-4.2 GHz Band Is Critical for the United States to Maintain Wireless Leadership as the World Shifts to 5G.**

The 3.7-4.2 GHz band presents an important opportunity to make additional mid-band spectrum available for a licensed, flexible-use wireless service to help meet the growing demand for mobile broadband. From a technical standpoint, the 3.7-4.2 GHz band offers promising attributes for wireless broadband in a 5G world. The band offers up to 500 megahertz of

---

<sup>20</sup> Lithuania consults on 3.4GHz-3.8GHz band for 5G use, TELEGEOGRAPHY (Oct. 5, 2018), <https://www.telegeography.com/products/commsupdate/articles/2018/10/05/lithuania-consults-on-3-4ghz-3-8ghz-band-for-5g-use/>; Angelina Rascoet, France's Regulator Starts Public Consultation on 5G Auction, BLOOMBERG MEDIA (Oct. 26, 2018), <https://biglawbusiness.com/frances-regulator-starts-public-consultation-on-5g-auction/>.

<sup>21</sup> Comments of CTIA, IB Docket No. 16-185, at 7 (filed Oct. 17, 2018) ("Adoption of 'radio tuning ranges' provides the benefits of international harmonization, even when different countries use different segments of a frequency range for [International Mobile Telecommunications].").

<sup>22</sup> See 3GPP, The Mobile Broadband Standard, Release 16 (July 16, 2018), <http://www.3gpp.org/release-16> (indicating that Release 16, which is "5G phase 2," should be complete in December 2019, which will bring with it an initial full 3GPP 5G system for submission to IMT-2020).

contiguous spectrum, sufficient to provide wider channels for faster speeds and lower latency that make 5G a break-through enabler of innovation. The band also has advantageous propagation characteristics to enable broader coverage than other, higher frequency bands that offer wider channelization.<sup>23</sup>

While the CBRS 3.5 GHz band will be the first mid-band spectrum to market for 5G use – and CTIA applauds the Commission for creating a better-balanced framework to incentivize investment in licenses in that band<sup>24</sup> – the CBRS rules nonetheless retain challenges for large-scale deployments; the Commission must ensure that those challenges do not restrain the 3.7-4.2 GHz band. In particular, as the Commission is well aware, the CBRS rules contain significantly lower transmit power levels than other bands (to reduce coexistence challenges) and just 70 megahertz overall for licenses.<sup>25</sup> By opening up 3.7-4.2 GHz spectrum for licensed, flexible-use service, subject to traditional licensing and technical rules and wider channels, the Commission can significantly expand the mid-band opportunity for new 5G use cases.

For all these reasons, the Commission should act quickly to make additional mid-band spectrum available for wireless use.

---

<sup>23</sup> See Notice ¶¶ 4-5 (discussing the characteristics that make the 3.7-4.2 GHz band ideally suited for next-generation wireless services).

<sup>24</sup> *Promoting Investment in the 3550-3700 MHz Band*, Report and Order, GN Docket No. 17-258, FCC 18-148 (rel. Oct. 24, 2018) (“2018 3.5 GHz Order”).

<sup>25</sup> See generally *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959 (2015).

**C. The Commission Should Transition Hundreds of Megahertz of Spectrum in the Band to Terrestrial, Licensed, Flexible-Use Service.**

For an effective mid-band 5G initiative, a substantial amount of 3.7-4.2 GHz spectrum, in the range of hundreds of megahertz, needs to be transitioned nationwide. CTIA appreciates the C-Band Alliance's recognition that spectrum in the 3.7-4.2 GHz band can be repurposed for flexible terrestrial use. And the C-Band Alliance's recent announcement that it intends to clear 200 megahertz, resulting in 180 megahertz of flexible-use spectrum, is an improvement over the earlier 100-megahertz proposal.<sup>26</sup> But, the Commission should go further and require more than that – hundreds of megahertz – be repurposed on a nationwide basis.

As the Commission is well aware, wide channelization will enable key 5G attributes – speeds up to 100 times faster than 4G networks and single digit latency.<sup>27</sup> Specifically, the Commission observed in the *Fourth Spectrum Frontiers Further Notice* regarding millimeter wave frequencies that “100 megahertz is the baseline to provide 5G services.”<sup>28</sup> The benefits of wide channelization apply in the mid-band too, and the Commission should ensure that licensees can assemble 100 megahertz holdings.<sup>29</sup> To put U.S. operators on an even footing with foreign

---

<sup>26</sup> Press Release, C-Band Alliance Increases to 200 MHz Its FCC Proposal for Spectrum Repurposing in the U.S. to Support Nationwide 5G Deployment, C-Band Alliance (Oct. 22, 2018), [https://c-bandalliance.com/wp-content/uploads/2018/10/C\\_Band\\_Alliance\\_Press\\_Release\\_22\\_October\\_2018\\_final.pdf](https://c-bandalliance.com/wp-content/uploads/2018/10/C_Band_Alliance_Press_Release_22_October_2018_final.pdf).

<sup>27</sup> Same Kim & Sohee Kim, 100 times faster than 4G: Wicked fast 5G debuts at 2018 Winter Olympics, BLOOMBERG (Feb. 13, 2018), [https://www.business-standard.com/article/international/100-times-faster-than-4g-wicked-fast-5g-debuts-at-2018-winter-olympics-118021300286\\_1.html](https://www.business-standard.com/article/international/100-times-faster-than-4g-wicked-fast-5g-debuts-at-2018-winter-olympics-118021300286_1.html).

<sup>28</sup> See *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Fourth Further Notice of Proposed Rulemaking, FCC 18-110, ¶ 10 (rel. Aug. 3, 2018).

<sup>29</sup> See, e.g., Comments of Ericsson, GN Docket Nos. 18-122 & 17-183, at 3 (filed May 31, 2018) (“Ericsson Feasibility Comments”) (“[S]omething on the order of 100 MHz will be needed on a per-operator basis to fulfill mobile 5G broadband use cases.”); Comments of Nokia, GN Docket

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.

### **III. THE COMMISSION SHOULD PROTECT EXISTING SATELLITE USES IN THE 3.7-4.2 GHz BAND WHILE LIMITING OTHER OPERATIONS.**

CTIA supports the Commission's goals of "making spectrum available for new wireless uses while balancing desired speed to the market, efficiency of use, and effectively accommodating incumbent Fixed Satellite Service (FSS) and Fixed Service (FS) operations in the band."<sup>30</sup> To advance these goals, the Commission should, as discussed below, balance the needs of existing earth station users while "limiting uses that would hamper new intensive terrestrial use."<sup>31</sup>

#### **A. Changes to the Commission's Earth Station Rules are Necessary to Facilitate the Repurposing of Spectrum in the 3.7-4.2 GHz Band.**

##### **1. Adopting the Proposed Definition of "Protected Incumbent" Strikes the Correct Balance between Protecting Incumbents and Facilitating New Uses.**

Any repurposing of 3.7-4.2 GHz spectrum must consider and account for incumbent earth station uses. As the *Notice* explains, 3.7-4.2 GHz earth station traffic includes programming content to television and radio broadcasters (including transportable antennas used to cover live news and sports events, cable television, and small master antenna systems), as well as backhaul of telephone and data traffic.<sup>32</sup> But, to promote investment in mid-band 5G services, it is critical

---

No. 18-122, at 4-5 (filed May 31, 2018) (noting that China, South Korea, and Japan have prioritized providing 100 megahertz of spectrum per operator in the mid-band spectrum range).

<sup>30</sup> *See Notice* ¶ 2.

<sup>31</sup> *Id.* ¶ 26.

<sup>32</sup> *Id.* ¶ 10.

that stakeholders have a stable regulatory environment, including an understanding of which entities are eligible for protection as incumbents.

In order to protect incumbent earth stations from harmful interference while increasing the intensity of terrestrial use in the 3.7-4.2 GHz band, CTIA supports the Commission's proposal to define incumbent earth stations as those that: (1) were operational as of April 19, 2018; (2) are licensed or registered (or have a pending application for license or registration) as of October 31, 2018; and (3) have timely certified the accuracy of information on file with the Commission to the extent required by the *Order*.<sup>33</sup> Any earth station that is not licensed or registered (or does not have a pending application on file) in the International Bureau Filing System ("IBFS") – or for which the licensee/registrant does not timely file the certification required in the *Order* – should be excluded from the definition of incumbent earth stations that will be protected under the parameters that may be developed in this proceeding.

## **2. Extending the Freeze on New Earth Stations is Necessary to Create a Stable Spectrum Environment.**

CTIA supports an extension of the ban on "new" 3.7-4.2 GHz band earth stations. The Commission has already imposed a freeze, effective April 19, 2018, on the filing of new or modified applications for earth station licenses in the 3.7-4.2 GHz band, while also creating a window to permit entities to register or license earth stations operating in the band.<sup>34</sup> That window, viewed properly as a limited exception to the freeze, has resulted in the filing

---

<sup>33</sup> *Id.* ¶ 27.

<sup>34</sup> See *Temporary Freeze on Applications for New or Modified Fixed Satellite Service Earth Stations and Fixed Microwave Stations in the 3.7-4.2 GHz Band; 90-Day Window to File Applications for Earth Stations Currently Operating in 3.7-4.2 GHz Band*, Public Notice, DA 18-398 at 1 (IB/PSHSB/WTB rel. Apr. 19, 2018) ("*Freeze and 90-Day PN*").

applications covering nearly 20,000 3.7-4.2 GHz earth station antennas. But the Commission should now provide for a “stable spectral environment for more intensive terrestrial use.”<sup>35</sup> To that end, the Commission should extend the freeze as follows: (i) earth station operators that register or license their existing stations by October 31, 2018 would be able to modify those stations at the registered location but not add new stations in new locations; and (ii) applications for new earth station registrations would not be allowed while the freeze is in effect.<sup>36</sup>

### **3. Deleting Uncertified Earth Stations from IBFS Will Promote Continued Data Integrity.**

CTIA supports the Commission’s proposal to remove from the IBFS database 3.7-4.2 GHz band earth station licenses or registrations for which the licensee or registrant does not file the certifications required in the *Order*.<sup>37</sup> Doing so will help to address concerns highlighted in the *NOI* record about the extent of use of the 3.7-4.2 GHz band.<sup>38</sup> For example, some commenters reported that there are vast numbers of earth stations that are registered in IBFS but may not actually be in use.<sup>39</sup> To address this concern, the *Order* requires operators of earth

---

<sup>35</sup> Notice ¶ 30.

<sup>36</sup> *Id.*; *International Bureau Announces Two-Week Extension of Filing Window for Earth Stations Currently Operating in 3.7-4.2 GHz Band*, Public Notice, DA 18-1061 (rel. Oct. 17, 2018).

<sup>37</sup> *Id.* ¶ 34.

<sup>38</sup> *See, e.g.*, Comments of the Broadband Access Coalition, GN Docket No. 17-183, at 6-7 (filed Oct. 2, 2017) (“BAC NOI Comments”); CTIA NOI Comments at 8; Comments of Microsoft Corporation, GN Docket No. 17-183, at 3 (filed Oct. 2, 2017); Verizon NOI Comments at 11; Reply Comments of the National Spectrum Management Association, GN Docket No. 17-183, at 6 (filed Nov. 15, 2017).

<sup>39</sup> *See, e.g.*, Comments of Google LLC and Alphabet Access, GN Docket No. 17-183, at 5-6 (filed Oct. 2, 2017); Reply Comments of Nokia, GN Docket No. 17-183, at 5 (filed Nov. 15, 2017); Reply Comments of the Open Technology Institute at New America and Public Knowledge, GN Docket No. 17-183 at 5 (filed Nov. 15, 2017); Reply Comments of Verizon, GN Docket No. 17-183, at 5 (filed Nov. 15, 2017).

stations to file certifications regarding the accuracy of all information in IBFS concerning their 3.7-4.2 GHz earth station operations.<sup>40</sup>

To ensure the benefits of these steps are fully realized – and the Commission has the best information possible on existing earth stations as it evaluates future terrestrial use in this band – CTIA agrees the Commission should update IBFS to automatically terminate 3.7-4.2 GHz band earth station licenses or registrations unless the registrant timely files the certification required by the *Order*.<sup>41</sup>

#### **4. Reexamining the Full-Band, Full-Arc Policy is Appropriate.**

CTIA supports reexamining the full-band, full-arc coordination policy to free-up unused spectrum for flexible terrestrial use while accommodating protected incumbents.<sup>42</sup> As CTIA has previously explained, FSS rules designed to protect against interference are overprotective, contributing to inefficient use of the band.<sup>43</sup> This is due largely to the fact that the Commission’s existing full-band, full-arc coordination policy adopted in the 1960s permits FSS earth stations to coordinate across the entire frequency band, and over the entire geostationary arc, regardless of how little spectrum the earth stations plans to use and how few satellites they plan to access.<sup>44</sup> Indeed, a typical earth station actually uses only a small part of the band. As a result, the *NOI*

---

<sup>40</sup> *Order* ¶ 19.

<sup>41</sup> *Notice* ¶ 34.

<sup>42</sup> *Id.* ¶ 39.

<sup>43</sup> See CTIA NOI Comments at 8.

<sup>44</sup> See Reply Comments of CTIA, GN Docket No. 17-183, at 10 (filed Nov. 15, 2017) (“CTIA NOI Reply Comments”).



record shows that large amounts of spectrum “go needlessly unused,” contrary to core principles of spectrum management.<sup>45</sup>

The record that developed out of the comments to the *NOI* suggests that the Commission is correct to reexamine the full-band, full-arc coordination policy given its goal to “to maximize spectrum efficiency and use in the 3.7-4.2 GHz band including more intensive terrestrial use of the band.”<sup>46</sup> As the Commission reviews information filed regarding incumbent earth station operations, it should consider whether users’ operations require the flexibility to move among any transponder on any satellite across the full arc, or whether all or certain users’ licenses or registrations should be limited to only those frequencies, azimuths, and elevation angles reported as in regular use. This could, for example, take into account those earth stations that make use of the flexibility provided by the full-band, full-arc policy that may contract for redundant backup capacity.

## **5. Collecting Additional Information about Incumbent Earth Station Operations Will Provide Further Clarity about Incumbent Uses.**

CTIA supports the proposal to require earth station operators to provide additional information for each antenna under each call sign, including geographic location, antenna gain, azimuth and elevation gain pattern, antenna azimuth relative to true north, antenna elevation angle, satellite at which the earth station is pointed, transponder number, etc.<sup>47</sup> The Commission

---

<sup>45</sup> See, e.g. Petition of Fixed Wireless Communications Coalition, Inc. for Rulemaking, RM-11778, at 1-2 (filed Oct. 11, 2016).

<sup>46</sup> Notice ¶ 39; see also BAC NOI Comments at 8; CTIA NOI Comments at 13-14; Ericsson Comments at 7-8; Comments of the Fixed Wireless Communications Coalition, GN Docket No. 17-183, at 5-6 (filed Oct. 2, 2017); Comments of the Utilities Technology Council and the Edison Electric Institute Comments, GN Docket No. 17-183, at 5, 12-14 (filed Oct. 2, 2017).

<sup>47</sup> Notice ¶ 41.

also should collect information from temporary fixed or transportable earth stations.<sup>48</sup> As the Commission recognizes, this expanded data set will develop a more complete record of existing FSS operations, help facilitate consideration of some transition options, and provide additional clarity on the availability of spectrum in the band. It may also be relevant to assessing possible interference avoidance coordination or relocation of facilities.

**B. The Commission Should Sunset Existing Point-to-Point Fixed Service Use.**

CTIA supports the Commission’s proposal to sunset point-to-point FS use of the 3.7-4.2 GHz band.<sup>49</sup> FS use of the band “has declined steeply over the past 20 years,” as common carrier and private operational fixed licensees have migrated to fiber or bands that have more channelization options and avoid the need to coordinate with FSS earth stations.<sup>50</sup> Indeed, current FS use in the band is minimal: just 115 licenses.<sup>51</sup> As NTIA explained years ago, “existing fixed terrestrial links are leaving this band at a rapid rate, and the lack of any new narrowband channelization suggests that this band is likely to be relatively lightly used by terrestrial fixed systems in the future.”<sup>52</sup>

These declining FS uses indicate that this important mid-band spectrum resource can and should be repurposed to higher and better uses. In addition, as the *Notice* correctly observes, other spectrum options exist to support point-to-point links. Accordingly, existing fixed links

---

<sup>48</sup> *Id.* ¶ 43.

<sup>49</sup> *Id.* ¶ 47.

<sup>50</sup> *Id.* ¶ 9.

<sup>51</sup> *Id.* ¶ 47.

<sup>52</sup> Robert J. Matheson, U.S. Department of Commerce, NTIA Report 00-378, Spectrum Usage for the Fixed Services, at 8 (Mar. 2000), <https://www.its.bldrdoc.gov/publications/download/TR-00-378.pdf>.

should transition out of the band over a three-year period, after which time the Commission could permit existing point-to-point FS licensees to continue to operate in the repacked band, but on a non-interference basis to any flexible-use services.

**C. The Commission Should Limit New Space Station Operations.**

CTIA supports the Commission's proposal to bar applications for new space station licenses and new petitions for market access concerning space-to-Earth operations in the 3.7-4.2 GHz band.<sup>53</sup> The proposed rule would merely make the existing freeze permanent, while allowing existing authorization holders to file applications to modify existing authorizations, relocate existing space stations, or replace existing space stations. CTIA supports the proposal that such a freeze should not bar operators with existing space station authorizations in the band as of June 21, 2018, from filing applications for additional space stations, "if authorization of such space stations would promote more efficient use of the band."<sup>54</sup> The Commission should encourage space station licensees to file new applications to effectuate the transition to a new band plan as soon as the new band plan is adopted in this proceeding.

**IV. ALTERNATIVE TRANSMISSION MEDIA OR TECHNOLOGIES MAY BE USED TO ENSURE SOME EXISTING 3.7-4.2 GHZ FSS NEEDS CAN BE MET.**

As important as C-band FSS services are, not all traffic needs to be delivered over the same spectrum and in the same way that it has historically been delivered.<sup>55</sup> Rather, alternative

---

<sup>53</sup> Notice ¶ 46. The Commission has already frozen, as of June 21, 2018, the filing of new space station license applications and new requests for U.S. market access through non-U.S.-licensed space stations in the 3.7-4.2 GHz band. *See International Bureau Announces Temporary Filing Freeze on New Fixed-Satellite Service Space Stations in the 3.7-4.2 GHz Band*, Public Notice, DA 18-640 (IB rel. June 21, 2018).

<sup>54</sup> Notice ¶ 46.

<sup>55</sup> *See, e.g.*, CTIA NOI Reply Comments at 6.

transmission media and new technologies can ensure some existing uses are met while repurposing spectrum in the 3.7-4.2 GHz band.<sup>56</sup>

As an initial matter, retuning and repacking of traffic into transponders and contiguous channels would permit more efficient use of 3.7-4.2 GHz spectrum. Close evaluation of any guard band requirements to maximize available spectrum for reallocation is also appropriate. At the same time, the Commission should consider the extent to which the following options can serve as adequate substitutes for particular C-band uses, including video content delivery.

**A. Fiber Provides an Alternative, Particularly in Urban and Suburban Areas.**

Fiber can substantially replace some services provided by FSS without significant disruption to customers.<sup>57</sup> Delivering data traffic through fiber cables has advantages in terms of lower latency, greater capacity, enhanced security, and lower cost. Compared to satellites in particular, fiber offers security from radiofrequency interference; much greater capacity; significantly lower latency; and improved economics compared to the cost of deploying and maintaining satellites.<sup>58</sup> Further, fiber is heavily deployed throughout the United States, and is becoming more and more available in rural areas.<sup>59</sup>

---

<sup>56</sup> See, e.g., Reply Comments of Competitive Carriers Association, GN Docket No. 17-183, at 3-4 (filed Nov. 15, 2017) (noting that alternative delivery methods could provide superior capacity for content and higher levels of throughput).

<sup>57</sup> See, e.g., Letter from Steve B. Sharkey, Vice President, Government Affairs Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 17-183 & 18-122, at 1-2 (filed June 29, 2018).

<sup>58</sup> See, e.g., Ericsson NOI Comments at 7; Nokia NOI Comments at 12.

<sup>59</sup> See Notice ¶ 64 (“FSS substitutes, particularly fiber, are most prevalent in urban areas while in rural areas there are fewer FSS substitutes.”).

According to one study, there are dense deployments of long-haul fiber in the northeast and coastal areas, with interconnection through long-haul hubs located at interior population centers in the United States.<sup>60</sup> The Commission should explore further how fiber can be used as an alternative to C-band spectrum as a means of repurposing existing satellite users.

**B. Other Satellite Spectrum Can Replace Services Traditionally Provided in the 3.7-4.2 GHz Band.**

Other satellite bands also can replace C-band offerings without significant disruption to customers. These bands include the Ku-band and the Ka-band.<sup>61</sup> As CTIA has explained, Ku- and Ka-band high-throughput satellites (“HTS”) use multiple spot beams to enable more frequency reuse and greater overall capacity. These spot beams can take advantage of high antenna gain, and in turn higher transmitted signal levels, to close links to earth stations at high data rates with sufficient rain-fade margin to provide good overall link availability. In addition, technologies like Adaptive Coding and Modulation (“ACM”) are helping satellites in the Ku- and Ka-bands overcome rain fades. Indeed, a UMTS Forum study found that new technologies like ACM are advancing the migration from the C-band to the Ku- and Ka-bands.<sup>62</sup> The

---

<sup>60</sup> Ramakrishnan Durairajan, et al., *Intertubes: A Study of the Us Long-Haul Fiber-Optic Infrastructure* § 2.5 (2015), [http://pages.cs.wisc.edu/~pb/tubes\\_final.pdf](http://pages.cs.wisc.edu/~pb/tubes_final.pdf); T-Mobile NOI Comments at 14.

<sup>61</sup> Ericsson, Ericsson Microwave Outlook: Trends And Needs In The Microwave Industry, 6 (Oct. 2016), <https://www.ericsson.com/assets/local/microwave-outlook/documents/ericsson-microwave-outlook-report-2016.pdf> (noting a long-term global trend of microwave spectrum usage moving to underutilized higher frequency bands in order to access wider channels).

<sup>62</sup> Electronics Communications Committee UMTS Forum, Study On Spectrum Uses, Trends And Demands In The Range 3400-4200 MHz (C-Band), 2 (Apr. 22, 2014), [https://cept.org/Documents/ecc-pt1/17536/ecc-pt1-14-050\\_study-on-spectrum-uses-trends-and-demands-in-the-range-3400-4200-mhz-c-band](https://cept.org/Documents/ecc-pt1/17536/ecc-pt1-14-050_study-on-spectrum-uses-trends-and-demands-in-the-range-3400-4200-mhz-c-band).

Commission should consider how the Ka- and Ku- bands could be used to facilitate more intensive terrestrial use of the 3.7-4.2 GHz band.

**C. Compression Technology Advancements Enable the Same Amount of Traffic to be Delivered Using Less Spectrum.**

Compression technology is another means to help enable repurposing of the C-band. As compression technology improves, it allows the same piece of information (*e.g.*, a video stream) to be carried using less capacity – and thus, less spectrum. As CTIA has previously explained, application of compression technologies could allow satellites to deliver the same amount of traffic using a smaller number of transponders, thus freeing up spectrum to be repurposed for wireless broadband.<sup>63</sup> For example, if content carried on two separate 36-megahertz transponders is compressed into a single transponder, then 36 megahertz would become available for flexible-use licensing.

As a ballpark figure, every new generation of encoding standards brings about two times better compression rate with the same image quality. For example, a transition from MPEG-2 to MPEG-4 AVC (H.264) produces video with about 50 percent of the bitrate, and a transition from MPEG-4 AVC (H.264) to HEVC (H.265) provides the same gain.<sup>64</sup> According to a 2017 study by Northern Sky Research, approximately 40 percent of C-band video distributors still use MPEG-2 for video compression – even though the technology available today is two generations

---

<sup>63</sup> CTIA NOI Comments at 12.

<sup>64</sup> See T. Wiegand, et al., Overview of the H.264/AVC video coding standard, IEEE Transactions on Circuits and Systems for Video Technology, vol. 13, no. 7, pp. 560–576 (July 2003); T. K. Tan, et al., Video Quality Evaluation Methodology and Verification Testing of HEVC Compression Performance, IEEE Transactions on Circuits and Systems for Video Technology, vol. 26, no. 1, pp. 76–90 (Jan. 2016).

beyond MPEG-2.<sup>65</sup> Transitioning from MPEG-2 to HEVC could increase transponder efficiency and ultimately result in the need for fewer transponders and less bandwidth to carry video channels,<sup>66</sup> and the Commission should explore compression technology as a solution to help repurpose 3.7-4.2 GHz spectrum.

**V. THE COMMISSION SHOULD ADOPT SERVICE AND TECHNICAL RULES THAT WILL SPEED BUILDOUT AND DEPLOYMENT OF 5G NETWORKS.**

**A. The Commission Should License 3.7-4.2 GHz Spectrum on an Exclusive, Geographic Area Basis.**

CTIA supports the Commission’s proposal to license the 3.7-4.2 GHz spectrum made available for flexible use on an exclusive, geographic area basis.<sup>67</sup> Flexible, exclusive-use licensing policies have long been the cornerstone of the Commission’s successful wireless strategy. It is on exclusively licensed spectrum that the U.S. wireless industry has deployed wireless services to 99.7 percent of the population and migrated through four generations of technology, becoming the global leader in the provision of 4G service. While wireless providers increasingly use unlicensed spectrum, exclusively licensed spectrum remains critically important, as exclusively licensed spectrum generates hundreds of billions of economic activity annually. The Commission itself has noted that exclusive-use licensing “strike[s] the right balance between the benefits of competition, on the one hand, and the efficiencies of scale and

---

<sup>65</sup> Alan Crisp, The Bottom Line, NORTHERN SKY RESEARCH (Apr. 25, 2017), <https://www.nsr.com/video-compression-killing-the-golden-goose/>.

<sup>66</sup> Daniel Minoli, Satellite Systems Engineering in an IPv6 Environment, Auerbach Publications (Feb. 3, 2009); Ericsson, *HEVC and DVB-S2X A Compressed Benefit?* (2017), <https://mediasolutions.ericsson.com/cms/wp-content/uploads/2017/08/HEVC-and-DVB-S2X-for-Distribution.pdf>.

<sup>67</sup> Notice ¶ 138.

scope that justify investments of capital and expertise.”<sup>68</sup> Licensing the 3.7-4.2 GHz band under its “proven formula” for wireless leadership will promote innovation and investment and lead to a more rapid deployment of 5G services in mid-band spectrum.

**B. Terrestrial Use in the Band Should Be Configured in an Unpaired Mode.**

One of the advantages of mid-band spectrum at 3.7-4.2 GHz is the availability of wider bandwidth compared to lower bands, and the Commission should take advantage of this wider bandwidth by configuring the band in an unpaired mode.<sup>69</sup> Unpaired spectrum is suitable for time division duplexing (“TDD”), which has become increasingly important to extract more capacity out of mobile networks.<sup>70</sup>

**C. A 15-Year License Term with an Expectation of Renewal Will Best Promote Robust Deployment in the Band.**

CTIA supports a 15-year license term with a renewal expectancy.<sup>71</sup> A 15-year license term is consistent with the Commission’s longstanding practice to provide longer license terms with an expectation of renewal for providers in compliance with its rules, including performance requirements. While the Commission generally maintains at least ten-year license terms for most wireless services, it has adopted longer terms where, as here, band clearing, relocation, or repacking may be needed to accommodate existing licensees. The certainty of a 15-year license

---

<sup>68</sup> *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Notice of Inquiry, 29 FCC Rcd 13020, 13045, ¶ 88 (2014).

<sup>69</sup> *Notice* ¶ 137.

<sup>70</sup> *See, e.g.*, Dr. John E. Smee, Five wireless inventions that define 5G NR — the global 5G standard, Qualcomm ONQ BLOG (Dec. 18, 2017), <https://www.qualcomm.com/news/onq/-/2017/12/18/five-wireless-inventions-define-5g-nr-global-5g-standard> (explaining the benefits of the 5G NR TDD self-contained slot structure).

<sup>71</sup> *Notice* ¶¶ 149, 143.



term will provide licensees with sufficient incentive to make the long-term investments needed for compliance.<sup>72</sup>

As is well documented, a renewal expectancy is important to assure prospective licensees that investing in the band will not lead to stranded investment. As the Commission recently concluded in the 3.5 GHz proceeding, a renewable license “is warranted to help ensure the kind of robust investment and deployment that will achieve global leadership in next generation wireless technologies, including 5G.”<sup>73</sup>

**D. Performance Requirements Should be Robust and Flexible.**

CTIA supports performance requirements in accordance with provisions of the Part 27 rules, *i.e.* to provide reliable signal coverage and offer service to a certain percentage of the population at interim and final stages.<sup>74</sup> However, the proposed population benchmarks of at least 45 percent of the population in each license area within six years of the license issue date, and to at least 80 percent of the population of each license area within 12 years from the license issue date, are more aggressive than any other Part 27 performance requirements, including in lower frequency bands with better propagation characteristics than exist in the 3.7-4.2 GHz band, including BRS, AWS-2, AWS-3, AWS-4, and the 600 MHz band.<sup>75</sup>

---

<sup>72</sup> This is true in other countries as well. For example, Belgium plans to hold a spectrum auction in late 2019 where it will offer 20-year licenses for 400 megahertz in the 3.6 GHz band. Sean Kinney, Update on global 5G spectrum auctions, RCR WIRELESS NEWS (Aug. 21, 2018), <https://www.rcrwireless.com/20180821/5g/5g-spectrum-auctions>.

<sup>73</sup> 2018 3.5 GHz Order ¶ 47.

<sup>74</sup> 47 C.F.R. § 27.14; Notice ¶ 150.

<sup>75</sup> 47 C.F.R. § 27.14.

Instead of the proposed benchmarks, the Commission should adopt an interim performance requirement of at least 40 percent of the population in each license area and a final performance requirement of at least 75 percent of the population in each license area. This approach is more consistent with other services,<sup>76</sup> and better takes into consideration the propagation characteristics of the 3.7-4.2 GHz band.

**E. The Power and OOB Limits Should Offer Suitable Protection Without Stifling Innovative Operations in the Band.**

CTIA supports the Commission's proposal to extend the AWS power limits in Section 27.50(d)(1)-(2) of its rules to apply to both fixed and base stations in the 3.7-4.2 GHz spectrum made available for flexible use.<sup>77</sup> These rules generally limit base station power in non-rural areas to 1640 watts EIRP (for emission bandwidths less than one megahertz) and to 1640 watts per MHz EIRP (for emission bandwidths greater than one megahertz), and they double these limits in rural areas, for antenna heights up to 300 meters. As the Commission notes, the AWS limits have "provided good service while avoiding harmful interference," and the higher power limit for rural areas may "promote the Commission's goals of furthering rural deployment of broadband services."<sup>78</sup> CTIA agrees.

The Commission, however, should refrain from imposing a 75 dBm EIRP limit on the total power of a base station, summed over all antenna elements, for fixed and base stations.

---

<sup>76</sup> *Id.* (requiring, for example, an AWS-2 licensee to cover 40 percent of the population by the interim buildout date and 75 percent of the population at the final buildout date).

<sup>77</sup> *Notice* ¶ 164.

<sup>78</sup> *Id.*

Instead, to ensure deployment of viable macro networks consistent with the existing LTE grid, the Commission should impose no limit on total power other than the power density limit.

Finally, CTIA supports the proposal to extend the longstanding limit on out-of-band emissions (“OOBE”) of -13 dBm/MHz at the authorized channel edge, provided an appropriate guard band is adopted.<sup>79</sup> As the Commission notes, this OOBE level “has been used successfully to protect adjacent operations from harmful interference in several AWS bands.”<sup>80</sup> However, CTIA urges the Commission to permit mobiles and portables in this spectrum to operate beyond 1 Watt (30 dBm) to facilitate robust and high-performance 5G deployment.

## **VI. REPURPOSING 3.7-4.2 GHz SPECTRUM FOR FLEXIBLE-USE SERVICES WILL HELP MEET THE REQUIREMENTS OF THE MOBILE NOW ACT.**

The steps above will also enable the Commission to help satisfy spectrum repurposing obligations set forth in the MOBILE NOW Act.<sup>81</sup> Specifically, the Act requires the Secretary of Commerce, working through NTIA and the Commission, to “identify a total of at least 255 megahertz of Federal and non-Federal spectrum for mobile and fixed wireless broadband use” by December 31, 2022.<sup>82</sup> To meet the requirement, spectrum must not have had “more than *de minimis* mobile or fixed wireless broadband operations” just prior to enactment of the Act.<sup>83</sup> CTIA agrees that 3.7-4.2 GHz band spectrum *is* eligible to satisfy the 255-megahertz requirement, because there was no more than a *de minimis* amount of fixed wireless broadband

---

<sup>79</sup> *Id.* ¶ 168.

<sup>80</sup> *Id.*

<sup>81</sup> See MOBILE NOW Act as incorporated in the Consolidated Appropriations Act, 2018, Pub. L. No. 115-141, 132 Stat. 348, Division P, Title VI (2018).

<sup>82</sup> *Id.* § 603(a)(1).

<sup>83</sup> *Id.* § 603(a)(3)(E) (emphasis added).

(115 fixed point-to-point licenses) and no mobile operations in the band prior to adoption of the Act. Thus, CTIA agrees that any portion of this band repurposed for terrestrial flexible-use service would qualify to help satisfy the requirement of Section 603(a)(1) to identify a total of at least 255 megahertz of spectrum for “mobile and fixed wireless broadband use.”<sup>84</sup>

Furthermore, in response to a question in the *Notice*,<sup>85</sup> the Commission should find that repurposed spectrum in the 3.7-4.2 GHz band will meet the separate MOBILE NOW Act mandate to identify 100 megahertz below 6 GHz for exclusive, licensed commercial mobile use, even with Internet of Things services enabled in the band. Internet of Things services are provided today on licensed commercial mobile service spectrum, and the repurposed spectrum should therefore meet the MOBILE NOW Act mandate.<sup>86</sup>

## **VII. NO DEDICATED, P2MP FIXED SERVICE SHOULD BE AUTHORIZED IN ANY PORTION OF THE BAND.**

The Commission should not authorize P2MP fixed service in any portion of the 3.7-4.2 GHz band or create a dedicated P2MP service in the band, as the Broadband Access Coalition proposed. Introducing P2MP networks will create encumbrances in the band – and even if limited to the repacked portion of the band, the introduction of P2MP networks will make any further repurposing more difficult down the road.<sup>87</sup>

Any proposal to allow use of even some portion of the band for P2MP is at odds with the goal of clearing existing uses and maximizing the amount of spectrum to be repurposed for 5G.

---

<sup>84</sup> *Id.* § 603(a)(1).

<sup>85</sup> *Notice* ¶ 133.

<sup>86</sup> MOBILE NOW Act, § 603(a)(2)(B).

<sup>87</sup> *Notice* ¶ 118.

Indeed, the Broadband Access Coalition proposal is inconsistent with the Commission’s April 19, 2018 decision to issue a temporary freeze on any new or modification applications for satellite earth station or fixed microwave licenses.<sup>88</sup> Further encumbering the band at this point is not prudent, as it will only complicate repacking and further repurposing. Indeed, the record in the *NOI* cautions that authorizing fixed service could make it more difficult to repack the existing C-band users and facilitate the new entry by terrestrial mobile services.<sup>89</sup>

Other bands are more appropriate for P2MP stakeholders that wish to enter the market – particularly with small rural offerings. For example, the new CBRS rules in the 3.5 GHz band make available spectrum, and the U-NII-1 and U-NII-3 bands offer other opportunities.<sup>90</sup> These are far better options for the P2MP proposal at issue here. In addition, the Commission is now exploring opening the 4.9 GHz band and portions of the 2.5 GHz band to commercial use.<sup>91</sup>

Further, under the flexible-use licensing framework the Commission proposes, new entrants can choose to offer mobile or fixed service – including P2MP service. Alternatively,

---

<sup>88</sup> See *Freeze and 90-Day PN*.

<sup>89</sup> See, e.g., Reply Comments of NCTA – The Internet & Television Association, GN Docket No. 17-183, at 9-10 (filed Nov. 15, 2017); Letter from Michele C. Farquhar, Counsel to SES Americom, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183, at 2 (filed July 5, 2018) (expressing “significant concern” about the proposal to authorize P2MP and noting the proposal “runs counter to a market-based approach for making the band available for 5G and would create an obstacle to the clearing/repacking process”); Joint Comments of Intel Corporation, Intelsat License LLC, and SES Americom, Inc., GN Docket No. 18-122, at 6 (filed May 31, 2018) (“[I]t is illogical to incentivize FSS operators to clear spectrum for 5G mobile use, while also introducing other fixed operations[.]”); Ericsson Feasibility Comments at 7 (noting that sharing concerns exist with respect to introducing P2MP).

<sup>90</sup> See *2018 3.5 GHz Order; Revision of Part 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, First Report and Order, 29 FCC Rcd 4127 (2014); *Operation Of Unlicensed NII Devices In The 5 GHz Frequency Range*, Report and Order, 12 FCC Rcd 1576 (1997).

<sup>91</sup> *Amendment of Part 90 of the Commission’s Rules*, Sixth Further Notice of Proposed Rulemaking, FCC 18-33 (rel. Mar. 23, 2018); *Transforming the 2.5 GHz Band*, Notice of Proposed Rulemaking, FCC 18-59 (rel. May 10, 2018).

they can assign rights via the secondary market. Allowing immediate use of the 3.7-4.2 GHz band for fixed P2MP operations would allow one type of use – P2MP – over others, which as a practical matter will limit future opportunities in the band. Such an outcome is contrary to the Commission’s goals to *increase* flexible access opportunities, *maximize* the intensity and efficiency of the spectrum’s use, and *accelerate* investment in the band.

## **VIII. CONCLUSION.**

CTIA commends the Commission for launching this rulemaking to repurpose mid-band spectrum for flexible use while protecting existing satellite uses. By taking the steps recommended herein, the Commission will help America’s efforts to lead in the race to 5G and will help meet consumer demand, promote competition, and ensure a vibrant, innovation-based mobile economy in the 5G world.

Respectfully submitted,

/s/ Jennifer L. Oberhausen

Jennifer L. Oberhausen  
Director, Regulatory Affairs

Thomas C. Power  
Senior Vice President and General Counsel

Scott K. Bergmann  
Senior Vice President, Regulatory Affairs

Thomas K. Sawanobori  
Senior Vice President and Chief Technology Officer

Kara Graves  
Director, Regulatory Affairs

**CTIA**  
1400 Sixteenth Street, NW  
Suite 600  
Washington, DC 20036  
(202) 785-0081

Dated: October 29, 2018