Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Wireless Telecommunications Bureau Seeks	)	RM-11798
to Refresh the Record on Unmanned Aircraft	)	
Systems Use of the 5 GHz Band	)	

COMMENTS OF CTIA

Thomas C. Power
Senior Vice President and General Counsel

Scott K. Bergmann
Senior Vice President, Regulatory Affairs

Kara Graves
Assistant Vice President, Regulatory Affairs

Avonne S. Bell
Director, Connected Life

CTIA
1400 16th Street, NW
Suite 600
Washington, D.C. 20036
(202) 736-3200

October 12, 2021

EXECUTIVE SUMMARY

Unmanned aircraft systems ("UAS") operations, supported by our nation's wireless networks, offer great promise in a variety of sectors, from infrastructure inspection and public safety to package delivery and mapping. As active participants in the UAS industry, CTIA and its members are playing a key role in the transformative opportunities presented by UAS for the U.S. economy. As the Commission explores ways to promote UAS innovation, it should consider the flexibility needed to accommodate the ever-evolving nature of UAS technology and uses. Consistent with CTIA's previous positions in this proceeding, CTIA recommends that any future notice of proposed rulemaking ("NPRM") should:

- Make clear that there are a variety of spectrum bands that can and will satisfy communications functions for UAS;
- Not inhibit or burden use of other spectrum bands that can support UAS communications, such as the commercial wireless bands;
- Take an expansive and flexible approach to the 5030-5091 MHz band, including exploration of options for how this band can be licensed and used;
- Ensure that any service and technical rules adopted for the 5030-5091 MHz band are technology neutral and neither require use of this band, nor preclude its use, by any class of UAS user; and
- Not foreclose the ability to use other spectrum bands for UAS in any future proceeding.

First, the Commission should recognize that UAS deployments will rely heavily upon commercial wireless spectrum and networks. Safe UAS operations depend on reliable, secure, nationwide communications over licensed spectrum. UAS operations that need command and control ("C2") links are already ongoing in various parts of the country, with growth expected to accelerate. The 5030-5091 MHz band is not currently available for C2 links and even after it is operational and available, the spectrum will not be sufficient and suitable for all UAS operations. Commercial wireless technology can presently enable UAS deployments on a larger scale, with reduced latency, providing UAS with an even faster and more reliable communications platform. This is, in no small part, due to the Commission's approach of enabling flexible use and allowing industry and standards bodies to develop interference protection criteria.

Second, the Commission should refrain from reserving the 5030-5091 MHz band for specific operations such as CNPC communications and omitting others by the establishment of

requirements for access to the band that have an exclusionary effect on certain parties or use cases. The Commission's approach to UAS spectrum should be consistent with its approach to spectrum allocations and service rules generally, valuing flexibility and neutrality as to users and technologies. CTIA urges the Commission to seek input on a variety of options for its overall licensing approach to the 5030-5091 MHz band to determine how to effectively enable UAS functions. Technology-neutral rules do not require the Commission to determine possible future uses or users of the band, focusing instead on enabling industry to use spectrum innovatively as technology and use cases evolve. Technology-neutral rules are especially important for UAS, where the pace of technical evolution is accelerated. A flexible, neutral approach to standards for spectrum that supports UAS communications must avoid sole reliance on narrowly focused, use-case-specific standards such as the RTCA CNPC standard on which the AIA Petition was based. Instead, the Commission should consider the work of other standards bodies that are creating wireless standards to support UAS communications, such as 3GPP.

As the Commission considers a future NPRM, it is important that it not create precedent with the 5030-5091 MHz band, including regulation under Part 87, that would limit the use of other spectrum bands for UAS. Application of Part 87 rules may be appropriate for the narrow UAS use cases envisioned by AIA's members, but is not appropriate for most categories of UAS under development today. In order to support the greatest number of UAS operations and realize the full economic potential of UAS, the Commission must ensure that it neither mandates a particular spectrum band or technological solution on all UAS, such as the 5030-5091 MHz band, nor precludes UAS operators from accessing other spectrum solutions, such as commercial wireless networks, to support emerging operations. The UAS market is continuously changing and growing, and the Commission's approach must remain flexible and technology neutral.

TABLE OF CONTENTS

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Wireless Telecommunications Bureau Seeks	)	RM-11798
to Refresh the Record on Unmanned Aircraft	)	
Systems Use of the 5 GHz Band	)	

COMMENTS OF CTIA

CTIA[1] submits these comments in response to the Public Notice released by the Wireless Telecommunications Bureau ("WTB") of the Federal Communications Commission ("Commission"), seeking to refresh the record on the petition[2] filed three years ago by the Aerospace Industries Association ("AIA") regarding unmanned aircraft systems ("UAS") operations in the 5030-5091 MHz band ("Refresh Public Notice").[3]

I. INTRODUCTION.

UAS provides a host of societal benefits that make citizens safer, more secure, and more productive. UAS operations extend human potential and allow us to execute dangerous or difficult tasks safely and efficiently, saving time, money, and most importantly, lives. Licensed

[1] CTIA—The Wireless Association® (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, D.C.

[2] *See* Petition of AIA for Rulemaking to Adopt Service Rules for Unmanned Aircraft Systems Command and Control in the 5030-5091 MHz Band, RM-11798 (filed Feb. 8, 2018) ("AIA Petition").

[3] *Wireless Telecommunications Bureau Seeks to Refresh the Record on Unmanned Aircraft Systems Use of the 5 GHz Band*, Public Notice, DA 21-1025, RM-11798 (rel. Aug. 20, 2021) ("Refresh Public Notice").

commercial wireless networks provide the coverage, reliability, redundancy, latency, security, and service quality necessary to support safe, nationwide commercial drone applications.

Importantly, UAS operations are accelerating in real time and, even if the Commission pursues rule changes, the 5030-5091 MHz band will not be available to support UAS operations for many years. The Federal Aviation Administration ("FAA") estimates that by 2024, there may be as many as 800,000 registered commercial drones, which is twice the number of commercial drones registered in 2020.[4] Accordingly, use of other commercial solutions to support UAS communications needs are necessary, including use of the commercial wireless networks. Networked cellular spectrum is ideally situated to meet UAS needs; it is widely available, reliable with certainty for quality of service, secure, interoperable, and positioned within a device ecosystem that is readily adaptable for UAS operational support. This is, in no small part, due to the Commission's approach of enabling flexible licensing and use of commercial wireless spectrum and allowing for a technology neutral approach facilitated by industry and standards bodies.

As the Commission explores ways to promote UAS innovation, it should consider the flexibility needed to accommodate the ever-evolving nature of UAS technology. Consistent with CTIA's previous positions in this proceeding, CTIA recommends that any future notice of proposed rulemaking ("NPRM") should:

- Make clear that there are a variety of spectrum bands that can and will satisfy communications functions for UAS;
- Not inhibit or burden use of other spectrum bands that can support UAS communications, such as the commercial wireless bands;
- Take an expansive and flexible approach to the 5030-5091 MHz band, including exploration of options for how this band can be licensed and used;

[4] Jennifer Caron, *Don't Fear the Drone!*, FAA SAFETY BRIEFING MAGAZINE, at 17 (May/June 2021), https://www.faa.gov/news/safety_briefing/2021/media/MayJun2021.pdf.

- Ensure that any service and technical rules adopted for the 5030-5091 MHz band are technology neutral and neither require use of this band, nor preclude its use, by any class of UAS user; and
- Not foreclose the ability to use other spectrum bands for UAS in any future proceeding.

II. THE COMMERCIAL WIRELESS INDUSTRY IS VITALLY IMPORTANT TO THE SUCCESS OF UAS DEPLOYMENT.

In its petition, AIA requests to the Commission include adopting licensing and service rules for Control and Non-Payload Communications ("CNPC")[5] links in the 5030-5091 MHz band to support UAS operations.[6] CTIA and its members are playing a key role in the transformative opportunities presented by UAS for the U.S. economy. As the Commission considers the regulatory framework for the 5030-5091 MHz band, it is important to recognize that this band is not the only spectrum that can satisfy UAS communications function needs, including C2 links, and that this band cannot be solely relied upon to support communications functions for all UAS at all altitudes, today or in the future.

A. UAS Deployments Will Rely Heavily Upon Commercial Wireless Spectrum.

CTIA members build, operate, and manage commercial wireless networks and also manufacture communications components, devices, network equipment, UAS devices, and their components. CTIA members play many roles in the UAS ecosystem, including as providers of essential communications networks that support safe and secure UAS operations as well as operators of UAS and Low Altitude Authorization and Notification Capability ("LAANC"), the precursor to the UAS Traffic Management ("UTM"). CTIA and its members are also engaged

[5] The term "CNPC" is often used interchangeably with "C2."

[6] *See* Refresh Public Notice at 1.

with the FAA, the Department of Homeland Security ("DHS"), and the National Aeronautics and Space Administration ("NASA") on various initiatives addressing UAS integration issues.[7]

Safe UAS innovations depend on the use of reliable, secure, and protected communications over licensed spectrum, including control links. Since the 5030-5091 MHz band is not presently available for UAS control links and that spectrum will not be sufficient for all UAS operations, the UAS industry will require use of licensed commercial wireless networks to support UAS operations.

B. Networked Cellular Offers Substantial Benefits to UAS.

Networked cellular offers significant benefits to UAS, particularly at low altitudes. Existing commercial 4G LTE networks currently support UAS control links, and further optimization after wide-scale testing will only expand those capabilities. As the Commission and WTB know, some of the key attributes of commercial wireless systems include:

- **Coverage and Quality of Service.** Wireless technology offers quality of service, with the coverage, performance, and latency required to support safe and secure UAS communications, both within and beyond visual line-of-sight. Commercial wireless networks today match the operational need for UAS, with 4G LTE covering 99.9 percent of the U.S. population.[8] Given this robust coverage, commercial wireless networks can readily connect with UTM systems to provide reliable and timely situational awareness for the entire UAS ecosystem.

- **Reliability and Redundancy.** The reliability of wireless technology will minimize and mitigate the risk of a "lost link" to a ground station or UTM. Wireless networks include overlapping, adjacent cell sites that minimize the possibility of connection issues to the UAS. The FAA's Drone Advisory Committee Report cited the reliability

[7] CTIA and its members are presently participating in the FAA's UAS Beyond Visual Line of Sight ("BVLOS") Operations Aviation Rulemaking Committee ("ARC") and previously participated in the FAA's UAS Identification and Tracking ARC. CTIA also has participated in the Commission's Technological Advisory Council ("TAC") working group for Communication Strategies for UAS; the FAA's UAS Integration Pilot Program; the NASA UTM Pilot Program; and the DHS Critical Infrastructure Partnership Advisory Council ("CIPAC").

[8] *See 2020 Communications Marketplace Report*, 36 FCC Rcd. 2945, 2996, Fig. II.A.34 (2020).

of wireless networks as a positive factor in supporting beyond visual line-of-sight missions as follows:

> Cellular networks in the US are engineered for massive volumes and cover more than 99% of Americans at approx. 300 million people. 56% of US population resides inside mode C veil. High risk areas are populated and located in proximity to transport infrastructure (*e.g.*, airports). Cellular networks are designed to serve these populated areas with high capacity and high reliability/coverage.[9]

- **Authentication and Security.** The wireless industry has a long history of working to protect its customers, networks, and technology from cyber threats. Wireless networks are equipped with a variety of security approaches, including authentication technologies that validate and authorize users seeking to access the networks. These technologies help to protect network users—including UAS operators.[10]

- **Interoperability.** Globally harmonized standards for the wireless industry can be leveraged for the benefit of UAS, providing the consistency and interoperability needed to allow vendors and manufacturers to take advantage of economies of scale, thus ensuring a vibrant global UAS ecosystem. Both wireless devices and infrastructure are readily available for use in the UAS ecosystem as smartphones, tablets, and network infrastructure equipment already interface with UAS and networked cellular.[11]

---

[9] RTCA, Drone Access to Airspace, Report of the Drone Advisory Committee, at 22 (Final Report – Nov. 2017), https://www.rtca.org/wp-content/uploads/2020/08/dac_tg2_final_reccomendations_11-17_update.pdf ("DAC Report"). The DAC Report highlighted a number of additional reasons why using commercial wireless networks is the right approach for safe and secure UAS operations.

[10] *See, e.g.*, SA3 - Security, https://www.3gpp.org/specifications-groups/sa-plenary/sa3-security (last visited Oct. 11, 2021) (describing the work of the 3rd Generation Partnership Project ("3GPP") Technical Specification Group Service and System Aspects (TSG SA) WG3 (SA3) to define the requirements, specify the architectures and protocols for security and privacy in 3GPP systems, and address security in the 5G System including for IoT and vertical industries); Mike Bartock, Jeff Cochonski, and Murugiah Souppaya, National Institute of Standards and Technology, *5G Cybersecurity; Preparing a Secure Evolution to 5G*, at 15 (Apr. 2020), https://www.nccoe.nist.gov/sites/default/files/library/project-descriptions/5G-pse-project-description-final.pdf (last visited Oct. 11, 2021) (listing relevant 5G commercial wireless standards); CSRIC VII, Working Group 3, *Report on Recommendations for Identifying Optional Security Features That Can Diminish the Effectiveness of 5G Security* (Mar. 10, 2021), https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-council-vii.

[11] *See, e.g.*, UAS Identification and Tracking Aviation Rulemaking Committee Recommendations Final Report (Sept. 30, 2017), https://www.faa.gov/regulations_policies/rulemaking/committees/documents/media/UAS%20ID%20ARC%20Final%20Report%20with%20Appendices.pdf; DAC Report at 24-26; Nikolai Vassiliev, Chief, Terrestrial Services Department, International Telecommunication Union, *Potential Spectrum and Telecom Technologies for Small UAS*, ICAO's Unmanned Aircraft Systems

Multi-billion-dollar investments in 5G wireless technology will bring denser, higher throughput coverage and lower latency to enable safe and secure UAS deployments on a larger scale[12] and will provide UAS with a faster, more reliable nationwide communications platform for UAS control links and other functions. Moreover, through the introduction of network slicing in 5G networks, a dedicated "slice" of network resources can be provided to UAS, satisfying ultra-reliable and low-latency requirements of unmanned aircraft control and non-payload signal delivery.[13]

In contrast to a dedicated UAS network utilizing the 5030-5091 MHz band, with an unclear proof of concept, standardization path, and investment return prospects, our nation's commercial wireless networks can provide a safe, reliable, and efficient method of providing robust communications resources for UAS communications. Commercial wireless technology can enable UAS deployments on a larger scale[14] and offer reduced latency, providing UAS with an even faster and more reliable communications platform.

CTIA supports the adoption of a proposed rulemaking proceeding to explore optimal service and technical rules for the 5030-5091 MHz spectrum so long as any Commission effort recognizes that this band is insufficient for all UAS use cases and communications functions. The Commission should ensure that any future NPRM does not mandate use of this band for UAS. Instead, the

---

Industry Symposium Montreal (Sept. 22-23, 2017), https://www.icao.int/Meetings/UAS2017/Documents/Nikolai%20Vassiliev_Background_Day%201.pdf.

[12] *See, e.g.,* Qualcomm, *Drones + 5G: The Sky's the Limit* (Nov. 14, 2016), https://www.qualcomm.com/news/onq/ 2016/11/14/drones-5g-skys-limit.

[13] *See, e.g.*, Ericsson, Network Slicing, https://www.ericsson.com/en/network-slicing (last visited Oct. 8, 2021). 5G network slicing is the use of network virtualization to divide single network connections into multiple distinct virtual connections that provide different amounts of resources to different types of traffic.

[14] Qualcomm, *Drones+5G: The Sky's the Limit* (Nov. 14, 2016), https://www.qualcomm.com/news/onq/2016/11/14/drones-5g-skys-limit.

NPRM should recognize that existing commercial wireless networks can and do already support accelerating drone deployments.

III. THE COMMISSION SHOULD TAKE AN EXPANSIVE, FLEXIBLE AND TECHNOLOGY NEUTRAL APPROACH TO SERVICE AND TECHNICAL RULES FOR THE 5030-5091 MHZ BAND.

There are some basic principles that should govern any Commission inquiry into service and technical rules for the 5030-5091 MHz band. Although UAS operations offer great promise in a variety of sectors, from infrastructure inspection and public safety to package delivery and mapping, this potential could be compromised if the Commission takes an unnecessarily narrow approach to service and technical rules for the 5030-5091 MHz band, or mandates use of the band for all UAS operations. As the Commission considers its next actions, it should take into account the broader UAS context and consider spectrum approaches that are flexible, forward-looking, and technology neutral to better ensure the Commission's efforts support the rapidly-evolving UAS industry.

With respect to the 5030-5091 MHz band, CTIA urges the Commission to give careful consideration to the licensing approach, scope of permitted services in the band, framework for beyond-line-of-sight ("BLOS") operations in the band, and technical requirements and standards.

A. Licensing Approach.

CTIA encourages the Commission to seek input on a variety of options for its overall licensing approach to the 5030-5091 MHz band to determine how to effectively enable UAS functions. For example, in the Refresh Public Notice, WTB suggests that there could be hybrid approaches to licensing the band.[15] CTIA encourages the Commission to consider such a licensing approach in a future NPRM.

[15] Refresh Public Notice at 5.

With respect to license eligibility for this band, the Commission should not, as AIA requested, require that parties seeking use of the 5030-5091 MHz band certify they have an FAA remote pilot certification, or that they are a "pilot in command."[16] FAA rules and regulations are evolving and it is unclear at this juncture what kind of certification, if any, the FAA will require for different types of UAS users. Moreover, to the extent the Commission determines that the band should not be allocated exclusively for aviation use, and allows other wireless services in the band, a license eligibility restriction that requires an FAA certification would be counterproductive.

In addition, the Commission should not, as AIA suggests, utilize Part 87 rules designed for *manned* aviation services to govern *unmanned* operations in the 5030-5091 MHz band, or any other band.[17] AIA justifies using Part 87 by stating that the band is allocated to Aeronautical Mobile Route Service ("AM(R)S"). However, prior operations authorized for AM(R)S directly supported *manned* aviation. As the FAA has acknowledged, there are critical differences among *manned* aircraft and *unmanned* aircraft, and regulations for each should be appropriate: "UAS operate with widely varying performance characteristics *that do not necessarily align with manned aircraft performance*. They vary in size, speed, and other flight capabilities."[18] Application of Part 87 rules may be acceptable for a narrow UAS use case, but such rules should not be utilized for most categories of UAS use under development today.

---

[16] *Id*. at 2.

[17] *Id*. at 5.

[18] U.S. Department of Transportation, Federal Aviation Administration, Integration of Civil Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap at 20 (Nov. 7, 2013), https://info.publicintelligence.net/FAA-UAS-Roadmap2013.pdf.

B. Scope of Permitted Services.

The Commission should not propose reserving the 5030-5091 MHz spectrum for one type of UAS use, such as CNPC communications enabled through the RTCA-DO362 standard, as proposed by AIA.[19] Instead, CTIA urges the Commission to approach this spectrum consistent with its approach to spectrum allocations and service rules generally, valuing flexibility and neutrality as to users and technologies. Technology-neutral rules do not require the Commission to determine possible future uses or users of the band, focusing instead on enabling industry to use spectrum innovatively as technology and use cases evolve. Technology-neutral rules are especially important for UAS, where the pace of technical evolution is accelerated and society cannot predict the use cases for UAS that will develop.

CTIA also encourages the Commission to consider a broad scope of permitted communications, and the full breadth of "safety" functions. CTIA agrees with the Refresh Public Notice that a future NPRM should explore an approach to the 5030-5091 MHz band that combines a broad scope of permitted communications, beyond CNPC.[20] Both payload and non-UAS general purpose communications could be permitted in the band. Taking this approach might require the Commission to modify the current allocation of the band to allow for payload and/or non-UAS mobile communications, and such suggestions should be further examined.

Finally, a future NPRM also should consider whether certain detect and avoid or remote identification and tracking functions could be accomplished in this band, while also permitting command and control communications. Such functions may fall within the definition of

[19] Moreover, to consider CNPC communications at all, there needs to be an understanding of how "control" and "payload" should be defined by the Commission for purposes of CNPC communications, as how these terms are defined could have far-reaching impacts for UAS regulations.

[20] Refresh Public Notice at 4.

AM(R)S as communications that are "relating to the safety and regularity of flight." All UAS communications that are or could be within the scope of AM(R)S should be explored in response to an NPRM.

In connection with this analysis, the Commission should examine the definition of communications that relate to the "safety and regularity of flight." Safety functions may vary widely depending on the drone and the type of operation. Although the AM(R)S is reserved for communications relating to safety and regularity of flight, primarily along national or international routes,[21] these concepts—safety and regularity of flight—apply to all UAS, not just those flying along pre-determined routes. As the Commission contemplates a future proposed rulemaking proceeding, it should ensure that its proposed service rules are sufficiently flexible to accommodate use by varying types of UAS. AIA's suggested prohibition against "non-route" services[22] would limit the scope of allowable UAS operations. Flexible service rules will accommodate advances in UAS technology and allow the market and the Commission to determine appropriate uses of the spectrum.

C. Supporting BLOS Operations.

In the Refresh Public Notice, WTB asks if there is interest in using the 5030-5091 MHz band for BLOS operations, and questions whether AIA's proposal "provides sufficient scope and certainty to incentivize the deployment of network infrastructure that can support both LOS and BLOS flights."[23] WTB also asks whether deployment of network infrastructure will be

[21] 47 C.F.R. § 87.5.

[22] *See* Refresh Public Notice at 2.

[23] *Id*. at 4.

necessary to support such use.[24] These questions are worthy of further exploration in a future NPRM.

BLOS operations require use or deployment of network infrastructure that can "see" the drone when it is beyond the pilot's own sight.[25] To the extent this band is to be used for BLOS, the spectrum will either need to be deployed on existing nationwide infrastructure, or brand-new infrastructure that can accommodate UAS flight over long distances. In either case, factors such as expense and time to market will need to be considered.

D. Technical Requirements and Standards.

As noted above, technological neutrality must be key to the Commission's approach when considering technical rules for UAS. A flexible, neutral approach to standards for spectrum that supports UAS communications must avoid sole reliance on narrowly focused, use-case-specific standards such as the RTCA CNPC standard on which the AIA Petition was based.[26] Instead, the Commission should consider the work of other standards bodies that are creating wireless standards to support UAS communications.

For example, 3GPP is addressing how commercial wireless LTE technologies can satisfy key performance indicators ("KPIs") for UAS, and support various UAS use cases.[27] The 3GPP

---

[24] *Id*.

[25] *See, e.g.*, Mahashreveta Choudhary, *What is BVLOS and why is it important for drone industry?*, GEOSPATIAL WORLD (Nov. 6, 2019), https://www.geospatialworld.net/blogs/what-is-bvlos-and-why-is-it-important-for-drone-industry/.

[26] Refresh Public Notice at 3.

[27] *See, e.g.*, Alliance for Telecommunications Industry Solutions ("ATIS"), Support of UAV Communications in 3GPP Cellular Standards (Oct. 2018), https://access.atis.org/apps/group_public/download.php/42855/ATIS-I-0000069.pdf ("ATIS Report"). *See also* 3GPP TR 36.777 at 19, Enhanced LTE support for aerial vehicles ("Release 15"), https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3231. Release 15 work focused on height reporting when a drone crosses a network-configured reference altitude, interference detection and mitigation, UAS-dedicated radio measurement reporting, signaling of flight path information from drone to LTE network,

standards work makes clear that RTCA is not the sole standards development organization ("SDO") addressing UAS spectrum usage. In Releases 15, 16, and 17, 3GPP has worked on a variety of objectives to enable use of commercial wireless technologies for various drone functions, including command and control.[28] Upcoming Release 18 will continue UAS work resulting in further enhancements to 5G network architecture for UAS and UAS applications.[29]

The 3GPP studies: (a) establish standards that will allow LTE technologies to satisfy key KPIs; and (b) discuss a variety of mitigation techniques already embedded in the existing standards. For example, in 3GPP Release 15 TR 36.777, for mitigating downlink interference, the following enhancements were suggested: FD-MIMO directional antenna base stations and directional antennas on UAS (instead of omnidirectional antennas); receive (Rx) beamforming antennas on UAS; Intra-site JT CoMP (Joint Transmission Coordinated Access Multi-Point) where multiple base stations from the same site coordinate in transmission; Release 13-based coverage extension to enhance synchronization and initial access for "aerial UEs" (UAVs); and coordinated data/control transmission (inter-site CoMP), where base stations from multiple sites coordinate transmission. All the features above were shown to limit the interference impact even with high density of UAS deployed.[30] Each of these features is already part of the existing 3GPP standard and some are deployed in networks today. Similarly, for uplink interference, 3GPP

---

location information reporting including a drone's horizontal and vertical velocity, and subscription-based aerial drone remote identification and authorization.

[28] *See, e.g.*, Marin Ivezic, *Introduction to 3GPP and 3GPP 5G Releases 15, 16, and 17*, 5G.SECURITY 5G Technology Primer (July 3, 2020), https://5g.security/5g-technology/5g-3gpp-releases-15-16-17/; *see also* 3GPP, UAS – UAV (Nov. 18, 2019), https://www.3gpp.org/uas-uav.

[29] *See, e.g.*, 3GPP, 3GPP Features and Study Items, 3GPP Feature and Study Item List: Rel-18, *Study on enhanced architecture for UAS Applications*, https://www.3gpp.org/DynaReport/FeatureListFrameSet.htm (last visited Oct. 8, 2021).

[30] Release 15 at 19.

found these same features (FD-MIMO, directional antennas, receive antenna beamforming, etc.), and power control-based mechanisms, could mitigate the interference impact from UAS.[31]

In addition to the interference mitigation features above that are already in the standards, Release 15 added a number of features targeted at better co-existence of aerial UEs versus terrestrial UEs, such as nominal power; height reporting, enhanced measurement reports, and events for interference management; subscription-based aerial identification and authorization; and route/waypoint reporting. 3GPP Release 16 conducted a study on the possible requirements and use cases around remote ID for UAS and services based on remote ID.[32] For Release 17, a study is being conducted on use cases and requirements for identification and tracking of UAS and using the requirements from TS 22.125 in Release 16 to look at the impact of the application layer, specifically "the application support/enabler functionalities for UTM and the service interactions between UAS and the UTM (e.g. fly route authorization, location management, group communication support)."[33]

Mobile network operators have every incentive to ensure that their networks operate optimally to both support new technologies such as UAS and protect current uses and users. Allowing the commercial mobile industry to continue working with standards-setting bodies such as 3GPP to develop standards to support UAS will be an effective and efficient approach to the expeditious development of UAS wireless standards that can be deployed, nationwide and worldwide. This approach is consistent with the highly successful flexible-use paradigm adopted

[31] *Id*. at 20.

[32] *See, e.g.*, 3GPP, UAS – UAV, https://www.3gpp.org/uas-uav (last visited Oct. 11, 2021).

[33] *See id*.

by the Commission for the past two decades and allows for continued innovation by the industry in response to the ever-changing UAS environment.

IV. CONCLUSION.

As active participants in the UAS industry, CTIA and its members are diligently supporting its rapid development and growth. The Refresh Public Notice underscores the importance of the Commission taking a careful and expansive approach to its consideration of service and technical rules for the 5030-5091 MHz band. UAS use and innovation is accelerating, and the Commission must ensure that any service rules for the 5030-5091 MHz band neither require use of this band, nor preclude its use by any class of UAS. The Commission also must ensure that any rules it adopts for this band, or any regulatory framework, be neutral with respect to standards and technologies, and not inhibit or burden use of other spectrum bands for various UAS types, missions, and functions.

Respectfully submitted,

/s/ Avonne S. Bell

Avonne S. Bell
Director, Connected Life

Thomas C. Power
Senior Vice President and General Counsel

Scott K. Bergmann
Senior Vice President, Regulatory Affairs

Kara Graves
Assistant Vice President, Regulatory Affairs

CTIA
1400 16th Street, NW
Suite 600
Washington, D.C. 20036
(202) 1736-3200

October 12, 2021