UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and
Information Administration
Washington, D.C. 20230

September 8, 2020

Mr. Ronald T. Repasi
Acting Chief, Office of Engineering and Technology (OET)
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Donald Stockdale, Ph.D.
Chief, Wireless Telecommunications Bureau (WTB)
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

RE: Amendment of the Commission's Rules with Regard to Facilitating Shared Use in the 3100-3550 MHz Band (WT Docket No. 19-348)

Dear Mr. Repasi and Dr. Stockdale:

Following up on the July 2020 report the National Telecommunications and Information Administration (NTIA) transmitted to the Federal Communications Commission (FCC or Commission) and the U.S. Congress, and the recent announcement by the White House, NTIA's Office of Spectrum Management (OSM) strongly encourages the Commission to issue a Further Notice of Proposed Rulemaking (FNPRM) in the above-referenced proceeding that would propose to reallocate the 3450-3550 MHz band to permit commercial mobile broadband on a shared basis with incumbent federal users.[1] As you know, the White House and Department of Defense (DoD) recently announced an initiative to make the 100 megahertz of spectrum between 3450 MHz and 3550 MHz available for full-power commercial use to the maximum extent possible in the entire contiguous United States.[2]

Leveraging technical work previously conducted by NTIA, DoD and the White House established America's Mid-Band Initiative Team (AMBIT) to devise a spectrum sharing framework to make available a contiguous, 100 megahertz segment of mid-band spectrum for

[1] *See* NTIA, *Feasibility of Commercial Wireless Services Sharing with Federal Operations in the 3100-3550 MHz Band* (July 2020), *available at* https://go.usa.gov/xG4HV. In accordance with Section 605(d) of the Making Opportunities for Broadband Investment and Limiting Excessive and Needless Obstacles to Wireless (MOBILE NOW Act), the Commission, in consultation with the NTIA, shall seek public comment on this report and the band identified therein as feasible and whether the band is most suitable for sharing with commercial wireless services through the assignment of new licenses by competitive bidding, for sharing with unlicensed operations, or through a combination of licensing and unlicensed operations. *See* Division P, Title VI of the Consolidated Appropriations Act of 2018, Pub. L. No. 115-141, Title VI, Div. P, Sec. 605(c)(4), (d), 132 Stat. 1100 (Mar. 23, 2018).

[2] *See* White House Fact Sheet, *President Donald J. Trump Is Unleashing America's 5G Potential* (Aug. 10, 2020), *available at* https://go.usa.gov/xG4HE; DoD Press Release, *White House and DOD Announce Additional Mid-Band Spectrum Available for 5G by the end of the Summer* (Aug. 10, 2020), *available at* https://go.usa.gov/xG4HN.

use in 5G development.[3] This framework establishes a spectrum-sharing solution that allows 5G development to progress in the private sector, while at the same time, allowing the U.S. military to continue to use that spectrum to meet national security requirements. DoD has agreed to minimize operations in the 3450-3550 MHz band to the extent possible. However, to ensure the preservation of military capabilities, readiness and national security, the military still requires permanent access in a limited number of geographic locations, periodic temporary access to a subset of the permanent access areas, access off the coast by Navy ships at extended ranges, and access wherever required in the event of a national emergency.[4] In continued support of this initiative and in anticipation of a forthcoming FNPRM, OSM in Enclosure 1 hereby provides the Commission's Office of Engineering and Technology and Wireless Telecommunications Bureau proposed text for a new US footnote to the Table of Frequency Allocations, including a description and preliminary list of DoD Cooperative Planning Areas (CPAs) and Periodic Use Areas (PUAs) in which DoD will continue to operate.

CPAs are geographic locations where federal use shall retain priority indefinitely over non-federal operations in the band and are further described in Enclosure 2. PUAs are geographic locations where federal use shall retain priority over non-federal operations for episodic periods and are further described in Enclosure 3. In both cases, federal users may require protection from interference from non-federal operations, either indefinitely or episodically. Geographic locations can be CPAs only or both CPAs and PUAs.

The AMBIT analysis and framework is based on an initial plan to make the 3450-3550 MHz band available for commercial use first in the contiguous United States. This approach enables expedited spectrum sharing for the benefit of the nation. However, NTIA and DoD plan to conduct additional analysis of federal operations in Alaska, Hawaii and the U.S. Territories and Possessions, in close cooperation with industry stakeholders to identify additional CPAs and PUAs outside of the contiguous United States.

Overall, the AMBIT spectrum sharing framework will be facilitated by DoD modifying its concepts of operations for testing and training in the contiguous United States. While DoD must maintain access to the band due to its mission requirements, DoD users are able to share the band through various approaches, which include but are not limited to compressing operations outside of the 3450-3550 MHz band, creating separation in space and/or time, and by modifying equipment. Below are two specific examples.

The first case is Shipborne Radar 3 (SB3) addressed in NTIA's January Technical Report. AMBIT determined effective operating procedures for sharing the band that protect both the ships and 5G. However, due to the unique propagation of electromagnetic spectrum over water, known as ducting, which can result in exceedingly long ranges of signal coverage due to extremely low radio propagation losses, the Navy plans to develop capabilities operating in

[3] E. Drocella, R. Sole, N. LaSorte, *Technical Feasibility of Sharing Federal Spectrum with Future Commercial Operations in the 3450-3550 MHz Band*, Technical Report 20-546 (Jan. 27, 2020), *available at* https://go.usa.gov/xG46c.

[4] *See, e.g.*, 47 U.S.C. Sec. 606(c); 47 C.F.R. Part 214.

another band that will augment SB3. This will allow the Navy to reduce operational use of the 3450-3550 MHz band at the horizon, reducing an interference source to and from 5G.

The second case is U.S. Air Force Station Keeping Equipment (SKE), which enhances flight safety and facilitates formation flight of cargo aircraft. As described in NTIA's January Technical Report, SKE formations can range in size from a two-aircraft element to multi-element formations. The U.S. Air Force plans to replace the system with one that operates in another band in order to improve 5G spectrum availability and operational effectiveness of the necessary SKE mission. This process may take up to a decade before all aircraft are retrofitted with the new equipment. To ensure readiness until the system is replaced, the Air Force will only use the lower 40 megahertz of the band (3450-3490 MHz) in two CPAs, providing immediate access to the upper 60 megahertz segment (3490-3550 MHz) with the possibility of the entire 100 megahertz becoming available with successful coordination across two CPAs where high tempo operations occur. The remainder of the contiguous U.S. will be unencumbered by the SKE missions. A more detailed description of the proposed SKE CPAs and PUA is at Enclosure 4.

In addition, OSM suggests that the FNPRM seek comment on non-federal technical parameters that would inform effective federal and non-federal coordination and coexistence in the band. Please find enclosed (Enclosure 5) the 5G characteristics and parameter assumptions used in the recent AMBIT analysis. These characteristics and assumptions formed the basis for DoD's technical analyses to determine the required separation distances between commercial 5G mobile broadband operations and DoD radar operations in CPAs to preclude mutual harmful interference between the existing radars and new 5G equipment. OSM encourages industry stakeholders to carefully assess their anticipated technical requirements to facilitate cooperative coexistence with military radar operations.

Finally, on August 17, 2020, OSM kicked off the federal transition planning process in preparation for an auction of the 3450-3550 MHz band as early as December 13, 2021. Section 113(h)(1) of the NTIA Organization Act, as amended (47 U.S.C. § 923(h)(1)), requires eligible federal entities submit transition plans to NTIA and the Technical Panel no later than 240 days before the auction commencement. Accordingly, OSM informed the affected agencies that the deadline for submitting transition plans is April 16, 2021, and provided them initial guidance for preparing the plans. Moving forward, OSM and DoD will hold workshops to receive input from and provide information to industry stakeholders, before licenses are auctioned, regarding commercial network planning and deployments in order to minimize impacts from incumbent federal operations on future commercial operations. The workshops may continue with licensees after the auction as necessary to resolve coordination issues and facilitate mutual agreements.

The White House and DoD announcement, this rulemaking, and the parallel transition process represent critical steps necessary to meet U.S. spectrum needs for 5G wireless broadband in mid-band spectrum while ensuring that DoD can maintain critical capabilities and readiness while continuing to perform its essential national security missions. OSM intends to facilitate an interagency steering group of NTIA, FCC, and DoD executive level experts to oversee, shepherd and coordinate the various moving parts as this spectrum band proceeds to auction, as was effectively done for the 1695-1710 MHz and 1755-1780 MHz bands. OSM looks forward to our

further collaborative efforts in this important initiative. If you have any questions, please contact Peter Tenhula, OSM Deputy Associate Administrator, at ptenhula@ntia.gov or 202-482-9142.

Sincerely,

Charles Cooper

Digitally signed by Charles Cooper
Date: 2020.09.08 21:49:26 -04'00'

Charles Cooper
Associate Administrator

Enclosures (5)

ENCLOSURE 1

USXXX In the 3450-3550 MHz band, the following provisions shall apply. In general, within the contiguous United States, the band is a shared co-primary allocation between the federal Radiolocation service and non-federal Fixed and Mobile, except aeronautical mobile, services. Federal operations in the 3450-3550 MHz band must protect non-federal operations from harmful interference, except under the following circumstances.

(a) Military Operational Need in National Emergency. In time of war or a threat of war, or a state of public peril or disaster or other national emergency (collectively "national emergency"), federal users are authorized to operate within the band as required to meet operational mission requirements. Upon notification, non-federal licensees shall terminate or otherwise adjust their operations to prevent harmful interference to the federal operations consistent with procedures established by the FCC in coordination with NTIA. During such operations and until the end of the national emergency, non-federal licensees must adjust their operations to enable federal use of the band and non-federal users may not claim protection from harmful interference.

(b) Cooperative Planning Areas. Cooperative Planning Areas are geographic locations in which non-federal operations shall coordinate with federal systems in the band to deploy non-federal operations in a manner that shall not cause harmful interference to federal systems operating in the band. In such areas, operators of non-federal stations may be required to modify their operations (*e.g.*, reduce power, adjust antenna pointing angles, *etc.*) to limit emissions at certain locations and may not claim interference protection from federal systems. To the extent possible, federal use in Cooperative Planning Areas will be chosen to minimize operational impact on non-federal users. The table below identifies the locations of Cooperative Planning Areas. Cooperative Planning Areas may also be Periodic Use Areas as described in paragraph (c). Coordination between federal users and non-federal licensees in Cooperative Planning Areas shall be consistent with procedures established by the FCC in coordination with NTIA.

(c) Periodic Use Areas. Periodic Use Areas are geographic locations where non-federal operations in the band may not cause harmful interference to federal systems operating in the band for episodic periods. During these times and in these areas, federal users may require interference protection from non-federal operations. Non-federal operations may be required to temporarily modify their operations (*e.g.*, reduce power, adjust antenna pointing angles, *etc.*) to limit emissions, which may include restrictions on non-federal stations' ability to radiate at certain locations. During such episodic time periods, non-federal users in Periodic Use Areas must alter their operations to enable federal systems' use of the band, and during such times, non-federal users may not claim interference protection from federal systems. To the extent possible, federal use in Periodic Use Areas will be chosen to minimize operational impact to non-federal users. Coordination between federal users and non-federal licensees in Periodic Use Areas shall be consistent with procedures established by the FCC in coordination with NTIA. While all Periodic Use Areas are co-located with Cooperative Planning Areas, the exact geographic area used during periodic use may differ from the co-located Cooperative Planning Area. The geographic locations of Periodic Use Areas are identified in the table below. Restrictions and authorizations for the Cooperative Planning Areas remain in effect during periodic use unless specifically relieved in the coordination process.

Table: Department of Defense Cooperative Planning Areas and Periodic Use Areas

Location name	State	CPA	PUA	
Little Rock	AR	Yes	-	
Yuma Proving Grounds	AZ	Yes	Yes	
Camp Pendleton	CA	Yes	-	
Edwards Air Force Base	CA	Yes	Yes	
National Training Center	CA	Yes	Yes	
Naval Air Weapons Station, China Lake	CA	Yes	Yes	
Point Mugu	CA	Yes	Yes	
San Diego*	CA	Yes	-	Includes Point Loma SESEF range *
Twentynine Palms	CA	Yes	-	
Eglin Air Force Base	FL	Yes	Yes	Includes Cape Sand Blas site
Mayport*	FL	Yes	-	Includes Mayport SESEF range*
Pensacola	FL	Yes	Yes	
Joint Readiness Training Center	LA	Yes	Yes	
Chesapeake Beach	MD	Yes	Yes	
Naval Air Station, Patuxent River	MD	Yes	Yes	
St. Inigoes	MD	Yes	Yes	
Bath	ME	Yes	Yes	
Pascagoula	MS	Yes	Yes	
Camp Lejeune	NC	Yes	-	
Cherry Point	NC	Yes	-	
Fort Bragg	NC	Yes	Yes	
Portsmouth	NH	Yes	Yes	
Moorestown	NJ	Yes	Yes	
White Sands Missile Range	NM	Yes	Yes	
Nevada Test and Training Range	NV	Yes	Yes	
Fort Sill	OK	Yes	Yes	
Tobyhanna Army Depot	PA	Yes	-	
Dahlgren	VA	Yes	Yes	
Newport News	VA	Yes	Yes	
Norfolk*	VA	Yes	-	Includes Fort Story SESEF range*
Wallops Island	VA	Yes	Yes	
Bremerton	WA	Yes	Yes	
Everett*	WA	Yes	-	Includes Ediz Hook SESEF range*

*Includes Shipboard Electronic Systems Evaluation Facility (SESEF) attached to each homeport.

ENCLOSURE 2

Cooperative Planning Area (CPA)

CPA Description: A CPA is a geographic location at which the DoD cannot vacate the 3450-3550 MHz band entirely without compromising national security, readiness, or DoD capabilities. Each CPA serves two purposes. Within CPAs, DoD requires permanent authorization to radiate and may require protection from interference for DoD systems and non-federal operations may not claim interference protection from federal systems. Each CPA is required on a routine, on-going basis.

NTIA and DoD will work cooperatively with the industry stakeholders and federal regulators in the coming months in advance of the auction, to identify methods to optimize the spectrum environment in ways that promote the greatest possible commercial use of the spectrum in the proposed license service areas and blocks, while also meeting DoD requirements. For each CPA surrounding a high-powered federal system, it is essential that non-federal systems be required to coordinate with DoD prior to the deployment of the non-federal networks to minimize the occurrence of damage to non-federal facilities and equipment.

Prior to the auction, NTIA and DoD will develop specific criteria for each CPA. These would include an understanding of the continued DoD operations (radiating), DoD protection criteria (as required), DoD areas of operation, and the affected license areas and blocks. These criteria will be published prior to the auction to provide prospective bidders with adequate information on the affect on each applicable license.

Coordination Procedures: DoD will establish coordination offices for the DoD and industry coordination, which will be published through NTIA.

DoD will work in cooperation with affected licensees to develop mutually acceptable coordination agreements with individual licensees to identify methods to further increase the commercial utility of the spectrum in and around each CPA. Development of successful coordination agreements may require tailored network solutions to maximize commercial spectrum access. Such agreements would potentially supersede the basic criteria established jointly by the Commission and NTIA. Prior to the development of mutually acceptable agreements, or if such agreements cannot be reached, the criteria established in final rules and a joint Public Notice would apply.

ENCLOSURE 3

Periodic Use Area (PUA)

PUA Description: A PUA is a geographic location at which the DoD cannot vacate the 3450-3550 MHz band entirely and without compromising national security, readiness, or DoD capabilities. Each PUA is co-located with a CPA, but the specific DoD areas of operation may vary. DoD requires periodic authorization to radiate and/or protection from interference and non-federal operations may not claim protection from DoD systems operating on or in the vicinity of each PUA. DoD's requirement is on a periodic basis and reflects a greater level of authorization to radiate and/or increased protection from interference than provided by the co-located CPA.

DoD proposes to work cooperatively with industry stakeholders in the coming months to identify methods to optimize the spectrum environment in ways that promote the greatest possible commercial use of the spectrum while also meeting DoD requirements in each PUA.

Specific minimum criteria for each PUA will be developed by DoD in cooperation with NTIA. These would include the same criteria as are established for each corresponding CPA including authorizations for continued DoD operations (radiating), DoD protection from interference, DoD areas of operation, and the affected licenses areas and blocks. Additionally, DoD will publish expected activation periods, the advanced notice which DoD must provide affected licensees when coordinating the activation of PUAs, and the method of coordinating via advance notification of affected licensees. The criteria will be published in the final rules and/or a Joint NTIA/FCC Public Notice.

Coordination Procedures: DoD would coordinate the activation of each PUA via advanced notification to affected licensees. As potentially there may be dozens of individual licensees, DoD cannot accommodate the activation period preferences of individual licensees.

Subsequent to the auction, DoD is willing to entertain the cooperative development of mutually acceptable coordination agreements with individual licensees to identify methods to further increase the commercial utility of the spectrum in the vicinity of PUAs. Such agreements would potentially supersede the basic criteria identified within the final rules and joint Public Notice. Prior to the development of mutually acceptable agreements, or if such agreements cannot be reached, the criteria established in final rules and a joint Public Notice would apply.

ENCLOSURE 4

U.S Air Force Station Keeping Equipment

The U.S. Air Force Station Keeping Equipment (SKE) enhances flight safety and facilitates the formation flight of cargo aircraft. SKE formations can range in size from a two-aircraft element to multi-element formations. The SKE system can operate on four channels, and two of the four are within the 3450-3550 MHz band. The number of formation flights required to maintain DoD readiness cannot be supported with only two channels. As a result the Air Force plans to replace the system with one developed to operate in another band in order to improve 5G spectrum availability and operational effectiveness of the necessary SKE mission. This replacement process may take up to a decade before all aircraft are retrofitted with the new equipment.

Prior to the system replacement, the reduction in available frequencies would impact the Air Force's ability to conduct certain training missions, and therefore the ability to maintain readiness. For this reason, the Air Force plans to mitigate the situation by working with industry stakeholders on sharing arrangements that will require two Cooperative Planning Areas, one of which is also a Periodic Use Area, in two regions of high-density training. Through this approach, the Air Force will enable 5G and maintain mission readiness.

Deployment of SKE is nationwide. However, one particular training location maintains high tempo 24/7 operations that dictates that the Air Force retain availability of three SKE channels to maintain readiness. As a result, in this region, 60 megahertz of spectrum will be available immediately to commercial 5G with the possibility of the full 100 megahertz of spectrum available provided commercial licensees can adjust their operations through the cooperative planning process to not interfere with the third SKE channel. The cooperative planning process would need to define the 5G operating parameters to prevent interference to the SKE system on-board aircraft during critical low altitude flights. Cooperative Planning Area documents would define these plans.

In a second region, 60 megahertz of spectrum can be provided immediately at all times with 100 megahertz available outside high tempo periodic SKE operations. In this case, 100 megahertz could be made available via cooperative planning as described in the paragraph above at all times. Alternatively, all 100 megahertz would be generally available 50 to 75 percent of the time, but non-federal access would be reduced to 60 megahertz on a scheduled basis to accommodate periodic high tempo operations. Cooperative Planning Area and Periodic Use Area documents would define these plans

ENCLOSURE 5

The National Telecommunications and Information Administration (NTIA) conducted interference testing with a prototype 4G Long Term Evolution (LTE) network that operates at 3500 MHz with Frequency Division Duplexing (FDD) equipment. The details of the testing are documented in NTIA Technical Report 14-506.[1] While these tests were conducted with 4G LTE rather than 5G hardware, it is considered a reasonable approximation. Based on this report and data gathered by the AMBIT's 5G Working Group, the following are assumptions used by the ABMIT for 5G equipment:

5G Base Station Transmitter Power Output as Effective Isotropic Radiated Power (EIRP)

- Urban: 1640 Watts per Megahertz (W/MHz)
- Non-Urban: 3280 W/MHz

5G Base Station Receiver Characteristics

- Interference Power Input Density
  - -35 dBm per meter squared (dBm/m^2) or 0.01 Volts per meter (V/m)
- Maximum Power Input
  - +35 dBm/m^2
- 1 dB Compression (P1dB)
  - -25 dBm for continuous wave signals referenced at antenna port
- 20 megahertz channels

[1] G.A. Sanders, J.E. Carroll, F. Sanders, R. Sole, *Effects of Radar Interference on LTE (FDD) eNodeB and UE Receiver Performance in the 3.5 GHz Band*, NTIA Technical Report 14-506 (July 2014), *available at* https://go.usa.gov/xG4Mq.