

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

In the Matter of)	
)	
Expanding Flexible Use of the 3.7 to 4.2 GHz Band)	GN Docket No. 18-122
)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz)	GN Docket No. 17-183 (Inquiry Terminated as to 3.7-4.2 GHz)
)	
Petition for Rulemaking to Amend and Modernize Parts 25 and 101 of the Commission's Rules to Authorize and Facilitate the Deployment of Licensed Point-to-Multipoint Fixed Wireless Broadband Service in the 3.7-4.2 GHz Band)	RM-11791
)	
Fixed Wireless Communications Coalition, Inc., Request for Modified Coordination Procedures in Band Shared Between the Fixed Service and the Fixed Satellite Service)	RM-11778
)	

COMMENTS OF INMARSAT

Inmarsat Inc. ("Inmarsat") submits these comments in response to the Federal Communications Commission ("Commission") Notice of Proposed Rulemaking on Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz ("Mid-Band NPRM").¹

I. INTRODUCTION

Inmarsat shares the Commission's goal of promoting the development of 5G through innovative spectrum policies that enable the deployment of new applications while also ensuring the protection and continued availability of incumbent services. Inmarsat joins the SIA filing in response to the Mid-Band NPRM, and supports the points made therein. Inmarsat files these

¹ Expanding Flexible Use of the 3.7 to 4.2 GHz Band, GN Docket No. 18-122, *Notice of Proposed Rulemaking*, FCC 18-91 (rel. July 13, 2018) ("Mid-Band NPRM").

comments to highlight an additional point: the need for protection of satellite tracking, telemetry, and command (“TT&C”) operations in the 3.7-4.2 GHz frequency band, including protection in perpetuity of frequencies used for emergency TT&C beacon transmissions.

II. ACHIEVING THE 5G VISION DEMANDS CREATIVE APPROACHES TO SPECTRUM THAT ENABLE CONTINUED GROWTH AND DEVELOPMENT OF SATELLITE SERVICES.

Realization of the full potential of the 5G ecosystem, with the capacity, ubiquity, reliability, and versatility required to enable the diverse applications that are envisioned, can only be achieved through a robust, heterogeneous network of networks that leverages licensed terrestrial, unlicensed, and satellite broadband technologies working together. Inmarsat fully supports this vision, and understands that making it come true will necessitate exploring new mechanisms of getting more services from the same spectrum. This may include consideration of innovative processes for satellite operators to manage their spectrum in order to support next generation applications while also ensuring the continued vitality and growth of critical satellite services relied upon by government, industrial, enterprise, and consumer users around the world.

Satellite communications systems will be a key component of the 5G ecosystem. Satellite service providers will play at least three essential roles in 5G. First, satellite broadband access technologies will provide 5G services directly to users in areas where terrestrial wireless systems are not deployed or are not up to the task. Second, satellite operators will provide services integrated with terrestrial wireless communications, enhancing and improving 5G applications, such as through enhanced location and navigation, improved security, and multicasting capabilities. And third, satellite and terrestrial systems will work together in the same spectrum in a heterogeneous network configuration providing users with seamless access to 5G services.

Satellite network operators can only deliver on this promise if they have the flexibility to innovate as well as control over their spectrum and systems. Satellite operators should be encouraged to explore partnerships and commercial agreements that will drive new sharing arrangements and deployment models. To do so, however, satellite operators require the certainty of continued, reliable access to their networks and spectrum required to serve both established and new user of satellite services. These flexible commercial and technological approaches are a preferable mechanism to achieve the Commission's goals of identifying new spectrum for 5G than a government-imposed repurposing or reallocation of spectrum, which could be costly, administratively complex, and ultimately leave important satellite users unserved or underserved.

III. SATELLITE TT&C, INCLUDING EMERGENCY BEACONS, MUST BE PROTECTED.

The Mid-Band NPRM seeks comment on approaches to expanding flexible use in the 3.7-4.2 GHz band, including a market-based approach that would give satellite spectrum licensees flexibility to make portions of their spectrum resources available for terrestrial use while enabling continuity of service for satellite users.² Although Inmarsat does not comment on this specific mechanism for repurposing the 3.7-4.2 GHz band, it does reiterate its position that opening satellite spectrum allocations to new flexible use should only be done in a way that protects existing services, maintains satellite operators' control over their systems and spectrum, and allows for continued growth and innovation in satellite services. Most importantly, any approach for introducing new flexible use in the 3.7-4.2 GHz band must protect satellite TT&C operations in perpetuity.

² Mid-Band NPRM ¶¶ 66-97.

The Commission sought comment in the Mid-Band NPRM about how it should treat TT&C operations.³ The Commission notes that several systems have TT&C operations in this band, and further, the Commission correctly recognizes that TT&C frequencies are a function of satellite design that cannot be changed after launch, and therefore TT&C operations will need protection throughout the life of the spacecraft.⁴ Inmarsat agrees with the Commission's assessment that TT&C operations must be protected. This protection should be provided for all currently operational (and applied-for) systems. Additionally, as explained below, Inmarsat proposes that the Commission provide protection for current and future use of emergency TT&C operations in the 4198-4200 MHz frequency range.

Inmarsat uses spectrum in the 3.7-4.2 GHz frequency range for TT&C operations in two ways across its satellite fleet. Inmarsat conducts TT&C operations in the space-to-earth direction for its Inmarsat-3 and Inmarsat-4 satellites, including its Alphasat satellite, in the 3945-3955 MHz frequency range. In the United States, these operations are conducted at Inmarsat's earth station in Hawaii.⁵ These are receive-only operations, with the transmitters located on the spacecraft already in orbit, and therefore no adjustments can be made to the frequency or signal. Inmarsat will continue to need to use these frequencies in this location for the rest of the operational life of the Inmarsat-3 and Inmarsat-4 satellites, which is likely to extend to 2030 or beyond.

Inmarsat also uses frequencies in the 4198-4200 MHz range for emergency TT&C operations on its Inmarsat-5 satellites on a global basis. Inmarsat has previously informed the

³ Mid-Band NPRM at ¶ 180.

⁴ *Id.*

⁵ *See* FCC Radio Station Authorization, Call Sign E080059.

Commission of the existence of these TT&C operations, although it did not seek a license to serve the United States in these frequencies.⁶ These frequencies are employed by beacons on the Inmarsat-5 spacecraft that are used during transfer orbit, satellite relocation activities, end-of-life operations and also in case of an emergency. Inmarsat's gateway earth station in Hawaii has the capability to receive transmissions from these emergency beacons, as do Inmarsat's other C-band TT&C earth stations around the world.

Inmarsat plans to use these same frequencies on future generations of satellites. Indeed, these same TT&C frequencies are integral to the design of the Inmarsat-6 satellites, the first of which is scheduled for launch in 2020. Because of the emergency nature of this use, and the corresponding need for high reliability, these operations cannot as effectively be conducted at a higher frequency band. Mid-Band spectrum has more attractive propagation characteristics for these emergency TT&C operations as compared to operations in higher frequency bands, improving reliability through greater resiliency to rain fade and other environmental factors. Additionally, higher frequency transmissions have a narrower beamwidth, that, while acceptable for normal operations, create additional challenges with establishing and sustaining communications during non-nominal situations—precisely the circumstances when emergency TT&C operations are brought into use. Finally, using the same frequencies for future emergency TT&C operations is a matter of efficiency and improved safety, as it will permit the spacecraft operator to take advantage of the availability of established TT&C sites around the world during transfer orbit, satellite relocation activities, end-of-life operations and emergencies. Therefore, Inmarsat respectfully requests that the 4198-4200 MHz band be protected as a home for

⁶ See IBFS File No. SES-LIC-20120426-00397, Attachment A at 5; *id.*, INMARSAT-5 F2 Schedule S Tech Report at 24; IBFS File No. SES-LIC-20150402-00188, Exhibit A at 4; *id.*, INMARSAT-5 F3 Schedule S Tech Report at 24.

emergency TT&C operations across the country in perpetuity. Even if the Commission chooses to prevent other future new space-to-earth operations in the 3.7-4.2 GHz band, this two megahertz range at the very top of the frequency band should be protected for emergency TT&C operations at existing and future earth stations.

IV. CONCLUSION

Inmarsat shares the Commission's vision of a vibrant and innovative 5G future. Achieving the promise of 5G will require robust, state-of-the-art satellite and terrestrial systems to work together to deliver ubiquitous, high capacity, and high reliability connectivity to all Americans. As the Commission explores creative approaches to spectrum use and regulation, it should recognize the key role of satellite communications today and in the future 5G ecosystem. New regulatory frameworks should ensure that satellite operators retain control and flexibility with respect to the use of their spectrum and systems. Additionally, critical satellite TT&C operations in the 3.7-4.2 GHz band should be protected in perpetuity.

Respectfully submitted

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October 29, 2018