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

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz For Mobile Radio Services	)	GN Docket No. 14-177
	)	
Amendment of the Commission's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands	)	ET Docket No. 95-183 (Terminated)
	)	
Implementation of Section 309(j) of the Communications Act – Competitive Bidding, 37.0-38.6 GHz and 38.6-40.0 GHz Bands	)	PP Docket No. 93-253 (Terminated)
	)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664

To the Commission:

REPLY COMMENTS OF O3B LIMITED

O3b Limited ("O3b") hereby replies to comments that were submitted in response to the Commission's Notice of Inquiry ("NOI") in the above-referenced proceeding.[1] O3b's reply comments are focused primarily on the Lower LMDS Band (27.5-28.35 GHz), and the V-band (37.0-38.6 GHz, 38.6-40.0 GHz, and 42.0-42.5 GHz).

In these reply comments, O3b reiterates the importance of the Ka-band and the V-band to the satellite industry. O3b already is using the Ka-band worldwide to provide advanced broadband services at fiber-like speeds. The satellite industry is using the Lower LMDS Band for spectrally-efficient applications; adding a co-primary allocation for FSS earth stations that are individually licensed and coordinated would enhance dramatically the range of FSS services that can be provided in the band. And the V-band is increasingly important for satellite expansion capacity.

[1] *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, GN Docket No. 14-177, *et al.*, Notice of Inquiry, FCC 14-154 (rel. Oct. 17, 2014).

5G services, by way of contrast, are still on the drawing board. The proponents of 5G have divergent views as to the nature of 5G services and the basis for licensing 5G services. Given these uncertainties, there is no basis in the record for initiating a rulemaking that would allocate spectrum above 24 GHz to 5G services. Rather, the best near-term approach is for existing mobile bands to serve as test-beds while significant 5G elements – geographic range of individual nodes, integration with existing networks, least disruptive spectrum assignments, technical development of handset capabilities – become better defined.

I. O3b is the Most Advanced Ka-band Fixed-Satellite System Worldwide

As indicated in its comments in this proceeding, O3b has successfully launched twelve (12) non-geostationary satellites over the last 20 months using segments of the Ka-band spectrum identified in this NOI. Commercial take-up of O3b's fiber-speed satellite broadband has exceeded all expectations. For example, four additional operator customers (telecommunications and mobile operators) have contracted for significant capacity with O3b since O3b filed its first Comments in this proceeding on January 15.[2] O3b is now the leading provider of satellite capacity in the Pacific Ocean Region – all in the Ka-band (27.6-28.4 GHz and 28.6-29.1 GHz uplink).

The O3b satellites, and the O3b ground network that support the satellites and O3b's customers, represent substantially more than $1.2 billion dollars in investment in advanced research and development, manufacturing (including spacecraft, gateway earth stations, next-generation modem development), IP networking, installation, and ongoing operation. Today, O3b's state-of-the-art Ka-band satellite network is providing radical improvements in mobile and broadband speeds with heretofore unachievably low latency for its customers and partners in the U.S. and overseas.

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[2] *See* Palau National Communications Corporation Goes Live on O3b Satellite Network: http://www.o3bnetworks.com/3526; Norfolk Telecom Goes Live on O3b Satellite Network: http://www.o3bnetworks.com/3527; Speedcast Partners with O3b to Deliver enhanced Connectivity to Papua New Guinea: http://www.o3bnetworks.com/3538; Palau Telecoms Goes Live on O3b Satellite Network: http://www.o3bnetworks.com/3529; O3b Becomes the Largest Provider of Satellite Capacity in the Pacific Region as Customers go Live on the Constellation: http://www.o3bnetworks.com/3525.

In addition, O3b is planning expansions to its existing fleet through a substantial procurement of new Ka-band satellites to be made during 2015 that will again offer a quantum leap in the availability of advanced satellite-based services, speeds, coverage and spectral efficiency using O3b's current Ka-band frequencies. The enhanced constellation is expected to provide extraordinary broadband services to worldwide customers.

O3b's current and future provision of ultra-advanced satellite broadband services in the Ka-band establishes O3b as a key party in interest in this proceeding.

II. 5G Mobile Services Are Still Being Defined and the Record Does Not Support Initiating a Rulemaking to Allocate Spectrum Above 24 GHz to 5G At This Time

It is clear from the comments submitted in this NOI and from publicly available information that 5G technology requires substantial further development and definition. There can be no 5G without 3G and 4G, and the mobile industry is still deploying 3G and 4G services in the spectrum that it has been allocated and assigned.[3] According to one mobile service association, 4G-LTE might not reach its technological peak until "well into the next decade" or even possibly not until around 2030.[4] These circumstances contradict suggestions by 5G proponents in this proceeding and elsewhere that it is realistic to expect 5G technology definition, standardization, testing and commercialization of initial 5G systems by 2020.[5]

In fact, the mobile industry has not even defined what 5G service will be (*i.e.*, mobile, fixed, Wi-Fi, and/or a hybrid of these). Without this definition, the FCC has no basis for considering mobile spectrum allocations, or determining the level of compatibility with incumbent services, in a rulemaking.

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[3] 4G-LTE "only accounts for 5% of the world's mobile connections" according to GSMA Intelligence Analysis in their December 2014 paper, *Understanding 5G: Perspectives on future technological advancements in mobile*, ("GSMA Intelligence Analysis") at 16.

[4] "Historically, cellular technologies have adhered to an approximate 20-year cycle from launch to peak penetration, with around ten years between the launch of each new technology (see Figure 5). The first commercial LTE networks went live in 2009 and based on historical precedent we would not expect the technology to reach a peak level of connections until around 2030." GSMA Intelligence Analysis at 21.

[5] See NOI at 8. In addition, the NGMN (Next Generation Mobile Networks) Alliance outlines its 5G roadmap which they describe as "an ambitious time-line with a launch of first commercial systems in 2020." *5G White Paper - Executive Version*, NGMN Alliance, 22 December 2014, at 19, www.ngmn.org.

The 5G mobile spectrum proposals cause concern because, generally, ubiquitously deployed mobile services present issues of harmful interference in sharing with fixed-satellite services. The extent to which interference will be an issue depends on the proposed technology and its characteristics, and there is not sufficient information available to properly assess, much less codify in the Commission's rules, the interference potential and mitigation conditions for 5G.[6]

Nothing in the comments on potential 5G architectures indicates that 5G services would be stand-alone services requiring dedicated spectrum.[7] Some commenters describe how 5G will have to be an overlay onto existing 3G and 4G services and spectrum to maintain continuity of use.[8] In fact, the descriptions of 5G provided by some manufacturers of mobile equipment have more in common with Wi-Fi than traditional mobile services.[9]. 5G services are expected to be added onto the networks of existing-generation mobile services, by existing operators, for use by existing customers, as demand and market conditions dictate. Thus, it would be more practical and less disruptive to existing services if the early development phases of 5G mobile services were tested and trialed using spectrum that is already available for terrestrial mobile services.

III. It Likewise Would Be Premature to Consider Adoption of Licensing Schemes for 5G Applications

It would be premature to consider any licensing approach for 5G. Given the uncertain nature of what 5G will look like, even 5G proponents have been unable to agree on a 5G licensing regime. Some commenters suggested that the current (e.g., BTA-based) exclusive geographic area would be most suitable, some said exclusive licensing would be appropriate within much smaller urban areas, and other 5G proponents said that 5G spectrum should be unlicensed nationwide.

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[6] In its Comments, Samsung attempts to show that mobile services could operate in the Lower LMDS Band (27.5-28.35 GHz) without causing harmful interference to FSS earth stations. Samsung's discussion, however, does not take into account the potential impact on primary FSS services that operate outside the United States or on secondary FSS services that operate in the United States. Samsung also relies on an ITU Recommendation that is not applicable to FSS sharing with terrestrial mobile systems and overlooks other ITU Recommendations that are more relevant.

[7] Comments of T-Mobile at 3. NOI at ¶7.

[8] Comments of Nokia at 11 and 21.

[9] *See* Comments of Nokia at 11; Comments of Alcatel Lucent at 7.

Even with these uncertainties, however, one thing is clear. Exclusive 5G licenses based on geographic service areas, as some 5G proponents have suggested, is unworkable in bands with incumbent satellite services. It would be contrary to the public interest to deprive customers of these satellite services. If the mobile industry's idea of "global harmonization" is to take bands that are being used worldwide for fixed satellite services and to convert the bands to exclusive 5G allocations, then that idea should be rejected out of hand.

As noted above, while 5G goes through its necessary design, standardization and initial commercialization steps, the proponents and developers of 5G mobile services should use existing licensed mobile spectrum to test and trial the 5G mobile technology designs. Similarly, 5G fixed networks may be tested in spectrum that has already been licensed for terrestrial fixed services, or these trials might be viable in currently-licensed terrestrial mobile spectrum. At a minimum, the initial years of 5G's commercialization can be expected to support and expand existing 3G and 4G services rather than to require additional spectrum that is dedicated for 5G.

IV. The FCC Should Commence a New Rulemaking on Lower LMDS Band (27.5 - 28.35 GHz)

A. The FCC Should Not Allocate Terrestrial Mobile Services in the Lower LMDS Frequencies At This Time

O3b agrees with other commenters that it is premature to consider spectrum allocations for mobile services (5G or otherwise) in the Lower LMDS band.[10] As noted in this NOI's record, the research and development for 5G networking is just beginning and there is no consensus yet among the 5G/IMT industry or the international community on service definitions, operational standards, bandwidth requirements, or the conditions under which "5G services" would avoid harmful interference to existing operators.

As described in O3b's and numerous other submissions to this record, the satellite industry is actively operating in, and developing ever more advanced, spectrally-efficient system designs and applications for high throughput satellite broadband services in the 27.5-28.35 GHz band, among other

[10] *See* Comments of Inmarsat at 5; Comments of ViaSat at 12; Comments of The Satellite Industry Association at 10.

segments of the Ka-band. Introducing another radiocommunications service, especially one as nascent and undefined as 5G is at this time, into the Lower LMDS band would be wholly disruptive to the broadband satellite investments, and to the services being provided to U.S. consumers, businesses, and local, state and federal government agencies today.

O3b also has concerns about the proposals made by some commenters, largely LMDS licensees, who recommend that the Commission grant existing licensees "license flexibility" under the principle of "technology neutrality" so that they may provide any service, whether fixed, 5G mobile, backhaul, Wi-Fi or other wireless services, within their licensed spectrum, irrespective of other operations or operators in the band.[11] As with 5G, these latter proposals cannot be supported at this time and should not even be considered without substantially more definition and understanding on how the new alternative services would impact existing operational services.

B. The FCC Should Commence a Rulemaking to Consider Co-Primary FSS Allocations in the Lower LMDS Bands

Taking into account the valuable services that the satellite industry is delivering in the Lower LMDS Band currently, the proven compatible co-existence of the LMDS Fixed Service with the Fixed-Satellite Services, and recognizing the regulatory certainty and practical flexibility required to promote the development and expansion of Ka-band FSS satellite services, O3b strongly urges the FCC to add a co-primary allocation for Fixed-Satellite Services in the 27.5-28.35 GHz band in the U.S. Table of Frequency Allocations.

Specifically, as petitioned in the Joint Comments of O3b, SES, Inmarsat and Intelsat,[12] the FCC should commence a rulemaking proceeding that would acknowledge the already substantial compatible use of the FSS in the Lower LMDS band, and elevate the Fixed-Satellite Services to co-primary status with LMDS services in the 27.5-28.35 GHz band. The Joint Commenters recommended that the Commission consider whether certain types of FSS earth stations could be allowed to operate in the 27.5-28.35 GHz band on an individually licensed and coordinated, co-primary basis with the Fixed Service in

[11] Comments of Echostar at 21-22 and Comments of XO Communications at 3-4.
[12] Comments of SES Americom, Intelsat, O3b and Inmarsat at 2-3.

the same band".[13] Indeed, FSS earth stations have been operating successfully on an individually licensed, coordinated basis with LMDS fixed service operators for quite a few years.

V. The FCC Should Complete the Open Proceeding Enabling Fixed-Satellite Services in V-band (37.0-42.5 GHz)

The V-band remains an increasingly important expansion band for satellite services as the orbital resources in the Ka-band are becoming congested. As stated in SIA's initial comments, the FCC has devoted much time and effort to making the V-band available for satellite services, and satellite manufacturers are developing satellite components that can be used in the V-band. O3b strongly urges the FCC to bring its efforts to fruition by completing the open Third V-band NPRM.[14] There has been a comprehensive record of comments filed in this docket, including a number of technically-detailed submissions that were filed by the satellite industry. Completion of the rulemaking will provide the certainty prospective satellite service providers need to design V-band satellite networks with confidence and to secure financing to build V-band satellite systems.

O3b disagrees with the lone commenter that proposed that the Commission place a freeze on V-band satellite applications.[15] Completing the outstanding rulemaking proceeding and adding the proposed FSS allocation will remove the regulatory uncertainty that has hindered development of this band, and will enable FSS access to the V-band for the provision of advanced satellite broadband and other services.

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[13] *Id* at 4.
[14] *See* Third Notice of Proposed Rulemaking in IB Docket No. 97-95 (released November 1, 2010) ("*Third V-Band NPRM*").
[15] See Comments of Straight Path Communications, 19, n.64.

Conclusion

In sum, there is no basis for initiating a rulemaking proceeding to consider allocating spectrum above 24 GHz for 5G services. The nature of 5G services is too uncertain at this stage to draw any meaningful conclusions as to compatibility with existing services. In the near term, existing mobile bands can serve as test-beds while significant 5G elements become better defined. Once this information has been developed, the Commission will be in a position to develop a balanced spectrum allocation approach that enables all technologies to grow and expand, including satellite services.

Respectfully submitted,

/s/ Suzanne Malloy .

Vice President of Regulatory Affairs
O3b Limited
900 17th Street NW, Suite 300
Washington, DC 20006

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