

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)	
)	
Expanding Flexible Use of the 3.7 to 4.2 GHz Band)	GN Docket No. 18-122
)	

To: The Commission

COMMENTS OF CB2.0 COMMUNICATIONS INC.

CB2.0 Communications Inc. (“CB2.0”), pursuant to Sections 1.415 and 1.419 of the Commission’s Rules, hereby comments on certain aspects of the Notice of Proposed Rulemaking (“NPRM”) released July 13, 2018 in the above-captioned proceeding.¹

Comment Summary and Overview

CB2.0 encourages and supports the Commissions’ initiative to facilitate a marketplace developed approach that provides planning certainty and lower long-term costs for end users by leveraging latest advances in technology.

CB2.0 is developing a low-cost, non-geostationary orbit (“NGSO”) global constellation that uses C-Band (one of five frequency bands utilized in the CB2.0 constellation), to deliver significantly more throughput (4x-10x) to high demand regions than currently available from geostationary orbits. CB2.0’s constellation design employs a unique combination of highly-inclined elliptical orbit (“HEO”) architecture (60+ degree inclination) and latest ‘new space’ technologies to dramatically lower costs and time-to-market. This will be accomplished by deploying a resilient, high-reliability, multi-satellite network that relies on smaller/lighter satellites, scalable deployment, electronically-

¹ See *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Order and Notice of Proposed Rulemaking, GN Docket No. 18-122, FCC 18-91 (released July 13, 2018).

steerable multibeam antennas, beam-hopping, efficient compression, flexible digital payloads, and low-cost reusable launchers.

Background – The CB2.0 Constellation

CB2.0 is a Canadian company with operations in both Canada and the United States that has developed a novel satellite constellation concept, known as “*Clarke Belt 2.0*,” that replicates the geostationary earth orbit (“GSO” arc, aka the Clarke Belt) above and below the earth using a HEO satellite architecture. This unique NGSO constellation design approach facilitates full spectrum reuse globally, effectively “doubling” the amount of spectrum available, including in the C-Band, which is especially critical in high demand areas such as the East and West Coasts of the United States, Western Europe and the Pacific Rim. By utilizing the most efficient technologies available, CB2.0 has created a constellation design capable of delivering improved hemispheric reach and unmatched capacity totaling of more than a Petabit/sec (1000 Terabits/sec) of global capacity, which exceeds by several multiples the quantum of potential GSO capacity currently achievable in the world’s highest traffic areas. Coupled with other technical and economic benefits from operational orbits that average half the distance to the GSO arc, thereby reducing latency, CB2.0 will deliver an order of magnitude higher efficiency, along with lower-cost capacity and global reach.

CB2.0 has several space network filings filed with the International Telecommunication Union (“ITU”) through the Canadian administration (Innovation, Science and Economic Development Canada) that contain most of the frequency bands allocated through the ITU worldwide for Fixed-Satellite Service (“FSS”), including C, X, Ku, Ka, and V/Q bands. Of specific relevance to this *NPRM*, the CB2.0 ITU filings incorporate the 3.6 to 4.2 GHz bands worldwide throughout all three ITU Regions.² Use of the particular NGSO HEO orbit utilized by CB2.0 in the

² See MAPLELEAF-1 Coordination Request, submitted December 28, 2016.

C-Band was considered at the 2003 World Radiocommunication Conference (“WRC”) and subsequent conferences, and resulted in ITU Resolution 157, which sets out technical limits for its harmonized use with GSO satellites.³

CB2.0 plans a global service for its constellation that efficiently serves a single hemisphere at a time from pole to pole. Accordingly, as indicated in prior discussions with the FCC, the company intends to provide service in the United States, and a formal request to access the U.S. market using the CB2.0 constellation will be forthcoming.

Discussion

I. The CB2.0 Constellation Approach to C-Band NGSO Service Can Help with Clearing and Sharing the C-Band

The *NPRM* seeks comment on whether and to what extent the C-Band can be cleared for flexible use and shared for more intensive terrestrial fixed use. CB2.0 takes no position at this time on how the band should be segmented to accommodate stakeholders’ use cases, but offers a technical solution that, through frequency reuse, will enable FSS spectrum to be used more efficiently.⁴ The benefits include the following:

- i) Government regulators, satellite and telecom industry worldwide may segment the C-band to create more certain long-term planning,
- ii) Capacity for operators to ‘dual-feed’ using both GSO and NGSO satellites, and an orderly transition for current users to migrate from one constellation to another,
- iii) Small low-cost multibeam flat-plate antennas (60 cm) that can simultaneously receive signals from GSO and CB2.0 HEO satellites, and deliver 100+ Mbps to/from HEO satellites,
- iv) Means to minimize the expense to either repoint, reposition, or move current C-Band users outside shared-use or urban areas,

³ See Resolution 157, “Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands allocated to the fixed-satellite service” (WRC-15).

⁴ The CB2.0 solution and benefits noted above may be applied to other FSS frequency bands and future flexible use band-sharing approaches (for example, Ka-Band and V/Q-Band).

- v) An option for ubiquitous, seamless, transparent, hybrid terrestrial and satellite roaming service bundling, utilizing a common chipset core with mobile industry,
- vi) Complementary capacity of 4x-10x over a given geographic area, that does not interfere with GSO or fixed services in the same bands due to large angular separation,
- vii) Scalable capacity at fractions of the cost of UHTS GSO or of any proposed NGSO orbit,
- viii) Compatible with currently proposed technical solutions that can be staged and can leverage the latest technology advances with each subsequent launch,
- ix) Highly reliable service availability enabled by C-Band's resistance to rain fade, and
- x) Lower latency than GSO or multi-hop LEO/NGSO networks (average half of GSO latency).

CB2.0 believes that current FSS satellite operators must be fairly compensated for any expenses to relocate their operations as part of any spectrum “clearing” the FCC may adopt to promote flexible use. If operator capacity is rationalized by moving users within the C-Band or to another spectrum band, FSS satellite operators will enjoy substantive benefits from improving fill-rates across their existing fleets.

II. International Harmonization and Cooperation is Critical to Success

CB2.0 notes that the upcoming WRC scheduled for the fall of 2019 has several agenda items to consider mid-band spectrum for flexible use. The outcome of those sessions will have an impact on harmonization in Region 2 and particularly along the borders shared with Canada and Mexico. Furthermore, harmonizing efforts for mobile smartphone chipsets by GSMA and 3GPP, producing new common use chipsets, and building up the supply chain will take a number of years – but represents a unique, first-time opportunity for satellite and mobile interests to share chips or common devices and offer hybrid complementary service coverage to serve in the same spectrum areas where one service or the other, implemented separately, cannot reach. If the Commission's rules on allocation of this band vary substantially from other markets/regulatory bodies, it could render any ability to repurpose the spectrum *much* less timely and fruitful.

Conclusion

CB2.0 favors a market-developed solution. CB2.0 believes that by leveraging the latest technology, and specifically the C-Band portion of its NGSO constellation, it can assist the telecom industry with a positive long term technical option and enable an economic and orderly transition with positive impact on current and future FSS users. CB2.0 appreciates the Commission's attention to these Comments and looks forward to further stakeholder engagement.

Respectfully submitted,

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