



Federal Communications Commission
Washington, D.C. 20554

March 10, 2017

Monish Kundra
Karousel LLC
204 South Union Street
Alexandria, VA 22314

Re: Karousel LLC, IBFS File No. SAT-LOA-20161115-00113 (Call Sign S2980)

Dear Mr. Kundra:

On November 15, 2016, Karousel LLC (Karousel) filed the above-captioned application for authority to construct, deploy, and operate a non-geostationary-satellite orbit (NGSO) fixed-satellite service (FSS) satellite system. To aid the Commission's evaluation of the application, please provide the following additional information:¹

1. Karousel seeks to operate its NGSO FSS system in the 29.1-29.25 GHz and 29.25-29.5 GHz bands. The 29.1-29.25 GHz and 29.25-29.5 GHz bands are allocated on a primary basis to the non-Federal fixed, mobile, and fixed-satellite services on the U.S. Table of Frequency Allocations.² Under the Commission's Ka-band Plan, the 29.1-29.25 GHz is designated on a primary basis to the operation of NGSO MSS feeder links and to LMDS hub-to-subscriber transmission, and the 29.25-29.5 GHz band is designated on a primary basis to NGSO MSS feeder links and GSO FSS.³ There is no designation for NGSO FSS in these bands.⁴ Accordingly, please clarify whether Karousel seeks a waiver of the Commission's Ka-band Plan in the 29.1-29.25 GHz and 29.25-29.5 GHz bands, and, if so, please provide the appropriate rationale.
2. Iridium Constellation LLC (Iridium) is currently licensed to operate its NGSO MSS constellation in the 29.1-29.3 GHz bands. In particular, Iridium is authorized to conduct TT&C operations and to operate feeder uplinks from 29.1-29.3 GHz (Earth-to-space).⁵ Karousel's application does not acknowledge the presence of Iridium's operations in these bands. We request that Karousel provide information about how it intends to prevent interference with Iridium's operations in the 29.1-29.3 GHz band.
3. Section 25.114(d)(1) of the Commission's rules requires that applicants provide an explanation of how the uplink frequency bands would be connected to the downlink frequency bands on their proposed satellite system.⁶ In order to better understand the beam and channel connections on the

¹ 47 CFR § 25.111(a).

² 47 CFR § 2.106.

³ 47 CFR § 25.202(a)(1).

⁴ Karousel's application incorrectly represents on page 38 of its narrative that the 29.1-29.25 GHz and 29.25-29.5 GHz bands are allocated to the non-Federal NGSO FSS on a secondary basis. This error is also implied on page 70 of Karousel's narrative. Please correct these errors as part of any filing made in response to this letter.

⁵ See *Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation*, Order and Authorization, IBFS File No. SAT-MOD-20131227-00148 (Aug. 1, 2016).

⁶ 47 CFR § 25.114(d)(1).

Karousel NGSO FSS system, we request that Karousel supplement its application with a showing (e.g. a strapping table, chart, or spreadsheet) that clearly presents this information.

4. Section 25.114(d)(14) of the Commission's rules requires that the applicant provide a description of the design and operational strategies that will be used to mitigate orbital debris.⁷ Please provide the following additional information and clarifications:
 - a. A statement as to whether Karousel satellites will release any debris of less than five millimeters in size.⁸
 - b. Information regarding the accuracy with which the parameters of satellite orbits will be maintained, including apogee, perigee, inclination, and the right ascension of the ascending node(s).⁹
 - c. A statement concerning the assessment of the risk of collision with other satellites and large debris, particularly the possibility of collision with satellites operating in the geostationary orbit or in orbits similar to that of the Karousel system, together with the methods used to calculate such risks;
 - d. A statement as to the methods by which Karousel intends to maintain safe flight profiles throughout the life of its satellites;
 - e. Additional information concerning the post-mission disposal plans for Karousel's satellites, including estimated fuel reserves to be maintained for disposal procedures, orbital parameters of the intended disposal orbit, whether Karousel intends to circularize the orbit of its satellites at end of life, and other details pertinent to the disposal of the satellites.¹⁰ Please address, for NGSO operations in an orbit inclined at 63.4 degrees, whether the formula for calculating minimum initial perigee for a GSO disposal, as found at 47 C.F.R. § 25.283(a), is suitable, bearing in mind possible differences in solar lunar perturbations and effects of solar radiation pressure. In particular, please provide a statement and/or analysis with respect to the long-term stability or instability of the proposed post-mission storage orbit. Such analysis should address any measures, such as selection of orbital parameters, that may affect the long-term evolution of orbital parameters, with particular attention to addressing any such evolution that would result in the satellites entering the geostationary protected region, *i.e.*, the area defined by the geosynchronous altitude, plus or minus 200 kilometers, and plus or minus 15 degrees from the equatorial plane, or the LEO protected region, *i.e.*, the area below 2000 km.

⁷ 47 CFR § 25.114(d)(14).


⁸ Karousel's application states that its NGSO system would not generate any debris "during normal operation in compliance with the U.S. Government Orbital Debris Mitigation Standard Practices (objective 1-1), which dictates that there will be no release of debris larger than 5 millimeters in any dimension that remains on orbit for more than 25 years." Karousel Application at 39. This statement is different from the disclosure requirement of 47 CFR § 25.114(d)(14)(i) (requiring "A statement that the space station operator has assessed and limited the amount of debris released in a planned manner during normal operations").

⁹ 47 CFR § 25.114(d)(14)(iii).

¹⁰ 47 CFR § 25.114(d)(14)(iv).

Karousel must file a letter providing the additional information by April 11, 2017. Failure to do so may result in the dismissal of Karousel's pending application pursuant to Section 25.112(c) of the Commission's rules, 47 C.F.R. § 25.112(c).

Sincerely,


Jose P. Albuquerque
Chief, Satellite Division
International Bureau

cc: Alexander Maltas
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