



Federal Communications Commission
Washington, D.C. 20554

September 2, 2021

Iulia Davies
Umbra Lab, Inc.
133 E De La Guerra, #39
Santa Barbara, CA 93101
Iulia.davies@umbra.space

Re: Umbra Lab, Inc., IBFS File No. SAT-LOA-20210616-00080; Call Sign S3095

Dear Ms. Davies:

On June 16, 2021, Umbra Lab, Inc. (Umbra) filed the above-referenced application requesting authority to construct, deploy, and operate six satellites (the Umbra SAR Constellation), which will include the satellite previously licensed under the experimental licensing process, Umbra-2001, ELS File No. 0424-EX-CN-2020. Please provide the following additional information in order to assist in the Commission's review of this application:

1. The legal narrative states that the satellites will operate with altitudes at 500-600 km, with a "nominal" altitude of 583 km, in four orbital planes.¹ However, the Schedule S lists the apogee and perigee of the satellites as 555 km and states they will operate in one orbital plane, and the technical attachment lists the perigee and apogee as 555 km \pm 55 km, and states both that the satellites will operate in six orbital planes and "up to six" orbital planes.² Please clarify the configuration of the satellites in the Umbra SAR Constellation, including operational altitude, inclination, number of orbital planes, and tolerances for altitude and inclination maintenance.
2. In the legal narrative, Umbra states that only communications in the 2200-2290 MHz frequency band will be conducted using earth stations located outside the United States, but in the technical attachment, Umbra states that all communications will occur using earth stations located outside the United States.³ Please clarify what, if any, communications will be conducted with earth stations in the United States.
3. In the technical attachment, Umbra states that each satellite is designed for a useful lifetime of five years, at the end of which Umbra intends to dispose of the satellites through atmospheric re-entry.⁴ For a small satellite licensee, the maximum six-year license term for the system begins when the first satellite in the system is in orbit and has begun operating,⁵ so there appears to be a conflict between the five-year lifetime of the later-launched satellites and the six year license term for the system. For example, we note that Umbra plans to launch four satellites in 2022.⁶ These

¹ Umbra Application, Attachment A at 3, 4.

² Umbra Application, Schedule S at 5, Attachment B at 1.

³ Umbra Application, Attachment A at 10, Attachment B at 5-6.

⁴ Umbra Application, Attachment B at 24; *see also* Attachment C-ODAR at 20.

⁵ *See* 47 CFR § 25.121(a)(3), (d)(3).

⁶ Umbra Application, Attachment A at 4, 6.

satellites must therefore have a shorter operational life than the satellites launched in 2021 in order to comply with the maximum six-year license term. Please clarify.

4. In the experimental application 0424-EX-CN-2020, the orbital lifetime of the satellite Umbra-2001 was stated to be eight years, not including post-mission disposal maneuvers. In the technical attachment of this application, the orbital lifetime of the Umbra satellites is listed as five years.⁷ Please confirm this change from what was authorized for the experimental-licensed satellite and provide a brief explanation.
5. The component lists appear different between the experimental application for Umbra-2001, 0424-EX-CN-2020, and this application.⁸ Please explain all differences and any updates that have been made. Please also clarify whether the six satellites in the Umbra SAR Constellation are technically identical.⁹
6. Please resubmit the antenna contour plots provided in the technical attachment in a larger and clearer format.
7. Please identify the assumed satellite altitude used for each power-flux density (PFD) value provided in the technical attachment¹⁰ was calculated.
8. In the orbital debris assessment report, Umbra states, “Umbra plans to create a process that flags an operator and executes propulsive maneuvers semi-autonomously, thereby minimizing the required time, propellant and tasking deltas required.”¹¹ Please provide more information regarding this process. Specifically, please describe the current stage of development for this process. Is it still in the design phase or has testing begun? If testing has begun, please provide detailed information on the tests performed and results to date. Please also detail what trigger(s) will cause the spacecraft to perform maneuvers, whether it is possible to override the autonomous process from the ground in the event of errors or emergencies, and whether the spacecraft continues to monitor the environment during a maneuver. Additionally, how many such maneuvers does Umbra expect a single spacecraft to perform during its lifetime? Will Umbra coordinate with nearby spacecraft operators prior to these autonomous maneuvers?

⁷ *Id.* at 28.

⁸ *See* Umbra Application, Attachment C - ODAR at 21.

⁹ 47 CFR § 25.122(b).

¹⁰ Umbra Application, Attachment B.

¹¹ Umbra Application, Attachment C - ODAR at 16.

9. In the technical attachment, Umbra provided detailed information regarding the applicability of Umbra's compliance with several footnotes to the International Table of Frequency Allocations.¹² Please also provide this information for footnotes 5.476A, 5.478A, and 5.478B.
10. Please resubmit the ITU Cost Recovery letter using the template attached to this letter.

Please submit the requested information by **October 2, 2021**. See 47 CFR § 25.112(c).

Sincerely,

Kerry E. Murray

Kerry E. Murray
Deputy Chief, Satellite Division
International Bureau

Attachment

Cc: Tony Lin
DLA PIPER LLP (US)
500 Eight Street, NW
Washington, DC 20004
Tony.lin@us.dlapiper.com

¹² Umbra Application, Attachment B at 14-16.

Attachment – Sample Cost Recovery Letter

Date

Secretary
Office of the Secretary
Federal Communications Commission
45 L Street, N.E.
Washington, D.C. 20554

Subject: ITU Cost Recovery Declaration for the (insert your commercial satellite name here) Satellite Network Operating in (insert “Geostationary Orbit at xxx° E.L./W.L.” or “Non-geostationary Orbit” here) in the (insert the word “Planned” or “Non-planned” here) Frequency Bands. (Insert its ITU satellite filing name here in parenthesis)

Reference: FCC Application File No. (insert your assigned file number here); Callsign (insert your assigned callsign here)

Dear FCC Secretary,

(Insert the name of your company, college, or scientific organization here) is aware that in accordance with Resolution 88 of the International Telecommunication Union’s (ITU) Plenipotentiary Conference (Marrakech, 2002), and ITU Council Decision 482, as modified, cost-recovery fees will apply to satellite network filings received by the Radiocommunications Bureau after November 7, 1998. As a consequence, Commission applicants are responsible for any and all fees charged by the ITU to process their satellite network filings. (Insert name of your company, college, or scientific organization here) hereby states that it is aware of this requirement and unconditionally accepts all cost recovery responsibilities associated with the ITU filings for the (insert your commercial satellite name here) satellite network. Please address all cost-recovery inquires, and ITU correspondence and filings, related to the (insert your commercial satellite name here) satellite network to the following point of contact. We understand that should there be any change in the point of contact information, we will inform the Commission within 30 days of the foreseen event.

Point of Contact Name: (Insert full name and title of POC within your company, college, or scientific organization here; the POC cannot be outside counsel or hired consultant)

Organization Name: (Insert name of your company, college, or scientific organization here)

Address: (Insert address of POC within your company, college, or scientific organization here)

E-Mail: (Insert e-mail address of POC within your company, college, or scientific organization here)

Telephone Number: (Insert telephone number of POC your company, college, or scientific organization here)

(Insert the name of your company, college, or scientific organization here) understands that it must remit payment of any resultant cost-recovery fee to the ITU by the due date specified in the ITU invoice, unless an appeal filed prior to the due date is pending with the ITU. We fully understand that a license granted in reliance on such a

commitment will be conditioned upon discharge of any such cost-recovery obligation. We also acknowledge that, in accordance with 47 C.F.R. §25.111, should we have an overdue ITU cost-recovery fee and have no appeal pending with the ITU, the Commission may dismiss any application associated with that satellite network.

Sincerely,

/ signature /
(Insert name of person authorizing this letter here)
(Insert title of person authorizing this letter here)
(Insert the name of your company, college, or
scientific organization here)