

DESCRIPTION OF PROPOSED MODIFICATION

Planet Labs PBC (“Planet”) respectfully requests to modify the authorization for its Earth Exploration Satellite Service (“EESS”) system (FCC Call Sign S2912).¹ Specifically, Planet requests authority to modify the authorized orbital altitude for the SkySat fleet, as follows:

- Authorize SkySat satellites 16 - 18 to operate in orbits with mean, semi-major axis altitudes from 345 km to 450 km. The target orbit altitude is 450 km circular. When including orbital fluctuations (+/- 5 km) and station-keeping maneuvers (+/- an additional 5 km), the nominal satellite orbit (at a target 450 km orbit) could have a perigee as low as 440 km and an apogee as high as 460 km;
- Authorize SkySat satellite 19 to operate in orbits with mean, semi-major axis altitudes from 345 km to 425 km. The target orbit altitude for this satellite is 425 km circular. When including orbital fluctuations (+/- 5 km) and station-keeping maneuvers (+/- an additional 5 km), the nominal satellite orbit (at a target 425 km orbit) could have a perigee as low as 415 km and an apogee as high as 435 km; and
- Authorize a lower operational range for SkySat satellites 3 -15, 20, and 21 down to a perigee of no less than 345 km as the satellites demise naturally.²

Except as stated specifically in this application, including the Schedule S³ and

¹ Planet currently operates the SkySat fleet of 21 commercial remote sensing satellites, under FCC Call Sign S2912, as part of a non-geostationary orbit (NGSO) Earth Exploration Satellite Service (EESS) high-resolution imagery satellite system. See Stamp Grant, Application, File No. SAT-MOD-20200615-00076 (granted March 18, 2021) (“Planet Authorization”).

² To be clear, as a satellite demises, Planet would maintain communications with the satellite for orbit determination and debris mitigation purposes, as long as possible. However, Planet would not operate the satellite for imaging purposes, if the satellite perigee is below 345 km.

³ For purposes of the Schedule S, Planet has provided information for a target nominal operational altitude of 445 km x 455 km for SkySats 16-18, and 420 km x 430 km for SkySat 19, which will all participate in an orbit raising campaign. For the remaining SkySat satellites, Planet provides information in the Schedule S for the proposed new lowest authorized orbit of 345 km.

attachments,⁴ Planet is not requesting any other changes to its license or authorized satellite operations and certifies that such operations remain unchanged.⁵ For the avoidance of doubt, there are no changes to the SkySat satellite propulsion system or the orbital debris mitigation plan, as previously authorized.

The requests, taken as a whole, seek to extend the operational lifetime of these satellites, increasing the value of the on-orbit assets and their ability to provide imagery to customers. At the higher operational altitudes proposed, Planet will be able to extend the lifetime of the satellites by up to 50 percent. Moreover, authorizing SkySat satellites 3-21 to operate down to a perigee of 345 km will enable continued use of these on-orbit assets as they begin to demise, prolonging their lifetime and utility to Planet and its customers. There are no countervailing harms with respect to radio frequency interference or orbital debris mitigation.

A delay in implementation will reduce the potential benefits, because of atmospheric drag at lower altitudes, which creates a greater strain on satellite resources; additional exposure to space weather in the current solar weather cycle; and additional staff resources needed to execute a new plan, taking into account weather patterns, possible conjunctions, and appropriate phasing of Planet's on-orbit resources. Accordingly, Planet submits that grant of the application will serve the public interest and requests expedited action.

I. Description of Modification

On March 16, 2020, Planet was granted authority to launch and operate the SkySat satellites 16 - 21 (Block 3 SkySats) at orbital altitudes ranging from 400 to 420 km.⁶ Planet projects it can maximize the lifetime of certain of these Block 3 SkySat satellites (16-19) by first raising their altitude and then continuing operations down to a perigee of 345 km.

On August 31, 2016,⁷ the Commission granted Planet authority to launch and operate SkySat satellites 3 -15 at orbital altitudes ranging from 400 km to 630 km. To maximize the lifetime of SkySat satellites 3-15, as well as SkySat satellites 20 and 21,

⁴Attached as an exhibit is updated ownership information.

⁵ See File No. SAT-MOD-20191217-00148, at Exhibit 43 (granted March 16, 2020).

⁶ See *id.*

⁷ See Stamp Grant, Application, File No. SAT-MOD-20150408-00019 (granted Aug. 31, 2016) ("Terra Bella Authorization").

Planet proposes to continue operations down to a perigee of 345 km.

A. Orbit raising plans for Block 3 SkySats

Planet first plans to increase the altitude of SkySat satellites 16 -18 to mean, semi-major axis altitudes between 420 to 450⁸ km. The target orbit altitude is 450 km circular.⁹ Planet anticipates that this new nominal operational altitude will increase the lifetime of these satellites up to 50 percent.

When including orbital fluctuations (+/- 5 km) and station-keeping maneuvers (+/- an additional 5 km), a nominal satellite orbit (at a target 450 km orbit) could have a perigee as low as 440 km and an apogee as high as 460 km. Planet would operate SkySats 16-18 at the new target altitude until a certain proportion of the propellant is depleted.¹⁰ At that point, Planet will permit the satellite to demise naturally.

Planet anticipates that raising to the new nominal altitude will take approximately 5-6 months. During this time, Planet will command multiple maneuvers per day in order to raise the block in a staggered approach. This approach will minimize conjunctions within the block and with other resident space objects (RSOs). Once at the final altitude, Planet will spend approximately 2 weeks decreasing the eccentricity of each vehicle's final orbit.

SkySat satellite 19 will be raised to a target mean, semi-major axis altitude from 420 to 425 km. The target orbit altitude for this satellite is 425 km circular.¹¹ When including orbital fluctuations (+/- 5 km) and station-keeping maneuvers (+/- an additional 5 km), the nominal satellite orbit (at a target 425 km orbit) could have a perigee as low as 415 km and an apogee as high as 435 km. Planet would operate

⁸ The SkySat satellites are already authorized by the Commission to operate at altitudes between 400 km to 420 km. See File No. SAT-MOD-20191217-00148, at Exhibit 43 (granted March 16, 2020).

⁹ Operational limitations may prevent Planet from achieving its target nominal orbits.

¹⁰ The target nominal orbits will not be perfectly circular, which is why Planet has specified the apogee and perigee of the target nominal altitude. In addition, Planet requires station-keeping flexibility above and below the target nominal altitude as it executes propellant burns to maintain altitude while addressing challenges such as space weather, collision avoidance, and appropriate phasing among Planet's satellite assets.

¹¹ Operational limitations may prevent Planet from achieving its target nominal orbits.

SkySat 19 at the new target altitude until a certain proportion of the propellant is depleted. At that point, Planet will permit the satellite to demise naturally. Planet anticipates that raising to the new nominal altitude for this satellite will take approximately 3 months.

As a result of operational circumstances unique to SkySat satellites 20 and 21, these satellites will remain in their current orbits until their mean altitude begins to decrease.

The International Space Station (ISS) and the Chinese Space Station (CSS) also operate in this altitude range. The ISS presently operates at approximately 420 x 411 km and the CSS operates at approximately 389 x 376 km. Planet has regular coordination meetings with the ISS trajectory operations and planning officer (TOPO) team, as well as NASA's Global Precipitation Measurement (GPM) vehicle trajectory team to ensure all parties are aware of upcoming maneuvers and operations. Planet adheres to keep-out zones around the ISS space station and around the GPM spacecraft as per the Operating Agreements (OAs) that Planet has in place with NASA. It also adheres to a keep-out zone around the CSS, consistent with industry best practice. All conjunction data messages (CDMs) with a probability of collision (PoC) greater than 1E-5 are tracked. Planet has had preliminary discussions with NASA regarding these planned orbit raising maneuvers, and NASA did not initially have any concerns so long as Planet continues to adhere to the OAs set in place by both ISS and GPM teams. Planet will continue to coordinate closely with NASA, as it does today.

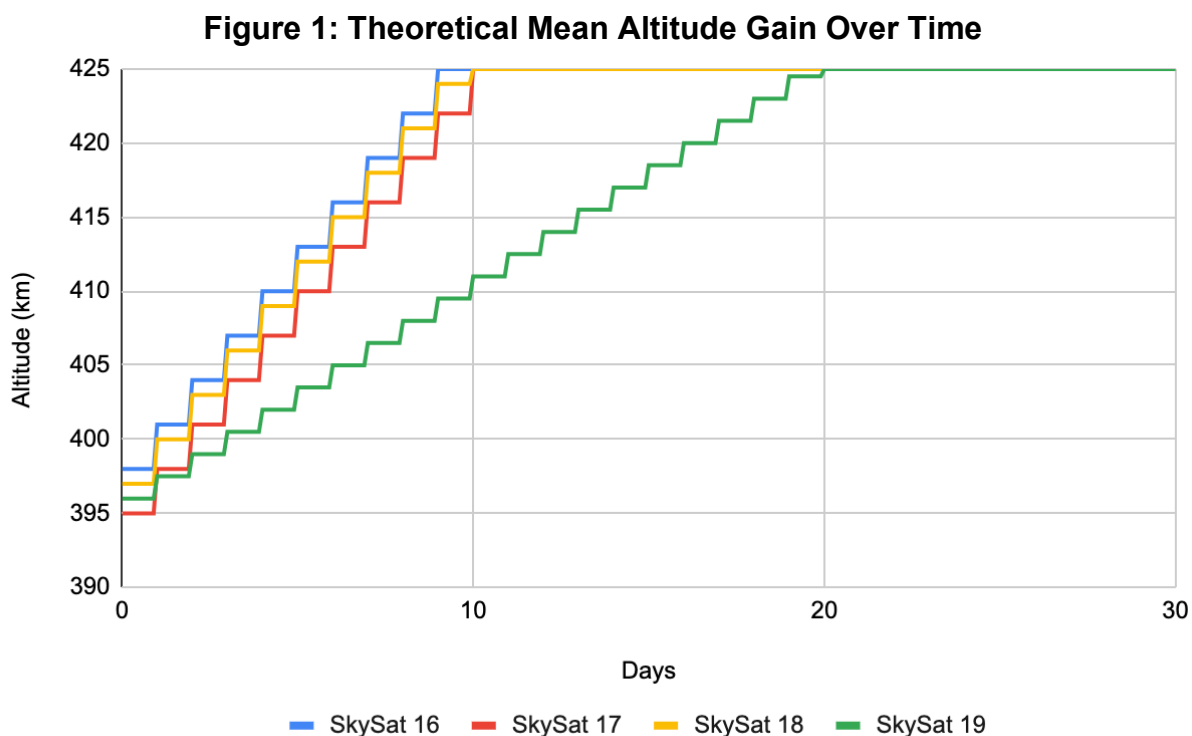
Operations of SkySat satellites at up to 630 km were previously approved.¹² Accordingly, the operation of several of the Block 3 SkySat satellites at a nominal 450 km altitude raises no new radio frequency interference issues or orbital debris mitigation matters.

B. Timeliness of orbit raising plans for Block 3 SkySats

Planet is requesting expedited action in order to implement this orbit raising plan. The potential benefit of raising these satellites diminishes exponentially if the orbit-raising plan is delayed beyond March 27th. At lower orbital altitudes, atmospheric drag creates a greater strain on satellite resources, requiring Planet to execute additional maneuvers that deplete propulsion reserves. Exposure to space weather in the current

¹² See Terra Bella Authorization.

solar weather cycle also poses additional challenges. The planned raising campaign is designed to maximize available resources while minimizing the effect of solar weather; delay could affect the efficacy of the raising campaign by exposing the satellites to higher atmospheric drag due to a lower operating altitude and increasing solar activity. It also takes significant staff resources to plan and execute a raising campaign of multiple satellites, including analyzing weather patterns, possible conjunctions, and appropriate phasing of Planet's satellites. Delay in a grant of the application would require the team to develop and execute a new plan, requiring additional staff resources, causing further delay, and compounding the effect of the atmospheric drag and solar weather factors described above. As shown in the chart below, Planet will quickly pass above the currently authorized operating range for SkySats 16 through 19.



C. Operational plans for Block 3 SkySat satellites after raising

Planet expects that under nominal operating conditions, the raised orbits would have a perigee of no more than 5 km below the target orbital altitude and an apogee of no more than 5 km above the target orbital altitude. Thus, for example, Planet expects

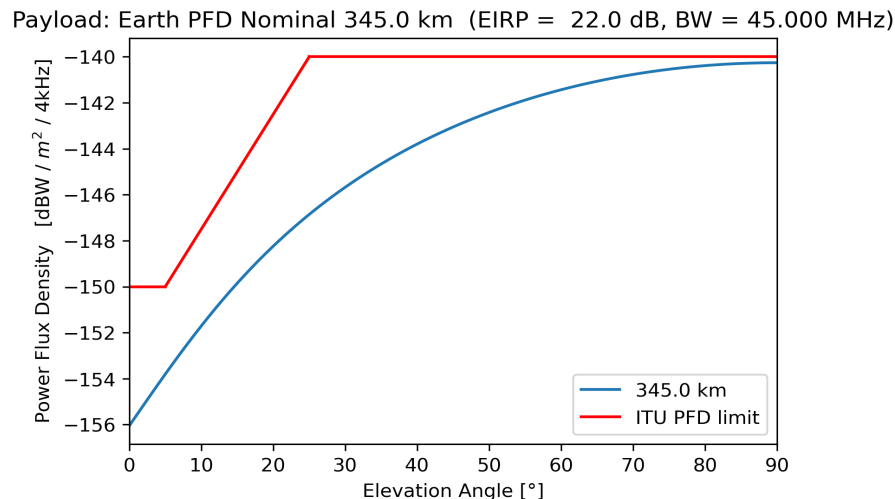
that under nominal operating conditions the SkySat satellites 16-18 would have a perigee of at least 445 km and an apogee of at most 455 km. Similarly, Planet expects that under nominal operating conditions SkySat satellite 19 would have a perigee of at least 420 km and an apogee of at most 430 km.

Planet plans to operate all raised SkySat satellites at their new nominal altitudes until they reach their budgeted propellant reserves. Planet will then allow the orbits to begin to decay naturally, reserving sufficient propellant for any necessary collision avoidance activities through reentry. This includes reserving sufficient propellant budget to keep the satellites outside of the relevant keep-out zones (discussed above) while crossing the ISS and CSS orbit bands.

D. Authorization to continue operations below 400 km down to 345 km

Once a SkySat satellite passes below an altitude of 400 km, it will take approximately 0.7 - 1.8 years to deorbit naturally, assuming a reasonable coefficient of drag.¹³ Downlink transmissions will not exceed power flux density (PFD) limits from the proposed 345 km perigee altitude, as shown in the chart below. Planet therefore requests authorization to continue to operate SkySat satellites 3-21 down to a perigee of no less than 345 km as the satellite orbits naturally decay.

Figure 2: X-band PFD at Earth's Surface at 345 km



¹³ Pursuant to prior grants, the SkySat satellites were authorized to operate at altitudes below 400 km during in-orbit raising. See Stamp Grant, Application of Terra Bella Technologies Inc., File No. SAT-MOD-20170317-00053 (granted June 28, 2017).

II. Additional/General Considerations**A. Form 312, Schedule S Requirements Waiver Request**

For purposes of the Schedule S, Planet has provided information for a target nominal operational altitude of 445 km x 455 km for SkySats 16-18, and 420 km x 430 km for SkySat 19, which will all participate in an orbit raising campaign. For the remaining SkySat satellites, Planet provides information in the Schedule S for the proposed new lowest authorized orbit of 345 km. Planet requests a limited waiver of section 25.114(c) of the Commission's rules, which requires certain information to be filed in the Schedule S. Some of these categories (*e.g.*, antenna pointing error and antenna rotational error) are inapplicable and/or do not permit the entry of correct values. In such cases, Planet has provided placeholder data (*i.e.*, "0.0" or "0.1") in the Schedule S to complete the form. Strict application of the rules here is unnecessary to serve the purposes of the rules, which is to ensure that the Commission has all the relevant information necessary to evaluate the application. Given that Planet has provided all relevant information in this Exhibit A, waiver of certain Schedule S requirements is appropriate.¹⁴

B. ITU Advance Publication Materials

Planet is preparing the relevant ITU submission for the proposed modification of its non-geostationary EESS system and will separately provide an electronic file with this information to the International Bureau.

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For the reasons set out above, Planet respectfully requests modification of the Planet Authorization. Further, because of the impact of delayed action, Planet requests expedited action.

¹⁴ See 47 C.F.R. § 1.3; see, *e.g.*, Stamp Grant, ViaSat, Inc., SAT-LOI-20140204-00013 (granted Jun. 18, 2014) (waiving Schedule S requirements because they were found to be unnecessary for the space station application).

EXHIBIT B

Planet Labs PBC
Application for License Modification

Respectfully submitted,

/s/ Danielle J. Piñeres

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TECHNICAL CERTIFICATE

I, Brian Lewis, hereby certify, under penalty of perjury, that I am the technically qualified person responsible for the preparation of the engineering information contained in the technical portions of the foregoing application and the related attachments, that I am familiar with Part 25 of the Commission's rules, and that the technical information is complete and accurate to the best of my knowledge and belief.

/s/ Brian Lewis

Brian Lewis
Chief Engineer, Space Systems
Planet Labs PBC

February 24, 2023