**EXHIBIT 43**
Planet Labs Inc.
License Application
FCC Form 312
June 2013

## Description of Application

With this application, Planet Labs Inc. ("Planet Labs"), formerly known as Cosmogia Inc. ("Cosmogia"), requests authority to launch and operate an Earth imagery satellite system in low-Earth orbit. As detailed in the application below, the initial phase of the satellite system will consist of a constellation of 28 satellites collectively named Flock 1, using the 8025-8400 MHz band allocated to the Earth Exploration Satellite Service ("EESS"). Commands to the spacecraft from the system's ground segment will operate in the 2025-2110 MHz band. In addition, secondary TT&C communications will use the 401-402 MHz and the 449.75-450.25 MHz bands for the early commissioning phase, as well as for emergency back-up communications. Flock 1 will operate on a non-common carrier basis.

Planet Labs anticipates launching the 28 satellite constellation, Flock 1, as early as December 2013, and has already commenced construction of the NGSO system. [1] Flock 1 will be transported to the International Space Station (ISS) and ejected from the ISS Multi-Purpose Experiment Platform. Ejection altitude depends on the ISS boost schedule, and is expected to be between 380 and 410 km. The system will continue to operate as the orbit naturally decays until 200 km. In order to demonstrate compliance with regulatory and technical provisions covering the range of possible operating altitudes, upper and lower case bounds are presented for parameters such as orbital lifetime, power flux density limits, link budgets, and predicted gain contours. A baseline altitude of 410 km is used for most calculations, including the Schedule S portion of FCC Form 312, and this exhibit with its associated attachments should be used as the complete information package where limitations in the application forms prohibit inputting a range of values. [2]

Planet Labs has submitted an application for license from the National Oceanic and Atmospheric Administration ("NOAA") to operate Flock 1, a private remote sensing space system. Planet Labs has already received license to operate from NOAA for four of its technology demonstration satellites. [3]

Timely deployment of the constellation will enable Planet Labs to begin to offer its unique imaging services to customers in the U.S. and around the world. To the extent necessary to enable Commission action prior to the deployment of Flock 1 as early as December 2013, Planet Labs respectfully requests expedited consideration of this request for launch and operation authority.

[1] Notification of commencement of space station construction is included as Attachment A.
[2] *See* Stamp Grant, DG Consents Sub, Inc., SAT-MOD-20120710-00111 (granted January 1, 2013).
[3] *See* Cosmogia Inc. License from National Oceanic and Atmospheric Administration to Operate a Private Remote Sensing Space System for Dove 1, 2, 3 and 4 (Access at http://www.nesdis.noaa.gov/CRSRA/licenseHome.html).

In support of its request for authorization, Planet Labs offers the following information concerning its proposed satellite system.

## I. Description of the Applicant

Planet Labs Inc. is a private U.S. company headquartered in San Francisco, California, incorporated in Delaware in December, 2010 under the name Cosmogia Inc. The name of the corporation was legally changed to Planet Labs Inc. in June 2013. Planet Labs designs, constructs and operates small Earth imagery satellites, and will provide Earth imagery products on a commercial basis. Planet Labs has launched and operated two successful technology demonstration missions, Dove 1 and Dove 2[4], which have proven the key satellite and ground segment technologies of the Flock 1 design. Planet Labs has two additional licensed technology demonstration missions, Dove 3 and Dove 4[5], expected to launch in November 2013, to continue maturing satellite and ground segment technologies and operations. The Flock 1 satellite design is nearly identical to that of the Dove 1 - 4 satellites, allowing for a highly robust, space-proven system to be put into operation with the launch of Flock 1.

## II. Information Required Under Section 25.114(d) of the Commission's Rules

### A. General Description of Overall Facilities, Operations and Services

The proposed Flock 1 satellite system will consist of a space segment comprised of 28 satellites and a ground segment comprised of a primary earth station located in Half Moon Bay, CA, along with other earth stations located outside the United States.[6] Each satellite is designed to receive commands from a ground station and downlink the imagery and telemetry data stored onboard the satellite. All satellite operations are coordinated from the ground; there will be no inter-satellite communications.

The Flock 1 satellites will be transported to the International Space Station (ISS) via a Resupply Flight on Orbital Science's Antares launch vehicle No Earlier Than December 2013. Once the 28 satellites have been delivered to the ISS and unpacked, they will gradually be deployed from the Multi-Purpose Experiment Platform.[7] The Flock 1 satellites will be 3-axis stabilized using reaction wheels and magnetorquers, and each satellite will be commissioned once ejected. The satellites do not carry active propulsion, but can perform station keeping and collision avoidance maneuvers using differential drag. The orbital period of the satellites will be approximately 92 minutes. The nominal lifetime of Flock 1 is 11 months, with a maximum lifetime of 18 months, depending on ejection altitude and atmospheric drag. Future TBD launches will replenish the space system to ensure continued operation for at least 15 years.

The data collected by the onboard camera of each satellite will be processed, stored and downlinked, along with basic telemetry data, in the 8025-8400 MHz band (X-band) to appropriate earth stations.

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[4] *See* FCC OET file number 0898-EX-ST-2012 and 0100-EX-PL-2012, respectively.
[5] *See* FCC OET file number 0548-EX-PL-2012 and 0551-EX-PL-2012, respectively.
[6] Earth stations will be filed for separately.
[7] This type of cubesat deployment has already been demonstrated with at least 5 different satellites http://www.aviationweek.com/Article.aspx?id=/article-xml/asd_10_08_2012_p04-02-503766.xml (Accessed June 4, 2013).

Transmissions will only occur while the satellites are visible from that particular earth station site, at a minimum elevation angle of 5 degrees. The X-band downlink will use Adaptive Coding and Modulation (ACM), as defined by the DVB-S2 standard, to adapt the coding, modulation and symbol rate based on the strength of the link throughout the pass in order to maximize data throughput. Since ACM and orbital altitude degradation allows for a wide range of operational modes, a "worst-case" analysis is provided for Power Flux Density and Occupied Bandwidth calculations.

For the telemetry, tracking and command (TT&C) functions, the satellites will receive command communications over the primary uplink channel using the 2025-2110 MHz band (S-band), which is authorized in the EESS subject to such conditions as may be applied on a case-by-case basis.[8]

A secondary TT&C downlink will use the 401-402 MHz band, which is authorized for Space Operations on a secondary basis for non-federal users.[9] A secondary TT&C uplink will use the 449.75-450.25 MHz band, which is authorized for space telecommand, subject to agreement obtained under No. 9.21.[10] These bands will only be used for the early commissioning phase, as well as for emergency back-up communications to ensure positive control of the satellites.

The proposed ground segment will consist of several remotely operated earth stations around the world equipped with 5 m antennas for the X/S-band transmission, and separately mounted cross-polarized yagi antennas for the UHF transmissions. Command signals will be issued from the mission control center in San Francisco, California, and uplinked to the satellites via the remotely operated earth stations. Telemetry data from the satellites will be received at the remotely operated earth stations and relayed to the San Francisco mission control center. The S-band uplink will also provide feedback for the adaptive X-band downlink rate.

### B. Description of Types of Services and Areas to be Served

The Planet Labs Flock 1 satellite system will collect large coverage, frequently updated Earth imagery. Planet Labs tools and products will be available to private sector customers, governments, organizations and individuals worldwide. Industries to benefit from the information include disaster monitoring and response, agriculture, real estate and construction, environmental monitoring and stewardship, financial services, insurance, scientific and academic research, conservation, humanitarian and mapping.

[8] *See* 47 C.F.R. § 2.106, footnote US347. Transmissions from the Flock 1 satellites will not cause harmful interference to Federal and non-Federal stations operating in accordance with the Table of Frequency Allocations.
[9] *See* 47 C.F.R. § 2.106; In the Matter of Orbital Imaging Corporation, DA 99-353, at ¶¶ 3,8 (1999).
[10] *See* 47 C.F.R. § 2.106, footnote 5.286 and US87. Transmissions from the Flock 1 satellites will not cause harmful interference to Federal and non-Federal stations operating in accordance with the Table of Frequency Allocations.

### C. Technical Description

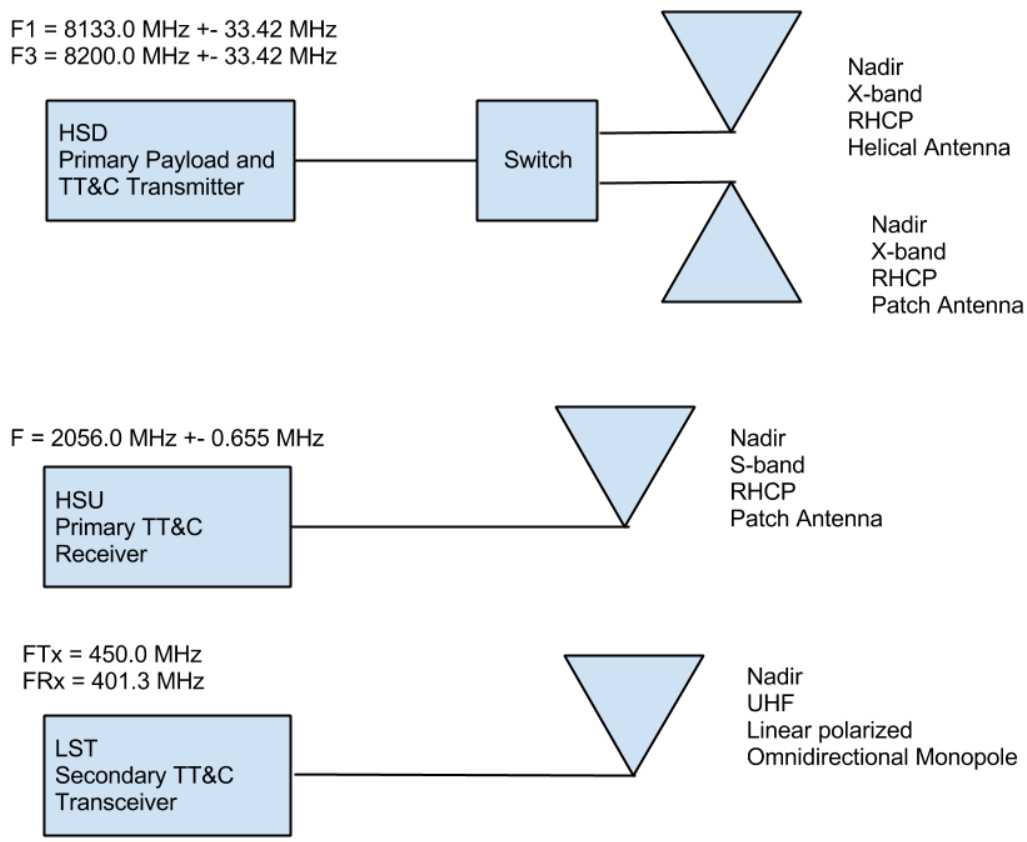


**Figure 1 Communication Block Diagram**

The Flock 1 communications system consists of a primary and secondary set of radios. The High Speed X-band Downlink (HSD) and the High Speed S-band Uplink (HSU) are the primary radios, the Low Speed UHF Transceiver (LST) is the secondary telemetry and command transceiver.

The HSD has two channels centered at 8133.0 and 8200.0 MHz, and transmits through a RF switch to either a medium gain patch antenna or a high gain helical antenna, both of which are mounted to the body of the satellite. Each satellite will be assigned one of the two transmission channels at the beginning of a pass to de-conflict potential interference, and each satellite is capable of operating in either a nadir-locked mode, or ground station pointing mode.

The HSU is centered at 2056.0 MHz and uses a patch antenna mounted to the body of the satellite. The LST uses a single omnidirectional dipole antenna mounted to the body of the satellite for both the 450 MHz and 401 MHz link.

The HSU and LST link will connect at 5 degree elevation or above, and remain at the same bitrate throughout the entire pass. The HSD will connect at 5 degree elevation or above, and uses Adaptive Coding and Modulation (ACM), as defined by the DVB-S2 standard, throughout the pass.

The technical characteristics of the proposed Flock 1 satellite system are further detailed in the Schedule S portion of the FCC Form 312 of this Application. The proposed satellite system's link budgets are included as Attachment B hereto, and the proposed satellite system's space station antenna patterns are included as Attachment C hereto. Attachment D shows the predicted gain contours required by Section 25.114(d)(3) of the Commission's rules at the Half Moon Bay earth station site from a 90° elevation angle.

### D. Power Flux Density Calculation

#### 1. Power Flux Density at the Surface of the Earth in the band 8025-8400 MHz

Section 25.208 of the Commission rules does not contain power flux density ("PFD") limits at the Earth's surface produced by emissions from NGSO EESS space stations operating in the 8025-8400 MHz band. However, Table 21-4 of the ITU Radio Regulations states that the PFD at the Earth's surface produced by emissions from an EESS space station in the 8025-8400 MHz band, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the following values:

- –150 dB(W/m²) in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;
- –150 + 0.5(d -5) dB(W/m²) in any 4 kHz band for angles of arrival d (in degrees) between 5 and 25 degrees above the horizontal plane;
- –140 dB(W/m²) in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

The PFD is calculated as:
PFD [dB(W/m²/4 kHz)] = EIRP (dBW) - 71 - 20log10(D) - 10log10(BW) - 24
Where:
EIRP is the Maximum EIRP of the transmission, in dBW;
D is distance between the satellite and affected surface area, in km;
BW is the symbol bandwidth of the transmission, in MHz.

These limits relate to the PFD that would be obtained under assumed free-space propagation conditions. Figure 2 below shows the worst-case scenario for PFD on the Earth's surface for both the helical and patch antenna at the upper and lower bounds of operational altitudes. The X-band transmitter power will be reduced by 0.5W on orbit at 200 km to satisfy the PFD limit (reduced output is shown in Figure 2 and indicated by an asterisk in the legend). The PFDs at the Earth's surface produced by the Flock 1 X-band transmitter, under all modes of operation and altitudes, satisfy the PFD limits in the ITU Radio Regulations for all angles of arrival.

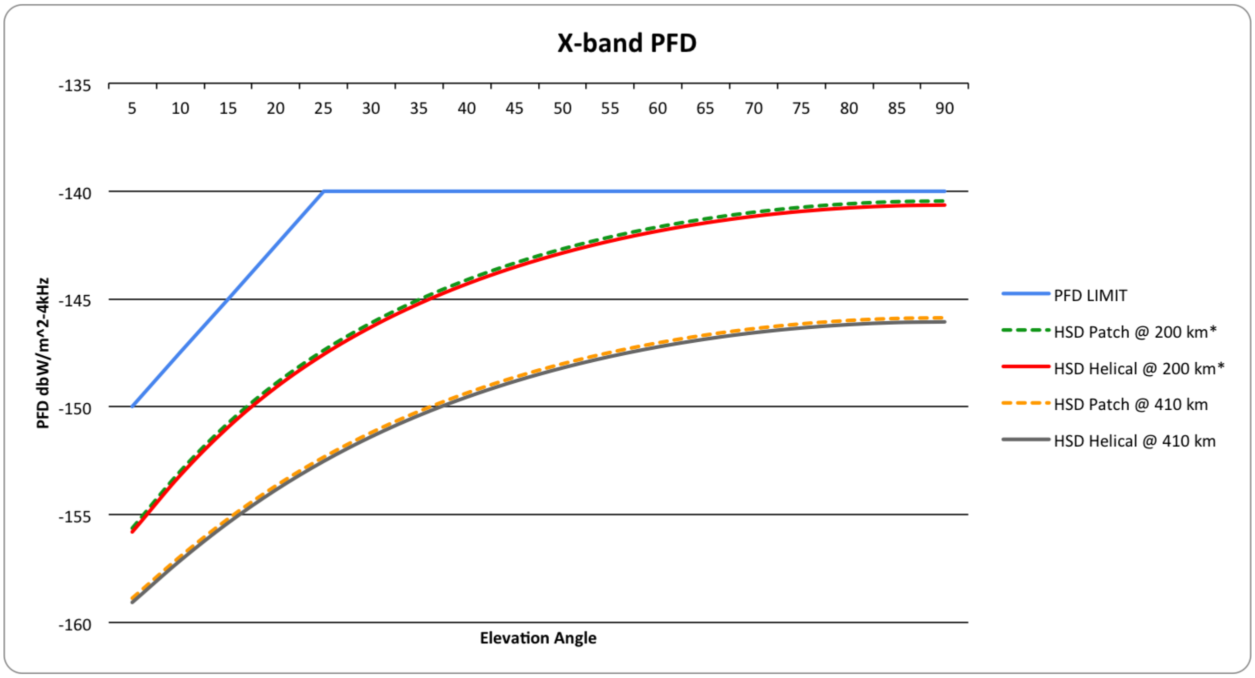


**Figure 2 Worst Case PFD at the surface of the Earth in the 8025-8400 MHz band produced by the Flock 1 X-band transmitter**

### 2. Power Flux Density at the Surface of the Earth in the band 8400-8450 MHz

ITU-R Recommendation SA-1157 specifies a maximum allowable interference power spectral flux-density level at the Earth's surface of -255.1 dB(W/(m²Hz)) to protect ground receivers in the deep-space research band 8400-8450 MHz. Planet Labs uses a combination of baseband digital filtering (using an alpha roll-off factor of 0.35) and RF layer bandpass filtering to achieve the ITU recommended protection level for the 8400-8450 MHz band.

### 3. Power Flux Density at the Geostationary Satellite Orbit

No. 22.5 of the ITU Radio Regulations specifies that in the frequency band 8025-8400 MHz, which the EESS using non-geostationary satellites shares with the fixed-satellite service (Earth-to-space) or the meteorological-satellite service (Earth-to-space), the maximum PFD produced at the geostationary satellite orbit ("GSO") by any EESS space station shall not exceed –174 dB(W/ m²) in any 4 kHz band. The calculation below shows that the PFD produced by the transmissions from the proposed Planet Labs satellites does not exceed the limit in No. 22.5, even in the worst possible hypothetical case.

The minimum possible distance between a Flock 1 satellite and GSO is 35786 - 410 = 35376 km. Under a hypothetical assumption of a Flock 1 satellite antenna radiating its peak EIRP toward GSO, the worst-case scenario for the helical antenna with EIRP = 15.92 dBW and BW = 29.7 MHz produces a PFD at GSO of -184.78 dB(W/m²) in any 4 kHz band. The worst-case scenario for the patch antenna with EIRP = 9.12 dBW and BW = 5.94 MHz produces a PFD at GSO of -184.59 dB(W/m²) in any 4 kHz band. Neither scenario exceeds the limit.

### E. Interference Analysis

#### 1. Interference between EESS systems operating in the band 8025-8400 MHz

Interference between the Flock 1 satellites and those of other systems is unlikely because EESS systems operating in the 8025-8400 MHz band normally transmit only in short periods of time while visible from the dedicated receiving earth stations. For the interference to happen, satellites belonging to different systems would have to travel through the antenna beam of the receiving earth station and transmit at the same time. In such an unlikely event, the interference can be still be avoided by coordinating the satellite transmissions amongst the various EESS users so that they do not occur simultaneously.

#### 2. Interference with the Fixed Service and the FSS in the band 8025-8400 MHz

Planet Labs demonstrates in sections II.D.1 and II.D.3 that the satellite transmissions will meet the limits specified by the ITU for protection of the Fixed Service in the 8025-8400 MHz band, as well as the geostationary FSS satellites using this band for their uplinks.

#### 3. Protection of the deep-space research in the band 8400-8450 MHz

Planet Labs also demonstrates in section II.D.2 that the protection criterion recommended by the ITU for deep-space research in the 8400-8450 MHz band is met.

### F. Public Interest Considerations

The grant of this application will permit Planet Labs to launch and operate a state-of-the-art remote sensing satellite system that will help empower users to make better decisions and enable a sustainable planet. Planet Labs will provide a unique data set of large coverage, frequently updated imagery and derived data that is currently unavailable from private sector or government remote sensing providers. In addition to traditional consumers of remote sensing data, Planet Labs will provide direct benefit to environmental and humanitarian organizations that historically have not had access to this extent of imagery. This service will compliment existing offerings in the remote sensing market and will help promote new users and applications.

### G. Orbital Debris Mitigation

Planet Labs has conducted an Orbital Debris Assessment Report ("ODAR") in compliance with NASA-STD-8719.14, Appendix A, which is attached as a separate exhibit and has been verified using higher fidelity models by the NASA Orbital Debris Program Office. As discussed in the submitted ODAR, the Flock 1 system is compliant with all applicable NASA orbital debris requirements. Following is a summary of that report.

Planet Labs confirms that the Flock 1 satellites will not undergo any planned release of debris. In addition, all separation and deployment mechanisms, and any other potential source of debris will be retained by the spacecraft, launch vehicle or deployment mechanism. Planet Labs has assessed the probability of the satellites becoming sources of debris by collision with both large and small objects using NASA's Debris Assessment Software (DAS) v2.0.2 and has found Flock 1 to be fully compliant.

The only source of stored energy on the satellites is the Lithium-Ion battery system. The 12 battery cells are charged before payload integration and provide electrical energy during the mission. The cells are recharged by silicon solar cells mounted on the deployable solar arrays. A battery cell protection circuit manages the charging cycle, performs battery balancing, and protects against over and undercharge conditions. The 12 batteries will not be passivated at End of Mission due to the low risk and low impact of explosive rupturing. The maximum total chemical energy stored in each battery is ~10kJ.

The Flock 1 satellites will be deployed from the International Space Station (ISS), and thus will initially be placed in an orbit that is very similar to the ISS. The first 16 satellites will be deployed in pairs in the ISS's "45 degree nadir-aft" direction. The other 12 will be deployed in a similar fashion after re-loading procedure. This deployment direction has been selected in conjunction with ISS representatives to minimize risk of collisions. Planet Labs has conducted a collision risk analysis using the DAS software and STK for the following scenarios: Flock 1 vs ISS, Flock 1 vs U.S. Space Catalog, and Flock 1 vs Flock 1. Flock 1 was found to be compliant in all cases. Planet Labs has also engaged the Joint Space Operations Center (JSpOC) to receive conjunction threat reports to better coordinate collision avoidance measures.

Planet Labs has identified China's Tiangong-1 space module and Bigelow Aerospace's inhabitable space stations as the other man-rated space objects that require a high level of coordination for collision mitigation. Planet Labs will provide the responsible organizations with the information needed to assess risks and ensure safe flight profiles. Planet Labs will provide a Point of Contact that will be available 24 hours per day/7 days per week to coordinate collision avoidance measures.

In addition to coordination and deployment sequencing efforts, each of the Flock 1 satellites will have the capability to perform collision avoidance using differential drag. Due to the two deployable solar array "wings", each Flock 1 satellite will have the ability to change its ballistic coefficient through an attitude maneuver using the onboard magnetorquers and reaction wheels. The ratio between minimum, nominal and maximum drag configuration is 1:3:19 (see Fig 3). At all operational altitudes, any of the Flock 1 satellites can perform a collision avoidance maneuver given approximately 24 hours' notice from a conjunction threat report.

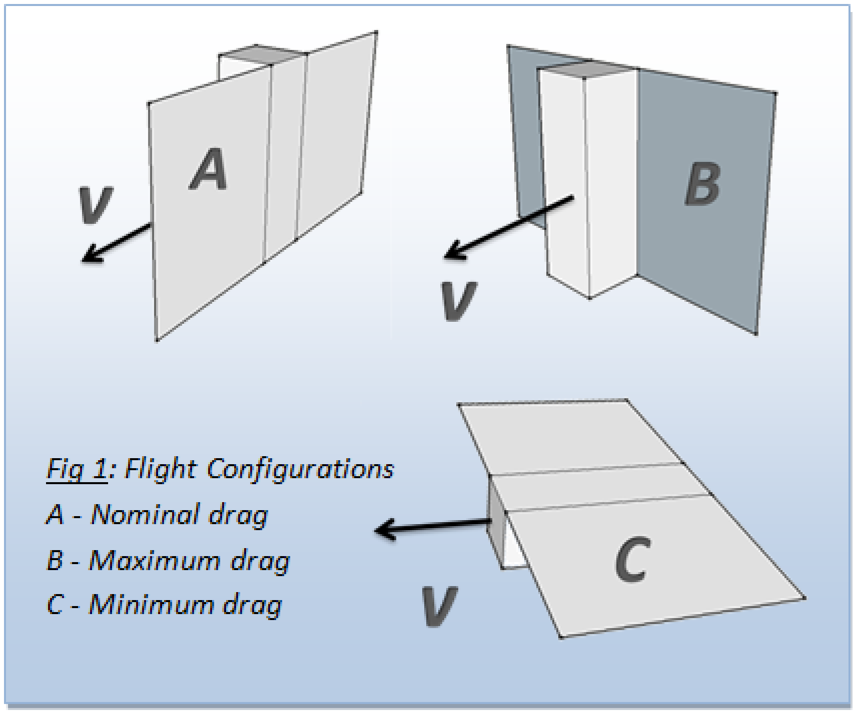


**Figure 3 Flock 1 satellite attitude configurations**

Section 25.114(d)(14)(iii) of the Commission's rules calls upon applicants to specify the accuracy, if any, with which the orbital parameters of their non-geostationary satellite orbit space stations will be maintained.[11] As the Flock 1 satellites will not carry maneuvering fuel, Planet Labs will not maintain the satellites' inclination angles, apogees, perigees, and right ascension of the ascending node to any specified degrees of accuracy. Planet Labs' disclosure of the above parameters, as well as the number of space stations, the inclination of orbital planes, and the orbital period to be used, can assist third parties in identifying potential problems. This information also lends itself to coordination between Planet Labs and other operators located in similar orbits.

Section 25.114(d)(14)(iii) also calls for indication of the anticipated evolution over time of the satellites' orbits. Planet Labs notes that the Flock 1 satellites will be in orbits that gradually decay over time until the satellites reenter the atmosphere. At a maximum initial altitude of 410 km, the satellite will reenter the atmosphere between 10 and 18 months, continuing operation down to 200 km. Section 25.114(d)(14)(iii) calls for the post-mission disposal plan, and Planet Labs notes that all Flock 1 satellites will completely burn up during re-entry with no surviving material reaching the ground. This analysis was conducted using the DAS software, and verified with higher fidelity models by the NASA Orbital Debris Program Office.

A more detailed Orbital Debris Assessment Report is included as a separate exhibit.

[11] *See* 47 C.F.R. § 25.114(d)(14)(iii).

### H. Extent of Communications with Flock 1 Satellites During Descent to the Atmosphere

Planet Labs intends to utilize the Flock 1 satellites for communications services (including TT&C functions) from the point at which each satellite is placed into its operational orbit until the satellite reaches an altitude of 200 km where final re-entry into the atmosphere is imminent. At all altitudes, Planet Labs is capable of controlling X-band emission levels from the ground by adjusting satellite transmitter power on a graduated basis as the satellite nears the Earth.[12]

## III. Additional/General Considerations

### A. Waiver Request of Modified Processing Round Rules

Planet Labs requests that this application be processed pursuant to the first-come, first-served procedure adopted for "GSO-like satellite systems" under Section 25.158 of the Commission's rules. [13] To the extent necessary to allow for such processing, Planet Labs also requests waiver of Sections 25.156 and 25.157 of the Commission's rules, which stipulate the processing of "NGSO-like satellite systems" under a modified processing round framework.[14]

The Commission may waive any of its rules if there is "good cause" to do so. [15] In general, waiver is appropriate if: (1) special circumstances warrant a deviation from the general rule; and (2) such deviation would better serve the public interest than would strict adherence to the general rule. [16] Generally, the Commission will grant a waiver of its rules in a particular case if the relief requested would not undermine the policy objective of the rule in question, and would otherwise serve the public interest.[17]

The Commission has previously waived the modified processing round requirement and allowed EESS NGSO satellite systems to be processed on a first-come, first-served basis. In Space Imaging, LLC, the Commission concluded that authorizing Space Imaging to operate in its requested EESS frequency bands would not preclude other NGSO operators from operating in those bands because NGSO EESS operators are generally capable of sharing spectrum in the same frequency[18]. The Commission also cited the fact that "very few" U.S. licensed EESS NGSO systems operating in the band further reduced the possibility of interference with other operators in the 8025-8400 MHz band[19]. In light of these circumstances, the Commission concluded that Space Imaging's applications warranted GSO-like processing, and waived Sections 25.156 and 25.157 of its rules[20].

[12] The X-band transmitter can be tuned from a 3W output down to a 0.5 W output in 0.5 W steps.
[13] *See* 47 C.F.R. § 25.158.
[14] *See* 47 C.F.R. §§ 25.156 & 25.157.
[15] *See* 47 C.F.R. § 1.3; WAIT Radio v. FCC, 418 F.2d 1153 (D.C. Cir. 1969) ("WAIT Radio"); Northeast Cellular Telephone Co. v. FCC, 897 F.2d 1164 (D.C. Cir. 1990) ("Northeast Cellular").
[16] Northeast Cellular, 897 F.2d at 1166.
[17] WAIT Radio, 418 F.2d at 1157.
[18] *See* Space Imaging, LLC, 20 FCC Rcd 11694, 11968 (2005). *See* also Stamp Grant, Skybox Imaging, Inc., SAT-LOA-20120322-00058 (granted September 20, 2012).
[19] Id. at 11968.
[20] Id. See also DigitalGlobe, Inc., 20 FCC Rcd 15696, 15699 (2005) (waiving Sections 25.156 and 25.157). See also Stamp Grant, Skybox Imaging, Inc., SAT-LOA-20120322-00058 (granted September 20, 2012).

Similar to the EESS NGSO system in Space Imaging, Planet Labs' system is fully capable of sharing with current and future NGSO systems operating in the same frequency bands. Spectrum sharing will be possible because the Planet Labs satellites and satellites in other systems transmit only in short periods of time while visible from the dedicated receiving earth station. For harmful interference to happen, satellites belonging to different systems would have to travel through the antenna beam of the receiving earth station and transmit at the exact same time. In such an unlikely event, the resulting interference can still be avoided by coordinating the satellite transmission so that they do not occur simultaneously. For these reasons, the waiver request here is fully warranted because waiving Sections 25.156 and 25.157 will not undermine the policy objectives of those rules.

### B. Waiver Request of Default Service Rules

Planet Labs requests a waiver of the default service rules under Section 25.217(b) of the Commission's rules[21]. Although the Commission has not adopted band-specific rules for EESS NGSO operations in the 8025-8400 MHz band, the Commission has previously granted a waiver of the default service rules contained in Section 25.217(b) to NGSO EESS system licensees, based on the fact that EESS operators in the 8025-8400 MHz band are required to comply with technical requirements in Part 2 of the Commission's rules and applicable ITU rules[22]. In these cases, the Commission concluded that because the cited requirements had been sufficient to prevent harmful interference in the 8025-8400 MHz band, there was no need to impose additional technical requirements on operations in that band, and therefore granted the waiver requests. For these same reasons, the Commission should grant Planet Labs a waiver of the default service rules contained in Section 25.217(b).

### C. Form 312, Schedule S

As required by the Commission's rules and policies, Planet Labs has completed, to the best of its ability, the FCC Form 312, Schedule S submission that reflects the orbital and physical/electrical characteristics of Flock 1. Due to the limitations of the Commission's software, Planet Labs urges the Commission to refer to the data in this exhibit and the link budgets in Attachment B for the most accurate information regarding the performance of Flock 1 links.

### D. Implementation Milestones

Planet Labs intends to supply the Commission with information sufficient to demonstrate that it has already satisfied the first three implementation milestones under Section 25.164(b) for NGSO systems in a separate submission. Planet Labs understands that in the absence of a favorable Commission determination of milestone compliance issued with the grant of this application or within 30 days thereafter, the full amount of the bond specified in Section 25.165(a)(1) will be required.

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[21] *See* 47 C.F.R. § 25.217.

[22] *See* Space Imaging, 20 FCC Rcd at 11973; DigitalGlobe, 20 FCC Rcd at 15701-02 (2005). *See* also Stamp Grant, Skybox Imaging, Inc., SAT-LOA-20120322-00058 (granted September 20, 2012).

### E. ITU Advance Publication Materials and Cost Recovery

Planet Labs has prepared the International Telecommunication Union ("ITU") Advance Publication Information submission for its proposed non-geostationary EESS system, and will provide this information to the Commission under separate cover. In particular, Planet Labs will provide an electronic file with this information to the Satellite Engineering Branch of the Satellite Division of the Commission's International Bureau. Planet Labs will also provided a letter acknowledging that it is responsible for any and all cost recovery fees associated with filings for the proposed system under ITU Council Decision 482 (modified 2008), as it may be modified or succeeded in the future.

In sum, Planet Labs respectfully requests the Commission to grant the application for launch and operation authority as detailed herein. To the extent necessary, Planet Labs requests expedited consideration of this Application in order to ensure favorable Commission action in advance of the scheduled December 2013 launch of Flock 1.

ATTACHMENT A
Planet Labs, Inc.
FCC Form 312, Exhibit 43
June 2013

**NOTIFICATION OF COMMENCEMENT OF SPACE STATION CONSTRUCTION**

Planet Labs Inc. (“Planet Labs”), pursuant to Section 25.113(f) of the Commission’s rules, 47 C.F.R. § 25.113(f), hereby notifies the Commission that it has commenced construction, at its own risk, of the twenty eight (28) non-geostationary orbit (“NGSO”) satellites it proposes to launch and operate in the Application to which this statement is attached.[23] Planet Labs intends to utilize these spacecraft to implement a NGSO Earth Exploration-Satellite Service system.

[23] *See* 47 C.F.R. § 25.164 (b)(3).

**LINK BUDGETS**

Figures 4-9 show the link budgets for the various frequency bands and modes of operation of the Flock 1 satellites. Note that the X-band ACM capability allows for higher effective bitrates at higher elevations. Figures 4 & 5 show the X-band downlink through the high gain helical antenna at low and high elevation angles, respectively. Figure 6 & 7 show the X-band downlink through the medium gain patch antenna at low and high elevation angles, respectively. Figure 8 shows the UHF downlink. Figure 9 shows the S-band and UHF uplinks. All link budgets are performed for an altitude of 410 km, the maximum altitude of ejection of Flock 1 from the ISS. In the event of a lower ejection altitude, as well as during orbit decay, both the space system and ground system transmitters can be adjusted to maintain equivalent link margin and EIRP levels.

**X-band Link Budget: Helical Antenna, Low Elevation**

| | | | |
|---|---|---|---|
| Modulation | | QPSK | QPSK |
| Bits/Symbol | | 2 | 2 |
| Data Rate | Mbps | 20 | 20 |
| FEC rate | | 0.5 | 0.5 |
| Symbol rate | MHz | 20.00 | 20.00 |
| Occupied Bandwidth | MHz | 29.70 | 29.70 |
| **Transmitter** | | **Ch 1** | **Ch 2** |
| Frequency | GHz | **8.133** | **8.200** |
| Transmitter Power | dBW | 5 | 5 |
| Transmitter Line Loss | dBW | 1 | 1 |
| Avg Transmit Antenna Gain | dBi | 12.3 | 12.3 |
| Eq. Isotropic Radiated Power | dBW | 15.92 | 15.92 |
| **Orbital Information** | | | |
| Orbit Altitude (km) | km | 410 | 410 |
| Elevation Angle | deg | 5 | 5 |
| Propagation Path Length | km | 1,833 | 1,833 |
| **Channel Losses** | | | |
| Free Space Loss | dB | -175.9 | -176.0 |
| Polarization Loss | dB | -0.5 | -0.5 |
| Rain Attenuation | dB | -1 | -1 |
| Cloud Attenuation | dB | -0.02 | -0.02 |
| Total Propagation Losses | dB | -177.44 | -177.51 |
| **Receive Antenna Properties** | | | |
| Antenna Aperture Gain | dBi | 50.4 | 50.4 |
| Receive Antenna Line Loss | dB | -0.1 | -0.1 |
| Rx Antenna Pointing Error Loss | dB | -0.20 | -0.20 |
| Rx Antenna Gain with pointing error | dB | 50.1 | 50.1 |
| **Radome Losses** | | | |
| Reflective Losses | dB | 0.78 | 0.78 |
| Dissipative Losses | dB | 0.75 | 0.75 |
| **Rx Antenna Performance** | | | |
| Net Antenna gain | dBi | 48.57 | 48.57 |
| System Noise Temperature | K | 144 | 144 |
| Ground Station G/T | dB/K | 26.99 | 26.99 |
| **Received Signal** | | | |
| Eb/No | dB | 21.06 | 20.99 |
| Required Bit Error Rate | | 1.00E-07 | 1.00E-07 |
| (Eb/N0) required for BER | dB | 9 | 9 |
| Implementation Losses | dB | 3 | 3 |
| **Margin** | **dB** | **9.06** | **8.99** |

**Figure 4 X-band, Helical Antenna, Low Elevation Link Budget**

| X-band Link Budget: Helical Antenna, High Elevation | | | |
|---|---|---|---|
| Modulation | | 8-PSK | 8-PSK |
| Bits/Symbol | | 3 | 3 |
| Data Rate | Mbps | 120 | 120 |
| FEC rate | | 0.89 | 0.89 |
| Symbol rate | MHz | 45.00 | 45.00 |
| Occupied Bandwidth | MHz | 66.83 | 66.83 |
| **Transmitter** | | **Ch 1** | **Ch 2** |
| Frequency | GHz | **8.133** | **8.200** |
| Transmitter Power | dBW | 5 | 5 |
| Transmitter Line Loss | dBW | 1 | 1 |
| Avg Transmit Antenna Gain | dBi | 12.3 | 12.3 |
| Eq. Isotropic Radiated Power | dBW | 15.92 | 15.92 |
| **Orbital Information** | | | |
| Orbit Altitude (km) | km | 410 | 410 |
| Elevation Angle | deg | 75 | 75 |
| Propagation Path Length | km | 424 | 424 |
| **Channel Losses** | | | |
| Free Space Loss | dB | -163.2 | -163.1 |
| Polarization Loss | dB | -0.5 | -0.5 |
| Rain Attenuation | dB | -1 | -1 |
| Cloud Attenuation | dB | -0.02 | -0.02 |
| Total Propagation Losses | dB | -164.71 | -164.61 |
| **Receive Antenna Properties** | | | |
| Antenna Aperture Gain | dBi | 50.4 | 50.4 |
| Receive Antenna Line Loss | dB | -0.1 | -0.1 |
| Rx Antenna Pointing Error Loss | dB | -0.20 | -0.20 |
| Rx Antenna Gain with pointing error | dB | 50.1 | 50.1 |
| **Radome Losses** | | | |
| Reflective Losses | dB | 0.78 | 0.78 |
| Dissipative Losses | dB | 0.75 | 0.75 |
| **Rx Antenna Performance** | | | |
| Net Antenna gain | dBi | 48.57 | 48.57 |
| System Noise Temperature | K | 144 | 144 |
| Ground Station G/T | dB/K | 26.99 | 26.99 |
| **Received Signal** | | | |
| Eb/No | dB | 26.01 | 25.93 |
| Required Bit Error Rate | | 1.00E-07 | 1.00E-07 |
| (Eb/N0) required for BER | dB | 9 | 9 |
| Implementation Losses | dB | 3 | 3 |
| **Margin** | **dB** | **14.01** | **13.93** |

**Figure 5 X-band, Helical Antenna, High Elevation Link Budget**

| X-band Link Budget: Patch Antenna, Low Elevation | | | |
|---|---|---|---|
| Modulation | | QPSK | QPSK |
| Bits/Symbol | | 2 | 2 |
| Data Rate | Mbps | 4 | 4 |
| FEC rate | | 0.50 | 0.50 |
| Symbol rate | MHz | 4.00 | 4.00 |
| Occupied Bandwidth | MHz | 5.94 | 5.94 |
| **Transmitter** | | **Ch 1** | **Ch 2** |
| Frequency | GHz | **8.133** | **8.200** |
| Transmitter Power | dBW | 5 | 5 |
| Transmitter Line Loss | dBW | 0.5 | 0.5 |
| Avg Transmit Antenna Gain | dBi | -2.0 | -2.0 |
| Eq. Isotropic Radiated Power | dBW | 2.12 | 2.12 |
| **Orbital Information** | | | |
| Orbit Altitude (km) | km | 410 | 410 |
| Elevation Angle | deg | 10 | 10 |
| Propagation Path Length | km | 1,466 | 1,466 |
| **Channel Losses** | | | |
| Free Space Loss | dB | -174.0 | -174.1 |
| Polarization Loss | dB | -0.5 | -0.5 |
| Rain Attenuation | dB | -1 | -1 |
| Cloud Attenuation | dB | -0.02 | -0.02 |
| Total Propagation Losses | dB | -175.50 | -175.57 |
| **Receive Antenna Properties** | | | |
| Antenna Aperture Gain | dBi | 50.4 | 50.4 |
| Receive Antenna Line Loss | dB | -0.1 | -0.1 |
| Rx Antenna Pointing Error Loss | dB | -0.20 | -0.20 |
| Rx Antenna Gain with pointing error | dB | 50.1 | 50.1 |
| **Radome Losses** | | | |
| Reflective Losses | dB | 0.78 | 0.78 |
| Dissipative Losses | dB | 0.75 | 0.75 |
| **Rx Antenna Performance** | | | |
| Net Antenna gain | dBi | 48.57 | 48.57 |
| System Noise Temperature | K | 144 | 144 |
| Ground Station G/T | dB/K | 26.99 | 26.909 |
| **Received Signal** | | | |
| Eb/No | dB | 16.19 | 16.12 |
| Required Bit Error Rate | | 1.00E-07 | 1.00E-07 |
| (Eb/N0) required for BER | dB | 9 | 9 |
| Implementation Losses | dB | 3 | 3 |
| **Margin** | **dB** | **4.19** | **4.12** |

**Figure 6 X-band, Patch Antenna, Low Elevation Link Budget**

| X-band Link Budget: Patch Antenna, High Elevation | | | |
|---|---|---|---|
| Modulation | | 8-PSK | 8-PSK |
| Bits/Symbol | | 3 | 3 |
| Data Rate | Mbps | 80 | 80 |
| FEC rate | | 0.89 | 0.89 |
| Symbol rate | MHz | 30.00 | 30.00 |
| Occupied Bandwidth | MHz | 44.55 | 44.55 |
| **Transmitter** | | **Ch 1** | **Ch 2** |
| Frequency | GHz | **8.133** | **8.200** |
| Transmitter Power | dBW | 5 | 5 |
| Transmitter Line Loss | dBW | 0.5 | 0.5 |
| Avg Transmit Antenna Gain | dBi | 5.0 | 5.0 |
| Eq. Isotropic Radiated Power | dBW | 9.12 | 9.12 |
| **Orbital Information** | | | |
| Orbit Altitude (km) | km | 410 | 410 |
| Elevation Angle | deg | 75 | 75 |
| Propagation Path Length | km | 424 | 424 |
| **Channel Losses** | | | |
| Free Space Loss | dB | -163.2 | -163.3 |
| Polarization Loss | dB | -0.5 | -0.5 |
| Rain Attenuation | dB | -1 | -1 |
| Cloud Attenuation | dB | -0.02 | -0.02 |
| Total Propagation Losses | dB | -164.71 | -164.78 |
| **Receive Antenna Properties** | | | |
| Antenna Aperture Gain | dBi | 50.4 | 50.4 |
| Receive Antenna Line Loss | dB | -0.1 | -0.1 |
| Rx Antenna Pointing Error Loss | dB | -0.20 | -0.20 |
| Rx Antenna Gain with pointing error | dB | 50.1 | 50.1 |
| **Radome Losses** | | | |
| Reflective Losses | dB | 0.78 | 0.78 |
| Dissipative Losses | dB | 0.75 | 0.75 |
| **Rx Antenna Performance** | | | |
| Net Antenna gain | dBi | 48.57 | 48.57 |
| System Noise Temperature | K | 144 | 144 |
| Ground Station G/T | dB/K | 26.99 | 26.99 |
| **Received Signal** | | | |
| Eb/No | dB | 20.97 | 20.90 |
| Required Bit Error Rate | | 1.00E-07 | 1.00E-07 |
| (Eb/N0) required for BER | dB | 9 | 9 |
| Implementation Losses | dB | 3 | 3 |
| **Margin** | **dB** | **8.97** | **8.90** |

**Figure 7 X-band, Patch Antenna, High Elevation Link Budget**

| UHF Downlink Link Budget | | |
|---|---|---|
| Modulation | | GFSK |
| Bits/Symbol | | 1 |
| Data Rate | Mbps | 0.0024 |
| FEC rate | | 0.5 |
| Symbol rate | MHz | 0.0048 |
| Occupied Bandwidth | MHz | 0.06 |
| **Transmitter** | | |
| Frequency | GHz | **0.4013** |
| Transmitter Power | dBW | -2 |
| Transmitter Line Loss | dBW | 0.5 |
| Avg Transmit Antenna Gain | dBi | -2.0 |
| Eq. Isotropic Radiated Power | dBW | -4.05 |
| **Orbital Information** | | |
| Orbit Altitude (km) | km | 410 |
| Elevation Angle | deg | 5 |
| Propagation Path Length | km | 1,833 |
| **Channel Losses** | | |
| Free Space Loss | dB | -149.8 |
| Polarization Loss | dB | -3.3 |
| Rain Attenuation | dB | -1 |
| Cloud Attenuation | dB | -0.02 |
| Total Propagation Losses | dB | -154.10 |
| **Receive Antenna Properties** | | |
| Antenna Aperture Gain | dBi | 16.50 |
| Receive Antenna Line Loss | dB | -0.4 |
| Rx Antenna Pointing Error Loss | dB | -0.40 |
| Rx Antenna Gain with pointing error | dB | 15.7 |
| **Radome Losses** | | |
| Reflective Losses | dB | 0 |
| Dissipative Losses | dB | 0 |
| **Rx Antenna Performance** | | |
| Net Antenna gain | dBi | 15.7 |
| System Noise Temperature | K | 284 |
| Ground Station G/T | dB/K | -8.83 |
| **Received Signal** | | |
| Eb/No | | 27.81 |
| Required Bit Error Rate | | 1.00E-07 |
| (Eb/N0) required for BER | dB | 14 |
| Implementation Losses | dB | 4 |
| **Margin** | **dB** | **9.81** |

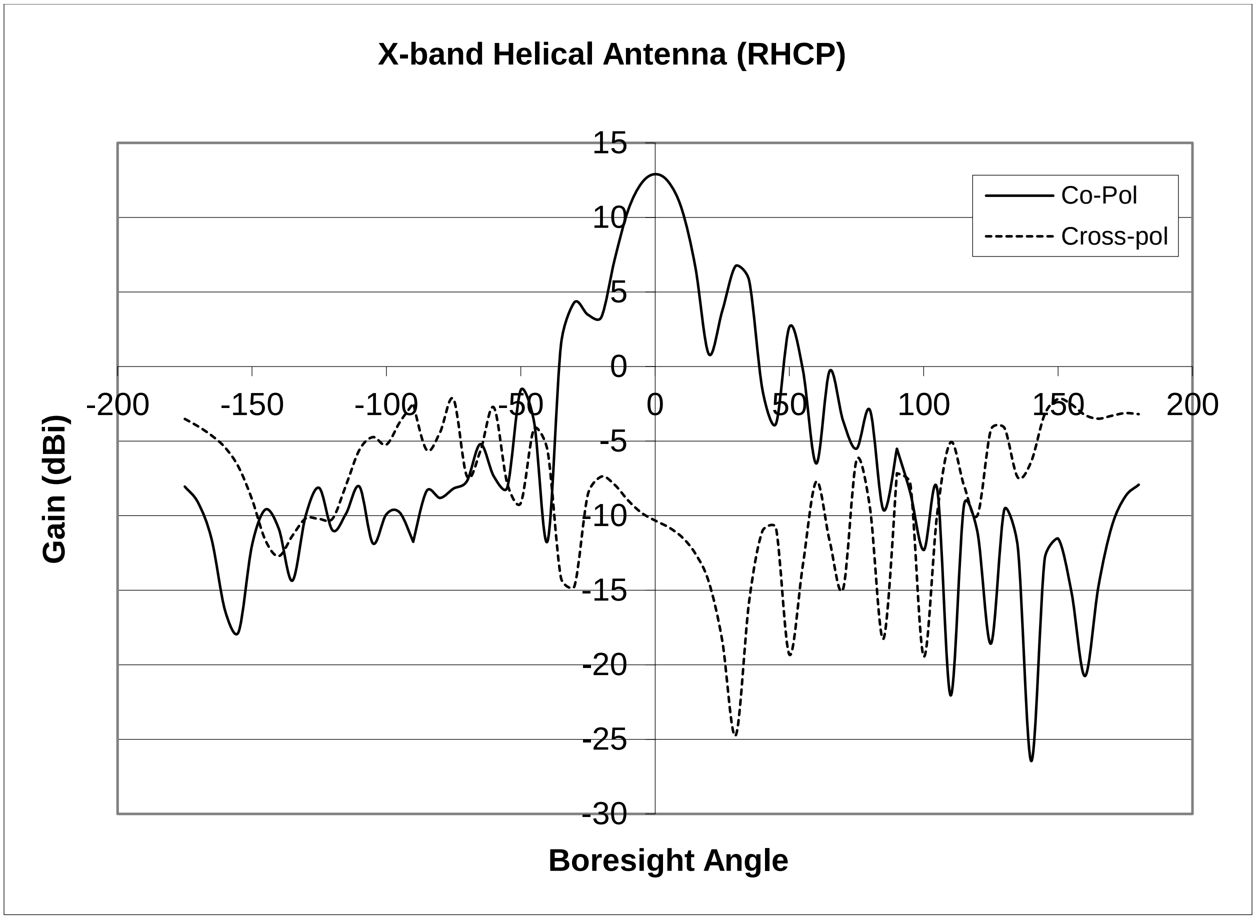
**Figure 8 UHF Downlink Link Budget**

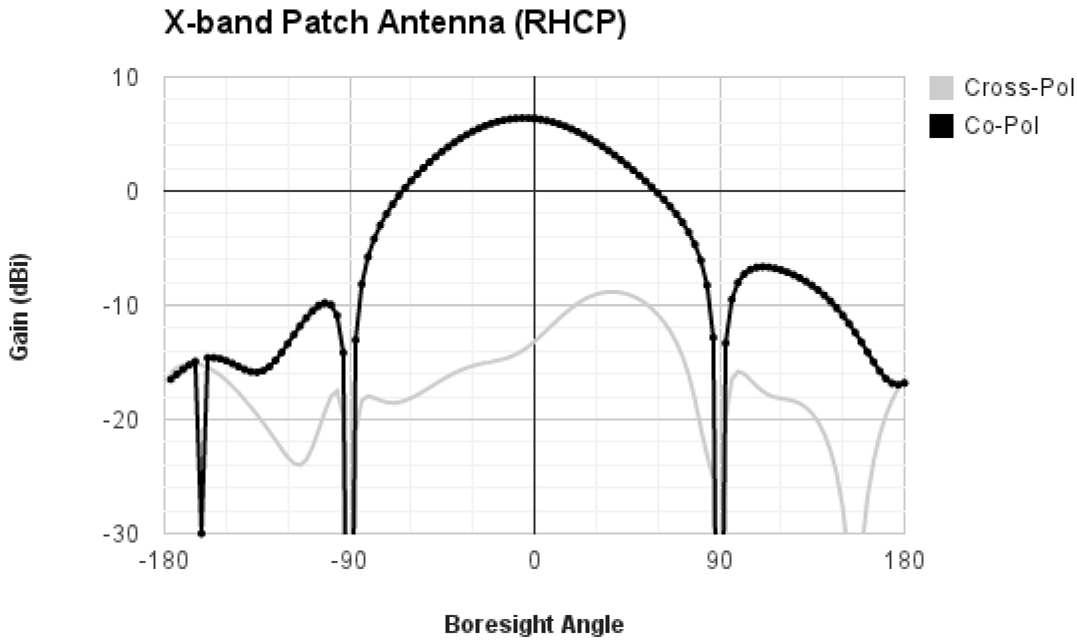
**S-band and UHF Uplink Link Budget**

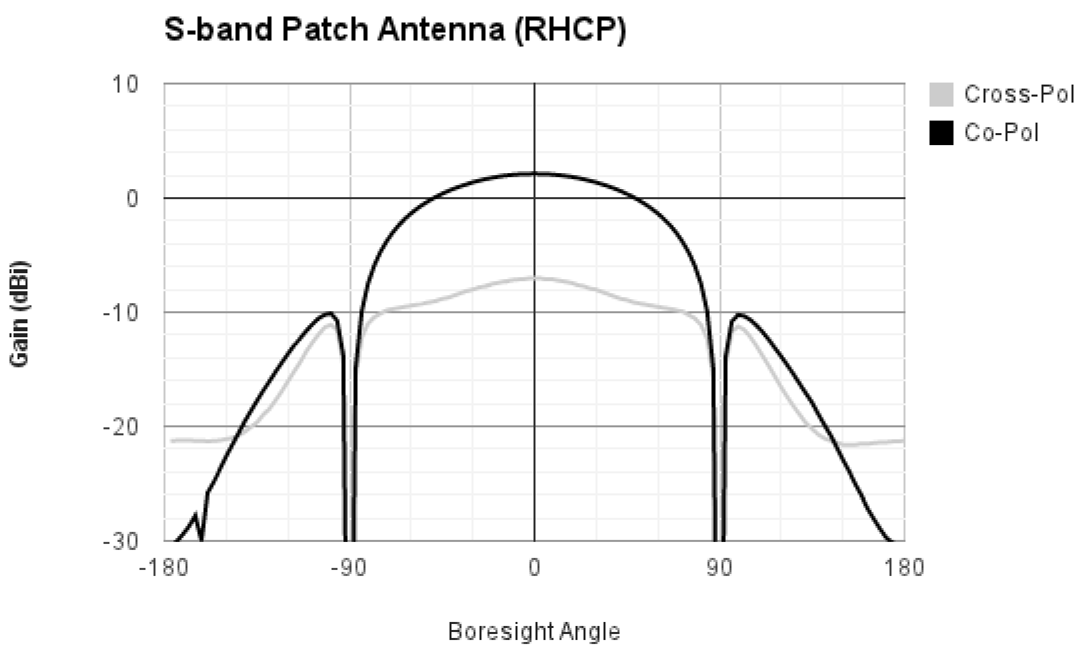
| | | | |
|---|---|---|---|
| Modulation | | MSK | GFSK |
| Bits/Symbol | | 1 | 1 |
| Data Rate | Mbps | 0.25 | 0.0024 |
| FEC rate | | 0.5 | 0.5 |
| Symbol rate | MHz | 0.5 | 0.0048 |
| Occupied Bandwidth | MHz | 1.31 | 0.06 |
| **Transmitter** | | | |
| Frequency | GHz | **2.056** | **0.450** |
| Transmitter Power | dBW | 13 | 14 |
| Transmitter Line Loss | dBW | 2 | 5 |
| Avg Transmit Antenna Gain | dBi | 38.0 | 16.5 |
| Transmit Total Gain | dB | 36.0 | 11.5 |
| Eq. Isotropic Radiated Power | dBW | 49.01 | 25.48 |
| **Orbital Information** | | | |
| Orbit Altitude (km) | km | 410 | 410 |
| Elevation Angle | deg | 5 | 5 |
| Propagation Path Length | km | 1,833 | 1,833 |
| **Channel Losses** | | | |
| Free Space Loss | dB | -164.0 | -150.8 |
| Polarization Loss | dB | -0.5 | -3.3 |
| Rain Attenuation | dB | -1 | -1 |
| Cloud Attenuation | dB | -0.02 | -0.02 |
| Total Propagation Losses | dB | -165.49 | -155.10 |
| **Radome Losses** | | | |
| Reflective Losses | dB | 0.75 | 0 |
| Dissipative Losses | dB | 0.72 | 0 |
| **Rx Antenna Performance** | | | |
| Net Antenna gain | dBi | -1 | -2.5 |
| System Noise Temperature | K | 100 | 100 |
| Rx G/T | dB/K | -21.0 | -22.5 |
| **Received Signal** | | | |
| Eb/No | dB | 30.09 | 27.11 |
| Required Bit Error Rate | | 5.00E-08 | 5.00E-08 |
| (Eb/N0) required for BER | dB | 14 | 14 |
| Implementation Losses | dB | 4 | 4 |
| **Margin** | **dB** | **14.09** | **9.11** |

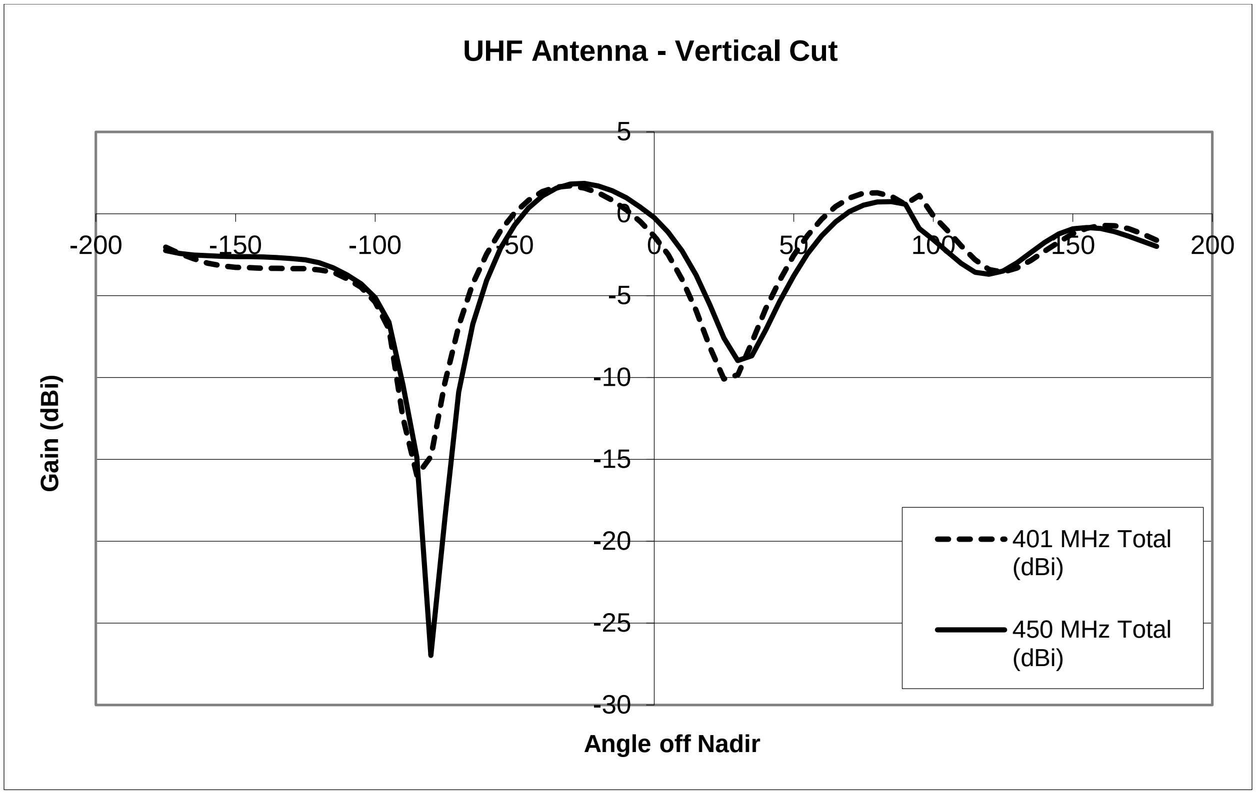
**Figure 9 S-band and UHF Uplink Link Budget**

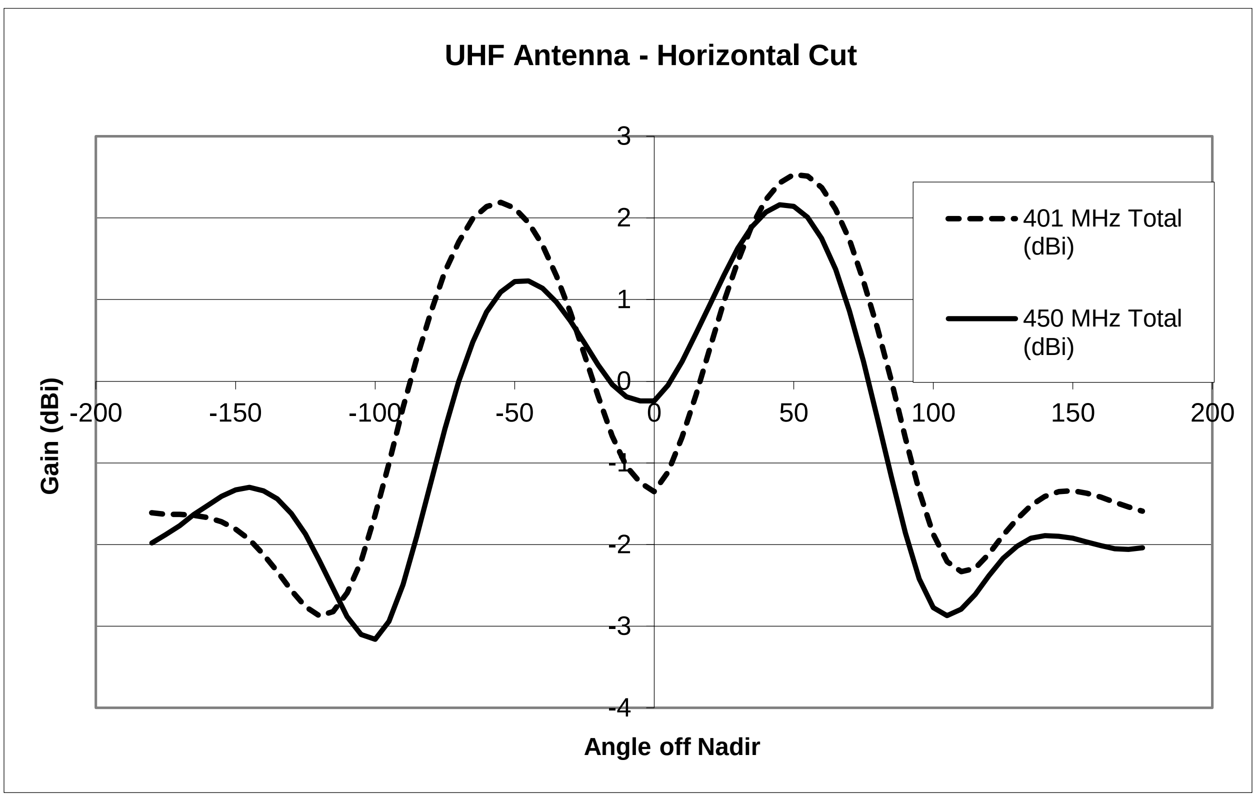
## FLOCK 1 ANTENNA PATTERNS


X-band Helical Antenna (RHCP)
Co-Pol
Cross-pol
Gain (dBi)
Boresight Angle
15
10
5
0
-5
-10
-15
-20
-25
-30
-200
-150
-100
-50
0
50
100
150
200


X-band Patch Antenna (RHCP)
Gain (dBi)
10
0
-10
-20
-30
-180
-90
0
90
180
Boresight Angle
Cross-Pol
Co-Pol


S-band Patch Antenna (RHCP)
Gain (dBi)
10
0
-10
-20
-30
-180
-90
0
90
180
Boresight Angle
Cross-Pol
Co-Pol


UHF Antenna - Vertical Cut
Gain (dBi)
Angle off Nadir
5
0
-5
-10
-15
-20
-25
-30
-200
-150
-100
-50
0
50
100
150
200
401 MHz Total (dBi)
450 MHz Total (dBi)


UHF Antenna - Horizontal Cut
Gain (dBi)
Angle off Nadir
3
2
1
0
-1
-2
-3
-4
-200
-150
-100
-50
0
50
100
150
200
401 MHz Total (dBi)
450 MHz Total (dBi)

**PREDICTED GAIN CONTOURS**

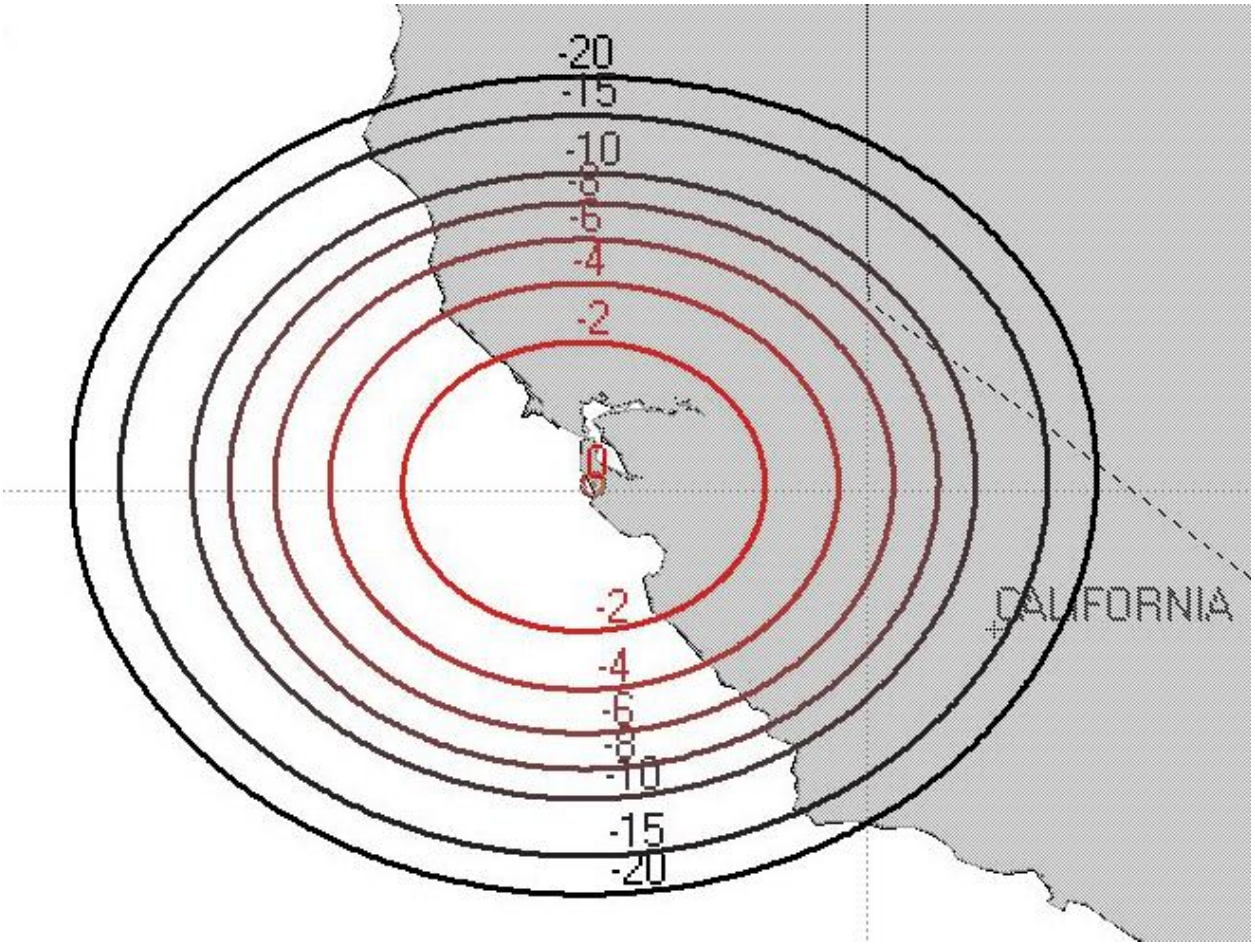



**Figure 10 X-band helical antenna gain contour at 410 km altitude over Half Moon Bay ground station.**

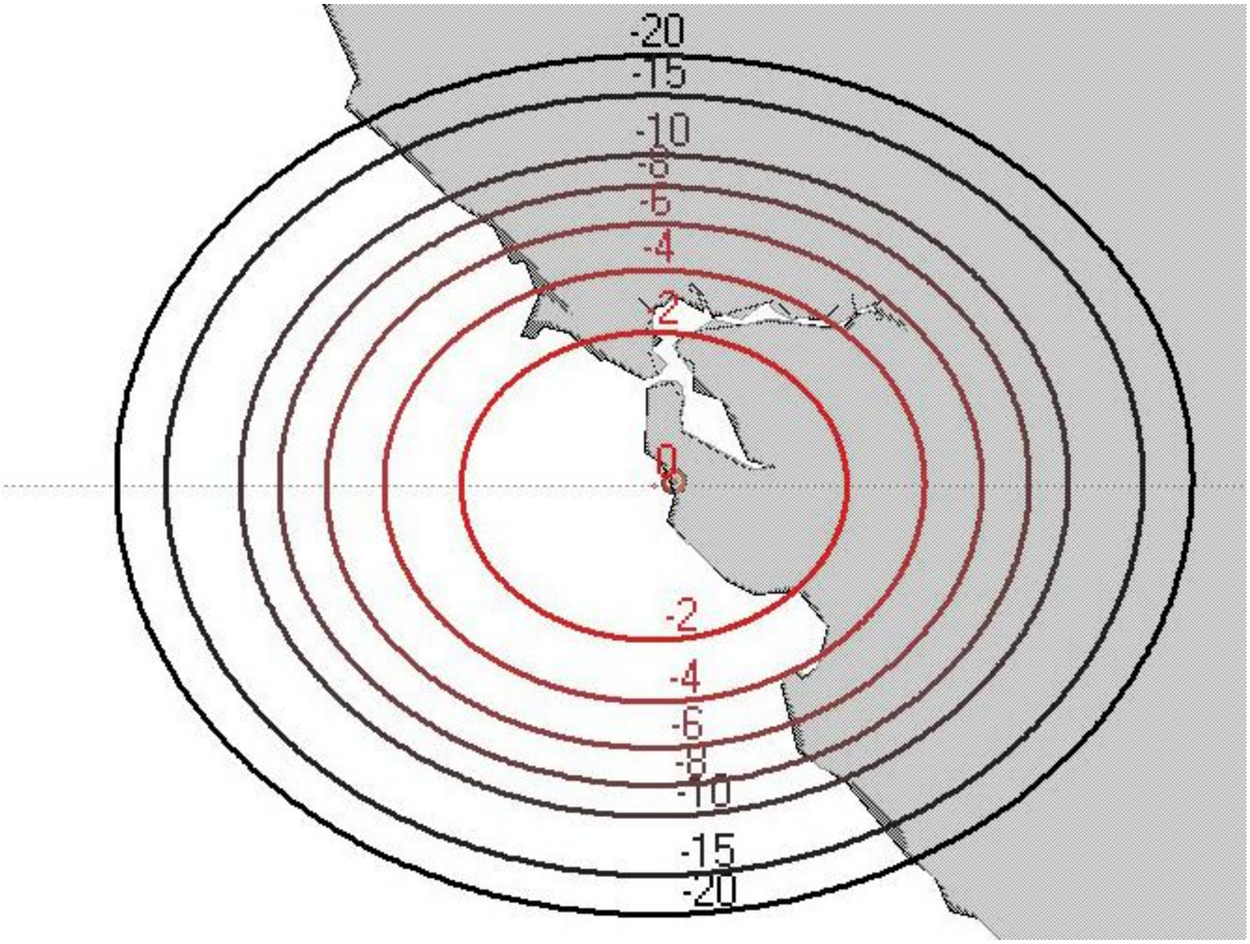



**Figure 11 X-band helical antenna gain contour at 200 km altitude over Half Moon Bay ground station.**

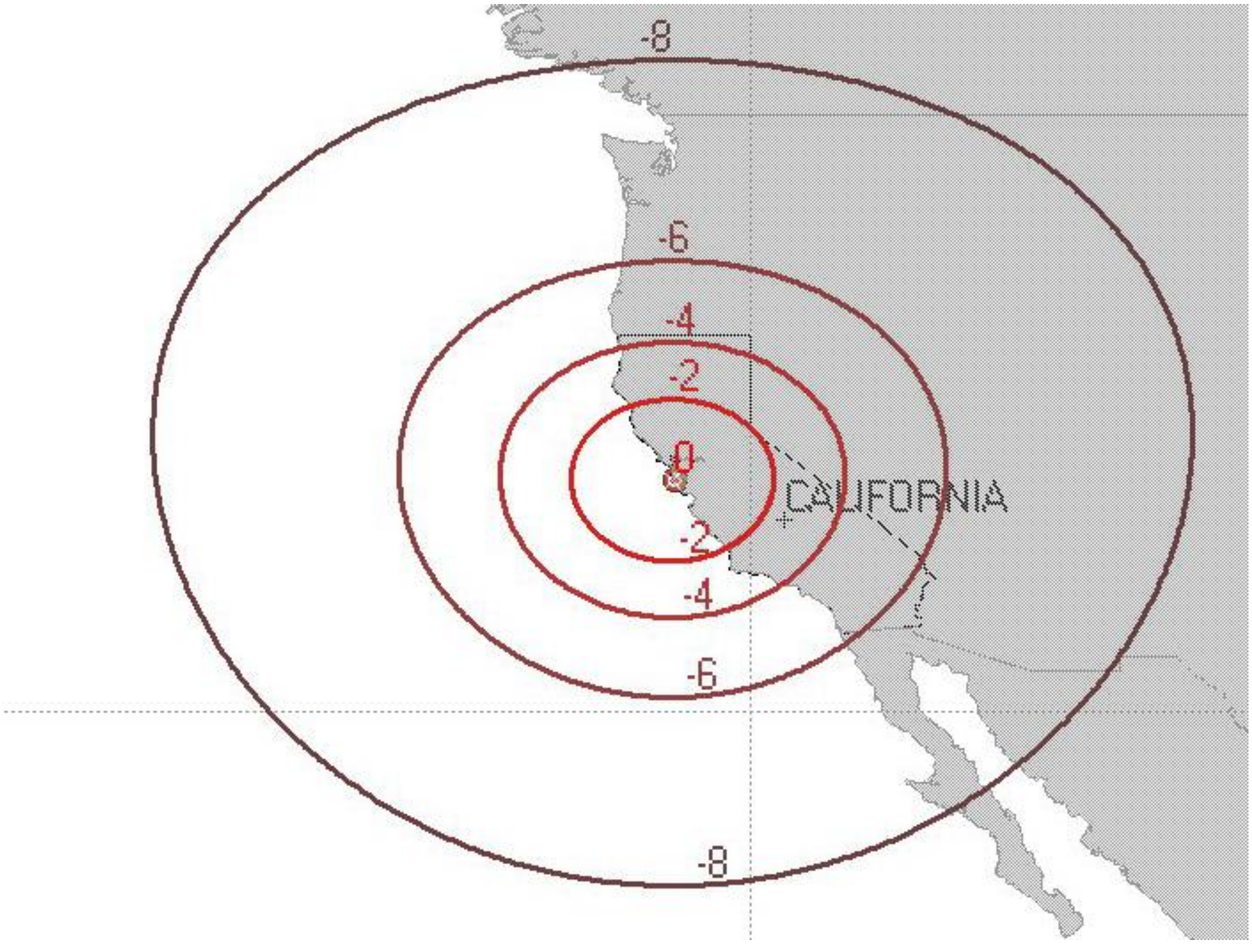



**Figure 12 X-band patch antenna gain contour at 410 km altitude over Half Moon Bay ground station.** [24]

[24] The -10, -15 and -20 gain contours do not intersect the Earth in this scenario and thus are note shown

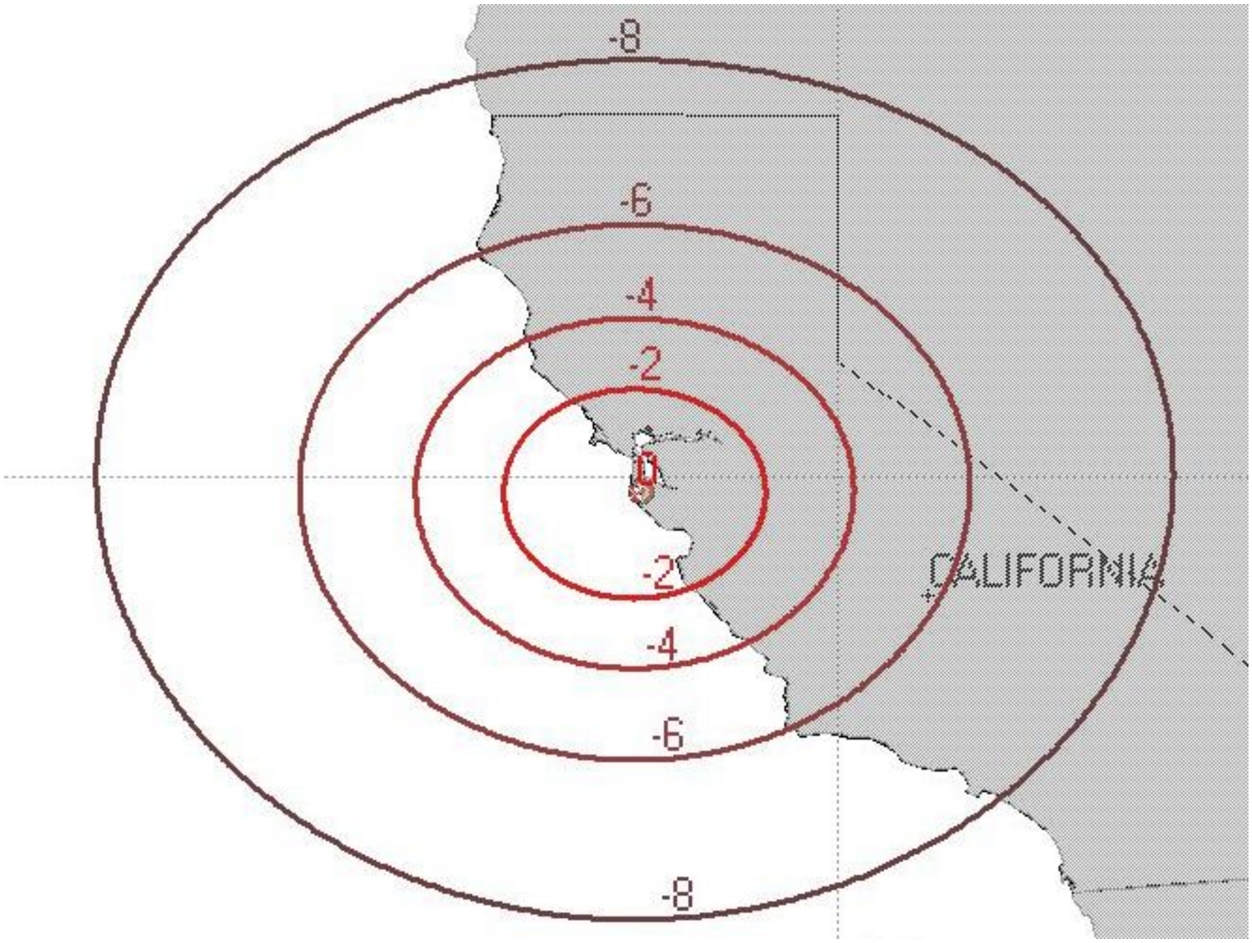



**Figure 13 X-band patch antenna gain contour at 200 km altitude over Half Moon Bay ground station.** [25]

[25] The -10, -15 and -20 gain contours do not intersect the Earth in this scenario and thus are note shown

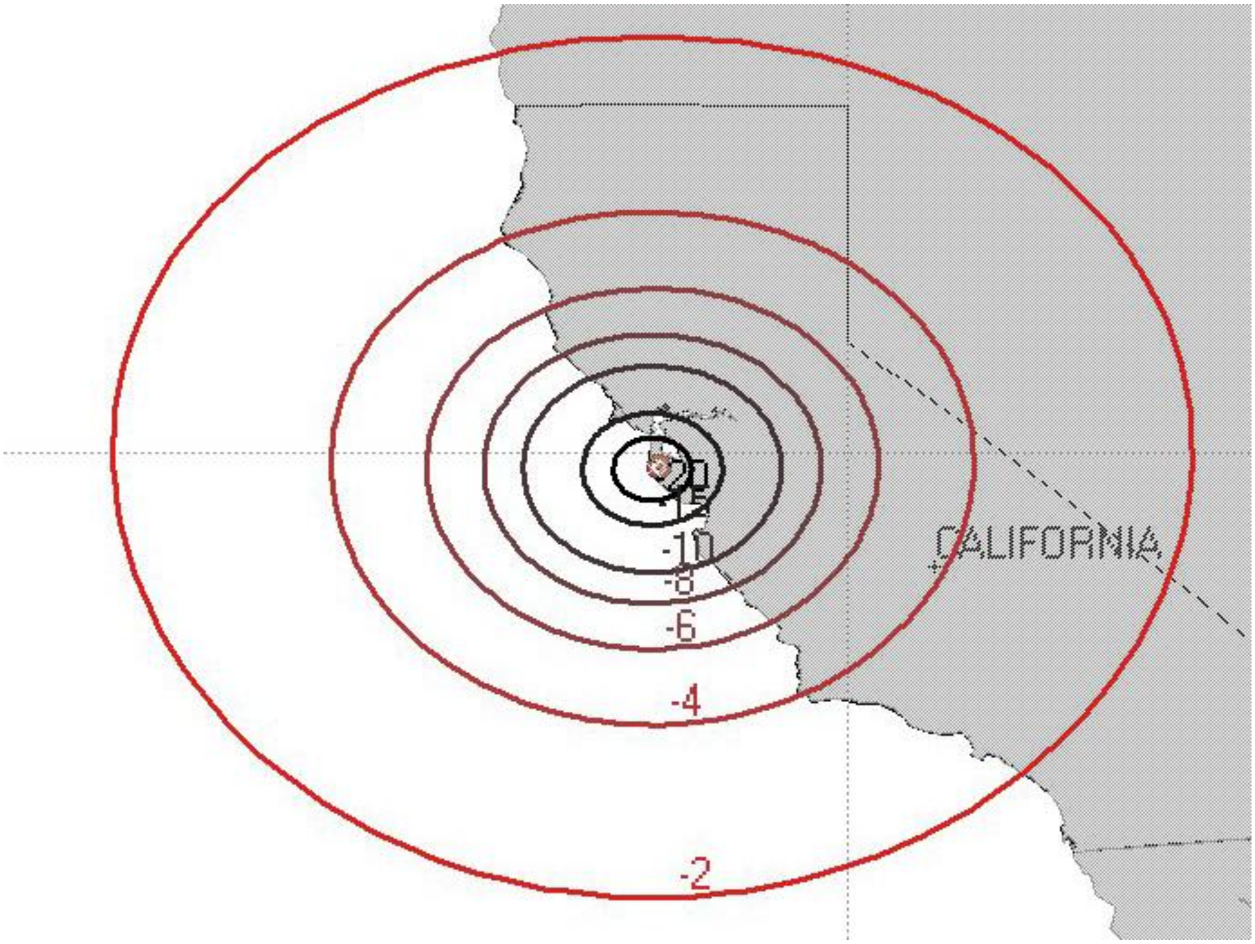


**Figure 14 UHF monopole antenna gain contour at 410 km altitude over Half Moon Bay ground station.**

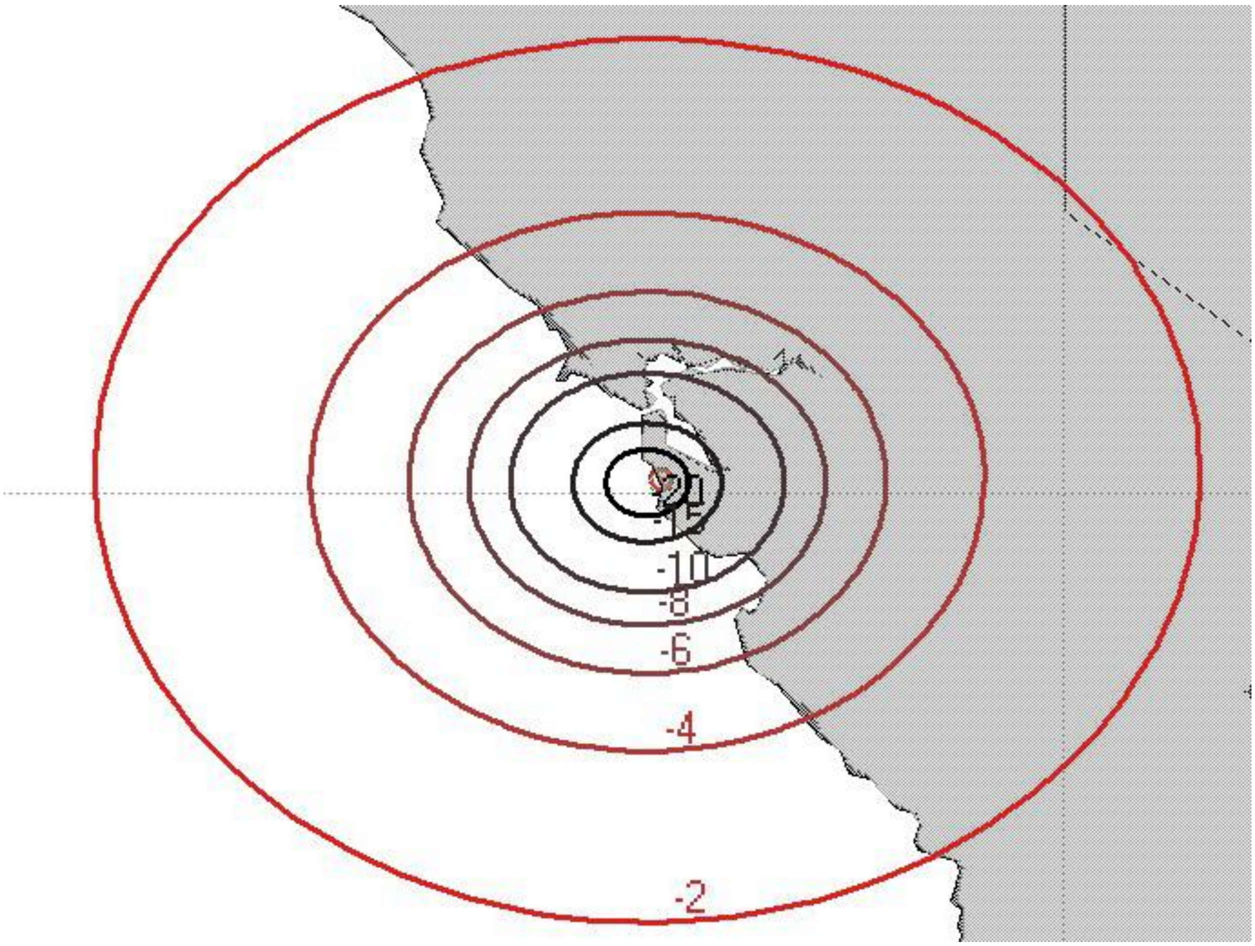



**Figure 15 UHF monopole antenna gain contour at 200 km over Half Moon Bay ground station.**

## IV. TECHNICAL CERTIFICATE

I, Michael Safyan, 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/ Michael Safyan*
Michael Safyan
Regulatory Compliance
Planet Labs Inc.
Dated: June 25, 2013