Skybox Imaging, Inc.
License Application
FCC Form 312
March 2012

Description of Application

With this application, Skybox Imaging, Inc. ("Skybox") requests authority to launch and operate a high-resolution imagery satellite system in low-Earth orbit. As detailed below, the system will consist of two non-geostationary orbit ("NGSO") satellites, SkySat-1 and SkySat-2, 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.

Skybox anticipates launching SkySat-1 in September 2012 and SkySat-2 six to twelve months thereafter. Given the near-term nature of the initial launch, Skybox has already commenced construction of both SkySat-1 and SkySat-2.[1] In June 2011, Skybox received a license from the National Oceanic and Atmospheric Administration ("NOAA") to operate the two-satellite private remote sensing space system it proposes here.[2]

Timely deployment of the two satellites of the initial Skybox system will enable Skybox to begin to offer its cost-effective, high-resolution imaging services to customers in the U.S. and around the world. To the extent necessary to enable Commission action prior to the September 2012 launch date for SkySat-1, Skybox respectfully requests expedited consideration of this request for launch and operation authority.

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

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

A. General Description of Overall Facilities, Operations and Services

The proposed Skybox imagery satellite system will consist of a space segment comprised of SkySat-1 and SkySat-2 and a ground segment comprised of a primary earth station located in Fairbanks, Alaska, a potential back-up earth station located near Skybox's California headquarters, and other earth stations located outside the United States.[3] Each satellite is designed to receive

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[1] Skybox's notification of commencement of space station construction is included as Attachment A to this Exhibit 43.

[2] *See* Skybox Imaging, Inc. License from National Oceanic and Atmospheric Administration to Operate a Private Remote Sensing Space System (issued June 30, 2011). Commercial remote sensing systems are subject to regulation by NOAA as well as the Commission.

[3] Skybox will apply separately to the Commission for authority to operate the Fairbanks and potential California earth stations.

commands from a ground station and downlink the data collected by three imaging sensors and stored onboard the satellite, as well as the telemetry data.

The proposed Skybox satellites will be three-axis stabilized using an on-board closed-loop control system. The satellites are based on advanced technology that allows for small, lightweight and low-cost spacecraft. SkySat-1 and SkySat-2 will be nearly identical satellites operating in independent circular inclined orbits.[4]

The Skybox satellites are planned to be launched as secondary payloads on their respective launch vehicles. SkySat-1 is scheduled to be launched on a Dnepr launch vehicle from Yasny, Russia on September 29, 2012. The launch arrangement for SkySat-2 is to be determined but is intended for sometime in the first half of 2013. The satellites are designed to operate in high-inclination circular orbits with the altitude in the range of 450 to 637 km and inclination from 85 to 100 degrees. SkySat-1 is expected to operate in a sunsynchronous orbit with a nominal altitude of 589 km. The orbit of SkySat-2 will be determined once the launch vehicle on which SkySat-2 is to be launched as a secondary payload is determined. The orbital period for the two spacecraft will be in the range from 94 to 98 minutes. With a nominal orbit altitude of 450 km, the expected orbital lifetime of the satellites is 2.5 years. The expected lifetime increases to 25 years if the orbit altitude is at the maximum of 637 km.

The data collected by the sensors onboard the satellites will be processed, stored and down linked in the 8025-8400 MHz band to the appropriate earth station while the satellites are visible from that particular earth station site at a five degree elevation angle or higher. The storage capacity on board each satellite is 768 GB.

For the telemetry, tracking and command ("TT&C") functions, the Skybox satellites will receive command communications from a gateway earth station using the 2025-2110 MHz band, which is authorized in the EESS subject to such conditions as may be applied on a case-by-case basis.[5] The proposed ground segment will consist of several earth stations around the world equipped with 1.5 m – 2.4 m antennas. Command signals will be issued from the mission operations center in Mountain View, California, and uplinked to the satellites via the primary earth station to be located in Fairbanks, Alaska.[6] Telemetry data from the satellites will be received at the Fairbanks earth station and relayed to the Mountain View operations center. As is typical of EESS operations, earth stations in the network will also have the capability of issuing limited commands in the 2025-2110 MHz band that direct the imaging operations of the satellites. These functions, which can be customer directed from Skybox "SkyNode" facilities, are distinct from the telecommand signals that Skybox alone will issue to command the spacecraft.

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[4] The satellites will be functionally identical, but are expected to have minor differences to enable them to be accommodated on different launch vehicles.

[5] *See* 47 C.F.R. § 2.106, footnote US347. Transmissions from the Skybox satellites will not cause harmful interference to Federal and non-Federal stations operating in accordance with the Table of Frequency Allocations.

[6] Other earth stations outside of the U.S. may have the capability to uplink limited imaging-only command signals to the SkySat satellites to direct imaging operations. In every case, however, core satellite command signals will originate at Skybox's Mountain View, California mission operations center and will be relayed to the satellites without change from an earth station in the network.

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

The Skybox EESS satellite system will provide satellite imagery and derived information products on a non-common carrier basis to commercial customers and governments worldwide. Industries to benefit from the information that Skybox will soon make available, following grant of this application, include the oil and gas, agriculture, real estate and construction, natural resources, news media, and online mapping industries. A partial list of applications using the Skybox system includes:

- *Mapping* – Map large area mosaics, point targets, borders, coastlines, pipelines, rivers and roads.
- *Counting and Analytics* – Quantify economic activity such as cars in retail parking lots, ships in ports and oil storage.
- *Vegetation Analysis* – Use normalized difference vegetation index to identify crop stress, blight and crop yield.
- *Surveying* – Create 3D accurate models of land topography for construction of infrastructure and roads.
- *Exploration and Site Selection* – Identify areas for construction, drilling, mining, farming, cell towers, watersheds and conservation.
- *Emergency Response* – Provide timely visibility of structural damage, land movement, flooding and political activity.
- *Asset Management* – Identify and track high value supply chain assets ranging from cargo ships and railcars.
- *Land Use Management* – Update continuously coverage for zoning, permitting, auditing and monitoring.

C. Technical Description

As noted above, the communication payload onboard the SkySat satellites is designed to receive commands from the associated earth stations (including telecommand signals from Skybox) and to downlink the data collected by three imaging sensors and stored onboard the satellites as well as the telemetry data required for operating the satellites. The block diagram of the communication payload is shown in Figure 1 below.

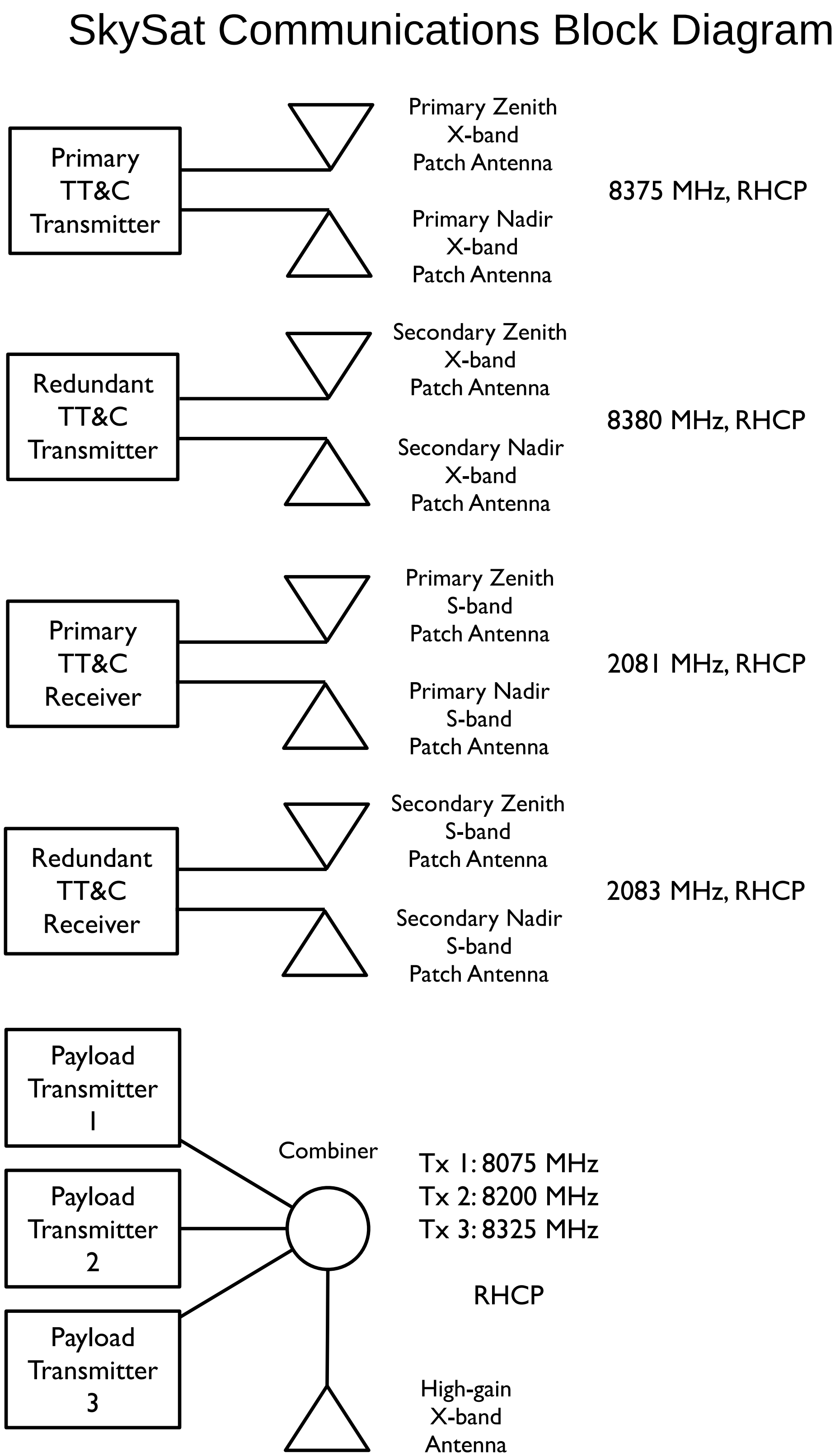

Figure 1. Communication Payload Block Diagram

The three transmitters operating in the 8025-8400 MHz band via a high gain antenna are used for downlinking the data collected and stored at each satellite. Data collected by each of the sensors at any time during the orbit is later downlinked by its respective data transmitter when the satellite is in view of one of the earth stations in the Skybox network. The data transmitters are nominally configured to downlink simultaneously, though individual operation is possible if required. This configuration also provides data downlink redundancy: the satellite will still operate (at a reduced capacity) even if two of the data transmitters fail. The redundant TT&C transmitters and receivers operating via low gain antennas are used for the telemetry transmission and command reception.

The technical characteristics of the proposed Skybox satellite system are 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 two potential U.S. earth station sites from a 90° elevation angle.[7] Skybox has relied upon its expertise in satellite design and selection of components in developing and providing the estimates of space station operational lifetime and reliability in Section S.15 of the Schedule S portion of this application.

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.[8] 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.

These limits relate to the PFD that would be obtained under assumed free-space propagation conditions. As shown in Figures 2 – 7 below, the PFDs at the Earth's surface produced by the SkySat-1 and SkySat-2 data and telemetry transmissions satisfy the PFD limits in the ITU Radio

[7] The gain contours are plotted at the intended 589 km altitude for SkySat-1 and at the minimum and maximum potential altitudes for SkySat-2. In several of the plots, contours beyond -8 dB or -10 dB from peak are not shown because they do not intersect with the Earth.

[8] 47 C.F.R. § 25.208.

Regulations for all angles of arrival.[9] In addition, the transmit power for both the TT&C and payload data transmitters is adjustable on orbit. This capability supports Skybox's ability to manage the satellites' PFD levels during all phases of the mission (i.e. for all operational altitudes).

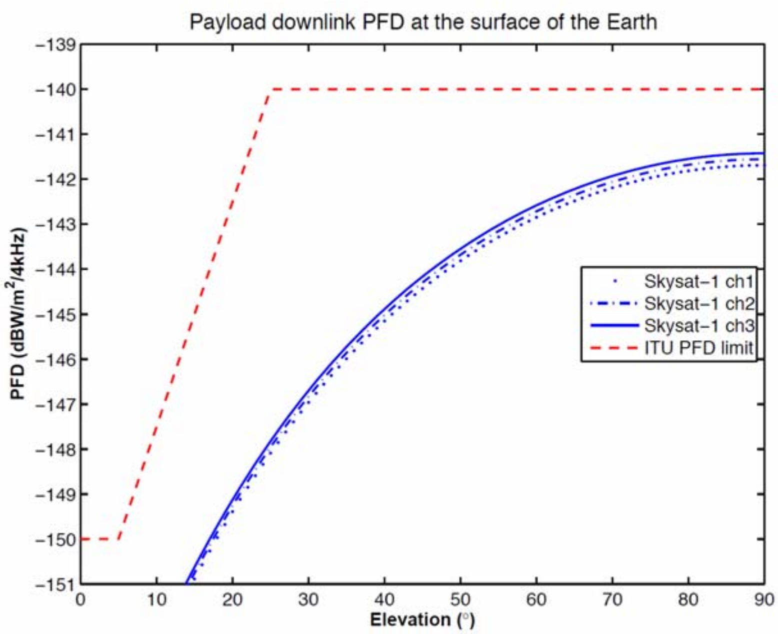

Figure 2. PFD at the Surface of the Earth produced by SkySat Data Downlinks (shown for 589 km SkySat-1 orbit altitude)

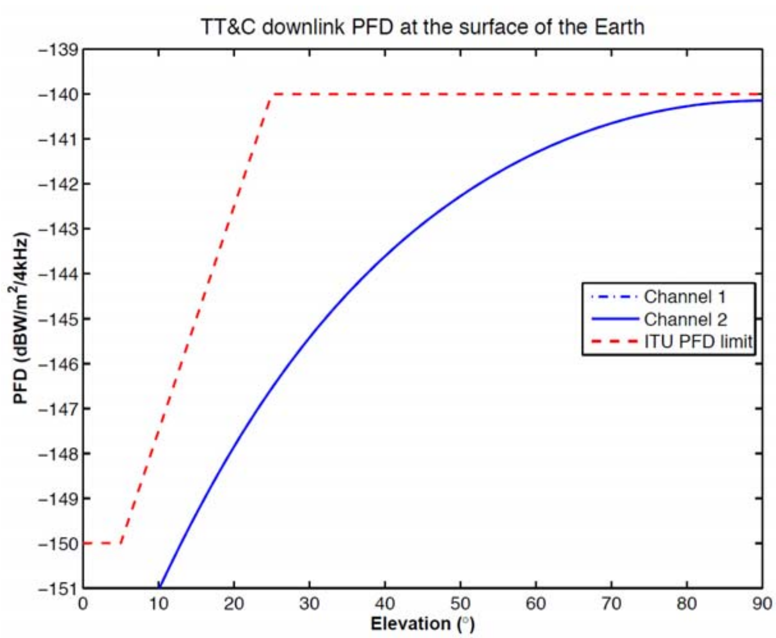

Figure 3. PFD at the Surface of the Earth produced by SkySat Telemetry Downlinks (shown for 589 km SkySat-1 orbit altitude)

9 Figures 2 and 3 depict the SkySat-1 PFDs at the intended altitude of 589 km. Figures 4 – 7 depict the SkySat-2 PFDs at altitudes of 450 km and 637 km, respectively. Specifically, Figures 4 and 5 depict PFDs for the data transmissions at 450 and 637 km, respectively, while Figures 6 and 7 depict PFDs for the telemetry transmissions at the same altitudes. No PFD level will be greater than the PFD at the 450 km minimum orbit altitude. If SkySat-2 is operated at its intended altitude of 589 km, the PFD figures will be identical or nearly identical to those depicted in Figures 2 and 3.

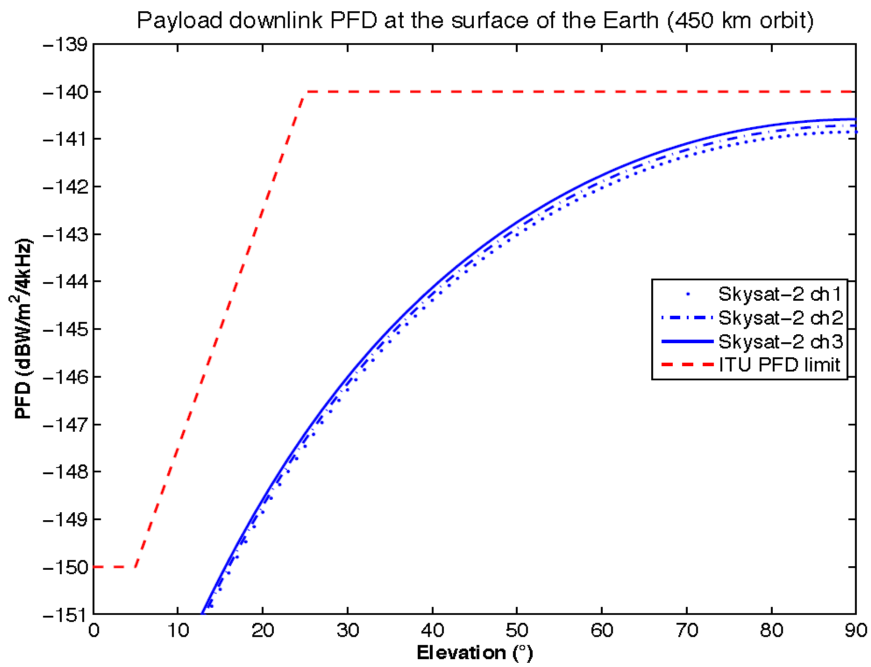

Figure 4. PFD at the Surface of the Earth produced by SkySat Data Downlinks (shown for 450 km SkySat-2 minimum orbit altitude)

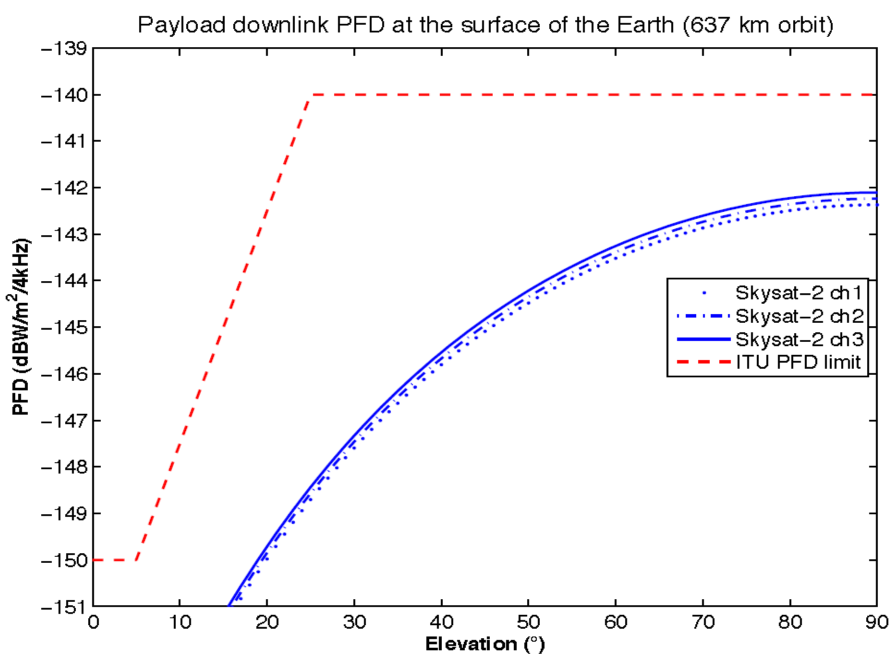

Figure 5. PFD at the Surface of the Earth produced by SkySat Data Downlinks (shown for 637 km SkySat-2 maximum orbit altitude)

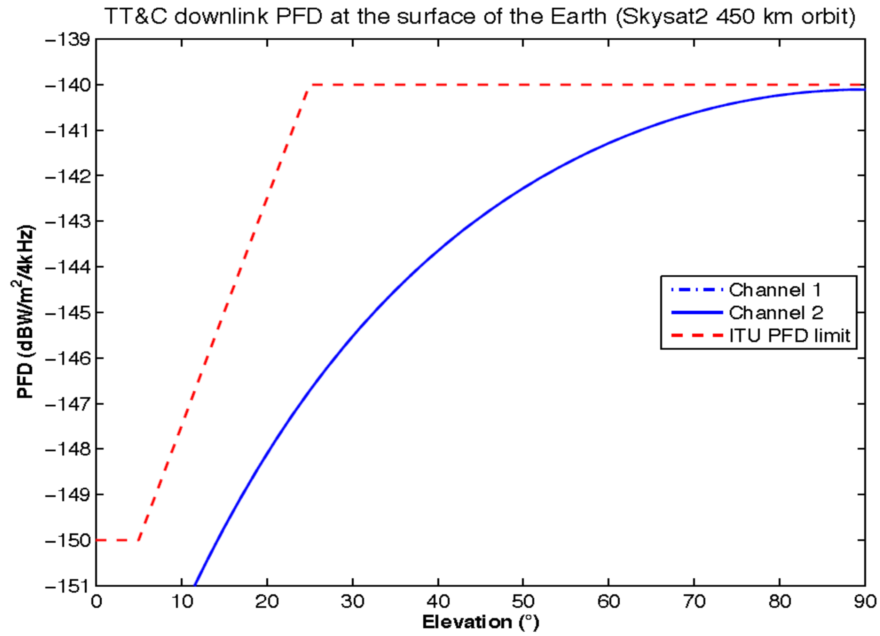

Figure 6. PFD at the Surface of the Earth produced by SkySat Telemetry Downlinks (shown for 450 km SkySat-2 minimum orbit altitude)

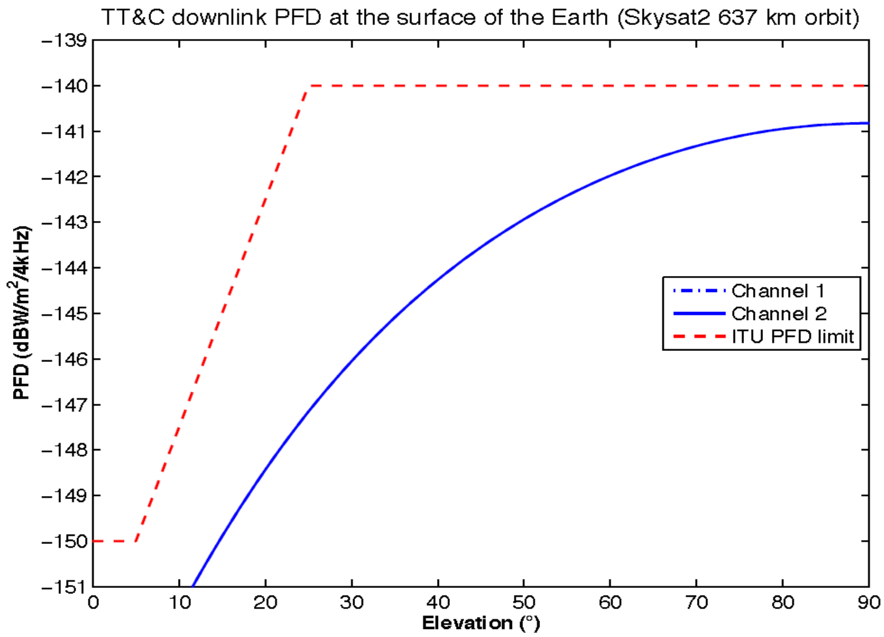

Figure 7. PFD at the Surface of the Earth produced by SkySat Telemetry Downlinks (shown for 637 km SkySat-2 maximum orbit altitude)

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/(m^2·Hz)) to protect ground receivers in the deep-space research band 8400-8450 MHz. Skybox uses a combination of digital filtering at the baseband signal (root-raised cosine filters with a roll-off factor of 0.35), a 7-th order analog baseband reconstruction filter, and bandpass RF filtering at the output of the transmitters provided by a triplexer 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/m^2) in any 4 kHz band. The calculation below shows that the PFD produced by the transmissions from the proposed Skybox satellites does not exceed the limit in No. 22.5, even in the worst possible hypothetical case.

The PFD at the GSO produced by the Skybox transmission is:

$$\text{PFD } [\text{dB}(\text{W/m}^2/4\text{ kHz})] = \text{EIRP (dBW)} - 71 - 20\log10(D) - 10\log10(BW) - 24$$

Where:

- EIRP is the Maximum EIRP of the transmission, in dBW;
- D is distance between the Skybox satellite and GSO, in km;
- BW is the symbol bandwidth of the transmission, in MHz.

The minimum possible distance between a Skybox satellite and the GSO is 35786 - 637 = 35149 km for the highest possible Skybox satellite orbit of 637 km. Under a hypothetical assumption that the Skybox satellite antenna is radiating at its peak EIRP toward the GSO, the data downlink transmission with the peak EIRP = 25.5 dBW and BW = 45 MHz produces a PFD at the GSO of -176.9 dB(W/m2) in any 4 kHz band.[10] Under the same hypothetical assumptions, the telemetry transmission from the Skybox satellite produces a PFD at the GSO of -175.7 dB(W/m2) in any 4 kHz band.

E. Interference Analysis

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

Interference between the Skybox satellites and those of other systems is very unlikely because EESS systems operating in the 8025-8400 MHz band normally transmit only in short

[10] Skybox notes that the symbol bandwidth of the transmission is 45 MHz, while the assigned bandwidth of the same transmission, shown in Schedule S, is 60 MHz.

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 a very unlikely event, the interference can be still be avoided by coordinating the satellite transmissions so that they do not occur simultaneously.

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

Skybox demonstrates above that the SkySat 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. *See* Sections I.D.1 and I.D.3 above.

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

Skybox also demonstrates above that the protection criterion recommended by the ITU for deep-space research in the 8400-8450 MHz band is met. *See* Section I.D.2 above.

F. Public Interest Considerations

The grant of this application will serve the public interest by permitting Skybox to launch and operate a new high-resolution imagery satellite system, thereby enhancing competition in the market for commercial remote sensing data. Skybox's innovative approach – using small, lightweight and low-cost satellites – will enable the company to meet the growing demand for high resolution imagery in a cost-effective, timely manner. Successful implementation by Skybox of SkySat-1 and SkySat-2 will lead in short order to requests for a follow-on system comprised of 12-24 satellites, which will further enhance the benefits of the Skybox EESS offering and competition in the industry.

G. Orbital Debris Mitigation

Skybox confirms that the SkySat satellites will not undergo any planned release of debris during their normal operations. In addition, all separation and deployment mechanisms, and any other potential source of debris will be retained by the spacecraft or launch vehicle. Skybox also has assessed the probability of the space stations becoming sources of debris by collision with small debris or meteoroids of less than one centimeter in diameter that could cause loss of control and prevent post-mission disposal. Skybox has taken steps to limit the effects of such collisions through shielding, the placement of components, and the use of redundant systems.

Skybox has assessed and limited the probability of accidental explosions during and after completion of mission operations through a failure mode verification analysis. As part of the satellite manufacturing process, Skybox has taken steps to ensure that debris generation will not result from the conversion of energy sources on board the satellites into energy that fragments the satellites. All sources of stored energy onboard the spacecraft will have been depleted or safely contained when no longer required for mission operations or post-mission disposal.

Skybox has assessed and limited the probability of the space stations becoming a source of debris by collisions with large debris or other operational spacecraft. Skybox does not intend to place either SkySat-1 or SkySat-2 in an orbit that is identical to or very similar to an orbit used by other space stations, and, in any event, will work closely with the SkySat-1 and SkySat-2 launch providers to ensure that the satellites are deployed in such a way as to minimize the potential for collision with any other spacecraft. This specifically includes minimizing the potential for collision with manned spacecraft. To Skybox's understanding, only the International Space Station and China's Tiangong-1 Space Station module are presently or imminently inhabited orbiting objects.[11] The operational altitude of the International Space Station is approximately 400 kilometers,[12] and the altitude of the Tiangong-1 space module is now approximately 382 kilometers.[13] Both facilities are significantly below the minimum possible operational orbit altitude of 450 km for SkySat-2. Although there is expected to continue to be at least 50 km of orbital separation between SkySat-2 and either the International Space Station or Tiangong-1, and most likely significantly greater separation if SkySat-2 is operated at its preferred altitude of approximately 590 kilometers, Skybox will be proactive to ensure that risks to inhabitable orbiting objects from either of its SkySat satellites are mitigated. This will include coordinating with NASA to assure protection of the International Space Station on an ongoing basis, and with the China National Space Agency with respect to Tiangong-1 and successor vehicles. Skybox will provide both agencies with all information they need to assess risks and ensure safe flight profiles, and with contact information for Skybox personnel on a 24 hours per day/7 days per week basis. With these measures, collisions will be able to be avoided even if there is at some future point less separation in orbits than is anticipated at a minimum today.[14]

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.[15] As the SkySat satellites will not carry maneuvering fuel, Skybox will not maintain the satellites' inclination angles, apogees, perigees, and right ascension of the ascending node to any specified degrees of accuracy.

Skybox's disclosure of the above parameters, as well as the number of space stations, the number and inclination of orbital planes, and the orbital period to be used, can assist third parties in identifying potential problems that may be the result of proposed operations. This information also lends itself to coordination between Skybox and other operators located in similar orbits.

As noted above, SkySat-1 and SkySat-2 are commercial remote sensing satellites subject to regulation by NOAA under Title 51 of the U.S. Code, as well as regulation by the Commission. Pursuant to licensing requirements codified under Title 51,[16] Skybox has requested and received

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[11] The Tiangong-1 spacecraft is an experimental space module that is destined to be part of a larger space complex over the next decade. It will be intermittently inhabited, with planned manned space missions to occur beginning this year.

[12] http://www.nasa.gov/mission_pages/station/expeditions/expedition26/iss_altitude.html (last visited March 20, 2012).

[13] http://www.china.org.cn/china/2011-11/19/content_23957633.htm (last visited March 20, 2012).

[14] Skybox will take identical proactive measures with respect to any other inhabitable orbiting objects that may be introduced during the time when SkySat spacecraft are in orbit. In particular, Skybox notes that testing of inhabitable space objects by Bigelow Aerospace LLC may occur during the license term.

[15] 47 C.F.R. § 25.114(d)(14)(iii).

[16] *See* 51 U.S.C. § 60122(b).

favorable action from NOAA on its plan for the post-mission disposal of its spacecraft.[17] The Commission has previously determined that "[t]o the extent that a remote sensing satellite applicant has submitted its post-mission disposal plans to NOAA for review and approval, [it] will not require submission of such information" as part of its examination of the debris mitigation disclosures of remote sensing satellites.[18] Accordingly, no submission regarding Skybox's post-mission disposal plans is required or included with this application.

Finally, Section 25.114(d)(14)(iii) of the Commission's Rules requires applicants to disclose "the accuracy – if any – with which orbital parameters of [its] non-geostationary satellite orbit space stations will be maintained, including apogee, perigee, inclination, and the right ascension of the ascending node(s)." 47 C.F.R. § 25.114(d)(14)(iii). As the SkySat satellites do not carry any maneuvering fuel or capability, there will be no active maintenance of the satellites' orbital parameters following insertion into their operating orbits after launch. To the extent that Section 25.114(d)(14)(iii) also calls for indication of the anticipated evolution over time of the satellites' orbits, Skybox notes that the SkySat satellites will be in orbits that gradually decay over time until the satellites reenter the atmosphere. At the minimum initial altitude of 450 km, the satellite will reenter the atmosphere in approximately 2.5 years; at the maximum initial altitude of 637 km, reentry will occur within 25 years.[19]

H. Extent of Communications with SkySat-1 and SkySat-2 During Descent to the Atmosphere

Skybox intends to utilize SkySat-1 and SkySat-2 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 during its descent where final re-entry into the atmosphere is imminent. Reentry will be imminent at an altitude of approximately 200 kilometers. At all altitudes down to the reentry altitude, Skybox will maintain the satellites' PFD at levels within the applicable ITU limits by reducing satellite transmitter power on a graduated basis as the satellite nears the Earth.[20]

II. <u>Additional/General Considerations</u>

A. Waiver Request of Modified Processing Round Rules

Skybox 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

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[17] *See* Skybox Imaging, Inc. License from National Oceanic and Atmospheric Administration to Operate a Private Remote Sensing Space System (issued June 30, 2011).

[18] *See Mitigation of Orbital Debris*, 19 FCC Rcd 11567, 11610 (2004). The Commission's decision addressed 15 U.S.C. § 5622(b)(4), which contained a licensing requirement identical to that in 51 U.S.C. § 60122(b)(4) to notify NOAA of the post-mission disposal of spacecraft. Section 60122 of Title 51 replaced Section 5622 of Title 15 effective December 18, 2010. *See* Pub.L. 111-314, 124 Stat. 3328 (2010).

[19] For SkySat-1, with its proposed orbit altitude of 589 km, decay of the orbit to the reentry point will take approximately 13 years.

[20] Skybox satellite transmitters have 256 steps of output power adjustments over the range from 0.1 to 1.5 watt output power.

rules.[21] To the extent necessary to allow for such processing, Skybox 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.[22]

The Commission may waive any of its rules if there is "good cause" to do so.[23] 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.[24] 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.[25]

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.[26] 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.[27] 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.[28]

Similar to the EESS NGSO system in *Space Imaging*, Skybox's 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 Skybox 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.

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[21] 47 C.F.R. § 25.158.

[22] 47 C.F.R. §§ 25.156 & 25.157.

[23] 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*").

[24] *Northeast Cellular*, 897 F.2d at 1166.

[25] *WAIT Radio*, 418 F.2d at 1157.

[26] *See Space Imaging, LLC*, 20 FCC Rcd 11694, 11968 (2005).

[27] *Id.* at 11968.

[28] *Id. See also DigitalGlobe, Inc.*, 20 FCC Rcd 15696, 15699 (2005) (waiving Sections 25.156 and 25.157).

B. Waiver Request of Default Service Rules

Skybox requests a waiver of the default service rules under Section 25.217(b) of the Commission's rules.[29] 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.[30] 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 Skybox 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, Skybox has completed, to the best of its ability and the limitations of the Commission's software, the FCC Form 312, Schedule S submission that reflects the orbital and physical/electrical characteristics of the SkySat-1 and SkySat-2 satellites proposed in this Application. Certain data fields in Microsoft Access Database file would not accept Skybox's data, which, in turn, caused errors in the database. To rectify this, Skybox was forced to input generic information into the electronic database file in order to maintain the integrity of the system. In particular, while the SkySat satellites do not employ transponders, the Schedule S software would not allow completion of the form beyond item S10 without an entry in the otherwise inapplicable table.[31] The one line of data provided there is thus a dummy entry and should be disregarded. Similarly, the performance parameters called for in Columns h and i of item S11 are not appropriate for the Skybox system links. Skybox urges the Commission to refer to the link budgets in Attachment B to this exhibit for more accurate information regarding the performance of SkySat links.

To the best of Skybox's understanding, the information in Form 312, Schedule S is complete. Any additional information used to complete the application process is identified here. Skybox requests whatever leave of the Commission it may need to resolve the software incompatibility issue in the fashion outlined in the previous paragraph.

D. Implementation Milestones

As noted above, Skybox has indicated under Section 25.113(f) of the Commission's rules that it has initiated construction of the two satellites in the system proposed in the instant application. Skybox intends to supply the Commission with information sufficient to demonstrate that it has satisfied the first three implementation milestones under Section 25.164(b) for NGSO systems in a separate submission at a later date. Skybox understands that in the absence of a

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[29] 47 C.F.R. § 25.217.

[30] *See Space Imaging*, 20 FCC Rcd at 11973; *DigitalGlobe*, 20 FCC Rcd at 15701-02 (2005).

[31] In other cases (e.g., items S12 and S13) that do not apply to the SkySat satellites, the items could be left blank without affecting completion of the Schedule S portion of the Form 312.

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.

E. ITU Advance Publication Materials and Cost Recovery

Skybox has prepared the International Telecommunication Union ("ITU") Advance Publication Information submission for its proposed non-geostationary EESS system, and has provided this information to the Commission under separate cover. In particular, Skybox has provided an electronic file with this information to the Satellite Engineering Branch of the Satellite Division of the Commission's International Bureau. Skybox has 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, Skybox respectfully requests the Commission to grant the application for launch and operation authority as detailed herein. To the extent necessary, Skybox requests expedited consideration of this Application in order to ensure favorable Commission action in advance of the scheduled September 29, 2012 launch of SkySat-1.

ATTACHMENT A

Skybox Imaging, Inc.
FCC Form 312, Exhibit 43
March 2012

NOTIFICATION OF COMMENCEMENT OF SPACE STATION CONSTRUCTION

Skybox Imaging, Inc. ("Skybox"), 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 two non-geostationary orbit ("NGSO") satellites it proposes to launch and operate in the Application to which this statement is attached. Skybox intends to utilize these spacecraft to implement a NGSO Earth Exploration-Satellite Service system.

LINK BUDGETS

Figures 1 – 3 depict the link budgets for SkySat-1 at its intended altitude of 589 km. Figures 4 – 9 depict the link budgets for SkySat-2 at 450 km and 637 km, respectively, which are the limits of the satellite's intended range. If SkySat-2 is operated at its intended altitude of 589 km, the link budget figures will be identical or nearly identical to those depicted in Figures 1 – 3.

SkySat-1 Payload Downlink Analysis

Skybox Imaging, Inc.

Parameter	Channel 1	Channel 2	Channel 3	Unit
General				
Orbit altitude	589	589	589	km
Elevation angle	5	5	5	deg
Slant range	2561	2561	2561	km
Frequency	8.075	8.200	8.325	GHz
Satellite Transmitter				
Amplifier output power	1.0	1.0	1.0	W
Circuit loss	3.3	3.3	3.3	dB
Antenna diameter	47	47	47	cm
Antenna efficiency	45	45	45	%
Antenna peak gain	28.5	28.7	28.8	dBi
Antenna HPBW	5.7	5.6	5.5	deg
EIRP	25.2	25.4	25.5	dBW
Channel Losses				
Free space loss	178.7	178.8	179.0	dB
Atmospheric loss	0.9	0.9	0.9	dB
Pointing loss	2.0	2.0	2.0	dB
Polarization loss	0.5	0.5	0.5	dB
Earth Station Receiver				
Antenna diameter	2.4	2.4	2.4	m
Antenna efficiency	50	50	50	%
Antenna peak gain	43.1	43.3	43.4	dBi
Antenna HPBW	1.1	1.1	1.1	deg
Radome loss	1.2	1.2	1.2	dB
Carrier power at the antenna output	−85.0	−84.8	−84.7	dBm
LNA noise temperature	51	51	51	K
System noise temperature	166	166	166	K
Station G/T	20.9	21.1	21.2	dB/K
Receiver noise power density (N_0)	−176.4	−176.4	−176.4	dBm/Hz
Carrier power-to-noise power density ratio (C/N_0)	91.4	91.6	91.7	dBHz
Earth Station Demodulator				
Modulation	8-PSK	8-PSK	8-PSK	
Symbol rate	45	45	45	MSps
Composite code rate	0.747	0.747	0.747	
Uncoded data rate	101	101	101	Mbit/s
Target BER	10^{-10}	10^{-10}	10^{-10}	
Demodulator implementation loss	0.8	0.8	0.8	dB
Required E_b/N_0 at target BER	5.2	5.2	5.2	dB
Received E_b/N_0	11.4	11.6	11.7	dB
Link Margin	**6.2**	**6.3**	**6.5**	**dB**

Figure 1.

SkySat-1 TT&C Uplink Analysis

Skybox Imaging, Inc.

Parameter	Channel 1	Channel 2	Unit
General			
Orbit altitude	589	589	km
Elevation angle	5	5	deg
Slant range	2561	2561	km
Frequency	2.081	2.083	GHz
Ground Station Transmitter			
Amplifier output power	15.0	15.0	W
Circuit loss	2.0	2.0	dB
Radome loss	0.2	0.2	dB
Antenna diameter	2.4	2.4	m
Antenna efficiency	50	50	%
Antenna peak gain	31.4	31.4	dBi
Antenna HPBW	4.3	4.3	deg
EIRP	40.9	40.9	dBW
Channel Losses			
Free space loss	166.9	166.9	dB
Atmospheric loss	0.5	0.5	dB
Pointing loss	0.5	0.5	dB
Polarization loss	0.5	0.5	dB
Satellite Receiver			
Antenna gain	0.0	0.0	dBi
Antenna HPBW	70.0	70.0	deg
Antenna circuit loss	0.7	0.7	dB
Carrier power at the antenna output	−98.2	−98.2	dBm
LNA noise temperature	289	289	K
System noise temperature	570	570	K
Receiver noise power density (N_0)	−171.0	−171.0	dBm/Hz
Carrier power-to-noise power density ratio (C/N_0)	72.8	72.8	dBHz
Earth Station Demodulator			
Modulation	FSK	FSK	
Symbol rate	16	16	kSps
Composite code rate	1.000	1.000	
Uncoded data rate	16	16	kbit/s
Target BER	10^{-5}	10^{-5}	
Required signal level at target BER	−110.0	−110.0	dBm
Received signal level	−98.9	−98.9	dBm
Link Margin	**11.1**	**11.1**	**dB**

Figure 2.

SkySat-1 TT&C Downlink Analysis

Skybox Imaging, Inc.

Parameter	Channel 1	Channel 2	Unit
General			
Orbit altitude	589	589	km
Elevation angle	5	5	deg
Slant range	2561	2561	km
Frequency	8.375	8.380	GHz
Satellite Transmitter			
Amplifier output power	0.7	0.7	W
Circuit loss	2.2	2.2	dB
Antenna gain	-4.0	-4.0	dBi
Antenna HPBW	70.0	70.0	deg
EIRP	-7.7	-7.7	dBW
Channel Losses			
Free space loss	179.0	179.0	dB
Atmospheric loss	0.9	0.9	dB
Pointing loss	2.0	2.0	dB
Polarization loss	0.5	0.5	dB
Earth Station Receiver			
Antenna diameter	2.4	2.4	m
Antenna efficiency	50	50	%
Antenna peak gain	43.5	43.5	dBi
Antenna HPBW	1.1	1.1	deg
Radome loss	1.2	1.2	dB
Carrier power at the antenna output	−117.9	−117.9	dBm
LNA noise temperature	51	51	K
System noise temperature	166	166	K
Station G/T	21.2	21.3	dB/K
Receiver noise power density (N_0)	−176.4	−176.4	dBm/Hz
Carrier power-to-noise power density ratio (C/N_0)	58.5	58.5	dBHz
Earth Station Demodulator			
Modulation	DPSK	DPSK	
Symbol rate	128	128	kSps
Composite code rate	0.500	0.500	
Uncoded data rate	64	64	kbit/s
Target BER	10^{-5}	10^{-5}	
Demodulator implementation loss	1.0	1.0	dB
Required E_b/N_0 at target BER	6.0	6.0	dB
Received E_b/N_0	10.5	10.5	dB
Link Margin	**4.5**	**4.5**	**dB**

Figure 3.

SkySat-2 Payload Downlink Analysis (450 km orbit)

Skybox Imaging, Inc.

Parameter	Channel 1	Channel 2	Channel 3	Unit
General				
Orbit altitude	450	450	450	km
Elevation angle	5	5	5	deg
Slant range	2157	2157	2157	km
Frequency	8.075	8.200	8.325	GHz
Satellite Transmitter				
Amplifier output power	0.7	0.7	0.7	W
Circuit loss	3.3	3.3	3.3	dB
Antenna diameter	47	47	47	cm
Antenna efficiency	45	45	45	%
Antenna peak gain	28.5	28.7	28.8	dBi
Antenna HPBW	5.7	5.6	5.5	deg
EIRP	23.7	23.9	24.0	dBW
Channel Losses				
Free space loss	177.2	177.4	177.5	dB
Atmospheric loss	0.9	0.9	0.9	dB
Pointing loss	2.0	2.0	2.0	dB
Polarization loss	0.5	0.5	0.5	dB
Earth Station Receiver				
Antenna diameter	2.4	2.4	2.4	m
Antenna efficiency	50	50	50	%
Antenna peak gain	43.1	43.3	43.4	dBi
Antenna HPBW	1.1	1.1	1.1	deg
Radome loss	1.2	1.2	1.2	dB
Carrier power at the antenna output	−85.0	−84.8	−84.7	dBm
LNA noise temperature	51	51	51	K
System noise temperature	166	166	166	K
Station G/T	19.7	19.9	20.0	dB/K
Receiver noise power density (N_0)	−176.4	−176.4	−176.4	dBm/Hz
Carrier power-to-noise power density ratio (C/N_0)	91.4	91.6	91.7	dBHz
Earth Station Demodulator				
Modulation	8-PSK	8-PSK	8-PSK	
Symbol rate	45	45	45	MSps
Composite code rate	0.747	0.747	0.747	
Uncoded data rate	101	101	101	Mbit/s
Target BER	10^{-10}	10^{-10}	10^{-10}	
Coding Gain at target BER	12.1	12.1	12.1	dB
Demodulator implementation loss	0.8	0.8	0.8	dB
Required E_b/N_0 at target BER	5.2	5.2	5.2	dB
Received E_b/N_0	11.4	11.5	11.7	dB
Link Margin	**6.2**	**6.3**	**6.4**	**dB**

Figure 4.

SkySat-2 Payload Downlink Analysis (637 km orbit)

Skybox Imaging, Inc.

Parameter	Channel 1	Channel 2	Channel 3	Unit
General				
Orbit altitude	637	637	637	km
Elevation angle	5	5	5	deg
Slant range	2691	2691	2691	km
Frequency	8.075	8.200	8.325	GHz
Satellite Transmitter				
Amplifier output power	1.0	1.0	1.0	W
Circuit loss	3.3	3.3	3.3	dB
Antenna diameter	47	47	47	cm
Antenna efficiency	45	45	45	%
Antenna peak gain	28.5	28.7	28.8	dBi
Antenna HPBW	5.7	5.6	5.5	deg
EIRP	25.2	25.4	25.5	dBW
Channel Losses				
Free space loss	179.1	179.3	179.4	dB
Atmospheric loss	0.9	0.9	0.9	dB
Pointing loss	2.0	2.0	2.0	dB
Polarization loss	0.5	0.5	0.5	dB
Earth Station Receiver				
Antenna diameter	2.4	2.4	2.4	m
Antenna efficiency	50	50	50	%
Antenna peak gain	43.1	43.3	43.4	dBi
Antenna HPBW	1.1	1.1	1.1	deg
Radome loss	1.2	1.2	1.2	dB
Carrier power at the antenna output	−85.4	−85.3	−85.1	dBm
LNA noise temperature	51	51	51	K
System noise temperature	166	166	166	K
Station G/T	19.7	19.9	20.0	dB/K
Receiver noise power density (N_0)	−176.4	−176.4	−176.4	dBm/Hz
Carrier power-to-noise power density ratio (C/N_0)	91.0	91.1	91.3	dBHz
Earth Station Demodulator				
Modulation	8-PSK	8-PSK	8-PSK	
Symbol rate	45	45	45	MSps
Composite code rate	0.747	0.747	0.747	
Uncoded data rate	101	101	101	Mbit/s
Target BER	10^{-10}	10^{-10}	10^{-10}	
Coding Gain at target BER	12.1	12.1	12.1	dB
Demodulator implementation loss	0.8	0.8	0.8	dB
Required E_b/N_0 at target BER	5.2	5.2	5.2	dB
Received E_b/N_0	11.0	11.1	11.3	dB
Link Margin	**5.8**	**5.9**	**6.0**	**dB**

Figure 5.

SkySat-2 TT&C Uplink Analysis (450 km orbit)

Skybox Imaging, Inc.

Parameter	Channel 1	Channel 2	Unit
General			
Orbit altitude	450	450	km
Elevation angle	5	5	deg
Slant range	2157	2157	km
Frequency	2.081	2.083	GHz
Ground Station Transmitter			
Amplifier output power	15.0	15.0	W
Circuit loss	2.0	2.0	dB
Radome loss	0.2	0.2	dB
Antenna diameter	2.4	2.4	m
Antenna efficiency	50	50	%
Antenna peak gain	31.4	31.4	dBi
Antenna HPBW	4.3	4.3	deg
EIRP	40.9	40.9	dBW
Channel Losses			
Free space loss	165.4	165.5	dB
Atmospheric loss	0.5	0.5	dB
Pointing loss	0.5	0.5	dB
Polarization loss	1.0	1.0	dB
Satellite Receiver			
Antenna gain	0.0	0.0	dBi
Antenna HPBW	70.0	70.0	deg
Antenna circuit loss	0.7	0.7	dB
Carrier power at the antenna output	−97.2	−97.2	dBm
LNA noise temperature	289	289	K
System noise temperature	570	570	K
Receiver noise power density (N_0)	−171.0	−171.0	dBm/Hz
Carrier power-to-noise power density ratio (C/N_0)	73.8	73.8	dBHz
Earth Station Demodulator			
Modulation	FSK	FSK	
Symbol rate	16	16	kSps
Composite code rate	1.000	1.000	
Uncoded data rate	16	16	kbit/s
Target BER	10^{-5}	10^{-5}	
Required signal level at target BER	−110.0	−110.0	dBm
Received signal level	−97.9	−97.9	dBm
Link Margin	**12.1**	**12.1**	**dB**

Figure 6.

SkySat-2 TT&C Uplink Analysis (637 km orbit)

Skybox Imaging, Inc.

Parameter	Channel 1	Channel 2	Unit
General			
Orbit altitude	637	637	km
Elevation angle	5	5	deg
Slant range	2691	2691	km
Frequency	2.081	2.083	GHz
Ground Station Transmitter			
Amplifier output power	15.0	15.0	W
Circuit loss	2.0	2.0	dB
Radome loss	0.2	0.2	dB
Antenna diameter	2.4	2.4	m
Antenna efficiency	50	50	%
Antenna peak gain	31.4	31.4	dBi
Antenna HPBW	4.3	4.3	deg
EIRP	40.9	40.9	dBW
Channel Losses			
Free space loss	167.4	167.4	dB
Atmospheric loss	0.5	0.5	dB
Pointing loss	0.5	0.5	dB
Polarization loss	1.0	1.0	dB
Satellite Receiver			
Antenna gain	0.0	0.0	dBi
Antenna HPBW	70.0	70.0	deg
Antenna circuit loss	0.7	0.7	dB
Carrier power at the antenna output	−99.2	−99.2	dBm
LNA noise temperature	289	289	K
System noise temperature	570	570	K
Receiver noise power density (N_0)	−171.0	−171.0	dBm/Hz
Carrier power-to-noise power density ratio (C/N_0)	71.9	71.9	dBHz
Earth Station Demodulator			
Modulation	FSK	FSK	
Symbol rate	16	16	kSps
Composite code rate	1.000	1.000	
Uncoded data rate	16	16	kbit/s
Target BER	10^{-5}	10^{-5}	
Required signal level at target BER	−110.0	−110.0	dBm
Received signal level	−99.9	−99.9	dBm
Link Margin	**10.1**	**10.1**	**dB**

Figure 7.

SkySat-2 TT&C Downlink Analysis (450 km)

Skybox Imaging, Inc.

Parameter	Channel 1	Channel 2	Unit
General			
Orbit altitude	450	450	km
Elevation angle	5	5	deg
Slant range	2157	2157	km
Frequency	8.375	8.380	GHz
Satellite Transmitter			
Amplifier output power	0.4	0.4	W
Circuit loss	2.2	2.2	dB
Antenna gain	-4.0	-4.0	dBi
Antenna HPBW	70.0	70.0	deg
EIRP	-10.0	-10.0	dBW
Channel Losses			
Free space loss	177.5	177.5	dB
Atmospheric loss	0.9	0.9	dB
Pointing loss	2.0	2.0	dB
Polarization loss	1.0	1.0	dB
Earth Station Receiver			
Antenna diameter	2.4	2.4	m
Antenna efficiency	50	50	%
Antenna peak gain	43.5	43.5	dBi
Antenna HPBW	1.1	1.1	deg
Radome loss	1.2	1.2	dB
Carrier power at the antenna output	-119.2	-119.2	dBm
LNA noise temperature	51	51	K
System noise temperature	166	166	K
Station G/T	20.0	20.1	dB/K
Receiver noise power density (N_0)	-176.4	-176.4	dBm/Hz
Carrier power-to-noise power density ratio (C/N_0)	57.2	57.2	dBHz
Earth Station Demodulator			
Modulation	DPSK	DPSK	
Symbol rate	128	128	kSps
Composite code rate	0.500	0.500	
Uncoded data rate	64	64	kbit/s
Target BER	10^{-5}	10^{-5}	
Demodulator implementation loss	1.0	1.0	dB
Required E_b/N_0 at target BER	6.0	6.0	dB
Received E_b/N_0	9.1	9.1	dB
Link Margin	**3.1**	**3.1**	**dB**

Note 1: this downlink assumes the satellite is NADIR pointed during AOS; the link margin improves by 9 dB if the satellite is pointed at the ground station.

Figure 8.

SkySat-2 TT&C Downlink Analysis (637 km)

Skybox Imaging, Inc.

Parameter	Channel 1	Channel 2	Unit
General			
Orbit altitude	637	637	km
Elevation angle	5	5	deg
Slant range	2691	2691	km
Frequency	8.375	8.380	GHz
Satellite Transmitter			
Amplifier output power	0.7	0.7	W
Circuit loss	2.2	2.2	dB
Antenna gain	-4.0	-4.0	dBi
Antenna HPBW	70.0	70.0	deg
EIRP	-7.7	-7.7	dBW
Channel Losses			
Free space loss	179.5	179.5	dB
Atmospheric loss	0.9	0.9	dB
Pointing loss	2.0	2.0	dB
Polarization loss	1.0	1.0	dB
Earth Station Receiver			
Antenna diameter	2.4	2.4	m
Antenna efficiency	50	50	%
Antenna peak gain	43.5	43.5	dBi
Antenna HPBW	1.1	1.1	deg
Radome loss	1.2	1.2	dB
Carrier power at the antenna output	−118.8	−118.8	dBm
LNA noise temperature	51	51	K
System noise temperature	166	166	K
Station G/T	20.0	20.1	dB/K
Receiver noise power density (N_0)	−176.4	−176.4	dBm/Hz
Carrier power-to-noise power density ratio (C/N_0)	57.6	57.6	dBHz
Earth Station Demodulator			
Modulation	DPSK	DPSK	
Symbol rate	128	128	kSps
Composite code rate	0.500	0.500	
Uncoded data rate	64	64	kbit/s
Target BER	10^{-5}	10^{-5}	
Demodulator implementation loss	1.0	1.0	dB
Required E_b/N_0 at target BER	6.0	6.0	dB
Received E_b/N_0	9.5	9.5	dB
Link Margin	**3.5**	**3.5**	**dB**

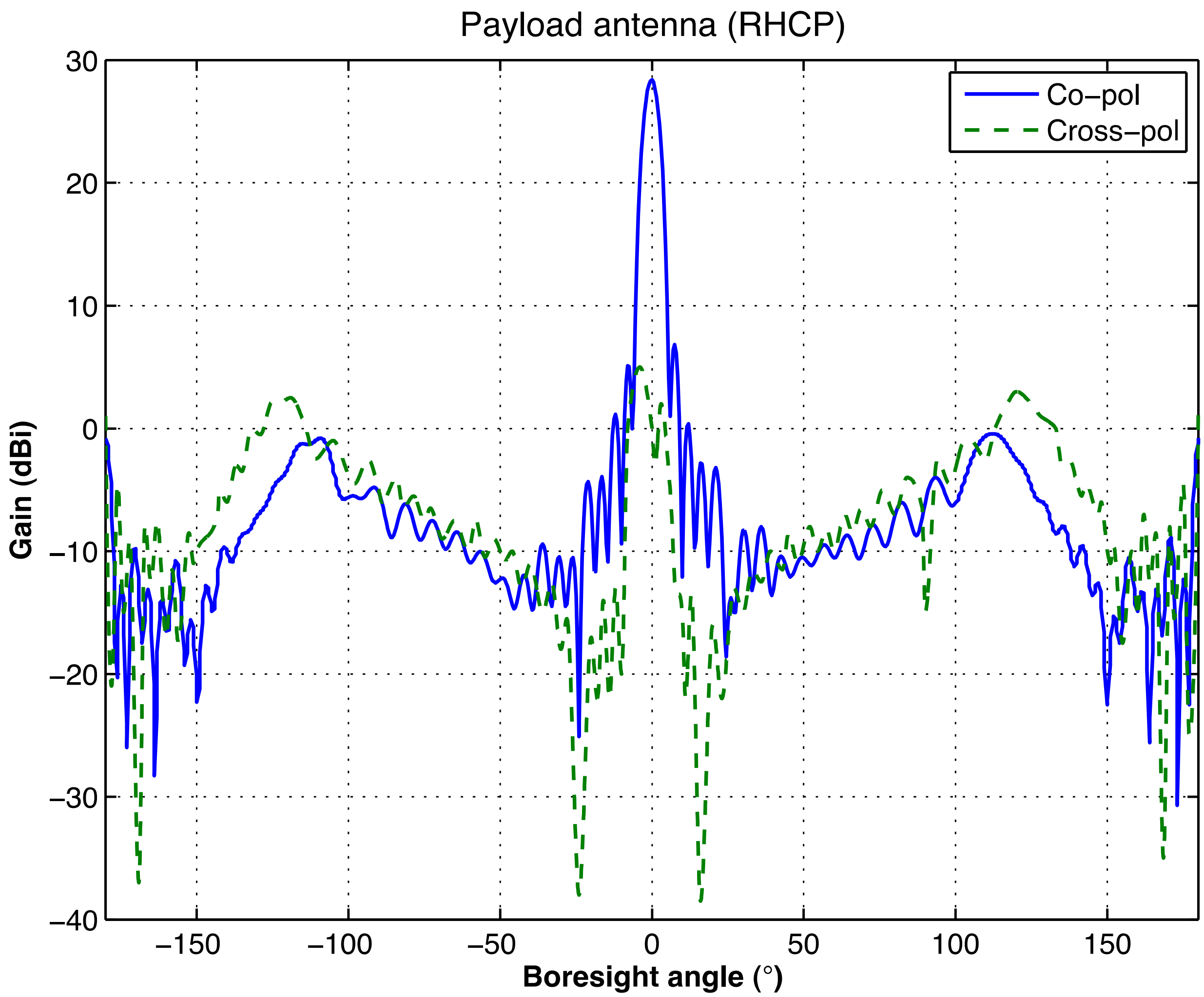
Note 1: this downlink assumes the satellite is NADIR pointed during AOS; the link margin improves by 9 dB if the satellite is pointed at the ground station.

Figure 9.

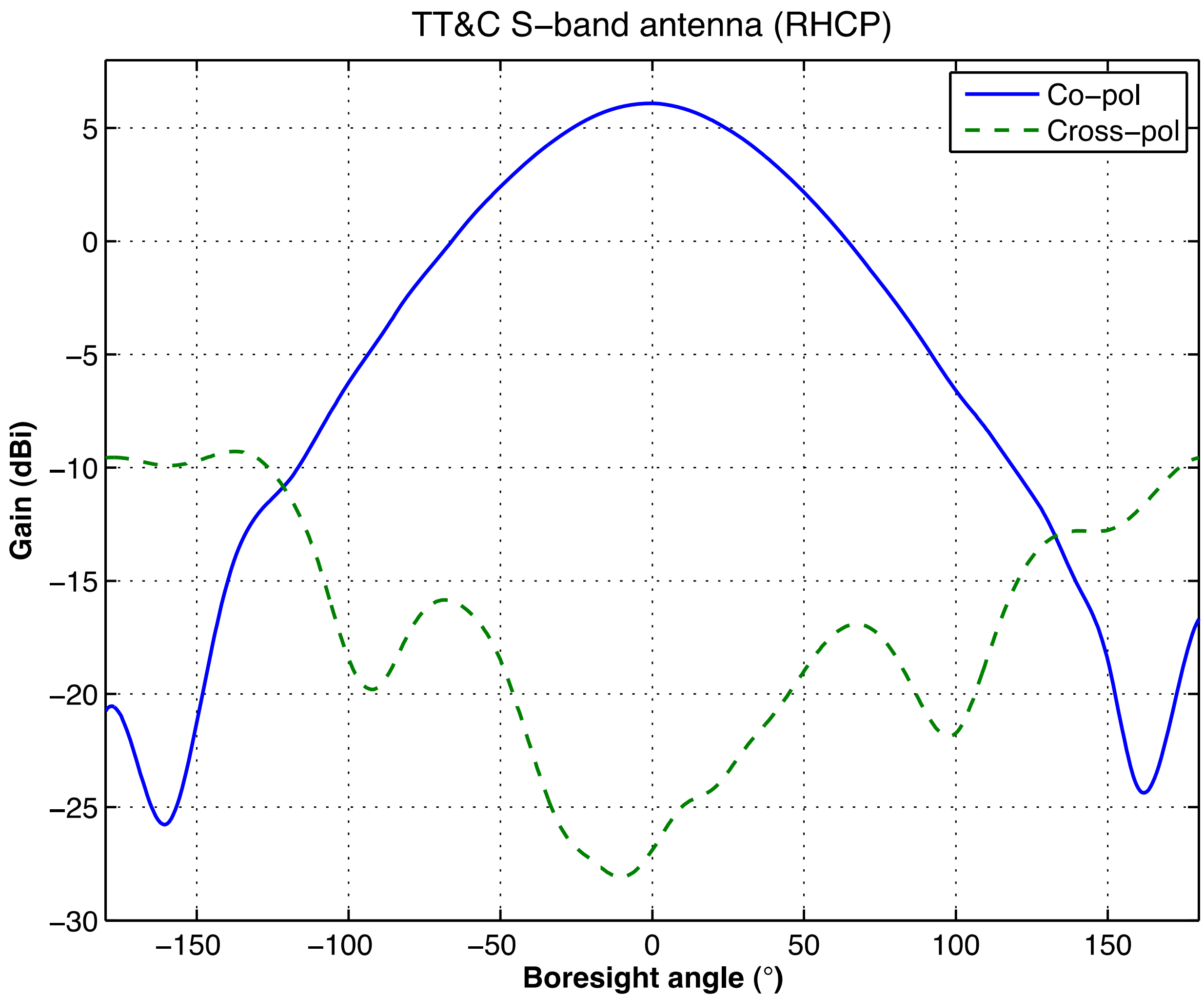
<u>ATTACHMENT C</u>

Skybox Imaging, Inc.
FCC Form 312, Exhibit 43
March 2012

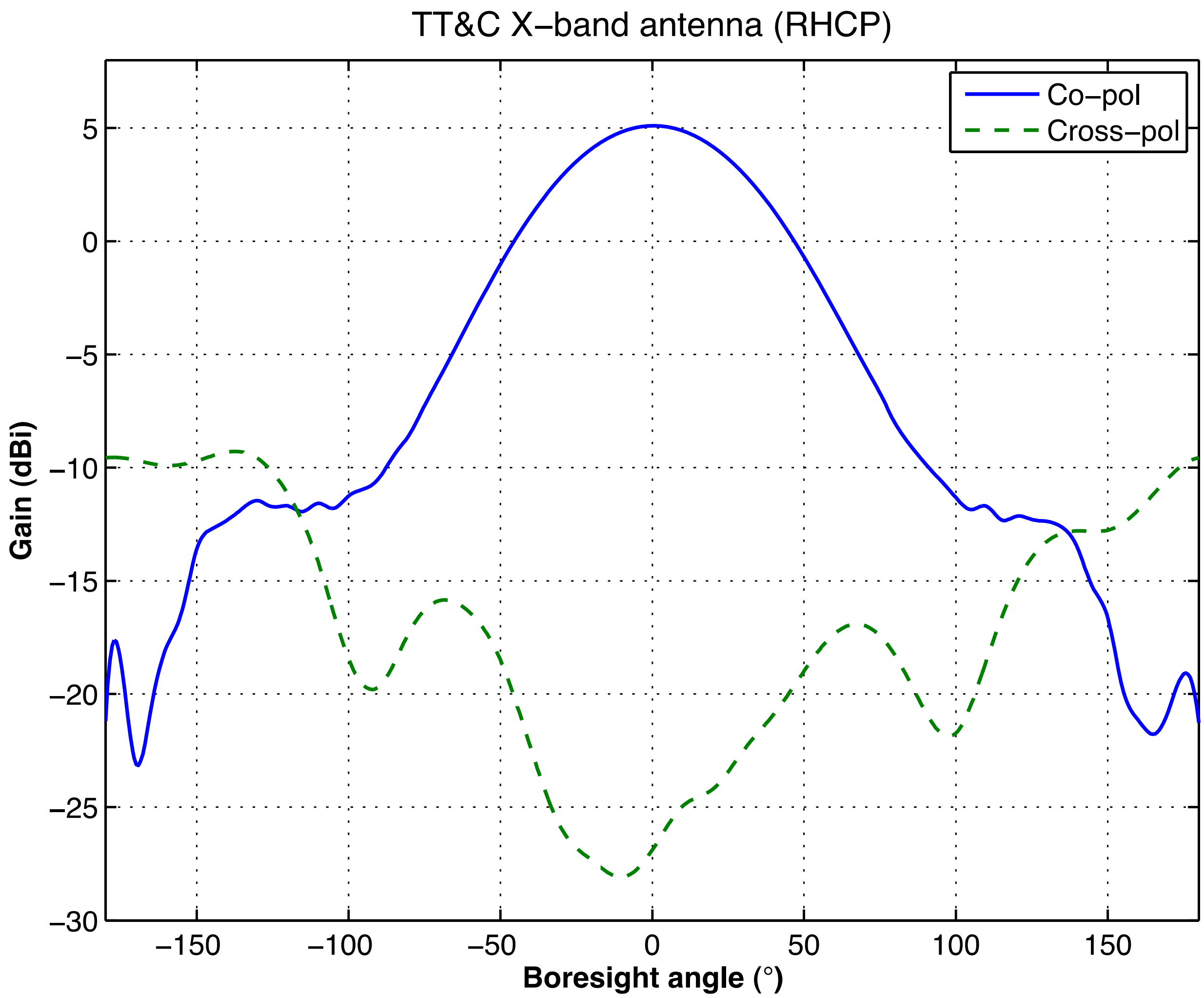
<u>SKYSAT SYSTEM ANTENNA PATTERNS</u>



Payload antenna (RHCP)
Co−pol
Cross−pol
Gain (dBi)
30
20
10
0
−10
−20
−30
−40
−150
−100
−50
0
50
100
150
Boresight angle (°)



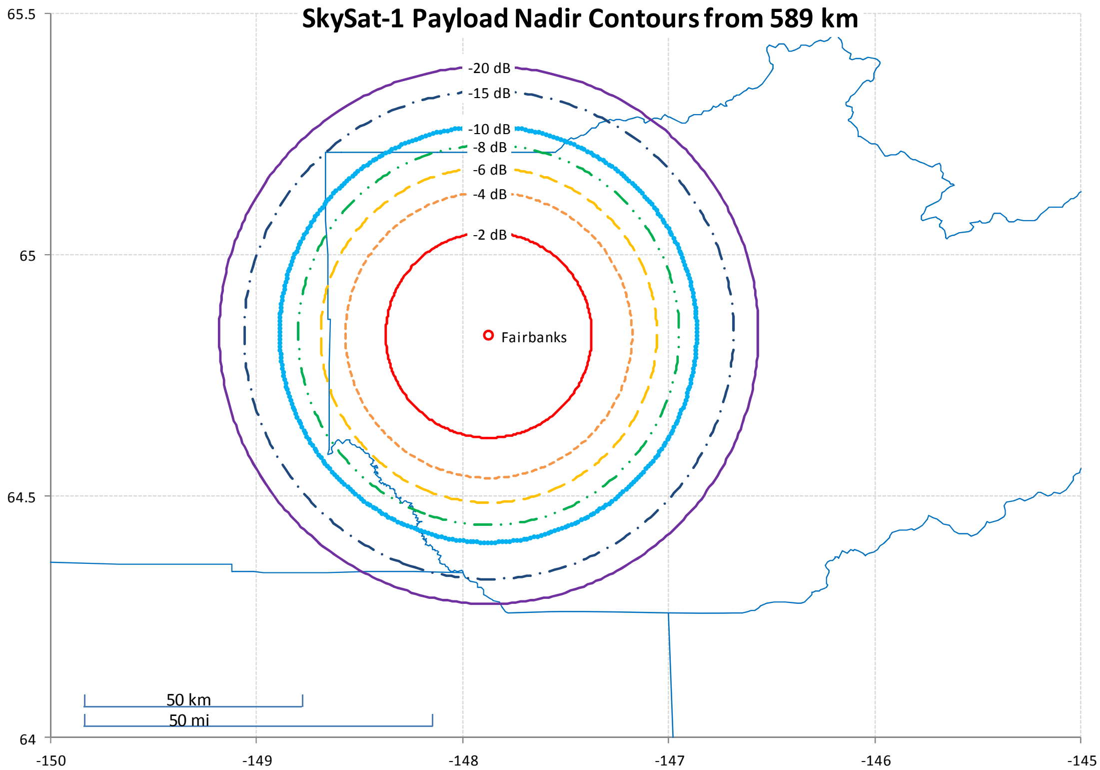
TT&C S−band antenna (RHCP)
Co−pol
Cross−pol
Gain (dBi)
5
0
−5
−10
−15
−20
−25
−30
−150
−100
−50
0
50
100
150
Boresight angle (°)

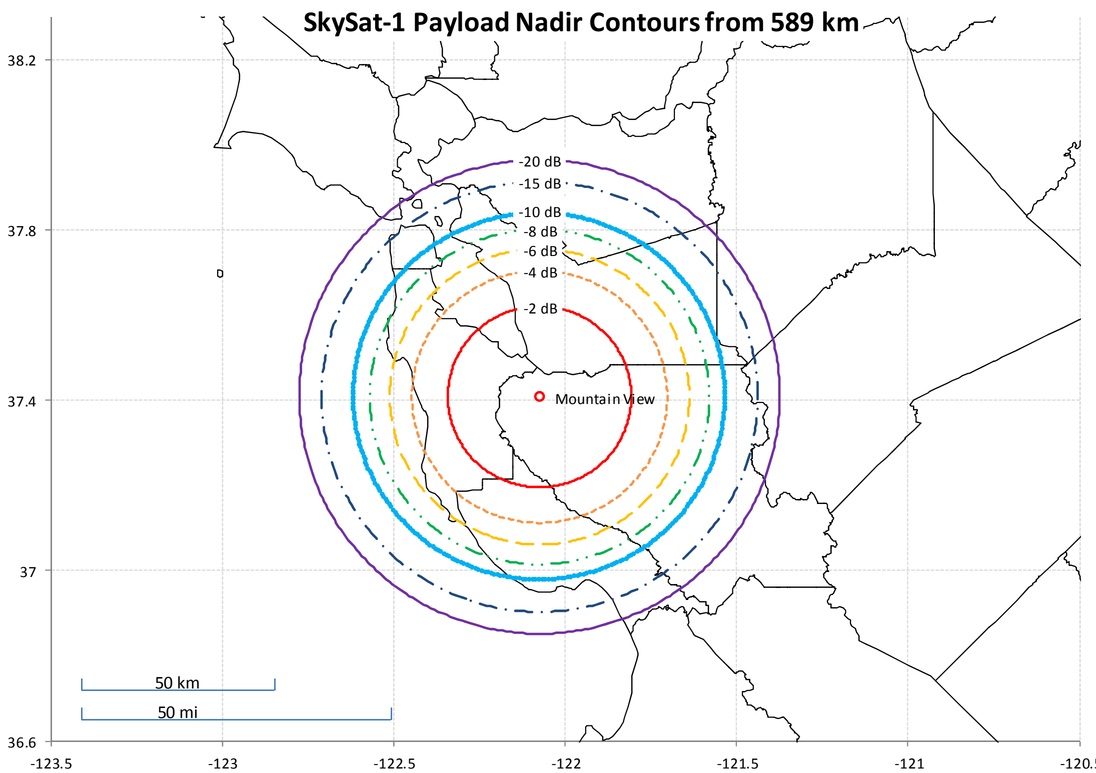

TT&C X−band antenna (RHCP)
Co−pol
Cross−pol
Gain (dBi)
5
0
−5
−10
−15
−20
−25
−30
−150
−100
−50
0
50
100
150
Boresight angle (°)

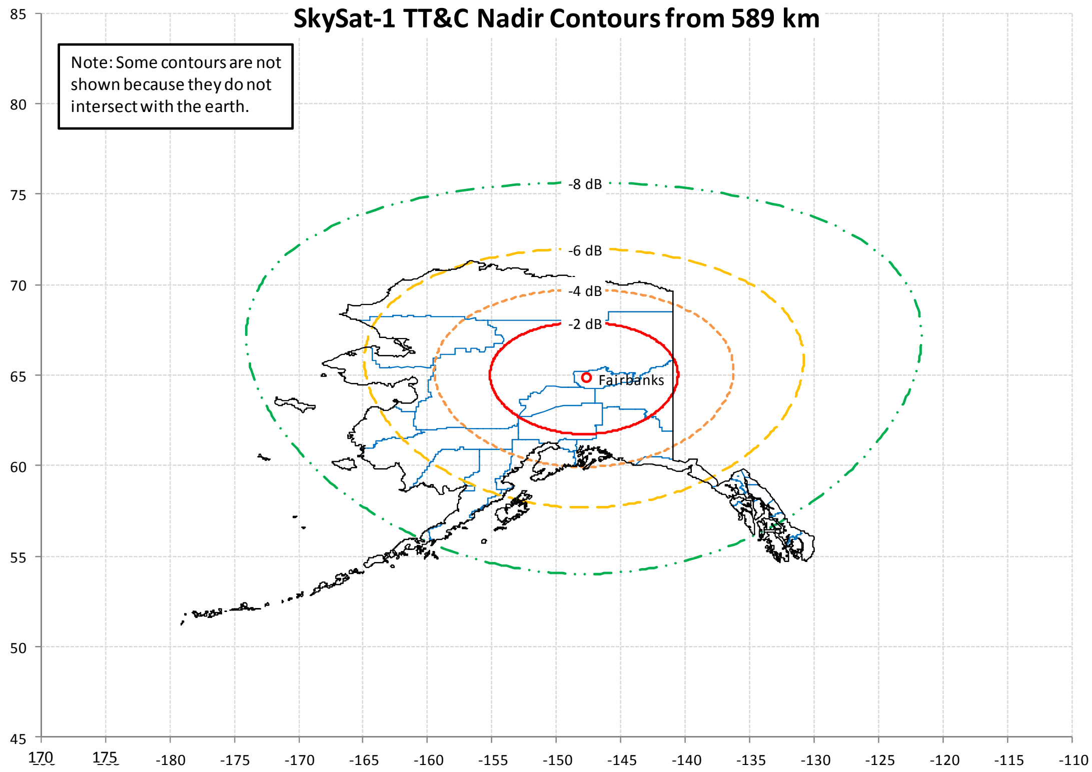
ATTACHMENT D

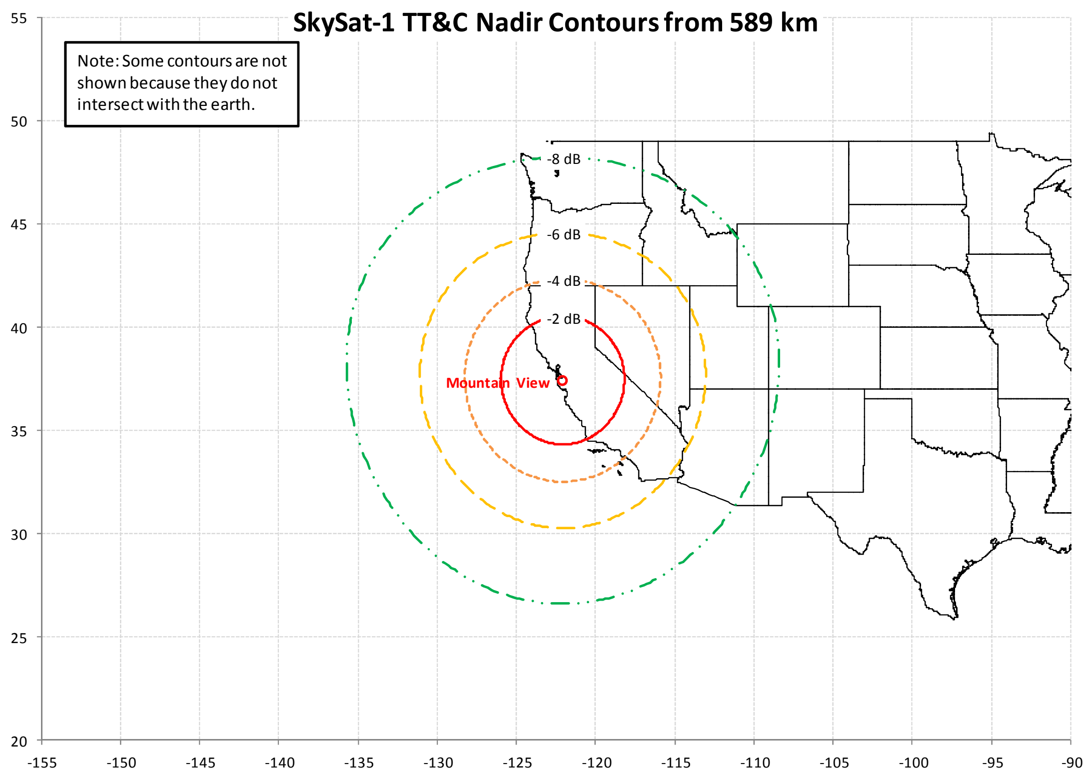
Skybox Imaging, Inc.
FCC Form 312, Exhibit 43
March 2012

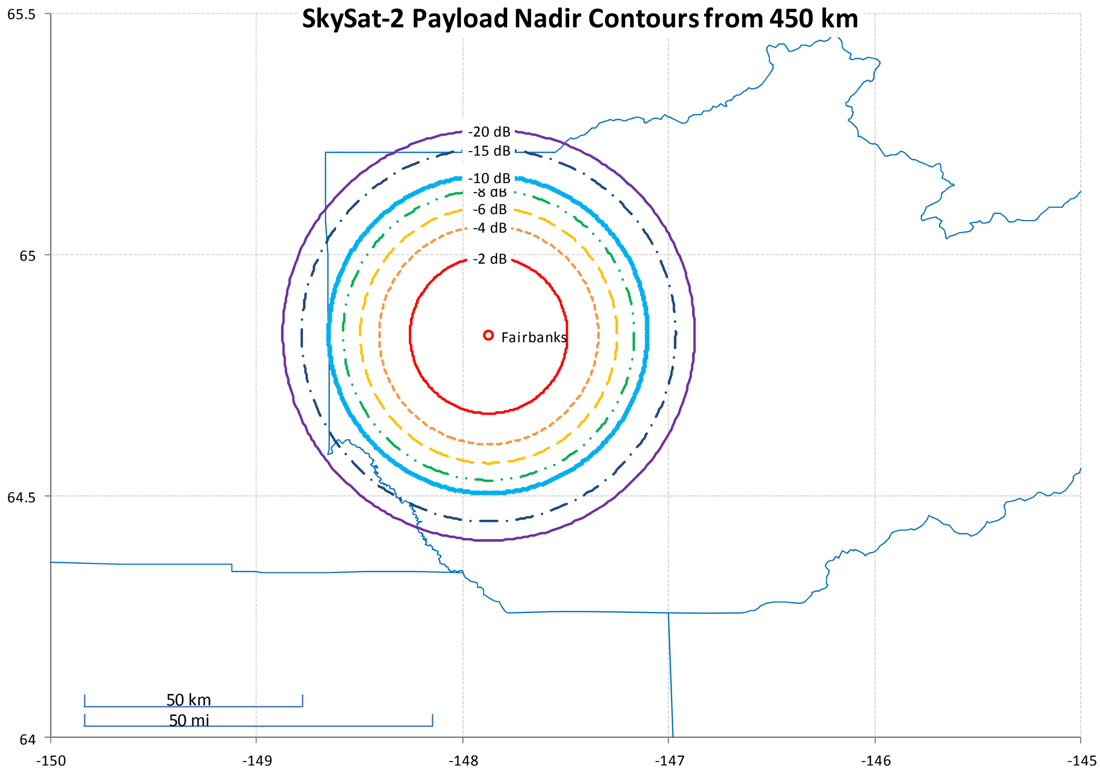
PREDICTED GAIN CONTOURS

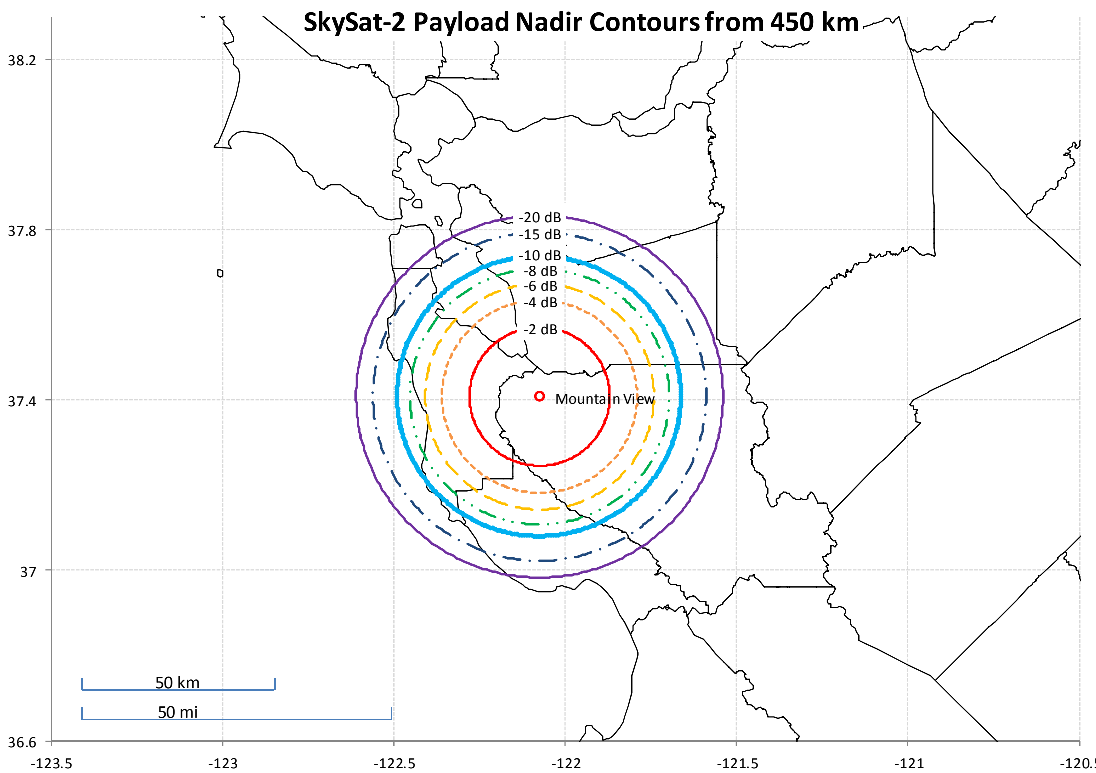

SkySat-1 Payload Nadir Contours from 589 km
65.5
65
64.5
64
-150
-149
-148
-147
-146
-145
-20 dB
-15 dB
-10 dB
-8 dB
-6 dB
-4 dB
-2 dB
Fairbanks
50 km
50 mi

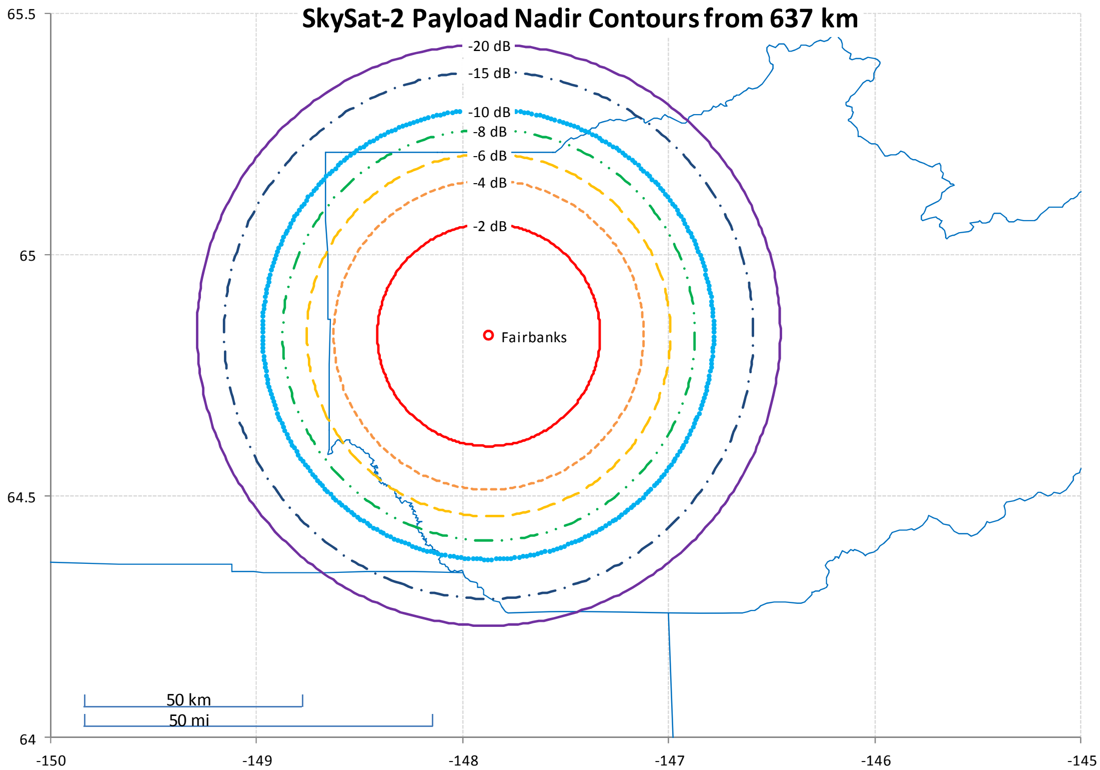

SkySat-1 Payload Nadir Contours from 589 km
38.2
37.8
37.4
37
36.6
-123.5
-123
-122.5
-122
-121.5
-121
-120.5
-20 dB
-15 dB
-10 dB
-8 dB
-6 dB
-4 dB
-2 dB
Mountain View
50 km
50 mi

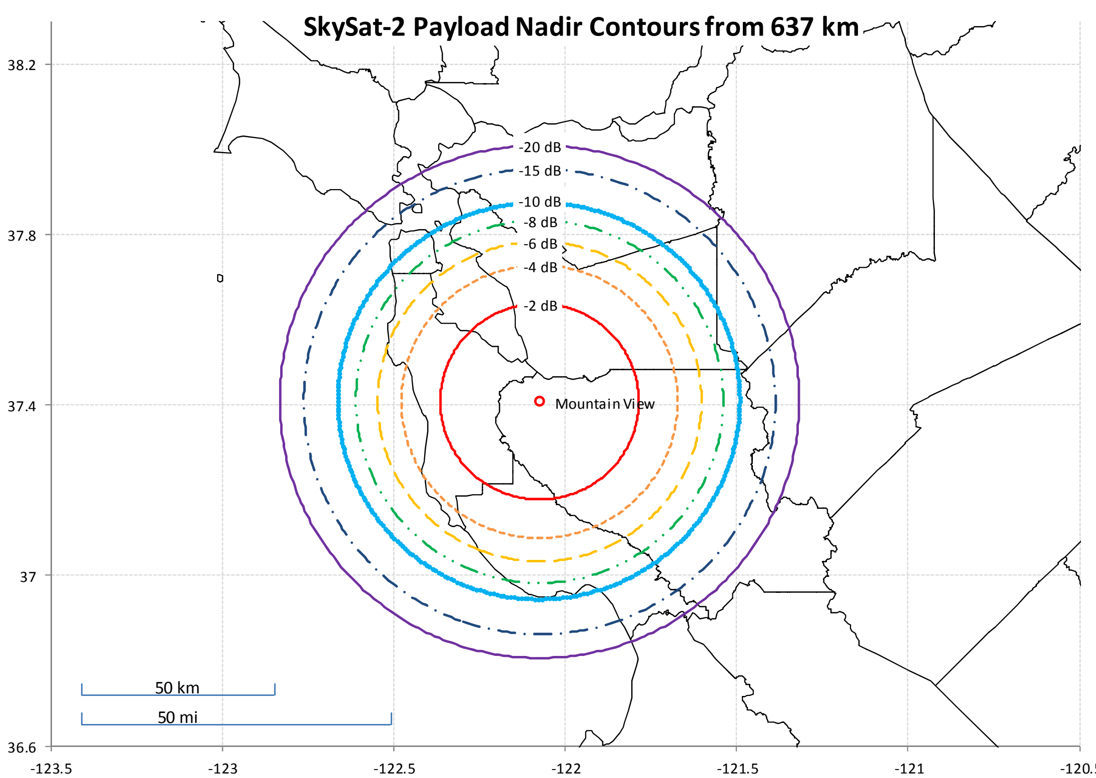

SkySat-1 TT&C Nadir Contours from 589 km
Note: Some contours are not shown because they do not intersect with the earth.
-8 dB
-6 dB
-4 dB
-2 dB
Fairbanks
85
80
75
70
65
60
55
50
45
170
175
-180
-175
-170
-165
-160
-155
-150
-145
-140
-135
-130
-125
-120
-115
-110

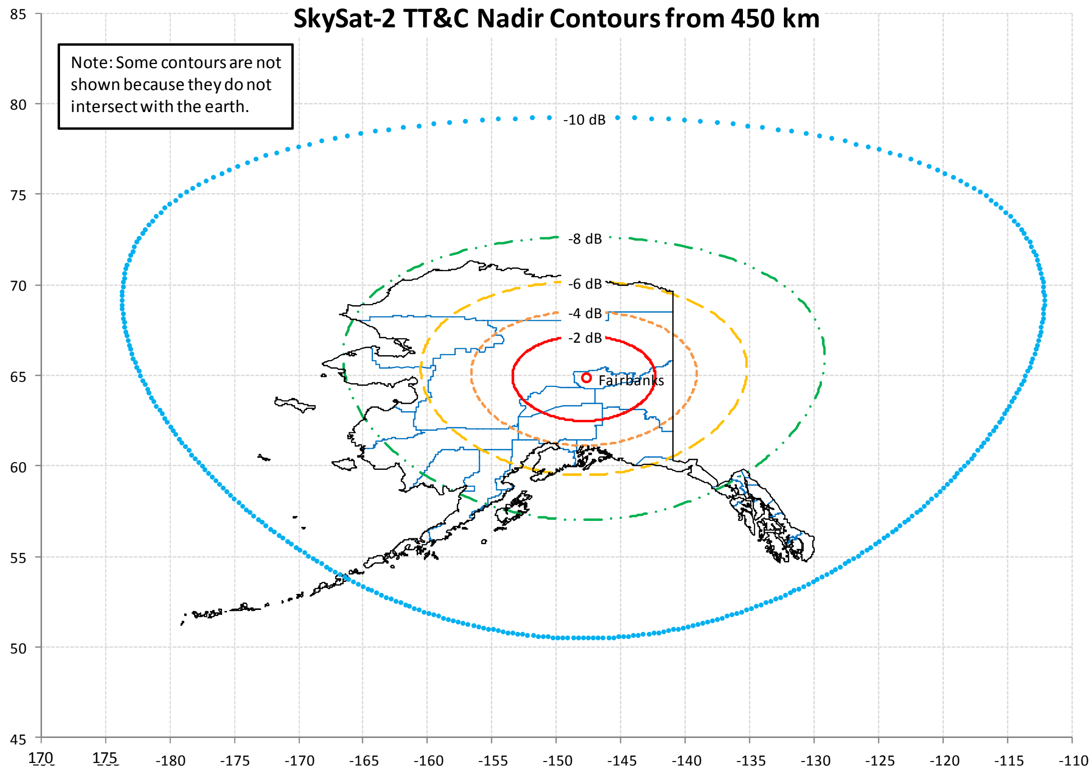

SkySat-1 TT&C Nadir Contours from 589 km
Note: Some contours are not shown because they do not intersect with the earth.
-8 dB
-6 dB
-4 dB
-2 dB
Mountain View
55
50
45
40
35
30
25
20
-155
-150
-145
-140
-135
-130
-125
-120
-115
-110
-105
-100
-95
-90

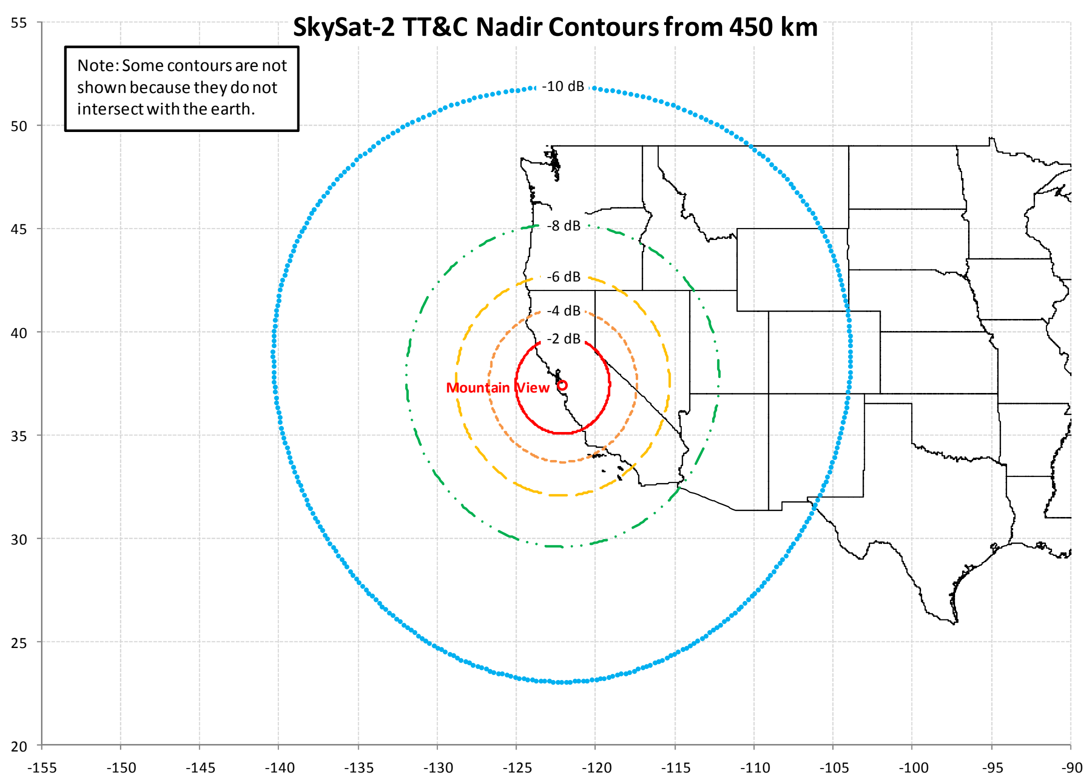

SkySat-2 Payload Nadir Contours from 450 km
-20 dB
-15 dB
-10 dB
-8 dB
-6 dB
-4 dB
-2 dB
Fairbanks
50 km
50 mi
65.5
65
64.5
64
-150
-149
-148
-147
-146
-145

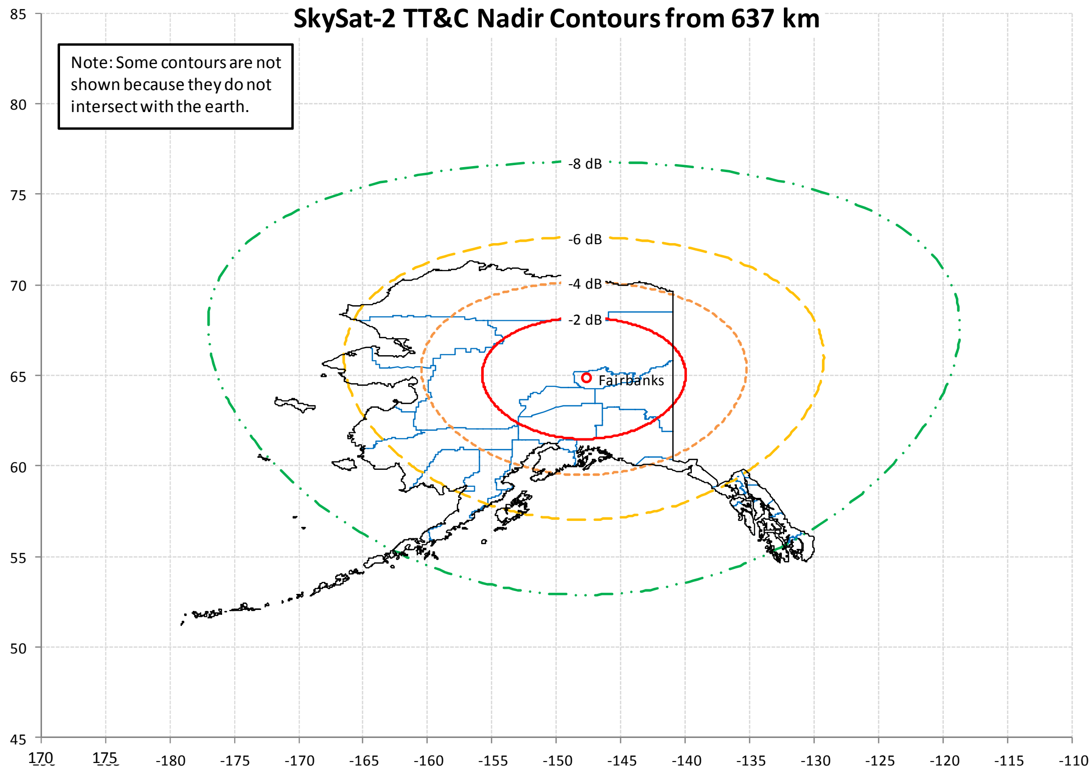

SkySat-2 Payload Nadir Contours from 450 km
-20 dB
-15 dB
-10 dB
-8 dB
-6 dB
-4 dB
-2 dB
Mountain View
50 km
50 mi
38.2
37.8
37.4
37
36.6
-123.5
-123
-122.5
-122
-121.5
-121
-120.5

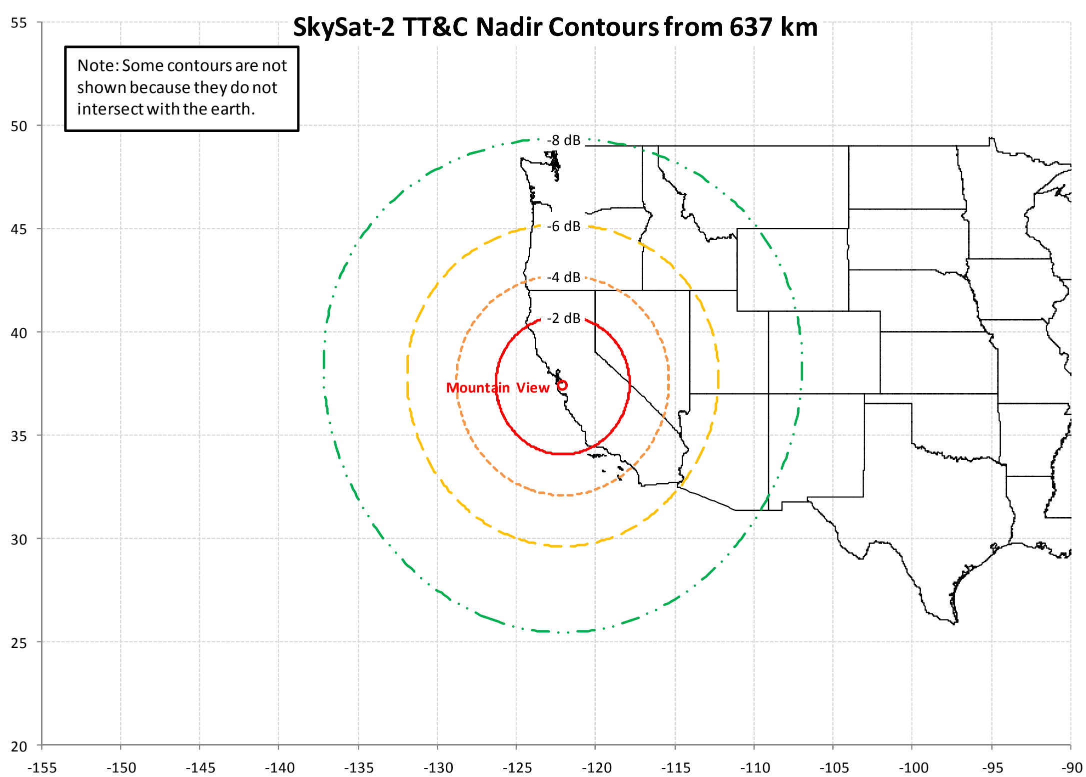

SkySat-2 Payload Nadir Contours from 637 km
-20 dB
-15 dB
-10 dB
-8 dB
-6 dB
-4 dB
-2 dB
Fairbanks
50 km
50 mi
65.5
65
64.5
64
-150
-149
-148
-147
-146
-145


SkySat-2 Payload Nadir Contours from 637 km
-20 dB
-15 dB
-10 dB
-8 dB
-6 dB
-4 dB
-2 dB
Mountain View
50 km
50 mi
38.2
37.8
37.4
37
36.6
-123.5
-123
-122.5
-122
-121.5
-121
-120.5


SkySat-2 TT&C Nadir Contours from 450 km
Note: Some contours are not shown because they do not intersect with the earth.
-10 dB
-8 dB
-6 dB
-4 dB
-2 dB
Fairbanks
85
80
75
70
65
60
55
50
45
170
175
-180
-175
-170
-165
-160
-155
-150
-145
-140
-135
-130
-125
-120
-115
-110


SkySat-2 TT&C Nadir Contours from 450 km
Note: Some contours are not shown because they do not intersect with the earth.
-10 dB
-8 dB
-6 dB
-4 dB
-2 dB
Mountain View
55
50
45
40
35
30
25
20
-155
-150
-145
-140
-135
-130
-125
-120
-115
-110
-105
-100
-95
-90


SkySat-2 TT&C Nadir Contours from 637 km
Note: Some contours are not shown because they do not intersect with the earth.
-8 dB
-6 dB
-4 dB
-2 dB
Fairbanks
85
80
75
70
65
60
55
50
45
170
175
-180
-175
-170
-165
-160
-155
-150
-145
-140
-135
-130
-125
-120
-115
-110


SkySat-2 TT&C Nadir Contours from 637 km
Note: Some contours are not shown because they do not intersect with the earth.
-8 dB
-6 dB
-4 dB
-2 dB
Mountain View
55
50
45
40
35
30
25
20
-155
-150
-145
-140
-135
-130
-125
-120
-115
-110
-105
-100
-95
-90

TECHNICAL CERTIFICATE

I, Jim McClelland, 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/ *Jim McClelland*
Jim McClelland
Vice President, Mission Assurance
Skybox Imaging, Inc.

Dated: March 22, 2012