Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Orbital Sidekick, Inc.	)	File No. _____
	)	
Application for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Earth-Exploration Satellite Service	)	Call Sign: _____

APPLICATION

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APPLICATION

Orbital Sidekick, Inc. ("OSK") requests authority from the Federal Communications Commission (the "Commission") to launch and operate six hyperspectral imaging small satellites in low-Earth, non-geostationary orbit ("NGSO") in connection with the planned deployment of its Global Hyperspectral Observation Satellite ("GHOSt") constellation. A completed Form 312, accompanying Schedule S, and Technical Annex are included with this application to provide the information required by the Commission's rules. This application is submitted pursuant to the Commission's streamlined licensing procedures governing small satellites.[1]

I. BACKGROUND AND DESCRIPTION OF OSK SERVICES

OSK is a San Francisco, California-based operator of space-based hyperspectral monitoring sensors that provide innovative remote sensing solutions for a diverse set of industrial and governmental customers, including end users in the energy, surveying and extraction, agriculture, environmental monitoring, and defense sectors.[2] OSK's proprietary Spectral Intelligence platform outpaces current remote sensing technologies by combining the

[1] 47 C.F.R. § 25.122. S*ee also Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd 13077 (2019) ("*Streamlined Licensing Order*").

[2] *See, e.g., Orbital Sidekick Awarded $16M U.S. Air Force STRATFI Contract*, https://orbitalsidekick.com/orbital-sidekick-awarded-16m-u-s-air-force-stratfi-contract/.

advanced sensing capabilities of its space-based sensing infrastructure with robust data analytics and machine learning to produce unparalleled radiometric speciation and change detection offerings. Examples of the kinds of data sets OSK provides its customers include protein content and evapotranspiration levels for crops, corrosion identification and leak detection for monitoring pipelines, accurate mineral surveying, environmental monitoring for various applications, and real-time road/rail infrastructure conditions. The deployment of the GHOSt constellation represents the next generation of OSK's space-based sensing capabilities and will allow OSK to scale its commercial product with larger coverage, reduced revisit times, better spatial resolution, and more spectral capability.[3]

Therefore, OSK respectfully requests the Commission expeditiously grant this streamlined application so that OSK may commence commercial operations and further expand its innovative offerings to its diverse set of customers.

II. DESCRIPTION OF SYSTEM FACILITIES AND OPERATIONS

A. Space Segment

The GHOSt mission will involve deploying a remote sensing constellation of smallsats with an optical payload. The satellite constellation will consist of six (6) satellites launched into sun-synchronous, low earth orbit. The spacecraft bus is based on Astro Digital's successful Corvus-XL small satellite platform and utilizes Astro Digital's heritage flight computer, ADCS, power, and communications subsystems. The payload for each satellite consists of a proprietary hyperspectral imager. Each satellite has external dimensions of 0.56 cm x 0.56 cm x 111.3 cm and a total mass of 85 kg.[4]

[3] OSK does not hold any Commission authorizations and has not filed any additional applications related to the proposed operations covered by the instant request for authorization.

[4] *See* Attachment C, Orbital Debris Assessment Report at §§ 2.1 & 2.3 ("ODAR").

As described more fully in the ODAR[5] and Technical Annex[6] accompanying this application, each satellite is equipped with state-of-the-art hardware and software solutions to ensure safe and efficient mission operations. The GHOSt satellites will not carry propulsion systems. Instead, each satellite will be capable of making orbital adjustments and performing collision avoidance maneuvers by utilizing differential drag.[7]

The GHOSt mission plans to operate in the bands outlined in the table below. Satellite downlink transmissions can be turned on and off by ground telecommand in compliance with Commission rules.[8]

Link Name	Band	Center Frequency	Bandwidth
Payload Downlink[9]	25.5-27.0 GHz	26.8 GHz	450 MHz
Adaptive Coding and Modulation Uplink[10]	2025.0-2110.0 MHz	2047.5 MHz	5 MHz
TT&C Uplink[11]	2025.0-2110.0 MHz	2056 MHz	5 MHz
TT&C Downlink[12]	400.15-401.0 MHz	400.5 MHz	40 kHz
Space-to-Space[13]	1616-1617.775 MHz	Assigned by Globalstar	Assigned by Globalstar

[5] *Id.*

[6] *See* Attachment B, Technical Annex ("Technical Annex").

[7] ODAR § 1.6.

[8] *See generally* Technical Annex; 47 C.F.R. § 25.207.

[9] FCC Form 312 Schedule S ("Schedule S"). *See* Technical Annex § III (describing the Ka-band band plan and details of channel assignments).

[10] *See* Schedule S.

[11] *Id*.

[12] *Id.*

[13] *Id.*; Technical Annex § IV.

B. Orbital Information

The GHOSt satellites described in this application will operate at an altitude between 500 and 600 km in a sun synchronous orbital ("SSO") inclination.[14] The information below describes the anticipated orbital characteristics for the GHOSt mission.

Satellites per Plane	**2**
Inclination	**SSO**
Orbital Period	**94.6 minutes at 500 km**
Apogee	**525 +75 km/- 25 km (circular)**
Perigee	**525 +75 km/- 25 km (circular)**
Active Service Arc	**Full Orbit**
LTAN	**9:00 am to 2:00 pm**

C. Ground Segment and Operations

The Mission Operations Center for GHOSt will be located at Astro Digital's facility in Santa Clara, CA and OSK's office in San Francisco, CA. Consistent with OSK's NOAA license, the GHOSt constellation will be monitored at all times via automated and human systems, facilitating rapid response to any technical or regulatory concerns.[15]

OSK will rely on a network of ground stations, including facilities located in Santa Clara, CA, Tromsø, Norway, Svalbard, Norway, and Troll, Antarctica, for its mission operations.[16] OSK may expand its ground station network over the mission life of GHOSt to include

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[14] *See* Schedule S.

[15] *Orbital Sidekick Private Remote Sensing License*, Public Summary, https://www.nesdis.noaa.gov/CRSRA/files/NOAA_Commercial_Remote_Sensing_License_Notice_Orbital_Sidekick.pdf.

[16] Technical Annex § I.

additional commercial stations inside or outside the United States. OSK has already initiated coordination efforts with federal operators in its targeted use bands to coordinate its operations and will operate in accordance with any agreements reached with these stakeholders, as applicable.[17]

D. Launch Schedule

The GHOSt satellites will be launched using a secondary payload launch service. OSK currently anticipates an initial launch of GHOSt-01 and GHOSt-02 in Q1 2022. OSK intends to fully deploy the GHOSt constellation by Q4 2022.

III. SMALL SATELLITE CERTIFICATIONS

Consistent with the requirements for streamlined treatment under Section 25.122 of the Commission's rules, OSK hereby certifies that all of the GHOSt satellites to be operated under this requested authorization meet the following criteria:[18]

47 C.F.R. § 25.122(c) Criteria	GHOSt Compliance
(1) The space station(s) will operate only in non-geostationary orbit.	GHOSt will be deployed into a sun synchronous orbit at a target altitude of 525 km.[19]
(2) The total in-orbit lifetime for any individual space station will be six years or less.	GHOSt-01 and GHOSt-02 are expected to have a total in-orbit

[17] *See, e.g.*, Application of Capella Space Corp. for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Earth-Exploration Satellite Service, Stamp Grant, IBFS File No. SAT-LOA-20200914-00108, at condition 9 (granted Dec. 17, 2020) (specifying operations subject to coordination).

[18] *See* 47 C.F.R. § 25.122(c). OSK is aware that the Commission recently added criteria for orbital debris mitigation. *See Mitigation of Orbital Debris in the New Space Age*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 4156 (2020) (Appendix A); *Applications for Streamlined Small Space Station Authorization*, Amendment, 85 FR 52452 (rel. Aug. 25, 2020). Although this amendment is not yet effective, OSK certifies that the GHOSt constellation complies with the new requirements, including those outlined in certifications 13 and 14 of this section.

[19] Schedule S; ODAR § 1.6.

	lifetime of 5.979 years.[20] All GHOSt satellites will have a total in-orbit lifetime of less than six years.
(3) The space station(s): (i) Will be deployed at an orbital altitude of 600 km or below; or (ii) Will maintain a propulsion system and have the ability to make collision avoidance and deorbit maneuvers using propulsion.	The GHOSt satellites will be deployed to a target altitude of 525 km, and no higher than 600 km.[21]
(4) Each space station will be identifiable by a unique signal-based telemetry marker distinguishing it from other space stations or space objects.	The telemetry system employed for the GHOSt mission allows each GHOSt satellite to be identified by a unique signal-based telemetry marker that will distinguish it from other space stations or objects.
(5) The space station(s) will release no operational debris.	The GHOSt satellites will not release any operational debris.[22]
(6) The space station operator has assessed and limited the probability of accidental explosions, including those resulting from the conversion of energy sources on board the space station(s) into energy that fragments the spacecraft.	OSK has assessed and limited the probability of accidental explosions, including those resulting from the conversion of energy sources on board the GHOSt satellites into energy that fragments the spacecraft.[23]
(7) The probability of a collision between each space station and any other large object (10 centimeters or larger) during the orbital lifetime of the space station is 0.001 or less as calculated using current National Aeronautics and Space Administration (NASA) software or other higher fidelity model.	The probability of collision between satellites in the GHOSt constellation and other large objects is 0.0000096, as calculated by the NASA Debris Assessment Software ("DAS").[24]
(8) The space station(s) will be disposed of post-mission through atmospheric re-entry. The probability of human casualty from portions of the spacecraft surviving re-entry and reaching the	Each GHOSt satellite will be disposed of through atmospheric re-entry. The probability of human casualty from portions of the

[20] ODAR § 6.41.

[21] *Id.* § 1.6.

[22] *Id.* § 3.

[23] *Id.* § 4.

[24] *Id.* § 5.1.1.

surface of the Earth is zero as calculated using current NASA software or higher fidelity models.	spacecraft surviving re-entry and reaching the surface of the Earth is zero as calculated using current NASA DAS.[25]
(9) Operation of the space station(s) will be compatible with existing operations in the authorized frequency band(s). Operations will not materially constrain future space station entrants from using the authorized frequency band(s).	Operation of the GHOSt satellites will be compatible with existing and future operators in the authorized frequency bands as discussed below and in the Technical Annex.[26]
(10) The space station(s) can be commanded by command originating from the ground to immediately cease transmissions and the licensee will have the capability to eliminate harmful interference when required under the terms of the license or other applicable regulations.	GHOSt can be commanded to immediately cease transmissions and to eliminate harmful interference.
(11) Each space station is 10 cm or larger in its smallest dimension.	The smallest dimension on each GHOSt satellite is 56 cm.[27]
(12) Each space station will have a mass of 180 kg or less, including any propellant.	Each GHOSt satellite will weigh 85 kg.[28]
(13) The probability that any individual space station will become a source of debris by collision with small debris or meteoroids that would cause loss of control and prevent disposal is 0.01 (1 in 100) or less.	OSK has assessed the probability of collision using the current NASA DAS and is compliant with every standard.[29] Further, the GHOSt satellites do not require a specific orientation or drag state to meet disposal requirements.[30] Thus, there is effectively no risk that any GHOSt satellite will become a

[25] *Id.* § 7.1.

[26] *See infra* § IV. *See* Technical Annex § V.

[27] ODAR § 2.1.

[28] *Id.*

[29] *Id.* § 5.1.2.

[30] *Id.*

	source of debris by collision with small debris or meteoroids that would cause loss of control and prevent disposal.
(14) Upon receipt of a space situational awareness conjunction warning, the licensee or operator will review and take all possible steps to assess the collision risk, and will mitigate the collision risk if necessary. As appropriate, steps to assess and mitigate the collision risk should include, but are not limited to: contacting the operator of any active spacecraft involved in such a warning; sharing ephemeris data and other appropriate operational information with any such operator; and modifying space station attitude and/or operations.	OSK will review conjunction warnings and take all necessary, steps to assess and mitigate collision risks to minimize operational impacts.

OSK notes the Commission has exempted streamlined small satellite applicants from the Part 25 processing round and default service requirements.[31] In place of the processing round rules, the Commission requires applicants to "(a) certify that operations of its satellites will not interfere with those of existing operators, [and] (b) certify that it will not materially constrain future operators from using the assigned frequency band(s)."[32] OSK certifies that the operations of its GHOSt constellation will not interfere with those of existing operators and that it will not materially constrain future operators from using the requested frequency bands.[33]

IV. SPECTRUM USE AND SHARING CAPABILITIES

The *Streamlined Licensing Order* and resulting Commission rules require applicants to provide a brief narrative description illustrating the methods by which current and future

[31] *Streamlined Licensing Order* ¶ 80.

[32] *Id.* ¶ 81.

[33] OSK's certification is not applicable to the L-band frequencies, which are used pursuant to commercial arrangements with Globalstar.

operators will not be materially constrained and requested spectrum can be shared.[34] The Technical Annex provides a detailed demonstration of how operations for the GHOSt constellation can accommodate co-frequency operators and avoid causing harmful interference.[35] To summarize, the GHOSt constellation will operate in a manner that will not materially constrain co-frequency operators and allow for spectrum sharing in all requested frequency bands because: (1) OSK has already reached out to federal operators in the requested spectrum bands to coordinate operations and will comply with applicable coordination conditions, as necessary; (2) the GHOSt satellites only transmit/receive in short periods of time while visible to the relevant earth stations, which reduces the likelihood of interference with other systems and allows for interference mitigation through coordination; (3) the GHOSt constellation uses earth stations located at very high latitudes (*e.g.*, Svalbard, Norway at 78°N), meaning transmissions will not be in view of other earth stations located at much lower latitudes; (4) GHOSt transmissions have a small and directive beamwidth of only 7.4° for payload downlink transmissions; and (5) the power flux-density of all transmissions comply with the limits set by both the Commission and the International Telecommunication Union ("ITU"), further reducing

[34] *Streamlined Licensing Order* ¶ 81 ("Examples of applications that might satisfy these sharing requirements may include scenarios in which a satellite operates with a limited number of earth stations and downlinks during relatively short periods of time, with the ability to effectively schedule transmissions such that future satellite entrants can be accommodated."); 47 C.F.R. § 25.122(d)(3).

[35] *See generally* Technical Annex.

the possibility of interference.[36] Accordingly, GHOSt operations will avoid harmful interference and not materially constrain current and future co-frequency spectrum users.

A. Payload Downlink

OSK seeks authorization to use the 25.5-27.0 GHz band for payload downlink operations under the co-primary EESS (space-to-Earth) allocation.[37] The GHOSt constellation satisfies the definition of EESS because, like other EESS systems the Commission has licensed pursuant to its streamlined rules,[38] the hyperspectral sensor carried by each GHOSt satellite will observe and record data relating to the characteristics of the Earth and its natural phenomena, and downlink such data to earth stations that are part of the satellite network.[39] All data transmitted in the requested band will be payload sensor data or metadata directly pertaining to the operation of the payload.

As detailed more fully in Sections I and III of the Technical Annex, the high gain Ka-band antennas employed on all GHOSt satellites will use six band channels, allowing for six wideband emissions to share three frequency channels using polarization diversity.[40] In so doing, the GHOSt satellites will utilize the radio spectrum at the highest efficiency.[41]

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[36] *Id.*; *see also* Schedule S.

[37] *See* 47 C.F.R. § 2.106 n. US258 ("In the bands 8025-8400 MHz and 25.5-27 GHz, the Earth exploration-satellite service (space-to-Earth) is allocated on a primary basis for non-Federal use. Authorizations are subject to a case-by-case electromagnetic compatibility analysis.").

[38] *See, e.g.*, Application of Loft Orbital for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Earth-Exploration Satellite Service, Stamp Grant, IBFS File No. SAT-AMD-20200527-00063 (Oct. 8, 2020) ("Loft Orbital Grant").

[39] *See* 47 C.F.R. § 2.1.

[40] *Id.*

[41] In all cases, the power flux-density of these transmissions comply with the limits set by both the Commission and the International Telecommunication Union ("ITU"). Technical Annex §§ V & VI; 47 C.F.R. § 25.208(p).

Spectrum sharing in the proposed 25.5-27.0 GHz band is possible for the five reasons identified above. Additionally, at present, few satellite operators transmit in the requested spectrum under the EESS allocation. Thus, the opportunity for harmful interference is limited and can be adequately mitigated, as necessary, through the coordination process.

B. S-Band Adaptive Coding and Modulation and TT&C Uplink

OSK seeks authorization to use the 2025-2110 MHz band under the EESS (Earth-to-space) allocation for telemetry, tracking, and command ("TT&C"), as well as modulation and coding of the high speed data (HSD) link for payload transmissions. Specifically, OSK intends to use the 2045.0 MHz to 2050.0 MHz frequency range for the HSD control uplink. This technique adjusts the satellite's modulation and coding to optimize payload downlink conditions and ensure proper link performance and efficiency. Also, this link will advise the spacecraft to retransmit any lost data frames. A second link, operating within the 2053.5 to 2058.5 MHz frequency range, will provide the traditional TT&C uplink operations for the GHOSt satellites.

Non-Federal Earth-to-space transmissions in the 2025-2110 MHz band may be authorized in the EESS services subject to such conditions as may be applied on a case-by-case basis and the limitation that any use may not cause harmful interference to authorized Federal and non-Federal operations.[42] The uplink transmissions from earth stations associated with the GHOSt constellation will not cause harmful interference to federal and non-federal stations operating in accordance with the U.S. Table of Frequency Allocations.[43] OSK has already

[42] 47 C.F.R. § 2.106 n. US 347. The Commission has recently granted multiple streamlined applications proposing TT&C uplink operations within this band. *See, e.g,* Application of Capella Space Corp. for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Earth-Exploration Satellite Service, Stamp Grant, IBFS File No. SAT-LOA-20200914-00108 (Dec. 17, 2020) ("Capella Grant"); *see also* Loft Orbital Grant.

[43] *See* Technical Annex § I.

initiated coordination with federal operators in this band[44] and will coordinate with additional co-frequency operators as necessary to ensure spectrum sharing consistent with the Commission's rules.

C. UHF TT&C Downlink

The GHOSt constellation will use the 400.15-401 band at a frequency range of 400.48-400.52 MHz for TT&C downlink telemetry operations consistent with the secondary allocation for the Space Operation service (space-to-Earth) and other smallsat operators authorized to operate in this band.[45] OSK will comply with all technical requirements and complete any necessary coordination with federal operators to ensure spectrum sharing is successful.

V. WAIVER REQUESTS

The Commission may waive any of its rules if there is "good cause" to do so.[46] 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 rule.[47] 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

[44] For example, OSK has already initiated coordination discussions with representatives from NASA regarding the planned operations of the GHOSt constellation within this spectrum band.

[45] The Commission recently granted Astro Digital U.S., Inc.'s TT&C operations in the space-to-Earth direction within this same band. *See* Application of Astro Digital US, Inc. for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Earth-Exploration Satellite Service, Stamp Grant, IBFS File No. SAT-AMD-20200528-00064 (Oct. 9, 2020) ("Astro Digital Grant).

[46] *See* 47 C.F.R. § 1.3; *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

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

otherwise serve the public interest.[48] OSK respectfully submits that good cause exists to waive the following Commission rules when granting the instant application.

A. U.S. Table of Frequency Allocations

1. 1616 MHz to 1617.775 MHz (Space-to-Space) Intersatellite Links (Globalstar Frequencies)

OSK requests a waiver of the U.S. Table of Frequency Allocations to use specific Globalstar frequencies for space-to-space inter-satellite data relay service ("IDRS").[49] The IDRS modem will operate on Globalstar-authorized and assigned channels centered at 1616.8875 MHz, having a bandwidth of 1.775 MHz.[50] The 1616-1617.775 MHz sub-band is allocated to Mobile-Satellite Service (Earth-to-space) on a primary basis, and the Commission has previously authorized Globalstar to communicate with U.S. earth stations in this band.[51]

As discussed in more detail in the Technical Annex,[52] use of these frequencies for IDRS will allow for spectrum sharing and will not cause harmful interference to other authorized operations. Given a top end emission of 1617.775 MHz, OSK's IDRS operations will not overlap with the lower portion of the shared Iridium-Globalstar spectrum band.[53] Moreover, the IDRS modem will only be used in limited, time-sensitive scenarios as part of OSK's service offerings to its customers. OSK anticipates primarily using the IDRS modem to send alerts

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

[49] *See* 47 C.F.R. §§ 2.102(a), 2.106.

[50] OSK notes that the Commission has recently granted multiple waiver requests to operate an inter-satellite data relay service in similar spectrum bands using the Globalstar system. *See, e.g.*, Loft Orbital Grant at ¶ 9; Astro Digital Grant at 1.

[51] *See, e.g.*, Application for Extension of License Term of Globalstar Licensee LLC, Stamp Grant, IBFS File No. SAT-MOD-20130314-00030 (Sept. 18, 2014).

[52] Technical Annex § IV.

[53] OSK notes that Iridium's service links are in the 1617.775-1626.5 MHz part of the Big LEO band. OSK confirms that it will not operate in this part of the L-band.

based on analytics from one or more of the GHOSt satellites. This capability serves the public interest by greatly increasing the responsiveness of the GHOSt system, improving safety, and potentially saving lives in emergency situations. Additionally, the intended use will not cause harmful interference to other stations operating in conformance with the ITU and FCC regulations and will not materially constrain any co-frequency operators.[54] For these reasons, OSK respectfully requests that the Commission grant a waiver of the U.S. Table of Frequency Allocations to permit the GHOSt constellation to communicate with Globalstar satellites.

2. 2025 to 2100 MHz (Earth-to-space) HSD Control and TT&C Uplink Under 47 C.F.R. § 25.202(g)(1)

Out of an abundance of caution, OSK respectfully requests a waiver of Section 25.202(g)(1) of the Commission's rules to allow HSD Control and TT&C uplink transmissions in the 2025 to 2100 MHz band under the EESS allocation. As discussed above, OSK plans to use the following spectrum for EESS operations: (1) 25.5-27 GHz band for its hyperspectral imaging payload downlink; and (2) the 2045.0 MHz to 2050.0 MHz, and 2053.5 to 2058.5 MHz bands for HSD Control and TT&C uplink transmissions, respectively.[55] Section 25.202 of the Commission's rules anticipates that satellite systems will conduct TT&C operations using frequencies at the edge of or within their assigned bands.[56] However, because OSK's EESS operations do not require an uplink channel for commercial communications, there is no band edge at which to conduct TT&C. Indeed, OSK's only uplink channels are for HSD Control and TT&C operations. Authorization to conduct such operations will not cause harmful interference

[54] In any case, OSK is willing to accept an assignment on a noninterference, unprotected basis. *See Streamlined Licensing Order* ¶ 116.

[55] *See supra* Part IV, B.

[56] 47 C.F.R. § 25.202(g)(1).

to co-frequency operators and is consistent with recent Commission waivers of this rule to enable similar smallsat operations.[57] Thus, OSK requests a waiver of section 25.202(g)(1) for the purpose of conducting HSD control and TT&C operations in the 2045.0 to 2050.0 MHz, and 2053.5 to 2058.5 MHz band segments, respectively.

VI. GRANT OF THE APPLICATION IS IN THE PUBLIC INTEREST

The grant of the instant application will serve the public interest by facilitating the near-term deployment of enhanced hyperspectral monitoring capabilities for commercial, scientific, and government applications. Upon deployment, the GHOSt constellation satellites will produce the highest resolution commercial hyperspectral imagery launched to-date. The market-leading sensing capabilities provided by OSK enable customers in the energy, extraction, infrastructure, agriculture, and forestry industries to make vital decisions with better information, saving money, time, and lives. For example, the following are just some of the key industry sectors that will benefit from capabilities unlocked by the deployment of the GHOSt constellation:

***National Defense*:** GHOSt's hyperspectral sensors can capture critical environmental and situational awareness information for use in national defense and crisis response efforts, including plume, camouflage, chemical weapon signatures, and target detection. In October 2020, the United States Department of the Air Force's commercial investment group, in conjunction with the Space and Missile Systems Center, and the Air Force Research Laboratory, contracted with OSK to accelerate the deployment of these services.[58] Upon deployment, OSK plans to integrate GHOSt's monitoring services with the United States Air Force Advanced Battle Management System.

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[57] *See* Capella Grant at ¶ 6; Loft Orbital Grant at ¶ 11.

[58] *Orbital Sidekick Awarded $16M U.S. Air Force STRATFI Contract*, Orbital Sidekick, https://orbitalsidekick.com/orbital-sidekick-awarded-16m-u-s-air-force-stratfi-contract/.

***Infrastructure Monitoring*.** Inefficient monitoring of infrastructure has led to safety and budgetary issues on regional and national levels. GHOSt's hyperspectral imaging can detect minute changes in infrastructure and report such changes in real-time, allowing operators to monitor the integrity of their mission-critical infrastructure more closely and maintain infrastructure more cost-effectively. GHOSt is particularly well suited for monitoring energy infrastructure, such as oil and gas pipelines, for regulatory compliance, leak prevention, and early leak detection.

***Environmental and Agricultural Monitoring*:** GHOSt will enable customers to collect and access vital data on environmental erosion and degradation, including the evapotranspiration levels for crops. These data sets provide OSK customers with early-warning detection of water, air, and land pollution, as well crop viability and yield.

Taken together, the GHOSt constellation will provide valuable new services for customers in the United States and around the world. Critically, the GHOSt constellation will provide these services while becoming neither a potential new source of orbital debris nor a source of harmful interference to co-frequency operators.

For these reasons, OSK submits that grant of this application is in the public interest.

VII. OTHER MATTERS

A. ITU Compliance

OSK acknowledges that pursuant to Section 25.111 of the Commission's rules, the Commission will submit filings to the ITU on OSK's behalf and that OSK is responsible for any and all fees charged by the ITU for such filings.[59] OSK will provide the Commission with the

[59] 47 C.F.R. § 25.111.

appropriate electronic files for submission to the ITU under separate cover. OSK's ITU Cost Recovery Letter is attached to this application.[60]

VIII. CONCLUSION

For the foregoing reasons, and for the reasons set forth in the accompanying materials, OSK respectfully requests that the Commission find that granting OSK operating authority for the GHOSt mission proposed herein would serve the public interest, and issue such grant expeditiously.

Respectfully submitted,

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[60] Attachment D, ITU Cost Recovery Letter.