

**** GRANT IN PART / DEFER IN PART ****



File # SAT-LOA-20190102-00001

Call Sign S3042 Grant Date 12/10/19

(or other identifier)

Term Dates see
From 12/10/19 To: conditions

Approved by OMB
3060-0678

Approved: _____

Stephen J. Duall
Stephen J. Duall
Chief, Satellite Policy Branch

Date & Time Filed: Jan 2 2019 11:41:50:223AM
File Number: SAT-LOA-20190102-00001
Callsign/Satellite ID: S3042

*with conditions

APPLICATION FOR SATELLITE SPACE STATION AUTHORIZATIONS FCC 312 MAIN FORM FOR OFFICIAL USE ONLY	FCC Use Only
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APPLICANT INFORMATION

Enter a description of this application to identify it on the main menu:

HawkEye 360, Inc.

1-8. Legal Name of Applicant			
Name:	HawkEye 360, Inc.	Phone Number:	571-203-0360
DBA Name:		Fax Number:	
Street:	196 Van Buren Street Suite 450	E-Mail:	rob@he360.com
City:	Herndon	State:	VA
Country:	USA	Zipcode:	20171 -
Attention:	Mr. Rob Rainhart		

ATTACHMENT TO GRANT
HawkEye 360, Inc.
IBFS File No. SAT-LOA-20190102-00001

IBFS File No(s):	SAT-LOA-20190102-00001	<p>GRANTED IN PART- DEFERRED IN PART With Conditions</p>  <p>International Bureau Satellite Division</p>
Licensee/Grantee:	HawkEye 360, Inc. (HE360)	
Call Sign:	S3042	
Satellite Name:	HE360 constellation	
Orbital Location: (required station- keeping tolerance)	Non-geostationary (NGSO) (see scope of grant below)	
Administration:	United States of America	
Nature of Service:	Earth Exploration Satellite Service (EESS)	
Scope of Grant:	Authority to construct, deploy, and operate up to 80 HE360 satellites, with apogee and perigee altitudes from 500 to 650 km (nominal 575 km) with inclinations of 97-98 degrees. ¹ Satellites will operate in clusters of 3 or 4 satellites. Action is deferred on the remainder of HE360's request to construct, deploy, and operate satellites in excess of the 80 satellites authorized herein. ²	
Service Area(s):	Global. See Schedule S Tech Report at Item S6.	
Frequencies:³	8025-8400 MHz (space-to-Earth) 2025-2110 MHz (Earth-to-space) 2410 MHz (space-to-space; 3 Pathfinder satellites launched on December 3, 2018 only)	
	<u>Telemetry, Tracking, and Command:</u> 2025-2110 MHz (Earth-to-space) 2200-2290 MHz (space-to-Earth) (emergency backup) 8025-8400 MHz (space-to-Earth) 432-438 MHz (Earth-to-space) (secondary TT&C; 3 Pathfinder satellites launched on December 3, 2018 only)	
	<u>Receive:</u> 156.7625-156.7875 MHz Automatic Identification System (AIS 3) 156.8125-156.8375 MHz (AIS 4) 161.9625-161.9875 MHz (AIS 1) 162.0125-162.0375 MHz (AIS 2) 406.0-406.1 MHz Emergency Position-Indicating Radiobeacon (EPIRB)	

¹ HE360's Constellation has been preceded by an experimental earth exploration three-satellite cluster called Pathfinder, which has been separately coordinated with federal operators. See ELS File No. 0024-EX-CN-2017, as modified 0055-EX-CM-2019. The Pathfinder satellites successfully launched on December 3, 2018 and are operational in the 2240 MHz, 2246 MHz, 2256 MHz (space-to-Earth), 432-438 MHz (Earth-to-space), 2410 MHz (space-to-space), and 8050 MHz, 8175 MHz, and 8300 MHz (space-to-Earth) frequency bands. Authorization for continued operations of the three Pathfinder satellites under Part 25 of the Commission's rules is included in this grant.

² Although HE360 originally requested authority to construct, deploy, and operate up to 220 satellite in a range of orbits and altitudes with no more than 80 simultaneously operational, it subsequently informed that its request had changed to up to 80 satellites with no more than 15 simultaneously operational, with a request to defer action on the remainder of its original request. See Letter from Dr. Michael Mineiro, V.P. Legal, Regulatory, and Government Affairs, HawkEye 360, to Stephen Duall, Chief, Satellite Policy Branch, Satellite Division, FCC (dated Dec. 4, 2019).

³ HE360 satellites have antennas capable of receiving in the following bands: 100-182 MHz (VHF Dipole): 382-422 MHz (UHF Dipole): 1090 MHz (ADS-B Patch): 1.6-1.7 GHz (L-band Patch); 2.9-3.1 GHz (S-band Patch): 1.4-7.0 GHz (Molded Button Antenna); 6.0-18.0 GHz (Horn Antenna).

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	156.5125-156.5375 MHz Digital Selective Calling (DSC) 1087.7-1092.3 MHz ((Earth-to-space) Automatic Dependent Surveillance-Broadcast (ADS-B))
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Unless otherwise specified herein, operations under this grant must comport with the legal and technical specifications set forth by the applicant or petitioner and with Federal Communication Commission's rules not waived herein. This grant is also subject to the following conditions:

1. HE360 must prepare the necessary information, as may be required, for submission to the International Telecommunication Union (ITU) to initiate and complete the advance publication, coordination, due diligence, and notification process for these space stations, in accordance with the ITU Radio Regulations. HE360 will be held responsible for all cost-recovery fees associated with ITU filings. No protection from interference caused by radio stations authorized by other administrations is guaranteed unless coordination and notification procedures are timely completed or, with respect to individual administrations, by successfully completing coordination agreements. Any radio station authorization for which coordination has not been completed may be subject to additional terms and conditions as required to effect coordination of the frequency assignments of other administrations. *See* 47 CFR § 25.111(b).

2. Upon receipt of a conjunction warning from the Joint Space Operation Center or other source, HE360 must review the warning and take all possible steps to assess and, if necessary, to mitigate collision risk, including, but not limited to: contacting the operator of any active spacecraft involved in such warning; sharing ephemeris data and other appropriate operational information with any such operator; modifying spacecraft attitude and/or operations.

3. The number of simultaneously operational satellites must not exceed 15. This number does not include the three Pathfinder satellites launched on December 3, 2018, under grants of experimental authorizations pursuant to Part 5 of the Commission's rules.⁴ These three Pathfinder satellites must operate under this Part 25 authorization pursuant to the terms and parameters, including earth station power level agreements and mitigation activities, coordinated with Federal users as part of those grants of experimental licenses.⁵

4. For nominal S-band TT&C uplink operations, HE360 ground stations must have a duty cycle of no more than 10% to ensure that the constellation complies with interference criteria contained in Recommendation ITU-R SA. 1155-2.

5. This grant includes authority to deploy and operate technically identical replacement satellites during the term of the license, pursuant to 47 CFR § 25.113(i). Based on information provided by the applicant, the anticipated total number of satellites to be deployed during the license term would be 80. Deployment involving a different satellite bus will require the filing and approval of a license modification request in order to, inter alia, address any differences in debris risks due to changes in the physical characteristics of the spacecraft.

6. HE360 must comply with any new rules adopted by the Commission as a result of the rulemaking in IB Docket No. 18-13.⁶

7. Transmissions in the 8025-8400 MHz frequency band may only be made to earth stations coordinated pursuant to the coordination agreement executed with the National Aeronautics and Space Administration (NASA) and certain other federal agencies. HE360 shall provide the FCC with an updated list of coordinated earth stations within ten business days following any changes to that list.⁷

⁴ *See supra* note 1. We note that the total number of simultaneously operational satellites refers specifically to those satellites operating in frequencies other than TT&C frequencies and does not include non-operational satellites that continue to operate in TT&C frequency bands as part of approved post-mission disposal plans.

⁵ *See, e.g.*, ELS File No. 0024-EX-CN-2017, as modified 0055-EX-CM-2019.

⁶ *Mitigation of Orbital Debris in the New Space Age*, Notice of Proposed Rulemaking, FCC 18-159 (rel. Nov. 19, 2018).

⁷ A list of earth stations already coordinated with federal agencies is attached as Appendix B to this grant.

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8. Power flux-density limits from operation in the 8025-8400 MHz band must not exceed the limits in No. 22.5 and Table 21-4 of the International Telecommunication Union's Radio Regulations, the limits/protection criteria in Recommendation ITU-R SA.1157-1 must be met, and the guidelines in Recommendation ITU-R SA.1810 must be followed.

9. Operations pursuant to this license must not cause harmful interference to stations operating in the 2025-2110 MHz band in accordance with the United States Table of Frequency Allocations. *See* 47 CFR § 2.106, Footnote US347.

10. Transmissions in the 2025-2110 MHz and 2200-2290 MHz bands may only be made to/from earth stations coordinated with federal agencies, including NASA, the National Oceanic and Atmospheric Administration (NOAA), and the United States Air Force. HE360 shall provide the FCC with an updated list of coordinated earth stations within ten business days following any changes to that list.⁸

11. Transmissions in the 2025-2110 MHz, 2200-2290 MHz, and 8025-8400 MHz are limited to the center frequencies coordinated with Federal users set forth in Appendix A to this grant.

12. All reception must comport with the requirements on unauthorized publication or use of communications in section 705 of the Communications Act of 1934, as amended (47 U.S.C. § 605). This license grant does not constitute an "authorization" with respect to the activities specified in section 705 of the Communications Act or in related provisions of chapter 119, Title 18, United States Code.

13. HE360's request for waiver of the U.S. Table of Frequency Allocations, Section 2.106, to receive ADB-S signals in the 1087.7-1092.3 MHz frequency band until the bands are allocated in the U.S. Table of Frequency Allocations, IS GRANTED. This band was allocated internationally for the aeronautical mobile-satellite (R) service (AMS(R)S) (Earth-to-space) on a primary basis, at WRC-15, and is limited to the space station reception of ADS-B emissions from aircraft transmitters that operate in accordance with recognized international aeronautical standards. Stations operating in the AMS(R)S shall not claim protection from stations operating in the aeronautical radionavigation service. Resolution 425 (WRC-15) shall apply. We find good cause to waive sections 2.102(a) and 2.106 to permit reception of ADS-B messages on an unprotected basis in the United States because doing so will not cause any interference or unreasonably preclude other services. Any future protection of ADS-B reception will be governed by the relevant status in the Table of Frequency Allocations and must be in accordance with any subsequent rulemaking proceedings to implement any new domestic allocations or service rules.

14. HE360's request for waiver of the U.S. Table of Frequency Allocations, Section 2.106, to receive AIS signals in the 156.7625-156.7875 MHz (AIS 3), 156.8125-156.8375 MHz (AIS 4), 161.9625-161.9875 MHz (AIS 1) and 162.0125-162.0375 MHz (AIS 2) frequency bands until the bands are allocated in the U.S. Table of Frequency Allocations, IS GRANTED. We find that the reception of AIS transmissions cannot cause harmful interference, and these transmissions will be present pursuant to existing authorizations using frequencies allocated to other services regardless of whether they are received by a HE360 satellite. We also conclude that the service HE360 proposes will serve the public interest by providing critical near real-time maritime data of interest for both government and commercial users. As a condition of this waiver, HE360 must not claim protection for reception of messages in the 156.0125-162.0375 MHz frequency band that is not in accordance with the Table of Frequency Allocations for the pertinent area and may only claim protection to the extent provided by the status of the reception under the Table of Frequency Allocations.

15. HE360 may claim protection for reception in the 156.7625-162.0375 MHz or 1087.7-1092.3 MHz bands only to the extent permitted under the U.S. Table of Frequency Allocations for domestic operations or the ITU Radio Regulations for international operations, as of the time of operation. Operations in the 156.7625-162.0375 MHz and 1087.7-1092.3 MHz bands must be in accordance with any Commission rulemakings

⁸ A list of earth stations already coordinated with federal agencies is attached as Appendix B to this grant.

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subsequent to the release of this license that implement any new domestic allocations or service rules for these bands.⁹

16. HE360 requests waiver of the U.S. Table of Frequency Allocations to allow its constellation to receive the DSC signal in the 156.5125-156.5375 MHz frequency band on a non-conforming, non-harmful interference basis IS GRANTED. The 156.5125-156.5375 MHz frequency band is allocated to Maritime Mobile on a primary basis for non-Federal operations and in all ITU Regions.¹⁰ In the United States, there is also limited use of this band by certain grandfathered public safety radio pool licensees.¹¹ We find that the reception of DSC transmissions cannot cause harmful interference, and these transmissions will be present pursuant to existing authorizations using frequencies allocated to other services regardless of whether they are received by a HE360 satellite. We also conclude that the service HE360 proposes will serve the public interest by providing near real-time maritime safety data.¹² As a condition of this waiver, HE360 must not claim protection for reception of messages in the 156.5125-156.5375 MHz frequency band that is not in accordance with the Table of Frequency Allocations for the pertinent area and may only claim protection to the extent provided by the status of the reception under the Table of Frequency Allocations.

17. HE360's request for waiver of the U.S. Table of Frequency Allocations, Section 2.106, to receive EPIRB signals in the 406-406.1 MHz frequency band IS GRANTED. The 406-406.1 MHz frequency band is allocated for Mobile-Satellite Service (MSS) and is limited to low-power satellite emergency position-indicating radio beacons (EPIRB).¹³ We find that the reception of EPIRB transmissions cannot cause harmful interference, and these transmissions will be present pursuant to existing authorizations using frequencies allocated to other services regardless of whether they are received by a HE360 satellite. We also conclude that the service HE360 proposes will serve the public interest by augmenting existing COSPAS SARSAT architecture used to monitor and geolocate EPIRB distress signals.¹⁴ As a condition of this waiver, HE360 must not claim protection for reception of messages in the 406-406.1 MHz frequency band that is not in accordance with the Table of Frequency Allocations for the pertinent area and may only claim protection to the extent provided by the status of the reception under the Table of Frequency Allocations.

18. HE360 must maintain a U.S. point of contact available by telephone 24 hours per day, seven days per week, with the authority and ability to terminate operations authorized herein. The telephone number for this U.S. point of contact must be provided to NTIA (bmitchell@ntia.doc.gov) and DOC/NOAA (david.franc@noaa.gov).

19. Given the opportunity for additional entrants to operate in HE360's requested frequency bands, we grant HE360's request for a waiver of the modified processing round requirements of 47 CFR §§ 25.156 and 25.175.¹⁵

⁹ *Iridium Order and Authorization*, 31 FCC Rcd at 8689, para. 50.

¹⁰ 47 CFR 2.106, notes 5.111, 5.266, and US52.

¹¹ 47 CFR § 2.106, note US266

¹² Exhibit A: Narrative at 44.

¹³ 47 CFR § 2.106 note 5.266.

¹⁴ The Sarsat (Search and Rescue Satellite Aided Tracking) system is operated by NOAA to detect and locate mariners, aviators, and recreational enthusiasts in distress. It uses NOAA satellites in low-earth and geostationary orbit to detect and locate distress signals and relay them from emergency beacons to a network of ground stations and the U.S. Mission Control Center, which processes the signals and alerts appropriate search and rescue authorities. Sarsat is part of the international COSPAS-SARSAT program. See <http://www.sarsat.noaa.gov>.

¹⁵ See *DigitalGlobe, Inc. Order and Authorization*, 20 FCC Rcd 15696 (Sat. Div., Int'l Bur. 2005) at para. 8.

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20. Because HE360 must comply with the technical requirements in Part 2 of the Commission's rules and the above-referenced power flux-density limits, which should prevent harmful interference to other operators in the band, we grant HE360's request for a waiver of the default service rules in 47 CFR § 25.217(b).¹⁶

21. This license will become null and void if, at any time during the license term, there are no HE360 satellites operating.

22. HE360's three Pathfinder satellites were successfully launched on December 3, 2018 and are operational. *See* ELS File No. 0024-EX-CN-2017. Authorization for continued operations of the three Pathfinder satellites under Part 25 of the Commission's rules is included in this grant. We find that warehousing concerns are addressed in this situation through the imposition of condition 21 above. Thus, we decline to impose milestone and bond obligations on HE360.

23. HE360's request for a waiver of section 25.114(c) of the Commission's rules, 47 CFR § 25.114(c), to the extent described in its application with respect to certain information to be provided in the Schedule S, IS GRANTED. We find that a waiver is warranted for the requirement for orbital information on the Schedule S for each satellite because the information HE360 provided in its Narrative is sufficient to fulfill the relevant informational requirements.

24. The license term is 15 years, calculated from the deployment of the three Pathfinder satellites on December 3, 2018 (that is, December 3, 2033).

25. Within 30 days after deployment of each satellite pursuant to this license, HE360 must file a notification with the Commission specifying its apogee and perigee altitudes and orbital inclination.


Licensee/grantee is afforded thirty (30) days from the date of release of this action to decline the grant as conditioned. Failure to respond within this period will constitute formal acceptance of the grant as conditioned.

This action is taken pursuant to Section 0.261 of the Commission's rules on delegated authority, 47 CFR § 0.261, and is effective upon release.

Station licenses are subject to the conditions specified in Section 309(h) of the Communications Act of 1934, as amended, 47 U.S.C. § 309(h).

Action Date:	December 10, 2019	
Term Dates	From: December 10, 2019	To: see conditions

Approved:


Stephen J. Duall
Chief, Satellite Policy Branch

¹⁶ *Id.*, 20 FCC Rcd at 15702-03, para. 19.

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Appendix A:
Table of Frequency Bands
Coordinated with NASA/NOAA/USAF, Satellites 1-15 (Call Sign S3042)

Frequency Band (MHz)	Use	Transmit Center Frequency (MHz) per cluster¹⁷
X-band: 8025-8400	Primary payload downlink	Sat#1 - 8075 MHz Sat#2 - 8165 MHz Sat#3 - 8255 MHz Sat#4 - 8345 MHz
X-Band: 8025-8400	TT&C downlink	Sat#1 - 8291 MHz Sat#2 - 8297 MHz Sat#3 - 8303 MHz Sat#4 - 8309 MHz
S-Band: 2200-2290	Emergency Backup TT&C downlink	Sat#1 - 2236 MHz Sat#2 - 2242 MHz Sat#3 - 2254 MHz Sat#4 - 2260 MHz
S-Band: 2025-2110	Primary payload uplink	For satellites one (1) through nine (9): ¹⁸ Sat#1 - 2068.2 MHz Sat#2 - 2062.7 MHz Sat#3 - 2077.4 MHz For satellites ten (10) through fifteen (15) (and any replacement satellites): Sat#1 - 2046.5 MHz Sat#2 - 2049.3 MHz Sat#3 - 2075.0 MHz Sat#4 - 2052.5 MHz
S-Band: 2025-2110	TT&C uplink	Sat#1 - 2063.965 MHz Sat#2 - 2064.965 MHz Sat#3 - 2065.965 MHz Sat#4 - 2065.465 MHz
S-Band: 2025-2110	High Speed TT&C uplink	Sat#1 - 2063.965 MHz Sat#2 - 2064.965 MHz Sat#3 - 2065.965 MHz Sat#4 - 2065.465 MHz

¹⁷ Each satellite cluster HE360 launches will be in groups of three (3) or four (4) satellites. The center band frequencies provided in this chart provide the center-band frequencies for each satellite in such a cluster (*i.e.*, Sat#1, #2, #3, and #4 refer to the satellite number within a cluster of either three or four satellites).

¹⁸ For the first nine (9) satellites, HE360 has pre-coordinated three (3) clusters of three (3) satellites (total 9) in these specific S-band Primary Payload UL center frequencies. For satellites ten (10) through fifteen (15) and any replacement satellites, HE360 has pre-coordinated for either three (3) or four (4) satellite clusters.

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Appendix B:
HawkEye 360 Earth Stations
Coordinated With Federal Agencies

HawkEye Earth Stations*		
Earth stations	Latitude (N)	Longitude (E)
Svalbard, Nor	78.231	15.390
Tromso, Nor	69.663	18.940
Troll, Antarctica	-72.001	2.526
Punta Arenas, Chile	-52.936	-70.870
Awarua, New Zealand	-46.529	168.381
Hartbeesthoek, South Africa	-25.884	27.884

* Earth stations are owned and operated by Kongsberg Satellite Services. *See also* Letter from Dr. Michael Mineiro, V.P. Legal, Regulatory, and Government Affairs, HawkEye 360, to Stephen Duall, Chief, Satellite Policy Branch, Satellite Division, FCC (dated Dec. 4, 2019).

9-16. Name of Contact Representative

Name:	HawkEye 360, Inc.	Phone Number:	571-203-0360
Company:		Fax Number:	
Street:	196 Van Buren Street Suite 450	E-Mail:	michael.mineiro@he360.com
City:	Herndon	State:	VA
Country:	USA	Zipcode:	20171 -
Attention:	Mr. Michael Mineiro	Relationship:	Other

CLASSIFICATION OF FILING

17. Choose the button next to the classification that applies to this filing for both questions a. and b. Choose only one for 17a and only one for 17b.

- a.
(N/A) a1. Earth Station
 a2. Space Station

- b.
 b1. Application for License of New Station
(N/A) b2. Application for Registration of New Domestic Receive-Only Station
(N/A) b3. Amendment to a Pending Application
(N/A) b4. Modification of License or Registration
(N/A) b5. Assignment of License or Registration
(N/A) b6. Transfer of Control of License or Registration
(N/A) b7. Notification of Minor Modification
(N/A) b8. Application for License of New Receive-Only Station Using Non-U.S. Licensed Satellite

 b9. Letter of Intent to Use Non-U.S. Licensed Satellite to Provide Service in the United States
 b10. Replacement Satellite Application - no new frequency bands
 b11. Replacement Satellite Application - new frequency bands (Not eligible for streamlined processing)
 b12. Petition for Declaratory Ruling to be Added to the Permitted List
(N/A) b13. Other (Please specify)

TYPE OF SERVICE

<p>20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Select all that apply:</p> <p><input type="checkbox"/> a. Fixed Satellite</p> <p><input type="checkbox"/> b. Mobile Satellite</p> <p><input type="checkbox"/> c. Radiodetermination Satellite</p> <p><input checked="" type="checkbox"/> d. Earth Exploration Satellite</p> <p><input type="checkbox"/> e. Direct to Home Fixed Satellite</p> <p><input type="checkbox"/> f. Digital Audio Radio Service</p> <p><input checked="" type="checkbox"/> g. Other (please specify) Radiofrequency Sensing</p>	
<p>21. STATUS: Choose the button next to the applicable status. Choose only one.</p> <p><input type="radio"/> Common Carrier <input checked="" type="radio"/> Non-Common Carrier</p>	<p>22. If earth station applicant, check all that apply.</p> <p>Not Applicable</p>
<p>23. If applicant is providing INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Choose one. Are these facilities:</p> <p><input type="radio"/> Connected to a Public Switched Network <input type="radio"/> Not connected to a Public Switched Network <input checked="" type="radio"/> N/A</p>	
<p>24. FREQUENCY BAND(S): Place an "X" in the box(es) next to all applicable frequency band(s).</p> <p><input type="checkbox"/> a. C-Band (4/6 GHz) <input type="checkbox"/> b. Ku-Band (12/14 GHz)</p> <p><input checked="" type="checkbox"/> c. Other (Please specify upper and lower frequencies in MHz.)</p> <p>Frequency Lower: 2025 Frequency Upper: 8400 (Please specify additional frequencies in an attachment)</p>	

TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.

- (N/A) a. Fixed Earth Station
- (N/A) b. Temporary-Fixed Earth Station
- (N/A) c. 12/14 GHz VSAT Network
- (N/A) d. Mobile Earth Station
- e. Geostationary Space Station.
- f. Non-Geostationary Space Station
- g. Other (please specify)

26. TYPE OF EARTH STATION FACILITY: Not Applicable

PURPOSE OF MODIFICATION

27. The purpose of this proposed modification is to: (Place an "X" in the box(es) next to all that apply.) Not Applicable

ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307? If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. §§ 1.1308 and 1.1311, as an exhibit to this application. A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments. Yes No

ALIEN OWNERSHIP

Earth station applicants not proposing to provide broadcast, common carrier, aeronautical en route or aeronautical fixed radio station services are not required to respond to Items 30-34.

29. Is the applicant a foreign government or the representative of any foreign government?

Yes No

30. Is the applicant an alien or the representative of an alien?

Yes No N/A

31. Is the applicant a corporation organized under the laws of any foreign government?

Yes No N/A

32. Is the applicant a corporation of which more than one-fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?

Yes No N/A

33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?

Yes No N/A

34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.

BASIC QUALIFICATIONS

35. Does the Applicant request any waivers or exemptions from any of the Commission's Rules?
If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents.

Yes No

36. Has the applicant or any party to this application or amendment had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, an explanation of circumstances.

Yes No

37. Has the applicant, or any party to this application or amendment, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If Yes, attach as an exhibit, an explanation of circumstances.

Yes No

38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attempting unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition? If Yes, attach as an exhibit, an explanation of circumstances

Yes No

39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If yes, attach as an exhibit, an explanation of the circumstances.

Yes No

Technical Cert

40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, address, and citizenship of those stockholders owning a record and/or voting 10 percent or more of the Filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer.

Ownership

41. By checking Yes, the undersigned certifies, that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes.

Yes No

42a. Does the applicant intend to use a non-U.S. licensed satellite to provide service in the United States? If Yes, answer 42b and attach an exhibit providing the information specified in 47 C.F.R. 25.137, as appropriate. If No, proceed to question 43.

Yes No

42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station?

43. Description. (Summarize the nature of the application and the services to be provided). (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Applicant seeks authority to launch and operate a non-geostationary orbit satellite system to receive and sense radiofrequency spectrum as discussed in the attached narrative.

Narrative

43a. Geographic Service Rule Certification

By selecting A, the undersigned certifies that the applicant is not subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25.

A

By selecting B, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will comply with such requirements.

B

By selecting C, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will not comply with such requirements because it is not feasible as a technical matter to do so, or that, while technically feasible, such services would require so many compromises in satellite design and operation as to make it economically unreasonable. A narrative description and technical analysis demonstrating this claim are attached.

C

CERTIFICATION

The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

44. Applicant is a (an): (Choose the button next to applicable response.)

- Individual
- Unincorporated Association
- Partnership
- Corporation
- Governmental Entity
- Other (please specify)

45. Name of Person Signing
Rob Rainhart

46. Title of Person Signing
SVP Engineering

47. Please supply any need attachments.

1: Frequency Bands

2:

3:

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT
(U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION
(U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT

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THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, PUBLIC LAW 104–13, OCTOBER 1, 1995, 44 U.S.C. SECTION 3507.



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(571) 203-0360 // www.he360.com

December 4, 2019

Stephen Duall
Chief, Policy Branch, Satellite Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20552

Subject: HawkEye 360
Reference: SAT-LOA-20190102-00001

Dear Mr. Duall:

On January 2nd, 2019, HE360 filed a request for authority to launch, operate and replenish a constellation of up to sixty (60) to eighty (80) operational low Earth orbit, non-geostationary (“NGSO”) microsattellites (SAT-LOA-20190102-00001). The total number of satellites to be launched and operated over the 15-year term of the requested satellite license is one hundred and sixty-five (165) to two hundred and twenty (220).

By this letter, HawkEye 360, Inc. (“HE360”) informs the International Bureau that it has completed pre-coordination with federal operators to launch, operate and replinsh fifteen (15) satellites of its satellite constellation.¹ The total number of satellites to be launched and operated over the 15-year term of the requested partial grant of fifteen operational satellites is eighty (80). Accordingly, HE360 requests that the Commission grant its above-referenced license application for fifteen operational satellites and defer consideration of the remaining satellites in the constellation, pending completion of further coordination with federal operators. Provided below are proposed license conditions and relevant parameters for the pre-coordinated satellites and earth stations.

Proposed license conditions:

¹ HE360’s Constellation has been preceded by an experimental earth exploration three-satellite cluster called Pathfinder, which has been separately coordinated with federal operators. See ELS File No. 0024-EX-CN-2017, as modified 0055-EX-CM-2019. The Pathfinder satellites successfully launched on December 3, 2018 and are operational in the 2240 MHz, 2246 MHz, 2256 MHz (space-to-Earth), 432-438 MHz (Earth-to-space), 2410 MHz (space-to-space), and 8050 MHz, 8175 MHz, and 8300 MHz (space-to-Earth) frequency bands. Authorization for continued operations of the three Pathfinder satellites, as previously coordinated, should be included under this Part 25 license application, as requested in our application, and should not count toward the 15-satellite limit.



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1) Transmissions in the 8025-8400 MHz frequency band may only be made to earth stations coordinated pursuant to the coordination agreement executed with the National Aeronautics and Space Administration (NASA) and certain other federal agencies.

2) Transmissions in the 2200-2290 MHz and 2025-2110 MHz bands may only be made to/from earth stations coordinated with federal agencies, including NASA, the National Oceanic and Atmospheric Administration (NOAA), and the United States Air Force. HawkEye shall provide the FCC the list of coordinated earth stations.

3) Pursuant to coordination with federal agencies, satellites 1 through 15 of the HawkEye constellation shall operate on the center frequencies identified in the following chart:

Frequency Band (MHz)	Use	Transmit Center Frequency for Satellites in Each Cluster (MHz) ²
X-band: 8025-8400	Primary payload downlink	Sat#1 - 8075 MHz Sat#2 - 8165 MHz Sat#3 - 8255 MHz Sat#4 - 8345 MHz
X-Band: 8025-8400	TT&C downlink	Sat#1 - 8291 MHz Sat#2 - 8297 MHz Sat#3 - 8303 MHz Sat#4 - 8309 MHz
S-Band: 2200-2290	Emergency Backup TT&C downlink	Sat#1 - 2236 MHz Sat#2 - 2242 MHz Sat#3 - 2254 MHz Sat#4 - 2260 MHz
S-Band: 2025-2110	Primary payload uplink	For satellites one (1) through nine (9): ³ Sat#1 - 2068.2 MHz Sat#2 - 2062.7 MHz Sat#3 - 2077.4 MHz For satellites ten (10) through fifteen (15) (and any replacement satellites): Sat#1 - 2046.5 MHz Sat#2 - 2049.3 MHz Sat#3 - 2075.0 MHz Sat#4 - 2052.5 MHz
S-Band: 2025-2110	TT&C uplink	Sat#1 - 2063.965 MHz Sat#2 - 2064.965 MHz Sat#3 - 2065.965 MHz Sat#4 - 2065.465 MHz
S-Band: 2025-2110	High Speed TT&C uplink	Sat#1 - 2063.965 MHz Sat#2 - 2064.965 MHz Sat#3 - 2065.965 MHz Sat#4 - 2065.465 MHz

Relevant satellite parameters:

The fifteen satellites will operate in a polar, sun synchronous orbit.

Earth station parameters:

HE360 has pre-coordinated the use of the following ground stations, which are owned and operated by Kongsberg Satellite Services:

² Each satellite cluster HawkEye 360 launches will be in groups of three (3) or four (satellites). The center band frequencies provided in this chart provide the center-band frequencies for each satellite in such a cluster.

³ For the first 9 satellites, HawkEye 360 has pre-coordinated three (3) clusters of three (3) satellites (total 9) in these specific S-Band Primary Payload UL center frequencies. For satellites ten (10) through fifteen (15) and any replacement satellites, we have pre-coordinated for either three (3) or four (4) satellite clusters.



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Earth Station Parameters			Relevant Bands		
Location	Latitude (N)	Longitude (E)	X-Band DL ⁴	S-Band UL ⁵	S-Band DL ⁶
Svalbard, Nor	78.231	15.390	X	X	X
Tromso, Nor	69.663	18.940	X	X	X
Troll, Antarctica	-72.001	2.526	X	X	X
Punta Arenas, Chile	-52.936	-70.870	X	X	X
Awarua, New Zealand	-46.529	168.381	X	X	X
Hartbeesthoek, South Africa	-25.884	27.884	X	X	X

Thank you for your consideration.

Sincerely,

Dr. Michael Mineiro
V.P. Legal, Regulatory, and Government
Affairs

⁴ Primary Payload DL and Primary TT&C DL

⁵ Primary Payload UL and TT&C UL

⁶ Emergency Backup TT&C DL