



312 File Number: **SATLOA2019010200001**

Filing Description

Question	Response
Description	Application for the HawkEye 360 Constellation

Satellite Information

Question	Response
Select Orbit Type	NGSO
Space Station or Satellite Network Name	HawkEye 360
Estimated Lifetime of Satellite(s) From Date of Launch	3 Years
Will the space station(s) operate on a Common Carrier basis?	No

Operating Frequency Bands (6)

Nature of service	Description	Frequency Band(s)	Mode Type
Earth Exploration-Satellite Service		8025.0 MHz -8400.0 MHz	Transmit
Earth Exploration-Satellite Service		2025.0 MHz -2110.0 MHz	Receive
Earth Exploration-Satellite Service		2200.0 MHz -2290.0 MHz	Transmit
Earth Exploration-Satellite Service		156.5 MHz -162.5 MHz	Receive
Earth Exploration-Satellite Service		406.0 MHz -406.1 MHz	Receive
Earth Exploration-Satellite Service		1087.7 MHz -1092.3 MHz	Receive

**Orbital
Information For
Non-
Geostationary
Satellites**

Question	Response
Total Number of Satellites in the active constellation	80
Orbit Epoch Date	01/01/2020
Celestial Reference Body	Earth

Orbital Plane 1:

Question	Response
Number of Satellites in Plane	8
Inclination Angle	97.0 degrees
Right Ascension of Ascending Node	0.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5770.0 seconds
Apogee	575.0 km
Perigee	575.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-90.0 degrees
Active Service Arc End Angle with respect to Ascending Node	90.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	180.0
2	180.0
3	180.0
4	180.0
5	0.0
6	0.0
7	0.0
8	0.0

Orbital Plane 2:

Question	Response
Number of Satellites in Plane	8
Inclination Angle	97.0 degrees
Right Ascension of Ascending Node	90.0 degrees

Argument of Perigee	0.0 degrees
Orbital Period	5770.0 seconds
Apogee	575.0 km
Perigee	575.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-90.0 degrees
Active Service Arc End Angle with respect to Ascending Node	90.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	225.0
2	225.0
3	225.0
4	225.0
5	45.0
6	45.0
7	45.0
8	45.0

Orbital Plane 3:

Question	Response
Number of Satellites in Plane	8
Inclination Angle	97.0 degrees
Right Ascension of Ascending Node	180.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5770.0 seconds
Apogee	575.0 km
Perigee	575.0 km

Active Service Arc Begin Angle with respect to Ascending Node	-90.0 degrees
Active Service Arc End Angle with respect to Ascending Node	90.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	90.0
2	90.0
3	270.0
4	270.0
5	270.0
6	270.0
7	90.0
8	90.0

Orbital Plane 4:

Question	Response
Number of Satellites in Plane	8
Inclination Angle	97.0 degrees
Right Ascension of Ascending Node	270.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5770.0 seconds
Apogee	575.0 km
Perigee	575.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-90.0 degrees
Active Service Arc End Angle with respect to Ascending Node	90.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	315.0
2	315.0
3	315.0
4	315.0
5	135.0
6	135.0
7	135.0
8	135.0

Orbital Plane 5:

Question	Response
Number of Satellites in Plane	8
Inclination Angle	5.0 degrees
Right Ascension of Ascending Node	0.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5770.0 seconds
Apogee	575.0 km
Perigee	575.0 km
Active Service Arc Begin Angle with respect to Ascending Node	0.0 degrees
Active Service Arc End Angle with respect to Ascending Node	0.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	180.0
2	180.0
3	180.0

4	180.0
5	0.0
6	0.0
7	0.0
8	0.0

Orbital Plane 6:

Question	Response
Number of Satellites in Plane	8
Inclination Angle	46.5 degrees
Right Ascension of Ascending Node	0.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5770.0 seconds
Apogee	575.0 km
Perigee	575.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-46.5 degrees
Active Service Arc End Angle with respect to Ascending Node	46.5 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	180.0
2	180.0
3	180.0
4	180.0
5	0.0
6	0.0
7	0.0

8	0.0
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Orbital Plane 7:

Question	Response
Number of Satellites in Plane	8
Inclination Angle	46.5 degrees
Right Ascension of Ascending Node	72.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5770.0 seconds
Apogee	575.0 km
Perigee	575.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-46.5 degrees
Active Service Arc End Angle with respect to Ascending Node	46.5 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	216.0
2	216.0
3	216.0
4	216.0
5	36.0
6	36.0
7	36.0
8	36.0

Orbital Plane 8:

Question	Response
Number of Satellites in Plane	8

Inclination Angle	46.5 degrees
Right Ascension of Ascending Node	144.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5770.0 seconds
Apogee	575.0 km
Perigee	575.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-46.5 degrees
Active Service Arc End Angle with respect to Ascending Node	46.5 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	252.0
2	252.0
3	252.0
4	252.0
5	72.0
6	72.0
7	72.0
8	72.0

Orbital Plane 9:

Question	Response
Number of Satellites in Plane	8
Inclination Angle	46.5 degrees
Right Ascension of Ascending Node	216.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5770.0 seconds

Apogee	575.0 km
Perigee	575.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-46.5 degrees
Active Service Arc End Angle with respect to Ascending Node	46.5 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	288.0
2	288.0
3	288.0
4	288.0
5	108.0
6	108.0
7	108.0
8	108.0

Orbital Plane 10:

Question	Response
Number of Satellites in Plane	8
Inclination Angle	46.5 degrees
Right Ascension of Ascending Node	288.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5770.0 seconds
Apogee	575.0 km
Perigee	575.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-46.5 degrees
Active Service Arc End Angle with respect to Ascending Node	46.5 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	324.0
2	324.0
3	324.0
4	324.0
5	144.0
6	144.0
7	144.0
8	144.0

Receiving Beams 1:

Question	Response
Beam ID	HSTU
Receive Beam Frequency	2025.0 MHz -2110.0 MHz
Beam Type	Fixed
Polarization	RHCP
Peak Gain	6.0 dBi
Antenna Pointing Error	1.0 degrees
Antenna Rotational Error	1.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	-26.5 dB/K
Min. Saturation Flux Density	-102.6 dBW/m2
Max. Saturation Flux Density	-89.26 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	VISIBLE EARTH

Receiving Beams 2:

Question	Response
Beam ID	PAYU
Receive Beam Frequency	2025.0 MHz -2110.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	6.0 dBi
Antenna Pointing Error	1.0 degrees
Antenna Rotational Error	1.0 degrees

Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	-24.3 dB/K
Min. Saturation Flux Density	-122.9 dBW/m2
Max. Saturation Flux Density	-97.67 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	VISIBLE EARTH

Receiving Beams 3:

Question	Response
Beam ID	TTCU
Receive Beam Frequency	2025.0 MHz -2110.0 MHz
Beam Type	Fixed
Polarization	RHCP
Peak Gain	6.0 dBi
Antenna Pointing Error	1.0 degrees
Antenna Rotational Error	1.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	-22.8 dB/K
Min. Saturation Flux Density	-110.0 dBW/m2
Max. Saturation Flux Density	-96.74 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	VISIBLE EARTH

Receiving

Beams 4:

Question	Response
Beam ID	AIS
Receive Beam Frequency	156.5 MHz -162.5 MHz
Beam Type	Fixed
Polarization	H
Peak Gain	2.0 dBi
Antenna Pointing Error	1.0 degrees
Antenna Rotational Error	1.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	0.0 degrees
G/T at Max. Gain Point	-27.4 dB/K
Min. Saturation Flux Density	-137.5 dBW/m2
Max. Saturation Flux Density	-124.2 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	VISIBLE EARTH

Receiving Beams 5:

Question	Response
Beam ID	DSC
Receive Beam Frequency	156.512 MHz -156.538 MHz
Beam Type	Fixed
Polarization	H
Peak Gain	2.0 dBi
Antenna Pointing Error	1.0 degrees
Antenna Rotational Error	1.0 degrees
Polarization Switchable	

Polarization Alignment Relative to the Equatorial Plane	0.0 degrees
G/T at Max. Gain Point	-27.4 dB/K
Min. Saturation Flux Density	-147.4 dBW/m2
Max. Saturation Flux Density	-134.1 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	VISIBLE EARTH

Receiving Beams 6:

Question	Response
Beam ID	EPRB
Receive Beam Frequency	406.0 MHz -406.1 MHz
Beam Type	Fixed
Polarization	H
Peak Gain	2.0 dBi
Antenna Pointing Error	1.0 degrees
Antenna Rotational Error	1.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	0.0 degrees
G/T at Max. Gain Point	-26.5 dB/K
Min. Saturation Flux Density	-145.5 dBW/m2
Max. Saturation Flux Density	-132.2 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	VISIBLE EARTH

Receiving Beams 7:

Question	Response
Beam ID	ADSB

Receive Beam Frequency	1087.7 MHz -1092.3 MHz
Beam Type	Fixed
Polarization	H
Peak Gain	5.0 dBi
Antenna Pointing Error	1.0 degrees
Antenna Rotational Error	1.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	0.0 degrees
G/T at Max. Gain Point	-21.5 dB/K
Min. Saturation Flux Density	-146.1 dBW/m ²
Max. Saturation Flux Density	-132.8 dBW/m ²
Co- or Cross Polar Mode	C
Service Area Description	VISIBLE EARTH

Receiving Channels (23)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
PYU1	0.17	2068.2	TT&C
HTU4	0.18	2065.465	TT&C
HTU3	0.18	2065.965	TT&C
HTU2	0.18	2064.965	TT&C
HTU1	0.18	2063.965	TT&C
TCU1	0.12	2063.965	TT&C
PYU5	2.66	2068.2	TT&C
PYU6	2.66	2062.7	TT&C
PYU7	2.66	2077.4	TT&C
PYU8	2.66	2072.0	TT&C
EPRB	0.1	406.05	Service Link
DSC	0.025	156.525	Service Link
AIS4	0.025	156.825	Service Link
TCU3	0.12	2065.965	TT&C
PYU4	0.17	2072.0	TT&C
TCU2	0.12	2064.965	TT&C
PYU2	0.17	2062.7	TT&C
PYU3	0.17	2077.4	TT&C
ADSB	4.6	1090.0	Service Link
AIS1	0.025	161.975	Service Link
AIS2	0.025	162.025	Service Link
AIS3	0.025	156.775	Service Link
TCU4	0.12	2065.465	TT&C

Transmitting Beams 1:

Question	Response
Beam ID	TCXD
Transmit Beam Frequency	8025.0 MHz -8400.0 MHz
Beam Type	Fixed
Polarization	RHCP
Peak Gain	4.1 dBi
Antenna Pointing Error	1.0 degrees
Antenna Rotational Error	1.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-51.72 dBW/Hz
Max. Transmit EIRP	0.0 dBW
Co- or Cross Polar Mode	C
Service Area Description	VISIBLE EARTH

Max. Power Flux Density

	* 0° - 5°	* 5° - 10°	* 10° - 15°	* 15° - 20°	* 20° - 25°	* 25° - 90°
*	(dBW/m ²	(dBW/m ²	(dBW/m ²	(dBW/m ²	(dBW/m ²	(dBW/m ²
BW:	/BW):	/BW):	/BW):	/BW):	/BW):	/BW):
4.0 kHz	-153.8	-152.1	-150.6	-149.3	-148.0	-141.9

Transmitting Beams 2:

Question	Response
Beam ID	PAYD
Transmit Beam Frequency	8025.0 MHz -8400.0 MHz

Beam Type	Steerable
Polarization	RHCP
Peak Gain	10.4 dBi
Antenna Pointing Error	1.0 degrees
Antenna Rotational Error	1.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-57.12 dBW/Hz
Max. Transmit EIRP	11.91 dBW
Co- or Cross Polar Mode	C
Service Area Description	VISIBLE EARTH

Max. Power Flux Density

	* 0° - 5° (dBW/m ² /BW):	* 5° - 10° (dBW/m ² /BW):	* 10° - 15° (dBW/m ² /BW):	* 15° - 20° (dBW/m ² /BW):	* 20° - 25° (dBW/m ² /BW):	* 25° - 90° (dBW/m ² /BW):
4.0 kHz	-159.2	-157.6	-156.0	-154.7	-153.5	-147.3

Transmitting Beams 3:

Question	Response
Beam ID	TCSD
Transmit Beam Frequency	2200.0 MHz -2290.0 MHz
Beam Type	Fixed
Polarization	RHCP
Peak Gain	6.0 dBi
Antenna Pointing Error	1.0 degrees

Antenna Rotational Error	1.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-52.05 dBW/Hz
Max. Transmit EIRP	2.03 dBW
Co- or Cross Polar Mode	C
Service Area Description	VISIBLE EARTH

Max. Power Flux Density

	* 0° - 5°	* 5° - 10°	* 10° - 15°	* 15° - 20°	* 20° - 25°	* 25° - 90°
*	(dBW/m ²	(dBW/m ²	(dBW/m ²	(dBW/m ²	(dBW/m ²	(dBW/m ²
BW:	/BW):	/BW):	/BW):	/BW):	/BW):	/BW):
4.0 kHz	-154.1	-152.5	-151.0	-149.6	-148.4	-142.2

Transmitting Channels (28)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
TSD6	4.0	2242.0	TT&C
PD12	80.0	8345.0	Service Link
PD11	80.0	8255.0	Service Link
PYD8	40.0	8345.0	Service Link
PYD7	40.0	8255.0	Service Link
PYD6	40.0	8165.0	Service Link
PYD5	40.0	8075.0	Service Link
PD10	80.0	8165.0	Service Link
PYD9	80.0	8075.0	Service Link
TSD5	4.0	2236.0	TT&C
TXD5	4.0	8291.0	TT&C
TXD6	4.0	8297.0	TT&C
TXD7	4.0	8303.0	TT&C
TXD8	4.0	8309.0	TT&C
TSD7	4.0	2254.0	TT&C
TSD8	4.0	2260.0	TT&C
PYD3	8.0	8255.0	Service Link
PYD2	8.0	8165.0	Service Link
PYD1	8.0	8075.0	Service Link
TSD1	0.256	2236.0	TT&C
TSD2	0.256	2242.0	TT&C
TSD3	0.256	2254.0	TT&C
TSD4	0.256	2260.0	TT&C
PYD4	8.0	8345.0	Service Link

TXD1	0.128	8291.0	TT&C
TXD2	0.128	8297.0	TT&C
TXD3	0.128	8303.0	TT&C
TXD4	0.128	8309.0	TT&C

Certification Questions

Question	Response
<p>Are the applicable service area coverage requirements of 25.143(b)(2) (ii) and (iii), or 25.144(a)(3)(i), or 25.145 (c)(1) and (2), or 25.146(i)(1) and (2), or 25.148(c), or 25.225 met?</p>	<p>N/A</p>
<p>Are the applicable frequency tolerances of 25.202(e) and out-of-band emission limits of 25.202(f)(1),(2), and (3) met?</p>	<p>Yes</p>
<p>Are the cessation of emissions requirements of 25.207 met?</p>	<p>Yes</p>
<p>Are the applicable power-flux-density limits of 25.208 met, and is the appropriate technical showing provided within the application?</p>	
<p>For NGSO applications, are the applicable equivalent-power-flux-density limits of 25.208 met, and is the appropriate technical showing provided within the application?</p>	<p>N/A</p>
<p>Are the applicable full-frequency-reuse requirements of 25.210 met?</p>	
<p>If the application is for a 17/24 GHz BSS space station, will it be operated at an offset location with full power and interference protection in accordance with 25.262(b)?</p>	

Attachments

File Name	Beam	Field	Attachment Type	Description
<u>HE360-GXT-Dec 12.mdb</u>		NGSO Antenna Gain Data	GIMS file (*.mdb)	
<u>Steerable Beam Service Area Description.pdf</u>		NGSO Antenna Gain Data	PDF file (*.pdf)	Steerable Beam Service Area Description