



312 File Number: **SATPDR2020022800021**

Filing Description

Question	Response
Description	Planned Swarm non-voice, non-geostationary mobile-satellite service system in UHF (399.9-400.05 and 400.15-401 MHz) band

**Satellite
Information**

Question	Response
Select Orbit Type	NGSO
Space Station or Satellite Network Name	ASTROBIENE USA
Estimated Lifetime of Satellite(s) From Date of Launch	4 Years
Will the space station(s) operate on a Common Carrier basis?	No

Operating Frequency Bands (2)

Nature of service	Description	Frequency Band(s)	Mode Type
Mobile-Satellite Service		399.9 MHz -400.05 MHz	Receive
Mobile-Satellite Service		400.15 MHz -401.0 MHz	Transmit

**Orbital
Information For
Non-
Geostationary
Satellites**

Question	Response
Total Number of Satellites in the active constellation	450
Orbit Epoch Date	06/01/2020
Celestial Reference Body	Earth

Orbital Plane 1:

Question	Response
Number of Satellites in Plane	48
Inclination Angle	97.6 degrees
Right Ascension of Ascending Node	242.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5790.0 seconds
Apogee	585.0 km
Perigee	585.0 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	82.5
2	75.0
3	67.5
4	60.0
5	0.0
6	7.5
7	15.0
8	22.5
9	30.0
10	37.5
11	45.0
12	52.5
13	180.0

14	187.5
15	195.0
16	202.5
17	210.0
18	217.5
19	225.0
20	232.5
21	240.0
22	247.5
23	255.0
24	262.5
25	270.0
26	277.5
27	285.0
28	292.5
29	300.0
30	307.5
31	315.0
32	322.5
33	330.0
34	337.5
35	345.0
36	352.5
37	90.0
38	97.5
39	105.0

40	112.5
41	120.0
42	127.5
43	135.0
44	142.5
45	150.0
46	157.5
47	165.0
48	172.5

Orbital Plane 2:

Question	Response
Number of Satellites in Plane	48
Inclination Angle	97.6 degrees
Right Ascension of Ascending Node	212.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5790.0 seconds
Apogee	585.0 km
Perigee	585.0 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	0.0
2	7.5
3	15.0

4	22.5
5	30.0
6	37.5
7	45.0
8	52.5
9	180.0
10	187.5
11	195.0
12	202.5
13	210.0
14	217.5
15	225.0
16	232.5
17	240.0
18	247.5
19	255.0
20	262.5
21	270.0
22	277.5
23	285.0
24	292.5
25	300.0
26	307.5
27	315.0
28	322.5
29	330.0

30	337.5
31	345.0
32	352.5
33	60.0
34	67.5
35	75.0
36	82.5
37	90.0
38	97.5
39	105.0
40	112.5
41	120.0
42	127.5
43	135.0
44	142.5
45	150.0
46	157.5
47	165.0
48	172.5

Orbital Plane 3:

Question	Response
Number of Satellites in Plane	48
Inclination Angle	97.6 degrees
Right Ascension of Ascending Node	339.5 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5790.0 seconds

Apogee	585.0 km
Perigee	585.0 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	0.0
2	7.5
3	15.0
4	22.5
5	30.0
6	37.5
7	45.0
8	52.5
9	180.0
10	187.5
11	195.0
12	202.5
13	210.0
14	217.5
15	225.0
16	232.5
17	240.0
18	247.5
19	255.0
20	262.5

21	270.0
22	277.5
23	285.0
24	292.5
25	300.0
26	307.5
27	315.0
28	322.5
29	330.0
30	337.5
31	345.0
32	352.5
33	60.0
34	67.5
35	75.0
36	82.5
37	90.0
38	97.5
39	105.0
40	112.5
41	120.0
42	127.5
43	135.0
44	142.5
45	150.0
46	157.5

47	165.0
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48	172.5
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Orbital Plane 4:

Question	Response
Number of Satellites in Plane	54
Inclination Angle	97.4 degrees
Right Ascension of Ascending Node	9.5 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5790.0 seconds
Apogee	585.0 km
Perigee	585.0 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	0.0
2	6.7
3	13.4
4	20.1
5	26.8
6	33.5
7	40.2
8	46.9
9	53.6
10	180.9

11	187.6
12	194.3
13	201.0
14	207.7
15	214.4
16	221.1
17	227.8
18	234.5
19	241.2
20	247.9
21	254.6
22	261.3
23	268.0
24	274.7
25	281.4
26	288.1
27	294.8
28	301.5
29	308.2
30	314.9
31	321.6
32	328.3
33	335.0
34	341.7
35	348.4
36	355.1

37	60.3
38	67.0
39	73.7
40	80.4
41	87.1
42	93.8
43	100.5
44	107.2
45	113.9
46	120.6
47	127.3
48	134.0
49	140.7
50	147.4
51	154.1
52	160.8
53	167.5
54	174.2

Orbital Plane 5:

Question	Response
Number of Satellites in Plane	48
Inclination Angle	97.4 degrees
Right Ascension of Ascending Node	309.5 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5790.0 seconds
Apogee	585.0 km

Perigee	585.0 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	0.0
2	7.5
3	15.0
4	22.5
5	30.0
6	37.5
7	45.0
8	52.5
9	180.0
10	187.5
11	195.0
12	202.5
13	210.0
14	217.5
15	225.0
16	232.5
17	240.0
18	247.5
19	255.0
20	262.5

21	270.0
22	277.5
23	285.0
24	292.5
25	300.0
26	307.5
27	315.0
28	322.5
29	330.0
30	337.5
31	345.0
32	352.5
33	60.0
34	67.5
35	75.0
36	82.5
37	90.0
38	97.5
39	105.0
40	112.5
41	120.0
42	127.5
43	135.0
44	142.5
45	150.0
46	157.5

47	165.0
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48	172.5
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Orbital Plane 6:

Question	Response
Number of Satellites in Plane	48
Inclination Angle	97.4 degrees
Right Ascension of Ascending Node	279.5 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5790.0 seconds
Apogee	585.0 km
Perigee	585.0 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	0.0
2	7.5
3	15.0
4	22.5
5	30.0
6	37.5
7	45.0
8	52.5
9	180.0
10	187.5

11	195.0
12	202.5
13	210.0
14	217.5
15	225.0
16	232.5
17	240.0
18	247.5
19	255.0
20	262.5
21	270.0
22	277.5
23	285.0
24	292.5
25	300.0
26	307.5
27	315.0
28	322.5
29	330.0
30	337.5
31	345.0
32	352.5
33	60.0
34	67.5
35	75.0
36	82.5

37	90.0
38	97.5
39	105.0
40	112.5
41	120.0
42	127.5
43	135.0
44	142.5
45	150.0
46	157.5
47	165.0
48	172.5

Orbital Plane 7:

Question	Response
Number of Satellites in Plane	36
Inclination Angle	97.4 degrees
Right Ascension of Ascending Node	257.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5790.0 seconds
Apogee	585.0 km
Perigee	585.0 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
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1	30.0
2	40.0
3	50.0
4	10.0
5	190.0
6	200.0
7	210.0
8	220.0
9	230.0
10	240.0
11	250.0
12	260.0
13	270.0
14	280.0
15	290.0
16	300.0
17	310.0
18	320.0
19	330.0
20	340.0
21	350.0
22	90.0
23	100.0
24	60.0
25	160.0
26	150.0

27	120.0
28	110.0
29	140.0
30	170.0
31	80.0
32	70.0
33	130.0
34	0.0
35	10.0
36	20.0

Orbital Plane 8:

Question	Response
Number of Satellites in Plane	60
Inclination Angle	10.0 degrees
Right Ascension of Ascending Node	330.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5790.0 seconds
Apogee	585.0 km
Perigee	585.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-10.0 degrees
Active Service Arc End Angle with respect to Ascending Node	10.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	240.0
2	246.0

3	252.0
4	258.0
5	264.0
6	270.0
7	276.0
8	282.0
9	288.0
10	294.0
11	300.0
12	306.0
13	312.0
14	318.0
15	324.0
16	330.0
17	336.0
18	342.0
19	348.0
20	354.0
21	234.0
22	228.0
23	222.0
24	216.0
25	210.0
26	204.0
27	198.0
28	192.0

29	186.0
30	180.0
31	174.0
32	168.0
33	162.0
34	156.0
35	150.0
36	144.0
37	138.0
38	132.0
39	126.0
40	120.0
41	114.0
42	108.0
43	102.0
44	96.0
45	90.0
46	84.0
47	78.0
48	72.0
49	66.0
50	60.0
51	54.0
52	48.0
53	42.0
54	36.0

55	30.0
56	24.0
57	18.0
58	12.0
59	6.0
60	0.0

Orbital Plane 9:

Question	Response
Number of Satellites in Plane	60
Inclination Angle	45.0 degrees
Right Ascension of Ascending Node	10.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5790.0 seconds
Apogee	585.0 km
Perigee	585.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-45.0 degrees
Active Service Arc End Angle with respect to Ascending Node	45.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	174.0
2	180.0
3	186.0
4	192.0
5	198.0
6	204.0

7	210.0
8	216.0
9	222.0
10	228.0
11	234.0
12	336.0
13	330.0
14	324.0
15	318.0
16	312.0
17	306.0
18	300.0
19	294.0
20	288.0
21	282.0
22	276.0
23	270.0
24	264.0
25	258.0
26	252.0
27	246.0
28	240.0
29	0.0
30	6.0
31	12.0
32	18.0

33	24.0
34	30.0
35	36.0
36	42.0
37	48.0
38	54.0
39	60.0
40	66.0
41	72.0
42	78.0
43	84.0
44	90.0
45	96.0
46	102.0
47	108.0
48	114.0
49	120.0
50	126.0
51	132.0
52	138.0
53	144.0
54	150.0
55	156.0
56	162.0
57	168.0
58	354.0

59	348.0
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60	342.0
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Receiving Beams 1:

Question	Response
Beam ID	RB01
Receive Beam Frequency	399.9 MHz -400.05 MHz
Beam Type	Fixed
Polarization	RHCP
Peak Gain	0.0 dBi
Antenna Pointing Error	2.0 degrees
Antenna Rotational Error	2.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	-24.8 dB/K
Min. Saturation Flux Density	-154.2 dBW/m ²
Max. Saturation Flux Density	-125.2 dBW/m ²
Co- or Cross Polar Mode	C
Service Area Description	Global

Receiving Channels (3)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
R002	0.063	399.9945	Service Link
R001	0.063	399.9315	Service Link
R003	0.063	400.0185	Service Link

Transmitting Beams 1:

Question	Response
Beam ID	TB01
Transmit Beam Frequency	400.505 MHz -400.645 MHz
Beam Type	Fixed
Polarization	RHCP
Peak Gain	0.0 dBi
Antenna Pointing Error	2.0 degrees
Antenna Rotational Error	2.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-41.4 dBW/Hz
Max. Transmit EIRP	4.77 dBW
Co- or Cross Polar Mode	C
Service Area Description	Global

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	-129.4	-129.4	-129.2	-129.0	-128.8	-125.9

Transmitting Channels (3)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
T003	0.063	400.6135	Service Link
T002	0.063	400.5995	Service Link
T001	0.063	400.5365	Service Link

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>SC_TB01.pdf</u>	TB01	NGSO Antenna Gain Data	PDF file (*.pdf)	
<u>SC_RB01.pdf</u>	RB01	NGSO Antenna Gain Data	PDF file (*.pdf)	