



312 File Number: **SATMOD2017071300103**

Filing Description

Question	Response
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Description	Request for Modification of X-band and S-band channels and beams for the S2912 (Flock) satellite constellation.
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**Satellite
Information**

Question	Response
Select Orbit Type	NGSO
Space Station or Satellite Network Name	FLOCK
Estimated Lifetime of Satellite(s) From Date of Launch	2 Years
Will the space station(s) operate on a Common Carrier basis?	No

**Operating
Frequency
Bands (4)**

Nature of service	Description	Frequency Band(s)	Mode Type
Space Operation Service		401.0 MHz -402.0 MHz	Transmit
Space Operation Service		449.75 MHz -450.25 MHz	Receive
Earth Exploration-Satellite Service		2025.0 MHz -2110.0 MHz	Receive
Earth Exploration-Satellite Service		8025.0 MHz -8400.0 MHz	Transmit

**Orbital
Information For
Non-
Geostationary
Satellites**

Question	Response
Total Number of Satellites in the active constellation	200
Orbit Epoch Date	01/01/2016
Celestial Reference Body	Earth

Orbital Plane 1:

Question	Response
Number of Satellites in Plane	200
Inclination Angle	97.4 degrees
Right Ascension of Ascending Node	0.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5739.0 seconds
Apogee	500.0 km
Perigee	500.0 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	30.6
2	32.4
3	34.2
4	36.0
5	37.8
6	39.6
7	41.4
8	43.2
9	45.0
10	46.8
11	48.6
12	50.4
13	52.2

14	54.0
15	55.8
16	291.6
17	293.4
18	295.2
19	297.0
20	298.8
21	300.6
22	302.4
23	304.2
24	306.0
25	307.8
26	309.6
27	311.4
28	313.2
29	315.0
30	316.8
31	318.6
32	320.4
33	322.2
34	324.0
35	325.8
36	327.6
37	329.4
38	331.2
39	333.0

40	334.8
41	336.6
42	338.4
43	340.2
44	342.0
45	343.8
46	345.6
47	347.4
48	349.2
49	351.0
50	352.8
51	354.6
52	356.4
53	358.2
54	57.6
55	59.4
56	61.2
57	63.0
58	64.8
59	66.6
60	68.4
61	70.2
62	72.0
63	73.8
64	75.6
65	77.4

66	79.2
67	81.0
68	90.0
69	91.8
70	93.6
71	95.4
72	97.2
73	99.0
74	100.8
75	102.6
76	104.4
77	106.2
78	108.0
79	109.8
80	111.6
81	113.4
82	115.2
83	10.8
84	12.6
85	14.4
86	16.2
87	18.0
88	19.8
89	21.6
90	23.4
91	25.2

92	27.0
93	28.8
94	88.2
95	86.4
96	84.6
97	82.8
98	117.0
99	118.8
100	120.6
101	122.4
102	124.2
103	126.0
104	127.8
105	129.6
106	131.4
107	133.2
108	135.0
109	136.8
110	138.6
111	140.4
112	142.2
113	144.0
114	145.8
115	147.6
116	149.4
117	151.2

118	153.0
119	154.8
120	156.6
121	158.4
122	160.2
123	162.0
124	163.8
125	165.6
126	167.4
127	169.2
128	171.0
129	172.8
130	174.6
131	176.4
132	178.2
133	180.0
134	181.8
135	183.6
136	185.4
137	187.2
138	189.0
139	190.8
140	192.6
141	194.4
142	196.2
143	198.0

144	199.8
145	201.6
146	203.4
147	205.2
148	207.0
149	208.8
150	210.6
151	212.4
152	214.2
153	216.0
154	217.8
155	219.6
156	221.4
157	223.2
158	225.0
159	226.8
160	228.6
161	230.4
162	232.2
163	234.0
164	235.8
165	237.6
166	239.4
167	241.2
168	243.0
169	244.8

170	246.6
171	248.4
172	250.2
173	252.0
174	253.8
175	255.6
176	257.4
177	259.2
178	261.0
179	262.8
180	264.6
181	266.4
182	268.2
183	270.0
184	271.8
185	273.6
186	275.4
187	277.2
188	279.0
189	280.8
190	282.6
191	284.4
192	286.2
193	288.0
194	289.8
195	9.0

196	7.2
197	5.4
198	3.6
199	1.8
200	0.0

Receiving Beams 1:

Question	Response
Beam ID	SUL
Receive Beam Frequency	2025.0 MHz -2110.0 MHz
Beam Type	Fixed
Polarization	RHCP
Peak Gain	5.0 dBi
Antenna Pointing Error	0.5 degrees
Antenna Rotational Error	0.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	-23.6 dB/K
Min. Saturation Flux Density	-95.5 dBW/m2
Max. Saturation Flux Density	-76.0 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	VISIBLEEARTH

Receiving Beams 2:

Question	Response
Beam ID	UUL
Receive Beam Frequency	449.75 MHz -450.25 MHz
Beam Type	Fixed
Polarization	H
Peak Gain	2.16 dBi
Antenna Pointing Error	0.5 degrees
Antenna Rotational Error	0.0 degrees

Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	0.0 degrees
G/T at Max. Gain Point	-24.5 dB/K
Min. Saturation Flux Density	-117.5 dBW/m2
Max. Saturation Flux Density	-99.5 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	VISIBLEEARTH

Receiving
Channels (4)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
UUC1	0.06	450.0	TT&C
SCH3	1.31	2057.31	TT&C
SCH2	1.31	2054.69	TT&C
SCH1	1.31	2056.0	TT&C

Transmitting
Beams 1:

Question	Response
Beam ID	XDLH
Transmit Beam Frequency	8025.0 MHz -8400.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	13.0 dBi
Antenna Pointing Error	0.5 degrees
Antenna Rotational Error	0.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-60.4 dBW/Hz
Max. Transmit EIRP	15.0 dBW
Co- or Cross Polar Mode	C
Service Area Description	VISIBLEEARTH

Max. Power Flux Density

	* 0° - 5°	* 5° - 10°	* 10° - 15°	* 15° - 20°	* 20° - 25°	* 25° - 90°
* (dBW/m ² /BW):	(dBW/m ² /BW):	(dBW/m ² /BW):	(dBW/m ² /BW):	(dBW/m ² /BW):	(dBW/m ² /BW):	(dBW/m ² /BW):
4.0 kHz	-161.8	-160.0	-158.4	-156.9	-155.7	-149.4

Transmitting
Beams 2:

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

Beam Type	Steerable
Polarization	RHCP
Peak Gain	16.0 dBi
Antenna Pointing Error	0.5 degrees
Antenna Rotational Error	0.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-65.2 dBW/Hz
Max. Transmit EIRP	18.0 dBW
Co- or Cross Polar Mode	C
Service Area Description	VISIBLEEARTH

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):
4.0 kHz	-166.5	-164.7	-163.1	-161.7	-160.4	-154.1

Transmitting Beams 3:

Question	Response
Beam ID	XDLL
Transmit Beam Frequency	8025.0 MHz -8400.0 MHz
Beam Type	Steerable
Polarization	LHCP
Peak Gain	16.0 dBi
Antenna Pointing Error	0.5 degrees

Antenna Rotational Error	0.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-65.2 dBW/Hz
Max. Transmit EIRP	18.0 dBW
Co- or Cross Polar Mode	C
Service Area Description	VISIBLEEARTH

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	-166.5	-164.7	-163.1	-161.7	-160.4	-154.1

Transmitting Beams 4:

Question	Response
Beam ID	UDL
Transmit Beam Frequency	401.0 MHz -402.0 MHz
Beam Type	Fixed
Polarization	H
Peak Gain	2.19 dBi
Antenna Pointing Error	0.5 degrees
Antenna Rotational Error	0.0 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	0.0 degrees
Max. Transmit EIRP Density	-42.2 dBW/Hz
Max. Transmit EIRP	0.19 dBW

Co- or Cross Polar Mode	C
Service Area Description	VISIBLEEARTH

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	-143.6	-141.8	-140.2	-138.7	-137.5	-131.2

**Transmitting
Channels (9)**

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
XCH2	94.5	8150.0	Feeder Link
XCH1	94.5	8150.0	Feeder Link
XC3R	94.5	8337.5	Feeder Link
XC3L	94.5	8337.5	Feeder Link
XC2R	94.5	8212.5	Feeder Link
XC2L	94.5	8212.5	Feeder Link
XC1R	94.5	8087.5	Feeder Link
XC1L	94.5	8087.5	Feeder Link
UDC1	0.06	401.3	TT&C

Certification Questions

Question	Response
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?	N/A
Are the applicable frequency tolerances of 25.202(e) and out-of-band emission limits of 25.202(f)(1),(2), and (3) met?	Yes
Are the cessation of emissions requirements of 25.207 met?	Yes
Are the applicable power-flux-density limits of 25.208 met, and is the appropriate technical showing provided within the application?	
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?	N/A
Are the applicable full-frequency-reuse requirements of 25.210 met?	
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)?	

Attachments

File Name	Beam	Field	Attachment Type	Description
<u>S-band patch antnena.pdf</u>	SUL	NGSO Antenna Gain Data	PDF file (*.pdf)	
<u>UHF Antenna.pdf</u>	UUL	NGSO Antenna Gain Data	PDF file (*.pdf)	
<u>Helical Gain Pattern.pdf</u>	XDLH	NGSO Antenna Gain Data	PDF file (*.pdf)	
<u>Quad Helical Gain Pattern.pdf</u>	XDLR	NGSO Antenna Gain Data	PDF file (*.pdf)	
<u>Quad Helical Gain Pattern.pdf</u>	XDLL	NGSO Antenna Gain Data	PDF file (*.pdf)	
<u>UHF Antenna.pdf</u>	UDL	NGSO Antenna Gain Data	PDF file (*.pdf)	