



(REFERENCE COPY) Schedule S

312 File Number: **SATLOI2016111500114**

Filing Description

Question	Response
Description	Kepler MULTUS filing for oneweb petition

Satellite Information

Question	Response
Select Orbit Type	NGSO
Space Station or Satellite Network Name	MULTUS
Estimated Lifetime of Satellite(s) From Date of Launch	10 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
Fixed-Satellite Service		14000.0 MHz -14500.0 MHz	Receive
Fixed-Satellite Service		10700.0 MHz -12700.0 MHz	Transmit

**Orbital
Information For
Non-
Geostationary
Satellites**

Question	Response
Total Number of Satellites in the active constellation	140
Orbit Epoch Date	11/01/2017
Celestial Reference Body	Earth

Orbital Plane 1:

Question	Response
Number of Satellites in Plane	20
Inclination Angle	90.0 degrees
Right Ascension of Ascending Node	0.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5820.0 seconds
Apogee	600.0 km
Perigee	600.0 km
Active Service Arc Begin Angle with respect to Ascending Node	0.0 degrees
Active Service Arc End Angle with respect to Ascending Node	360.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	0.0
2	18.0
3	36.0
4	54.0
5	72.0
6	90.0
7	108.0
8	126.0
9	144.0
10	162.0
11	180.0
12	198.0
13	216.0

14	234.0
15	252.0
16	270.0
17	288.0
18	306.0
19	324.0
20	342.0

Orbital Plane 2:

Question	Response
Number of Satellites in Plane	20
Inclination Angle	90.0 degrees
Right Ascension of Ascending Node	51.4 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5820.0 seconds
Apogee	600.0 km
Perigee	600.0 km
Active Service Arc Begin Angle with respect to Ascending Node	0.0 degrees
Active Service Arc End Angle with respect to Ascending Node	360.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	344.63
2	326.63
3	308.63
4	290.63
5	272.63

6	254.63
7	236.63
8	218.63
9	200.63
10	182.63
11	164.63
12	146.63
13	128.63
14	110.63
15	92.63
16	74.63
17	56.63
18	38.63
19	20.63
20	2.63

Orbital Plane 3:

Question	Response
Number of Satellites in Plane	20
Inclination Angle	90.0 degrees
Right Ascension of Ascending Node	102.86 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5820.0 seconds
Apogee	600.0 km
Perigee	600.0 km
Active Service Arc Begin Angle with respect to Ascending Node	0.0 degrees
Active Service Arc End Angle with respect to Ascending Node	360.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	5.28
2	23.28
3	41.28
4	59.28
5	77.29
6	257.28
7	239.28
8	221.28
9	95.28
10	113.28
11	131.28
12	149.28
13	167.28
14	185.28
15	203.28
16	347.28
17	329.28
18	311.28
19	293.28
20	275.28

Orbital Plane 4:

Question	Response
Number of Satellites in Plane	20
Inclination Angle	90.0 degrees

Right Ascension of Ascending Node	154.29 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5820.0 seconds
Apogee	600.0 km
Perigee	600.0 km
Active Service Arc Begin Angle with respect to Ascending Node	0.0 degrees
Active Service Arc End Angle with respect to Ascending Node	360.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	7.89
2	349.89
3	277.89
4	295.89
5	313.89
6	79.89
7	61.89
8	43.89
9	25.89
10	331.89
11	259.89
12	241.89
13	223.89
14	205.89
15	187.89
16	169.89
17	151.89

18	133.89
19	115.89
20	97.89

Orbital Plane 5:

Question	Response
Number of Satellites in Plane	20
Inclination Angle	90.0 degrees
Right Ascension of Ascending Node	205.7 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5820.0 seconds
Apogee	600.0 km
Perigee	600.0 km
Active Service Arc Begin Angle with respect to Ascending Node	0.0 degrees
Active Service Arc End Angle with respect to Ascending Node	360.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	298.44
2	100.44
3	10.44
4	28.44
5	46.44
6	316.44
7	208.44
8	190.44
9	172.44

10	154.44
11	136.44
12	118.44
13	82.44
14	64.44
15	226.44
16	244.44
17	262.44
18	280.44
19	352.44
20	334.44

Orbital Plane 6:

Question	Response
Number of Satellites in Plane	20
Inclination Angle	90.0 degrees
Right Ascension of Ascending Node	257.1 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5820.0 seconds
Apogee	600.0 km
Perigee	600.0 km
Active Service Arc Begin Angle with respect to Ascending Node	0.0 degrees
Active Service Arc End Angle with respect to Ascending Node	360.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	246.94

2	264.94
3	282.94
4	300.94
5	318.94
6	336.94
7	228.94
8	84.94
9	66.94
10	48.94
11	30.94
12	12.94
13	192.94
14	210.94
15	354.94
16	174.94
17	156.94
18	138.94
19	120.94
20	102.94

Orbital Plane 7:

Question	Response
Number of Satellites in Plane	20
Inclination Angle	90.0 degrees
Right Ascension of Ascending Node	308.6 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5820.0 seconds

Apogee	600.0 km
Perigee	600.0 km
Active Service Arc Begin Angle with respect to Ascending Node	0.0 degrees
Active Service Arc End Angle with respect to Ascending Node	360.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	195.44
2	213.44
3	231.44
4	177.44
5	159.44
6	87.44
7	69.44
8	51.44
9	33.44
10	15.44
11	105.44
12	123.44
13	141.44
14	357.44
15	339.44
16	321.44
17	303.44
18	285.44
19	267.44

Receiving Beams 1:

Question	Response
Beam ID	UG1
Receive Beam Frequency	14000.0 MHz -14500.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	43.0 dBi
Antenna Pointing Error	0.1 degrees
Antenna Rotational Error	0.1 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	-6.3 dB/K
Min. Saturation Flux Density	-94.0 dBW/m2
Max. Saturation Flux Density	-63.0 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	Global (outside US)

Receiving Beams 2:

Question	Response
Beam ID	UU1
Receive Beam Frequency	14000.0 MHz -14500.0 MHz
Beam Type	Both Steerable and Shapeable
Polarization	RHCP
Peak Gain	25.5 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 -6.3 dB/K

Min. Saturation Flux Density -94.0 dBW/m²

Max. Saturation Flux Density -63.0 dBW/m²

Co- or Cross Polar Mode C

Service Area Description Global

**Receiving
Channels (12)**

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
UG2	250.0	14375.0	Feeder Link
UU1	50.0	14025.0	Service Link
UU9	50.0	14425.0	Service Link
UU8	50.0	14375.0	Service Link
UU7	50.0	14325.0	Service Link
UU6	50.0	14275.0	Service Link
UU5	50.0	14225.0	Service Link
UU4	50.0	14175.0	Service Link
UU3	50.0	14125.0	Service Link
UU2	50.0	14075.0	Service Link
UG1	250.0	14125.0	Feeder Link
UU10	50.0	14475.0	Service Link

Transmitting Beams 1:

Question	Response
Beam ID	DG1
Transmit Beam Frequency	10700.0 MHz -12700.0 MHz
Beam Type	Both Steerable and Shapeable
Polarization	LHCP
Peak Gain	23.6 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	-24.2 dBW/Hz
Max. Transmit EIRP	26.6 dBW
Co- or Cross Polar Mode	C
Service Area Description	Global (outside US)

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	-160.1	-158.5	-156.7	-155.0	-153.4	-144.7

Transmitting Beams 2:

Question	Response
Beam ID	DU1
Transmit Beam Frequency	10700.0 MHz -12700.0 MHz

Beam Type	Both Steerable and Shapeable
Polarization	LHCP
Peak Gain	23.6 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	-21.4 dBW/Hz
Max. Transmit EIRP	13.6 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	-200.0	-200.0	-152.0	-154.2	-152.6	-148.1

Transmitting Channels (19)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
DG10	125.0	11512.5	Feeder Link
DG11	125.0	11387.5	Feeder Link
DUa1	15.0	10707.5	Service Link
DG9	125.0	11637.5	Feeder Link
DG8	125.0	11762.5	Feeder Link
DG7	125.0	11887.5	Feeder Link
DG6	125.0	12012.5	Feeder Link
DG5	125.0	12137.5	Feeder Link
DG4	125.0	12262.5	Feeder Link
DG3	125.0	12387.5	Feeder Link
DG2	125.0	12512.5	Feeder Link
DG16	125.0	10762.5	Feeder Link
DG15	125.0	10887.5	Feeder Link
DG14	125.0	11012.5	Feeder Link
DG13	125.0	11137.5	Feeder Link
DG12	125.0	11262.5	Feeder Link
DG1	125.0	12637.5	Feeder Link
DUm3	15.0	12692.5	Service Link
DUf7	15.0	11697.5	Service Link

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?	Yes
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?	Yes
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?	Yes
Are the applicable full-frequency-reuse requirements of 25.210 met?	Yes
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
GainProfile_D1.pdf	DU1	NGSO Antenna Gain Data	PDF file (*.pdf)	Gain pattern for Phase I array antenna, space-to-earth (10.7 - 12.75GHz). R. F. technical narrative. Plots of azimuth = 0 and elevation = 0 contours.
GainProfile_D2.pdf	DU1	NGSO Antenna Gain Data	PDF file (*.pdf)	Predicted gain pattern for Phase II & III (10.7 - 12.75). Graph shows peak cumulative gain, as steerable antenna permits dynamic steering across "phi" angles.
GainProfile_D1.pdf	DG1	NGSO Antenna Gain Data	PDF file (*.pdf)	Gain pattern for Phase I array antenna, space-to-earth (10.7 - 12.75GHz). R. F. technical narrative. Plots of azimuth = 0 and elevation = 0 contours.
GainProfile_D2.pdf	DG1	NGSO Antenna Gain Data	PDF file (*.pdf)	Predicted gain pattern for Phase II & III (10.7 - 12.75). Graph shows peak cumulative gain, as steerable antenna permits dynamic steering across "phi" angles.
GainProfile_U1.pdf	UG1	NGSO Antenna Gain Data	PDF file (*.pdf)	Gain pattern for Phase I array antenna, earth-to-space (14.0 - 14.50GHz). R.F. technical narrative. Plots of azimuth = 0 and elevation = 0 contours.
GainProfile_U1.pdf	UU1	NGSO Antenna Gain Data	PDF file (*.pdf)	Gain pattern for Phase I array antenna, earth-to-space (14.0 - 14.50GHz). R.F. technical narrative. Plots of azimuth = 0 and elevation = 0 contours.

