



312 File Number: **SATAMD2017030100029**

Filing Description

Question	Response
Description	Theia Satellite Network - V-Band Modification

Satellite Information

Question	Response
Select Orbit Type	NGSO
Space Station or Satellite Network Name	USASAT NGSO-4MOD
Estimated Lifetime of Satellite(s) From Date of Launch	12 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
Fixed-Satellite Service		37500.0 MHz -42000.0 MHz	Transmit
Fixed-Satellite Service		42000.0 MHz -42500.0 MHz	Transmit
Fixed-Satellite Service		47200.0 MHz -50200.0 MHz	Receive
Fixed-Satellite Service		50400.0 MHz -51400.0 MHz	Receive

**Orbital
Information For
Non-
Geostationary
Satellites**

Question	Response
Total Number of Satellites in the active constellation	120
Orbit Epoch Date	01/01/2018
Celestial Reference Body	Earth

Orbital Plane 1:

Question	Response
Number of Satellites in Plane	14
Inclination Angle	98.6047 degrees
Right Ascension of Ascending Node	203.806 degrees
Argument of Perigee	90.0 degrees
Orbital Period	6053.0 seconds
Apogee	809.0 km
Perigee	791.0 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	4.392
2	30.106
3	338.677
4	312.963
5	287.249
6	261.535
7	235.82
8	210.106
9	184.392
10	55.82
11	81.535

12	107.249
13	132.963
14	158.677

Orbital Plane 2:

Question	Response
Number of Satellites in Plane	1
Inclination Angle	98.3985 degrees
Right Ascension of Ascending Node	15.299 degrees
Argument of Perigee	90.0 degrees
Orbital Period	5989.0 seconds
Apogee	750.0 km
Perigee	750.0 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	0.0

Orbital Plane 3:

Question	Response
Number of Satellites in Plane	1
Inclination Angle	98.3985 degrees
Right Ascension of Ascending Node	350.8 degrees
Argument of Perigee	90.0 degrees

Orbital Period	5989.0 seconds
Apogee	750.0 km
Perigee	750.0 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	0.0

Orbital Plane 4:

Question	Response
Number of Satellites in Plane	1
Inclination Angle	98.3985 degrees
Right Ascension of Ascending Node	326.301 degrees
Argument of Perigee	90.0 degrees
Orbital Period	5989.0 seconds
Apogee	750.0 km
Perigee	750.0 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	0.0

Orbital Plane 5:

Question	Response
Number of Satellites in Plane	1
Inclination Angle	98.3985 degrees
Right Ascension of Ascending Node	301.802 degrees
Argument of Perigee	90.0 degrees
Orbital Period	5989.0 seconds
Apogee	750.0 km
Perigee	750.0 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	0.0

Orbital Plane 6:

Question	Response
Number of Satellites in Plane	1
Inclination Angle	98.3985 degrees
Right Ascension of Ascending Node	277.303 degrees
Argument of Perigee	90.0 degrees
Orbital Period	5989.0 seconds
Apogee	750.0 km
Perigee	750.0 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	0.0

Orbital Plane 7:

Question	Response
Number of Satellites in Plane	1
Inclination Angle	98.3985 degrees
Right Ascension of Ascending Node	252.804 degrees
Argument of Perigee	90.0 degrees
Orbital Period	5989.0 seconds
Apogee	750.0 km
Perigee	750.0 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	0.0

Orbital Plane 8:

Question	Response
Number of Satellites in Plane	1

Inclination Angle	98.3985 degrees
Right Ascension of Ascending Node	228.305 degrees
Argument of Perigee	90.0 degrees
Orbital Period	5989.0 seconds
Apogee	750.0 km
Perigee	750.0 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	0.0

Orbital Plane 9:

Question	Response
Number of Satellites in Plane	1
Inclination Angle	98.3985 degrees
Right Ascension of Ascending Node	203.806 degrees
Argument of Perigee	90.0 degrees
Orbital Period	5989.0 seconds
Apogee	750.0 km
Perigee	750.0 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	0.0

Orbital Plane 10:

Question	Response
Number of Satellites in Plane	14
Inclination Angle	98.6047 degrees
Right Ascension of Ascending Node	15.299 degrees
Argument of Perigee	90.0 degrees
Orbital Period	6053.0 seconds
Apogee	809.0 km
Perigee	791.0 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	69.144
2	94.858
3	120.573
4	146.287
5	172.001
6	197.715
7	223.43
8	249.144

9	274.858
10	300.573
11	326.287
12	352.001
13	17.715
14	43.43

Orbital Plane 11:

Question	Response
Number of Satellites in Plane	14
Inclination Angle	98.6047 degrees
Right Ascension of Ascending Node	350.8 degrees
Argument of Perigee	90.0 degrees
Orbital Period	6053.0 seconds
Apogee	809.0 km
Perigee	791.0 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	52.558
2	78.272
3	103.987
4	129.701
5	155.415

6	181.129
7	206.844
8	232.558
9	258.272
10	283.987
11	309.701
12	335.415
13	1.129
14	26.844

Orbital Plane 12:

Question	Response
Number of Satellites in Plane	14
Inclination Angle	98.6047 degrees
Right Ascension of Ascending Node	326.301 degrees
Argument of Perigee	90.0 degrees
Orbital Period	6053.0 seconds
Apogee	809.0 km
Perigee	791.0 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	61.663
2	87.377

3	113.092
4	138.806
5	164.52
6	190.234
7	215.949
8	241.663
9	267.377
10	293.092
11	318.806
12	344.52
13	10.234
14	35.949

Orbital Plane 13:

Question	Response
Number of Satellites in Plane	14
Inclination Angle	98.6047 degrees
Right Ascension of Ascending Node	301.802 degrees
Argument of Perigee	90.0 degrees
Orbital Period	6053.0 seconds
Apogee	809.0 km
Perigee	791.0 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	45.075
2	70.789
3	96.504
4	122.218
5	147.932
6	173.646
7	199.361
8	225.075
9	250.789
10	276.504
11	302.218
12	327.932
13	353.646
14	19.361

Orbital Plane 14:

Question	Response
Number of Satellites in Plane	14
Inclination Angle	98.6047 degrees
Right Ascension of Ascending Node	277.303 degrees
Argument of Perigee	90.0 degrees
Orbital Period	6053.0 seconds
Apogee	809.0 km
Perigee	791.0 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	54.181
2	79.895
3	105.61
4	131.324
5	157.038
6	182.752
7	208.467
8	234.181
9	259.895
10	285.61
11	311.324
12	337.038
13	2.752
14	28.467

Orbital Plane 15:

Question	Response
Number of Satellites in Plane	14
Inclination Angle	98.6047 degrees
Right Ascension of Ascending Node	252.804 degrees
Argument of Perigee	90.0 degrees
Orbital Period	6053.0 seconds

Apogee	809.0 km
Perigee	791.0 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	37.591
2	63.305
3	89.02
4	114.734
5	140.448
6	166.162
7	191.877
8	217.591
9	243.305
10	269.02
11	294.734
12	320.448
13	346.162
14	11.877

Orbital Plane 16:

Question	Response
Number of Satellites in Plane	14
Inclination Angle	98.6047 degrees

Right Ascension of Ascending Node	228.305 degrees
Argument of Perigee	90.0 degrees
Orbital Period	6053.0 seconds
Apogee	809.0 km
Perigee	791.0 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	46.698
2	72.412
3	98.127
4	123.841
5	149.555
6	175.269
7	200.984
8	226.698
9	252.412
10	278.127
11	303.841
12	329.555
13	355.269
14	20.984

Receiving Beams 1:

Question	Response
Beam ID	GUL4
Receive Beam Frequency	47200.0 MHz -50200.0 MHz
Beam Type	Steerable
Polarization	LHCP
Peak Gain	40.72 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	12.59 dB/K
Min. Saturation Flux Density	-81.76 dBW/m2
Max. Saturation Flux Density	-72.22 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	XAX

Receiving Beams 2:

Question	Response
Beam ID	GUL5
Receive Beam Frequency	50400.0 MHz -51400.0 MHz
Beam Type	Steerable
Polarization	LHCP
Peak Gain	41.1 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	12.98 dB/K
Min. Saturation Flux Density	-86.38 dBW/m2
Max. Saturation Flux Density	-76.84 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	XAX

Receiving Beams 3:

Question	Response
Beam ID	GUR4
Receive Beam Frequency	47200.0 MHz -50200.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	40.72 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	12.59 dB/K
Min. Saturation Flux Density	-81.76 dBW/m2
Max. Saturation Flux Density	-72.22 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	XAX

Receiving

Beams 4:

Question	Response
Beam ID	GUR5
Receive Beam Frequency	50400.0 MHz -51400.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	41.1 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	12.98 dB/K
Min. Saturation Flux Density	-86.38 dBW/m ²
Max. Saturation Flux Density	-76.84 dBW/m ²
Co- or Cross Polar Mode	C
Service Area Description	XAX

**Receiving
Channels (3)**

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
GU5	1500.0	49450.0	Feeder Link
GU6	1000.0	50900.0	Feeder Link
GU4	1500.0	47950.0	Feeder Link

Transmitting Beams 1:

Question	Response
Beam ID	GTR7
Transmit Beam Frequency	37500.0 MHz -42000.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	38.79 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
Max. Transmit EIRP Density	-46.14 dBW/Hz
Max. Transmit EIRP	50.06 dBW
Co- or Cross Polar Mode	C
Service Area Description	XAX

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):
1.0 MHz	-139.4	-126.4	-123.3	-122.1	-121.0	-115.2

Transmitting Beams 2:

Question	Response
Beam ID	GTR8
Transmit Beam Frequency	42000.0 MHz -42500.0 MHz

Beam Type	Steerable
Polarization	RHCP
Peak Gain	38.79 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
Max. Transmit EIRP Density	-46.14 dBW/Hz
Max. Transmit EIRP	50.06 dBW
Co- or Cross Polar Mode	C
Service Area Description	XAX

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:
1.0 MHz	-139.4	-126.4	-123.3	-122.1	-121.0	-115.2

Transmitting Beams 3:

Question	Response
Beam ID	GTL7
Transmit Beam Frequency	37500.0 MHz -42000.0 MHz
Beam Type	Steerable
Polarization	LHCP
Peak Gain	38.79 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
Max. Transmit EIRP Density	-46.14 dBW/Hz
Max. Transmit EIRP	50.06 dBW
Co- or Cross Polar Mode	C
Service Area Description	XAX

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:
1.0 MHz	-139.4	-126.4	-123.3	-122.1	-121.0	-115.2

Transmitting Beams 4:

Question	Response
Beam ID	GTL8
Transmit Beam Frequency	42000.0 MHz -42500.0 MHz
Beam Type	Steerable
Polarization	LHCP
Peak Gain	38.79 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
Max. Transmit EIRP Density	-46.14 dBW/Hz

Max. Transmit EIRP	50.06 dBW
Co- or Cross Polar Mode	C
Service Area Description	XAX

Max. Power Flux Density

	* 0° - 5° (dBW/m ²)	* 5° - 10° (dBW/m ²)	* 10° - 15° (dBW/m ²)	* 15° - 20° (dBW/m ²)	* 20° - 25° (dBW/m ²)	* 25° - 90° (dBW/m ²)
BW:	/BW):	/BW):	/BW):	/BW):	/BW):	/BW):
1.0 MHz	-139.4	-126.4	-123.3	-122.1	-121.0	-115.2

Transmitting Channels (3)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
GD7	2500.0	38750.0	Feeder Link
GD9	500.0	42250.0	Feeder Link
GD8	2000.0	41000.0	Feeder 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
<u>GTL7-Contour.gxt</u>	GTL7	NGSO Antenna Gain Data	GXT file (*.gxt)	Beam contour projection for beam pointing in the nadir direction.
<u>GTL8-Contour.gxt</u>	GTL8	NGSO Antenna Gain Data	GXT file (*.gxt)	Beam contour projection for beam pointing in the nadir direction.
<u>GTR7-Contour.gxt</u>	GTR7	NGSO Antenna Gain Data	GXT file (*.gxt)	Beam contour projection for beam pointing in the nadir direction.
<u>GTR8-Contour.gxt</u>	GTR8	NGSO Antenna Gain Data	GXT file (*.gxt)	Beam contour projection for beam pointing in the nadir direction.
<u>GUL4-Contour.gxt</u>	GUL4	NGSO Antenna Gain Data	GXT file (*.gxt)	Beam contour projection for beam pointing in the nadir direction.
<u>GUL5-Contour.gxt</u>	GUL5	NGSO Antenna Gain Data	GXT file (*.gxt)	Beam contour projection for beam pointing in the nadir direction.
<u>GUR4-Contour.gxt</u>	GUR4	NGSO Antenna Gain Data	GXT file (*.gxt)	Beam contour projection for beam pointing in the nadir direction.
<u>GUR5-Contour.gxt</u>	GUR5	NGSO Antenna Gain Data	GXT file (*.gxt)	Beam contour projection for beam pointing in the nadir direction.
<u>GTL7-Coverage.gxt</u>	GTL7	NGSO Antenna Gain Data	GXT file (*.gxt)	Coverage map of beam scanned to all possible locations with a minimum elevation angle of 12 degrees.

<u>GTL8-Coverage.gxt</u>	GTL8	NGSO Antenna Gain Data	GXT file (*.gxt)	Coverage map of beam scanned to all possible locations with a minimum elevation angle of 12 degrees.
<u>GTR7-Coverage.gxt</u>	GTR7	NGSO Antenna Gain Data	GXT file (*.gxt)	Coverage map of beam scanned to all possible locations with a minimum elevation angle of 12 degrees.
<u>GTR8-Coverage.gxt</u>	GTR8	NGSO Antenna Gain Data	GXT file (*.gxt)	Coverage map of beam scanned to all possible locations with a minimum elevation angle of 12 degrees.
<u>GUL4-Coverage.gxt</u>	GUL4	NGSO Antenna Gain Data	GXT file (*.gxt)	Coverage map of beam scanned to all possible locations with a minimum elevation angle of 12 degrees.
<u>GUL5-Coverage.gxt</u>	GUL5	NGSO Antenna Gain Data	GXT file (*.gxt)	Coverage map of beam scanned to all possible locations with a minimum elevation angle of 12 degrees.
<u>GUR5-Coverage.gxt</u>	GUR5	NGSO Antenna Gain Data	GXT file (*.gxt)	Coverage map of beam scanned to all possible locations with a minimum elevation angle of 12 degrees.
<u>GUR4-Coverage.gxt</u>	GUR4	NGSO Antenna Gain Data	GXT file (*.gxt)	Coverage map of beam scanned to all possible locations with a minimum elevation angle of 12 degrees.