



312 File Number: **SATAMD2021102500134**

Filing Description

Question	Response
Description	R2 Space, LLC is a private company headquartered in Ann Arbor, MI hereby submits an Application for Spectrum to Operate a Private Remote Sensing Space System for eight XR satellites. This form represents an amended version of SAT-LOA-20200511-00042.

**Satellite
Information**

Question	Response
Select Orbit Type	NGSO
Space Station or Satellite Network Name	XR
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 (4)**

Nature of service	Description	Frequency Band(s)	Mode Type
Earth Exploration-Satellite Service		2086.836 MHz -2086.964 MHz	Receive
Earth Exploration-Satellite Service		2262.75 MHz -2264.25 MHz	Transmit
Earth Exploration-Satellite Service		8025.0 MHz -8400.0 MHz	Transmit
Earth Exploration-Satellite Service		9500.0 MHz -9800.0 MHz	Transmit

**Orbital
Information For
Non-
Geostationary
Satellites**

Question	Response
Total Number of Satellites in the active constellation	8
Orbit Epoch Date	01/24/2021
Celestial Reference Body	Earth

Orbital Plane 1:

Question	Response
Number of Satellites in Plane	2
Inclination Angle	97.6 degrees
Right Ascension of Ascending Node	82.0 degrees
Argument of Perigee	43.0 degrees
Orbital Period	5712.0 seconds
Apogee	541.0 km
Perigee	530.0 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	180.0

Orbital Plane 2:

Question	Response
Number of Satellites in Plane	2
Inclination Angle	97.7 degrees
Right Ascension of Ascending Node	0.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5400.0 seconds
Apogee	550.0 km
Perigee	550.0 km
Active Service Arc Begin Angle with respect to Ascending Node	180.0 degrees
Active Service Arc End Angle with respect to Ascending Node	180.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	0.0
2	180.0

Orbital Plane 3:

Question	Response
Number of Satellites in Plane	2
Inclination Angle	97.7 degrees
Right Ascension of Ascending Node	0.0 degrees
Argument of Perigee	0.0 degrees
Orbital Period	5400.0 seconds
Apogee	550.0 km
Perigee	550.0 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	180.0

Orbital Plane 4:

Question	Response
Number of Satellites in Plane	2
Inclination Angle	97.7 degrees
Right Ascension of Ascending Node	0.0 degrees

Argument of Perigee	0.0 degrees
Orbital Period	5400.0 seconds
Apogee	550.0 km
Perigee	550.0 km
Active Service Arc Begin Angle with respect to Ascending Node	0.0 degrees
Active Service Arc End Angle with respect to Ascending Node	90.0 degrees

Mean Anomaly For Each Satellite

Satellite Number	Mean Anomaly (degrees) at the Orbit Epoch Date
1	0.0
2	180.0

Receiving Beams 1:

Question	Response
Beam ID	Sup
Receive Beam Frequency	2086.836 MHz -2086.964 MHz
Beam Type	Fixed
Polarization	RHCP
Peak Gain	3.0 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	3.0 dB/K
Min. Saturation Flux Density	-200.0 dBW/m2
Max. Saturation Flux Density	-197.0 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	N/A

Receiving
Channels (1)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
Sup1	0.128	2086.9	TT&C

Transmitting
Beams 1:

Question	Response
Beam ID	PDL
Transmit Beam Frequency	8025.0 MHz -8400.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	16.0 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
Max. Transmit EIRP Density	-65.9 dBW/Hz
Max. Transmit EIRP	19.8 dBW
Co- or Cross Polar Mode	C
Service Area Description	N/A

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	-167.7	-166.0	-164.5	-163.0	-161.8	-155.6

Transmitting
Beams 2:

Question	Response
Beam ID	Sttc
Transmit Beam Frequency	2262.75 MHz -2264.25 MHz

Beam Type	Fixed
Polarization	RHCP
Peak Gain	3.0 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
Max. Transmit EIRP Density	-47.39 dBW/Hz
Max. Transmit EIRP	3.68 dBW
Co- or Cross Polar Mode	C
Service Area Description	N/A

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	-159.8	-158.1	-156.6	-155.2	-153.9	-147.7

Transmitting Beams 3:

Question	Response
Beam ID	SAR
Transmit Beam Frequency	9500.0 MHz -9800.0 MHz
Beam Type	Steerable
Polarization	V
Peak Gain	40.0 dBi
Antenna Pointing Error	0.1 degrees

Antenna Rotational Error	0.1 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	0.0 degrees
Max. Transmit EIRP Density	-7.101 dBW/Hz
Max. Transmit EIRP	77.67 dBW
Co- or Cross Polar Mode	C
Service Area Description	N/A

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	-108.9	-107.3	-105.7	-104.3	-103.1	-96.9

Transmitting
Channels (4)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
Xtx1	150.0	8300.0	Service Link
Xtx2	375.0	8212.5	Service Link
Sdwn	1.5	2263.5	TT&C
SAR	300.0	9650.0	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?	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?	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?	
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
2020 05 10 - Exhibit C - Antenna Beampatterns.pdf		NGSO Antenna Gain Data	PDF file (*.pdf)	