



312 File Number: **SATLOA2022021800020**

Filing Description

Question	Response
Description	Lockheed Martin Corporation Parsec

Satellite
Information

Question	Response
Select Orbit Type	NGSO
Space Station or Satellite Network Name	Parsec
Estimated Lifetime of Satellite(s) From Date of Launch	15 Years
Will the space station(s) operate on a Common Carrier basis?	No

**Operating
Frequency
Bands (10)**

Nature of service	Description	Frequency Band (s)	Mode Type
Other Satellite Service (please specify)	Lunar crosslink service	23150.0 MHz -23550.0 MHz	Receive
Other Satellite Service (please specify)	Lunar crosslink service	27000.0 MHz -27500.0 MHz	Transmit
Other Satellite Service (please specify)	Inter-Satellite Service	27000.0 MHz -27500.0 MHz	Receive
Other Satellite Service (please specify)	Inter-Satellite Service	23150.0 MHz -23550.0 MHz	Transmit
Space Research Service		25500.0 MHz -27000.0 MHz	Transmit
Space Research Service		22550.0 MHz -23150.0 MHz	Receive
Space Research Service		8450.0 MHz -8500.0 MHz	Transmit
Space Research Service		7190.0 MHz -7235.0 MHz	Receive
Space Research Service		2200.0 MHz -2290.0 MHz	Receive
Space Research Service		2025.0 MHz -2110.0 MHz	Transmit

**Orbital
Information For
Non-
Geostationary
Satellites**

Question	Response
Total Number of Satellites in the active constellation	2
Orbit Epoch Date	10/17/2023
Celestial Reference Body	Moon

Orbital Plane 1:

Question	Response
Number of Satellites in Plane	1
Inclination Angle	56.2 degrees
Right Ascension of Ascending Node	0.0 degrees
Argument of Perigee	90.0 degrees
Orbital Period	47520.0 seconds
Apogee	8729.0 km
Perigee	879.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-56.2 degrees
Active Service Arc End Angle with respect to Ascending Node	56.2 degrees

Mean Anomaly For Each Satellite

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

Orbital Plane 2:

Question	Response
Number of Satellites in Plane	1
Inclination Angle	56.2 degrees
Right Ascension of Ascending Node	0.0 degrees
Argument of Perigee	90.0 degrees
Orbital Period	47520.0 seconds
Apogee	8729.0 km
Perigee	879.0 km
Active Service Arc Begin Angle with respect to Ascending Node	-56.2 degrees

Active Service Arc End Angle with respect to Ascending Node	56.2 degrees
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Mean Anomaly For Each Satellite

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

Receiving Beams 1:

Question	Response
Beam ID	Kxr2
Receive Beam Frequency	23150.0 MHz -23550.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	42.0 dBi
Antenna Pointing Error	0.25 degrees
Antenna Rotational Error	0.25 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	10.77 dB/K
Min. Saturation Flux Density	-126.0 dBW/m2
Max. Saturation Flux Density	-106.1 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	Lunar

Receiving Beams 2:

Question	Response
Beam ID	KErx
Receive Beam Frequency	22550.0 MHz -23150.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	38.0 dBi
Antenna Pointing Error	0.25 degrees
Antenna Rotational Error	0.25 degrees

Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	10.77 dB/K
Min. Saturation Flux Density	-112.8 dBW/m2
Max. Saturation Flux Density	-106.8 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	Global

Receiving
Beams 3:

Question	Response
Beam ID	XErx
Receive Beam Frequency	7190.0 MHz -7235.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	32.0 dBi
Antenna Pointing Error	0.25 degrees
Antenna Rotational Error	0.25 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	5.0 dB/K
Min. Saturation Flux Density	-131.6 dBW/m2
Max. Saturation Flux Density	-119.4 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	Global

Receiving

Beams 4:

Question	Response
Beam ID	Kxrx
Receive Beam Frequency	27000.0 MHz -27500.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	44.0 dBi
Antenna Pointing Error	0.25 degrees
Antenna Rotational Error	0.25 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	15.8 dB/K
Min. Saturation Flux Density	-124.0 dBW/m2
Max. Saturation Flux Density	-104.1 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	Lunar service area.

Receiving Beams 5:

Question	Response
Beam ID	Sxrx
Receive Beam Frequency	2200.0 MHz -2290.0 MHz
Beam Type	Fixed
Polarization	RHCP
Peak Gain	16.0 dBi
Antenna Pointing Error	0.25 degrees
Antenna Rotational Error	0.25 degrees
Polarization Switchable	

Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
G/T at Max. Gain Point	-11.1 dB/K
Min. Saturation Flux Density	-133.9 dBW/m2
Max. Saturation Flux Density	-128.2 dBW/m2
Co- or Cross Polar Mode	C
Service Area Description	Lunar service area.

Receiving
Channels (5)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
Ka6	114.3	23350.0	Service Link
S2	0.3	2245.0	Service Link
Ka2	45.714	22750.0	Service Link
Ka4	114.3	27250.0	Service Link
X2	1.14	7205.0	TT&C

Transmitting
Beams 1:

Question	Response
Beam ID	Sctx
Transmit Beam Frequency	2025.0 MHz -2110.0 MHz
Beam Type	Fixed
Polarization	RHCP
Peak Gain	16.0 dBi
Antenna Pointing Error	0.25 degrees
Antenna Rotational Error	0.25 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-29.9 dBW/Hz
Max. Transmit EIRP	17.0 dBW
Co- or Cross Polar Mode	C
Service Area Description	Lunar, relaying data to users on the Lunar surface

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	-190.8	-190.8	-190.8	-190.8	-190.8	-190.8

Transmitting
Beams 2:

Question	Response
Beam ID	Kctx
Transmit Beam Frequency	23150.0 MHz -23550.0 MHz

Beam Type	Steerable
Polarization	RHCP
Peak Gain	42.0 dBi
Antenna Pointing Error	0.25 degrees
Antenna Rotational Error	0.25 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-29.5 dBW/Hz
Max. Transmit EIRP	46.5 dBW
Co- or Cross Polar Mode	C
Service Area Description	Lunar service area

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):
1.0 MHz	-151.4	-151.4	-151.4	-151.4	-151.4	-151.4

Transmitting Beams 3:

Question	Response
Beam ID	Kxt2
Transmit Beam Frequency	27000.0 MHz -27500.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	44.0 dBi
Antenna Pointing Error	0.25 degrees

Antenna Rotational Error	0.25 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-31.6 dBW/Hz
Max. Transmit EIRP	49.0 dBW
Co- or Cross Polar Mode	C
Service Area Description	Lunar

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):
1.0 MHz	-153.4	-153.4	-153.4	-153.4	-153.4	-153.4

Transmitting Beams 4:

Question	Response
Beam ID	KEtx
Transmit Beam Frequency	25500.0 MHz -27000.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	44.0 dBi
Antenna Pointing Error	0.25 degrees
Antenna Rotational Error	0.25 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-31.6 dBW/Hz

Max. Transmit EIRP	49.0 dBW
Co- or Cross Polar Mode	C
Service Area Description	Global

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):
* BW:						
1.0 MHz	-153.4	-153.4	-153.4	-153.4	-153.4	-153.4

**Transmitting
Beams 5:**

Question	Response
Beam ID	XEtx
Transmit Beam Frequency	8450.0 MHz -8500.0 MHz
Beam Type	Steerable
Polarization	RHCP
Peak Gain	33.0 dBi
Antenna Pointing Error	0.25 degrees
Antenna Rotational Error	0.25 degrees
Polarization Switchable	
Polarization Alignment Relative to the Equatorial Plane	45.0 degrees
Max. Transmit EIRP Density	-26.6 dBW/Hz
Max. Transmit EIRP	34.0 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	-172.4	-172.4	-172.4	-172.4	-172.4	-172.4

Transmitting
Channels (5)

Channel ID	Channel Bandwidth (MHz)	Center Frequency s (MHz)	Feeder Link, Service Link or TT&C
Ka5	114.3	27250.0	Service Link
S1	0.3	2067.0	Service Link
Ka1	114.3	26000.0	Service Link
Ka3	45.7	23350.0	Service Link
X1	1.143	8466.0	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?	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?	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>XErx_Gain.txt</u>	XErx	NGSO Antenna Gain Data	Text file (*.txt)	The X Receive from Earth antenna pattern is a pencil beam with a peak gain of 32 dBic and a 1.5 deg half-power-beam-width. Theta (cone) Angle is the 1st column, and gain for a single phi cut is the second.
<u>Srxr_Gain.txt</u>	Srxr	NGSO Antenna Gain Data	Text file (*.txt)	The S Receive from the Moon antenna pattern is a single directive lobe with a peak gain of 16 dBic and a 16 deg half-power-beam-width. Theta (cone) Angle is the 1st column, and subsequent columns are Phi (clock) angle slices.
<u>Krxr_Gain.txt</u>	Krxr	NGSO Antenna Gain Data	Text file (*.txt)	The Ka Receive from Moon antenna pattern is a pencil beam with a peak gain of 44 dBic and a 0.5 deg half-power-beam-width. Theta (cone) Angle is the 1st column, and subsequent columns are Phi (clock) angle slices.
<u>KEtx_Gain.txt</u>	KEtx	NGSO Antenna Gain Data	Text file (*.txt)	The Ka Transmit to Earth antenna pattern is a pencil beam with a peak gain of 44 dBic and a 0.5 deg half-power-beam-width. Theta (cone) Angle is the 1st column, and subsequent columns are Phi (clock) angle slices.
<u>XEtx_Gain.txt</u>	XEtx	NGSO Antenna Gain Data	Text file (*.txt)	The X Transmit to Earth antenna pattern is a pencil beam with a peak gain of 33 dBic and a 1.5 deg half-power-beam-width. Theta (cone) Angle is the 1st column, and gain for a single phi cut is the second.

<u>Sctx_Gain.txt</u>	Sctx	NGSO Antenna Gain Data	Text file (*.txt)	The S Transmit to the Moon antenna pattern is a single directive lobe with a peak gain of 16 dBic and a 16 deg half-power-beam-width. Theta (cone) Angle is the 1st column, and subsequent columns are Phi (clock) angle slices.
<u>Kctx_Gain.txt</u>	Kctx	NGSO Antenna Gain Data	Text file (*.txt)	The Ka Transmit to Moon antenna pattern is a pencil beam with a peak gain of 42 dBic and a 0.5 deg half-power-beam-width. Theta (cone) Angle is the 1st column, and subsequent columns are Phi (clock) angle slices.
<u>Parsec_GXT.mdb</u>		Service Area Diagram	GIMS file (*.mdb)	Parsec GXT files (ITU GIMS format)
<u>KErx_Gain.txt</u>	KErx	NGSO Antenna Gain Data	Text file (*.txt)	The Ka Receive from Earth antenna pattern is a pencil beam with a peak gain of 38 dBic and a 0.6 deg half-power-beam-width. Theta (cone) Angle is the 1st column, and subsequent columns are Phi (clock) angle slices.