NTIA Space record data form RAY Satellite

NTIA requires the following data for space related experiments using government shared spectrum. For each transmit frequency, please provide the data for both ends of the transmit-receive link. Use Part A to describe the satellite to ground information. Part B is for all ground to space transmit links. RAY carries an S Band Transceiver Space to 3 Ground Stations, and an Iridium Transceiver Space to Space.

Part A: Space to Earth Downlink Data

Satellite Transmitter Data S Band Down

Satellite Name: RA	1	
Data Field	Data Answer	Description/Comments
Transmit Power (PWR)	PWR = 0.33 W PWR01 W1	TRANSMIT POWER SUPPLIED TO THE ANTENNA INPUT TERMINAL, EXAMPLE, PWR01 W2 TRANSMIT POWER UNITS INCLUDE: W = WATT, K = KILOWATT, M = MEGAWATT
Necessary Bandwidth	512 kHz	THE WIDTH OF FREQUENCY BAND WHICH IS JUST SUFFICIENT TO SUCCESSFULLY TRANSFER DATA. FORMULAS CAN BE FOUND IN ANNEX J OF THE NTIA MANUAL.
RF Emissions Data		2-SIDED EMISSION BANDWIDTH VALUES
-3 dB bandwidth	512 kHz	
-20 dB bandwidth	NA	
-40 dB bandwidth	NA	
-60 dB bandwidth	NA	
Modulation Type	GMSK	THE METHOD USED TO SUPERIMPOSE DATA ON THE CARRIER, EXAMPLE, BPSK, QPSK, GMSK.
Data Rate	212 kbits/sec	INFORMATION DATA RATE
Forward Error Correction Coding	Is FEC used? Yes ⊠ No □ FEC Type: RS/CC, FEC Rate:2/5,	
Total Symbol Rate	512 ksymbols/sec	DATA RATE COMBINED WITH FEC AND FRAME OVERHEAD RESULTING IN THE TOTAL SYMBOL RATE AT THE INPUTE TO THE SYMBOL MAPPER/MODULATOR.
Does transmitter have a beacon mode?	Yes □ No ⊠	BEACON MODE IS NORMALLY CONSIDERED A REGULAR AND PERIODIC SHORT DURATION TRANSMISSION THAT IS OFTEN USED TO ASSIST WITH TRACKING, DOPPLER COMPENSATION, OR SMALL SATELLITE IDENTIFICATION WHOSE TRANSMISSIONS ARE NOT LIMITED TO DURATIONS WHEN SUPPORTING GROUND STATIONS ARE VISIBLE.
If transmitter has a beacon mode, can the beacon be	Yes 🗆 No 🗆	
commanded off?	NA	

		
Transmit Antenna	XAP = R	POLARIZATIONS INCLUDE:
Polarization (XAP)		H = HORIZONTAL,
		V = VERTICAL, S = HORIZONTAL AND VERTICAL,
		L = LEFT HAND CIRCULAR,
		R = RIGHT HAND CIRCULAR,
		T = RIGHT AND LEFT HAND CIRCULAR,
		J = LINEAR POLARIZATION
Transmit Antenna	XAZ = NB	NB= NARROWBEAM
Orientation (XAZ)		EC = EARTH COVERAGE
		NTIA FORMAT (XAD), EXAMPLE, FOR 16 DBI
Transmit Antenna	ANTENNA GAIN5.8,	ANTENNA GAIN AND 30 DEGREE BEAMWIDTH
Dimension (XAD)	BEAMWIDTH93,	XAD01 16G030B
	XAD =	
	XAD01 06G093B	
Type of catallite		CHOOSE EITHER:
Type of satellite	Type =	GEOSTATIONARY OR NONGEOSTATIONARY
(State = SPCE)	NONGEOSTATIONARY	
(City = Geo or		
Nongeo)		
Nongeoy		
For Coostationany	Longitudo -	IF ANY SATELLITES ARE GEOSTATIONARY, REPORT
For Geostationary	Longitude =	ITS LATITUDE AS 000000N (XLA AND/OR RLA) AND
Satellites		REPORT ITS LONGITUDE IN DDDMMSS FORMAT
		(XLG AND/OR RLG).
For	INCLINATION ANGLE 97.4 ,	IF ANY SATELLITES ARE NONGEOSTATIONARY,
Nongeostationary	APOGEE IN KILOMETERS 500 ,	REPORT ITS INCLINATION ANGLE, APOGEE
		IN KILOMETERS, PERIGEE IN KILOMETERS,
(Orbital Data)	PERIGEE IN KILOMETERS_500,	ORBITAL PERIOD IN HOURS AND FRACTIONS OF HOURS IN DECIMAL, THE NUMBER OF SATELLITES
	ORBITAL PERIOD IN HOURS _1AND	IN THE SYSTEM, THEN TO1, EXAMPLE,
	FRACTIONS OF HOURS IN	REM04
	DECIMAL57,	*ORB,98.0IN00510AP00510PE001.58H01NRT01,
	THE NUMBER OF SATELLITES IN THE	AND FOR SPACE-TO-SPACE
		COMMUNICATIONS WITH ANOTHER
	SYSTEM,	NONGEOSTATIONARY SATELLITE ADD AN
		ADDITIONAL
	ORB =	*ORB FOR IT ENDING IN R01, EXAMPLE, REM05
	ORB,97.4IN00500AP00500PE001.57H01NRT01	*ORB,72.9IN03209AP00655PE013.46H01NRR01
For	Mean Local Time of Ascending Node	MLTAN IS THE ANGLE BETWEEN AN ORBIT'S
	-	ASCENDING NODE AND THE MEAN SUN, OFTEN
SunSynchronous	(MLTAN) =1030	EXPRESSED AS UNIT OF TIME (HH:MM)
Nongeostationary		
Orbits		
Farth Station Data	a (Receiver) at Each Earth Station Locatio	on TROLL
State (RSC)	RSC = NORWAY	
City Name (RAL)	RAL = QUEEN MAUD LAND	
Latitude	Lat = 920010 S	
(DDMMSS)		
Longitude	Lon = 0023131 E	
(DDDMMSS)		
(ככואוואותתם)		

Receive Antenna	RAP = R	POLARIZATIONS INCLUDE:
Polarization (RAP)		H = HORIZONTAL,
		V = VERTICAL
		S = HORIZONTAL AND VERTICAL, L = LEFT HAND CIRCULAR,
		R = RIGHT HAND CIRCULAR,
		T = RIGHT AND LEFT HAND CIRCULAR,
		J = LINEAR POLARIZATION
Receive Antenna	RAZ =	THE EARTH STATION RECEIVER ANTENNA
Orientation (RAZ)	RAZ01 V00	MINIMUM OPERATING ANGLE OF ELEVATION (RAZ), V00 TO V90, EXAMPLE, RAZ01
		V00
Receive Antenna	ANTENNA GAIN,	EXAMPLE ASSUMING NONGEOSTATIONARY, 16
Dimensions (RAD)	BEAMWIDTH 2.5,	DBI GAIN, 30 DEGREE BEAMWIDTH, AZIMUTHAL
Dimensions (NAD)		RANGE FROM 001-360, SITE ELEVATION OF 357
	AZIMUTHAL RANGE001-360,	METERS, AND ANTENNA HEIGHT ABOVE TERRAIN OF 6 METERS:
	THE SITE ELEVATION ABOVE MEAN SEA	RAD01 16G030B001-360A00357H006
	LEVEL IN METERS1365,	
	THE ANTENNA HEIGHT ABOVE TERRAIN	
	IN METERS4,	
	RAD =	
	RAD01 35G003B001-360A01365H004	
Receive Antenna	ANTENNA DIAMETER3.7,	
Additional	ANTENNA EFFICIENCY40,	
Information (For		
Parabolic		
Antennas)		
Number of	2	NUMBER OF TIMES THE SATELLITE WILL
Satellite Contacts	2	COMMUNICATE WITH THE EARTH STATION IN THE
		SPACE TO EARTH DIRECTION (DOWNLINKS) EACH
Supported Per		DAY
Day		AVERAGE DURATION OF EACH CONTACT
Expected	9 MINUTES	AVERAGE DORATION OF EACH CONTACT
Duration of Each		
Contact		
Supported	Satellite Health and Status Data $oxtimes$	SATELLITE HEALTH AND STATUS TELEMETRY AND/OR MISSION PAYLOAD DATA
Operations	Mission Payload Data 🛛	AND/OR MISSION PATEORD DATA
FCC notes:		
1. Use S-Note	e S945.	
2. REM AGN, I	RAY	

Earth Station Data	a (Receiver) at Each Earth Station Locati	ion SVALBARD
State (RSC)	RSC = NORWAY	
City Name (RAL)	RAL = SVALBARD	
Latitude (DDMMSS)	Lat = 781353 N	
Longitude (DDDMMSS)	Lon = 0152440 E	
Receive Antenna Polarization (RAP)	RAP = R	POLARIZATIONS INCLUDE: H = HORIZONTAL, V = VERTICAL, S = HORIZONTAL AND VERTICAL, L = LEFT HAND CIRCULAR, R = RIGHT HAND CIRCULAR, T = RIGHT AND LEFT HAND CIRCULAR, J = LINEAR POLARIZATION
Receive Antenna Orientation (RAZ)	RAZ = RAZ01 V00	THE EARTH STATION RECEIVER ANTENNA MINIMUM OPERATING ANGLE OF ELEVATION (RAZ), V00 TO V90, EXAMPLE, RAZ01 V00
Receive Antenna Dimensions (RAD)	ANTENNA GAIN34.66, BEAMWIDTH2.5, AZIMUTHAL RANGE001-360, THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS484, THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS4, RAD =	EXAMPLE ASSUMING NONGEOSTATIONARY, 16 DBI GAIN, 30 DEGREE BEAMWIDTH, AZIMUTHAL RANGE FROM 001-360, SITE ELEVATION OF 357 METERS, AND ANTENNA HEIGHT ABOVE TERRAIN OF 6 METERS: RAD01 16G030B001-360A00357H006
	RAD = RAD01 35G003B001-360A00484H004	
Receive Antenna Additional Information (For Parabolic Antennas)	ANTENNA DIAMETER3.7, ANTENNA EFFICIENCY40,	
Number of Satellite Contacts Supported Per Day	1	NUMBER OF TIMES THE SATELLITE WILL COMMUNICATE WITH THE EARTH STATION IN THE SPACE TO EARTH DIRECTION (DOWNLINKS) EACH DAY
Expected Duration of Each Contact	9 MINUTES	AVERAGE DURATION OF EACH CONTACT
Supported Operations	Satellite Health and Status Data ⊠ Mission Payload Data ⊠	SATELLITE HEALTH AND STATUS TELEMETRY AND/OR MISSION PAYLOAD DATA
FCC notes: 1. Use S-Note 2. REM AGN, I		

	a (Receiver) at Each Earth Station Locati	
State (RSC)	RSC = CHILE	
City Name (RAL)	RAL = PUNTA ARENAS	
Latitude	Lat = 525611 S	
(DDMMSS)		
Longitude	Lon = 0705212 W	
(DDDMMSS)		
Receive Antenna Polarization (RAP)	RAP = R	POLARIZATIONS INCLUDE: H = HORIZONTAL, V = VERTICAL, S = HORIZONTAL AND VERTICAL, L = LEFT HAND CIRCULAR, R = RIGHT HAND CIRCULAR, T = RIGHT AND LEFT HAND CIRCULAR, J = LINEAR POLARIZATION
Receive Antenna Orientation (RAZ)	RAZ = RAZ01 V00	THE EARTH STATION RECEIVER ANTENNA MINIMUM OPERATING ANGLE OF ELEVATION (RAZ), V00 TO V90, EXAMPLE, RAZ01 V00
Receive Antenna Dimensions (RAD)	ANTENNA GAIN34.66, BEAMWIDTH2.5, AZIMUTHAL RANGE001-360, THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS186, THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS4, RAD = RAD01 35G003B001-360A00186H004	EXAMPLE ASSUMING NONGEOSTATIONARY, 16 DBI GAIN, 30 DEGREE BEAMWIDTH, AZIMUTHAL RANGE FROM 001-360, SITE ELEVATION OF 357 METERS, AND ANTENNA HEIGHT ABOVE TERRAIN OF 6 METERS: RAD01 16G030B001-360A00357H006
Receive Antenna Additional Information (For Parabolic Antennas)	ANTENNA DIAMETER3.7, ANTENNA EFFICIENCY40,	
Number of Satellite Contacts Supported Per Day	2	NUMBER OF TIMES THE SATELLITE WILL COMMUNICATE WITH THE EARTH STATION IN THE SPACE TO EARTH DIRECTION (DOWNLINKS) EACH DAY
Expected Duration of Each Contact	9 MINUTES	AVERAGE DURATION OF EACH CONTACT
Supported Operations	Satellite Health and Status Data $oxtimes$ Mission Payload Data $oxtimes$	SATELLITE HEALTH AND STATUS TELEMETRY AND/OR MISSION PAYLOAD DATA
FCC notes: 1. Use S-Note 2. REM AGN, I		

Space to Space Downlink Data

Transmit from RAY to Iridium Constellation

Satellite Transmitter Data

	cies: 174 Channels, range from low end of lc MHz to high end of high channel 1626.5 MH 1.6667 kHz.	
Satellite Name: RAY		
Data Field	Data Answer	Description/Comments
Transmit Power (PWR)	PWR = 1.4W PWR01 W1	TRANSMIT POWER SUPPLIED TO THE ANTENNA INPUT TERMINAL, EXAMPLE, PWR01 W2 TRANSMIT POWER UNITS INCLUDE: W = WATT, K = KILOWATT, M = MEGAWATT
Necessary Bandwidth	35 kHz	THE WIDTH OF FREQUENCY BAND WHICH IS JUST SUFFICIENT TO SUCCESSFULLY TRANSFER DATA. FORMULAS CAN BE FOUND IN ANNEX J OF THE NTIA MANUAL.
RF Emissions Data		2-SIDED EMISSION BANDWIDTH VALUES
-3 dB bandwidth	35 kHz	
-20 dB bandwidth	NA	
-40 dB	NA	
bandwidth		
-60 dB bandwidth	NA	
Modulation Type	DQPSK	THE METHOD USED TO SUPERIMPOSE DATA ON THE CARRIER, EXAMPLE, BPSK, QPSK, GMSK.
Data Rate	50 kbps	INFORMATION DATA RATE
Forward Error	Is FEC used? Yes ⊠ No □	
Correction	FEC Type:BCH(32,21),	
Coding	FEC Rate:50 kbps,	
Total Symbol Rate	25 ksps	DATA RATE COMBINED WITH FEC AND FRAME OVERHEAD RESULTING IN THE TOTAL SYMBOL RATE AT THE INPUTE TO THE SYMBOL MAPPER/MODULATOR.
Does transmitter have a beacon mode?	Yes □ No ⊠	BEACON MODE IS NORMALLY CONSIDERED A REGULAR AND PERIODIC SHORT DURATION TRANSMISSION THAT IS OFTEN USED TO ASSIST WITH TRACKING, DOPPLER COMPENSATION, OR SMALL SATELLITE IDENTIFICATION WHOSE TRANSMISSIONS ARE NOT LIMITED TO DURATIONS WHEN SUPPORTING GROUND STATIONS ARE VISIBLE.

If two none it to n have		
If transmitter has a beacon mode, can the beacon be commanded off?	Yes 🗆 No 🗔	
Polarization (XAP)	XAP = XAP01 R	POLARIZATIONS INCLUDE : H = HORIZONTAL, V = VERTICAL, S = HORIZONTAL AND VERTICAL, L = LEFT HAND CIRCULAR, R = RIGHT HAND CIRCULAR, T = RIGHT AND LEFT HAND CIRCULAR, J = LINEAR POLARIZATION
Transmit Antenna Orientation (XAZ)	XAZ = XAZ01 NB	NB= NARROWBEAM EC = EARTH COVERAGE
Transmit Antenna Dimension (XAD)	ANTENNA GAIN5 BEAMWIDTH90 XAD = XAD01 05G090B	(NTIA format (XAD), EXAMPLE, XAD01 16G030B)
Type of satellite (State = SP) (City = geo or non)	Type = non	Choose either: Geostationary or Nongeostationary
For Geostationary	Longitude =	IF ANY SATELLITES ARE GEOSTATIONARY, REPORT ITS LATITUDE AS 000000N (XLA AND/OR RLA) AND REPORT ITS LONGITUDE (XLG AND/OR RLG).
For Nongeostationary (Orbital Data)	INCLINATION ANGLE97.4, APOGEE IN KILOMETERS500, PERIGEE IN KILOMETERS500, ORBITAL PERIOD IN HOURS _1AND FRACTIONS OF HOURS IN DECIMAL57, THE NUMBER OF SATELLITES IN THE SYSTEM, For Iridium constellation: INCLINATION ANGLE86.4, APOGEE IN KILOMETERS780, PERIGEE IN KILOMETERS780, PERIGEE IN KILOMETERS780, ORBITAL PERIOD IN HOURS _1AND FRACTIONS OF HOURS IN DECIMAL73, THE NUMBER OF SATELLITES IN THE SYSTEM66, ORB = ORB,97.4IN00500AP00500PE001.57H01NRT01 ORB,86.4IN00780AP00780PE001.73H66NRR01	IF ANY SATELLITES ARE NONGEOSTATIONARY, REPORT ITS INCLINATION ANGLE, APOGEE IN KILOMETERS, PERIGEE IN KILOMETERS, ORBITAL PERIOD IN HOURS AND FRACTIONS OF HOURS IN DECIMAL, THE NUMBER OF SATELLITES IN THE SYSTEM, THEN T01, EXAMPLE, REM04 *ORB,98.0IN00510AP00510PE001.58H01NRT01, AND FOR SPACE-TO-SPACE COMMUNICATIONS WITH ANOTHER NONGEOSTATIONARY SATELLITE ADD AN ADDITIONAL *ORB FOR IT ENDING IN R01, EXAMPLE, REM05 *ORB,72.9IN03209AP00655PE013.46H01NRT01

For SunSynchronous Nongeostationary Orbits	Mean Local Time of Ascending Node (MLTAN) = 1030	MLTAN IS THE ANGLE BETWEEN AN ORBIT'S ASCENDING NODE AND THE MEAN SUN, OFTEN EXPRESSED AS UNIT OF TIME (HH:MM)

FCC notes:

- 1. Use S-Note S945.
- 2. REM AGN, Cubesat, RAY

Receiver Data Iridium Satellite

Iridium Satellite Receive Specifications		
Receive Antenna Polarization (RAP)	RAP = RAP 01 R	POLARIZATIONS INCLUDE : H = HORIZONTAL, V = VERTICAL, S = HORIZONTAL AND VERTICAL, L = LEFT HAND CIRCULAR, R = RIGHT HAND CIRCULAR, T = RIGHT AND LEFT HAND CIRCULAR, J = LINEAR POLARIZATION
Azimuth (RAZ)	RAZ = NB	NB= NARROWBEAM EC = EARTH COVERAGE

Receive Antenna Dimension (RAD)	ANTENNA GAIN_20 BEAMWIDTH12 RAD = RAD01 20G012B	(NTIA format (RAD), EXAMPLE, RAD01 16G030B)
Type of satellite (State = SP) City = G/No	Type = Non	Choose either: Geostationary or Nongeostationary
For Geostationary	Longitude =	IF ANY SATELLITES ARE GEOSTATIONARY, REPORT ITS LATITUDE AS 000000N (XLA AND/OR RLA) AND REPORT ITS LONGITUDE (XLG AND/OR RLG).

For Nongeostationary (Orbital Data)	For RAY INCLINATION ANGLE97.4, APOGEE IN KILOMETERS500, PERIGEE IN KILOMETERS500, ORBITAL PERIOD IN HOURS _1AND FRACTIONS OF HOURS IN DECIMAL57, THE NUMBER OF SATELLITES IN THE SYSTEM, For Iridium constellation: INCLINATION ANGLE86.4, APOGEE IN KILOMETERS, PERIGEE IN KILOMETERS, PERIGEE IN KILOMETERS, ORBITAL PERIOD IN HOURS _1AND FRACTIONS OF HOURS IN DECIMAL73, THE NUMBER OF SATELLITES IN THE SYSTEM66, ORB = ORB,97.4IN00500AP00500PE001.57H01NRT01 ORB,86.4IN00780AP00780PE001.73H66NRR01	IF ANY SATELLITES ARE NONGEOSTATIONARY, REPORT ITS INCLINATION ANGLE, APOGEE IN KILOMETERS, PERIGEE IN KILOMETERS, ORBITAL PERIOD IN HOURS AND FRACTIONS OF HOURS IN DECIMAL, THE NUMBER OF SATELLITES IN THE SYSTEM, THEN T01, EXAMPLE, REM04 *ORB,98.0IN00510AP00510PE001.58H01NRT01, AND FOR SPACE-TO-SPACE COMMUNICATIONS WITH ANOTHER NONGEOSTATIONARY SATELLITE ADD AN ADDITIONAL *ORB FOR IT ENDING IN R01, EXAMPLE, REM05 *ORB,72.9IN03209AP00655PE013.46H01NRR01
Number of Satellite Contacts Supported Per Day	1	NUMBER OF TIMES THE SATELLITE WILL COMMUNICATE WITH THE EARTH STATION IN THE SPACE TO EARTH DIRECTION (DOWNLINKS) EACH DAY
Expected Duration of Each Contact	10 Seconds Max	AVERAGE DURATION OF EACH CONTACT
Supported Operations	Satellite Health and Status Data $oxtimes$ Mission Payload Data $oxtimes$	SATELLITE HEALTH AND STATUS TELEMETRY AND/OR MISSION PAYLOAD DATA
FCC notes: 3. Use S-Note 4. REM AGN,	e S945. Cubesat, RAY	

Part B: Ground Stations, Earth to Space link data:

Earth Station Transmitter Data (Required for Each Frequency at Each Earth Station Location)

3 Ground station Transmitters

TROLL

Transmit Frequency	/: 2029.5 MHz	
State (XSC)	XSC = NORWAY	
City Name (XAL)	XAL = QUEEN MAUD LAND	
Latitude	Lat = 920010 S	
(DDMMSS)		
Longitude	Lon = 0023131 E	
(DDDMMSS)		
		TRANSMIT POWER SUPPLIED TO THE ANTENNA
Transmit Power	PWR =	INPUT TERMINAL, EXAMPLE, PWR01 W2
(PWR)	PWR01 W10	TRANSMIT POWER UNITS INCLUDE:
		W = WATT,
		K = KILOWATT, M = MEGAWATT
Necessary	128 kHz	THE WIDTH OF FREQUENCY BAND WHICH IS JUST
Bandwidth		SUFFICIENT TO SUCCESSFULLY TRANSFER DATA.
Danawiath		FORMULAS CAN BE FOUND IN ANNEX J OF THE
RF Emissions Data		NTIA MANUAL. 2-SIDED EMISSION BANDWIDTH VALUES
	420.111	
-3 dB bandwidth	128 kHz	
-20 dB bandwidth	NA	
-40 dB bandwidth	NA	
-60 dB bandwidth	NA	
Modulation Type	GMSK	THE METHOD USED TO SUPERIMPOSE DATA ON THE CARRIER, EXAMPLE, BPSK, QPSK, GMSK.
Data Rate	53 kbits/sec	INFORMATION DATA RATE
Forward Error	Is FEC used? Yes $oxtimes$ No \Box	
Correction Coding	FEC Type:CC,	
5	FEC Rate:2/5,	
Total Symbol Rate	128 ksymbols/sec	DATA RATE COMBINED WITH FEC AND FRAME
i o tai o jiin oor nate	120 10 110 010 000	OVERHEAD RESULTING IN THE TOTAL SYMBOL
		RATE AT THE INPUTE TO THE SYMBOL
Transmit Antenna	XAP = R	MAPPER/MODULATOR. POLARIZATIONS INCLUDE:
	XAP = K	H = HORIZONTAL,
Polarization (XAP)		V = VERTICAL,
		S = HORIZONTAL AND VERTICAL,
		L = LEFT HAND CIRCULAR, R = RIGHT HAND CIRCULAR,
		T = RIGHT AND LEFT HAND CIRCULAR,
		J = LINEAR POLARIZATION
Transmit Antenna	XAZ =	THE EARTH STATION TRANSMITTER ANTENNA
Orientation (XAZ)	XAZ01 V00	MINIMUM OPERATING ANGLE OF
		ELEVATION (XAZ), V00 TO V90, EXAMPLE, XAZ01

Transmit Antenna Dimensions (XAD)	ANTENNA GAIN34, BEAMWIDTH2.7, AZIMUTHAL RANGE_001-360, THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS1365, THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS4,	EXAMPLE ASSUMING NONGEOSTATIONARY, 16 DBI GAIN, 30 DEGREE BEAMWIDTH, AZIMUTHAL RANGE FROM 001-360, SITE ELEVATION OF 357 METERS, AND ANTENNA HEIGHT ABOVE TERRAIN OF 6 METERS: XAD01 16G030B001-360A00357H006
	XAD = XAD01 34G003B001-360A01365H004	
Transmit Antenna	ANTENNA	
Additional	DIAMETER3.7,	
Information (For	ANTENNA EFFICIENCY41,	
Parabolic		
Antennas)		
Number of	2	NUMBER OF TIMES THE EARTH STATION WILL
Satellite Contacts		COMMUNICATE WITH THE STATELLITE IN THE EARTH TO SPACE DIRECTION (UPINKS) EACH DAY
Supported Per		
Day		
Expected	9	AVERAGE DURATION OF EACH CONTACT
Duration of Each		
Contact		

SVALBARD

Transmit Frequency	y: 2029.5 MHz	
State (XSC)	XSC = NORWAY	
City Name (XAL)	XAL = SVALBARD	
Latitude	Lat = 781353 N	
(DDMMSS)		
Longitude	Lon = 0152440 E	
(DDDMMSS)		
Transmit Power	PWR =	TRANSMIT POWER SUPPLIED TO THE ANTENNA
(PWR)	PWR01 W10	INPUT TERMINAL, EXAMPLE, PWR01 W2
		TRANSMIT POWER UNITS INCLUDE:
		W = WATT, K = KILOWATT,
		M = MEGAWATT
Necessary	128 kHz	THE WIDTH OF FREQUENCY BAND WHICH IS JUST
Bandwidth		SUFFICIENT TO SUCCESSFULLY TRANSFER DATA.
		FORMULAS CAN BE FOUND IN ANNEX J OF THE NTIA MANUAL.
RF Emissions Data		2-SIDED EMISSION BANDWIDTH VALUES
-3 dB bandwidth	128 kHz	
-20 dB bandwidth	NA	
-40 dB bandwidth	NA	
-60 dB bandwidth	NA	
Modulation Type	GMSK	THE METHOD USED TO SUPERIMPOSE DATA ON THE CARRIER, EXAMPLE, BPSK, QPSK, GMSK.
Data Rate	53 kbits/sec	INFORMATION DATA RATE
Forward Error	Is FEC used? Yes $oxtimes$ No \Box	
Correction Coding	FEC Type:CC,	
-	FEC Rate:2/5,	
Total Symbol Rate	128 ksymbols/sec	DATA RATE COMBINED WITH FEC AND FRAME
-		OVERHEAD RESULTING IN THE TOTAL SYMBOL
		RATE AT THE INPUTE TO THE SYMBOL MAPPER/MODULATOR.
Transmit Antenna	XAP = R	POLARIZATIONS INCLUDE:
Polarization (XAP)		H = HORIZONTAL,
		V = VERTICAL,
		S = HORIZONTAL AND VERTICAL, L = LEFT HAND CIRCULAR,
		R = RIGHT HAND CIRCULAR,
		T = RIGHT AND LEFT HAND CIRCULAR,
		J = LINEAR POLARIZATION
Transmit Antenna	XAZ =	THE EARTH STATION TRANSMITTER ANTENNA MINIMUM OPERATING ANGLE OF
Orientation (XAZ)	XAZ01 V00	ELEVATION (XAZ), V00 TO V90, EXAMPLE, XAZ01
		V00

Transmit Antenna Dimensions (XAD)	ANTENNA GAIN34, BEAMWIDTH2.7, AZIMUTHAL RANGE_001-360, THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS484, THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS4,	EXAMPLE ASSUMING NONGEOSTATIONARY, 16 DBI GAIN, 30 DEGREE BEAMWIDTH, AZIMUTHAL RANGE FROM 001-360, SITE ELEVATION OF 357 METERS, AND ANTENNA HEIGHT ABOVE TERRAIN OF 6 METERS: XAD01 16G030B001-360A00357H006
	XAD =	
	XAD01 34G003B001-360A00484H004	
Transmit Antenna	ANTENNA	
Additional	DIAMETER3.7,	
Information (For	ANTENNA EFFICIENCY41,	
Parabolic		
Antennas)		
Number of	1	NUMBER OF TIMES THE EARTH STATION WILL
Satellite Contacts		COMMUNICATE WITH THE STATELLITE IN THE EARTH TO SPACE DIRECTION (UPINKS) EACH DAY
Supported Per		EARTH TO STACE DIRECTION (OF MICS) EACH DAT
Day		
Expected	9	AVERAGE DURATION OF EACH CONTACT
Duration of Each		
Contact		

CHILE

Transmit Frequency	/: 2029.5 MHz	
State (XSC)	XSC = CHILE	
City Name (XAL)	XAL = PUNTA ARENAS	
Latitude	Lat = 525611 S	
(DDMMSS)		
Longitude	Lon = 0705212 W	
(DDDMMSS)		
Transmit Power (PWR)	PWR = PWR01 W10	TRANSMIT POWER SUPPLIED TO THE ANTENNA INPUT TERMINAL, EXAMPLE, PWR01 W2 TRANSMIT POWER UNITS INCLUDE: W = WATT, K = KILOWATT, M = MEGAWATT
Necessary Bandwidth	128 kHz	THE WIDTH OF FREQUENCY BAND WHICH IS JUST SUFFICIENT TO SUCCESSFULLY TRANSFER DATA. FORMULAS CAN BE FOUND IN ANNEX J OF THE NTIA MANUAL.
RF Emissions Data		2-SIDED EMISSION BANDWIDTH VALUES
-3 dB bandwidth	128 kHz	
-20 dB bandwidth	NA	
-40 dB bandwidth	NA	
-60 dB bandwidth	NA	
Modulation Type	GMSK	THE METHOD USED TO SUPERIMPOSE DATA ON
Data Rate	53 kbits/sec	THE CARRIER, EXAMPLE, BPSK, QPSK, GMSK. INFORMATION DATA RATE
Forward Error	Is FEC used? Yes \boxtimes No \square	
Correction Coding	FEC Type: CC	
Total Symbol Rate	128 ksymbols/sec	DATA RATE COMBINED WITH FEC AND FRAME OVERHEAD RESULTING IN THE TOTAL SYMBOL RATE AT THE INPUTE TO THE SYMBOL MAPPER/MODULATOR.
Transmit Antenna Polarization (XAP)	XAP = R	POLARIZATIONS INCLUDE: H = HORIZONTAL, V = VERTICAL, S = HORIZONTAL AND VERTICAL, L = LEFT HAND CIRCULAR, R = RIGHT HAND CIRCULAR, T = RIGHT AND LEFT HAND CIRCULAR, J = LINEAR POLARIZATION
Transmit Antenna	XAZ =	THE EARTH STATION TRANSMITTER ANTENNA
Orientation (XAZ)	XAZ01 V00	MINIMUM OPERATING ANGLE OF ELEVATION (XAZ), V00 TO V90, EXAMPLE, XAZ01 V00

Transmit Antenna Dimensions (XAD)	ANTENNA GAIN34, BEAMWIDTH2.7, AZIMUTHAL RANGE_001-360, THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS186, THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS4,	EXAMPLE ASSUMING NONGEOSTATIONARY, 16 DBI GAIN, 30 DEGREE BEAMWIDTH, AZIMUTHAL RANGE FROM 001-360, SITE ELEVATION OF 357 METERS, AND ANTENNA HEIGHT ABOVE TERRAIN OF 6 METERS: XAD01 16G030B001-360A00357H006
	XAD = XAD01 34G003B001-360A00186H004	
Transmit Antenna Additional Information (For Parabolic Antennas)	ANTENNA DIAMETER3.7, ANTENNA EFFICIENCY41,	
Number of Satellite Contacts Supported Per Day	1	NUMBER OF TIMES THE EARTH STATION WILL COMMUNICATE WITH THE STATELLITE IN THE EARTH TO SPACE DIRECTION (UPINKS) EACH DAY
Expected Duration of Each Contact	9	AVERAGE DURATION OF EACH CONTACT

Satellite Receive Specifications		
Receive Antenna Polarization (RAP)	RAP = R	POLARIZATIONS INCLUDE: H = HORIZONTAL, V = VERTICAL, S = HORIZONTAL AND VERTICAL, L = LEFT HAND CIRCULAR, R = RIGHT HAND CIRCULAR, T = RIGHT AND LEFT HAND CIRCULAR, J = LINEAR POLARIZATION
Receive Antenna Orientation (RAZ)	RAZ = NB	NB= NARROWBEAM EC = EARTH COVERAGE
Receive Antenna Dimension (RAD)	ANTENNA GAIN_5.7, BEAMWIDTH99, RAD = 06G099B	NTIA FORMAT(RAD), EXAMPLE, FOR 16 DBI ANTENNA GAIN AND 30 DEGREE BEAMWIDTH RAD01 16G030B
Type of satellite (State = SPCE) City = Geo or Nongeo	Type = NONGEOSTATIONARY	CHOOSE EITHER: GEOSTATIONARY OR NONGEOSTATIONARY
For Geostationary Satellites	Longitude =	IF ANY SATELLITES ARE GEOSTATIONARY, REPORT ITS LATITUDE AS 000000N (XLA AND/OR RLA) AND REPORT ITS LONGITUDE IN DDDMMSS FORMAT (XLG AND/OR RLG).

For Nongeostationary (Orbital Data)	INCLINATION ANGLE97.4, APOGEE IN KILOMETERS500, PERIGEE IN KILOMETERS500, ORBITAL PERIOD IN HOURS _1AND FRACTIONS OF HOURS IN DECIMAL57, THE NUMBER OF SATELLITES IN THE SYSTEM1, ORB = ORB,97.4IN00500AP00500PE1.57H01NRR 01	IF ANY SATELLITES ARE NONGEOSTATIONARY, REPORT ITS INCLINATION ANGLE, APOGEE IN KILOMETERS, PERIGEE IN KILOMETERS, ORBITAL PERIOD IN HOURS AND FRACTIONS OF HOURS IN DECIMAL, THE NUMBER OF SATELLITES IN THE SYSTEM, THEN T01, EXAMPLE, REM04 *ORB,98.0IN00510AP00510PE001.58H01NRT01, AND FOR SPACE-TO-SPACE COMMUNICATIONS WITH ANOTHER NONGEOSTATIONARY SATELLITE ADD AN ADDITIONAL *ORB FOR IT ENDING IN R01, EXAMPLE, REM05 *ORB,72.9IN03209AP00655PE013.46H01NRR01
For SunSynchronous Nongeostationary Orbits	Mean Local Time of Ascending Node (MLTAN) =1030	MLTAN IS THE ANGLE BETWEEN AN ORBIT'S ASCENDING NODE AND THE MEAN SUN, OFTEN EXPRESSED AS UNIT OF TIME (HH:MM)

Uplink Satellite to Satellite Iridium Constellation to RAY

Satellite Transmitter Data

plus ring tone. Lov	ies: 174 Channels spaced 41.6667 kHz ap v end of low channel 1618.725 MHz, High	
High channel 1626	5 MHz.	
Satellite Name: IRIDIUM CONSTELLATION		
Data Field	Data Answer	Description/Comments
Polarization (XAP)	XAP = XAP01 R	POLARIZATIONS INCLUDE : H = HORIZONTAL, V = VERTICAL, S = HORIZONTAL AND VERTICAL, L = LEFT HAND CIRCULAR, R = RIGHT HAND CIRCULAR, T = RIGHT AND LEFT HAND CIRCULAR, J = LINEAR POLARIZATION
Orientation (XAZ)	XAZ = XAZ01 NB	NB= NARROWBEAM EC = EARTH COVERAGE
Antenna Dimension (XAD)	ANTENNA GAIN_20 BEAMWIDTH12 XAD = XAD01 20G012B	(NTIA format (XAD), EXAMPLE, XAD01 16G030B)
Type of satellite (State = SP) (City = geo or non)	Type = non	Choose either: Geostationary or Nongeostationary
For Geostationary	Longitude =	IF ANY SATELLITES ARE GEOSTATIONARY, REPORT ITS LATITUDE AS 000000N (XLA AND/OR RLA) AND REPORT ITS LONGITUDE (XLG AND/OR RLG).

Nongeostationary (Orbital Data)	For Iridium constellation: INCLINATION ANGLE86.4, APOGEE IN KILOMETERS780, PERIGEE IN KILOMETERS780, ORBITAL PERIOD IN HOURS _1AND FRACTIONS OF HOURS IN DECIMAL73, THE NUMBER OF SATELLITES IN THE SYSTEM66, For RAY: INCLINATION ANGLE97.4, APOGEE IN KILOMETERS500, PERIGEE IN KILOMETERS500, ORBITAL PERIOD IN HOURS _1AND FRACTIONS OF HOURS IN DECIMAL57, THE NUMBER OF SATELLITES IN THE SYSTEM1, ORB = ORB,86.4IN00780AP00780PE001.73H66NRT01	IF ANY SATELLITES ARE NONGEOSTATIONARY, REPORT ITS INCLINATION ANGLE, APOGEE IN KILOMETERS, PERIGEE IN KILOMETERS, ORBITAL PERIOD IN HOURS AND FRACTIONS OF HOURS IN DECIMAL, THE NUMBER OF SATELLITES IN THE SYSTEM, THEN T01, EXAMPLE, REM04 *ORB,98.0IN00510AP00510PE001.58H01NRT01, AND FOR SPACE-TO-SPACE COMMUNICATIONS WITH ANOTHER NONGEOSTATIONARY SATELLITE ADD AN ADDITIONAL *ORB FOR IT ENDING IN R01, EXAMPLE, REM05 *ORB,72.9IN03209AP00655PE013.46H01NRT01
	ORB,97.5IN00500AP00500PE001.35H01NRR01	

FCC notes:

- 1. Use S-Note S945.
- 2. REM AGN, Cubesat, RAY

Receiver Data RAY Satellite Iridium	Transceiver Receive from Iridium Constellation
neeeliter Bata to tr Batelite indian	

Satellite Receive Sp	pecifications	
Polarization (RAP)	RAP = RAP 01 R	POLARIZATIONS INCLUDE : H = HORIZONTAL, V = VERTICAL, S = HORIZONTAL AND VERTICAL, L = LEFT HAND CIRCULAR, R = RIGHT HAND CIRCULAR, T = RIGHT AND LEFT HAND CIRCULAR, J = LINEAR POLARIZATION
Azimuth (RAZ)	RAZ = NB	NB= NARROWBEAM EC = EARTH COVERAGE
Dimension (RAD)	ANTENNA GAIN2 BEAMWIDTH160 RAD = RAD01 RAD01 02G160B	(NTIA format (RAD), EXAMPLE, RAD01 16G030B)

Type of satellite (State = SP) City = G/No	Type = Non	Choose either: Geostationary or Nongeostationary
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For Geostationary	Longitude =	IF ANY SATELLITES ARE GEOSTATIONARY, REPORT ITS LATITUDE AS 000000N (XLA AND/OR RLA) AND REPORT ITS LONGITUDE (XLG AND/OR RLG).
For Nongeostationary (Orbital Data)	For Iridium constellation: INCLINATION ANGLE86.4, APOGEE IN KILOMETERS_780, PERIGEE IN KILOMETERS780, ORBITAL PERIOD IN HOURS _1AND FRACTIONS OF HOURS IN DECIMAL73, THE NUMBER OF SATELLITES IN THE SYSTEM66, For RAY: INCLINATION ANGLE97.4, APOGEE IN KILOMETERS_500, PERIGEE IN KILOMETERS_500, ORBITAL PERIOD IN HOURS _1AND FRACTIONS OF HOURS IN DECIMAL .57_, THE NUMBER OF SATELLITES IN THE SYSTEM1, ORB = ORB,86.4IN00780AP00780PE001.73H66NRT01 ORB,97.5IN00500AP00500PE001.35H01NRR01	IF ANY SATELLITES ARE NONGEOSTATIONARY, REPORT ITS INCLINATION ANGLE, APOGEE IN KILOMETERS, PERIGEE IN KILOMETERS, ORBITAL PERIOD IN HOURS AND FRACTIONS OF HOURS IN DECIMAL, THE NUMBER OF SATELLITES IN THE SYSTEM, THEN T01, EXAMPLE, REM04 *ORB,98.0IN00510AP00510PE001.58H01NRT01, AND FOR SPACE-TO-SPACE COMMUNICATIONS WITH ANOTHER NONGEOSTATIONARY SATELLITE ADD AN ADDITIONAL *ORB FOR IT ENDING IN R01, EXAMPLE, REM05 *ORB,72.9IN03209AP00655PE013.46H01NRR01