

NTIA Space record data form for PROTOCATCHER Experimental Cubesat

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 (or to other satellite) information. Part B is for all ground to space (or from other satellite) transmit links.

PROTOCATCHER Includes an Iridium modem as the only radio.

Part A: Space to Space Downlink Data

From PROTOCATCHER to the Iridium Constellation

Satellite Transmitter Data 9603 Modem

Transmit Frequencies: 174 Channels, range from low end of low channel 1618.725 MHz to high end of high channel 1626.5 MHz, channel spacing 41.7 kHz.		
Satellite Name: PROTOCATCHER		
Data Field	Data Answer	Description/Comments
Transmit Power (PWR)	PWR = 1W	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	NA	
-20 dB bandwidth	NA	
-40 dB bandwidth	NA	
-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 Correction Coding	Is FEC used? Yes ☒ No ☐ FEC Type: __BCH(32,21)_____, 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 INPUT 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 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 GAIN ____2____ BEAMWIDTH ____160____ XAD = XAD01 02G160B	(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)	For PROTOCATCHER: INCLINATION ANGLE____97.6____, APOGEE IN KILOMETERS____ 500 ____ , PERIGEE IN KILOMETERS____ 487 ____ , ORBITAL PERIOD IN HOURS _1_ AND FRACTIONS OF HOURS IN DECIMAL_.57_, THE NUMBER OF SATELLITES IN THE SYSTEM____1____ , For Iridium constellation: INCLINATION ANGLE____86.4____ , APOGEE IN KILOMETERS_780____ , PERIGEE IN KILOMETERS____780____ , ORBITAL PERIOD IN HOURS _1_ AND FRACTIONS OF HOURS IN DECIMAL_.73_, THE NUMBER OF SATELLITES IN THE SYSTEM____66____ , ORB = ORB,97.6IN00500AP00487PE001.57H01NRT01 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) = 22:31 For PROTOCATCHER	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, PROTOCATCHER

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____ BEAMWIDTH ____12____ 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 PROTOCATCHER: INCLINATION ANGLE____97.6_____, APOGEE IN KILOMETERS____500_____, PERIGEE IN KILOMETERS____487_____, ORBITAL PERIOD IN HOURS __1__AND FRACTIONS OF HOURS IN DECIMAL_.57__, THE NUMBER OF SATELLITES IN THE SYSTEM____1_____, For Iridium constellation: INCLINATION ANGLE____86.4_____, APOGEE IN KILOMETERS_780_____, PERIGEE IN KILOMETERS____780_____, ORBITAL PERIOD IN HOURS _1__AND FRACTIONS OF HOURS IN DECIMAL_.73__, THE NUMBER OF SATELLITES IN THE SYSTEM____66_____, ORB = ORB,97.6IN00500AP00487PE001.57H01NRT01 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	15	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 ☒ Mission Payload Data ☒	SATELLITE HEALTH AND STATUS TELEMETRY AND/OR MISSION PAYLOAD DATA
FCC notes: 1. Use S-Note S945. 2. REM AGN, Cubesat, PROTOCATCHER		

Part B:**Iridium Constellation to PROTOCATCHER:****Satellite Transmitter Data to Iridium 9603 Modem**

Transmit Frequencies: 174 Channels spaced 41.6667 kHz apart, plus ring tone. Low end of low channel 1618.725 MHz, High end of 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_____ BEAMWIDTH ____12_____ 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).

For Nongeostationary (Orbital Data)	For Iridium constellation: INCLINATION ANGLE__86.4_____, APOGEE IN KILOMETERS_780_____, PERIGEE IN KILOMETERS__780_____, ORBITAL PERIOD IN HOURS _1_ AND FRACTIONS OF HOURS IN DECIMAL_.73_____, THE NUMBER OF SATELLITES IN THE SYSTEM__66_____, For PROTOCATCHER: INCLINATION ANGLE_____97.6_____, APOGEE IN KILOMETERS_____500_____, PERIGEE IN KILOMETERS_____487_____, ORBITAL PERIOD IN HOURS __1____ AND FRACTIONS OF HOURS IN DECIMAL_.57_____, THE NUMBER OF SATELLITES IN THE SYSTEM__1_____, ORB = ORB,86.4IN00780AP00780PE001.73H66NRT01 ORB,97.6IN00500AP00487PE001.57H01NRR01	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
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FCC notes:

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

Receiver Data PROTOCATCHER Satellite Iridium Transceiver 9603 Receive from Iridium Constellation

Satellite Receive Specifications		
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 GAIN__2_____ BEAMWIDTH__160_____ 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 ANGLE__86.4_____, APOGEE IN KILOMETERS_780_____, PERIGEE IN KILOMETERS__780_____, ORBITAL PERIOD IN HOURS _1_ AND FRACTIONS OF HOURS IN DECIMAL_.73_____, THE NUMBER OF SATELLITES IN THE SYSTEM__66_____, For PROTOCATCHER: INCLINATION ANGLE_____97.6_____, APOGEE IN KILOMETERS_____500_____, PERIGEE IN KILOMETERS_____487_____, ORBITAL PERIOD IN HOURS __1____ AND FRACTIONS OF HOURS IN DECIMAL_.57_____, THE NUMBER OF SATELLITES IN THE SYSTEM__1_____, ORB = ORB,86.4IN00780AP00780PE001.73H66NRT01 ORB,97.6IN00500AP00487PE001.57H01NRR01	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