

NTIA Space record data form

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.

**Part A: Space to Earth Downlink Data**

Satellite Transmitter Data (Required for Each Frequency)

| Transmit Frequency: 400.5 MHz        |  |   |
|--------------------------------------|--|---|
| Satellite Name: CuPID                |  |   |
| Data Field                           | Data Answer  | Description/Comments  |
| Transmit Power (PWR)                 | PWR = 0.47 W<br><br>P <sub>out</sub> = 1W<br>Line Losses = 3.3 dB<br>P <sub>ant</sub> = -3.3 dBW                         | TRANSMIT POWER SUPPLIED TO THE ANTENNA INPUT TERMINAL, EXAMPLE, PWR01 W2<br>TRANSMIT POWER UNITS INCLUDE:<br>W = WATT,<br>K = KILOWATT,<br>M = MEGAWATT   |
| Necessary Bandwidth                  | 57.76 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                      | 17.4 kHz   |   |
| -20 dB bandwidth                     | 45.6 kHz   |   |
| -40 dB bandwidth                     | 234.8 kHz  |   |
| -60 dB bandwidth                     | 1189.1 kHz   |   |
| Modulation Type                      | GFSK   | THE METHOD USED TO SUPERIMPOSE DATA ON THE CARRIER, EXAMPLE, BPSK, QPSK, GMSK.  |
| Data Rate                            | 38.4 kbps  | INFORMATION DATA RATE   |
| Forward Error Correction Coding      | Is FEC used? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/><br>FEC Type: _____,<br>FEC Rate: _____, |   |
| Total Symbol Rate                    | 38.4 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 <input type="checkbox"/><br>No <input checked="" type="checkbox"/>   | 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. |

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| If transmitter has a beacon mode, can the beacon be commanded off?  | Yes <input type="checkbox"/><br>No <input type="checkbox"/>   |   |
| Transmit Antenna Polarization (XAP)                                 | XAP = J   | POLARIZATIONS INCLUDE:<br>H = HORIZONTAL,<br>V = VERTICAL,<br>S = HORIZONTAL AND VERTICAL,<br>L = LEFT HAND CIRCULAR,<br>R = RIGHT HAND CIRCULAR,<br>T = RIGHT AND LEFT HAND CIRCULAR,<br>J = LINEAR POLARIZATION   |
| Transmit Antenna Orientation (XAZ)                                  | XAZ = EC  | NB= NARROWBEAM<br>EC = EARTH COVERAGE   |
| Transmit Antenna Dimension (XAD)                                    | ANTENNA GAIN <u>2.15</u> ,<br>BEAMWIDTH <u>360</u> , (Dipole)<br>XAD = 2.15G360B  | NTIA FORMAT (XAD), EXAMPLE, FOR 16 DBI ANTENNA GAIN AND 30 DEGREE BEAMWIDTH<br>XAD01 16G030B  |
| Type of satellite (State = SPCE)<br>(City = Geo or Nongeo)          | Type = NONGEOSTATIONARY   | CHOOSE EITHER:<br>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 ANGLE <u>97.61</u> ,<br>APOGEE IN KILOMETERS <u>550</u> ,<br>PERIGEE IN KILOMETERS <u>550</u> ,<br>ORBITAL PERIOD IN HOURS<br><u>1</u> AND FRACTIONS OF HOURS IN DECIMAL <u>0.6</u> ,<br>THE NUMBER OF SATELLITES IN THE SYSTEM <u>1</u> ,<br><br>ORB =<br>97.61IN00550AP00550PE001.6H01NRT01 | 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<br>*ORB,98.0IN00510AP00510PE001.58H01NRT01,<br>AND FOR SPACE-TO-SPACE COMMUNICATIONS WITH ANOTHER NONGEOSTATIONARY SATELLITE ADD AN ADDITIONAL<br>*ORB FOR IT ENDING IN R01, EXAMPLE, REM05<br>*ORB,72.9IN03209AP00655PE013.46H01NRR01 |
| For SunSynchronous Nongeostationary Orbits                          | Mean Local Time of Ascending Node (MLTAN) = <u>10:30</u>  | MLTAN IS THE ANGLE BETWEEN AN ORBIT'S ASCENDING NODE AND THE MEAN SUN, OFTEN EXPRESSED AS UNIT OF TIME (HH:MM)  |
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| <b>Earth Station Data (Receiver) at Each Earth Station Location</b> |   |   |
| State (RSC)   | RSC = MA  |   |
| City Name (RAL)   | RAL = Boston  |   |
| Latitude (DDMMSS)   | Lat = 422057 N  |   |
| Longitude (DDDMMSS)   | Lon = 0710620 W   |   |

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| Receive Antenna Polarization (RAP)                              | RAP = R   | POLARIZATIONS INCLUDE:<br>H = HORIZONTAL,<br>V = VERTICAL,<br>S = HORIZONTAL AND VERTICAL,<br>L = LEFT HAND CIRCULAR,<br>R = RIGHT HAND CIRCULAR,<br>T = RIGHT AND LEFT HAND CIRCULAR,<br>J = LINEAR POLARIZATION |
| Receive Antenna Orientation (RAZ)                               | RAZ = V00   | THE EARTH STATION RECEIVER ANTENNA MINIMUM OPERATING ANGLE OF ELEVATION (RAZ), V00 TO V90, EXAMPLE, RAZ01 V00   |
| Receive Antenna Dimensions (RAD)                                | ANTENNA GAIN <u>14.35</u> ,<br>BEAMWIDTH <u>35.2</u> ,<br>AZIMUTHAL RANGE <u>001-360</u> ,<br>THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS <u>30</u> ,<br>THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS <u>2</u> ,<br><br>RAD = 14.35G035B001-360A00030H002 | 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:<br>RAD01 16G030B001-360A00357H006  |
| Receive Antenna Additional Information (For Parabolic Antennas) | ANTENNA DIAMETER _____,<br>ANTENNA EFFICIENCY _____,  |   |
| 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                               | 6 minutes   | AVERAGE DURATION OF EACH CONTACT  |
| Supported Operations  | Satellite Health and Status Data <input checked="" type="checkbox"/><br>Mission Payload Data <input checked="" type="checkbox"/>  | SATELLITE HEALTH AND STATUS TELEMETRY AND/OR MISSION PAYLOAD DATA   |
|   |   |   |
| State (RSC)   | RSC = VA  |   |
| City Name (RAL)   | RAL = Wallops Island  |   |
| Latitude (DDMMSS)   | Lat = 375121 N  |   |
| Longitude (DDDMMSS)   | Lon = 0753043 W   |   |
| Receive Antenna Polarization (RAP)                              | RAP = R   | POLARIZATIONS INCLUDE:<br>H = HORIZONTAL,<br>V = VERTICAL,<br>S = HORIZONTAL AND VERTICAL,<br>L = LEFT HAND CIRCULAR,<br>R = RIGHT HAND CIRCULAR,<br>T = RIGHT AND LEFT HAND CIRCULAR,<br>J = LINEAR POLARIZATION |

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| Receive Antenna Orientation (RAZ)                                       | RAZ = V00  | THE EARTH STATION RECEIVER ANTENNA MINIMUM OPERATING ANGLE OF ELEVATION (RAZ), V00 TO V90, EXAMPLE, RAZ01 V00  |
| Receive Antenna Dimensions (RAD)  | ANTENNA GAIN <u>32</u> ,<br>BEAMWIDTH <u>2.9</u> ,<br>AZIMUTHAL RANGE <u>001-360</u> ,<br>THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS <u>3</u> ,<br>THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS <u>13.7</u> ,<br><br>RAD = 32G003B001-360A00003H014 | 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:<br>RAD01 16G030B001-360A00357H006 |
| Receive Antenna Additional Information (For Parabolic Antennas)         | ANTENNA DIAMETER <u>18m</u> ,<br>ANTENNA EFFICIENCY <u>62%</u>   |  |
| 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                                       | 6 minutes  | AVERAGE DURATION OF EACH CONTACT   |
| Supported Operations  | Satellite Health and Status Data <input checked="" type="checkbox"/><br>Mission Payload Data <input checked="" type="checkbox"/>   | SATELLITE HEALTH AND STATUS TELEMETRY AND/OR MISSION PAYLOAD DATA  |
| FCC notes:<br>1. Use S-Note S945.<br>2. REM AGN, Cubesat, (insert name) |  |  |

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

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

|                                      |  |   |
|--------------------------------------|--|---|
| Transmit Frequency: <b>400.5 MHz</b> |  |   |
| State (XSC)                          | XSC = MA   |   |
| City Name (XAL)                      | XAL = Boston   |   |
| Latitude (DDMMSS)                    | Lat = 422057 N   |   |
| Longitude (DDDMMSS)                  | Lon = 0710620 W  |   |
| Transmit Power (PWR)                 | PWR = 1.78W<br><br>P <sub>out</sub> = 5W<br>Line Losses = 4.5 dB<br>P <sub>ant</sub> = 2.5 dBW                           | TRANSMIT POWER SUPPLIED TO THE ANTENNA INPUT TERMINAL, EXAMPLE, PWR01 W2<br>TRANSMIT POWER UNITS INCLUDE:<br>W = WATT,<br>K = KILOWATT,<br>M = MEGAWATT   |
| Necessary Bandwidth                  | 13.44 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                      | 2.0 kHz  |   |
| -20 dB bandwidth                     | 10.1 kHz   |   |
| -40 dB bandwidth                     | 22.9 kHz   |   |
| -60 dB bandwidth                     | 216.9  |   |
| Modulation Type                      | GFSK   | THE METHOD USED TO SUPERIMPOSE DATA ON THE CARRIER, EXAMPLE, BPSK, QPSK, GMSK.  |
| Data Rate                            | 9.6 kbps   | INFORMATION DATA RATE   |
| Forward Error Correction Coding      | Is FEC used? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/><br>FEC Type: _____,<br>FEC Rate: _____, |   |
| Total Symbol Rate                    | 9.6 kpsps  | DATA RATE COMBINED WITH FEC AND FRAME OVERHEAD RESULTING IN THE TOTAL SYMBOL RATE AT THE INPUT TO THE SYMBOL MAPPER/MODULATOR.  |
| Transmit Antenna Polarization (XAP)  | XAP = R  | POLARIZATIONS INCLUDE:<br>H = HORIZONTAL,<br>V = VERTICAL,<br>S = HORIZONTAL AND VERTICAL,<br>L = LEFT HAND CIRCULAR,<br>R = RIGHT HAND CIRCULAR,<br>T = RIGHT AND LEFT HAND CIRCULAR,<br>J = LINEAR POLARIZATION |
| Transmit Antenna Orientation (XAZ)   | XAZ = V00  | THE EARTH STATION TRANSMITTER ANTENNA MINIMUM OPERATING ANGLE OF ELEVATION (XAZ), V00 TO V90, EXAMPLE, XAZ01 V00  |

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| Transmit Antenna Dimensions (XAD)                                | ANTENNA GAIN <u>14.35</u> ,<br>BEAMWIDTH <u>35.2</u> ,<br>AZIMUTHAL RANGE <u>001-360</u> ,<br>THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS <u>30</u> ,<br>THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS <u>2</u> ,<br><br>XAD = 14.35G035B001-360A00030H002 | 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:<br>XAD01 16G030B001-360A00357H006 |
| Transmit Antenna Additional Information (For Parabolic Antennas) | ANTENNA DIAMETER _____,<br>ANTENNA EFFICIENCY _____,  |  |
| Number of Satellite Contacts Supported Per Day                   | 2   | 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                                | 6 minutes   | AVERAGE DURATION OF EACH CONTACT   |
|  |   |  |
| State (XSC)  | XSC = VA  |  |
| City Name (XAL)  | XAL = Wallops Island  |  |
| Latitude (DDMMSS)  | Lat = 375121 N  |  |
| Longitude (DDDMMSS)  | Lon = 0753043 W   |  |
| Transmit Power (PWR)   | PWR = 2W<br><br>$P_{out} = 5W$<br>Line Losses = 4.5 dB<br>$P_{ant} = 37 \text{ dBW}$  | TRANSMIT POWER SUPPLIED TO THE ANTENNA INPUT TERMINAL, EXAMPLE, PWR01 W2<br>TRANSMIT POWER UNITS INCLUDE:<br>W = WATT,<br>K = KILOWATT,<br>M = MEGAWATT  |
| Necessary Bandwidth  | 13.44 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  | 2.0 kHz   |  |
| -20 dB bandwidth   | 10.1 kHz  |  |
| -40 dB bandwidth   | 22.9 kHz  |  |
| -60 dB bandwidth   | 216.9   |  |
| Modulation Type  | GFSK  | THE METHOD USED TO SUPERIMPOSE DATA ON THE CARRIER, EXAMPLE, BPSK, QPSK, GMSK.   |
| Data Rate  | 9.6 kbps  | INFORMATION DATA RATE  |
| Forward Error Correction Coding                                  | Is FEC used? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/><br>FEC Type: _____,<br>FEC Rate: _____   |  |

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| Total Symbol Rate  | 9.6 ksps   | DATA RATE COMBINED WITH FEC AND FRAME OVERHEAD RESULTING IN THE TOTAL SYMBOL RATE AT THE INPUT TO THE SYMBOL MAPPER/MODULATOR.  |
| Transmit Antenna Polarization (XAP)                              | XAP = R  | POLARIZATIONS INCLUDE:<br>H = HORIZONTAL,<br>V = VERTICAL,<br>S = HORIZONTAL AND VERTICAL,<br>L = LEFT HAND CIRCULAR,<br>R = RIGHT HAND CIRCULAR,<br>T = RIGHT AND LEFT HAND CIRCULAR,<br>J = LINEAR POLARIZATION |
| Transmit Antenna Orientation (XAZ)                               | XAZ = V00  | THE EARTH STATION TRANSMITTER ANTENNA MINIMUM OPERATING ANGLE OF ELEVATION (XAZ), V00 TO V90, EXAMPLE, XAZ01 V00  |
| Transmit Antenna Dimensions (XAD)                                | ANTENNA GAIN <u>32</u> ,<br>BEAMWIDTH <u>2.9</u> ,<br>AZIMUTHAL RANGE <u>001-360</u> ,<br>THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS <u>3</u> ,<br>THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS <u>13.7</u> ,<br><br>XAD = 32G003B001-360A00003H014 | 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:<br>XAD01 16G030B001-360A00357H006  |
| Transmit Antenna Additional Information (For Parabolic Antennas) | ANTENNA DIAMETER <u>18m</u> ,<br>ANTENNA EFFICIENCY <u>62%</u>   |   |
| Number of Satellite Contacts Supported Per Day                   | 2  | NUMBER OF TIMES THE EARTH STATION WILL COMMUNICATE WITH THE SATELLITE IN THE EARTH TO SPACE DIRECTION (UPINKS) EACH DAY   |
| Expected Duration of Each Contact                                | 6 minutes  | AVERAGE DURATION OF EACH CONTACT  |
| <b>Satellite Receive Specifications</b>                          |  |   |
| Receive Antenna Polarization (RAP)                               | RAP = J  | POLARIZATIONS INCLUDE:<br>H = HORIZONTAL,<br>V = VERTICAL,<br>S = HORIZONTAL AND VERTICAL,<br>L = LEFT HAND CIRCULAR,<br>R = RIGHT HAND CIRCULAR,<br>T = RIGHT AND LEFT HAND CIRCULAR,<br>J = LINEAR POLARIZATION |
| Receive Antenna Orientation (RAZ)                                | RAZ = NB   | NB= NARROWBEAM<br>EC = EARTH COVERAGE   |
| Receive Antenna Dimension (RAD)                                  | ANTENNA GAIN <u>2.15</u> ,<br>BEAMWIDTH <u>360</u> ,<br>RAD = 2.15G360B  | NTIA FORMAT(RAD), EXAMPLE, FOR 16 DBI ANTENNA GAIN AND 30 DEGREE BEAMWIDTH<br>RAD01 16G030B   |

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| Type of satellite<br>(State = SPCE)<br>City = Geo or<br>Nongeo | Type = NONGEOSTATIONARY   | CHOOSE EITHER:<br>GEOSTATIONARY OR NONGEOSTATIONARY  |
| For Geostationary<br>Satellites                                | Longitude =   | IF ANY SATELLITES ARE GEOSTATIONARY, REPORT<br>ITS LATITUDE AS 000000N (XLA AND/OR RLA) AND<br>REPORT ITS LONGITUDE IN DDDMMSS FORMAT<br>(XLG AND/OR RLG).   |
| For<br>Nongeostationary<br>(Orbital Data)                      | INCLINATION ANGLE <u>97.61</u> ,<br>APOGEE IN KILOMETERS <u>550</u> ,<br>PERIGEE IN KILOMETERS <u>550</u> ,<br>ORBITAL PERIOD IN HOURS <u>1</u> AND<br>FRACTIONS OF HOURS IN<br>DECIMAL <u>0.6</u> ,<br>THE NUMBER OF SATELLITES IN THE<br>SYSTEM <u>1</u> ,<br><br>ORB =<br>97.61IN00550AP00550PE001.6H01NRT01 | IF ANY SATELLITES ARE NONGEOSTATIONARY,<br>REPORT ITS INCLINATION ANGLE, APOGEE<br>IN KILOMETERS, PERIGEE IN KILOMETERS,<br>ORBITAL PERIOD IN HOURS AND FRACTIONS OF<br>HOURS IN DECIMAL, THE NUMBER OF SATELLITES<br>IN THE SYSTEM, THEN T01, EXAMPLE,<br>REM04<br>*ORB,98.0IN00510AP00510PE001.58H01NRT01,<br>AND FOR SPACE-TO-SPACE<br>COMMUNICATIONS WITH ANOTHER<br>NONGEOSTATIONARY SATELLITE ADD AN<br>ADDITIONAL<br>*ORB FOR IT ENDING IN R01, EXAMPLE, REM05<br>*ORB,72.9IN03209AP00655PE013.46H01NRR01 |
| For<br>SunSynchronous<br>Nongeostationary<br>Orbits            | Mean Local Time of Ascending Node<br>(MLTAN) = <u>10:30</u>   | MLTAN IS THE ANGLE BETWEEN AN ORBIT'S<br>ASCENDING NODE AND THE MEAN SUN, OFTEN<br>EXPRESSED AS UNIT OF TIME (HH:MM)   |