

### **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

| Transmit Frequency: 400.500 MHz                       |                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| Satellite Name: Momentum X1                           |                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Data Field                                            | Data Answer                                                                                                                                                                                                                                                         | Description/Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 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                                                                                                                                                                                                                                                                   |
| Orientation (XAZ)                                     | XAZ = EC                                                                                                                                                                                                                                                            | NB = NARROWBEAM<br>EC = EARTH COVERAGE                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Antenna Dimension (XAD)                               | ANTENNA GAIN 0.0 dBi<br>BEAMWIDTH 360 degrees<br>XAD = 0G3608                                                                                                                                                                                                       | (NTIA format (XAD), EXAMPLE, XAD01 16G030B)                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Type of satellite (State = SP)<br>(City = geo or non) | Type = Nongeostationary                                                                                                                                                                                                                                             | Choose either:<br>Geostationary or<br>Nongeostationary                                                                                                                                                                                                                                                                                                                                                                                                                               |
| For Geostationary                                     | Longitude = N/A                                                                                                                                                                                                                                                     | 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 ANGLE 98.0 degrees,<br>APOGEE IN KILOMETERS 585 km,<br>PERIGEE IN KILOMETERS 585 km,<br>ORBITAL PERIOD IN HOURS 1 AND FRACTIONS OF HOURS IN DECIMAL 61,<br>THE NUMBERS OF SATELLITES IN THE SYSTEM 1<br><br>ORB =<br>98.0IN00585AP00585PE001.61H01NRT01 | 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,72.9IN03209AP00655PE13.46H01NRR01 |
|                                                       |                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Earth Station Data (Receiver A)                                         |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| State (RSC)                                                             | RSC = California                                                                                                                                                                                                                                |                                                                                                                                                                                                                    |
| City Name (RAL)                                                         | RAL = Santa Clara                                                                                                                                                                                                                               |                                                                                                                                                                                                                    |
| Latitude (DDMMSS)                                                       | Lat = 372248 N                                                                                                                                                                                                                                  |                                                                                                                                                                                                                    |
| Longitude (DDMMSS)                                                      | Lon = 1215740 W                                                                                                                                                                                                                                 |                                                                                                                                                                                                                    |
| 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 |
| Antenna Azimuth (RAZ)                                                   | RAZ = V00                                                                                                                                                                                                                                       | THE EARTH STATION RECEIVER ANTENNA AZIMUTH (RAZ), THE MINIMUM ANGLE OF ELEVATION, V00 TO V90, EXAMPLE, RAZ01 V00                                                                                                   |
| Antenna Dimensions (RAD)                                                | ANTENNA GAIN 22 dB,<br>BEAMWIDTH 14 degrees,<br>AZIMUTHAL RANGE 0 – 360 degrees,<br>THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS 23 meters,<br>THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS 13 meters,<br><br>RAD = 22G014B000-360A00023H013 | EXAMPLE ASSUMING NONGEOSTATIONARY,<br>RAD01 16G030B000-360A00357H006                                                                                                                                               |
| FCC notes:<br>1. Use S-Note S945.<br>2. REM AGN, Cubesat, (Momentum X1) |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                    |

| Earth Station Data (Receiver B) |                 |                                                                                                                                                                                                                    |
|---------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| State (RSC)                     | RSC = Colorado  |                                                                                                                                                                                                                    |
| City name (RAL)                 | RAL = Littleton |                                                                                                                                                                                                                    |
| Latitude (DDMMSS)               | Lat = 393424 N  |                                                                                                                                                                                                                    |
| Longitude (DDMMSS)              | Lon = 1050801 W |                                                                                                                                                                                                                    |
| 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 |
| Antenna Azimuth (RAZ)           | RAZ = V00       | THE EARTH STATION RECEIVER ANTENNA AZIMUTH (RAZ), THE MINIMUM ANGLE OF ELEVATION, V00 TO V90, EXAMPLE, RAZ01 V00                                                                                                   |

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| Antenna Dimensions (RAD)                                                | ANTENNA GAIN 22 dB<br>BEAMWIDTH 14 degrees,<br>AZIMUTHAL RANGE 0 – 360 degrees<br>THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS 1773 meters,<br>THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS 14 meters,<br><br>RAD = 22G014B000-360A01773H014 | EXAMPLE ASSUMING NONGEOSTATIONARY,<br>RAD01 16G030B000-360A00357H006 |
| FCC notes:<br>1. Use S-Note S945.<br>2. REM AGN, Cubesat, (Momentum X1) |                                                                                                                                                                                                                                                 |                                                                      |

| Earth Station Data (Receiver C)                                         |                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| State (RSC)                                                             | RSC = N/A                                                                                                                                                                                                                                             |                                                                                                                                                                                                                    |
| City name (RAL)                                                         | RAL = Tromsø                                                                                                                                                                                                                                          |                                                                                                                                                                                                                    |
| Latitude (DDMMSS)                                                       | Lat = 693946 N                                                                                                                                                                                                                                        |                                                                                                                                                                                                                    |
| Longitude (DDMMSS)                                                      | Lon = 0185626 E                                                                                                                                                                                                                                       |                                                                                                                                                                                                                    |
| 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 |
| Antenna Azimuth (RAZ)                                                   | RAZ = V00                                                                                                                                                                                                                                             | THE EARTH STATION RECEIVER ANTENNA AZIMUTH (RAZ), THE MINIMUM ANGLE OF ELEVATION, V00 TO V90, EXAMPLE, RAZ01 V00                                                                                                   |
| Antenna Dimensions (RAD)                                                | ANTENNA GAIN 22.1 dB,<br>BEAMWIDTH 13.4 degrees,<br>AZIMUTHAL RANGE 0 – 360 degrees,<br>THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS 103 meters,<br>THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS 3.7 meters,<br><br>RAD = 22G013B000-360A00103H004 | EXAMPLE ASSUMING NONGEOSTATIONARY,<br>RAD01 16G030B000-360A00357H006                                                                                                                                               |
| FCC notes:<br>1. Use S-Note S945.<br>2. REM AGN, Cubesat, (Momentum X1) |                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                    |

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

## Earth Station Transmitter Data

| Earth Station Transmitter Data (Transmitter A) |                                                                                                                                                                                                                                             |                                                                                                                                                                                                                    |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transmit Frequency: 402.900 MHz                |                                                                                                                                                                                                                                             |                                                                                                                                                                                                                    |
| State (XSC)                                    | XSC = California                                                                                                                                                                                                                            |                                                                                                                                                                                                                    |
| City Name (XAL)                                | XAL = Santa Clara                                                                                                                                                                                                                           |                                                                                                                                                                                                                    |
| Latitude (DDMMSS)                              | Lat = 372248 N                                                                                                                                                                                                                              |                                                                                                                                                                                                                    |
| Longitude (DDMMSS)                             | Lon = 1215740 W                                                                                                                                                                                                                             |                                                                                                                                                                                                                    |
| 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 |
| Antenna Azimuth (XAZ)                          | XAZ = V00                                                                                                                                                                                                                                   | THE EARTH STATION Transmitter ANTENNA AZIMUTH (XAZ), THE MINIMUM ANGLE OF ELEVATION, V00 TO V90, EXAMPLE, XAZ01 V00                                                                                                |
| Antenna Dimensions (XAD)                       | ANTENNA GAIN 22 dB<br>BEAMWIDTH 14 degrees,<br>AZIMUTHAL RANGE 0 – 360 degrees<br>THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS 23 meters<br>THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS 13 meters<br><br>XAD = 22G014B000-360A00023H013 | EXAMPLE ASSUMING NONGEOSTATIONARY,<br>XAD01 16G030B000-360A00357H006                                                                                                                                               |

| Earth Station Transmitter Data (Transmitter B) |                 |                                                                                                                                                                                                                    |
|------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transmit Frequency: 402.900 MHz                |                 |                                                                                                                                                                                                                    |
| State (XSC)                                    | XSC = Colorado  |                                                                                                                                                                                                                    |
| City Name (XAL)                                | XAL = Littleton |                                                                                                                                                                                                                    |
| Latitude (DDMMSS)                              | Lat = 393424 N  |                                                                                                                                                                                                                    |
| Longitude (DDMMSS)                             | Lon = 1050801 W |                                                                                                                                                                                                                    |
| 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 |
| Antenna Azimuth (XAZ)                          | XAZ = V00       | THE EARTH STATION Transmitter ANTENNA AZIMUTH (XAZ), THE MINIMUM ANGLE OF ELEVATION, V00 TO V90, EXAMPLE, XAZ01 V00                                                                                                |

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| Antenna Dimensions (XAD) | ANTENNA GAIN 22 dB<br>BEAMWIDTH 14 degrees,<br>AZIMUTHAL RANGE 0 – 360 degrees<br>THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS 1773<br>THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS 14 meters<br><br>XAD = 22G014B000-360A01773H014 | EXAMPLE ASSUMING NONGEOSTATIONARY,<br>XAD01 16G030B000-360A00357H006 |
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| Earth Station Transmitter Data (Transmitter C) |                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                    |
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| Transmit Frequency: 402.900 MHz                |                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                    |
| State (XSC)                                    | XSC = N/A                                                                                                                                                                                                                                         |                                                                                                                                                                                                                    |
| City Name (XAL)                                | XAL = Tromsø                                                                                                                                                                                                                                      |                                                                                                                                                                                                                    |
| Latitude (DDMMSS)                              | Lat = 693946 N                                                                                                                                                                                                                                    |                                                                                                                                                                                                                    |
| Longitude (DDMMSS)                             | Lon = 0185626 E                                                                                                                                                                                                                                   |                                                                                                                                                                                                                    |
| 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 |
| Antenna Azimuth (XAZ)                          | XAZ = V00                                                                                                                                                                                                                                         | THE EARTH STATION Transmitter ANTENNA AZIMUTH (XAZ), THE MINIMUM ANGLE OF ELEVATION, V00 TO V90, EXAMPLE, XAZ01 V00                                                                                                |
| Antenna Dimensions (XAD)                       | ANTENNA GAIN 22.1 dB<br>BEAMWIDTH 13.4 degrees,<br>AZIMUTHAL RANGE 0 – 360 degrees<br>THE SITE ELEVATION ABOVE MEAN SEA LEVEL IN METERS 103 meters<br>THE ANTENNA HEIGHT ABOVE TERRAIN IN METERS 3.7 meters<br><br>XAD = 22G013B000-360A00103H004 | EXAMPLE ASSUMING NONGEOSTATIONARY,<br>XAD01 16G030B000-360A00357H006                                                                                                                                               |

| Satellite Receive Specifications |                                               |                                                                                                                                                                                                                    |
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| 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 |
| Azimuth (RAZ)                    | RAZ = RAZ01 V00                               | STATION RECEIVER ANTENNA AZIMUTH (XAZ), THE MINIMUM ANGLE OF ELEVATION, V00 TO V90, EXAMPLE, RAZ01 V00                                                                                                             |
| Dimension (RAD)                  | ANTENNA GAIN 0.0 dBi<br>BEAMWIDTH 360 degrees | (NTIA format (RAD)), EXAMPLE, RAD01 16G030B)                                                                                                                                                                       |

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|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                  | RAD = 0G360B                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Type of satellite<br>(State = SP)<br>City = G/No | Type = Nongeostationary                                                                                                                                                                                                                                                  | Choose either:<br>Geostationary or<br>Nongeostationary                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| For Geostationary                                | Longitude = N/A                                                                                                                                                                                                                                                          | IF ANY SATELLITES ARE GEOSTATIONARY, REPORT ITS LATITUDE AS 000000N (XLA AND/OR RLA) AND REPORT ITS LONGITUDE (XLG AND/OR RLG).                                                                                                                                                                                                                                                                                                                                                                               |
| For<br>Nongeostationary<br>(Orbital Data)        | INCLINATION ANGLE 98.0 degrees,<br>APOGEE IN KILOMETERS 585 km,<br>PERIGEE IN KILOMETERS 585 km,<br>ORBITAL PERIOD IN HOURS 1 AND<br>FRACTIONS OF HOURS IN DECIMAL 61,<br>THE NUMBER OF SATELLITES IN THE<br>SYSTEM 1,<br><br>ORB,98.0IN00585AP00585PE001.61H01N<br>RT01 | IF ANY SATELLITES ARE NONGEOSTATIONARY,<br>REPORT ITS INCLINATION ANGLE, APOGEE IN<br>KILOMETERS, PERIGEE IN KILOMETERS, ORBITAL<br>PERIOD IN HOURS AND FRACTIONS OF HOURS IN<br>DECIMAL, THE NUMBER OF SATELLITES IN THE<br>SYSTEM, THEN T01, EXAMPLE, REM04<br>*ORB,98.0IN00510AP00510PE001.58H01NRT01, AND<br>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 |