

S4 CROSSOVER NTIA Space record data form for S4 CROSSOVER Experiment

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 transmit links.

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

**From S4 CROSSOVER to the Iridium Constellation**

**Satellite Transmitter Data**

Transmit Frequencies: 174 Channels, range from low end of low channel 1618.75 MHz to high end of high channel 1626 MHz, channel spacing 41.6667 kHz.		
Satellite Name: S4 CROSSOVER		
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 <input checked="" type="checkbox"/> No <input type="checkbox"/> FEC Type: <u>  BCH(32,21)  </u> , FEC Rate: <u>    50 kbps    </u> ,	
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 <input type="checkbox"/> 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.
If transmitter has a beacon mode, can the beacon be commanded off?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
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 <u>  2  </u> BEAMWIDTH <u>  160  </u> 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).

<p>For Nongeostationary (Orbital Data)</p>	<p>For S4 CROSSOVER:          INCLINATION ANGLE <u>97.5</u>,          APOGEE IN KILOMETERS <u>525</u>,          PERIGEE IN KILOMETERS <u>525</u>,          ORBITAL PERIOD IN HOURS <u>1</u> AND FRACTIONS OF HOURS IN DECIMAL <u>.58</u>,          THE NUMBER OF SATELLITES IN THE SYSTEM <u>1</u>,</p> <p>For Iridium constellation:          INCLINATION ANGLE <u>86.4</u>,          APOGEE IN KILOMETERS <u>780</u>,          PERIGEE IN KILOMETERS <u>780</u>,          ORBITAL PERIOD IN HOURS <u>1</u> AND FRACTIONS OF HOURS IN DECIMAL <u>.73</u>,          THE NUMBER OF SATELLITES IN THE SYSTEM <u>66</u>,</p> <p>ORB =          ORB,97.5IN00525AP00525PE001.58H01NRT01          ORB,86.4IN00780AP00780PE001.73H66NRR01</p>	<p>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</p>
<p>For SunSynchronous Nongeostationary Orbits</p>	<p>Mean Local Time of Ascending Node (MLTAN) = 1745 For S4 Crossover</p>	<p>MLTAN IS THE ANGLE BETWEEN AN ORBIT'S ASCENDING NODE AND THE MEAN SUN, OFTEN EXPRESSED AS UNIT OF TIME (HH:MM)</p>

<p>FCC notes:</p> <ol style="list-style-type: none"> <li>1. Use S-Note S945.</li> <li>2. REM AGN, Cubesat, S4 CROSSOVER</li> </ol>
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**Receiver Data Iridium Satellite**

<p><b>Iridium Satellite Receive Specifications</b></p>		
<p>Receive Antenna Polarization (RAP)</p>	<p>RAP = RAP 01 R</p>	<p>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</p>
<p>Receive Antenna Orientation (RAZ)</p>	<p>RAZ = V00</p>	<p>THE EARTH STATION RECEIVER ANTENNA MINIMUM OPERATING ANGLE OF ELEVATION (RAZ), V00 TO V90, EXAMPLE, RAZ01 V00</p>

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 S4 CROSSOVER: INCLINATION ANGLE____97.5____, APOGEE IN KILOMETERS____525____, PERIGEE IN KILOMETERS____525____, ORBITAL PERIOD IN HOURS __1__ AND FRACTIONS OF HOURS IN DECIMAL_.58__, 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,97.5IN00525AP00525PE001.58H01NRT01 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	96	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 <input checked="" type="checkbox"/> Mission Payload Data <input checked="" type="checkbox"/>	SATELLITE HEALTH AND STATUS TELEMETRY AND/OR MISSION PAYLOAD DATA
FCC notes: 1. Use S-Note S945. 2. REM AGN, Cubesat, S4 CROSSOVER		

## From S4 CROSSOVER to the Globalstar Constellation

### Satellite Globalstar Simplex Transmitter Data

Transmit Frequency: 1615 MHz to 1617.5 MHz		
Satellite Name: S4 CROSSOVER		
Data Field	Data Answer	Description/Comments
Transmit Power (PWR)	PWR = .056 W	TRANSMIT POWER SUPPLIED TO THE ANTENNA INPUT TERMINAL, EXAMPLE, PWR01 W2 TRANSMIT POWER UNITS INCLUDE: W = WATT, K = KILOWATT, M = MEGAWATT
Necessary Bandwidth	2,500 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	BPSK	THE METHOD USED TO SUPERIMPOSE DATA ON THE CARRIER, EXAMPLE, BPSK, QPSK, GMSK.
Data Rate	0.1 kbps	INFORMATION DATA RATE
Forward Error Correction Coding	Is FEC used? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> FEC Type: <u>_24 bits per 9 byte packet_</u> FEC Rate: _____,	
Total Symbol Rate	0.1 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"/> 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.

If transmitter has a beacon mode, can the beacon be commanded off?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
Polarization (XAP)	XAP = XAP01 L	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 ___ 5 ___ BEAMWIDTH ___ 100 ___ XAD = XAD01 05G100B	(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 ANGLE ___ 97.5 ___, APOGEE IN KILOMETERS ___ 525 ___, PERIGEE IN KILOMETERS ___ 525 ___, ORBITAL PERIOD IN HOURS ___ 1 ___ AND FRACTIONS OF HOURS IN DECIMAL ___ .58 ___, THE NUMBER OF SATELLITES IN THE SYSTEM ___ 1 ___,  ORB = ORB,97.5IN00525AP00525PE001.58H01NRT01 ORB,52.0IN01414AP01414PE001.90H48NRR01	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

FCC notes:

3. Use S-Note S945.
4. REM AGN, Cubesat, S4 CROSSOVER

Receiver Data Globalstar Satellite Constellation

Satellite Receive Specifications		
Polarization (RAP)	RAP = RAP 01 T	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 __12__ BEAMWIDTH __037__ RAD = RAD01 12G037B	(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)	INCLINATION ANGLE __52__, APOGEE IN KILOMETERS __1414__, PERIGEE IN KILOMETERS __1414__, ORBITAL PERIOD IN HOURS __1__ AND FRACTIONS OF HOURS IN DECIMAL __.90__, THE NUMBER OF SATELLITES IN THE SYSTEM __48__,  ORB = ORB,52.0IN01414AP01414PE001.90H48NRR01	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

FCC notes:

5. Use S-Note S945.
6. REM AGN, Cubesat, S4 CROSSOVER

**Part B:****Iridium Constellation to S4 CROSSOVER:****Satellite Transmitter Data**

Transmit Frequencies: 174 Channels spaced 41.6667 kHz apart, plus ring tone. Low end of low channel 1618.75 MHz, High end of High channel 1626.2912 MHz.		
Satellite Name: IRIDIUM CONSTELLATION		
<b>Data Field</b>	<b>Data Answer</b>	<b>Description/Comments</b>
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).



<p>For Nongeostationary (Orbital Data)</p>	<p>For Iridium constellation:  INCLINATION ANGLE <u>86.4</u>,  APOGEE IN KILOMETERS <u>780</u>,  PERIGEE IN KILOMETERS <u>780</u>,  ORBITAL PERIOD IN HOURS <u>1</u> AND  FRACTIONS OF HOURS IN DECIMAL <u>.73</u>,  THE NUMBER OF SATELLITES IN THE  SYSTEM <u>66</u>,</p> <p>For S4 CROSSOVER:  INCLINATION ANGLE <u>97.5</u>,  APOGEE IN KILOMETERS <u>525</u>,  PERIGEE IN KILOMETERS <u>525</u>,  ORBITAL PERIOD IN HOURS <u>1</u> AND  FRACTIONS OF HOURS IN DECIMAL <u>.58</u>,  THE NUMBER OF SATELLITES IN THE  SYSTEM <u>1</u>,</p> <p>ORB =  ORB,86.4IN00780AP00780PE001.73H66NRT01  ORB,97.5IN00525AP00525PE001.58H01NRR01</p>	<p>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</p>
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<p>FCC notes:</p> <ol style="list-style-type: none"> <li>1. Use S-Note S945.</li> <li>2. REM AGN, Cubesat, S4 CROSSOVER</li> </ol>
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Receiver Data S4 CROSSOVER Satellite Iridium Transceiver Receive from Iridium Constellation

<b>Satellite Receive Specifications</b>		
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 <u>2</u> BEAMWIDTH <u>160</u> 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)	<p>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_____,</p> <p>For S4 CROSSOVER: INCLINATION ANGLE_____97.5_____, APOGEE IN KILOMETERS_____525_____, PERIGEE IN KILOMETERS_____525_____, ORBITAL PERIOD IN HOURS __1____ AND FRACTIONS OF HOURS IN DECIMAL_.58_____, THE NUMBER OF SATELLITES IN THE SYSTEM__1_____,</p> <p>ORB = ORB,86.4IN00780AP00780PE001.73H66NRT01 ORB,97.5IN00525AP00525PE001.58H01NRR01</p>	<p>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</p>