

# Ku-Band Spot Uplink/Ku-Band Spot Downlink 12.5-12.75 GHz

| UPLINK BEAM INFORMATION                     |           |             |             |             |           |           |
|---------------------------------------------|-----------|-------------|-------------|-------------|-----------|-----------|
| Uplink Beam Name                            | KUSPOT    | KUSPOT      | KUSPOT      | KUSPOT      | KUSPOT    | KUSPOT    |
| Uplink Frequency (GHz)                      | 14.25     | 14.25       | 14.25       | 14.25       | 14.25     | 14.25     |
| Uplink Beam Polarization                    | LINEAR    | LINEAR      | LINEAR      | LINEAR      | LINEAR    | LINEAR    |
| Uplink Relative Contour Level (dB)          | -4        | -4          | -4          | -4          | -4        | -4        |
| Uplink Contour G/T (dB/K)                   | 5.8       | 5.8         | 5.8         | 5.8         | 5.8       | 5.8       |
| Uplink SFD (dBW/m2)                         | -77.2     | -89.2       | -83.2       | -83.2       | -83.2     | -83.2     |
| Rain Rate (mm/hr)                           | 42        | 42          | 42          | 42          | 42        | 42        |
| DOWNLINK BEAM INFORMATION                   |           |             |             |             |           |           |
| Downlink Beam Name                          | KUSPOT    | KUSPOT      | KUSPOT      | KUSPOT      | KUSPOT    | KUSPOT    |
| Downlink Frequency (GHz)                    | 11.95     | 11.95       | 11.95       | 11.95       | 11.95     | 11.95     |
| Downlink Beam Polarization                  | LINEAR    | LINEAR      | LINEAR      | LINEAR      | LINEAR    | LINEAR    |
| Downlink Relative Contour Level (dB)        | -4        | -4          | -4          | -4          | -4        | -4        |
| Downlink Contour EIRP (dBW)                 | 43.7      | 43.7        | 43.7        | 43.7        | 43.7      | 43.7      |
| Rain Rate (mm/hr)                           | 42        | 42          | 42          | 42          | 42        | 42        |
| ADJACENT SATELLITE 1                        |           |             |             |             |           |           |
| Satellite 1 Orbital Location                | 31.5E     | 31.5E       | 31.5E       | 31.5E       | 31.5E     | 31.5E     |
| Uplink Power Density (dBW/Hz)               | -45       | -45         | -45         | -45         | -45       | -45       |
| Uplink Polarization Advantage (dB)          | 0         | 0           | 0           | 0           | 0         | 0         |
| Downlink EIRP Density (dBW/Hz)              | -21.4     | -21.4       | -21.4       | -21.4       | -21.4     | -21.4     |
| Downlink Polarization Advantage (dB)        | 0         | 0           | 0           | 0           | 0         | 0         |
| ADJACENT SATELLITE 2                        |           |             |             |             |           |           |
| Satellite 1 Orbital Location                | 34.9E     | 34.9E       | 34.9E       | 34.9E       | 34.9E     | 34.9E     |
| Uplink Power Density (dBW/Hz)               | -45       | -45         | -45         | -45         | -45       | -45       |
| Uplink Polarization Advantage (dB)          | 0         | 0           | 0           | 0           | 0         | 0         |
| Downlink EIRP Density (dBW/Hz)              | -20.0     | -20.0       | -20.0       | -20.0       | -20.0     | -20.0     |
| Downlink Polarization Advantage (dB)        | 0         | 0           | 0           | 0           | 0         | 0         |
| CARRIER INFORMATION                         |           |             |             |             |           |           |
| Carrier ID                                  | 36M0F3F   | 77M0G7W     | 10M3G7W     | 100KG7W     | 1M45G7W   | 400KG7W   |
| Carrier Modulation                          | TV/FM     | QPSK        | QPSK        | QPSK        | BPSK      | BPSK      |
| Peak to Peak Bandwidth of EDS (MHz)         | 4         | N/A         | N/A         | N/A         | N/A       | N/A       |
| Information Rate(kbps)                      | N/A       | 52563       | 6000        | 64          | 512       | 128       |
| Code Rate                                   | N/A       | 1/2x188/204 | 1/2x188/204 | 1/2x239/256 | R1/2      | R1/2      |
| Occupied Bandwidth(kHz)                     | 36000     | 64451       | 6771.1      | 75.4        | 1229      | 307       |
| Allocated Bandwidth(kHz)                    | 36000     | 77000       | 10300       | 100         | 1450      | 400       |
| Minimum C/N, Clear Sky (dB)                 | 10        | 3.36        | 3.87        | 2.99        | 3.4       | 3.4       |
| Minimum C/N, Rain (dB)                      | 10        | 3.36        | 3.57        | 2.79        | 2.7       | 2.7       |
| UPLINK EARTH STATION                        |           |             |             |             |           |           |
| Earth Station Diameter (meters)             | 3.7       | 2.4         | 1.8         | 1.8         | 1.8       | 1.8       |
| Earth Station Gain (dBi)                    | 52.7      | 49          | 46.4        | 46.4        | 46.4      | 46.4      |
| Earth Station Elevation Angle               | 20        | 20          | 20          | 20          | 20        | 20        |
| DOWNLINK EARTH STATION                      |           |             |             |             |           |           |
| Earth Station Diameter (meters)             | 11.0      | 3.0         | 6.1         | 6.1         | 7.0       | 6.1       |
| Earth Station Gain (dBi)                    | 60.4      | 49.2        | 55.5        | 55.5        | 57.0      | 55.5      |
| Earth Station G/T (dB/K)                    | 38.0      | 26.7        | 33.1        | 33.1        | 34.6      | 33.1      |
| Earth Station Elevation Angle               | 20        | 20          | 20          | 20          | 20        | 20        |
| LINK FADE TYPE                              |           |             |             |             |           |           |
| Clear Sky                                   | Clear Sky | Clear Sky   | Clear Sky   | Clear Sky   | Clear Sky | Clear Sky |
| UPLINK PERFORMANCE                          |           |             |             |             |           |           |
| Uplink Earth Station EIRP (dBW)             | 75.2      | 73.7        | 61.2        | 40.7        | 52.3      | 46.7      |
| Uplink Path Loss, Clear Sky (dB)            | -207.5    | -207.5      | -207.5      | -207.5      | -207.5    | -207.5    |
| Uplink Rain Attenuation                     | 0.0       | 0.0         | 0.0         | 0.0         | 0.0       | 0.0       |
| Satellite G/T(dB/K)                         | 5.8       | 5.8         | 5.8         | 5.8         | 5.8       | 5.8       |
| Boltzman Constant(dBW/K-Hz)                 | 228.6     | 228.6       | 228.6       | 228.6       | 228.6     | 228.6     |
| Carrier Noise Bandwidth (dB-Hz)             | -75.6     | -78.1       | -68.3       | -48.8       | -60.9     | -54.9     |
| Uplink C/N(dB)                              | 26.6      | 22.5        | 19.8        | 18.9        | 18.4      | 18.8      |
| DOWNLINK PERFORMANCE                        |           |             |             |             |           |           |
| Downlink EIRP per Carrier (dBW)             | 38.2      | 43.7        | 30.2        | 9.7         | 21.3      | 15.7      |
| Antenna Pointing Error (dB)                 | -0.5      | -0.5        | -0.5        | -0.5        | -0.5      | -0.5      |
| Downlink Path Loss, Clear Sky (dB)          | -205.9    | -205.9      | -205.9      | -205.9      | -205.9    | -205.9    |
| Downlink Rain Attenuation                   | 0.0       | 0.0         | 0.0         | 0.0         | 0         | 0         |
| Earth Station G/T (dB/K)                    | 38.0      | 26.7        | 33.1        | 33.1        | 34.6      | 33.1      |
| Boltzman Constant(dBW / K - Hz)             | 228.6     | 228.6       | 228.6       | 228.6       | 228.6     | 228.6     |
| Carrier Noise Bandwidth (dB-Hz)             | -75.6     | -78.1       | -68.3       | -48.8       | -60.9     | -54.9     |
| Downlink C / N(dB)                          | 22.8      | 14.4        | 17.1        | 16.2        | 17.2      | 16.1      |
| COMPOSITE LINK PERFORMANCE                  |           |             |             |             |           |           |
| C/N Uplink (dB)                             | 26.6      | 22.5        | 19.8        | 18.9        | 18.4      | 18.8      |
| C/N Downlink (dB)                           | 22.8      | 14.4        | 17.1        | 16.2        | 17.2      | 16.1      |
| C/I Intermodulation (dB)                    | N/A       | N/A         | 19.0        | 18.0        | 17.5      | 17.9      |
| C/I Uplink Co-Channel (dB)*                 | 28.9      | 28.6        | 27.4        | 27.0        | 27.0      | 27.0      |
| C/I Downlink Co-Channel (dB)*               | 28.9      | 28.6        | 27.4        | 27.0        | 27.0      | 27.0      |
| C/I Uplink Adjacent Satellite 1 (dB)        | 19.3      | 15.3        | 12.6        | 11.6        | 11.1      | 11.5      |
| C/I Downlink Adjacent Satellite 1 (dB)      | 19.4      | 10.5        | 13.6        | 12.6        | 13.7      | 12.5      |
| C/I Uplink Adjacent Satellite 2 (dB)        | 22.6      | 18.6        | 15.9        | 14.9        | 14.4      | 14.9      |
| C/I Downlink Adjacent Satellite 2 (dB)      | 21.7      | 13.9        | 16.2        | 15.2        | 16.2      | 15.2      |
| C/(N+I) Composite (dB)                      | 13.4      | 6.6         | 7.1         | 6.1         | 6.3       | 6.1       |
| Required System Margin (dB)                 | -1.0      | -1.0        | -1.0        | -1.0        | -1.0      | -1.0      |
| Net C/(N+I) Composite (dB)                  | 12.4      | 5.6         | 6.1         | 5.1         | 5.3       | 5.1       |
| Minimum Required C/N (dB)                   | -10.0     | -3.4        | -3.9        | -3.0        | -3.4      | -3.4      |
| Excess Link Margin (dB)                     | 2.4       | 2.2         | 2.2         | 2.1         | 1.9       | 1.7       |
| Number of Carriers                          | 2         | 1           | 10          | 1120        | 77        | 280       |
| CARRIER DENSITY LEVELS                      |           |             |             |             |           |           |
| Uplink Power Density (dBW/Hz)               | -53.1     | -53.4       | -53.5       | -54.5       | -55.0     | -54.5     |
| Downlink EIRP Density At Beam Peak (dBW/Hz) | -33.4     | -30.4       | -34.1       | -35.1       | -35.6     | -35.1     |

## Ku-Band Spot Uplink/Ku-Band Spot Downlink 10.95-11.2 & 11.45-11.7 GHz

| UPLINK BEAM INFORMATION                     |           |             |             |             |           |           |             |
|---------------------------------------------|-----------|-------------|-------------|-------------|-----------|-----------|-------------|
| Uplink Beam Name                            | KUSPOT    | KUSPOT      | KUSPOT      | KUSPOT      | KUSPOT    | KUSPOT    | KUSPOT      |
| Uplink Frequency (GHz)                      | 14.25     | 14.25       | 14.25       | 14.25       | 14.25     | 14.25     | 14.25       |
| Uplink Beam Polarization                    | LINEAR    | LINEAR      | LINEAR      | LINEAR      | LINEAR    | LINEAR    | LINEAR      |
| Uplink Relative Contour Level (dB)          | -4        | -4          | -4          | -4          | -4        | -4        | -4          |
| Uplink Contour G/T (dB/K)                   | 5.8       | 5.8         | 5.8         | 5.8         | 5.8       | 5.8       | 5.8         |
| Uplink SFD (dBW/m2)                         | -77.2     | -89.2       | -83.2       | -83.2       | -83.2     | -83.2     | -89.2       |
| Rain Rate (mm/hr)                           | 42        | 42          | 42          | 42          | 42        | 42        | 42          |
| DOWNLINK BEAM INFORMATION                   |           |             |             |             |           |           |             |
| Downlink Beam Name                          | KUSPOT    | KUSPOT      | KUSPOT      | KUSPOT      | KUSPOT    | KUSPOT    | KUSPOT      |
| Downlink Frequency (GHz)                    | 11.95     | 11.95       | 11.95       | 11.95       | 11.95     | 11.95     | 11.95       |
| Downlink Beam Polarization                  | LINEAR    | LINEAR      | LINEAR      | LINEAR      | LINEAR    | LINEAR    | CIRCULAR    |
| Downlink Relative Contour Level (dB)        | -4        | -4          | -4          | -4          | -4        | -4        | -4          |
| Downlink Contour EIRP (dBW)                 | 43.7      | 43.7        | 43.7        | 43.7        | 43.7      | 43.7      | 43.7        |
| Rain Rate (mm/hr)                           | 42        | 42          | 42          | 42          | 42        | 42        | 42          |
| ADJACENT SATELLITE 1                        |           |             |             |             |           |           |             |
| Satellite 1 Orbital Location                | 31.5E     | 31.5E       | 31.5E       | 31.5E       | 31.5E     | 31.5E     | 31.5E       |
| Uplink Power Density (dBW/Hz)               | -45       | -45         | -45         | -45         | -45       | -45       | -45         |
| Uplink Polarization Advantage (dB)          | 0         | 0           | 0           | 0           | 0         | 0         | 0           |
| Downlink EIRP Density (dBW/Hz)              | -20.0     | -20.0       | -20.0       | -20.0       | -20.0     | -20.0     | -20.0       |
| Downlink Polarization Advantage (dB)        | 0         | 0           | 0           | 0           | 0         | 0         | 0           |
| ADJACENT SATELLITE 2                        |           |             |             |             |           |           |             |
| Satellite 1 Orbital Location                | 34.9E     | 34.9E       | 34.9E       | 34.9E       | 34.9E     | 34.9E     | 34.9E       |
| Uplink Power Density (dBW/Hz)               | -45       | -45         | -45         | -45         | -45       | -45       | -45         |
| Uplink Polarization Advantage (dB)          | 0         | 0           | 0           | 0           | 0         | 0         | 0           |
| Downlink EIRP Density (dBW/Hz)              | -20.0     | -20.0       | -20.0       | -20.0       | -20.0     | -20.0     | -20.0       |
| Downlink Polarization Advantage (dB)        | 0         | 0           | 0           | 0           | 0         | 0         | 0           |
| CARRIER INFORMATION                         |           |             |             |             |           |           |             |
| Carrier ID                                  | 36M0F3F   | 77M0G7W     | 10M3G7W     | 100K67W     | 1M45G7W   | 400K67W   | 112M0G7W    |
| Carrier Modulation                          | TV/FM     | QPSK        | QPSK        | QPSK        | BPSK      | BPSK      | QPSK        |
| Peak to Peak Bandwidth of EDS (MHz)         | 4         | N/A         | N/A         | N/A         | N/A       | N/A       | N/A         |
| Information Rate(kbps)                      | N/A       | 52563       | 6000        | 64          | 512       | 128       | 86015       |
| Code Rate                                   | N/A       | 1/2x188/204 | 1/2x188/204 | 1/2x239/256 | R1/2      | R1/2      | 1/2x188/204 |
| Occupied Bandwidth(kHz)                     | 36000     | 64451       | 6771.1      | 75.4        | 1229      | 307       | 93335       |
| Allocated Bandwidth(kHz)                    | 36000     | 77000       | 10300       | 100         | 1450      | 400       | 112000      |
| Minimum C/N, Clear Sky (dB)                 | 10        | 3.36        | 3.87        | 2.99        | 3.4       | 3.4       | 3.36        |
| Minimum C/N, Rain (dB)                      | 10        | 3.36        | 3.57        | 2.79        | 2.7       | 2.7       | 3.36        |
| UPLINK EARTH STATION                        |           |             |             |             |           |           |             |
| Earth Station Diameter (meters)             | 3.7       | 2.4         | 1.8         | 1.8         | 1.8       | 1.8       | 3.0         |
| Earth Station Gain (dBi)                    | 52.7      | 49          | 46.4        | 46.4        | 46.4      | 46.4      | 49.7        |
| Earth Station Elevation Angle               | 20        | 20          | 20          | 20          | 20        | 20        | 20          |
| DOWNLINK EARTH STATION                      |           |             |             |             |           |           |             |
| Earth Station Diameter (meters)             | 11.0      | 3.0         | 6.1         | 7.0         | 7.0       | 7.0       | 3.7         |
| Earth Station Gain (dBi)                    | 60.4      | 49.2        | 55.5        | 57.0        | 57.0      | 57.0      | 51.1        |
| Earth Station G/T (dB/K)                    | 38.0      | 26.7        | 33.1        | 34.6        | 34.6      | 34.6      | 28.6        |
| Earth Station Elevation Angle               | 20        | 20          | 20          | 20          | 20        | 20        | 20          |
| LINK FADE TYPE                              |           |             |             |             |           |           |             |
| UPLINK PERFORMANCE                          | Clear Sky | Clear Sky   | Clear Sky   | Clear Sky   | Clear Sky | Clear Sky | Clear Sky   |
| Uplink Earth Station EIRP (dBW)             | 75.2      | 73.7        | 61.2        | 40.7        | 52.3      | 46.7      | 73.7        |
| Uplink Path Loss, Clear Sky (dB)            | -207.5    | -207.5      | -207.5      | -207.5      | -207.5    | -207.5    | -207.5      |
| Uplink Rain Attenuation                     | 0.0       | 0.0         | 0.0         | 0.0         | 0.0       | 0.0       | 0.0         |
| Satellite G/T(dB/K)                         | 5.8       | 5.8         | 5.8         | 5.8         | 5.8       | 5.8       | 5.8         |
| Boltzman Constant(dBW/K-Hz)                 | 228.6     | 228.6       | 228.6       | 228.6       | 228.6     | 228.6     | 228.6       |
| Carrier Noise Bandwidth (dB-Hz)             | -75.6     | -78.1       | -68.3       | -48.8       | -60.9     | -54.9     | -79.7       |
| Uplink C/N(dB)                              | 26.6      | 22.5        | 19.8        | 18.9        | 18.4      | 18.8      | 20.9        |
| DOWNLINK PERFORMANCE                        |           |             |             |             |           |           |             |
| Downlink EIRP per Carrier (dBW)             | 38.2      | 43.7        | 30.2        | 9.7         | 21.3      | 15.7      | 43.7        |
| Antenna Pointing Error (dB)                 | -0.5      | -0.5        | -0.5        | -0.5        | -0.5      | -0.5      | -0.5        |
| Downlink Path Loss, Clear Sky (dB)          | -205.9    | -205.9      | -205.9      | -205.9      | -205.9    | -205.9    | -205.9      |
| Downlink Rain Attenuation                   | 0.0       | 0.0         | 0.0         | 0.0         | 0         | 0         | 0.0         |
| Earth Station G/T (dB/K)                    | 38.0      | 26.7        | 33.1        | 34.6        | 34.6      | 34.6      | 28.6        |
| Boltzman Constant(dBW / K - Hz)             | 228.6     | 228.6       | 228.6       | 228.6       | 228.6     | 228.6     | 228.6       |
| Carrier Noise Bandwidth (dB-Hz)             | -75.6     | -78.1       | -68.3       | -48.8       | -60.9     | -54.9     | -79.7       |
| Downlink C / N(dB)                          | 22.8      | 14.4        | 17.1        | 17.7        | 17.2      | 17.6      | 14.7        |
| COMPOSITE LINK PERFORMANCE                  |           |             |             |             |           |           |             |
| C/N Uplink (dB)                             | 26.6      | 22.5        | 19.8        | 18.9        | 18.4      | 18.8      | 20.9        |
| C/N Downlink (dB)                           | 22.8      | 14.4        | 17.1        | 17.7        | 17.2      | 17.6      | 14.7        |
| C/I Intermodulation (dB)                    | N/A       | N/A         | 19.0        | 18.0        | 17.5      | 17.9      | N/A         |
| C/I Uplink Co-Channel (dB)*                 | 28.9      | 28.6        | 27.4        | 27.0        | 27.0      | 27.0      | 27.0        |
| C/I Downlink Co-Channel (dB)*               | 28.9      | 28.6        | 27.4        | 27.0        | 27.0      | 27.0      | 27.0        |
| C/I Uplink Adjacent Satellite 1 (dB)        | 19.3      | 15.3        | 12.6        | 11.6        | 11.1      | 11.5      | 13.7        |
| C/I Downlink Adjacent Satellite 1 (dB)      | 18.0      | 9.1         | 12.2        | 12.8        | 12.3      | 12.7      | 9.6         |
| C/I Uplink Adjacent Satellite 2 (dB)        | 22.6      | 18.6        | 15.9        | 14.9        | 14.4      | 14.9      | 17.0        |
| C/I Downlink Adjacent Satellite 2 (dB)      | 21.7      | 13.9        | 16.2        | 16.7        | 16.2      | 16.6      | 14.1        |
| C/(N+I) Composite (dB)                      | 13.0      | 6.0         | 6.7         | 6.5         | 6.0       | 6.4       | 5.9         |
| Required System Margin (dB)                 | -1.0      | -1.0        | -1.0        | -1.0        | -1.0      | -1.0      | -1.0        |
| Net C/(N+I) Composite (dB)                  | 12.0      | 5.0         | 5.7         | 5.5         | 5.0       | 5.4       | 4.9         |
| Minimum Required C/N (dB)                   | -10.0     | -3.4        | -3.9        | -3.0        | -3.4      | -3.4      | -3.4        |
| Excess Link Margin (dB)                     | 2.0       | 1.6         | 1.8         | 2.5         | 1.6       | 2.0       | 1.5         |
| Number of Carriers                          | 2         | 1           | 10          | 1120        | 77        | 280       | 1           |
| CARRIER DENSITY LEVELS                      |           |             |             |             |           |           |             |
| Uplink Power Density (dBW/Hz)               | -53.1     | -53.4       | -53.5       | -54.5       | -55.0     | -54.5     | -55.7       |
| Downlink EIRP Density At Beam Peak (dBW/Hz) | -33.4     | -30.4       | -34.1       | -35.1       | -35.6     | -35.1     | -32.0       |