

| Link Parameters                          | Riverside, CA          | Riverside, CA                | Riverside, CA                | Cheyenne, WY           | Cheyenne, WY                 | Cheyenne, WY                 | Germantown, MD         | Germantown, MD               | Germantown, MD               |
|--|------------------------|------------------------------|------------------------------|------------------------|------------------------------|------------------------------|------------------------|------------------------------|------------------------------|
|  | Gateway<br>(clear-sky) | Gateway<br>(faded uplink #1) | Gateway<br>(faded uplink #2) | Gateway<br>(clear-sky) | Gateway<br>(faded uplink #1) | Gateway<br>(faded uplink #2) | Gateway<br>(clear-sky) | Gateway<br>(faded uplink #1) | Gateway<br>(faded uplink #2) |
| <b>Modulation Parameters:</b>            |                        |                              |                              |                        |                              |                              |                        |                              |                              |
| Information Bit Rate                     | (kbps)                 | 448,200                      | 448,200                      | 448,200                | 448,200                      | 448,200                      | 448,200                | 448,200                      | 448,200                      |
| FEC Rate                                 |                        | 0.7470                       | 0.7470                       | 0.7470                 | 0.7470                       | 0.7470                       | 0.7470                 | 0.7470                       | 0.7470                       |
| Modulation Type (BPSK/QPSK/8PSK/16QAM)   |                        | 8PSK                         | 8PSK                         | 8PSK                   | 8PSK                         | 8PSK                         | 8PSK                   | 8PSK                         | 8PSK                         |
| <b>Link Geometry:</b>                    |                        |                              |                              |                        |                              |                              |                        |                              |                              |
| Satellite Longitude                      | (°East)                | -65.0                        | -65.0                        | -65.0                  | -65.0                        | -65.0                        | -65.0                  | -65.0                        | -65.0                        |
| Tx E/S City Location                     | (name)                 | Riverside                    | Riverside                    | Riverside              | Cheyenne                     | Cheyenne                     | Cheyenne               | Germantown                   | Germantown                   |
| Tx E/S Longitude                         | (°East)                | -117.4                       | -117.4                       | -117.4                 | -104.8                       | -104.8                       | -104.8                 | -77.3                        | -77.3                        |
| Tx E/S Latitude                          | (°North)               | 34.0                         | 34.0                         | 34.0                   | 41.1                         | 41.1                         | 41.1                   | 39.2                         | 39.2                         |
| Tx E/S Range to Satellite                | (km)                   | 39,321                       | 39,321                       | 39,321                 | 38,825                       | 38,825                       | 38,825                 | 37,564                       | 37,564                       |
| Tx E/S Elevation to Satellite            | (°)                    | 22.4                         | 22.4                         | 22.4                   | 27.6                         | 27.6                         | 27.6                   | 42.9                         | 42.9                         |
| Rx E/S City Location                     | (name)                 | Rio de Janeiro               | Rio de Janeiro               | Rio de Janeiro         | Rio de Janeiro               | Rio de Janeiro               | Rio de Janeiro         | Rio de Janeiro               | Rio de Janeiro               |
| Rx E/S Longitude                         | (°East)                | -43.3                        | -43.3                        | -43.3                  | -43.3                        | -43.3                        | -43.3                  | -43.3                        | -43.3                        |
| Rx E/S Latitude                          | (°North)               | -22.9                        | -22.9                        | -22.9                  | -22.9                        | -22.9                        | -22.9                  | -22.9                        | -22.9                        |
| Rx E/S Range to Satellite                | (km)                   | 36,853                       | 36,853                       | 36,853                 | 36,853                       | 36,853                       | 36,853                 | 36,853                       | 36,853                       |
| Rx E/S Elevation to Satellite            | (°)                    | 53.7                         | 53.7                         | 53.7                   | 53.7                         | 53.7                         | 53.7                   | 53.7                         | 53.7                         |
| <b>Uplink (per carrier):</b>             |                        |                              |                              |                        |                              |                              |                        |                              |                              |
| Carrier Frequency                        | (MHz)                  | 29,000                       | 29,000                       | 29,000                 | 29,000                       | 29,000                       | 29,000                 | 29,000                       | 29,000                       |
| HPA Power Level                          | (W)                    | 2.65                         | 26.62                        | 50.00                  | 5.90                         | 18.91                        | 50.00                  | 2.65                         | 43.04                        |
| HPA Power in dBW                         | (dBW)                  | 4.2                          | 14.3                         | 17.0                   | 7.7                          | 12.8                         | 17.0                   | 4.2                          | 16.3                         |
| Post-HPA Losses                          | (dB)                   | 1.0                          | 1.0                          | 1.0                    | 1.0                          | 1.0                          | 1.0                    | 1.0                          | 1.0                          |
| Tx E/S Power to Antenna in dBW           | (dBW)                  | 3.2                          | 13.3                         | 16.0                   | 6.7                          | 11.8                         | 16.0                   | 3.2                          | 15.3                         |
| PSD into Tx E/S Antenna                  | (dBW/Hz)               | -80.7                        | -70.7                        | -68.0                  | -77.3                        | -72.2                        | -68.0                  | -80.7                        | -68.6                        |
| Tx E/S Antenna Diameter                  | (m)                    | 13.2                         | 13.2                         | 13.2                   | 8.1                          | 8.1                          | 8.1                    | 13.2                         | 13.2                         |
| Tx E/S Antenna Gain                      | (dB)                   | 68.8                         | 68.8                         | 68.8                   | 65.3                         | 65.3                         | 65.3                   | 68.8                         | 68.8                         |
| Tx E/S EIRP per Carrier                  | (dBW)                  | 72.0                         | 82.0                         | 84.8                   | 72.0                         | 77.1                         | 81.3                   | 72.0                         | 84.1                         |
| E/S Pointing Loss                        | (dB)                   | 0.5                          | 0.5                          | 0.5                    | 0.5                          | 0.5                          | 0.5                    | 0.5                          | 0.5                          |
| Atmospheric Loss                         | (dB)                   | 1.17                         | 1.17                         | 1.17                   | 0.79                         | 0.79                         | 0.79                   | 0.69                         | 0.69                         |
| Availability up                          | (%)                    | 50.00                        | 99.90                        | 99.98                  | 50.00                        | 99.90                        | 99.99                  | 50.00                        | 99.90                        |
| Rain attenuation                         | (dB)                   | 0.3                          | 10.3                         | 20.6                   | 0.1                          | 5.2                          | 13.6                   | 0.3                          | 12.5                         |
| Free Space Loss                          | (dB)                   | 213.6                        | 213.6                        | 213.6                  | 213.5                        | 213.5                        | 213.5                  | 213.2                        | 213.2                        |
| <b>Satellite:</b>                        |                        |                              |                              |                        |                              |                              |                        |                              |                              |
| G/T towards Tx E/S                       | (dB/K)                 | 17.0                         | 17.0                         | 17.0                   | 17.0                         | 17.0                         | 17.0                   | 17.0                         | 17.0                         |
| Output Back-Off (Aggregate across txpdr) | (dB)                   | -3.0                         | -3.0                         | -3.0                   | -3.0                         | -3.0                         | -3.0                   | -3.0                         | -3.0                         |
| EIRP per Carrier towards Rx E/S          | (dBW)                  | 62.8                         | 62.8                         | 62.8                   | 62.8                         | 62.8                         | 62.8                   | 62.8                         | 62.8                         |
| EIRP SD                                  | (dBW/Hz)               | -21.2                        | -21.2                        | -21.2                  | -21.2                        | -21.2                        | -21.2                  | -21.2                        | -21.2                        |
| <b>Downlink:</b>                         |                        |                              |                              |                        |                              |                              |                        |                              |                              |
| Carrier Frequency                        | (MHz)                  | 18,300                       | 18,300                       | 18,300                 | 18,300                       | 18,300                       | 18,300                 | 18,300                       | 18,300                       |
| Atmospheric Loss                         | (dB)                   | 0.39                         | 0.39                         | 0.39                   | 0.39                         | 0.39                         | 0.39                   | 0.39                         | 0.39                         |
| Availability down                        | (%)                    | 90.00                        | 90.00                        | 90.00                  | 90.00                        | 90.00                        | 90.00                  | 90.00                        | 90.00                        |
| Rain attenuation                         | (dB)                   | 0.3                          | 0.3                          | 0.3                    | 0.3                          | 0.3                          | 0.3                    | 0.5                          | 0.5                          |
| E/S Pointing Loss                        | (dB)                   | 0.25                         | 0.25                         | 0.25                   | 0.25                         | 0.25                         | 0.25                   | 0.25                         | 0.25                         |
| Free Space Loss                          | (dB)                   | 209.0                        | 209.0                        | 209.0                  | 209.0                        | 209.0                        | 209.0                  | 209.0                        | 209.0                        |
| Rx E/S Antenna Diameter                  | (m)                    | 0.74                         | 0.74                         | 0.74                   | 0.74                         | 0.74                         | 0.74                   | 0.74                         | 0.74                         |
| Rx E/S Antenna Gain                      | (dB)                   | 40.8                         | 40.8                         | 40.8                   | 40.8                         | 40.8                         | 40.8                   | 40.8                         | 40.8                         |
| Rx E/S G/T (clear-sky)                   | (dB/K)                 | 17.8                         | 17.8                         | 17.8                   | 17.8                         | 17.8                         | 17.8                   | 17.8                         | 17.8                         |
| System (LNA+Sky) Noise Temp.             | (K)                    | 200                          | 200                          | 200                    | 200                          | 200                          | 200                    | 200                          | 200                          |
| Increase in Noise Temp due to rain       | (K)                    | 41                           | 41                           | 41                     | 41                           | 41                           | 41                     | 56                           | 56                           |
| <b>Total Link:</b>                       |                        |                              |                              |                        |                              |                              |                        |                              |                              |
| Carrier Noise Bandwidth                  | (kHz)                  | 250,000                      | 250,000                      | 250,000                | 250,000                      | 250,000                      | 250,000                | 250,000                      | 250,000                      |
| (C/N) - Thermal Uplink                   | (dB)                   | 18.1                         | 18.1                         | 10.6                   | 18.7                         | 18.7                         | 14.6                   | 18.9                         | 18.9                         |
| (C/N) - Thermal Downlink                 | (dB)                   | 15.3                         | 15.3                         | 15.3                   | 15.3                         | 15.3                         | 15.0                   | 15.0                         | 15.0                         |
| (C/I) - Other Link Degradations          | (dB)                   | 15.0                         | 15.0                         | 15.0                   | 15.0                         | 15.0                         | 15.0                   | 15.0                         | 15.0                         |
| (C/N) - Total Actual                     | (dB)                   | 11.2                         | 11.2                         | 8.3                    | 11.3                         | 11.3                         | 10.2                   | 11.2                         | 11.2                         |
| (C/N) - Total Required                   | (dB)                   | 8.2                          | 8.2                          | 8.2                    | 8.2                          | 8.2                          | 8.2                    | 8.2                          | 8.2                          |
| Excess Margin                            | (dB)                   | 3.0                          | 3.0                          | 0.1                    | 3.1                          | 3.1                          | 2.0                    | 3.0                          | 3.0                          |