

# ECHOSTAR-86.5W Link Budgets

|   |          | High Power Mode  |  |  |
|---|----------|--|--|--|
| Link Parameters                                     |          | 1  | 2  | 3  |
|   |          | 13 meter Feeder Link<br>E/S<br>Nominal Feeder Link<br>Site | 13 meter Feeder Link<br>E/S<br>Nominal Feeder Link<br>Site | 13 meter Feeder Link<br>E/S<br>Nominal Feeder Link<br>Site |
|   |          | to   | to   | to   |
|   |          | 45 cm Receive-Only   | 45 cm Receive-Only   | 45 cm Receive-Only   |
| <b>Modulation Parameters:</b>                       |          |  |  |  |
| Information Bit Rate per Carrier                    | (kbps)   | 41,200   | 41,200   | 41,200   |
| FEC Rate  |          | 2/3  | 2/3  | 2/3  |
| Overall Coding Overhead                             | (%)      | 56.5%  | 56.5%  | 56.5%  |
| Modulation Type (BPSK/QPSK/8PSK/16QAM)              |          | 8PSK   | 8PSK   | 8PSK   |
| Filter Roll-off Factor ("alpha")                    | (%)      | 20   | 20   | 20   |
| <b>Link Geometry:</b>                               |          |  |  |  |
| Satellite Longitude                                 | (°East)  | -86.5  | -86.5  | -86.5  |
| Tx E/S City Location                                | (name)   | Cheyenne   | Cheyenne   | Cheyenne   |
| Tx E/S Longitude                                    | (°East)  | -104.7   | -104.7   | -104.7   |
| Tx E/S Latitude                                     | (°North) | 41.1   | 41.1   | 41.1   |
| Tx E/S Range to Satellite                           | (Km)     | 37,865   | 37,865   | 37,865   |
| Tx E/S Elevation to Satellite                       | (°)      | 38.9   | 38.9   | 38.9   |
| Tx E/S Altitude                                     | (m)      | 1876.0   | 1876.0   | 1876.0   |
| Rx E/S City Location                                | (name)   | Miami  | New York   | Los Angeles  |
| Rx E/S Longitude                                    | (°East)  | -80.3  | -74.0  | -118.2   |
| Rx E/S Latitude                                     | (°North) | 25.9   | 40.8   | 34.0   |
| Rx E/S Range to Satellite                           | (km)     | 36,571   | 37,692   | 37,934   |
| Rx E/S Elevation to Satellite                       | (°)      | 59.0   | 41.2   | 38.0   |
| Rx E/S Altitude                                     | (m)      | 1.0  | 15.0   | 33.0   |
| <b>Link (per carrier):</b>                          |          |  |  |  |
| Carrier Frequency                                   | (MHz)    | 17,550   | 17,550   | 17,550   |
| HPA Power Level (to give required PFD at satellite) | (W)      | 4.2  | 4.2  | 4.2  |
| HPA Power in dBW                                    | (dBW)    | 6.3  | 6.3  | 6.3  |
| Post-HPA Losses                                     | (dB)     | 2.0  | 2.0  | 2.0  |
| Tx E/S Power to Antenna in dBW                      | (dBW)    | 4.3  | 4.3  | 4.3  |
| Tx E/S Antenna Diameter                             | (m)      | 13.0   | 13.0   | 13.0   |
| Antenna Efficiency                                  | (%)      | 65   | 65   | 65   |
| Tx E/S Antenna Gain                                 | (dB)     | 65.7   | 65.7   | 65.7   |
| Tx E/S EIRP   | (dBW)    | 70.0   | 70.0   | 70.0   |
| E/S Pointing Loss                                   | (dB)     | 0.1  | 0.1  | 0.1  |
| Atmospheric Loss                                    | (dB)     | 0.30   | 0.30   | 0.30   |
| Availability up                                     | (%)      | 99.9   | 99.9   | 99.9   |