# Table A.1: DIRECTV 1R Link Budgets

| **UPLINK BEAM INFORMATION** | | |
|---|---|---|
| Uplink Beam Name | RUSSIA | RUSSIA |
| Uplink Frequency (GHz) | 17.450 | 17.450 |
| Uplink Beam Polarization | CIRCULAR | CIRCULAR |
| Uplink Relative Contour Level (dB) | -6.0 | -6.0 |
| Uplink Contour G/T (dB/K) | 0.8 | 0.8 |
| Uplink SFD (dBW/m2) | -79.8 | -79.8 |
| Rain Rate (mm/hr) | 22.0 | 22.0 |
| **DOWNLINK BEAM INFORMATION** | | |
| Downlink Beam Name | RUSSIA | RUSSIA |
| Downlink Frequency (GHz) | 12.350 | 12.350 |
| Downlink Beam Polarization | CIRCULAR | CIRCULAR |
| Downlink Relative Contour Level (dB) | -6.0 | -6.0 |
| Downlink Contour EIRP (dBW) | 51.8 | 51.8 |
| Rain Rate (mm/hr) | 22.0 | 22.0 |
| **ADJACENT SATELLITE 1** | | |
| Satellite 1 Orbital Location | 51.2E | 51.2E |
| Uplink Power Density (dBW/Hz) | -45.0 | -45.0 |
| Uplink Polarization Advantage (dB) | 0.0 | 0.0 |
| Downlink EIRP Density (dBW/Hz) | -21.4 | -21.4 |
| Downlink Polarization Advantage (dB) | 0.0 | 0.0 |
| **ADJACENT SATELLITE 2** | | |
| Satellite 1 Orbital Location | 60.3E | 60.3E |
| Uplink Power Density (dBW/Hz) | -45.0 | -45.0 |
| Uplink Polarization Advantage (dB) | 0.0 | 0.0 |
| Downlink EIRP Density (dBW/Hz) | -26.2 | -26.2 |
| Downlink Polarization Advantage (dB) | 0.0 | 0.0 |
| **CARRIER INFORMATION** | | |
| Carrier ID | 24M0G7W | 24M0G7W |
| Carrier Modulation | QPSK | QPSK |
| Peak to Peak Bandwidth of EDS (MHz) | N/A | N/A |
| Information Rate(kbps) | 16383 | 16383 |
| Code Rate | 1/2x188/204 | 1/2x188/204 |
| Occupied Bandwidth(kHz) | 20089 | 20089 |
| Allocated Bandwidth(kHz) | 24000 | 24000 |
| Minimum C/N, Clear Sky (dB) | 3.36 | 3.36 |
| Minimum C/N, Rain (dB) | 3.36 | 3.36 |
| **UPLINK EARTH STATION** | | |
| Earth Station Diameter (meters) | 5.0 | 5.0 |
| Earth Station Gain (dBi) | 57.0 | 57.0 |
| Earth Station Elevation Angle | 20 | 20 |
| **DOWNLINK EARTH STATION** | | |
| Earth Station Diameter (meters) | .60 | .90 |
| Earth Station Gain (dBi) | 35.5 | 39.0 |
| Earth Station G/T (dB/K) | 13.0 | 16.5 |
| Earth Station Elevation Angle | 20 | 20 |
| **LINK FADE TYPE** | Clear Sky | Clear Sky |
| **UPLINK PERFORMANCE** | | |
| Uplink Earth Station EIRP (dBW) | 72.2 | 72.2 |
| Uplink Path Loss, Clear Sky (dB) | -209.2 | -209.2 |
| Uplink Rain Attenuation | 0.0 | 0.0 |
| Satellite G/T(dB/K) | 0.8 | 0.8 |
| Boltzman Constant(dBW/K-Hz) | 228.6 | 228.6 |
| Carrier Noise Bandwidth (dB-Hz) | -73.0 | -73.0 |
| Uplink C/N(dB) | 19.3 | 19.3 |
| **DOWNLINK PERFORMANCE** | | |
| Downlink EIRP per Carrier (dBW) | 46.8 | 46.8 |
| Antenna Pointing Error (dB) | -.5 | -.5 |
| Downlink Path Loss, Clear Sky (dB) | -206.2 | -206.2 |
| Downlink Rain Attenuation | 0.0 | 0.0 |
| Earth Station G/T (dB/K) | 13.0 | 16.5 |
| Boltzman Constant(dBW / K - Hz) | 228.6 | 228.6 |
| Carrier Noise Bandwidth (dB-Hz) | -73.0 | -73.0 |
| Downlink C / N(dB) | 8.6 | 12.1 |
| **COMPOSITE LINK PERFORMANCE** | | |
| C/N Uplink (dB) | 19.3 | 19.3 |
| C/N Downlink (dB) | 8.6 | 12.1 |
| C/I Intermodulation (dB) | N/A | N/A |
| C/I Uplink Co-Channel (dB)* | 27.0 | 27.0 |
| C/I Downlink Co-Channel (dB)* | 27.0 | 27.0 |
| C/I Uplink Adjacent Satellite 1 (dB) | 29.5 | 29.5 |
| C/I Downlink Adjacent Satellite 1 (dB) | 19.7 | 19.3 |
| C/I Uplink Adjacent Satellite 2 (dB) | 29.3 | 29.3 |
| C/I Downlink Adjacent Satellite 2 (dB) | 21.7 | 22.2 |
| | | |
| C/(N+I) Composite (dB) | 7.6 | 10.1 |
| Required System Margin (dB) | -1.0 | -1.0 |
| Net C/(N+I) Composite (dB) | 6.6 | 9.1 |
| Minimum Required C/N (dB) | -3.4 | -3.4 |
| Excess Link Margin (dB) | 3.3 | 5.8 |
| Number of Carriers | 1.0 | 1.0 |
| **CARRIER DENSITY LEVELS** | | |
| Uplink Power Density (dBW/Hz) | -57.8 | -57.8 |
| Downlink EIRP Density At Beam Peak (dBW/Hz) | -20.2 | -20.2 |