

NOISE BUDGET REFERENCE CALCULATION

Beam Uplink Downlink
USA SSA

Carrier parameters

| | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
|-------------------------------|-------|-------|-------|-------|-------|------|-------|
| Data Rate (Mbps) | 0.064 | 0.384 | 1.544 | 2.048 | 9.216 | 45 | 69.64 |
| FEC | 0.682 | 0.682 | 0.875 | 0.682 | 0.75 | 0.75 | 0.795 |
| Modulation | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| C/(N+I) - Total Required (dB) | 7.4 | 7.4 | 10.8 | 7.4 | 9.9 | 5.6 | 8.7 |

Uplink

| | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Uplink Frequency (MHz) | 14000 | 14000 | 14000 | 14000 | 14000 | 14000 | 14000 |
| Tx antenna Input power (dBW) | -2.52 | 5.29 | 10.25 | 12.55 | 18.67 | 25.56 | 27.22 |
| Input power density (dBW/Hz) | -50 | -50 | -50 | -50 | -50 | -50 | -50 |
| Tx Antenna Diameter (Metres) | 4.50 | 1.80 | 1.20 | 1.80 | 2.40 | 4.50 | 7.00 |
| Tx Antenna Efficiency | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 |
| Tx Antenna Gain (dB) | 54.5 | 46.6 | 43.0 | 46.6 | 49.1 | 54.5 | 58.4 |
| Mispointing loss (dB) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Atmospheric loss (dB) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Uplink Path loss (dB) | 207.8 | 207.8 | 207.8 | 207.8 | 207.8 | 207.8 | 207.8 |
| Uplink Rain Attenuation (dB) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Max. Satellite antenna G/T (dB/K) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Edge of coverage USA (dB) | 6.0 | 6.0 | 3.0 | 6.0 | 6.0 | 6.0 | 6.0 |

| | | | | | | | |
|---|------|------|------|------|------|------|------|
| $(C/I)_{\text{Up-Intrasystem}}$ (dB) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| $(C/I)_{\text{Up-ASI}}$ (dB) | 32.2 | 24.2 | 20.7 | 24.2 | 26.7 | 32.2 | 36.0 |
| $(C/N)_{\text{Uplink Thermal}}$ (dB) | 25.5 | 17.6 | 17.1 | 17.6 | 20.1 | 25.5 | 29.4 |
| $C/(N_{\text{thermal}}+N_{\text{ASI}}+N_{\text{intrasystem}})$ (dB) | 23.6 | 16.5 | 15.4 | 16.5 | 18.9 | 23.6 | 26.2 |

Downlink

| | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Downlink Frequency (MHz) | 11500 | 11500 | 11500 | 11500 | 11500 | 11500 | 11500 |
| Beam peak EIRP density (dBW/Hz) | -23 | -23 | -23 | -23 | -23 | -23 | -23 |
| Downlink EIRP/Carrier (dBW) | 24.48 | 32.29 | 37.25 | 39.55 | 45.67 | 52.56 | 54.22 |
| Edge of coverage SSA (dB) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Downlink EIRP/Carrier at EOC (dBW) | 18.48 | 26.29 | 31.25 | 33.55 | 39.67 | 46.56 | 48.22 |
| Rx E/S Antenna Diameter (Metres) | 0.90 | 1.80 | 2.40 | 1.20 | 2.40 | 0.90 | 1.80 |
| Rx Antenna Efficiency | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 |
| Rx Antenna Gain (dB) | 38.8 | 44.8 | 47.3 | 41.3 | 47.3 | 38.8 | 44.8 |
| Rx System Noise temp (K) | 110.0 | 110.0 | 110.0 | 110.0 | 110.0 | 110.0 | 110.0 |
| Rx E/S G/T (dB/K) | 18.4 | 24.4 | 26.9 | 20.9 | 26.9 | 18.4 | 24.4 |
| Antenna mispointing error (dB) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Atmospheric loss (dB) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Downlink Path loss (dB) | 206.1 | 206.1 | 206.1 | 206.1 | 206.1 | 206.1 | 206.1 |
| Downlink Rain Attenuation (dB) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| $(C/I)_{\text{Dn Intra-system}}$ (dB) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| $(C/I)_{\text{Down-ASI}}$ (dB) | 16.9 | 22.9 | 25.4 | 19.4 | 25.4 | 16.9 | 22.9 |
| $(C/N)_{\text{Downlink Thermal}}$ (dB) | 11.1 | 17.2 | 19.7 | 13.6 | 19.7 | 11.2 | 17.2 |
| $C/(N_{\text{thermal}}+N_{\text{ASI}}+N_{\text{intrasystem}})$ (dB) | 10.1 | 16.0 | 18.3 | 12.5 | 18.3 | 10.1 | 16.0 |

End-to-End

| | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
|-------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| (C/N+I) - Total Actual (dB) | 9.9 | 13.2 | 13.6 | 11.1 | 15.6 | 9.9 | 15.6 |
| (C/N+I) - Total Required(dB) | 7.4 | 7.4 | 10.8 | 7.4 | 9.9 | 5.6 | 8.7 |
| Margin (dB) | 2.5 | 5.8 | 2.8 | 3.7 | 5.7 | 4.3 | 6.9 |