

Table 4 Link budgets for 7 typical Ku-band carriers

| Parameter | Digital TV MCPC 40 MBPS QPSK $\frac{3}{4}$ RS | Digital TV MCPC 40 MBPS QPSK $\frac{3}{4}$ RS | Digital TV SCPC QPSK $\frac{3}{4}$ RS | Digital TV SCPC QPSK $\frac{3}{4}$ RS | 56Kbps QPSK $\frac{3}{4}$ RS |
|--|---|---|---------------------------------------|---------------------------------------|------------------------------|
| Digital MOD ID | A_Ku | B_Ku | C_Ku | D_Ku | E_Ku |
| Carrier designation | 36M0G7 W | 27M0G7 W | 6M95G1 W | 5M00G1 W | 100KG1 W |
| Throughput rate, Mbps | 40 | 32 | 8 | 6 | 0.0562 |
| Symbol rate, MHz | 28.8 | 22.9 | 5.7 | 4.2 | 0.0407 |
| Uplinks: | | | | | |
| Transmit Power (dBW) | 20 | 20 | 8.9 | 8.9 | -2 |
| Transmit Loss (dB) | -1 | -1 | -1 | -1 | -1 |
| Antenna diameter | 6.1 | 6.1 | 3.7 | 3.7 | 1.8 |
| Antenna Gain (dBi) | 57.2 | 57.2 | 52.9 | 52.9 | 46.6 |
| Ground Station EIRP (dBW) | 76.2 | 76.2 | 60.8 | 60.8 | 43.6 |
| Uplink Rain Loss (dB) | -2 | -2 | -2 | -2 | -2 |
| Free Space Loss (dB) | -207.5 | -207.5 | -207.5 | -207.5 | -207.5 |
| Satellite G/T (dB/K) | 3 | 3 | 3 | 3 | 3 |
| Data Rate (dB-Hz) | 76 | 75 | 69 | 67.6 | 47.5 |
| Boltzmann's Constant (dBW/K-Hz) | -228.6 | -228.6 | -228.6 | -228.6 | -228.6 |
| Eb/No (dB) | 22.3 | 23.3 | 13.9 | 15.3 | 18.2 |
| Eb/Io (dB) | 18 | 18 | 16 | 16 | 16 |
| Total Eb/(No + Io) (dB) For 10 ⁻⁷ | 16.6 | 16.9 | 11.8 | 12.6 | 14 |
| Downlinks: | | | | | |
| Satellite Carrier EIRP (dBW) | 49.4 | 49.4 | 35.7 | 34.3 | 18.5 |
| Downlink Rain Loss (dB) | -3 | -3 | -3 | -3 | -3 |
| Free Space Loss (dB) | -206.3 | -206.3 | -206.3 | -206.3 | -206.3 |
| Ground station antenna dia, m | 0.9 | 0.9 | 2.4 | 2.4 | 1.2 |
| Ground Station G/T (dB/K) | 17.1 | 17.1 | 25.6 | 25.6 | 19.6 |
| Eb/No (dB) | 9.8 | 10.8 | 11.6 | 11.6 | 9.9 |
| C/IM(dB) | | | 18 | 18 | 18 |
| Eb/InterMod, dB | | | 16.6 | 16.6 | 16.6 |
| C/I(ASI), dB | 15 | 15 | 15 | 15 | 15 |
| Eb/Io(ASI), dB | 13.6 | 13.6 | 13.6 | 13.6 | 13.6 |
| Eb/Io (dB) | 13.6 | 13.6 | 11.8 | 11.8 | 11.8 |
| Eb/(No + Io) (dB) | 8.3 | 9 | 8.7 | 8.7 | 7.7 |
| Eb/(No+Io) total (dB) | 7.7 | 8.3 | 7 | 7.2 | 6.8 |

| | | | | | |
|--------------|-----|-----|-----|-----|-----|
| Required(dB) | 5.4 | 5.4 | 5.4 | 5.4 | 5.4 |
| Margin(dB) | 2.3 | 2.9 | 1.6 | 1.8 | 1.4 |

Table 5 Link budgets for TV/FM in Ku-band

| Parameter | Typical TV/FM link |
|---------------------------------|--------------------|
| Carrier designation | 36M0F3F |
| Uplinks: | |
| Transmit Power (dBW) | 22 |
| Transmit Loss (dB) | -1 |
| Antenna diameter | 6.1 |
| Antenna Gain (dBi) | 57.2 |
| Ground Station EIRP (dBW) | 78.2 |
| Uplink Rain Loss (dB) | -2 |
| Free Space Loss (dB) | -207.5 |
| Satellite G/T (dB/K) | 3 |
| Bandwidth (dB-Hz) | 75.6 |
| Boltzmann's Constant (dBW/K-Hz) | -228.6 |
| C/N, uplink(dB) | 24.7 |
| Downlinks: | |
| Satellite Carrier EIRP (dBW) | 49.4 |
| Downlink Rain Loss (dB) | -3 |
| Free Space Loss (dB) | -206.3 |
| Ground station antenna dia, m | 1.2 |
| Ground Station G/T (dB/K) | 19.6 |
| C/N, DL (dB) | 12.7 |
| C/I ASI (dB) | 18 |
| C/Ntot, dB | 11.4 |
| Required(dB) | 11 |
| Margin(dB) | 0.4 |

| | |
|---------------------------|--|
| 1.544 MBPS QPSK 3/4 | Digital TV MCPC 50 MBPS 8PSK 2/3 RS |
| F_Ku | G_Ku |
| 1M60G1 W | 36M0G7 W |
| 1.544 | 50 |
| 1.1 | 27.1 |
| | 32.55319 |
| 8 | 20 |
| -1 | -1 |
| 1.8 | 6.1 |
| 46.6 | 57.2 |
| 53.6 | 76.2 |
| -2 | -2 |
| -207.5 | -207.5 |
| 3 | 3 |
| 61.9 | 76 |
| -228.6 | -228.6 |
| 13.8 | 21.3 |
| 16 | 18 |
| 11.8 | 16.3 |
| | |
| 28.5 | 49.4 |
| -3 | -3 |
| -206.3 | -206.3 |
| 2.4 | 2.4 |
| 25.6 | 25.6 |
| 11.5 | 17.3 |
| 18 | |
| 16.6 | |
| 15 | 15 |
| 13.6 | 12.3 |
| 11.8 | 12.3 |
| 8.7 | 11.1 |
| 6.9 | 10 |

| | |
|-----|-----|
| 5.4 | 7.2 |
| 1.5 | 2.8 |