## Link Budget

STRATHcube is currently on the FYS design booster programme. For this a link budget was required. Much of the background research for this link budget was done by a previous student. The link budget was then reassessed and updated to reflect the impact of DVB-S2 and ACM on the link budget.

## System Definitions

| Name | Value | Source |
|---|---|---|
| **STRATHCube** | | |
| Transmit Power | 1.5W | Previous FYS limit |
| Cable Losses | 0.116 dB | 20cm RG-188/AU |
| VSWR | 1.9 : 1 | ISIS Antenna Datasheet |
| Antenna Reflection Loss | 0.44 dB | Calculation |
| Connector Losses | 0.2 dB | 4 Connectors @ 0.05dB |
| Switch Losses | 0.5 dB | |
| Total Line Losses | 1.26 dB | Calculation |
| Antenna Gain (Tx) | 0 dBi | ISIS Antenna Datasheet |
| **EIRP** | 0.50 dBW | Calculation |
| **Ground Station** | | |
| Antenna Gain | 13 dBi | |
| LNA Gain | 22.5 dB | |
| Line Losses | 0.2852 dB | |
| Other Line Losses | 2.1 dB | |
| **Ground Station Noise Temperature** | | |
| Antenna | 154K | |
| Feedline | 290K | |
| LNA | 28K | |
| Frontend | 1000K | |
| Cable Loss | 1.023 | |
| Transmission Line Coefficient | 0.6331 | |
| **Receiver Noise Temperature** | 249.365K | Calculation |
| **Atmospheric Path Losses** | | |
| Scintillation | 0.16 dB | |
| Atmospheric | 1.1 dB | |
| Rain Fade | 0 dB | |
| Ionospheric | 0.4 dB | |
| Polarisation | 3 dB | |
| **Total Atmospheric Path Loss** | 4.66 dB | |

Table 1: Static Parameters

| Name | Adverse | Nominal | Favourable |
|---|---|---|---|
| Pointing Loss | (90 ° error) | 3dB (30 ° error) | 0dB (10 ° error) |
| Elevation | 10° | 20° () | 40° |

Table 2: Dynamic Parameters

## Scenarios

### Commisioning Phase

STRATHcube shortly after deployment from the international space station.

| Name | Adverse | Nominal | Favourable |
|---|---|---|---|
| Altitude | 409km | | |
| Slant Range | 1463 | 1001km | 611km |

Table 3: STRATHcube Commisioning Phase Parameters