TCET 3222
Week   10
Lab   8

1. Login to the website as listed on page 1.

2. Click on "Link Budgets Index Page." (shown on top of Page 2)

3. Click on "VSAT Information Index." (see Page 3)

4. Go through 1-7 (page 4)and:

   a) Take notes for your report

   b) Calculate the values in 5) and 6) and write down the results.

5. Go back to 2 above.

6. Follow a) through g) on page 1 as also shown on page 3.

7. Follow the rest of the lab as outlined on page 1.

Lab Title: Satellite Link Budget Calculation

1. **Go to the following site,**
   http://www.satsig.net/linkbugt.htm

2. **Go through a-g below and click to calculate results in each case,**

   [Pre-calculated link budget with useful default parameters inserted (may be amended and recalculated)]

   a) <u>SCPC / DAMA 8kbit/s mesh network satellite link budget for 1.8m antennas - Skylinx</u>
   b) <u>Digital television broadcasting - MPEG satellite link budget</u>
   c) <u>Data broadcasting or data distribution satellite link budget</u>
   d) <u>Line of sight link radio budget - one way - single hop</u>
   e) <u>Satellite mobile phone link budget - return link from mobile to hub</u>
   f) <u>Europe to Africa - Satellite internet broadband outlink</u>
   g) <u>Africa to Europe - Satellite internet TDMA return link</u>

3. **Build up a table of your results,**

4. **Explain the results in each case,**

5. **In each section (a-g), briefly explain the characteristics of the service (What is SCPC/DAMA, Digital TV Broadcasting, Data Broadcasting by Satellite, …?)**

Satellite Link Budget Calculator

Complete all white boxes and then click any calculate button to obtain results in the green boxes.

Uplink frequency GHz

Uplink antenna diameter m

Uplink antenna aperture efficiency e.g. 0.65   0.65

Uplink antenna transmit gain dBi

Uplink antenna, power at the feed W

1) ✓ <u>Link Budgets index page</u>   <u>Astra beam coverage</u>

<u>VSAT information</u>   <u>O3b beams</u>

<u>Latitude and longitude explanation</u>   <u>Antenna beam width calculator</u>

Satellite Signals   <u>Satellite beam design</u>   <u>Views of the earth from various geo orbit positions</u>

home page   <u>IET satellite communications summer school</u>

<u>VSAT network design</u>

<u>Satellite downlink EIRP</u>

<u>Uplink satellite G/T</u>

<u>Uplink PFDsat</u>

Satellite Link Budget Calculator

Complete all white boxes and then click any calculate button to obtain results in the green boxes.

Uplink frequency GHz
Uplink antenna diameter m
Uplink antenna aperture efficiency e.g. 0.65   0.65
Uplink antenna transmit gain dBi
Uplink antenna, power at the feed W
Uplink EIRP dBW
<u>Range (35778 - 41679) km</u>   38500.0
Uplink path loss dB
<u>Uplink pfd at satellite dBW/m^2</u>
Bandwidth Hz
<u>Satellite uplink G/T dB/K</u>
Uplink C/N dB

Click to calculate results

Downlink frequency GHz
Downlink receive antenna diameter m
Downlink receive antenna aperture efficiency e.g. 0.65 0.65
<u>Downlink system noise temperature (antenna+LNA) K</u>
Downlink receive antenna gain dBi
Downlink receive antenna G/T dB/K
<u>Downlink satellite EIRP dBW</u>
Downlink path loss dB
Downlink C/N dB

Click to calculate results

<u>Uplink C/interference dB</u>   28.0
Uplink C/N dB
<u>Satellite C/intermod dB</u>   21.0
Downlink C/N dB
<u>Downlink C/interference dB</u> 28.0
Total link C/N dB

Click to calculate results   Click to zero everything except defaults

2.

II

Satellite Signals
Satsig home page

Satellite Signals
VSAT index page

VSAT information index

Satellite Link Budget calculator

Antenna gain and beamwidth

Uplink BUC power

Uplink power control UPPC

Uplink power flux density (PFD)

Uplink G/T

Latency

Downlink noise temperature

Antenna noise temperature

Downlink EIRP

SETI communications range

Uplink power control UPPC

Explanation of satellite links

Satellite beam design

Tooway out-link link budget

Tooway return-link link budget

Link budget for VSAT Remotes (return-link) to Hub direction

Link budget for Hub to VSAT Remotes (out-link) direction of transmission

a) SCPC / DAMA 8kbit/s mesh network satellite link budget for 1.8m antennas - Skylinx

b) Digital TV television broadcasting - MPEG satellite link budget

c) Data broadcasting or data distribution satellite link budget

d) Line of sight link radio budget - one way - single hop

e) Satellite mobile phone link budget - return link from mobile to hub

f) Europe to Africa - Satellite internet broadband outlink

g) Africa to Europe - Satellite internet TDMA return link

O3b beams

How to measure EbNo and EbNo calculator

Views of the earth from various geo orbit positions

IET satellite communications summer school

INSAT 4CR DSNG Ku band link budget

Satellite link budget information : index page

This page is an index page linking to a variety of pages which will help you with calculations related to satellite communications links.

You are welcome to suggest ideas for more pages: eric@satsig.net

You might also submit anything that might help. I would particularly like someone to provide a write up about inter-modulation and the implications for BUC and transponder operating point.

▶ Page created 23 Feb 2015, amended 6 July 2016

Satellite Signals
Home page

Satellite Signals
Maps index

Satellite Signals
Misc index

Satellite Signals
Link budgets index

Index page about VSAT (Very Small Aperture Terminal) Satellite Communications and Satellite Internet terminals

Educational:

1) Introduction and explanation of VSATs

2) Broadband satellite Internet - How it works

Satellite link budget

3) What is TDMA ? explanation

4) Explanation of satellite links

5) EbNo measurement and calculation

6) Noise temperature, noise figure and noise factor

Design your own satellite beam

Eutelsat beacon frequencies.

Explanation of satellite TV Polar mount plus examples.

How to set up antenna reflector panels using fishing line.

Axial ratio and cross polar discrimination (XPD) interference.

Ku transmit reject / receive bandpass filters for sale as used for satellite internet.

Information about how an LNB works and LNBs for sale

Symbol rate

7) VSAT network design

How to set up circular polarisation

C band circular polarisation feed

Explanation of satellite beams

Miscellaneous VSAT hardware sales

Ku band BUC sale

C band BUC sale

Useful external links:

Eutelsat satellites

Intelsat satellites

Lyngsat - listings of satellite TV programs

ViaSat LinkStar etc:

Linkstar serial cable connection

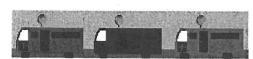Voice mesh network using Skylinx VSAT dish

Recommended VSAT equipment

LinkStar terminal description (fast text only version - ok for dial up download)

Large satellite hub dish antennas for sale

Tooway satellite using Surfbeam DOCSIS modem

Hand held satellite phone and mobile/transportable satellite internet terminals:

RBGAN

R-BGAN mobile / transportable broadband satellite internet.   Plain

BGAN.

Iridium satellite phone

2.4m transportable antenna (Batwing type)

1.2m prime focus and dual-optics antennas

Teleport hubs:

SMS Gateway to Africa and Middle East Teleport (Rugby UK)

Teleport VSAT hub sale