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# A NEW VSAT LINK ABNALYSIS

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**Abstract:** The VSAT LINK analysis is done for calculating link margin analysis using turbo-c program. This article describes various parameters such as satellite name and transmission and reception parameters and the total link analysis. This particular VSAT is used in AIRDEFENCE applications.

## I. INTRODUCTION

Link margin calculation is an important for the best use of receiving signals from satellites which are in GEO SYNCHRONOUS orbits. In this paper the TX and RX parameters, and satellite parameters are described and link margin is calculated by hand calculation and also a turbo –c program is executed for calculation of C/N (CARRIER TO NOISE) up link and down link AND Eb/No is also calculated. Also the following is the new VSAT LINK DESIGN CALCULATION FOR L-BAND communication.

**DESIGN-1**

MISSILE/TUT Tx.POWER= 100W=20Db
Pt=20db
Gt=17 dbi(KLHCP)
UPLINK FREQUENCY=fu=1.5GHz.(lambda=0.2meters)
DOWNLINK FREQUENCY fl=1.0GHz(lambda=0.1meters)
SATELLITE RECEIVER ANTENNA GAIN
Gsat=17 dbi(LHCP)
SATELLITE TX(DOWN LINK)
PARABOLIC DISH(EFFICIENCY)=65%
Gsat'=30dbi(VERTICAL POLARIZATION)
GROUND STATION(mct-tut)
Gr'=51dbi(PARABOLIC DISH DIAMETER=10.4 METERS)
POLARIZATION(VERTICAL)efficiency=60%


 

Table 1:

| ANTENNA TYPE/GAIN POLARIZATION |
|---|
| MISSILE(TUT/TUR) HELICAL/17dbi LHCP |
| SATELLITE RECEIVER -DO- -DO- |
| SATELLITE TRANSMITTER PARABOLIC DISH /30dbi VERICAL |
| MCT-TUT(EARTH STATION"?) PARABOLIC DISH/51dbi VERTICAL |

Table 2:

| PARAMETER SELECTED VALUE: |
|---|
| MULTIPLE ACCESS CDMA |
| DIGITAL MODULATION BPSK |
| DATA RATE 512 kbps |
| BAND WIDTH FOR ONE CHANNEL 1500KHz |
| DATA RATE(DOWN LINK) 150MHz |
| CHANNELS PER CARRIER 100 |
| BAND WIDTH OF EACH TRANSPONDER 7.5MHz |

**LINK BUDGET:**

- POWER FED TO THE TUT-MCT=100W=20DB Ptmct=20db
- GAIN OF THE TUT-MCT Gtmct=51dbi
- EIRP=Ptmct+Gtmct=71dbw
- PATH LOSS FOR UPLINK=Lpu=32.5+20log10(74000)+20log10(1500)=193.4db
- RAIN ATTENUATION=3.0db
- GAIN OF THE RECEIVER AT SATELLITE:Gsat'=17dbi
- POWER RECEIVED AT THE SATELLITE= Psat'=Ptmct*Gtmct*Gsat'(LAMBDA/4*PI*R).^2=-45.4dbw
- SATELLITE TOTAL NOISE TEMPERATURE Tsat=-500k=27db
- TOTAL NOISE POWER FOR THE TRANSPONDER

  Nxpndr=K*Tsat*Bxpndr
  K=-228.6DB
  Tsat=27db
  Bxpndr=68.7db
  Nxpndr=-132.8dbk

**CARRIER TO NOISE POWER RATIO AT SATELLITE INPUT**

(C/N)uplink=Psat'-Nxpndr=87.5db

**DOWNLINK BUDGET**

- POWER FED TO THE SATELLITE TX.ANTENNA Psatt=100w=20db
- GAIN OF THE SATELLITE TX. ANTENNA=Gsatt=30dbi
- DOWN LINK FREQUENCY=1.0GHz
- EIRP=50dbw
- PATHLOSS DOWNLINK=Lpd=189.8db
- GAIN OF THE EARTH STATION RECEIVER (MCT-TUT-)=51dbi Ggroundr=51dbi

**POWER RECEIVED AT THE GROUND STATION**

- Pgroundr=Psatt*Gsatt*Ggroundr*(LAMBDA/4*PI*R).^2 -38.3db
- Nground=K*Tground*Bground=-149.9dbw


 

- C/N)GROUND)=Pgroundr-Ngroundr =11.6db
- OVERALL DOWN LINK(C./N)=-10log(10.^(C/N)UP)+10.^-(C/N)DOWN)=87.5
- AVAILABLE Eb/No=OVERALL DOWNLINK(C/No)/INPUT DATA RATE(Rb) =87.5-57.0=30.5 Eb/No=30.5db

Minimum time for which the missile is on sky 5minutes=300 seconds tx.rate=Rb/FEC (coding)=512/0.5=1024kbps bandwidth=tx.rate*1.4=1433.6khz bandwidthrate=1500khz total transponder bandwidth=1500*50=7.5Mhz no.of earth stations=100. Downlink bandwidth=100*1500=150Mhz also correct C/Nground=111.6db

## CONCLUSION:

This is very useful for any VSAT network designer. Also the link analysis is very useful for the working engineers and Researchers.

## REFERENCES:

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