TCET 3222

Week: 6

Lab: 4

Lab Title: Satmaster Pro 7.2

a. Software Description:

This software package is designed to be of general use within all branches of the satellite industry from antenna manufacturers, broadcasters, SNV operatives, through to system installation companies, engineering consultants and sole traders. Signal propagation, antenna aiming (including dual feeds), link budget analysis and solar outage prediction provide the backbone to the package. The digital and FM link budget modules employ industry standard ITU-R and CRANE rain attenuation models as well as atmospheric absorption prediction modeling. Low elevation paths are supported including atmospheric refraction effects. These and other useful features, such as integral magnetic variation calculation and tens of thousands of stored town/city co-ordinates, combine to enable a system to be either designed for, or installed at, any global location.

Look angles, dual feeds, modified polar mount settings, antenna sizing, uplink power and solar outage prediction are reliably calculated. Graphical functions include plotting of theoretical lobe patterns, atmospheric absorption, attenuation due to precipitation and Eb/No versus bit error probability for various modulation schemes besides an internal bitmap viewer to display footprint maps or reference diagrams.

Tables of "look angles" from major towns and cities, in a chosen country, may be generated for existing or future satellites.

b. Objective:

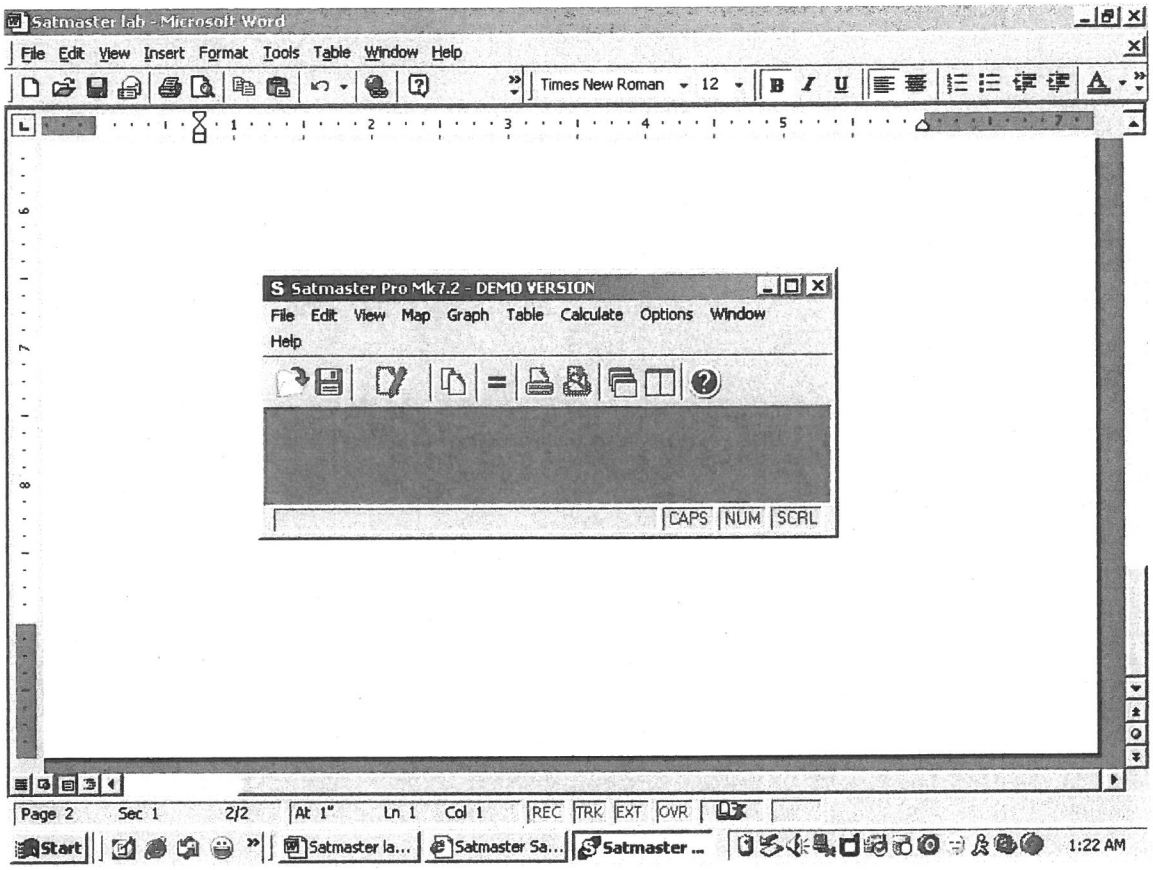
In this lab, students will be able to study signal propagation, antenna aiming (including dual feeds), and perform link budget analysis and solar outage prediction. Students will be able to plot the theoretical lobe patterns, atmospheric absorption, attenuation due to precipitation and Eb/No versus bit error probability for various modulation schemes.

c. Procedure:

1. **Go to www.arrowe.com site,**
2. **Download Satmaster Pro Demo (1.24 MB) and save it to the hard disk,**

Satmaster Pro Demo.lnk

3. **Open Satmaster Pro Demo (S),**
4. **You will see the following page:**



5. **Follow the steps below:**

5.1: Click on Graph and a) Choose Noise Temp. v Noise Fig., record the plot,

b) Click on Aperture Lobe Patterns, on circular regular patterns, plot the patterns for f=4,12,20 GHz at the given aperture, record all six patterns and compare the results for circular v regular pattern.

c) Plot Antenna Aperture v Gain for f=4,12,20 GHz and efficiency=0.65 and D=10m. Record Results and compare.

d) Plot EIRP v Antenna Aperture for f=4,12,20 GHz, Nsystem(total)=200, B(mhz)=36, C/N (dB)=12, D(m)=Auto. Record the results, compare and explain.

e) Plot Ant. Parabola at D=0.8m, f/D=0.7, record result.

f) Plot the Atmospheric Absorption for:

- **f1) Location=Liverpool, Sat=Astra 1D its corresponding data, and**
- **f2) Location=New York, Sat=Galaxy 13 and its corresponding data. Record the results and compare.**

g) Plot Rain Attenuation for the given parameters. Change the polarization to V and C for all three Rain Attenuation Models and plot the results.

h) Plot Eb/No v BER for all three modulation types, (M=2 for BPSK and=4for the others.)

5.2: Click on Table, and Calculate and go through the parameters. Record and discuss the results.