RENU/NSRC Wireless Networking

Exercises: 1.1 Basic Radio Physics

Exercise 1: Electromagnetic fields and waves

Question: What is the wavelength of an electromagnetic wave at ...

- **2.4 GHz?** **….....**
- **5 GHz?** **….....**
- **900 MHz?** **….....**

Question: What is the polarization of the electromagnetic field emitted by a dipole?

Answer:

Question: VSAT satellites are geostationary satellites at a height of **35,785 km** above the equator. What minimum delay (latency) does this imply for data travelling over VSAT?

Answer:

Question: If a specific radio device has a timeout window of 50 microseconds – this means, it expects an answer from the other end within 50 microseconds - then, rom how many kilometers of distance would this begin to affect the radio link?

Answer:

Exercise 2: Electromagnetic spectrum

Question: What are the relevant frequency ranges for wireless networking?

Answer:

Question: What is the wavelength of visible light?

Answer:

Question: Which of the following devices could interfere with a wireless network?

a) Wireless microphone in a conference room

b) Microwave oven in a kitchen
c) Mobile phone
d) Rontgen Lab in a hospital
e) Car or diesel engine

Answer:

Exercise 3: Radio wave propagation

Question: If you have to reach clients within a village with many many trees, what frequency would you choose? Why?

a) 915 Mhz
b) 2.4 Ghz
c) 5.8 GHz

Answer:

Question: How wide does the radio 'line' of sight become for a 100 km link – roughly? Some centimeters, some meters, some kilometers?

Answer:

Question: What materials and substances should you most look out for when planning a wireless link? In other words, what will cause most problems?

Answer:

Exercise 4: Working with dBs

Question: Express these values in dBm / mW!

dBm	mW
0	
	10
13	
	2
26	
	200