SNS COLLEGE OF TECHNOLOGY

Coimbatore – 35

An Autonomous Institution

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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

19ECT311 / Wireless Communication

III ECE/ VI SEMESTER

Unit II - **MOBILE RADIO PROPAGATION**

Topic 5 : Link Budget using path loss model

Guess!!!!!!!!!!!!!!!

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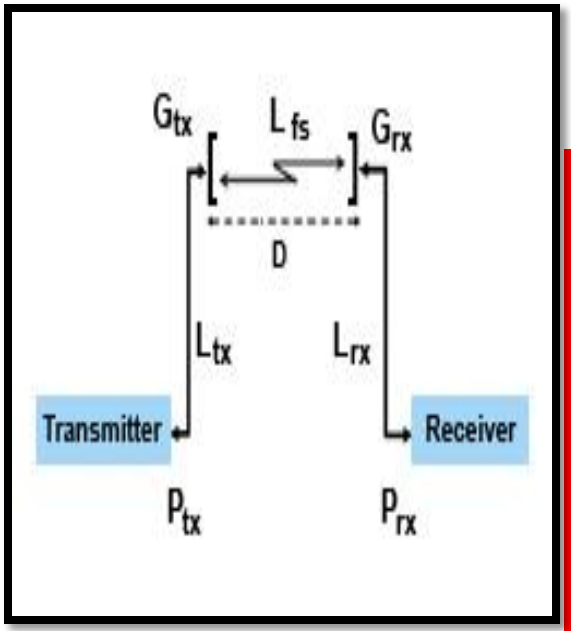
Link Budget

- BUDGET????
- What is Communication link?
- Characteristics of link.
- Path loss
- Required received power

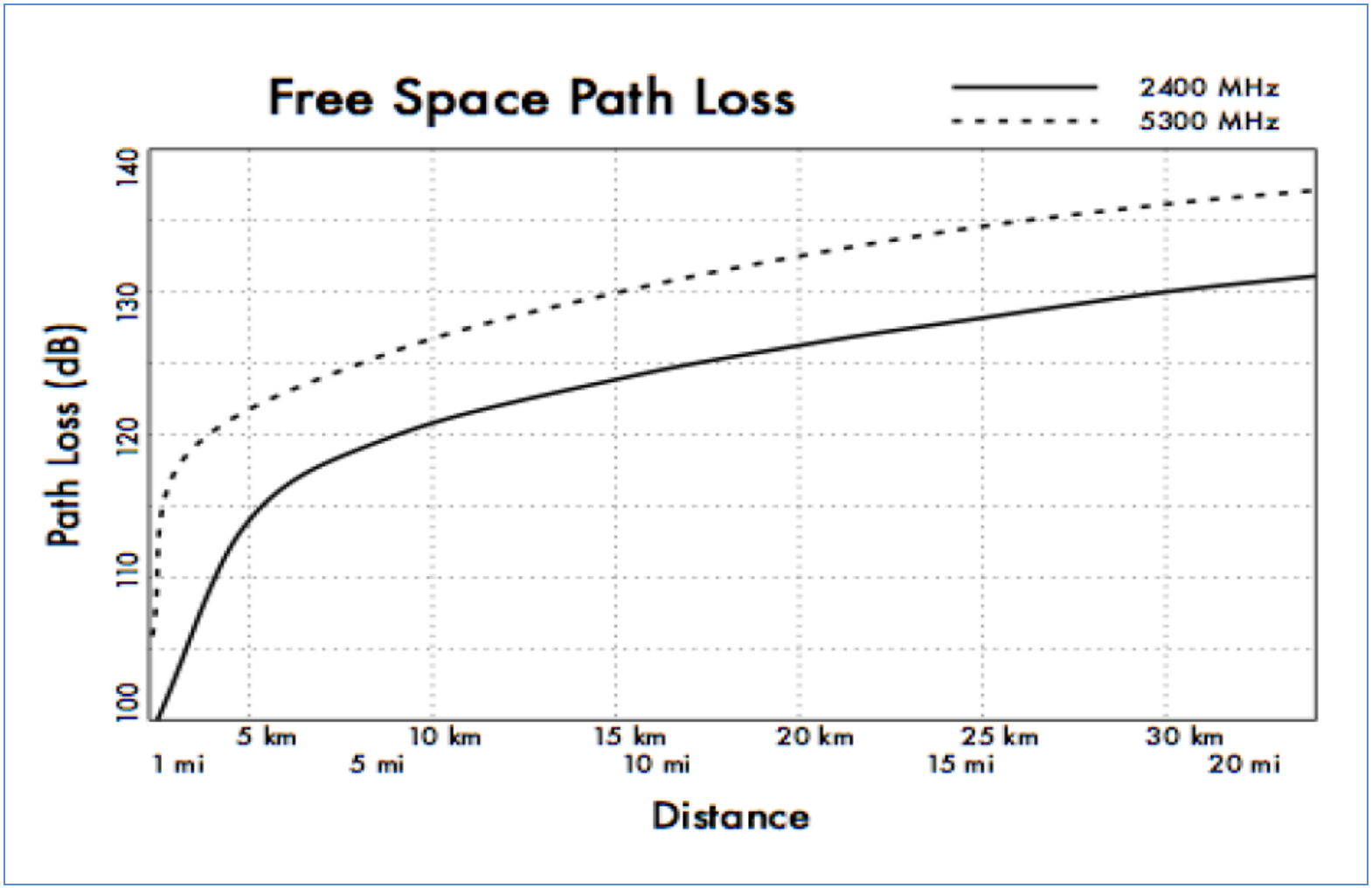
Link Budget - Need

A link budget is used to predict performance before the link is established.

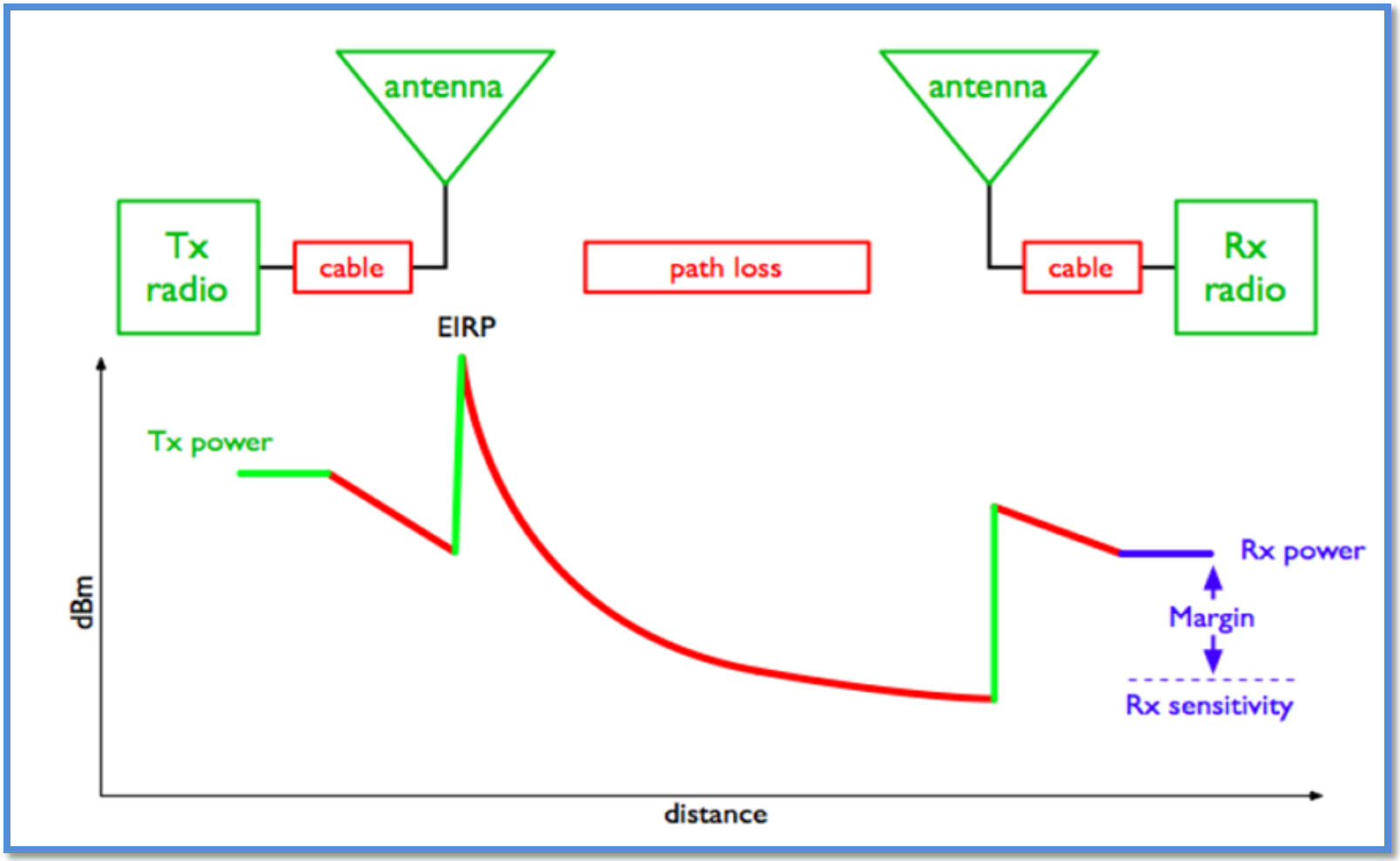
- Show in advance if it will be acceptable
- Show if one option is better than another
- Provide a criterion to evaluate actual performance



Path Loss


Free Space Path Loss
2400 MHz
5300 MHz
Path Loss (dB)
140
130
120
110
100
5 km
10 km
15 km
20 km
25 km
30 km
1 mi
5 mi
10 mi
15 mi
20 mi
Distance

Power in Wireless System

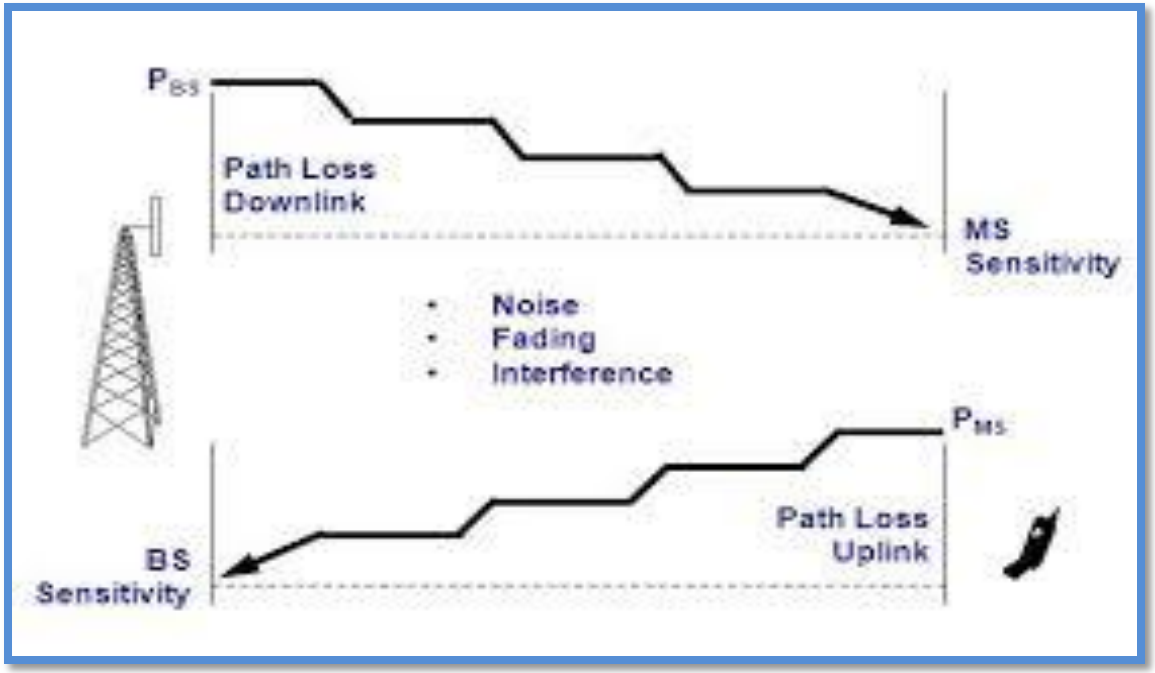


ACTIVITY

Activity: Draw a logo which may describe your character or things you like.

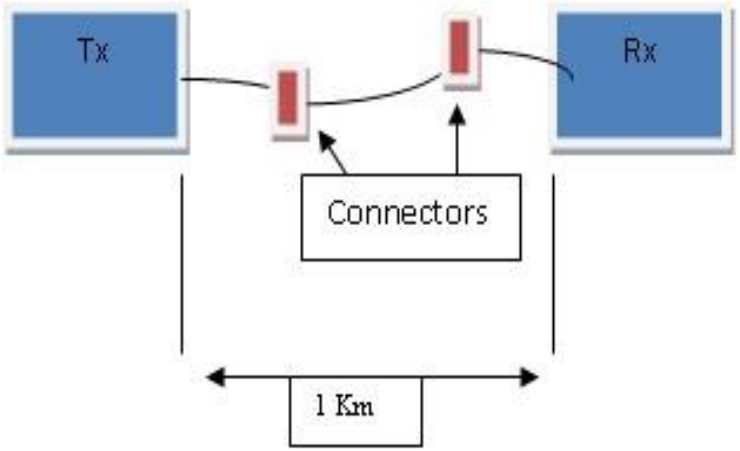
Link Design

- The performance of any communication link depends on the quality of the equipment being used
- The link budget is a quantifying analysis of the link performance



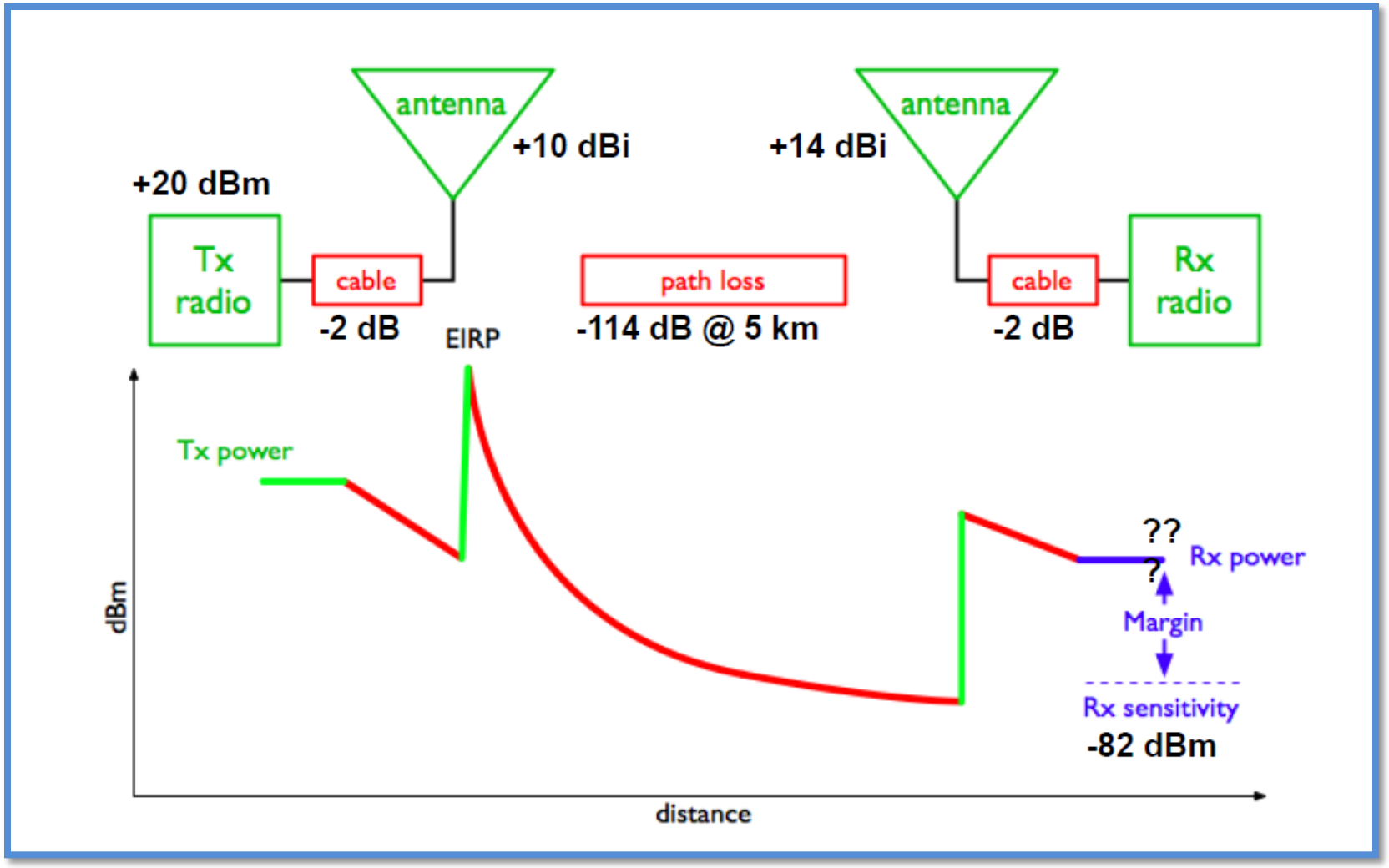
Link Design

- The difference between the minimum received signal level and the actual received power is called the Link Margin
- Link margin is a positive value and should be maximized



System Power budget (Min. received Signal level)= 14 dB
Actual received power(due to Link loss) = 2.5 dB
Link Margin = 12.5 dB

Client Link


antenna
+10 dBi
+20 dBm
Tx radio
cable
-2 dB
EIRP
path loss
-114 dB @ 5 km
antenna
+14 dBi
cable
-2 dB
Rx radio
Tx power
dBm
??
Rx power
Margin
Rx sensitivity
-82 dBm
distance

Calculation

20 dBm (TX Power AP)

+10 dBi (Antenna Gain AP)

- 2 dB (Cable Losses AP)

+14 dBi (Antenna Gain Client)

- 2 dB (Cable Losses Client)

40 dB Total Gain

-114 dB (free space loss@5 km)

- 74 dBm (expected received signal level)

-82 dBm(sensitivity of Client)

8 dB (Link Margin)

CONCLUSION

- A link budget makes a log by keeping all entries of losses and gains in signal propagation
- A wave is attenuated via amplifiers and antennas to increase the gain product and eliminate noise
- Data can be lost during propagation of a signal between the transmitter and receiver within one device or between two or more devices
- Keeping track of such losses and gains is important to calculate the reliability and efficiency of a link

Assessment

- Link budget consists of calculation of
  a) Useful signal power
  b) Interfering noise power
  c) Useful signal & Interfering noise power
  d) Signal and Noise
- Link budget can help in predicting
  a) Equipment weight and size
  b) Technical risk
  c) Prime power requirements
  d) **Equipment weight and size, Technical risk and Prime power requirements**.
- Space loss occurs due to decrease in
  a) **Electric field strength**
  b) Efficiency
  c) Phase
  d) Signal power

Thank you