SIMULATION OF WI-FI SIGNAL

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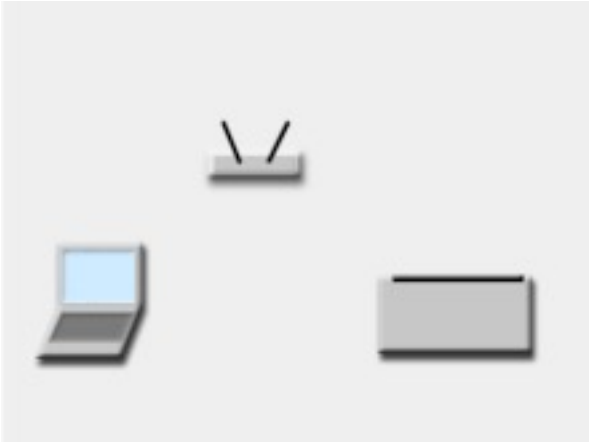
INTRODUCTION

- Wireless network protocol
- Exchange data by rado waves
- Radio frequency: 2.4 5 6 GHz
- Bit rate: 1 – 461200 Mbit/s



SIGNAL PROPAGATION

- Power transmitted/ power received:

$$\frac{P_r}{P_t} = D_r . D_t . (\frac{\lambda}{4\pi d})^2$$

Where:

- D_t is the directivity of the transmitting antenna
- D_r is the directivity of the receiving antenna
- λ is the signal wavelength
- D is the distance between the antennas

- Free space path loss formular:

$$FSPL = (\frac{4\pi f}{c})^2$$

WIFI FREE-SPACE PATH LOSS IN DECIBELS

- Free space path loss in decibels:

$$FSPL(dB) = 20 * \log(d) + 20 * \log(f) + 20 * \log\left(\frac{4\pi}{c}\right)$$

$$= 20 * \log(d) + 20 * \log(f) - 147.55$$

- SI unit with metre for d and hertz for f → GHz for f:

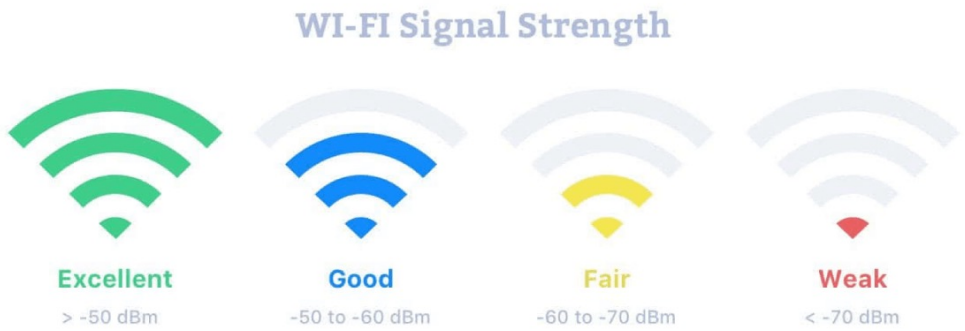
$$FSPL(dB) = 20 * \log(d) + 20 * \log(f) + 32.45$$

- $* \log(10^9) = 180$

WIFI SIGNAL

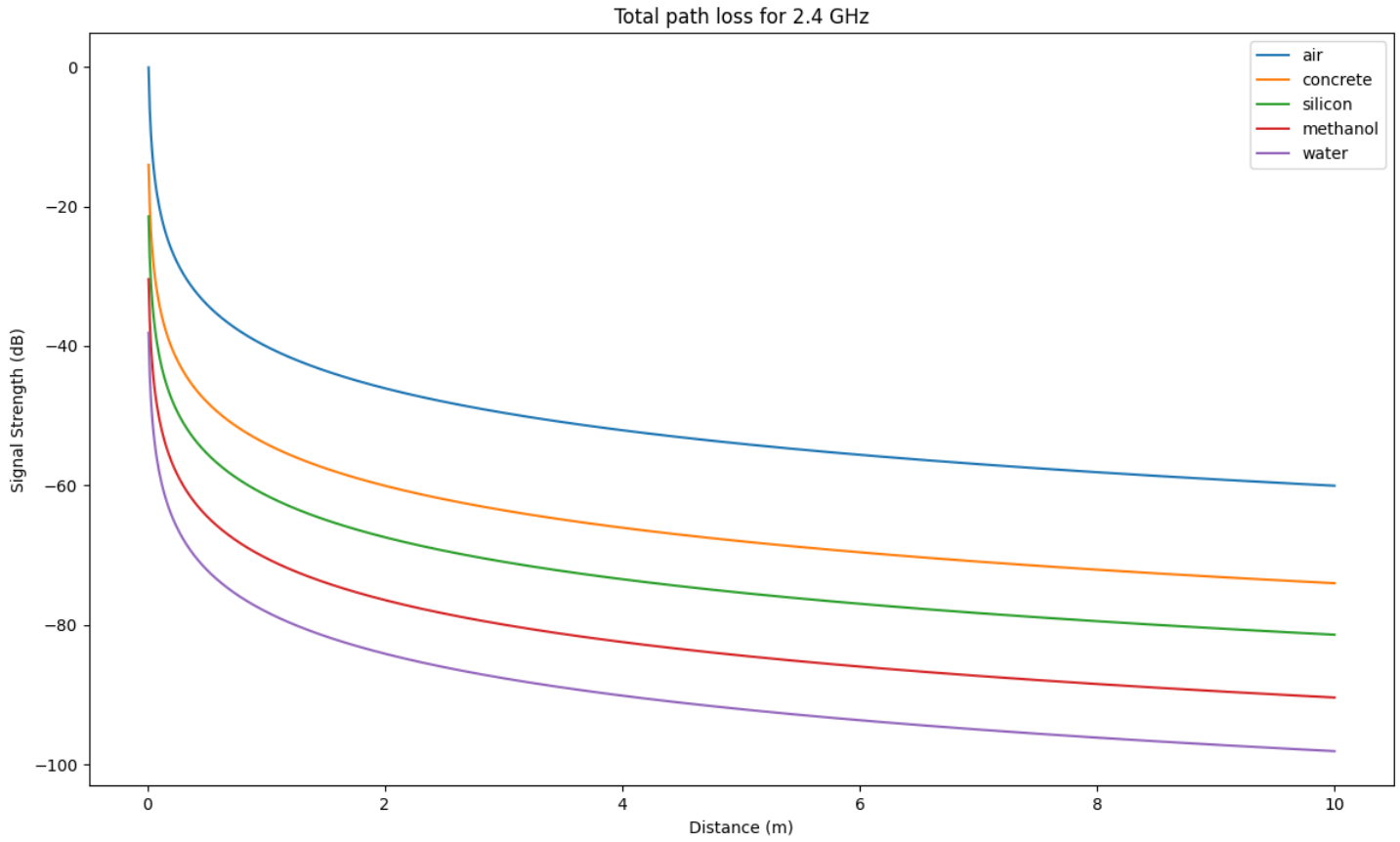
- Power received = Power transmitted – FSPL – material reduction.

$$= PowerTransmitted - 20 * \log(d) - 20 * \log(f) - 32.45 - 20 * \log(RelativePermittivity)$$

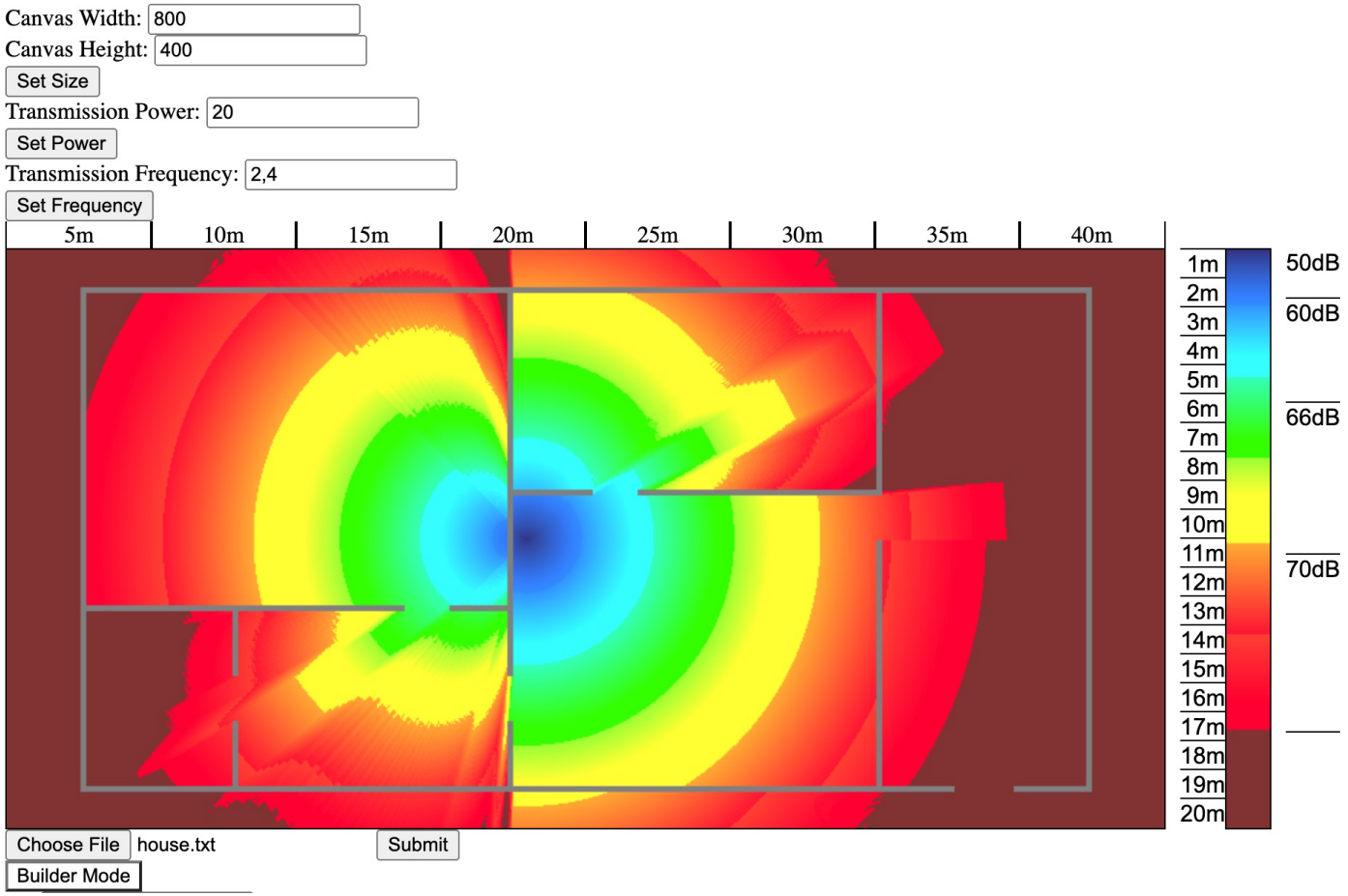


RELATIVE PERMITTIVITY

Air: 1
Concrete: 4.5
Silicon: 11.7
Methanon: 33
Water: 80



SIMULATION


Canvas Width: 800
Canvas Height: 400
Set Size
Transmission Power: 20
Set Power
Transmission Frequency: 2,4
Set Frequency
5m
10m
15m
20m
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30m
35m
40m
1m
2m
3m
4m
5m
6m
7m
8m
9m
10m
11m
12m
13m
14m
15m
16m
17m
18m
19m
20m
50dB
60dB
66dB
70dB
Choose File
house.txt
Submit
Builder Mode