

Module Four

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I. DRONE FREQUENCY RANGE IN DK/EU

27mhz

35mhz

40mhz

433mhz Used in DK - Long range, telemetry.

900mhz Used in US/China, GSM in DK

1.3ghz

2.4ghz Used in DK - RC Signal

5.8ghz Used in DK - Video feed.

II. MAX DISTANCE ELOS/BVLOS FOR 2M ANTENNA DRONE AT 100M

Using the formula for Line-of-Sight [1], we get

$$3.57 \times (\sqrt{Kh_1} + \sqrt{Kh_2}), \quad (1)$$

where h_1 is height of antenna 1 in meters and h_2 is the height of the second antenna in meters, and K is a refraction factor, which we will not take into account for this exercise.

$$3.57 \times (\sqrt{2m} + \sqrt{100m}) = 40.7487km \quad (2)$$

III. MAX DISTANCE WITH TX/RX WITH UNLIMITED HEIGHT

Having an antenna at 2 m yields the following graph for distance as a function of altitude, see Figure 1.

IV. POWER VS. SIGNAL STRENGTH

Signal strength created by an increase in power follows exactly the same formula, is a constant for any power ratio (regardless of distance covered), and is:

$$dB = 10 * \log \frac{P1}{P2}$$

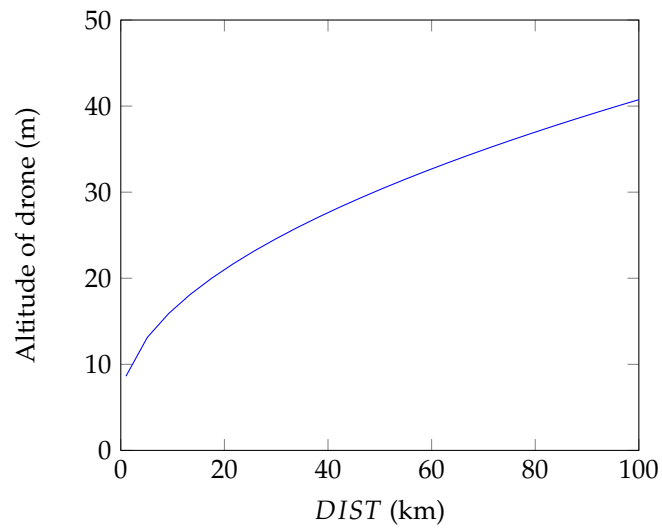


Figure 1: Graph for distance as a function of drone altitude

V. 433 vs 900 MHz

Given the same amount of power in both systems, the 433mhz will give more range,

REFERENCES

- [1] Rajmohan Rajaraman. Antennas & propagation - cs 6710. <http://www.ccs.neu.edu/home/rraj/Courses/6710/S10/Lectures/AntennasPropagation.pdf>, 2010. Online: Accessed 6-March-2017.