

# TK3: Mobile & Ubiquitous Computing - Exercise 01

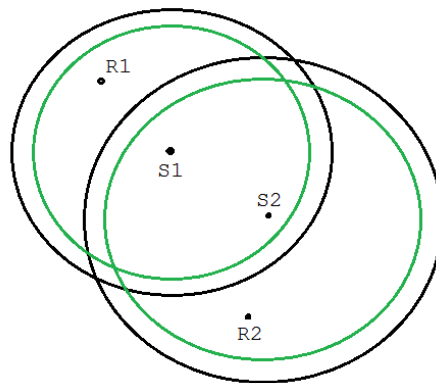
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## 1 Task 1.1

Exposed terminal problem: sender  $s_1$  would like to send to receiver  $r_1$  and sender  $s_2$  would like to send to receiver  $r_2$ . However, during LBT,  $s_1$  senses  $s_2$  and so does not send to  $r_1$ , even though the sending from  $s_2$  would not interfere with the reception to  $r_1$ .

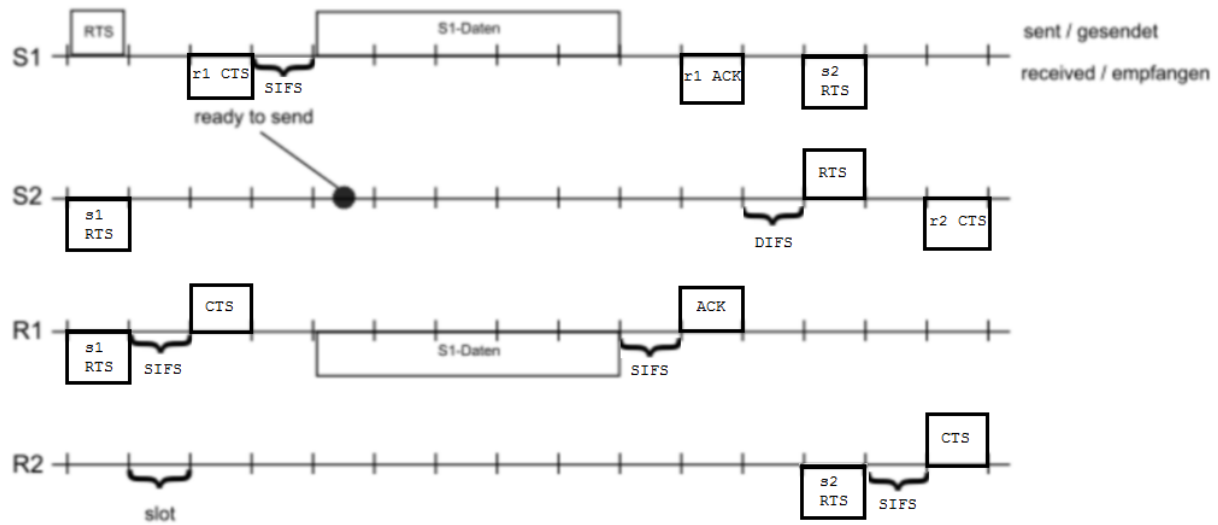
An example of this situation could be:



In black: detection range;

In green: transmission range;

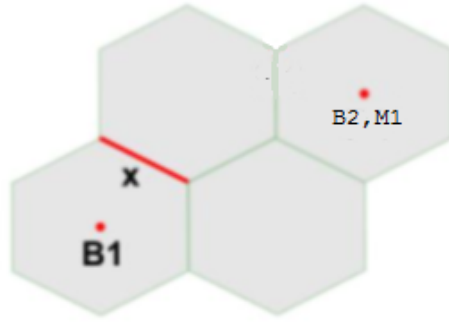
## 2 Task 1.2



- s1 sends the ready to send packet.
- after 1 SIFS r1 communicates to s1 that it is ready to receive the packet.
- after 1 SIFS s1 sends the data.
- at the time displayed with the black dot sender s2 would like to send data to r2. However, with the RTS from s1 it received the NAV and so it waits because s1 is sending.
- after 1 SIFS from the end of the sent data from s1, r1 sends an ack.
- after 1 DIFS the contention period begins and finally s2 can send its own ready to send packet to r2.
- after 1 SIFS r2 communicates to s2 that it is ready to receive the packet.
- after 1 SIFS s2 sends the data and so on...

## 3 Task 1.3

Considering the situation described in the text of the exercise:



$$SNR = \frac{P_{B2}}{P_{B1}}$$

$$P_{B2} = P_b = 100W$$

$$P_{B1} = P_b * g * \frac{1}{f^2 * d_{B1M1}^2} = 100W * 5.6 * 10^{14} \frac{m^2}{s^2} * \frac{1}{(2.4 * 10^9 Hz)^2 (300m)^2}$$

And therefore, substituting these two results in the first formula, what we obtain is:

$$SNR = \frac{100W}{100W * 5.6 * 10^{14} \frac{m^2}{s^2} * \frac{1}{(2.4 * 10^9 Hz)^2 (300m)^2}} = 9.26 * 10^8$$