Networks and Communications 2023

Don’t forget your microwaves

1di) wavespeed = fλ

Wavespeed = speed of light = 3 x 108

f = 0.06 MHz = 60000 Hz

λ = wavespeed / f = 3 x 108 / 60000 = 5000m = 5000 km

1dii) popcorn

2a) Things in red are the answers to fill in the gaps

I’ve assumed that the person initiating the end of the interaction will be A once they confirm that B heard them. The question isn’t really specific so having B initiate the “FIN” should also be OK (that would just mean swapping the As and Bs in the last 4 rows).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SRC | DST | SYN | ACK | FIN | DATA |  |
| A | B | C |  |  |  |  |
| B | A | C | C |  |  |  |
| A | B |  | C |  |  |  |
| A | B |  |  |  | CCCC |  |
| ------------------- | ------------------- | ------------------- | ------------------- | ------------------- | ------------------- | <= not-heard |
| A | B |  |  |  | CCCC |  |
| B | A |  |  |  | CC | <= mis-heard |
| A | B |  |  |  | CCCC |  |
| B | A |  | C |  |  |  |
| A | B |  |  | C |  |  |
| B | A |  | C |  |  |  |
| A | B |  |  | C |  |  |
| B | A |  | C |  |  |  |

2b) TDM (Time Division Multiplexing) is when stations must wait for their turn to transmit, so that collisions are avoided. The transmission rate is limited to R/N, where R is maximum channel rate. In this case, we would be avoiding the two parties clapping at the same time.

An example of TDM is Slotted Aloha, where stations can transmit whenever they want to in discrete time slots. If there is a collision, each side waits a random amount of time before attempting to retransmit. This helps to avoid collisions, with maximum efficiency 36% at 100% load.

2d) Assume you have weapons, a shovel, people who can stand guard, and adequate redstone

1. Lock the treasure room
2. Bury your treasure (yarr)
3. Guard the treasure room
4. Have a decoy treasure room so everyone looks in the wrong place
5. Place traps around the room (landmines, spikes in the ground, big hole covered with leaves)
6. Redstone booby trap