COSC 264  
Introduction to Computer Networking and the Internet

# Assignment

Partners:

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## Questions:

1. **The protocol between sender and receiver as described above has (at least) one weakness: it has a deadlock. Please explain the notion of a deadlock in the context of networking protocols and describe the particular deadlock situation in our case. A guiding question is: what can go wrong and when in case certain packets are lost?**A deadlock in the context of networking protocols indicates a situation where two programs are sharing the same resources, which can prevent the other from accessing the shared resource. This can then result in the functions both stopping.In the case of our network, the particular deadlock
2. **What is the magicno field good for?**

The magicno field is used as a checksum to ensure that the packet received is viable. If the received packet has a number that is not the hexadecimal value 0x497E in the magicno field, then sender, channel, or receiver receiving the packet knows to drop it, and print an error message.

1. **How have you solved the issue with the bit errors? Please explain what you have added to the packet and add to the sender and receiver modules.**

We drop the packet when a bit error becomes evident according to the packet checking in receiver and in channel and then the packet should be resent by the sender.

1. **Please explain what the select() function is doing and why it is useful for the channel (and in another way for the sender).**The select function waits for input on sockets. If no input available, call will block so that it does not use the CPU. This may put all of the threads to sleep. It is useful for the channel as it is blocking.
2. **Please explain how you have checked whether or not the file was transferred correctly (i.e., the receiver’s copy is identical to the transmitter’s copy).**We chose to check whether or not the file was transferred correctly by comparing the transmitter and receiver copies in a document checker online. As shown above, our file was sent correctly.
3. **We consider different packet loss probabilities of P {0.0, 0.01, 0.05, 0.1, 0.2, 0.3} and a source file of length M = 512 \* 100 = 51,200 bytes (you need to create such a file). For each value of P make ten repetitions of the file transfer and for each repetition record how man packets the sender has sent in total. Draw a graph that shows the different values of P on the x-axis and for each such value the average number of total packets (the average being taken over the ten repetitions) on the y-axis. Explain the results.**
4. **Assume the following:**
   1. **The probability to lose an individual packet (either a dataPacket or an acknowledgementPacket) is P,**
   2. **Packet loss events are statistically independent of each other.**
   3. **The size of the file to be transmitted requires N packets.**

**Please derive and justify an expression for the average total number of packets that need to be sent (including retransmissions) to transmit the entire file. Compare this to the (average) total number of packets you have observed in your experiments.**

This is the expression we believe would find the average total number of packets that needs to be sent, as N packets would be sent, along with an additional N\*P packets to account for the packet loss, assuming a packet that has been lost cannot be lost again. If we were to assume that a lost packet can be lost again, the equation would need to be modified to continue sending (N-(N\*P))\*P packets, where the number of lost packets decreases as more packets are sent, until it reaches the last packet sent.

## Source Code:

### Type:

#### Packet

packet.py

### Programs:

#### Channel

channel.py

#### Receiver

receiver.py

#### Sender

sender.py