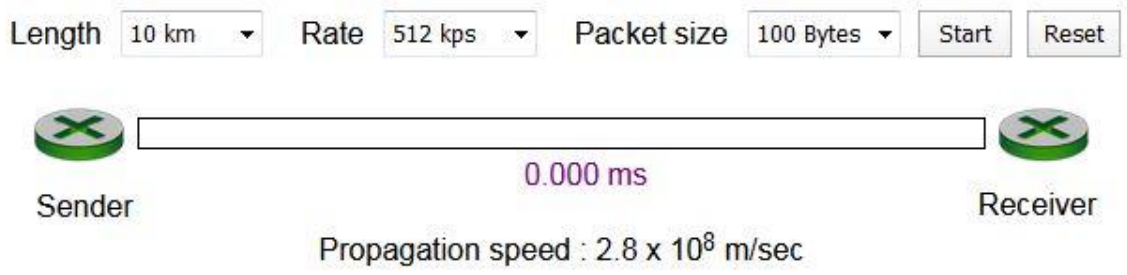
This project requires you to implement a simulator (interactive animator) to illustrates one of the most fundamental concepts in computer networking: **transmission delay versus propagation delay**.

You need to set

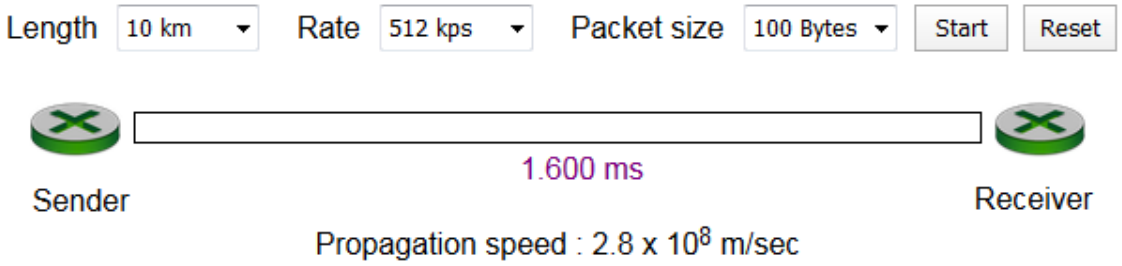
- the length of the link (at least four lengths)
- the packet sizes (at least four sizes)
- the transmission rates (at least three rates)
- the simulator shows the packet being sent from sender to receiver.

The following figure shows the interface which is an initial state.

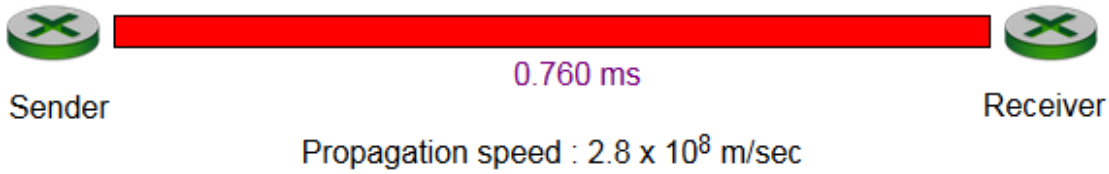


Note that for many combinations, the head of the packet reaches the receiver before transmission is finished at the sender.

Time below the link shows the time took for the all packets to be delivered to the receiver.



Red color bar on the link shows movement of packets; timer continues to count from the beginning of the transmission till the end of transmission. The figure below shows packets are currently being propagated from the sender to the receiver. Timer MUST be displayed to show its counting during propagation the packets. Propagation speed is fixed, 2.8×10^8 m/sec.



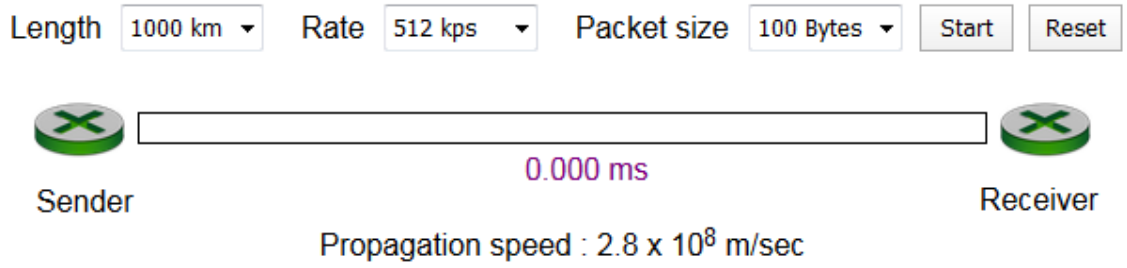
According to the values of the Length, Rate, Packet size, the propagation delay will be different. You need to implement for user to be able to set such values as **a dropdown menu**;

- **Length**: 10 km, 100 km, 500 km, and 1000 km
- **Rate**: 512 kbps, 1 Mbps, 10 Mbps, and 100 Mbps
- **Packet size**: 100 Byte, 500 Byte, and 1 K Byte

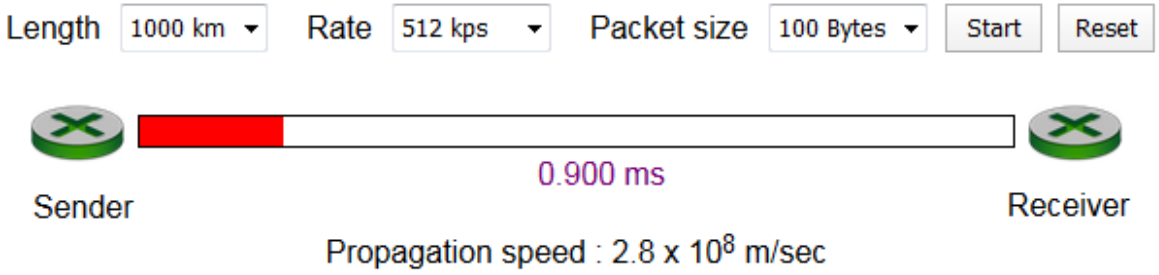
As a part of implementation, you need to set up an interface window to simulate transmission delay versus propagation delay. The interface page must show the first figure on the previous page to set the length between sender and receiver, transmission rate, and packet size and start simulation as well as to reset the simulation.

For example: A red bar shows the movement of packet over the link.

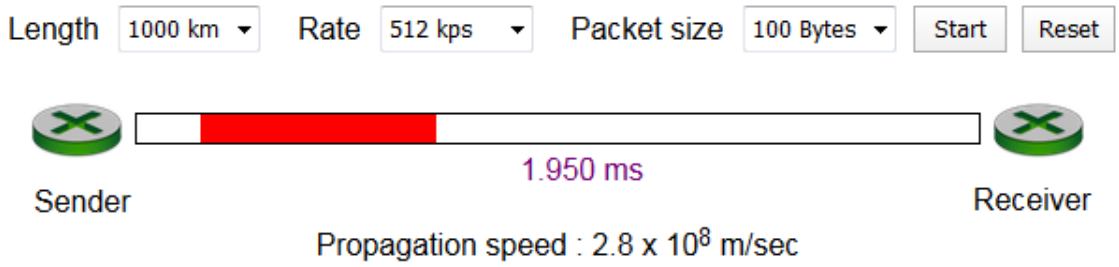
1.



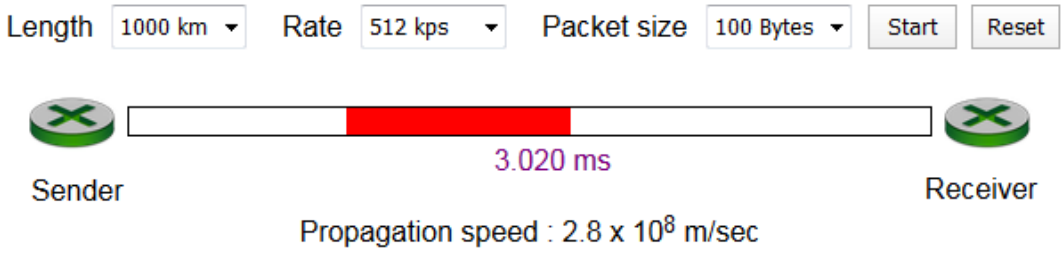
2.



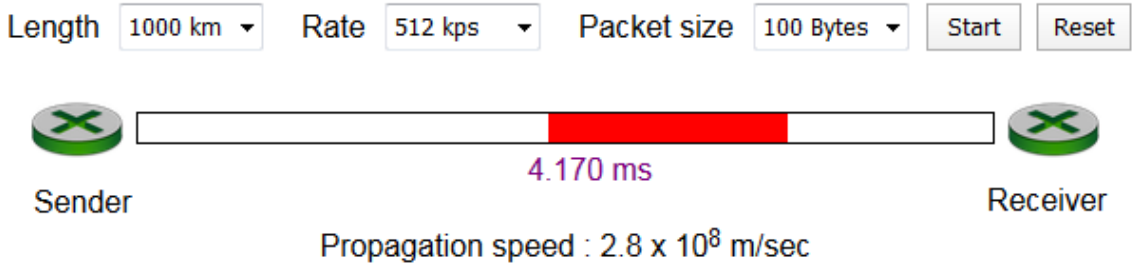
3.


Length
1000 km
Rate
512 kps
Packet size
100 Bytes
Start
Reset
1.950 ms
Sender
Receiver
Propagation speed : 2.8 x 10^8 m/sec

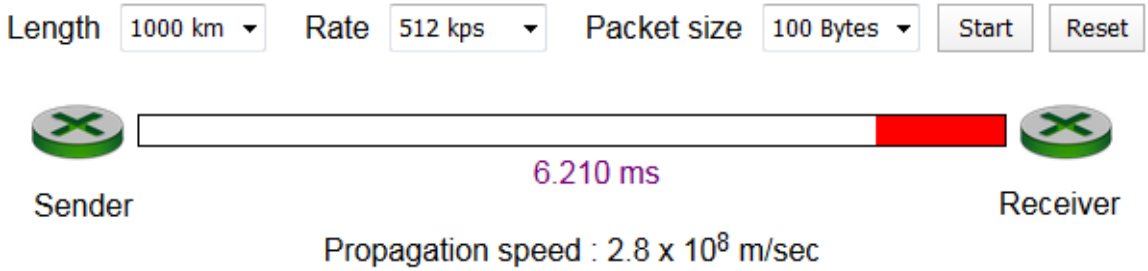
4.


Length
1000 km
Rate
512 kps
Packet size
100 Bytes
Start
Reset
3.020 ms
Sender
Receiver
Propagation speed : 2.8 x 10^8 m/sec

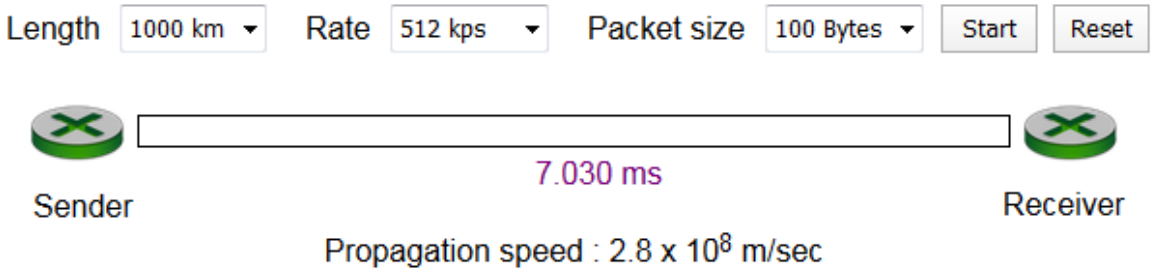
5.


Length
1000 km
Rate
512 kps
Packet size
100 Bytes
Start
Reset
4.170 ms
Sender
Receiver
Propagation speed : 2.8 x 10^8 m/sec

6.


Length
1000 km
Rate
512 kps
Packet size
100 Bytes
Start
Reset
6.210 ms
Sender
Receiver
Propagation speed : 2.8 x 10^8 m/sec

7.



According to the three values, you can see different displays of the red colored bar over the link because it shows movement of the packets.

Requirements:

- The simulator MUST be implemented using JAVA.
- You MUST upload a **WinZip file** containing following **FOUR** items to claim full credit;

    1. Your program in a **PACKAGE with a proper name - If it is not in a package, it won't be graded.**
    2. An executable file.
    3. A copy of source program with code documentations.
    4. A few snapshots like the above to show that your implementation is working as intended in a MS WORD along with a brief explanation.

- Your implementation MUST be tested in the eclipse because it would be graded in it no matter where you created your program.
- Do NOT submit a 'tar' file or 'HEIC' file.
- Interface design is also a part of grading.

- **DUE: By 11:59 PM on April 22.**
- **The same late submission policy will be applied if it is submitted after the due but by the end of April 25.**
- **If submission time is displayed in red color in the Western Online, it is late no matter how late it is. So, make sure that your submission is made before the due date & time to avoid 50% late penalty.**