

1. First we must note that after the first packet reaches to the first router, the second packet will be sent, and after the second packet reaches to first router the third one will be sent.

For the first packet to reach the first router we have:

$$\text{Propagation delay} = d_{prop} = \frac{l_1 \text{ m}}{c \frac{\text{m}}{\text{s}}} \text{ s}$$

$$\text{Transmission delay} = d_{trans} = \frac{1500 \text{ kbyte}}{b_1 \frac{\text{kbyte}}{\text{s}}} \text{ s}$$

So the total is the sum of propagation and transmission delay.

Now for the second packet to reach the first router holds the same scenario.

For the third packet transmission starts after the second packet reaches to the first router so the third packet should wait 2 times of the delay for the first link and then it will traverse links normally. Because there is no congestion so the propagation and transmission delay for the second link is less or equal to the first link and also for the third link is less than or equal to the second link, so it will send packets on the second link and the third link without delay. So the total delay is:

$$3 * \left(\frac{l_1 \text{ m}}{c \frac{\text{m}}{\text{s}}} + \frac{1500 \text{ kbyte}}{b_1 \frac{\text{kbyte}}{\text{s}}} \right) + \frac{l_2 \text{ m}}{c \frac{\text{m}}{\text{s}}} + \frac{1500 \text{ kbyte}}{b_2 \frac{\text{kbyte}}{\text{s}}} + \frac{l_3 \text{ m}}{c \frac{\text{m}}{\text{s}}} + \frac{1500 \text{ kbyte}}{b_3 \frac{\text{kbyte}}{\text{s}}}$$

2. If we just encrypt the username and password and send it to server, the server expects an unencrypted username/password pair. So if we want to change client side we have to changing the server side.
3. You should implement TCP mechanisms in the application layer. You should implement handshaking. Then number each packet start from a sequential number. When it receives a packet from a previously unknown client, it adds that number to the list, initializing the sequence number. When a packet is received by the client, it should check for the correct order number and if it is not correct it can save it until the other packets between are received or it can drop it and request for the packet. And

also for every packet which is in order, you should send an ACK. After a while when the client didn't receive any packet from another client it should remove it from the list, or they can finish their connection themselves.

4. There are 280 top level domains. Some non commons are:

- .biz: restricted for business.

- .int: used only for registering organizations established by international treaties between governments.

- .mobi: reserved for consumers and providers of mobile products and services.

- .museum: reserved for museums.