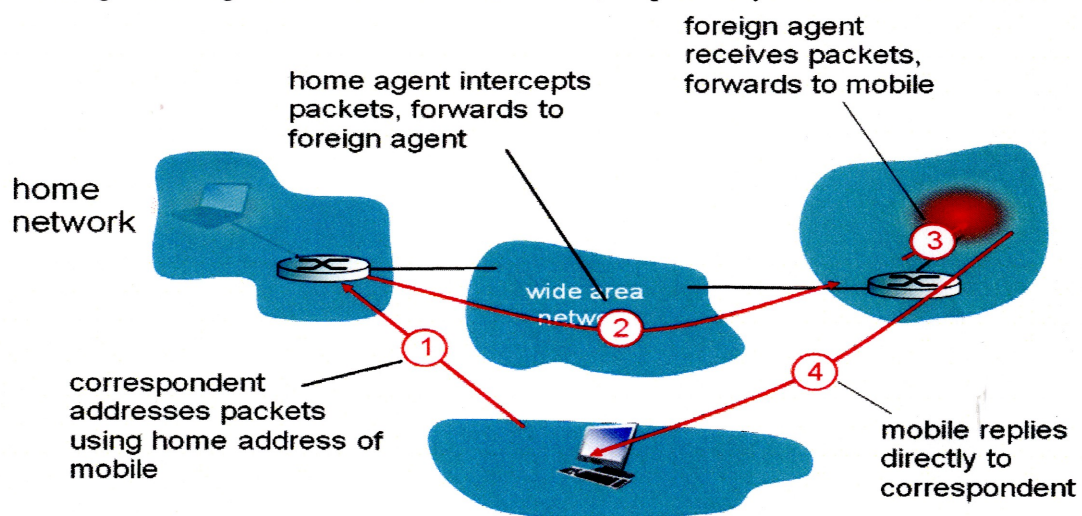
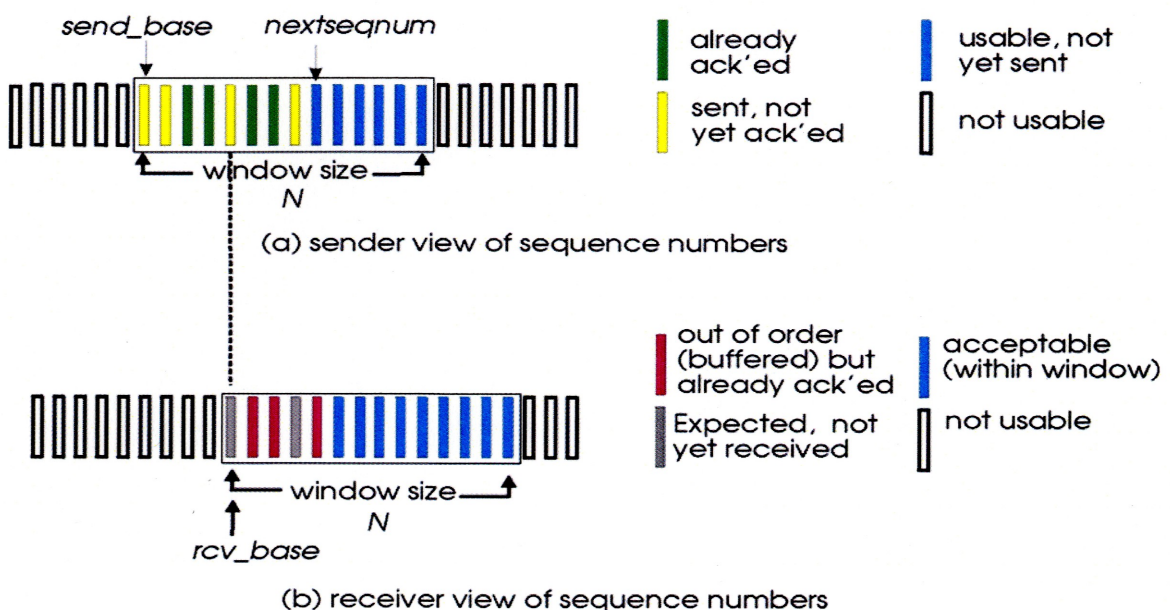


1. There are seven layers in ISO/OSI model. Please explain them briefly from application layer to physical layer. What are the advantages of dividing the network protocol into layers? What are the possible problems behind it? Please also compare it with today's internet protocol stack.
2. What is client-server architecture? What is P2P architecture? What are advantages and disadvantages of both architectures? Which architecture is most widely used in today's system and why?
3. Explain briefly what is CSMA/CD protocol in wired networks? Please draw a diagram to show the advantage of CSMA with collision detection (CD). What is CSMA/CD protocol in wireless networks? Please draw pictures to explain what is hidden terminal problem? And what is exposed terminal problem?
4. For the following graph, if the IP address of correspondent node is A, home network is B, foreign network is C, and care-of-address of the mobile receiver is C.1, please show how encapsulation technique is used to send data from A to C.1 via triangle routing and then C.1 send data to A, respectively.

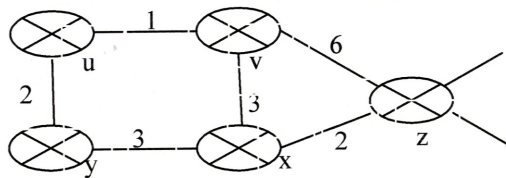


5. Are the following figures for selective repeat correct? Please explain the operations of selective repeat by using those two figures and identify and correct errors if there are.



6. Please draw a picture of TCP Reno protocol (congestion window versus transmission round) which include slow start, congestion avoidance, fast retransmit, and time out.
7. Please draw a block diagram which consists of different parts for a router. Then please explain briefly the function of each part.
8. Consider a packet of length  $L$  which begins at end system A, travels over one link to a packet switch, and travels from the packet switch over a second link to a destination end system. Let  $d_i$ ,  $s_i$ , and  $R_i$  denote the length, propagation speed, and the transmission rate of link  $i$  for  $i = 1, 2$ . The packet switch delays each packet by  $d_{proc}$ . Assuming no queueing delay, in terms of  $d_i$ ,  $s_i$ ,  $R_i$ , ( $i = 1, 2$ ), and  $L$ , what is the total end-to-end delay for the packet? Suppose now the packet is 1000 bytes, the propagation speed on both links is  $2.5 \times 10^8$  m/s, the transmission rates of both links is 1 Mbps, the length of the first link is 4000 km, and the length of the last link is 1000 km. For these values, what is the end-to-end delay? Explain briefly what is ISO/OSI 7-layer protocol reference model? What are the advantages of dividing the network protocol into layers? What are the possible problems behind it?

9.



Consider the network shown above, and assume each node initially knows the cost to each of its neighbors. Consider the distant-vector algorithm and shows the distance table entries at node z.

10. Please use the Dijkstra algorithm to construct the routing paths step by step (beginning from u).

