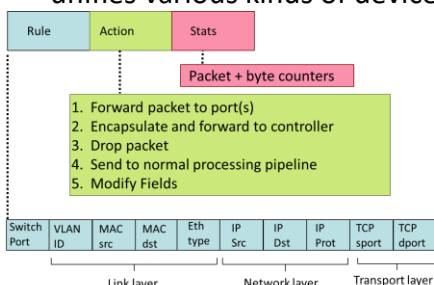


Dept. of Computer Science and Engineering, National Sun Yat-sen Univ.
Second Semester of 2020 PhD Qualifying Exam

Subject : Computer Networks

1. There are four sources of packet delays. Please explain them according to the order of delays while it enters into a node such as a router. What are the advantages and disadvantages of adopting packet switching for sending packets?
2. Internet protocol stack consists of five layers. Please explain the functions of each layer, respectively. Then please depict the advantages and disadvantages behind layering.
3. Encapsulation is a common approach adopted by networking engineers. Please list four examples of applying encapsulation in networking. What are the advantages of the encapsulation method?
4. How can we achieve reliable data transfer under unreliable channel conditions? Please list and explain related techniques used to realize reliable packet transmissions under changing channel conditions.
5. Briefly explain the operations of TCP congestion control by drawing a graph of congestion window size versus transmission round. Your explanation must include the slow start phase, the congestion avoidance phase, and the condition of experiencing 1 a time out or three repeated ACKs losses.
6. Please draw a generic router architecture and explain its operations. Please draw a picture to show and explain the operations of input port functions of a router,
7. There are two methods for the network control plane, which is per-router control for traditional routers and logically centralized control for software-defined networking (SDN) routers. Please draw two graphs for illustrating the differences between these two kinds of methods.
8. Please write a pseudo code for Dijkstra's algorithm. Please also give remarks to your codes for easy reading.
9. Please use the following graph of OpenFlow to explain the rule, the action, and the stats of flow table entries. Please also use the graph to explain the wide applicability of the OpenFlow, which unifies various kinds of devices such as routers, switches, firewalls, NATs, and so on.



10. What is CSMA? What is CSMA/CD? What is CSMA/CA? Why is CSMA/CD used in IEEE 802.3 wired Ethernet and why is CSMA/CA used in 802.11 wireless networks? Please draw a picture to show the early abort of transmission if a collision is detected along the time by CSMA/CD. Please also draw pictures to explain the hidden terminal problem and the exposed terminal problem in wireless networks?