CSE208 Computer Networks
2019-2020 Spring Final Homework

Due 2020.06.28

Submission: Submit your solutions to AKUZEM (OYS) as a single zip file including your solutions' PDF files and TurnItIn originality report PDF files.

TurnItIn class code: 24533933
class key: network19
assignments (for each question):
Final Question 1, Final Question 2...

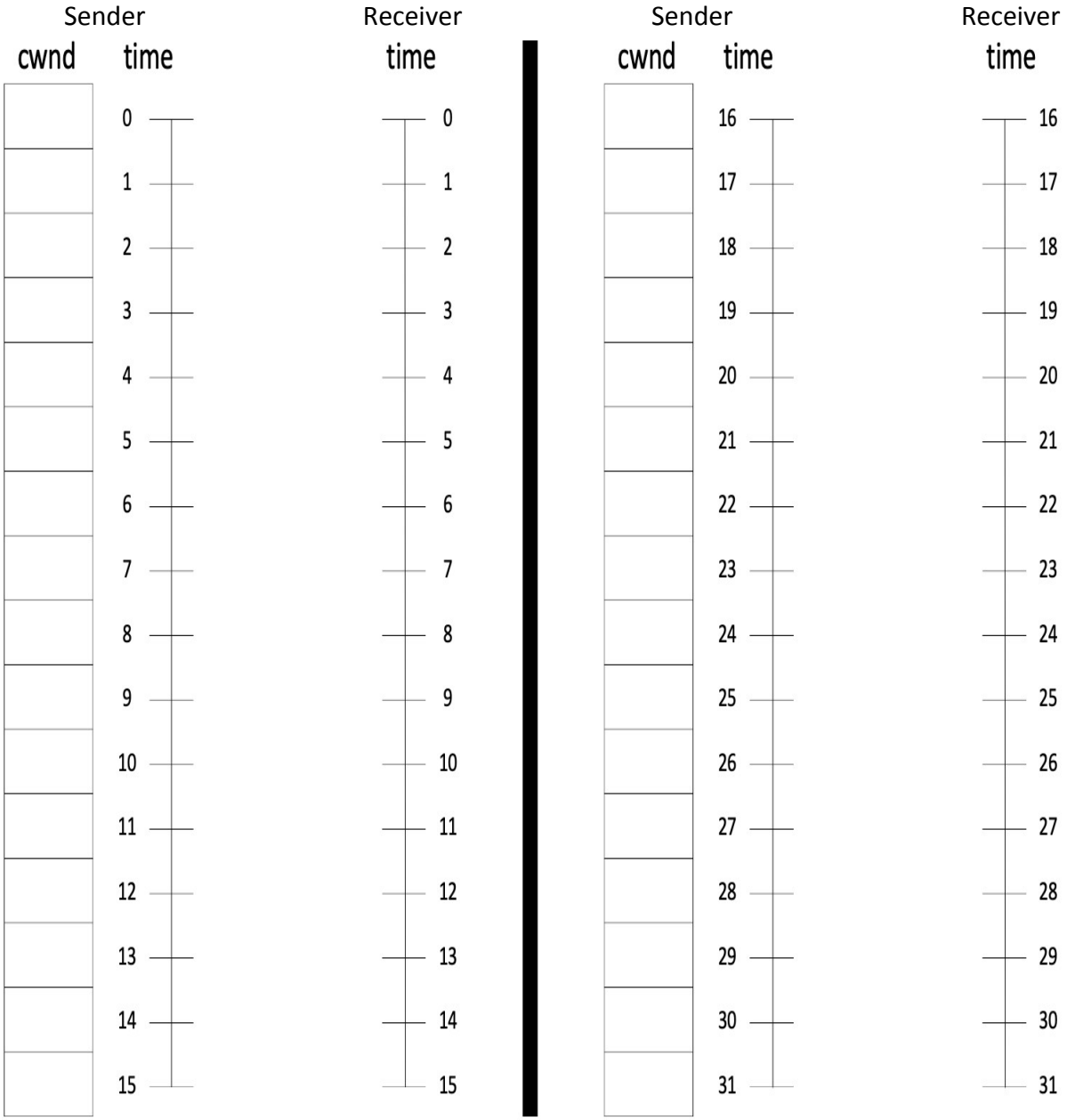
Name the zip file as Student_name_ID.zip, e.g. Ali_Veli_123456.zip
Name the solution PDF's as questionNumber.pdf, e.g. 1.pdf, 2.pdf...
Name the TurnItIn check PDF's as questionNumber_T.pdf, e.g. 1_T.pdf, 2_T.pdf...

Penalties:
Incorrect PDFs / using other formats: -5 pts
Incorrect compression format (rar, tar...) / no zip etc... : -5 pts
Incorrect naming of files: -10 pts
Late submission policy: Not allowed according to the calendar

Important: To get full grades, you must explain all of your solutions in problems. Only writing the correct answer may not earn you full grade.

Both provide the scanned versions of your handwritten solutions for the problems and typed text in a word processor in the same PDF files. Scanned handwritten solutions are not necessary except for the problems 1 to 5.
(Summary: include scanned solutions together with the digital text in the same PDFs for questions 1 to 5, include digital text for all questions)
Answers without the text written in word processor will not be accepted.

Question 1 (17 points) There is a connection where distance between sender and receiver is 200 kms. We want to transfer a file of size 10^4 bytes. Assume that there is a 40 bytes header for each segment and maximum segment size is 1250 bytes. The losses occur where data segment 5 and ACK segment 3 are sent on their **first** transmission. All the data and ACK segments except these 2 segments are sending to receiver without loss. Calculate how long does it take to transfer whole file and to receive last ACK for receiver by using Go-Back-N algorithm with window size N=4 by assuming the connection speed is 10 Mbps and propagation speed is 1x10^5 km/s. Timeout is 10 ms and is started when every time the sender window is slided. **Draw the timeline. Show all data and ACK segments on drawing in detail.**

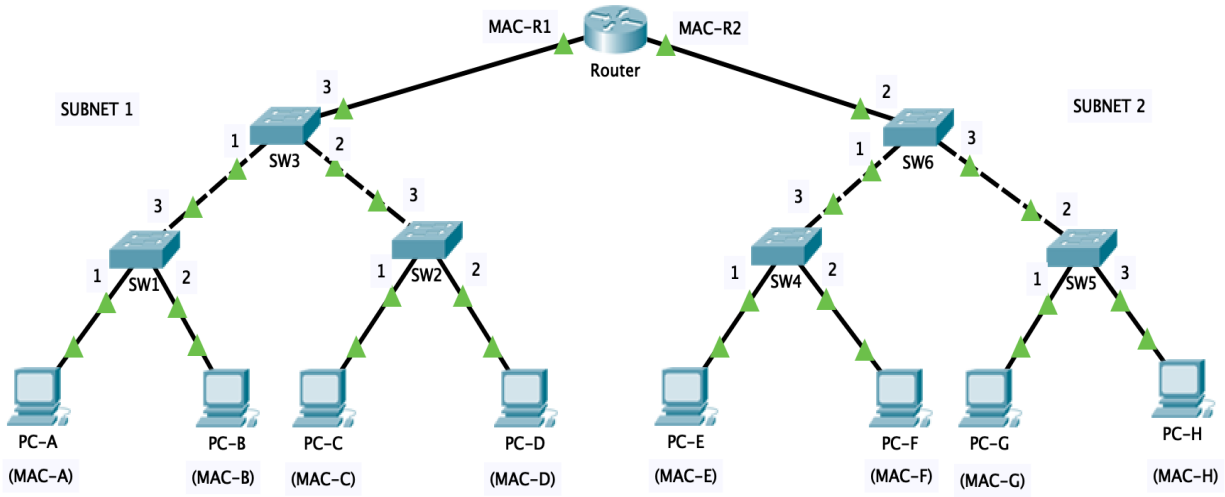


Question 2 (10 points)

Target Network	Next Hop
139.179.222.0/25	R1
139.179.128.0/17	R2
139.179.120.0/21	R3
193.179.216.0/21	R4
139.179.0.0/16	R5

According to routing table above, which output ports are IP packets with destination addresses below routed to? **Show your work in detail**.

i. 139.179.60.1
ii. 139.179.226.4
iii. 139.179.124.55
iv. 139.179.223.18
v. 139.179.127.222



Question 3 (27 points) Consider the network diagram above. There are two subnets separated by a router, namely subnet-1 and subnet-2. In each subnet there is a multi-switch architecture. There are 8 PCs with MAC addresses MAC-A, MAC-B, …, MAC-H. The MAC address of the subnet-1 adapter of the router is MAC-R1 and MAC address of the subnet-1 adapter of the router is MAC-R2. All switches have three interfaces numbered as 1,2 and 3.

At t = 0, assume the following:

- ARP tables of all PCs are up-to-date.
- ARP tables of both router adapters are up-to-date.
- Forwarding (Mac address) tables of all switches are empty.
- All PCs know the IP address of the router and their subnet mask. The routing table at the router is up-to-date.
- All PCs and the router know the IP addresses of all other PCs. Hence, there is no need for a DNS lookup.

a. (9 points) *At t = 0.1*, PC-A sends an IP segment to PC-H. *At t = 0.11*, the segment is received by PC-H. What is the state of the forwarding tables of switches *at t = 0.2*; i.e. after all packet propagation, forwarding, processing in the network is completed. Fill the following tables.

SW1	
MAC add.	İnterface

SW2	
MAC add.	İnterface

SW3	
MAC add.	İnterface

SW4	
MAC add.	İnterface

SW5	
MAC add.	İnterface

SW6	
MAC add.	İnterface

b. (9 points) After the packet transmission mentioned in the previous part is completed, *at t = 0.3*, PC-H sends an IP segment to PC-A. *At t = 0.31*, the segment is received by PC-A. What is the state of the forwarding tables of switches *at t = 0.4*; i.e. after all packet propagation, forwarding, processing in the network is completed. Fill the following tables.

SW1	
MAC add.	İnterface

SW2	
MAC add.	İnterface

SW3	
MAC add.	İnterface

SW4	
MAC add.	İnterface

SW5	
MAC add.	İnterface

SW6	
MAC add.	İnterface

c. (9 points) After both packet transmission mentioned in the previous parts are completed, *at t = 0.5*, PC-B sends an IP segment to PC-G. *At t = 0.51*, the segment is received by PC-G. What is the state of the forwarding tables of switches *at t = 0.6*; i.e. after all packet propagation, forwarding, processing in the network is completed. Fill the following tables.

SW1	
MAC add.	İnterface

SW2	
MAC add.	İnterface

SW3	
MAC add.	İnterface

SW4	
MAC add.	İnterface

SW5	
MAC add.	İnterface

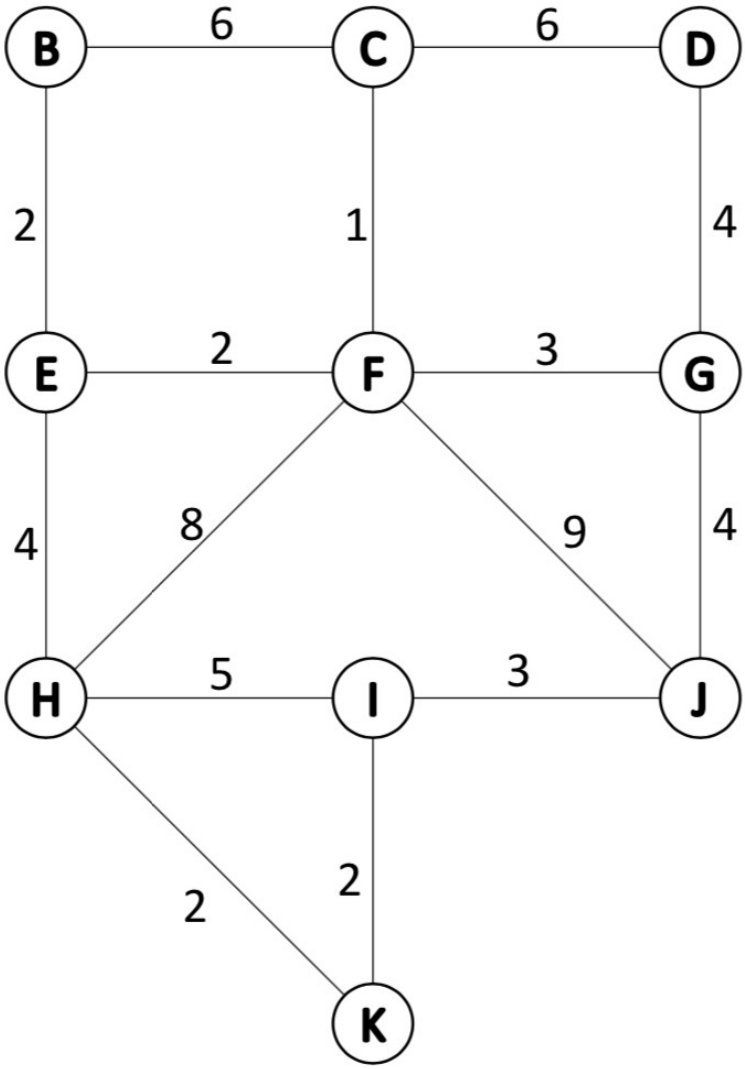
SW6	
MAC add.	İnterface

Question 4 (5 points) Write the appropriate command name for the following blank places about router in Packet Tracer.

1) Enter into privileged EXEC mode? _____
2) Enter into global configuration mode? _____
3) Negate the command? _____
4) Enable the interface? _____
5) To prevent console messages from interrupting commands? _____

Question 5 (20 points) Execute the Dijkstra algorithm at node C for the network shown below by filling in the following table. In the table, you need to give both the distance D(v) and previous node p(v).

Iter.	Added	D(B), p(B)	D(D), p(D)	D(E), p(E)	D(F), p(F)	D(G), p(G)	D(H), p(H)	D(I), p(I)	D(J), p(J)	D(K), p(K)
0	C									
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										



Question 6 (5 points) Write at least 5 parameters that are dynamically determined by TCP at run-time.

Question 7 (6 points) Write at least 2 strict reasons on why we still need an IP address and why MAC-based intra/inter-domain routing is not a good idea and not feasible while all modern network cards already provide a unique MAC address ready for communication.

Question 8 (2 points) Why simple shortest-path routing is not enough with BGP?
(Maximum 2 sentences)

Question 9 (2 points) Write at least 3 parameters that can be set by BGP administrators to set-up BGP.

Question 10 (6 points) Clearly explain “hidden terminal problem” and “exposed terminal problem” and their solutions in your own words and own understanding (each one with maximum 5 sentences).