Practice Exam 2

Spring 25

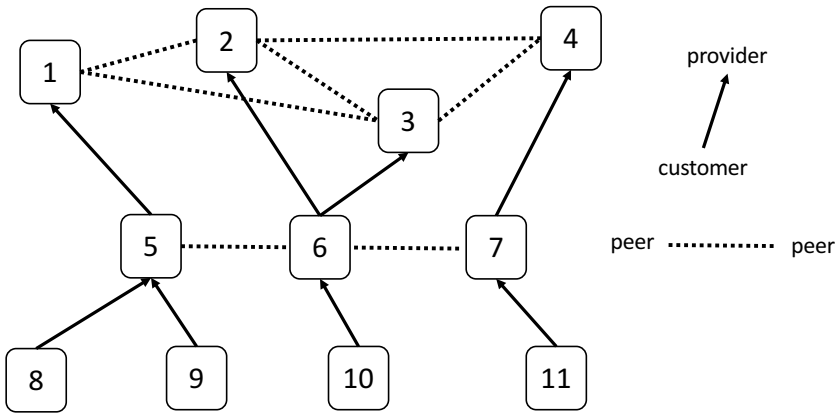
1 BGP

Recall that in BGP routing a valley-free path is a path that follows a sequence of zero or more provider links, followed by at most one peer link, followed by a sequence of customer links.

(a) Using the local preference to enforce valley-free paths, please fill in whether a route imported from a neighbor of a given type should be sent to another neighbor of a given type or not. Answer by Yes or No.

Route received from	**Route sent to**		
	Customer	**Provider**	**Peer**
Customer			
Provider			
Peer			

(b) Consider the diagram below of ASes shown in the diagram below. Arrows point from customer up towards a provider, dashed lines connect peers.

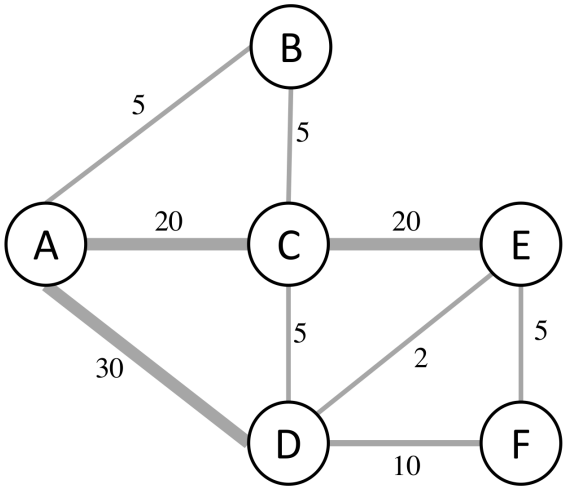


i. What possible valley-free paths are there from AS11 to AS10?

ii. Which path will be used for sending traffic from AS11 to AS10?

2 Distance-vector Routing

Consider the below network showing the links and their cost between the nodes; here, the cost represents the propagation delays (for both distance vectors and data packets); assume transmission and processing delays to be zero. Assume distance vector routing and that all nodes send their current distance vectors to all neighbors at every 10 seconds, starting at t = 10s. Assume the nodes' clocks are perfectly synchronized. Below is node A's initial forwarding table.



A's Forwarding Table at t=5s

Destination	Next Hop	Cost
B	B	5
C	C	20
D	D	30
E	-	∞
F	-	∞

(a) Fill in A's forwarding table at the following times.

t = 15s

Dest.	Next hop	Cost
B		
C		
D		
E		
F		

t = 25s

Dest.	Next hop	Cost
B		
C		
D		
E		
F		

t = 35s

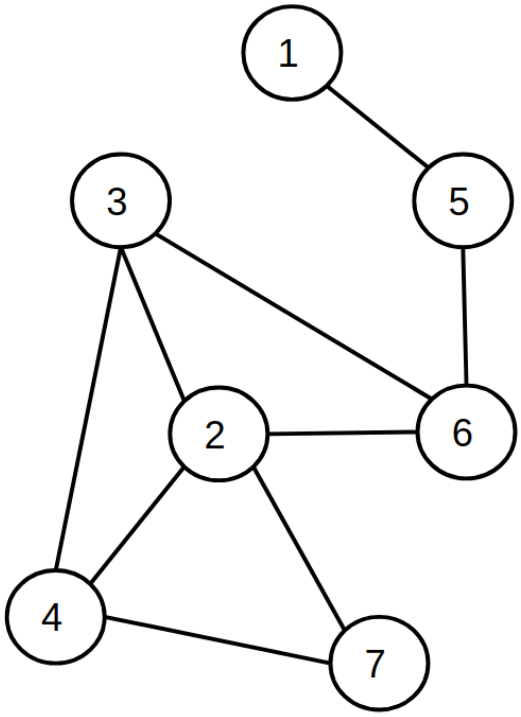
Dest.	Next hop	Cost
B		
C		
D		
E		
F		

(b) Circle the first of these times that sees a converged network (i.e. the first time when no more DVs will be sent in the future).

5s 15s 25s 35s 45s 55s 65s 75s 85s 95s 105s 115s 125s

3 The Spanning Tree Algorithm

Run the spanning tree protocol on the graph below.



Round 1

	Send
1	
2	
3	
4	
5	
6	
7	

Round 2

	Send
1	
2	
3	
4	
5	
6	
7	

Round 3

	Send
1	
2	
3	
4	
5	
6	
7	

Round 4

	Send
1	
2	
3	
4	
5	
6	
7	

Round 5

	Send
1	
2	
3	
4	
5	
6	
7	

Round 6

	Send
1	
2	
3	
4	
5	
6	
7	

4 Conceptual Questions

(a) Why do network switches and routers implement only physical, link and network layers?
Your Answer: _____

(b) Why is it that routing protocols have non-zero convergence time?
Answer: _____

(c) **Addressing.** Which of the following may be the reason to use hierarchical addressing in the Internet? Mark all the reasons that apply.

A. Avoiding large forwarding table sizes.

B. Avoiding large coordination overhead for address assignment.

C. Avoiding large overhead due to network failures.

D. Avoiding large overhead due to device mobility.

Your Answer: _____

(d) **Circuit versus Packet Switching.** Which of the following may be the reason to use circuit switching rather than packet switching for forwarding purposes? Mark all the reasons that apply.

A. Improved resource utilization

B. Improved scalability due to not maintaining "per-connection state"

C. More predictable performance

D. No packet header overhead

Your Answer: _____

(e) **Link Layer** Suppose you are consulting a networking company on choice of a mechanism to be used for achieving **high throughput in a shared (broadcast) medium**. The networking company tells you that they expect their network to be very "lightly" loaded, that is, very few sources will have data to transmit at any point of time. Which one of the following protocols would you recommend?

A. Time Division Multiplexing (Time sharing)

B. Frequency Division Multiplexing (Frequency Sharing)

C. CSMA/CD

D. Link State Routing

E. Distance Vector Routing

F. "Me, a consultant!?! Hahaha"

Your Answer: _____

(f) Loops. Which of the following protocols can get into permanent loops, even in absence of network changes?

A. Ethernet

B. Link State

C. Distance Vector

D. BGP

E. None of the above

Your Answer: _____