Computer Networks HW-3

- **Pavan Sai Korlapati**

Question 1: We made a distinction between the forwarding function and the routing function performed in the network layer. What are the key differences between routing and forwarding?

Answer:

Routing is a process that determines the end to end path of the packets that are traveling through the internet. This is a network-wide process that may take several seconds to complete and in scale, maintained and determined by software. Whereas forwarding is a router's local action of transferring the packets from its input interfaces to output interfaces. This process happens a lot quicker than routing and will complete in nanoseconds.

Question 2: We noted that network layer functionality can be broadly divided into data plane functionality and control plane functionality. What are the main functions of the data plane? Of the control plane?

Answer:

The main function of the data plane is to forward the datagrams from their input links to the output links which is also referred to as packet forwarding. The input ports of the data plane perform functionalities like terminating incoming physical link at router, interoperate with link layer at the other side of incoming link and perform lookup functions at input ports. Whereas for the control plane, the main functionality is to determine the path of packets taken from its source to destination which means routing. It executes routing protocols and responds to attached links. It also communicates with remote controllers and performs management functions.

Question 3: What is meant by destination-based forwarding? How does this differ from generalized forwarding?

Answer:

Destination based forwarding means that the datagram at the router will be transferred to an output interface based on the destination of the datagram. But in case of generalized forwarding, information associated with a datagram is also considered to determine the output interface of the datagram which means that the forwarding decisions can be influenced by port numbers of source addresses.

Question 4: Suppose you purchase a wireless router and connect it to your cable modem. Also suppose that your ISP dynamically assigns your connected device (that is, your wireless router) one IP address. Also suppose that you have five PCs at home that use

802.11 to wirelessly connect to your wireless router. How are IP addresses assigned to the five PCs? Does the wireless router use NAT? Why or why not?

Answer:

Yes, the wireless router uses NAT to obtain IP address from your ISP. A wireless router includes a DHCP server which is used to assign IP addresses for the PCs.

Question 5: Compare and contrast link-state and distance-vector routing algorithms.

Answer:

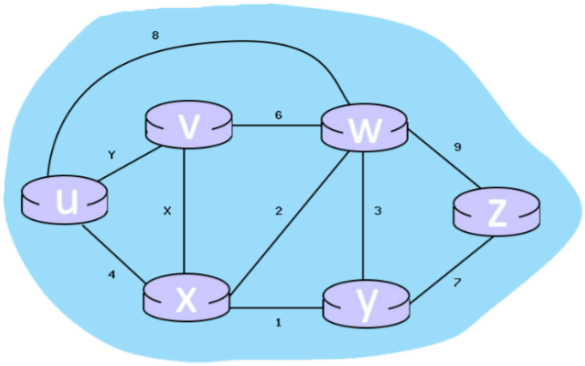
Link state algorithm computes least distance between the source and destination with the overall knowledge of the network. Distance vector routing algorithm calculates the least cost path iteratively and decentralized. In this algorithm, a node knows the other node to which it should send the packet.

Question 6: Is it necessary that every autonomous system use the same intra-AS routing algorithm? Why or why not?

Answer:

No, every AS has its own administrative algorithm. These algorithms can differ based on the type of necessity with regards to scalability and interoperability.

Question 7:



Consider the completed table below, which calculates the shortest distance to all nodes from Z:

Node	Shortest distance from Z	Previous Node
Z	0	n/a
Y	7	Z
X	8	Y
W	9	Z
V	10	X
U	12	X

a. For link X, what is the cost associated with this link? If the answer can't be determined given the information, respond with 'n/a' (10 points)

Answer:

According to table, Distance from node z to v = 10 with x as previous node.

Implies, X + d(x) + d(y) = 10;

X + 1 + 7 = 10;

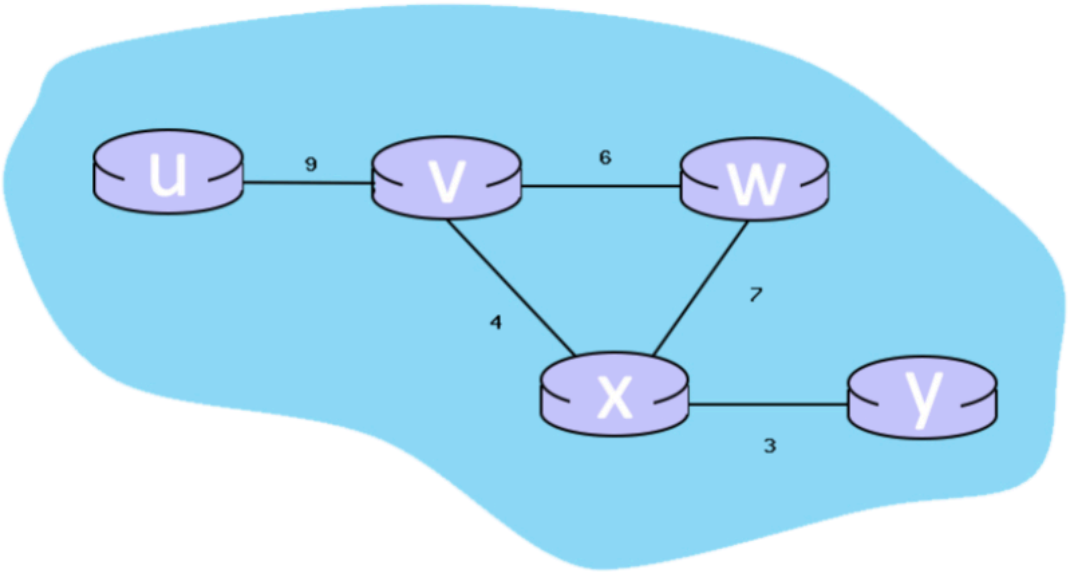
Cost of link X = 2

b. For link Y, what is the cost associated with this link? If the answer can't be determined given the information, respond with 'n/a' (10 points)

Answer:

The link Y has not been used for the above table and hence it cannot be determined ‘n/a’.

Question 8: The 6-node network:



a. When the algorithm converges, what are the distance vectors from router 'Y' to all routers? Write your answer as u,v,w,x,y (5 points)

Answer:

The distance vector is (u,v,w,x,y) = (16, 7, 10, 3, 0)

b. The phrase “Good News travels fast” is very applicable to distance vector routing when link cost decreases; what is the name of the problem that can occur when link cost increases? (5 points)

Answer:

When the link cost increases, it is called the “Count to Infinity” problem. (“Bad news travels slow”)