

Assignment-4

Date: _____ Page 26

Q.1] Write a note on network service models.

Ans Services provided by network layers for individual datagrams.

- Guaranteed delivery
 - This service guarantees that the package will arrive at its destination.
- Guaranteed delivery with bounded delay
 - This service not only guarantees delivery, but delivery with a specified with a host-to-host delay bound.
- Services provided by network layers for ex flow of datagrams.
- In-order packet delivery
 - This packet guarantees that packet will arrive at the destination in the order that they were sent.
- Guaranteed minimal bandwidth
 - This network-layer service emulates the behaviour of a transmission link of a specified bit rate (for e.g., 1Mbps). b/w

sending & receiving hosts.

- As long as the sending host transmits bits at a rate below the specified bit rate, then no packet is lost.
- Guaranteed maximum jitter
- This service guarantees that the amount of time between the transmission of two successive packets at the sender is equal to the amount of time between their receipt at the receiver.

• Security services

- Using a secret session key known only by a source and destination host, the network layer in the source host could encrypt the payloads of all datagrams being sent to the destination host.
- The network layers in the destination host would then be responsible for decrypting the payloads.

Q.2) Explain Virtual and Datagram network

One Virtual Network :-

- It consists of
 - i. A path between the source and destination hosts

2. Vc numbers, one number of for each link along the path.
 3. Entries in the forwarding table in each router along the path.
- A packet belonging to a virtual circuit will carry a Vc number in its header.

Datagram Networks

- In connectionless service, packets are injected into the subnet individually and routed independently of each other.
- No advance setup is needed.
- The packets are frequently called datagrams and the subnet is called a datagram subnet.
- Only directly connected lines can be used.

	Datagram	Virtual circuit
Connection setup	None	Required
Addressing	Packets contains full source and destination address	Each virtual circuit no. entered to table on setup, used for routing.
State Information	None other than routes table containing setup, all packets destination network follow same route	Route established at routers
Effect of Router Failure	Only one packets lost during crash	All virtual circuit passing through failed routers terminated.

	Datagram	Virtual Circuit
Congestion Control	Difficult since all packets routed independently satisfies each virtual circuit resource requirement at setup, since can vary.	Simple by pre-allocating enough buffers to maximum number of circuits fixed.

Q.3) Explain Broadcast and Multicast routing in detail.

Ans • Broadcast

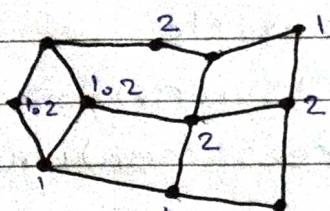
- Host need to send messages to many or all other hosts.
- For example
 - A service distributing weather reports
 - stock market updates
 - Live radio programs
- In short, sending a packet to all destination simultaneously is called broadcasting.
- First broadcasting method that simply send a distinct packet to each destination.
- so, it's waste of bandwidth, but it also requires the source to have a complete list of all destinations
- In practice this may be the only possibility, but it is the least desirable of the methods.

- Flooding is second method. Although it is for ordinary point-to-point communication, for broadcasting it might raise serious consideration, especially if none of the methods are applicable.
- The problem with Flooding as a broadcast technique is the same problem it has as a point-to-point routing algorithm.
- It generates too many packets and consumes too much bandwidth.
- ~~A third~~
- A third algorithm is Multi Destination Routing.
- If this method is used, each packet contains either a list of destinations or a bit map indicating the desired destinations.

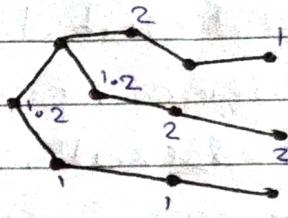
• Multicast Routing

- sending a message to a group is called multicasting, and its routing algorithm is called multicast routing.
- Multicasting requires group management. Need to create and destroy groups, and to allow processes to join and leave groups.
- To do multicast routing, each router computes a spanning tree covering all other routers.

- For example,
- some routes are attached to hosts that belong to one or both of these groups, as indicated in the figure.



(a)



(b)

- A spanning tree for the leftmost routes
- When a process sends a multicast packet to a group, the first route examines its spanning tree and prunes it, removing all lines that do not lead to hosts that are members of the group.

Q.4) Explain Routing algorithms in detail.

Ans There are three routing algorithms.

1) Link state routing algorithm.

- It is also known as Dijkstra's algorithm
- It computes the least cost path from one node to all other nodes.
- It's iterative and after the k^{th} least-cost paths are known to k destination nodes.

2) Distance Vector Algorithm.

- It is iterative, asynchronous and distributed.

- It is distributed in that each node receives some information from one or more of its directly attached neighbours, performs a calculation and then distributes the results of its calculation back to its neighbours.
- It is iterative, so, process continues on until no more information is exchanged between neighbours.
- The algorithm is asynchronous. It does not require all of the nodes to operate with each other.

By Hierarchical Routing

- As networks grow in size, the source routing tables grow proportionally.
- Router memory, CPU time and more bandwidth consumed to send status reports about them.
- When hierarchical routing is used, the sources are divided into what called regions.
- Each source knowing all the details about how to route packets to destination within its own region.
- But knowing nothing about the internal structure of other regions.