

UNIT III MOBILE NETWORK LAYER

Mobile IP – DHCP – AdHoc – Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV, Hybrid routing – ZRP, Multicast Routing-ODMRP, Vehicular AdHoc networks (VANET) – MANET VsVANET – Security.

PART A

1. Why the traditional IP cannot be used in a mobile network. What are the main differences between the traditional IP and the mobile IP? How does mobile IP support mobile hubs?

IP is responsible for routing a packet to any host, connected to the Internet, uniquely identified by an assigned IP address. The nodes in the LAN are assigned an address based on the LAN address. In the traditional IP addressing scheme, when a host moves to a different location, it may move to another network. As a result, it needs to change its IP address. The mobile IP allows mobile computers to stay connected to the Internet regardless of their location and without changing their IP address. The traditional IP does not support user mobility. Mobile IP was created by extending IP to enable users to keep the same IP address while travelling to a different network.

2. Mention the following terms associated with mobile IP:

Home Network: The home network of a mobile device is the network within which the device receives its identifying IP address (home address). In other words, a home network is a subnet to which a mobile node belongs to as per its assigned IP address. Within the home network, there is no need of mobile IP.

Home Address (HA): The home address of a mobile device is the IP address assigned to the device within its home network. The IP address on the current network is known as home address.

Foreign Agent (FA): The foreign agent is a router in a foreign network that functions as the point of attachment for a mobile node when it roams to the foreign network. The packets from the home agent are sent to the foreign node which delivers it to the mobile node.

Foreign Network: The foreign network is the current subnet to which the mobile node is visiting. It is different from home network. In other words, a foreign network is the network in which a mobile node is operating when away from its home network.

Correspondent Node (CN): The home agent is a router on the home network serving as the anchor point for communication with the mobile node. It tunnels packets from a device on the Internet, called a correspondent node (CN), to the roaming mobile node.

Care-of-Address (COA): It is the address that is used to identify the present location of a foreign agent. The packets sent to the MN are delivered to COA.

The COA can be any of the following two types:

(a) Foreign agent COA: The COA is an IP address of foreign agent (FA).

(b) Co-located COA: When the mobile node (MN) acquires a temporary IP address, that address acts as the COA.

Home Agent (HA): It is located in home network and it provides several services for the MN. HA maintains a location registry. The location registry keeps track of the node locations using the current care-of-address of the MN.

3. What do you mean by agent solicitation? Why are agent advertisement messages needed?

In case a mobile node (MN) does not receive any COA, then the MN should send an agent solicitation message. But it is important to monitor that these agent solicitation messages do not flood the network. A mobile node can usually send up to three solicitation messages (one per second) as soon as it enters a new network. The basic purpose of the solicitation messages sent by a mobile node (MN) is to search for a foreign agent (FA).

4. Differentiate the functionalities of a foreign agent & Home agent?

Home Agent (HA): It is located in home network and it provides several services for the MN. HA maintains a location registry. The location registry keeps track of the node locations using the current care-of-address of the MN.

Foreign Agent (FA): The foreign agent is a router in a foreign network that functions as the point of attachment for a mobile node when it roams to the foreign network. The packets from the home agent are sent to the foreign node which delivers it to the mobile node.

5. Mention the encapsulation concept in mobile IP?

Encapsulation is required because each datagram we intercept and forward needs to be resent over the network to the device's care-of address. The default encapsulation process used in Mobile IP is called IP Encapsulation Within IP, commonly abbreviated IP-in-IP.

6. What is tunneling process?

The packet is forwarded by the home agent to the foreign agent. When the packet comes to the foreign agent (care-of-address), it delivers the packet to the mobile node. This process is called tunneling. Tunneling has two primary functions: encapsulation of the data packet to reach the tunnel endpoint, and decapsulation when the packet is delivered at that endpoint.

7. List out the features of DHCP

Dynamic Host Configuration Protocol (DHCP) is a network protocol that enables a server to automatically assign an IP address to a computer from a defined range of numbers configured for a given network.

8. What is Route Optimization?

Route optimization enables the datagram's to be routed directly in both directions. Route optimization also provides support for smooth handoffs by letting the previous foreign agent tunnel datagram's to mobile node's current location.

9. What is base station?

A base station (BS) is located at the centre of each cell. The BS in a cell receives communications from all mobile handsets in the cell and forwards the data to the appropriate handset. Thus, a base station keeps track of the calls of all handsets in its cell.

10. What is guard band?

Frequency band split into five sub-bands (channels). the different channels are adjacent to each other, each channel was separated from the adjacent channels by a spacing of about 30 kHz. This was called a guard band. The use of guard bands was one of the causes of inefficient spectrum usage and resulted in the reduced number of simultaneous calls that could be supported.

11. What is Ad-Hoc ?

In a simplistic realization of this concept, a mobile device wanting to communicate can forward its packets to its neighbours, and the neighbour nodes in turn can forward those to their neighbours, and so on until the destination is reached.

12. Define MANET.

A mobile ad hoc network (MANET) is a continuously self-configuring, infrastructure-less network of mobile devices connected without wires.

13. Define VANET.

The Vehicular Ad-Hoc Network, or VANET, is a technology that uses moves cars as nodes in a network to create a mobile network.

14. What is Routing ?

Routing is to find the best path between the source and the destination for forwarding packets in any store-and-forward network.

15. What are the Types of communications?

In a network, a node can initiate the following types of communications:

Unicast: In this, a message is sent to a single destination node.

Multicast: In this type of transmission, a message is sent to a selected subset of the network nodes.

Broadcast: In this type of transmission, a message is sent to all the nodes in the network. Since unrestrained broadcast communications can choke a MANET, applications usually do not use broadcast communication.

16. Write the Classification of Unicast MANET Routing Protocols

Unicast routing protocols in MANETs are classified into proactive (table-driven), reactive (on-demand) and hybrid protocols. This classification is based on how a protocol manages to determine the route correctly in the presence of topology changes.

17. What are Proactive routing protocols?

A proactive routing protocol is also known as a table-driven routing protocol. In this protocol, each node in a routing table maintains information about routes to every other node in the network. These tables are periodically updated in the face of random network topology changes. An example of a proactive (table-driven) protocol is the Destination Sequenced Distance Vector (DSDV) protocol.

18. What are Reactive routing protocols?

Reactive routing protocol is also known as an on-demand routing protocol, since in this protocol nodes do not maintain up-to-date routes to different destinations, and new routes are discovered only when required. When a node does not have knowledge about any route to a specific destination, it uses a flooding technique to determine the route.

19. What is Hybrid routing protocols?

Hybrid routing protocols have the characteristics of both proactive and reactive protocols. These protocols combine the good features of both the protocols. The hybrid routing protocols are designed to achieve increased scalability by allowing nodes with close proximity to work together to form some sort of a backbone to reduce the route discovery overheads.

PART B

1. Elaborate about the scenario of packet delivery to and from a mobile node in detail with diagram.

- Scenario of packet delivery(8)
- Diagrams (5)

2. What are the main functions of DHCP? Why is DHCP needed? Can it be used when nodes are mobile? Explain your answer.

- Functions of DHCP (6)
- Purpose of DHCP (4)
- Used in Mobile Nodes (3)

3. Explain the agent discovery process in Mobile IP.

- Mobile IP Solicitation (6)
- Discovery Process (7)

4. Explain about the multicast routing protocol.

PART C

1. Explain the key mechanism of mobile IP with the help of a suitable schematic diagram and by using suitable examples.

- Mobile IP (5)
- Schematic Diagrams (5)
- Explanation (5)

2. Write in detail about Reactive Routing Protocols with DSR.

- Reactive Routing Protocols (4)
- Dynamic source routing (4)
- Route discovery(2)
- Route Maintenance(3)
- Examples(2)

3. Write in detail about Reactive Routing Protocols with AODV.

- Reactive Routing Protocols (10)
- AODV (4)
- Examples(1)

4. Illustrate the process of route discovery, route reply, data delivery and route caching using DSR.

- route discovery (4)
- route reply (4)
- data delivery (4)
- route caching (3)