Important Instructions:

1) **Open this MS-Word document and start writing answers below each respective question given on page 2.**
2) **Answers the question in the same sequence in which they appear.**
3) **Provide to the point and concrete answers.**
4) **First read the questions and understand what is required of you before writing the answer.**
5) **Attempt the paper yourself and do not copy from your friends or the Internet. Students with exactly similar answers or copy paste from the Internet will not get any marks for their assignment.**
6) **You can contact me for help if you have any doubt in the above instructions or the assignment questions.**
7) **All questions must be attempted.**
8) **Do not forget to write your name, university ID, class and section information.**
9) **Rename you answer file with your university ID# before uploading to SIC.**
10) **When you are finished with writing your answers and are ready to submit your answer, convert it to PDF (no MS Word) and upload it to SIC unzipped, before the deadline mentioned on SIC.**
11) **Do not make any changes to the format provided.**
12) **Failure in following the above instructions might result in deduction of marks.**

Sessional Assignment, Course: - Mobile Computing

Deadline: - Mentioned on SIC **Marks: - 20**

Program: - BS (CS), BS-SE **Dated: 11 April 2020**

Related Course: Lecture 7 and 8.

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Class and Section: BS (SE-8) Section A

Q1: In what aspects is an Adhoc network different from infrastructure networks? (3)

Answer:

- Infrastructure means permanent. Infrastructure wireless network is a centralized communication network. Before any networking will come about you would like to set up dedicated machines to act as routers/access point. Whereas Ad-hoc means temporary. Ad-hoc wireless network may be a temporary wireless network. The keyword in Ad-hoc network is decentralization. By strict definition Ad-hoc network is the one during which you don't need to undergo an access point to communicate.
- In infrastructure mode elements that handle networking are totally different from clients that participate in network. During this approach a decentralization of devices is obtained. Where as in Ad-hoc mode the clients are tightly coupled with networking responsibilities so we attain a monolithic system that is centralized at individual level however distributed at a group level.
- Infrastructure network is complex to set up and easier to work whereas Ad-hoc network is less complicated to set up and much additional complicated to work. All nodes in Ad-hoc network should be organized to use one of the routing protocols. This implies that the complexity of the network will increase with each device you add.

Q2: What is the difference between reactive and proactive routing protocols in MANETS? (3)

Answer:

- **Reactive routing protocol:** It uses on-demand approach for locating routes, that is, a route is established only if it's needed by a source node for transmission of information packets. This protocol has 2 basic operations: route discovery and route maintenance. This protocol uses Route Request (RREQ), Route Reply (RREP) and Route Error (RERR) messages to search out and maintain the routes. Once a source node needs a

route to the destination node, it broadcasts a RREQ packet within the network. Once a node receives a route request that has constant source address and request ID fields as in former route request packets, it rejects the packet. Otherwise it'll examine if there's an entry in its routing table for the destination address. If that address is present, then the destination sequence number within the table is compared to the destination in its routing table, and if it cannot reach the destination through that route, it'll increment the destination sequence number and sends a route request. In route maintenance, once a link breakage in an active route is detected, the node notifies this link breakage by sending a RERR message to the source node. The source node can reinitiate the route discovery method if it still has information to send.

- **Proactive routing protocol:** This protocol facilitates economical flooding of management messages throughout the network by using chosen nodes known as Multipoint Relays (MRPs). The matter of flooding the network with management messages is overcome by the MPR nodes. MRPs are chosen by every node and are used to forward management messages leading to a distributed operation of the protocol. Additionally to the present, a node ceaselessly maintains routes to all destinations within the network, so creating the protocol fitted to traffic pattern that's random and periodic. Moreover, the proactive nature makes OLSR appropriate for networks wherever communicating pairs modify over time. The protocol is improvement of classical link state routing algorithm and uses the conception of Multipoint relays (MPRs). This protocol is a lot favorable for traffic patterns wherever giant subset of nodes is communicating with another large subset of nodes, and wherever the source and destination pairs are changing over time. This protocol is preponderantly fitted to giant and dense networks.

Q3: Differentiate between regular and MPR flooding? (2)

Answer:

- **Regular Flooding:** In regular flooding every application should sent a packet to all neighbors with a hop-limit set to one. The received neighbors method the flooded packet and can resend it to their own neighbors if necessary. Flooded packets are therefore repeatedly forwarded till it's reached all nodes within a network.

- **MPR Flooding:** exploitation hello messages the OLSR protocol at every node discovers 2-hop neighbor data and performs a distributed election of a collection of multipoint relays (MPRs). Nodes choose MPRs specified there's a path to every of its 2-hop neighbors via a node chosen as an MPR. These MPR nodes then source and forward messages that contain the MPR selectors. The forwarding path for TC messages isn't shared among all nodes however varies counting on the source, only a subset of nodes source link state data, not all links of a node are publicized however only those who represent MPR selections.

Q4: On which path is the route reply message sent in DSR? (3)

Answer: When a Route Request message reaches a node, the accumulated route indicates the nodes through which it's passed. This accumulated route is employed by a node to send a Route Reply message back to the initiator. The Route Reply messages are often sent either by the destination node or by associate intermediate node that finds a route to the destination in its route cache. A node will send a route reply if it finds a route to the target in its route cache. If there's a better (shorter) route reply, the initiator starts using another route.

Q5: What is source routing? (2)

Answer:

- **Source routing:** Source routing is to specify the route that packets take through the network. There are choices within the IP header that may be set to specify the routers that a packet should go through on the way to its destination.
  There are two modes of source-routing, loose and strict. Loose specifies that the packet ought to pass though the listed hops, strict specifies the precise path on a hop-by-hop basis. This implies that somebody will force their traffic to require a particular path through your network, probably bypassing varied security stuff. There are only a few "legitimate" uses for source routing, the main one being guaranteeing that folks at exchange points are protruding to their agreements.

Q6: If AODV does not store route information in the packet then how does the routing works? (4)

Answer: When a source has information to transmit to unknown destination, it broadcasts a Route Request (RREQ) for that destination. At every intermediate node, once a RREQ is received a route to the source is made. If the receiving node has not received this RREQ before, isn't the destination and doesn't have a current route to the destination, it resends the RREQ. If the receiving node is the destination or encompasses a current route to the destination, it generates a Route Reply (RREP). Because the RREP propagates, every intermediate node creates a route to the destination. Once the source receives the RREP, it records the route to the destination and might begin sending information. As information flows from the source to the destination, every node on the route updates the timers related to the routes to the source and destination, maintaining the routes within the routing table. If a route isn't used for a few amount of your time, a node can't be certain whether or not the route remains valid; consequently, the node removes the route from its routing table. If information is flowing and a link break is detected, a Route Error (RERR) is sent to the source of the info. Because the RERR propagates towards the source, every intermediate node invalidates routes to any out of reach destinations.

Q7. What are the functions of sequence numbers in AODV? (3)

Answer: A monotonically increasing number maintained by every originating node. In AODV routing protocol messages, it's utilized by different nodes to see the freshness of the data contained from the originating node. Sequence number unambiguously identifies the actual RREQ once taken in conjunction with the originating node's IP address. Destination Sequence number is the latest sequence number received within the past by the conceiver for any route towards the destination. Originator Sequence number is the current sequence number to be utilized in the route entry informing the conceiver about the route request.