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2020S1213

Assignment 3: Routing Algorithm

Q. Define the following terms:

(i) Forwarding
(ii) Network Lifetime
(iii) Flooding
(iv) Adhoc
(v) Reactive

(i) **Forwarding**: Forwarding means to place the packet in its route to its destination. Forwarding requires a host or a router to have a routing table. When a host has a packet to send or when a router has recieved a packet to be forwarded, it looks at this table to find the route to the final destination.

(ii) **Network Lifetime**: Network Lifetime is defined as the time during which the network is operational. In other words, it is defined as the time until the first sensor node or group of sensor nodes in the network runs out of energy.

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(iii) **Flooding**: In a computer network, flooding occurs when a router uses a non-adaptive routing algorithm to send an incoming packet to every out going link except the node on which the packet arrived. Flooding is a way to distribute routing protocols updates quickly to every node in a network.

(iv) **Ad Hoc**: Ad hoc means allowing tasks to be done as they are requested without any formal approval process. This is a simple approach but provides little in the way of management and accountability. Ad hoc networks are infrastructure less networks.

(v) **Reactive**: These are also known as on-demand protocols. In this type of routing, the route is discovered only when it is required / needed. The process of route discovery occurs by flooding the route request packets throughout the network.

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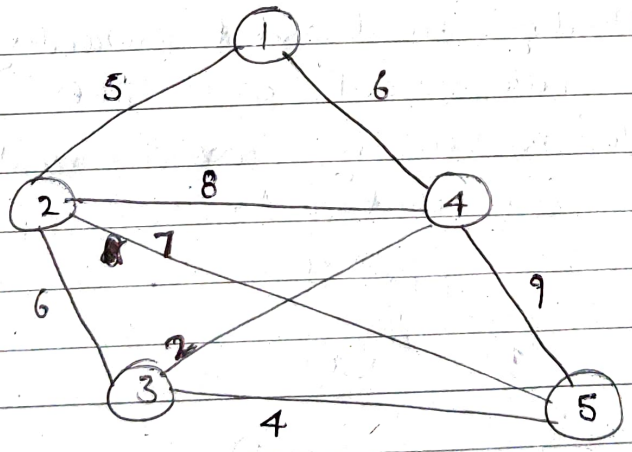
Q.1 Find the path from Node 1 to Node 5 by using LOADng and AODV Protocol. Solve it step by step. List the differences existing between two algorithms.

Input:

1. Static Network: Represented by an Adjacency Matrix

Example:

	1	2	3	4	5
1	0	1	0	1	0
2	1	0	1	1	1
3	0	1	0	1	1
4	1	1	1	0	1
5	0	1	1	1	0



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2. Communication Cost:

	1	2	3	4	5
1	0	5	0	6	0
2	5	0	6	8	7
3	0	6	0	2	4
4	6	8	2	0	9
5	0	7	4	9	0

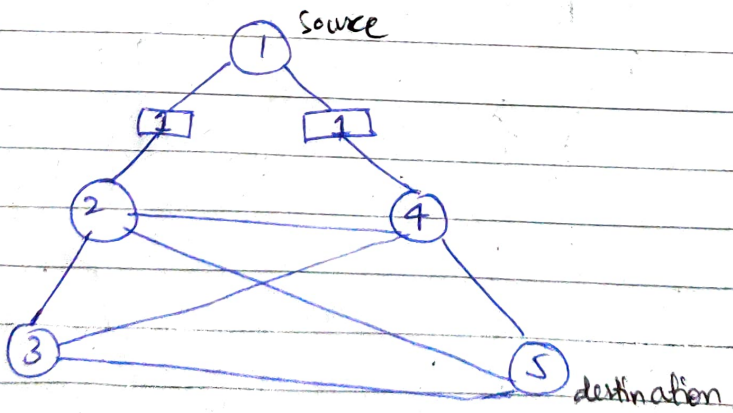
3. Source Address : 1

4. Destination Address : 5

Implement the LOADng Protocol over this network to find the minimum cost path from source to destination.

LOADng Protocol:

→ Step 1: Flooding based packet forwarding
Source node (Node 1) sends RREQ packet to its neighbouring nodes by mentioning the hop count as 1.



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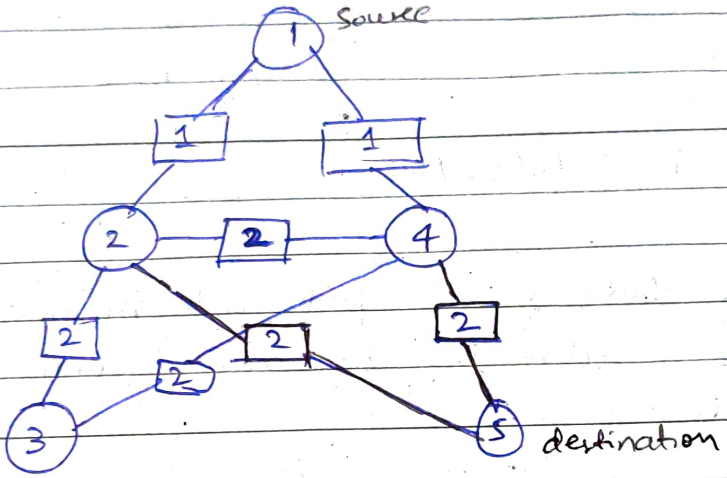
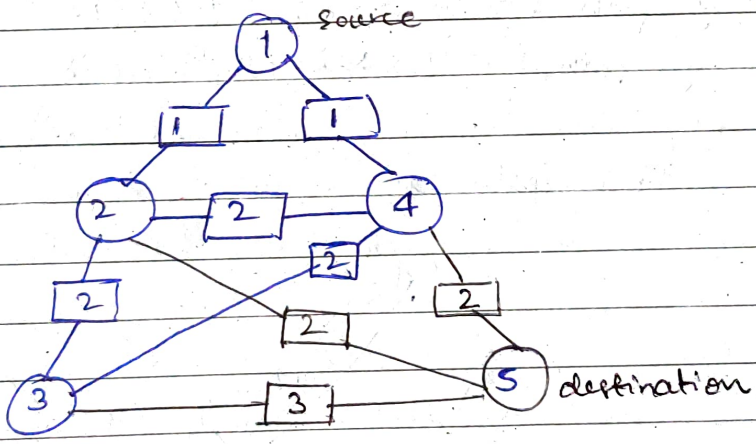
→ Step 2: The intermediate node forwards packet to their neighbours by increasing the hop count until destination is reached.





→ Step 3: Of all the paths that lead to destination, select those with minimum number of hops. The minimum number of hops in this network are 2.

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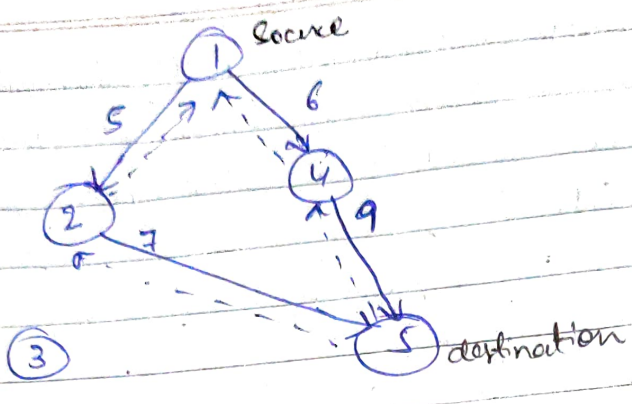
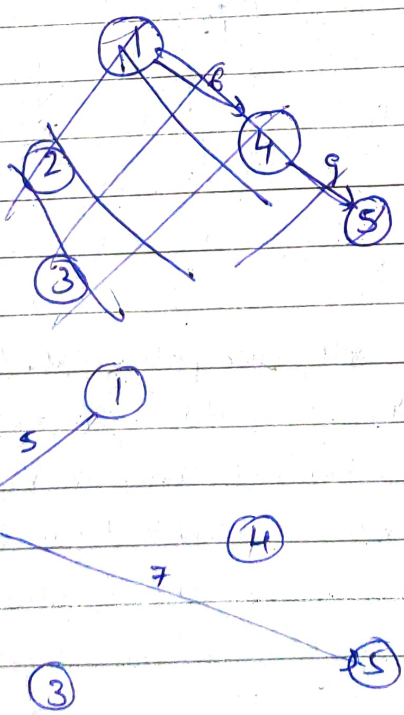


- - - -> → RREQ_ACK

→ Step 4: Out of all paths with minimum hops, select the one with minimum cost.

cost of path 1 → 2 → 5 : 5 + 7 = 12
cost of path 1 → 4 → 5 : 6 + 9 = 15

∴ the path is



the minimum cost is 12.

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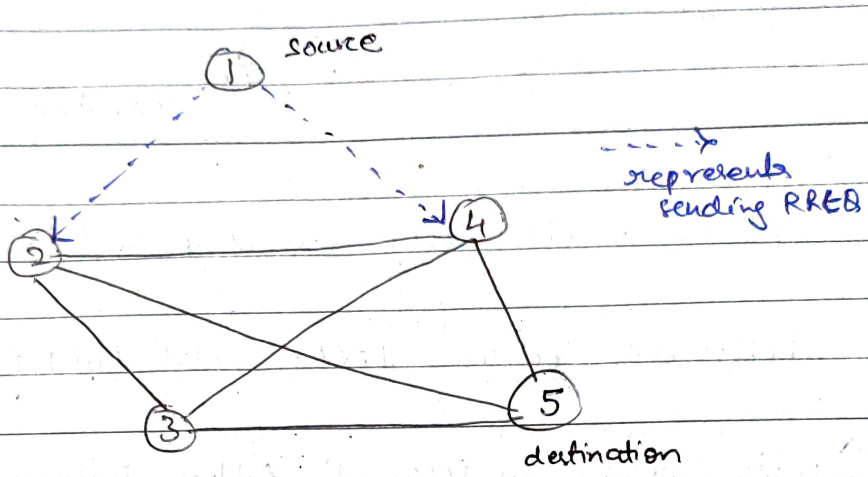
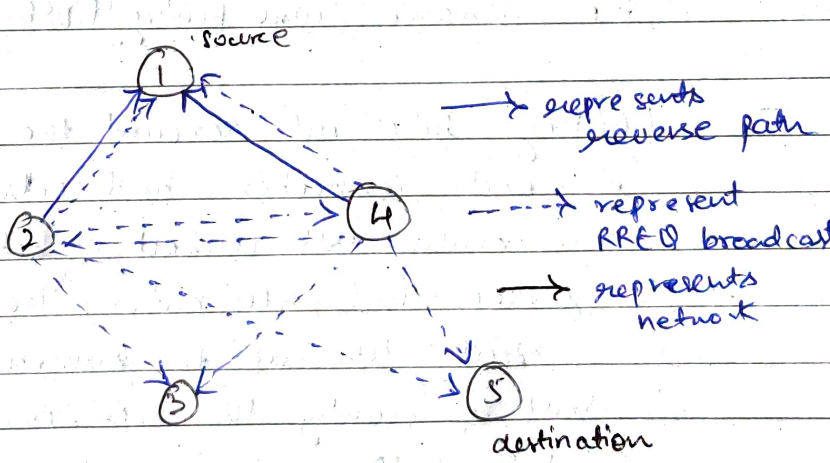
AODV Routing Protocol:

→ Step 1: Source node floods the network by sending RREQ to all its neighbours



→ Step 2: The neighbour nodes re-broadcast a RREQ and sets up a reverse path pointing towards the source



→ Step 3: Destination node (Node 5) doesn't forward RREQ, as it is intended target of RREQ. It sends a Route Reply (RREP) along the reverse path set-up.

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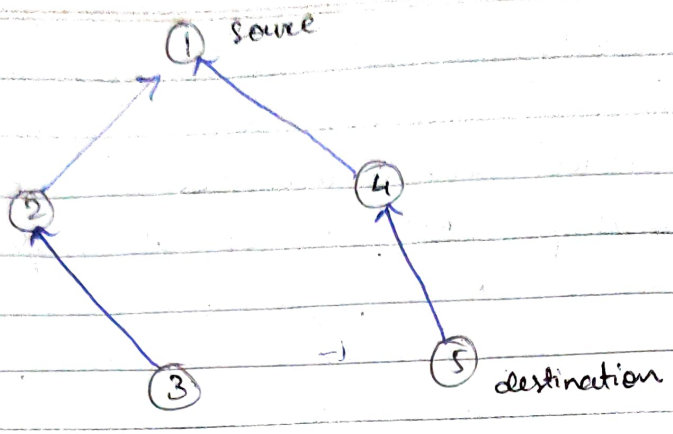

RREP travels along reverse path (5 → 4 → 1)

Differences between LOADng and AODV Protocols

→ Lightweight On-Demand Adhoc Distance Vector Protocol - Next Generation (LOADng) is inspired by AODV protocol; while the Ad hoc On-Demand Distance Vector Protocol (AODV) is based on the Dynamic Source Routing (DSR) Protocol.

→ LOADng takes into account the weights of each connection and sets up the minimum cost connection between source and destination. The AODV protocol sets up the minimum path just by counting the hops required while LOADng also considers the minimum cost path among all the paths with minimum hops between source and destination.