

National University of Computer and Emerging Sciences



Laboratory Manuals
for
Computer Networks - Lab

(CL -3001)

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Objective:

- Analyze Distance vector routing protocol on NS2
- Implementation of Circular and Star Topology using ns2

Distance vector routing protocol

Distance vector protocols (a **vector** contains both **distance** and direction) determines the path to remote networks using hop count as the metric. A hop count is defined as the number of times a packet needs to pass through a **router** to reach a remote (far away) destination.

In NS2, we add following command to set the routing protocol to Distance Vector

\$ns rtproto DV

To bring the link between two nodes down/up at specific simulation time we write the following commands

\$ns rtmodel-at 0.30 down \$node1 \$node2

\$ns rtmodel-at 0.40 up \$node1 \$node2

For Arrays in tcl:

set arrayName(Index) arrayValue

NOTE:

- You will have to implement both the following topologies using **For loop** in TCL Language and use as much less statements as possible.
- You must define the nodes and links between the nodes using for loop. Simple definitions of nodes/links will not be accepted.

In-lab statement 1:

[10]

1. Write a Tcl script that forms a network consisting of **7 nodes**, numbered from 0 to 6, forming a **ring topology**.
2. The links have a 512Kbps bandwidth with 5ms delay and droptail queue.
3. Set the routing protocol to DV (Distance vector).
4. Send UDP packets from node 0 to node 3 with the rate of 100 packets/sec with each packet having a size of 1 Kilo Bytes.

5. Start transmission at 0.02.
6. Bring **down the link** between node 2 and node 3 at 0.4.
7. Bring the dropped link back **up** at 1.0.
8. Finish the transmission at 1.5
End the simulation at 2.0.
9. Also monitor two queues (b/w Node 0 &1) and (b/w Node 0 &6) and answer the following.

Answer the following in a text document:

- a. What path do the packets follow initially? And why?
- b. What path do the packets take after the link fails? And why?
- c. If we remove the Distance Vector Algorithm, what path the packets follow after the link fails? And why?

In-lab statement 2:

[10]

You will have to create a **star topology** as given in the diagram below using ns2 to implement the Distance vector routing protocol. Assume all the devices in the following star topology as nodes and all the wires as duplex links having a **capacity of 512Kb** and a **propagation delay of 10ms** with a **stochastic fair queue** scheduling algorithm.

You will have to send TCP data from H1 to H4 having red color. Also you will have to send UDP data with a rate of 256Kbps from H2 to H5 having blue color.

Scheduling Events:

- ☐ TCP Data starts at 0.1 and stops at 1.5
- ☐ UDP Data starts at 0.2 and stops at 1.3
- ☐ Bring the link between SW1 and H5 down at 0.5 and bring it back up at 0.9
- ☐ Bring the link between SW1 and H4 down at 0.7 and bring it back up at 1.2
- ☐ Stop the simulation at 2.0

Note: You must orient the nodes as shown in the topology using the orient feature for NAM. Consider SW1 as a node.



