

4.4 Experiment no.4

Title: Write a program to implement link state /Distance vector routing protocol to find suitable path for transmission.

Objective: To understand working of Distance vector routing protocol.

Prerequisite:

1. Shortest path finding
2. Classification of routing Algorithm

Learning Objectives:

1. Understand the concept Distance vector routing
2. Understand the Concept of Routing Algorithms

Theory:

Introduction:

A distance-vector routing (DVR) protocol requires that a router inform its neighbors of topology changes periodically. Historically known as the old ARPANET routing algorithm (or known as Bellman-Ford algorithm).

Bellman Ford Basics – Each router maintains a Distance Vector table containing the distance between itself and ALL possible destination nodes. Distances, based on a chosen metric, are computed using information from the neighbors' distance vectors.

Information kept by DV router -

- Each router has an ID

Associated with each link connected to a router,

- There is a link cost (static or dynamic).
- Intermediate hops

Distance Vector Table Initialization -

- Distance to itself = 0
- Distance to ALL other routers = infinity number.

Distance vector Algorithm:

1. A router transmits its distance vector to each of its neighbors in a routing packet.
2. Each router receives and saves the most recently received distance vector from each of its neighbors.
3. A router recalculates its distance vector when:
 - a. It receives a distance vector from a neighbor containing different information than before.
 - b. It discovers that a link to a neighbor has gone down.

The DV calculation is based on minimizing the cost to each destination

$D_x(y)$ = Estimate of least cost from x to y

$C(x,v)$ = Node x knows cost to each neighbor v

$D_x = [D_x(y): y \in N]$ = Node x maintains distance vector

Node x also maintains its neighbors' distance vectors

– For each neighbor v, x maintains $D_v = [D_v(y): y \in N]$

Distance Vector Routing:

- It is a dynamic routing algorithm in which each router computes distance between itself and each possible destination i.e. its immediate neighbors.
- The router share its knowledge about the whole network to its neighbors and accordingly updates table based on its neighbors.
- The sharing of information with the neighbors takes place at regular intervals.
- It makes use of Bellman Ford Algorithm for making routing tables.
- Problems – Count to infinity problem which can be solved by splitting horizon.
 - Good news spread fast and bad news spread slowly.
 - Persistent looping problem i.e. loop will be there forever.

Link State Routing:

- It is a dynamic routing algorithm in which each router shares knowledge of its neighbors with every other router in the network.
- A router sends its information about its neighbors only to all the routers through flooding.
- Information sharing takes place only whenever there is a change.
- It makes use of Dijkstra's Algorithm for making routing tables.
- Problems – Heavy traffic due to flooding of packets.
– Flooding can result in infinite looping which can be solved by using Time to live(TTL) field.

Conclusion: Hence we have studied distance vector algorithm to find suitable path for transmission.

Outcome: Understand working of Distance vector routing protocol.

FAQs:

- 1) What is Link State Algorithm?
- 2) What is Distance Vector Algorithm?
- 3) Difference Between Link State and distance vector algorithm?