

Objectives: To simulate and study the Distance Vector Routing algorithm using simulation.

Concept:

Distance Vector Routing is a routing algorithm where each router maintains a table that lists the distance to every other router in the network. Routers periodically exchange these tables with their neighbors to update their routing information.

Procedure:

The Distance Vector Routing algorithm follows these steps to build routing tables for each router:

1. Create a simulator object: Initialize the network simulation environment.
2. Define different colors for different data flows: Assign distinct colors to represent different types of data flows or routes for visualization.
3. Open nam and trace files and define finish procedure:
 - Open files for network visualization (nam) and trace file to record network events.
 - Define a procedure to handle the simulation finish and close the nam and trace files.
4. Create n number of nodes using for loop: Create a specified number of routers or nodes in the network.
5. Create duplex links between the nodes: Establish communication links (connections) between the nodes. These links represent the physical or logical connections between routers.
6. Setup UDP connections:
 - Establish UDP connections between nodes based on the network topology.
 - Define sender and receiver nodes for each UDP connection.
7. Apply traffic generation (CBR):
 - Implement Constant Bit Rate (CBR) traffic over the UDP connections.
 - Specify the traffic parameters such as data rate and packet size.
8. Choose Distance Vector Routing protocol:
 - Select the Distance Vector Routing protocol (e.g., RIP, EIGRP) to transmit routing information between routers.
 - Configure routing protocol parameters such as update intervals and convergence criteria.
9. Schedule events and run the program:
 - Schedule events for routing updates and data packet transmission.
 - Execute the simulation program to observe how routers exchange routing tables and forward data packets based on the Distance Vector Routing algorithm.

Algorithm (Distance Vector Routing):

1. Initialize the routing tables for each router with initial distance estimates.
2. Periodically, for each router, update its routing table based on information received from its neighbors.
3. Share routing tables with neighbors.
4. Calculate new distance estimates for routes using the Bellman-Ford equation: $D(x) = \min \{c(x,v) + D(v)\}$ where $D(x)$ is the distance to destination x , $c(x,v)$ is the cost to reach x through neighbor v , and $D(v)$ is the distance to v .
5. Repeat steps 2-4 until convergence (no further changes in routing tables occur).
6. Forward data packets according to the routing table entries.