

23ITT204 - COMPUTER NETWORK

UNIT 4 - ROUTING

DISTANCE VECTOR ROUTING

Distance Vector Routing: How Routers Find the Best Path

Discover the fundamental algorithm that helps routers across the internet determine the most efficient path for your data to travel.

What is Distance Vector Routing?

Distance vector routing is a dynamic routing protocol where routers exchange information about network distances with their immediate neighbors. Each router maintains a routing table containing the cost (typically measured in hop counts) to reach various destinations and the next hop router to use.

This protocol implements the Bellman-Ford algorithm, continuously updating routing tables through iterative exchanges. Routers make decisions based purely on their neighbors' reports, earning the nickname "**routing by rumor**" since they lack complete network visibility.



Neighbor Communication

Routers share distance metrics with adjacent devices



Routing Tables

Each router maintains cost and next-hop information



Periodic Updates

Information exchanges occur at regular intervals

How Distance Vector Routing Works: A Simple Example

01

Initial State

RouterA establishes a direct connection to destination D with a cost of 1 hop. This becomes the baseline for all subsequent routing calculations.

03

Network-Wide Distribution

Router B broadcasts its routing information to its neighbors, who perform similar calculations. This ripple effect continues across the network, with each router adding its link cost.

Throughout this process, routers continuously compare newly received routes against existing entries, always selecting paths with the minimum total cost to ensure efficient packet delivery.

02

First Propagation

Router B receives an update from A: "Destination D reachable at cost 2". Router B calculates its own cost as 2 (1 hop to A, plus A's cost of 1) and updates its routing table to route through A.

04

Convergence

After multiple update cycles, all routers learn the lowest-cost paths to destination D. The routing tables stabilize, achieving network convergence where optimal routes are established.

Strengths, Challenges & Protocols

Strengths

Simplicity

Straight forward implementation with minimal computational overhead makes it ideal for learning and basic deployments

Efficiency

Works effectively in small to medium-sized networks where topology changes are infrequent

Key Challenges

Slow Convergence

Network topology changes require multiple update cycles before all routers learn new paths

Count-to-Infinity

When links fail, routers may repeatedly increment costs, creating temporary routing loops

Mitigation techniques: Split horizon prevents routes from being advertised back to their source. Route poisoning marks failed routes as unreachable. Hold-down timers prevent premature updates.

Common Protocols

RIP Family

RIP, RIPv2, and RIPv6 (with IPv6 support) remain widely used for basic networks

Cisco Protocols

IGRP and Enhanced IGRP (EIGRP) offer proprietary enhancements with faster convergence

Despite inherent limitations, distance vector routing remains foundational in networking education and continues to serve as the backbone for many operational networks, particularly in smaller enterprise and branch office environments.