

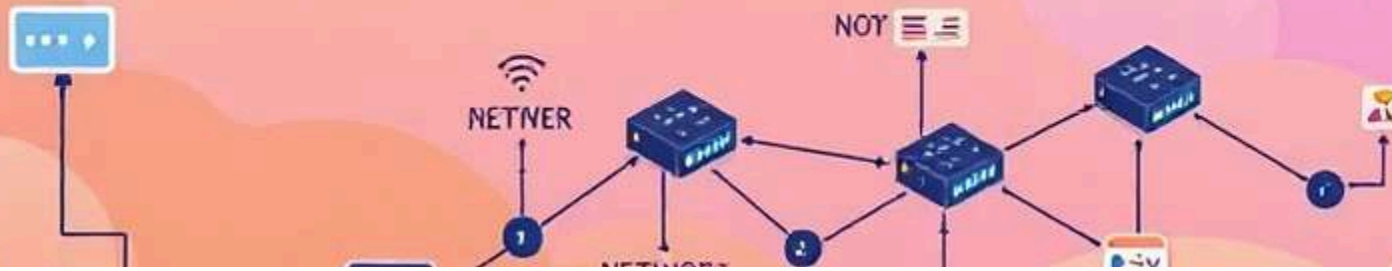
23ITT204 - COMPUTER NETWORK

UNIT 4 - ROUTING

RIP

Link State Routing: How Routers Map the Network

Discover how intelligent routers build complete network maps to find the fastest paths for your data.



What is Link State Routing?

Link state routing represents a sophisticated approach where every router maintains a comprehensive view of the entire network landscape, enabling intelligent path decisions.



Complete Topology Knowledge

Each router learns the full network structure, not just immediate neighbors, providing global awareness for optimal routing decisions.



Link State Advertisements

Routers share connectivity information and link costs through LSAs, ensuring every node receives identical network state information.



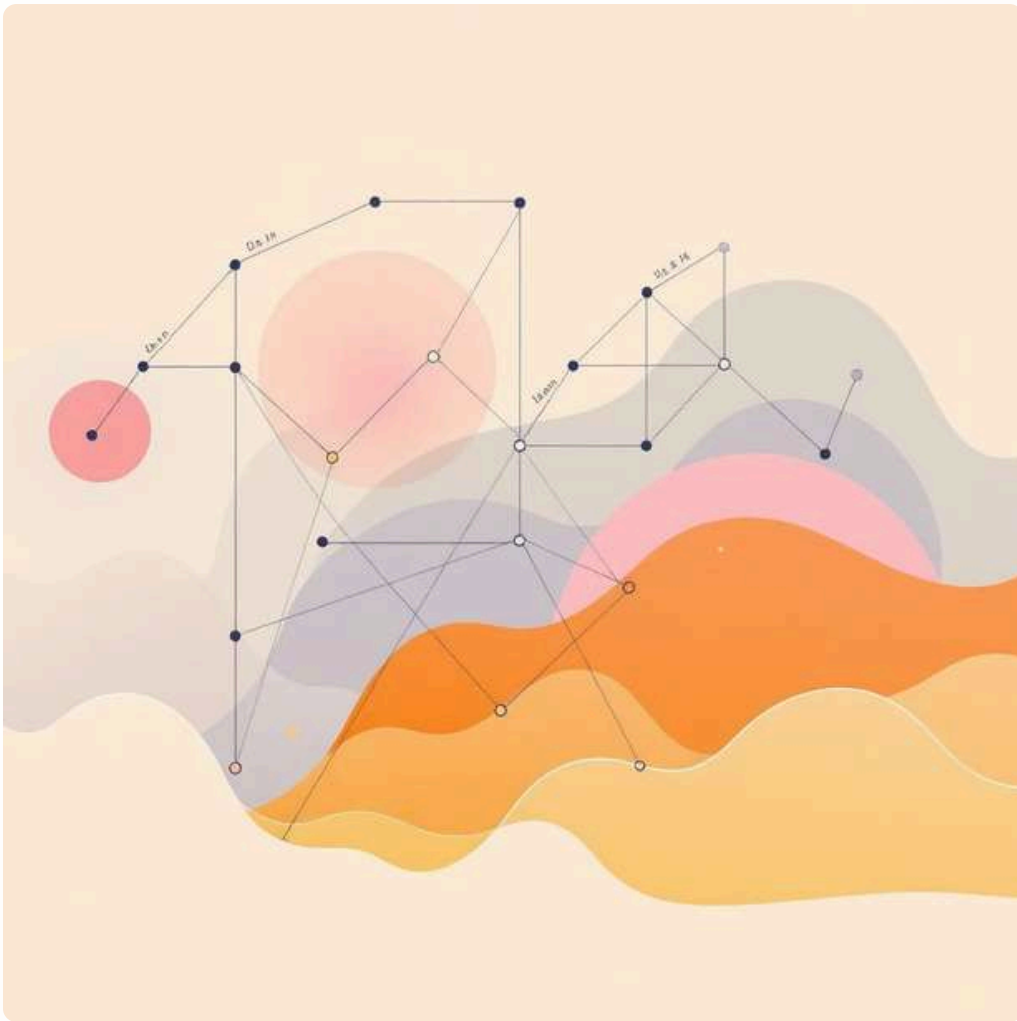
Independent Path Calculation

Every router independently builds its own network map and calculates optimal paths, eliminating reliance on second-hand information.

Contrast with Distance Vector: Distance vector protocols share routing tables only with neighbors essentially "routing by rumor" while link state protocols provide complete network visibility.

How Does It Work? The Power of Dijkstra's Algorithm

Link staterouting leverages mathematical precision to ensure every router finds the absolute best path through the network.



01

LSA Flooding

Routers flood Link State Advertisements to all network nodes, ensuring synchronized topology information across the entire infrastructure.

03

Routing Table Construction

Calculated shortest paths populate the routing table, which directs next-hop forwarding decisions for incoming packets.

02

Shortest Path Calculation

Each router executes Dijkstra's Shortest Path First algorithm, mathematically determining the lowest-cost route to every possible destination.

04

Efficient Updates

Updates transmit only when topology changes occur, dramatically reducing network overhead compared to periodic full-table exchanges.



Why Link State Routing Matters

Link state protocols power the backbone of modern enterprise and internet service provider networks, delivering performance and reliability at scale.

Industry-Standard Protocols

OSPF (Open Shortest Path First) and IS-IS (Intermediate System to Intermediate System) are widely deployed in enterprise environments and ISP backbone networks worldwide.

Rapid Convergence & Scalability

Networks converge quickly after topology changes, with architectural support for thousands of routers through hierarchical area designs.

Advanced Feature Support

Enables sophisticated capabilities including hierarchical network areas, equal-cost multipath routing for load balancing, and traffic engineering.

Accuracy & Reliability

Maintains precise, up-to-date network views enabling efficient routing decisions and faster recovery from network failures.