

Examining Distance Vector Routing Metrics

Distance vector routing protocols use routing algorithms to determine the best route. These algorithms generate a metric value for each path through the network. The smaller the metric, the better the path. Metrics can be calculated based on one or more characteristics of a path.

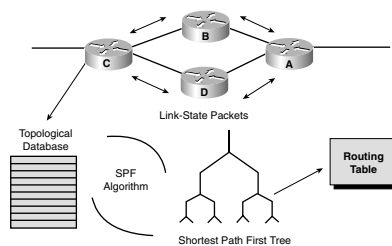
Commonly Used Metrics

- **Hop count**—Number of times a packet goes through a router.
- **Ticks**—Delay on a data link using IBM PC clock ticks (approximately 55 ms).
- **Cost**—An arbitrary value based on a network administrator-determined value. Usually bandwidth, cost in dollars, or time.
- **Bandwidth**—A link's data capacity.
- **Delay**—Time required to reach the destination.
- **Load**—Network activity.
- **Reliability**—Bit error rate of each network link.
- **MTU (maximum transmission unit)**—The maximum message length allowed on the path.

Link-State Routing

The *link-state-based routing algorithm* (also known as shortest-path first [SPF]) maintains a database of topology information. Unlike the distance vector algorithm, link-state routing maintains full knowledge of distant routers and how they interconnect. Link-state routing provides better scaling than distance vector routing for the following reasons:

- Link state sends only topology changes. Distance vector sends complete routing tables.



- Link-state updates are sent less often than distance vector.
- Link state is hierarchical, which limits the scope of route changes.
- Link state supports classless addressing and summarization.

Balanced Hybrid Routing

Balanced hybrid routing combines aspects of both distance vector and link-state protocols. Balanced hybrid routing uses distance vector with more accurate metrics, but unlike distance vector routing protocols, it updates only when there is a topology change. Balanced hybrid routing provides faster convergence while limiting the use of resources such as bandwidth, memory, and processor overhead. The Cisco EIGRP is an example of a balanced hybrid protocol.

Dynamic Routing Summary

- Routing protocols use the network layer address to forward packets to the destination network.
- An AS is a collection of networks under a common administrative domain.
- More than one routing protocol can be used at the same time. Administrative distance is used to rate the trustworthiness of each information source.
- Distance vector, link state, and balanced hybrid are the most common IGPs.
- Distance vector-based algorithms send copies of routing tables. As network discovery proceeds, routers accumulate metric information used to determine the best path to distant networks.
- A link-state routing algorithm, also known as SPF, sends network topology information rather than metrics.
- Balanced hybrid routing combines aspects of both distance-vector and link state-protocols.

Distance Vector Routing

Any topology change in a network running a distance vector protocol triggers an update in the routing tables. The topology updates follow the same step-by-step process as the initial network discovery.