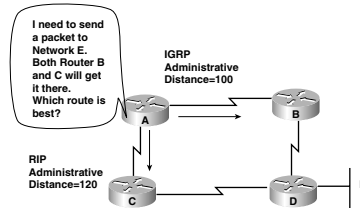


## Autonomous Systems

An *autonomous system* (AS) is a group of networks under a common administrative domain. *Interior Gateway Protocols* (IGPs), such as RIP and IGRP, exchange routing information within an autonomous system. *Exterior Gateway Protocols* (EGPs) are used to connect autonomous systems. Border Gateway Protocol (BGP) is an example of an EGP.

## Ranking Routes with Administrative Distance

Several routing protocols can be used simultaneously in the same network. When there is more than a single source of routing information, an administrative distance value is used to rate the trustworthiness of each routing information source. The administrative distance metric is an integer from 0 to 255. In general, a route with a lower number is considered more trustworthy and is more likely to be used.



## Default Distance Values

Route Source	Default Distance
Connected interface	0
Static route address	1
EIGRP	90
IGRP	100
OSPF	110
RIP	120
Ext. EIGRP	170
Unknown	255

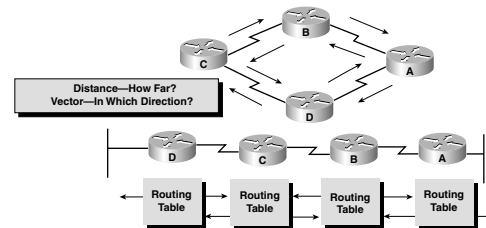
## Routing Protocol Classes

There are three basic routing protocol classes:

- **Distance vector**—Uses the direction (vector) and distance to other routers as metrics. RIP and IGRP are both distance vector protocols.

- **Link state**—Also called shortest path first, this protocol re-creates the topology of the entire network.
- **Balanced hybrid**—Combines the link-state and distance vector algorithms.

## How Distance Vector Protocols Route Information



Routers using distance vector-based routing share routing table information with each other. This method of updating is called *routing by rumor*. Each router receives updates from its direct neighbor. In the figure, router B shares information with routers A and C.

Router C shares routing information with routers B and D. In this case, the routing information is distance vector metrics (such as number of hops). Each router increments the metrics as they are passed on (incrementing hop count, for example).

*Distance accumulation* is a method that keeps track of the routing distance between any two points in the network, but the routers do not have an exact topology of an internetwork.

## How Information Is Discovered with Distance Vectors

*Network discovery* is the process of learning about destinations that are not directly connected. As the network discovery proceeds, routers accumulate metrics and learn the best paths to various destinations. In the figure, each directly connected network has a distance of 0. Router A learns about other networks based on information it receives from Router B. Router A increments the distance metric for any route learned by Router B. For example, router B knows about the networks to which Router C is directly connected. Router B then shares this information with Router A, which increments the distance to these networks by 1.

Routing Table				Routing Table				Routing Table			
10.1.0.0	E0	0	10.2.0.0	S0	0	10.3.0.0	S0	0	10.4.0.0	E0	0
10.2.0.0	S0	0	10.3.0.0	S1	0	10.4.0.0	E0	0			
10.3.0.0	S0	1	10.4.0.0	S1	1	10.2.0.0	S0	1			
10.4.0.0	S0	2	10.1.0.0	S0	1	10.1.0.0	S0	2			