Introducing routing

- Routing is the process that a router uses to forward packets toward the destination network.
- A router makes decisions based upon the destination IP address of a packet.
- In order to make the correct decisions, routers must learn the direction to remote networks.

1

Introduction to routing protocols

- A routing protocol is the communication used between routers.
- Examples of routing protocols are:
  - Routing Information Protocol (RIP)
  - Interior Gateway Routing Protocol (IGRP)
  - Enhanced Interior Gateway Routing Protocol (EIGRP)
  - Open Shortest Path First (OSPF)

2

- A routed protocol is used to direct user traffic.
- Examples of routed protocols are:
  - Internet Protocol (IP)
  - Internetwork Packet Exchange (IPX)

3

Static

Uses a programmed route that a network administrator enters into the router

Dynamic

Uses a route that a routing protocol adjusts automatically for topology or traffic changes

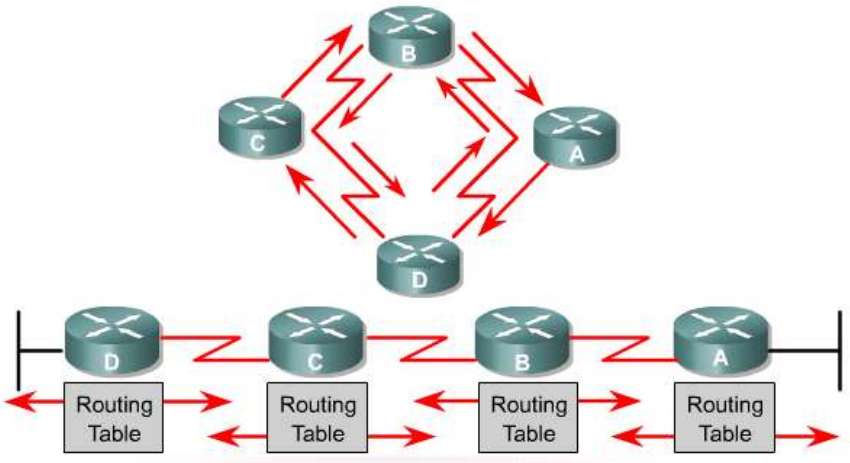
4

Identifying the classes of routing protocols

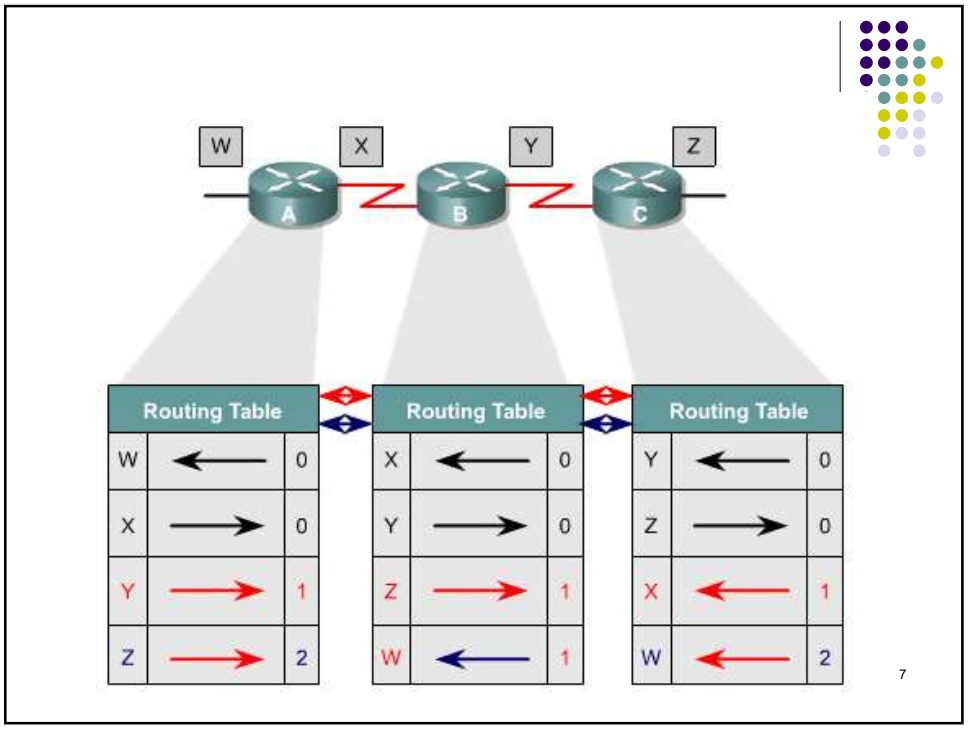
- Most routing algorithms can be classified into one of two categories:
  - distance vector
  - link-state
- The distance vector routing approach determines the direction (vector) and distance to any link in the internetwork.
- The link-state approach, also called shortest path first, recreates the exact topology of the entire internetwork.

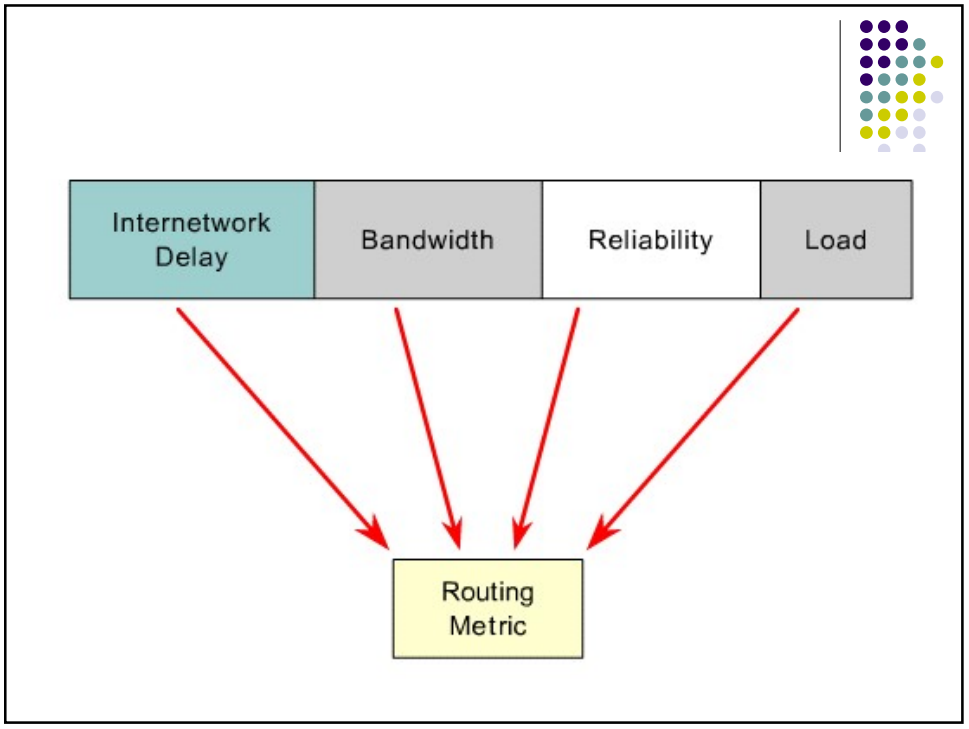
5

Distance vector routing protocol features



Pass periodic copies of a routing table to neighbor routers and accumulate distance vectors.


W
X
Y
Z
A
B
C
Routing Table
W 0
X 0
Y 1
Z 2
Routing Table
X 0
Y 0
Z 1
W 1
Routing Table
Y 0
Z 0
X 1
W 2
7


Internetwork Delay
Bandwidth
Reliability
Load
Routing Metric

Path determination

- A router determines the path of a packet from one data link to another, using two basic functions:
  - A path determination function
  - A switching function

9

- Path determination occurs at the network layer.
- The path determination function enables a router to evaluate the paths to a destination and to establish the preferred handling of a packet.
- The router uses the routing table to determine the best path and proceeds to forward the packet using the switching function.

10

Routing configuration

- Enabling an IP routing protocol on a router involves the setting of both global and routing parameters.
- Global tasks include selecting a routing protocol, such as RIP, IGRP, EIGRP or OSPF.
- The major task in the routing configuration mode is to indicate IP network numbers.

11

Routing protocols

- Examples of IP routing protocols include:
  - **RIP** – A distance vector interior routing protocol
  - **IGRP** – Cisco's distance vector interior routing protocol
  - **OSPF** – A link-state interior routing protocol
  - **EIGRP** – Cisco's advanced distance vector interior routing protocol
  - **BGP** – A distance vector exterior routing protocol

12