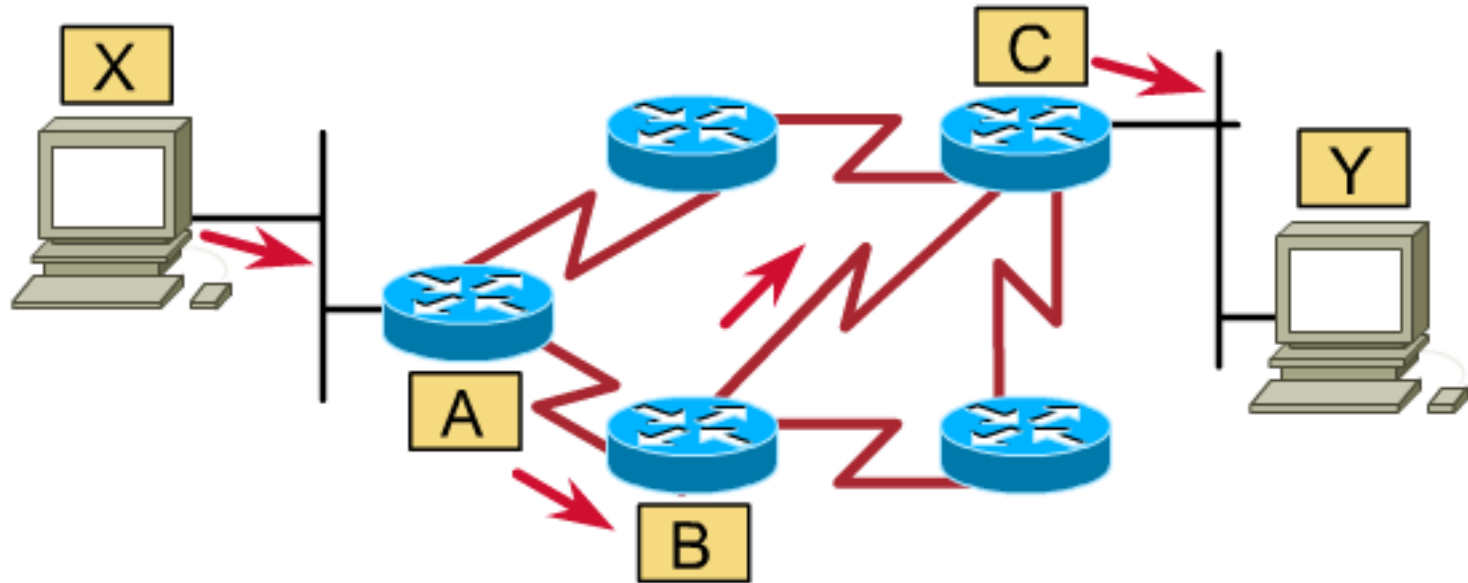




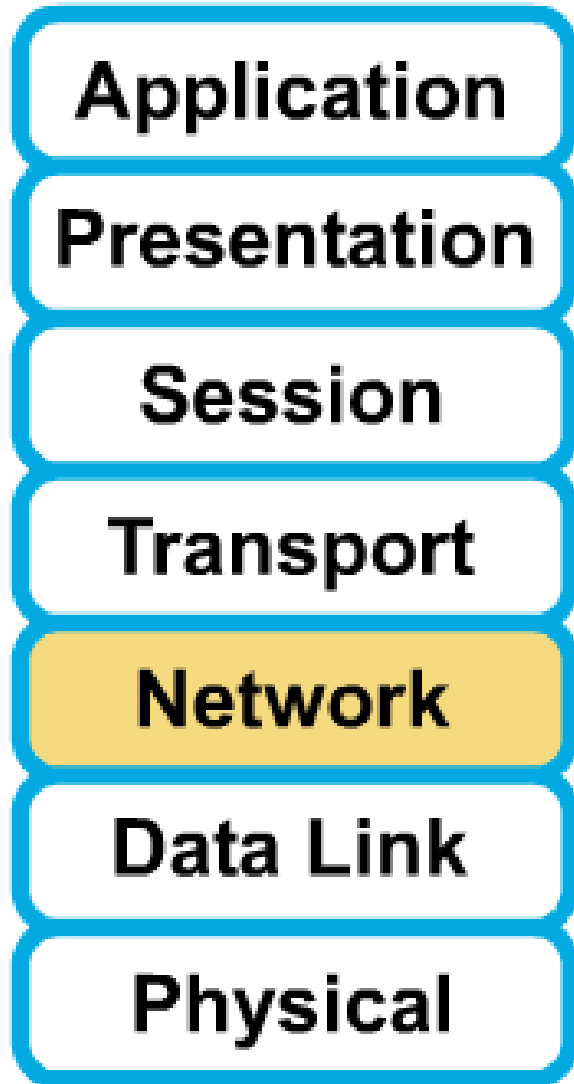
ROUTED AND ROUTING PROTOCOLS

Network protocols



- In order to allow two host communicate together through internetwork, they need a same network protocol.
- Protocols are like languages.
- IP is a network layer protocol.

Routed protocol

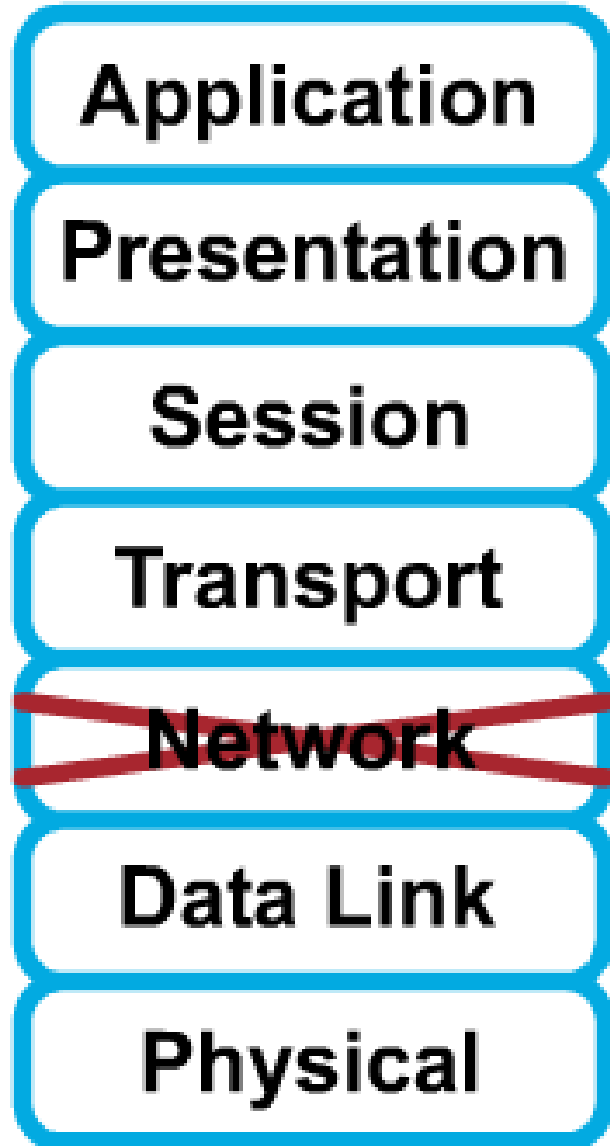


- Protocols that provide support for the network layer are called **routed** or **routable protocols**.
- IP is a network layer protocol, and because of that, it can be routed over an internetwork.

Three important routed protocols

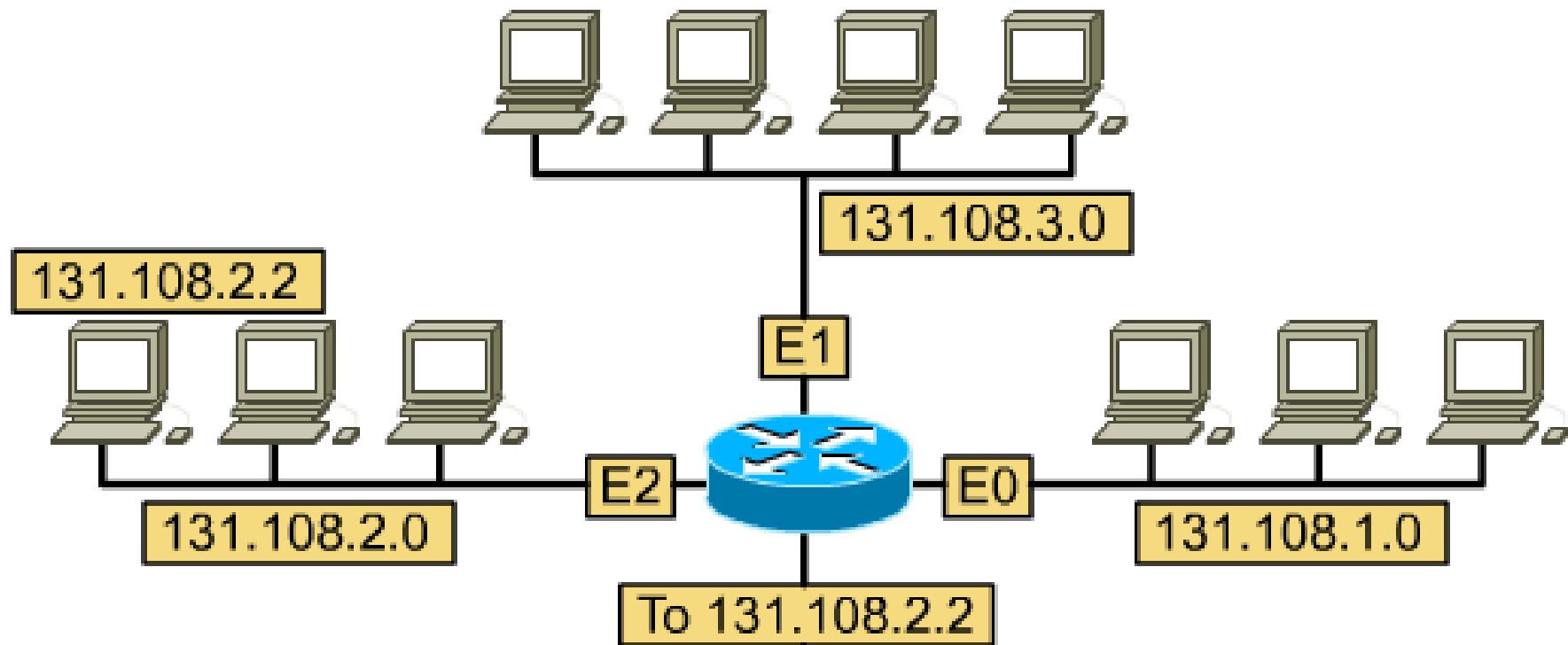
- **TCP/IP:** 04 bytes
 - Class A: 1 byte network + 3 bytes host
 - Class B: 2 bytes network + 2 bytes host
 - Class C: 3 bytes network + 1 byte host
- **IPX/SPX:** 10 bytes
 - 4 bytes network + 6 bytes host
- **AppleTalk:** 03 bytes
 - 2 bytes network + 1 byte host

Non-routable protocol



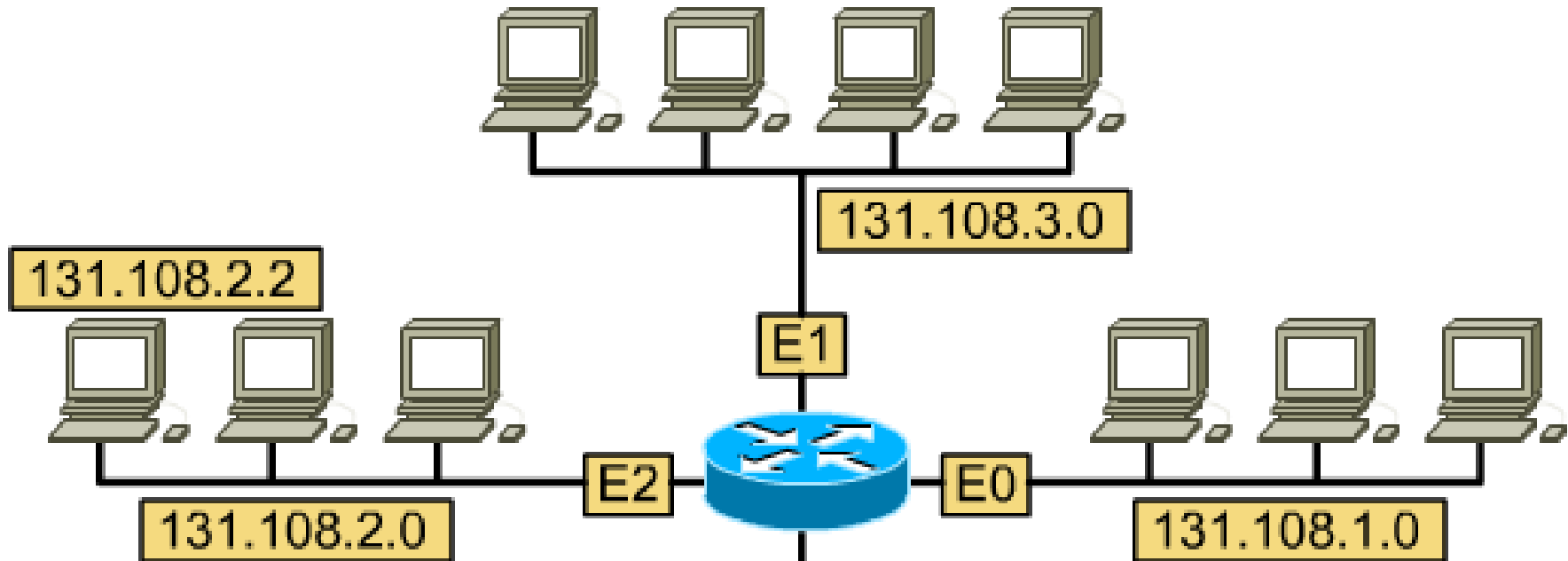
- Non-routable protocols are protocols that do not support Layer 3.
- The most common of these non-routable protocols is NetBEUI.
- NetBEUI is a small, fast, and efficient protocol that is limited to running on one segment.

Addressing of a routable protocol



131.108.2.2	10000011	01101100	00000010	00000010
AND				
255.255.255.0	11111111	11111111	11111111	00000000
	<hr/>			
	10000011	01101100	00000010	00000000

Routing table



131.108.1.0	E0
131.108.2.0	E1
131.108.3.0	E2

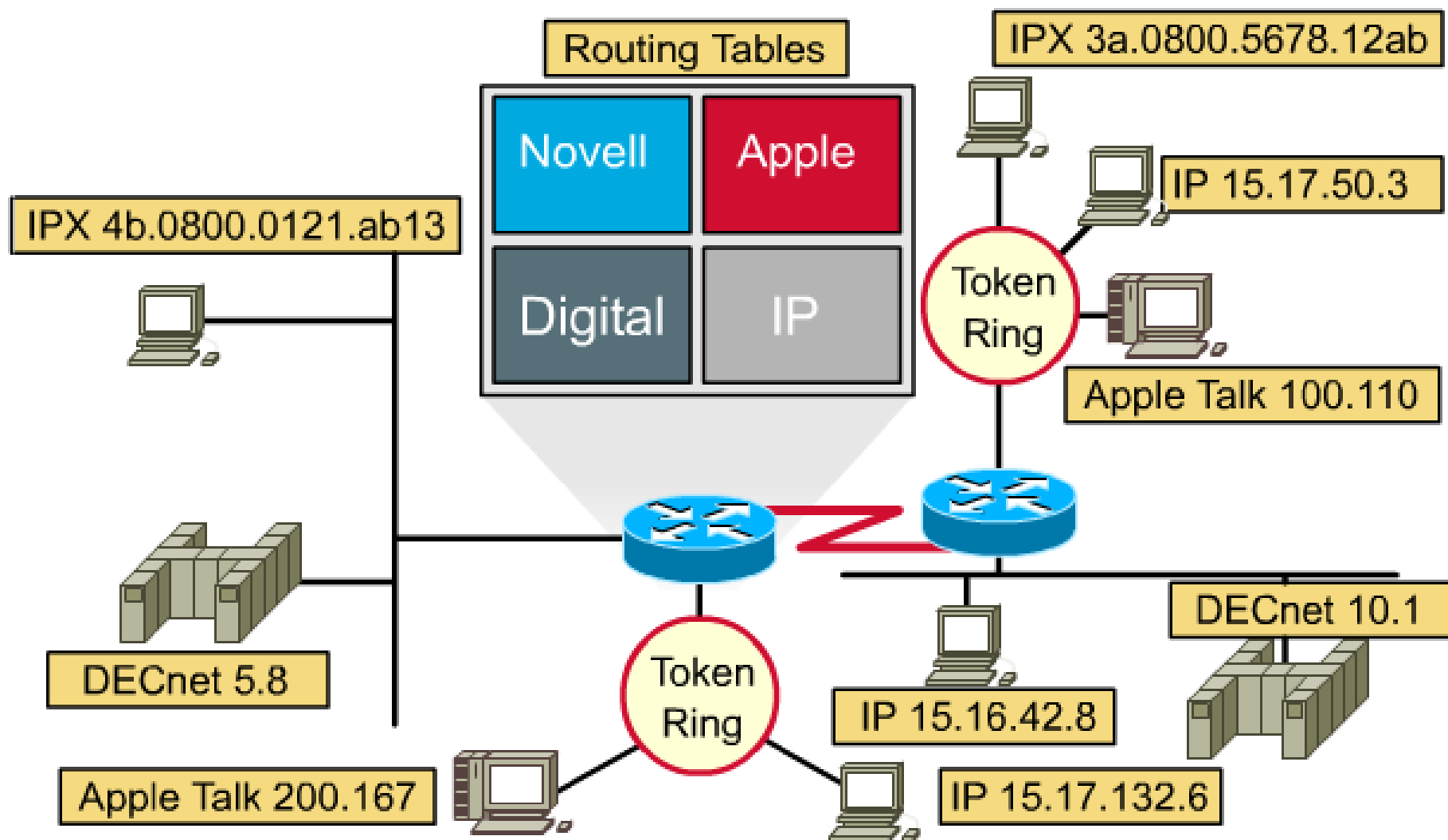
131.108.2.2
AND

255.255.255.0

11111111	11111111	11111111	00000000
10000011	01101100	00000010	00000000

010 00000010

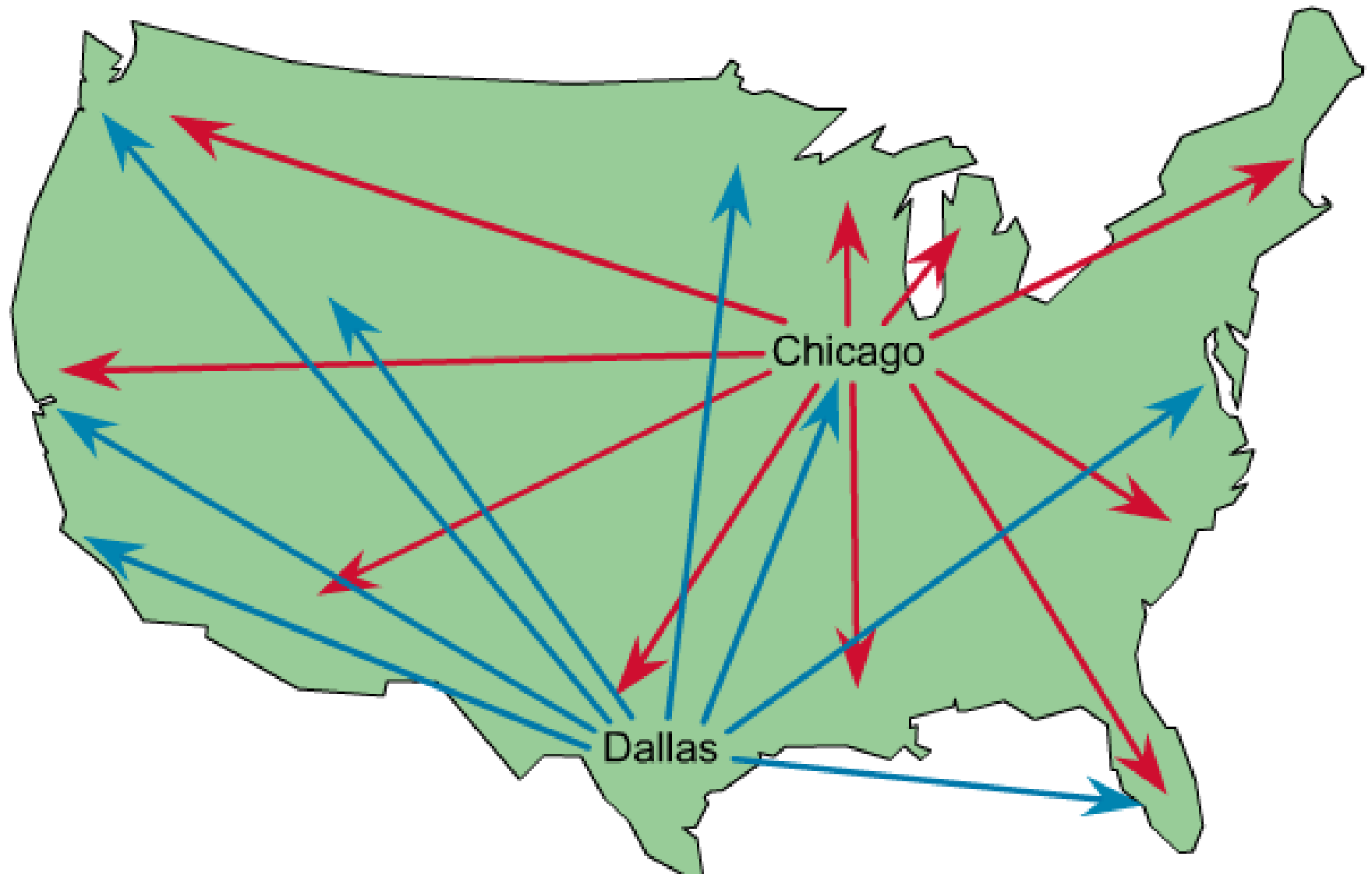
Multi-protocol routing



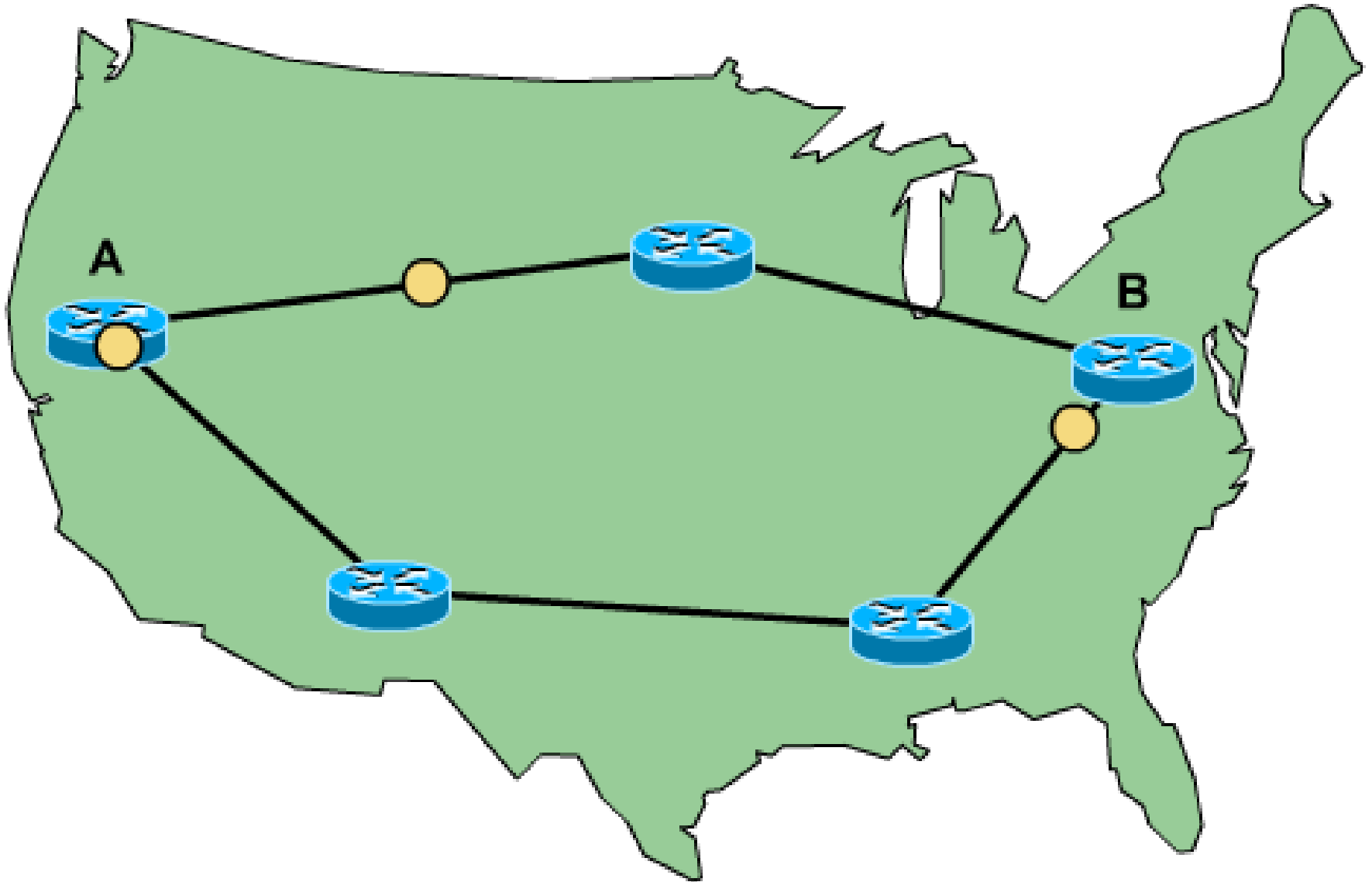
Classification #1: Static and Dynamic

- Static routes:
 - The network administrator manually enter the routing information in the router.
- Dynamic routes:
 - Routers can learn the information from each other on the fly.
 - Using routing protocol to update routing information.
 - RIP, IGRP, EIGRP, OSPF ...

Static routes



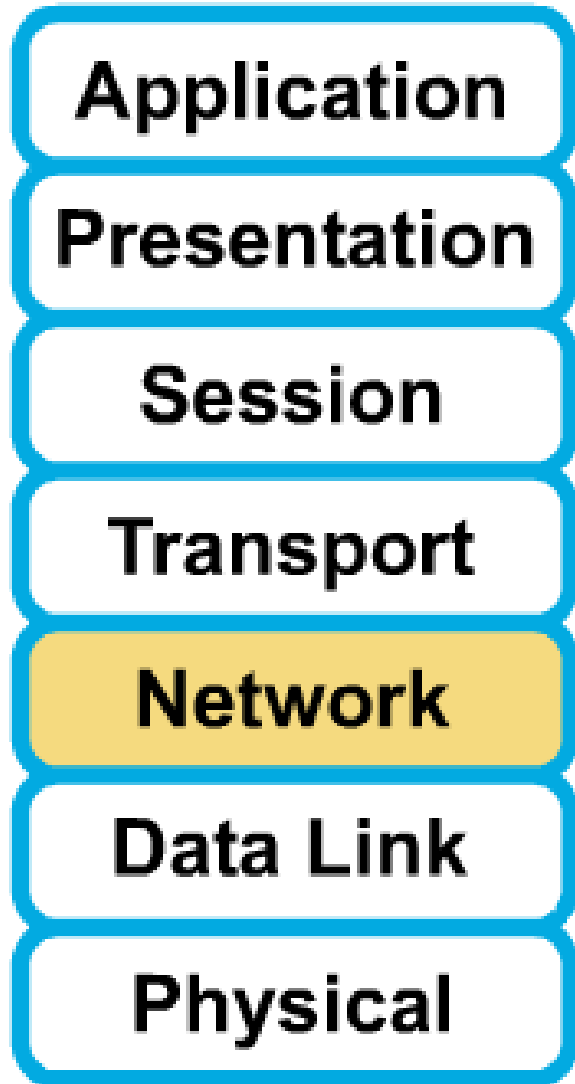
Dynamic routes



Static vs. dynamic routes

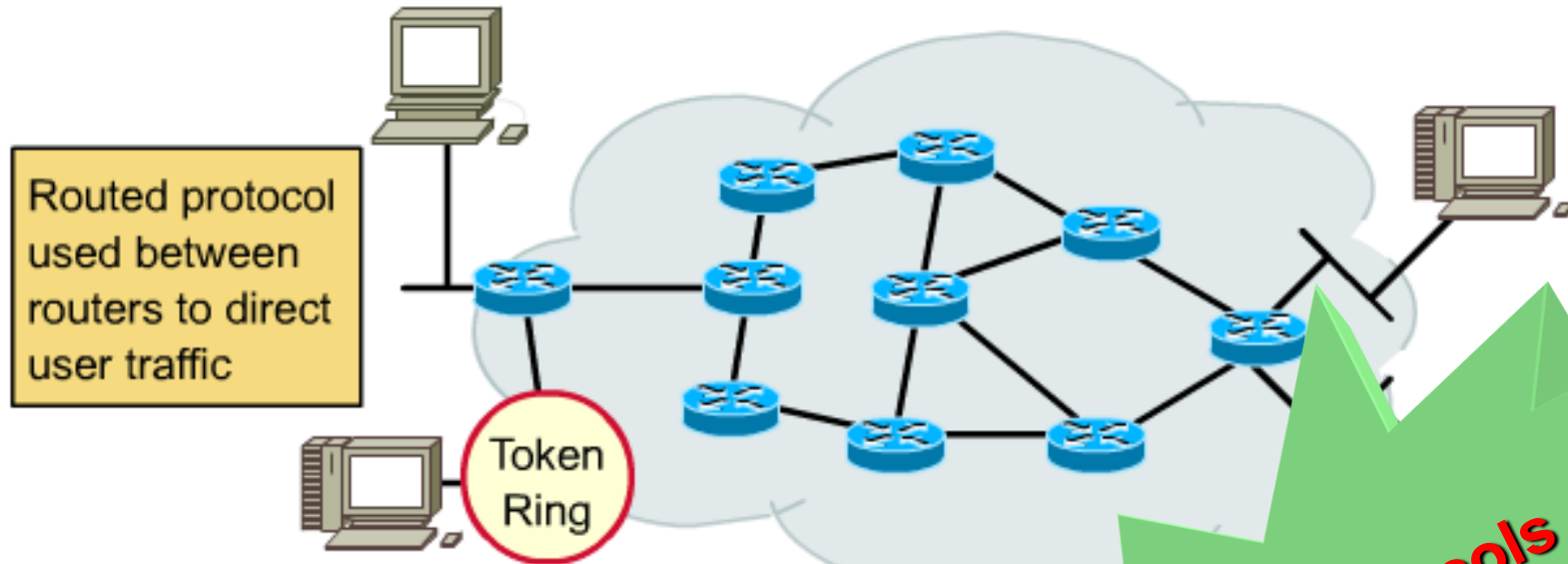
- **Static routes:**
 - For hiding parts of an internetwork.
 - To test a particular link in a network.
 - For maintaining routing tables whenever there is only one path to a destination network.
- **Dynamic routes:**
 - Maintenance of routing table.
 - Timely distribution of information in the form of routing updates.
 - Relies on routing protocol to share knowledge.
 - Routers can adjust to changing network conditions.

Routing protocol



- **Routing** protocols determine the paths that routed protocols follow to their destinations.
- Routing protocols enable routers that are connected to create a map, internally, of other routers in the network or on the Internet.

Routed vs. Routing protocol



Examples: IP, IPX

Routing protocol used between routers to maintain tables

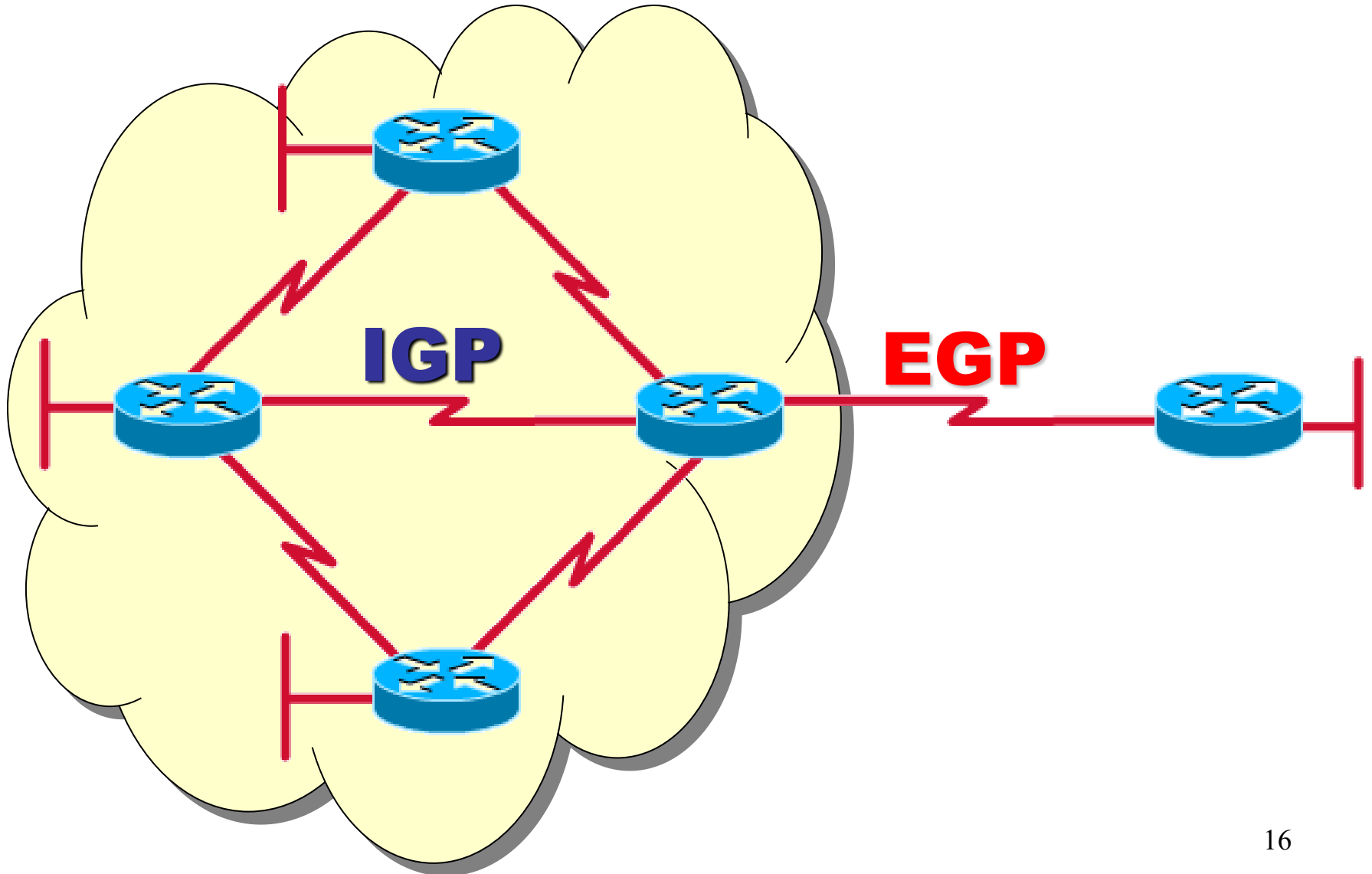
Examples: RIP, IGRP, OSPF

Routing protocols determine how routed protocols are routed

Classification #2: IGP and EGP

- Dynamic routes.
- Interior Gateway Protocols (RIP, IGRP, EIGRP, OSPF):
 - Be used within an autonomous system, a network of routers under one administration, like a corporate network, a school district's network, or a government agency's network.
- Exterior Gateway Protocols (EGP, BGP):
 - Be used to route packets between autonomous systems.

IGP vs. EGP



Classification #3: DVP and LSP

- Distance-Vector Protocols (RIP, IGRP):
 - View network topology from neighbor's perspective.
 - Add distance vectors from router to router.
 - Frequent, periodic updates.
 - Pass copy of routing tables to neighbor routers.
- Link State Protocols (OSPF):
 - Gets common view of entire network topology.
 - Calculates the shortest path to other routers.
 - Event-triggered updates.
 - Passes link state routing updates to other routers.