Routing

Static Routing

RIP

EIGRP

Single Area OSPF

Determine IP Routes

- Routing :

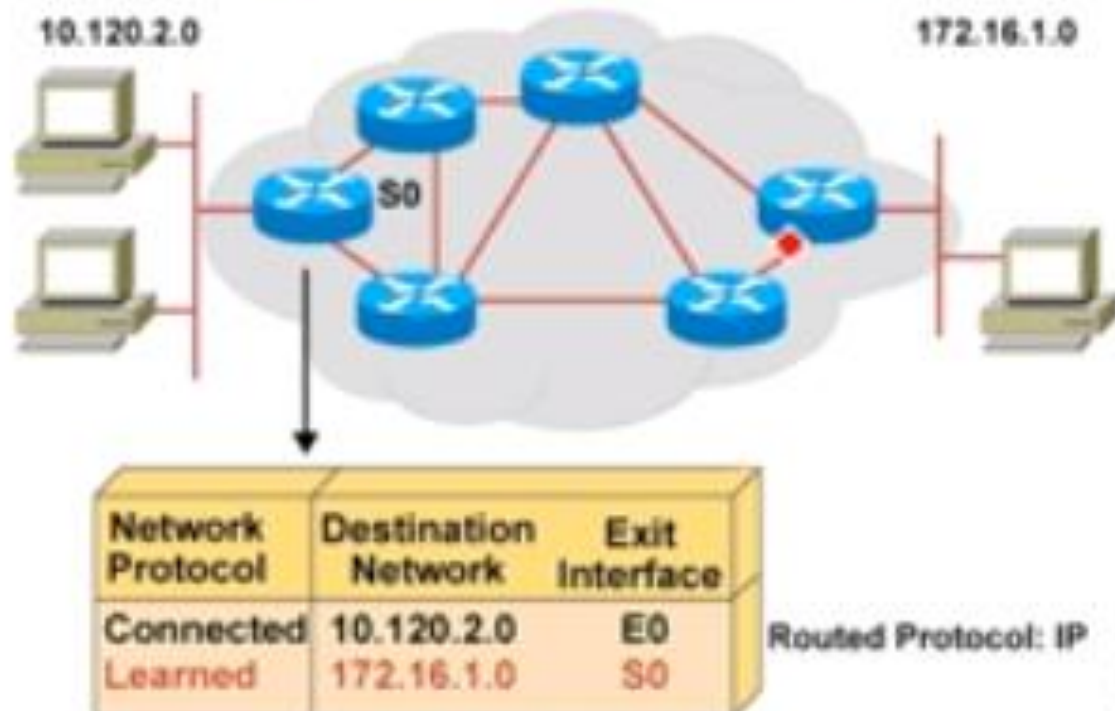How to determine the best route to destination

What Is Routing?

To route, a router needs to do the following:

- Know the destination address
- Identify the sources it can learn from
- Discover possible routes
- Select the best route
- Maintain and verify routing information

What Is Routing? (Cont.)

10.120.2.0

172.16.1.0

S0

Network Protocol	Destination Network	Exit Interface
Connected	10.120.2.0	E0
Learned	172.16.1.0	S0

Routed Protocol: IP

- Routers must learn destinations that are not directly connected.
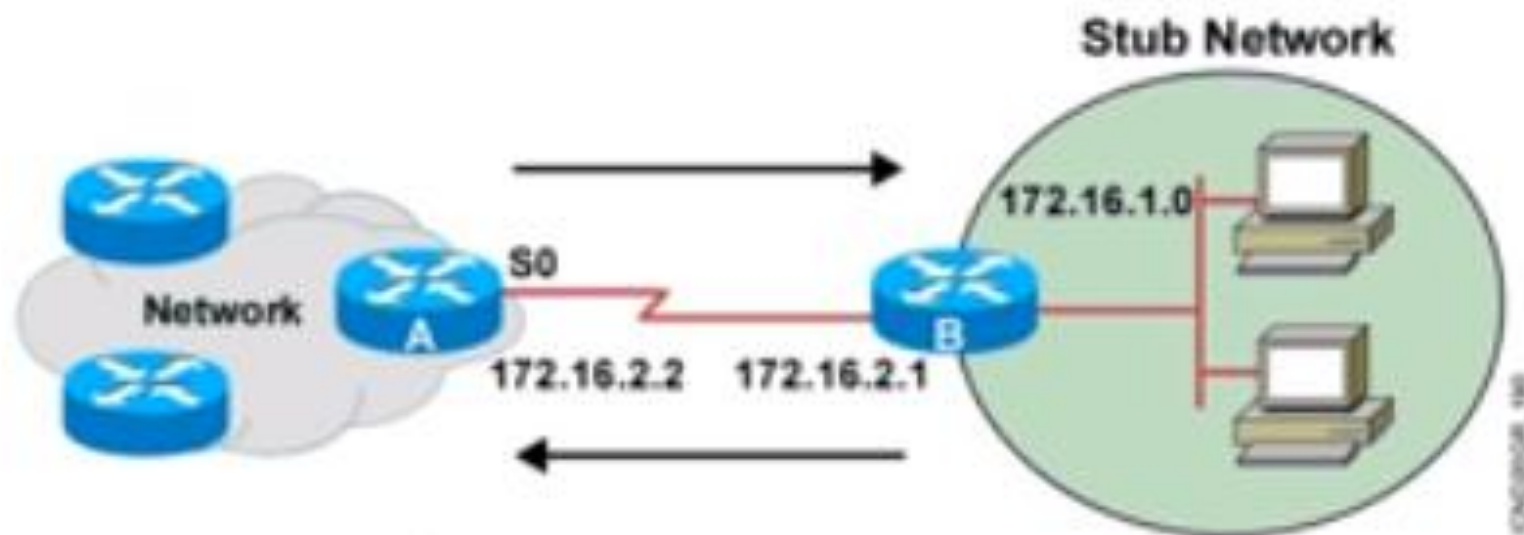
Identifying Static and Dynamic Routes

Static Route

- Uses a route that a network administrator enters into the router manually

Dynamic Route

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

Static Routes

Stub Network

172.16.1.0

S0

Network

A

172.16.2.2   172.16.2.1

B

- Configure unidirectional static routes to and from a stub network to allow communications to occur.
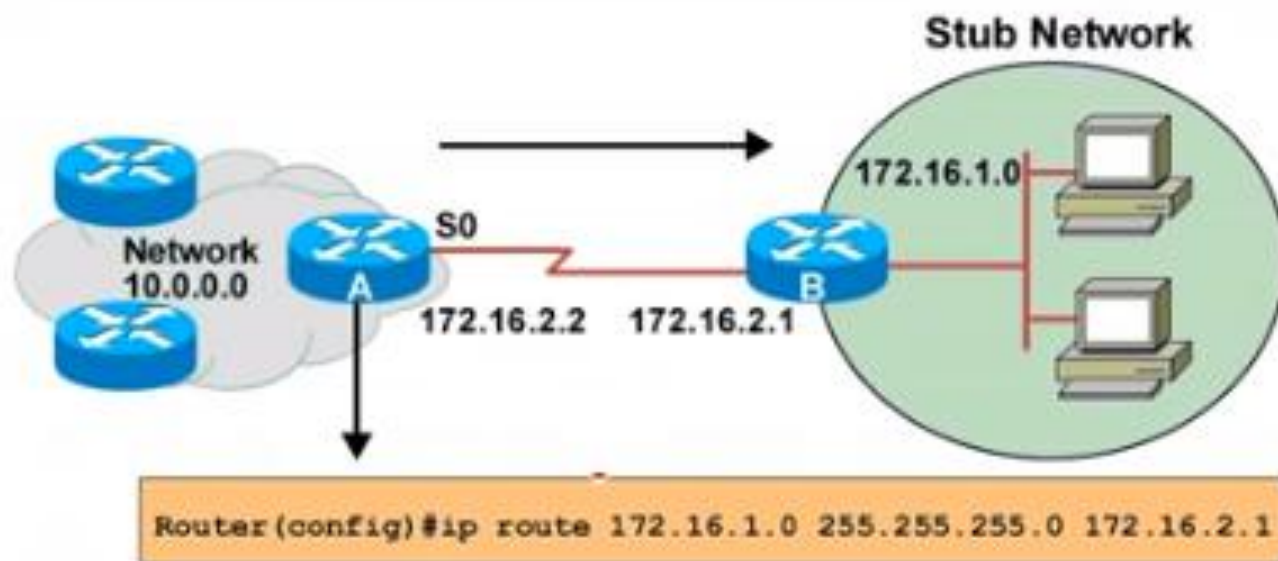
Static Route Configuration

Cisco.com

```
Router(config)#ip route network  [mask]
(address | interface)
```

- Defines a path to an IP destination network or subnet or host

Static Route Example

Stub Network
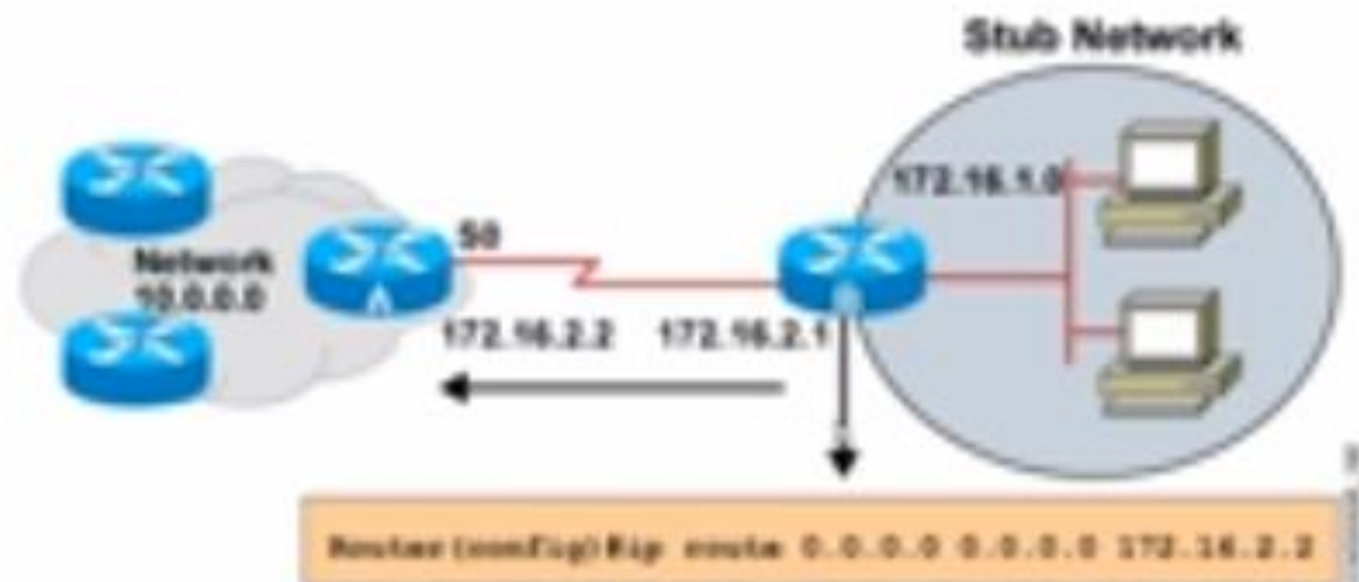
172.16.1.0

**Network
10.0.0.0**

S0

A

B

172.16.2.2   172.16.2.1

```
Router(config)#ip route 172.16.1.0 255.255.255.0 172.16.2.1
```

- **This is a unidirectional route. You must have a route configured in the opposite direction.**

Default Routes
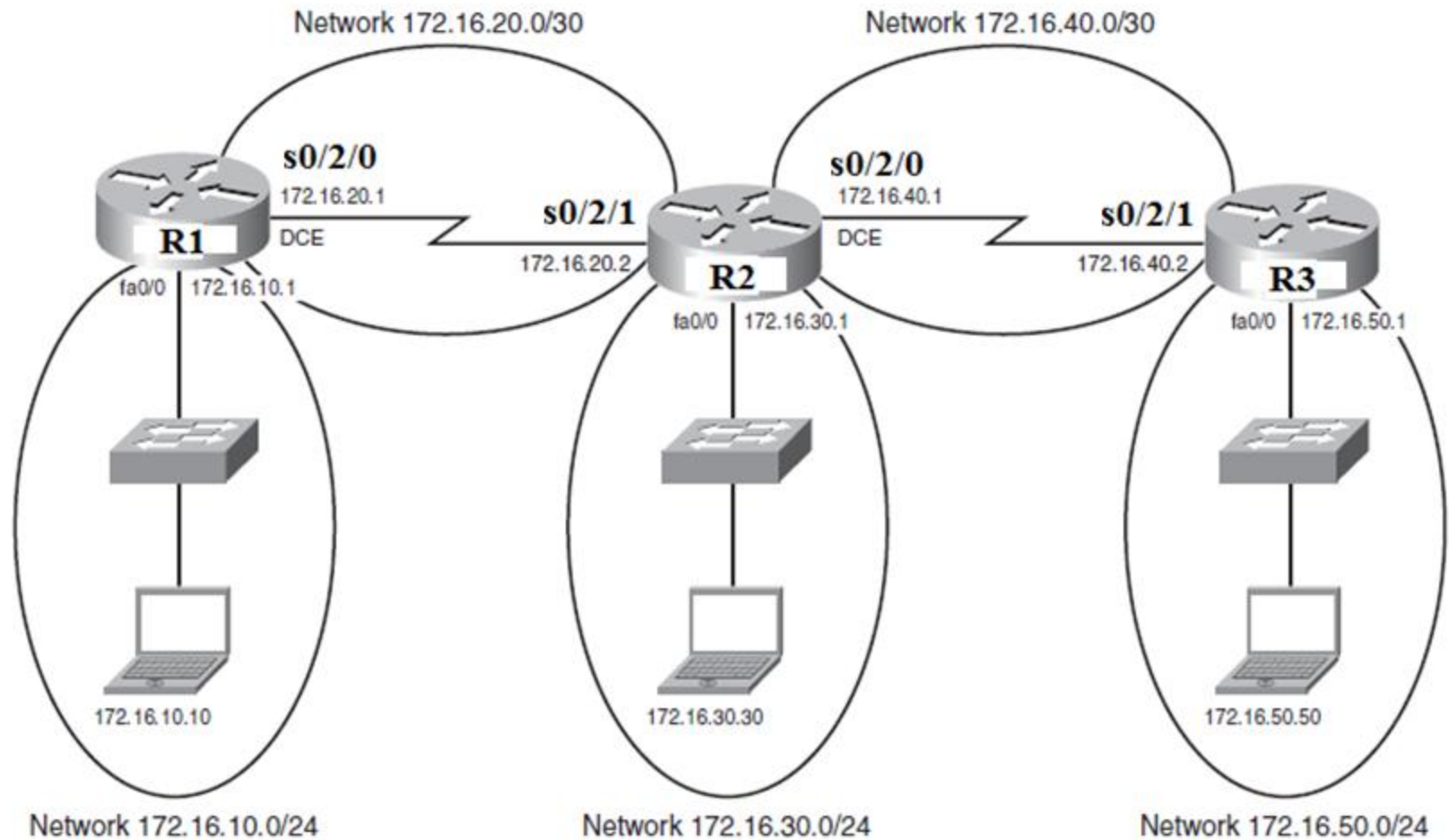
Stub Network


```
Router(config)#ip route 0.0.0.0 0.0.0.0 172.16.2.2
```

- This route allows the stub network to reach all known networks beyond router A.

Network Topology for Static Route Configuration

Network 172.16.20.0/30

Network 172.16.40.0/30

s0/2/0
172.16.20.1
R1
DCE

s0/2/1
172.16.20.2
R2

s0/2/0
172.16.40.1
DCE

s0/2/1
172.16.40.2
R3

fa0/0   172.16.10.1

fa0/0   172.16.30.1

fa0/0   172.16.50.1

172.16.10.10

172.16.30.30

172.16.50.50

Network 172.16.10.0/24

Network 172.16.30.0/24

Network 172.16.50.0/24

Router **R1**

R1 >enable	Moves to privileged mode
R1 #configure terminal	Moves to global configuration mode
R1 (config)#ip route 172.16.30.0 255.255.255.0 172.16.20.2	Configures a static route using the next-hop address
R1 (config)#ip route 172.16.40.0 255.255.255.0 172.16.20.2	Configures a static route using the next-hop address
R1 (config)#ip route 172.16.50.0 255.255.255.0 172.16.20.2	Configures a static route using the next-hop address
R1 (config)#exit	Moves to privileged mode
R1 #copy running-config startup-config	Saves the configuration to NVRAM

Router   R2

R2 >**enable**	Moves to privileged mode
R2 #**configure terminal**	Moves to global configuration mode
R2 (config)#**ip route 172.16.10.0 255.255.255.0 serial** 0/2/1	Configures a static route using the exit interface
R2 (config)#**ip route 172.16.50.0 255.255.255.0 serial** 0/2/0	Configures a static route using the exit interface
R2 (config)#**exit**	Moves to privileged mode
R2 #**copy running-config startup-config**	Saves the configuration to NVRAM

Router **R3**

R3	>**enable**	Moves to privileged mode
R3	#**configure terminal**	Moves to global configuration mode
R3	(config)#**ip route 0.0.0.0 0.0.0.0 serial 0/2/1**	Configures a static route using the default route
R3	(config)#**exit**	Moves to privileged mode
R3	#**copy running-config startup-config**	Saves the configuration to NVRAM