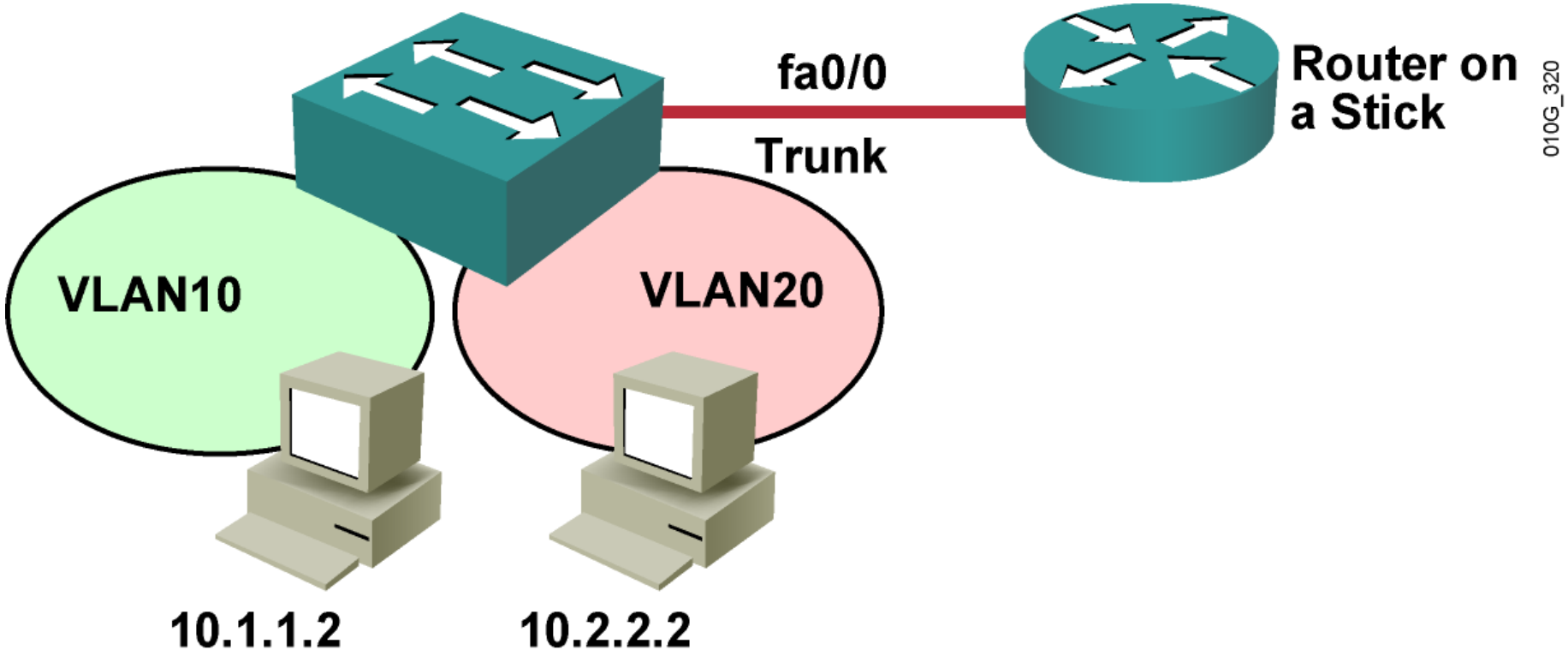
Implementing Inter-VLAN Routing

Describing Routing Between VLANs

Inter-VLAN Routing with External Router



- **Single trunk link carries traffic for multiple VLANs to and from router.**

Inter-VLAN Routing
External Router Configuration Commands

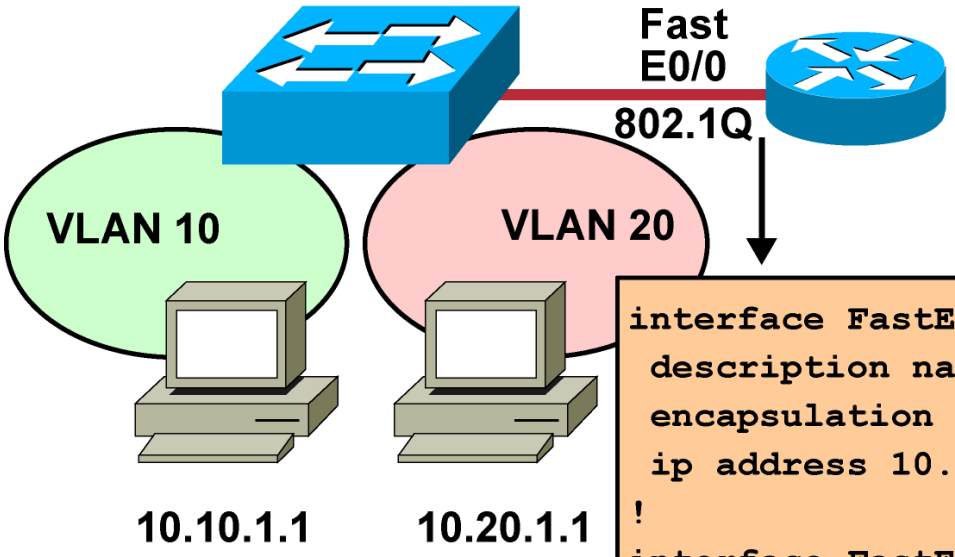
Configure on subinterface

- encapsulation dot1Q (or isl) 10
- ip address 10.10.1.1 255.255.255.0

Verify

- show vlan 10
- show ip route

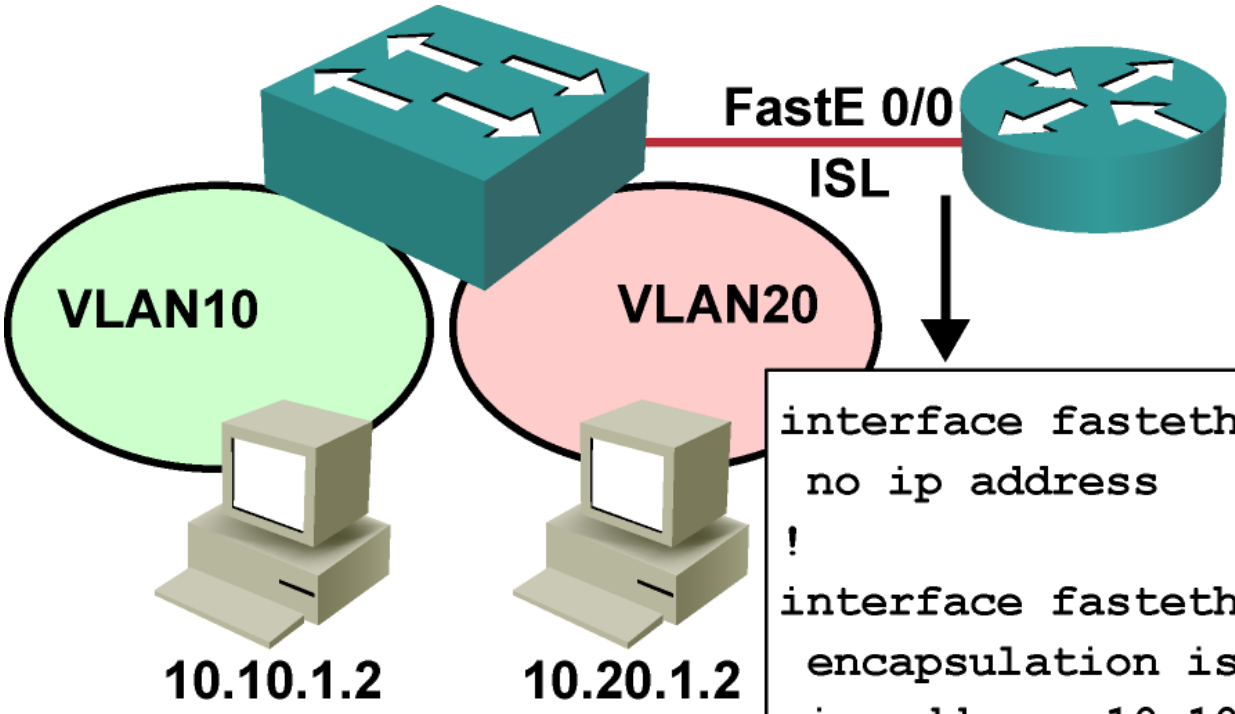
Inter-VLAN Routing on External Router: 802.1Q Trunk Link




```
interface FastEthernet0/0.1
 description native vlan - VLAN 1 is un frame tagged
 encapsulation dot1q 1 native
 ip address 10.1.1.1 255.255.255.0
!
interface FastEthernet0/0.10
 encapsulation dot1Q 10
 ip address 10.10.1.1 255.255.255.0
!
interface FastEthernet0/0.20
 encapsulation dot1Q 20
 ip address 10.20.1.1 255.255.255.0
!
```

010G_322

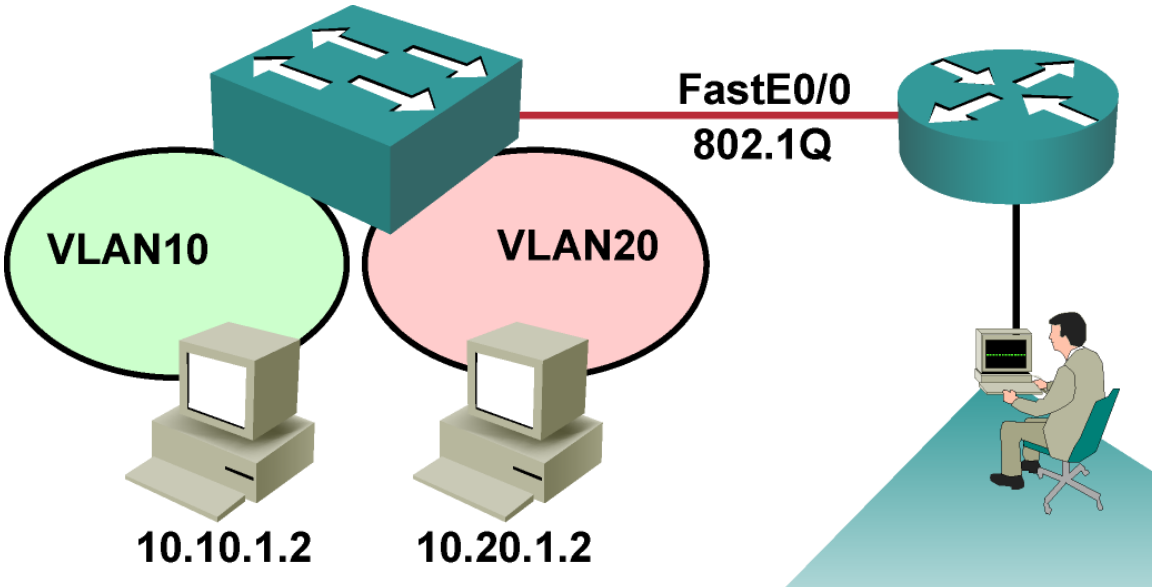
Inter-VLAN Routing on External Router: ISL Trunk Link




```
interface fastethernet 0/0
 no ip address
!
interface fastethernet 0/0.10
 encapsulation isl 10
 ip address 10.10.1.1 255.255.255.0
interface fastethernet 0/0.20
 encapsulation isl 20
 ip address 10.20.1.1 255.255.255.0
```

310P_304

Verifying Inter-VLAN Routing




```
Switch#ping 10.10.1.2
Sending 5, 100-byte ICMP Echos to 172.16.10.3
time out is 2 seconds:
!!!!!
Success rate is 100 percent (5/5),
round-trip min/avg/max 0/0/0/ ms
```

310P_125

The ping **command tests connectivity to remote hosts.**

Verifying the Inter-VLAN Routing Configuration

```
Router#show vlan
```

- Displays the current IP configuration per VLAN

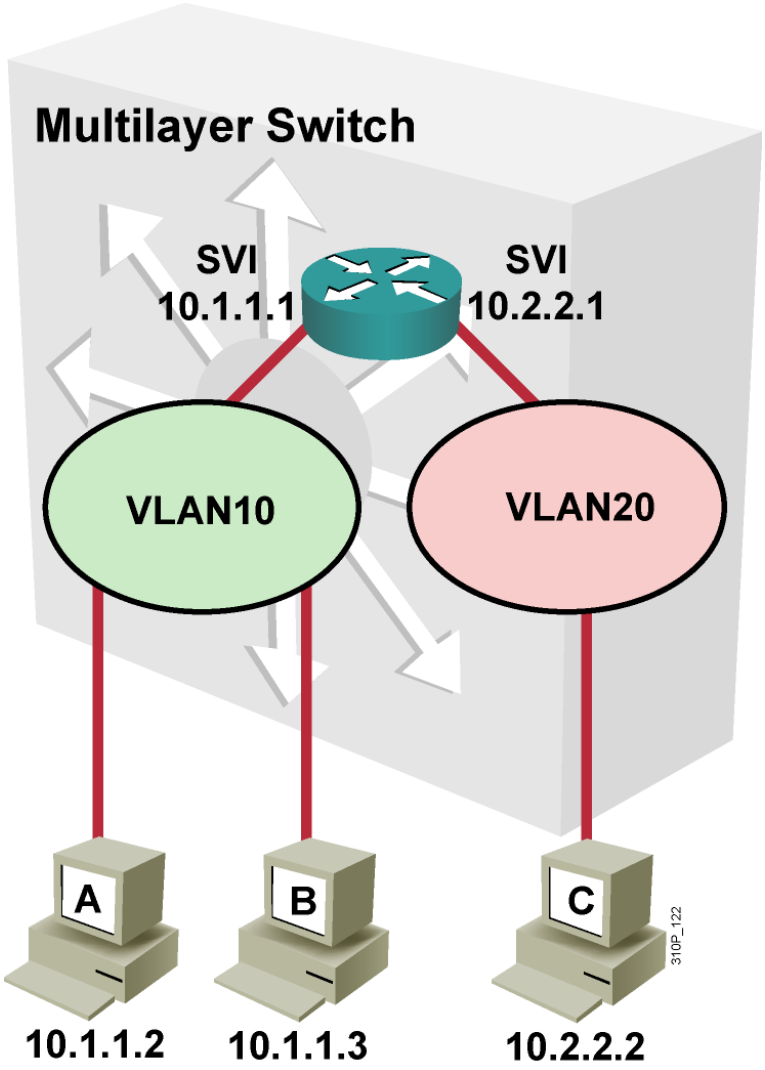
```
Router#show ip route
```

- Displays IP route table information

```
Router#show ip interface brief
```

- Displays IP address on interfaces and current state of interface

Layer 3 SVI


Multilayer Switch
SVI
10.1.1.1
SVI
10.2.2.1
VLAN10
VLAN20
A
B
C
10.1.1.2
10.1.1.3
10.2.2.2
310P_122

SVI on a Multilayer Switch

Configure

- ip routing
- interface vlan 10
  - ip address 10.1.1.1 255.255.255.0
- router eigrp 50
  - network 10.0.0.0

Verify

- show ip route

Configuring Inter-VLAN Routing Through an SVI

Step 1 : Configure IP routing.

```
Switch(config)#ip routing
```

Step 2 : Create an SVI interface.

```
Switch(config)#interface vlan vlan-id
```

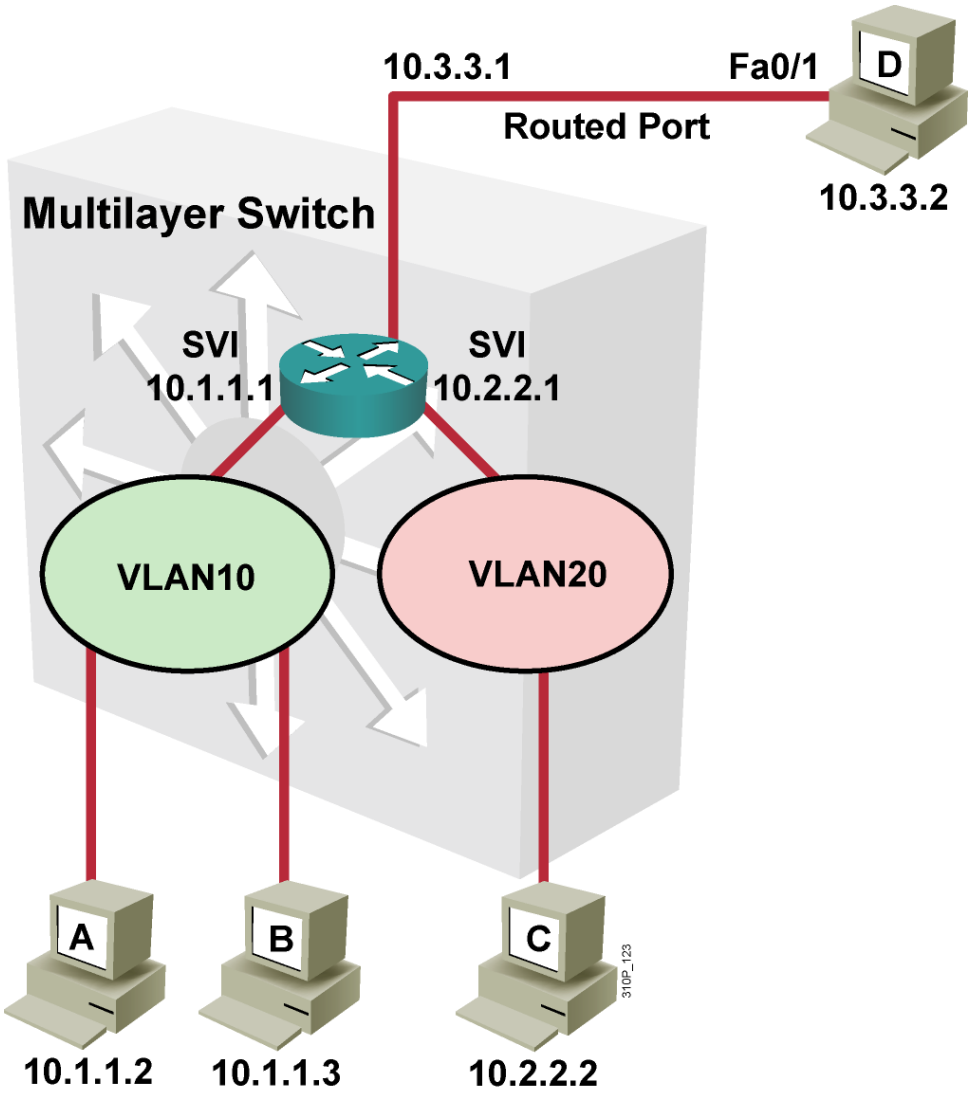
Step 3 : Assign an IP address to the SVI.

```
Switch(config-if)#ip address ip-address mask
```

Step 4 : Configure the IP routing protocol if needed.

```
Switch(config)#router ip_routing_protocol <options>
```

Routed Ports on a Multilayer Switch (Cont.)



Routed Ports on a Multilayer Switch

- **Physical switch port with Layer 3 capability**
- **Not associated with a VLAN**
- **Requires removal of Layer 2 port functionality**

Configure

- ip routing
- interface fa0/1
  - no switchport
  - ip address 10.3.3.1 255.255.255.0
- router eigrp 50
  - network 10.0.0.0

Configuring a Routed Port

Step 1 : Configure IP routing.

```
Switch(config)#ip routing
```

Step 2 : Create a routed port.

```
Switch(config-if)#no switchport
```

Step 3 : Assign an IP address to the routed port.

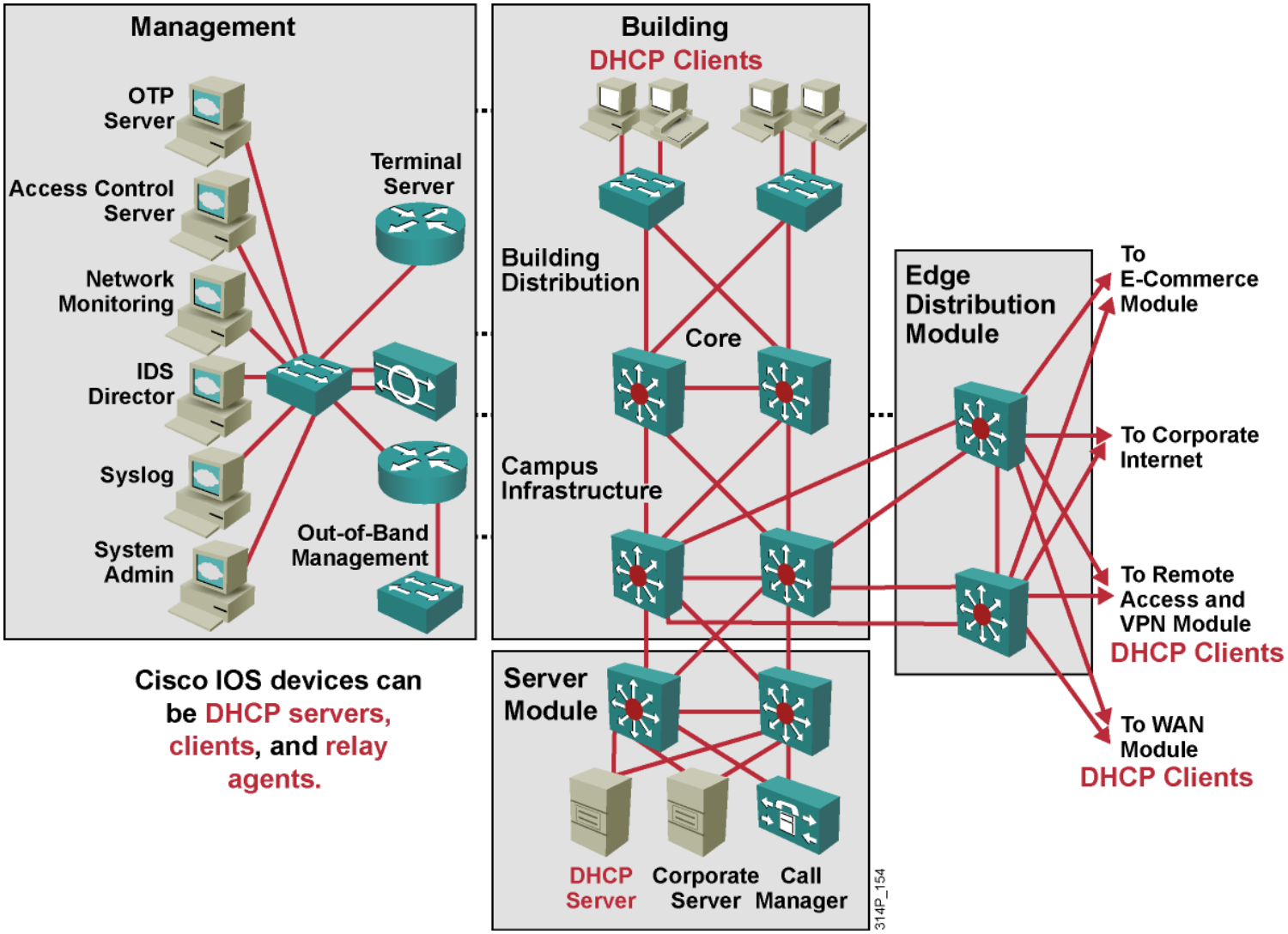
```
Switch(config-if)#ip address ip-address mask
```

Step 4 : Configure the IP routing protocol if needed.

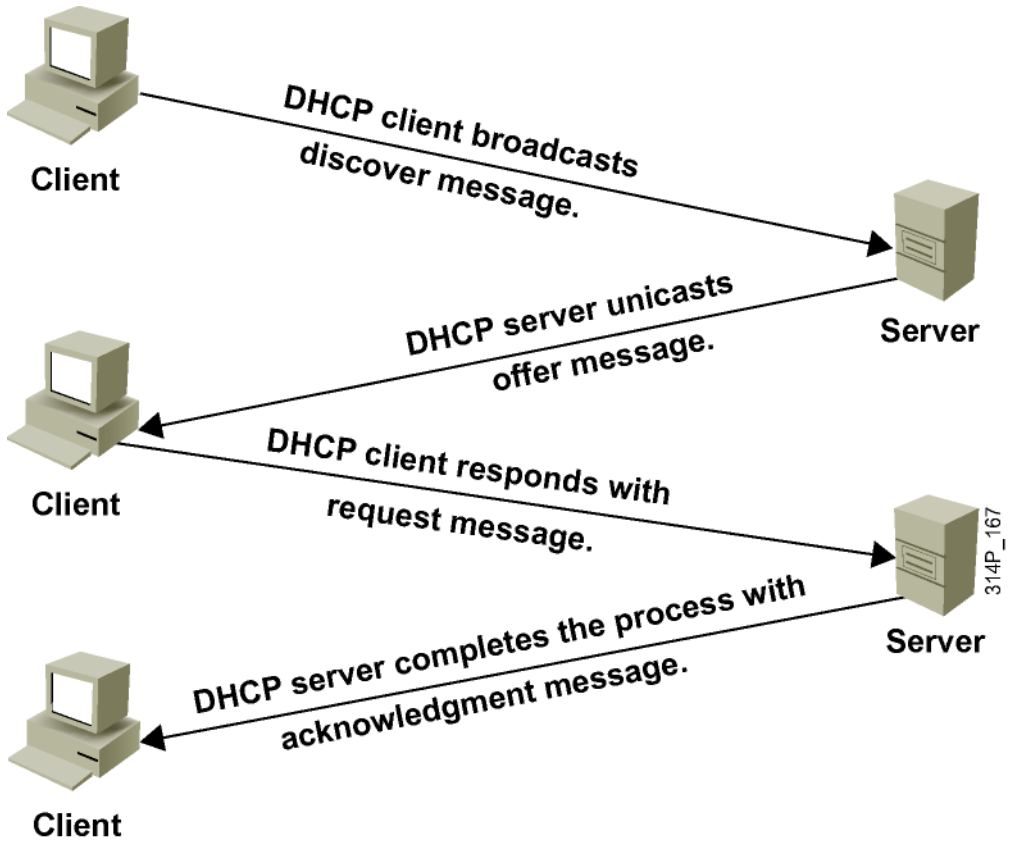
```
Switch(config)#router ip_routing_protocol <options>
```

Configuring DHCP

DHCP in an Enterprise Network



Dynamic Host Configuration Protocol



Configuring a DHCP Server

```
Router(config)#ip dhcp pool [pool name]
```

- **Enables a DHCP pool for use by hosts**

```
Router(config-dhcp)#network [network address][subnet mask]
```

- **Specifies the network and subnet mask of the pool**

```
Router(config-dhcp)#default-router [host address]
```

- **Specifies the default router for the pool to use**

DHCP Server Configuration Example

```
ip dhcp excluded-address 172.16.1.100 172.16.1.103
ip dhcp excluded-address 172.16.2.100 172.16.2.103
ip dhcp pool LAN
  network 172.16.0.0/16
  domain-name cisco.com
  dns-server 172.16.1.102 172.16.2.102
  netbios-name-server 172.16.2.103 172.16.2.103
  default-router 172.16.1.100
```

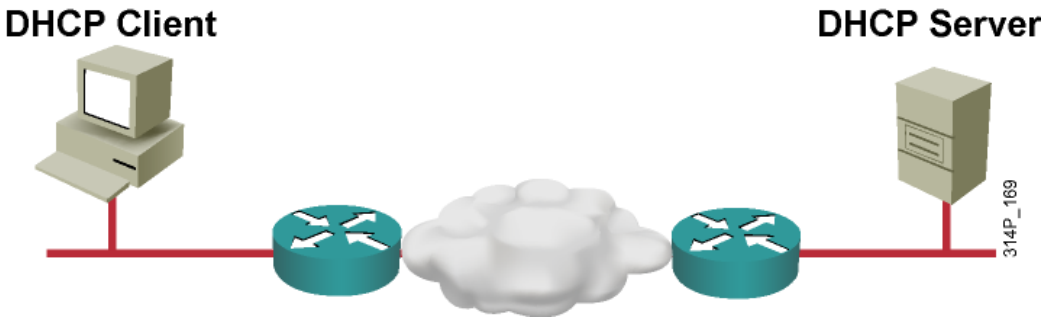
DHCP Client

```
Router (config-if)#
```

```
ip address dhcp
```

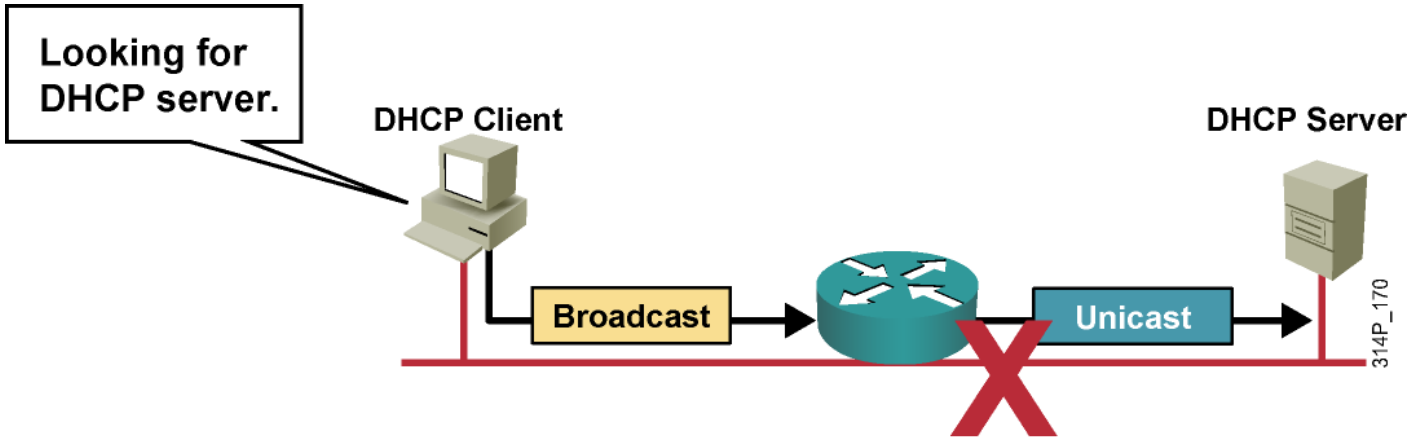
Enables a Cisco IOS device to obtain an IP address dynamically from a DHCP server

Helper Addressing Overview



- **Routers do not forward broadcasts, by default.**
- **Helper address provides selective connectivity.**

Why Use a Helper Address?



- **Sometimes clients do not know the server address.**
- **Helpers change broadcast to unicast to reach server.**

IP Helper Address Commands

Router(config-if)#

```
ip helper-address address
```

- **Enables forwarding and specifies destination address for main UDP broadcast packets**
- **Changes destination address from broadcast to unicast or directed broadcast address**

DHCP Verification Commands

```
router#
show ip dhcp database
```

- Displays recent activity on the DHCP database

```
router#
show ip dhcp server statistics
```

- Shows count information about statistics and messages sent and received

```
router#
show ip route dhcp
```

- Displays routes added to the routing table by DHCP

```
router#
debug ip dhcp server {events | packets | linkage}
```

- Enables debugging on the DHCP server


CISCO SYSTEMS