

# EAST WEST UNIVERSITY

Course Name: Data Communications  
Course Code: CSE350

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## Lab Topic: Routing Configurations & Protocols with DHCP Server

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### 1 Design Implementation

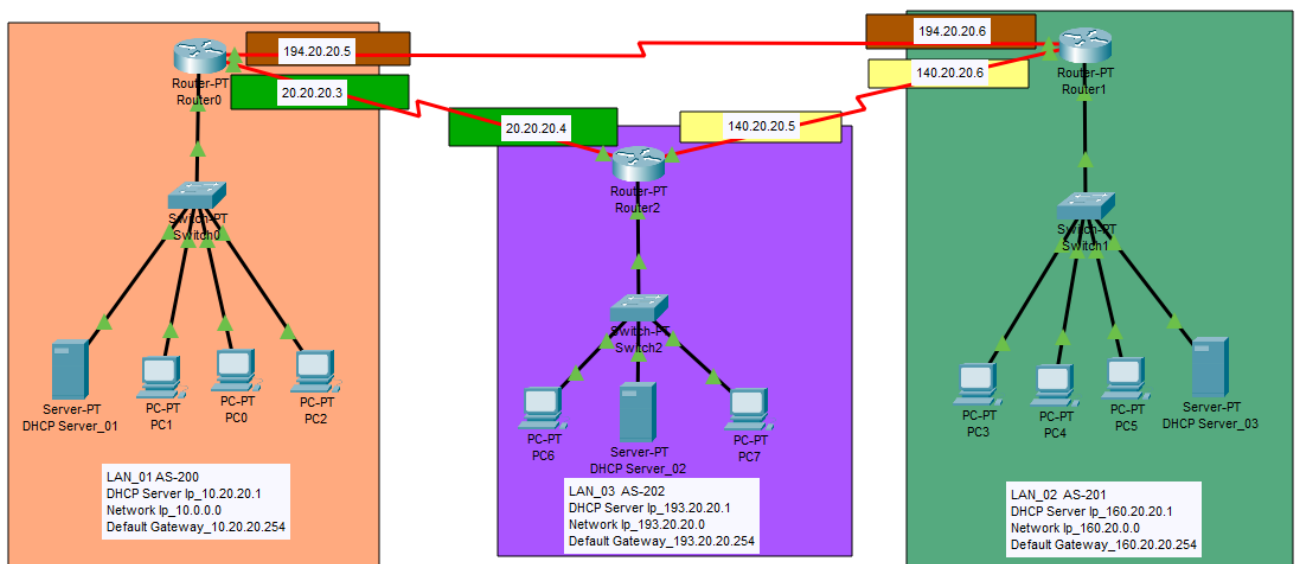


Figure 1: LAN Topology

## 2 IP Address Allocation

The following table outlines the network topology used, including six networks and three DHCP server IP addresses, as shown below:

Network IP	DHCP Server IP
10.0.0.0	10.20.20.1
20.0.0.0	160.20.20.1
140.20.0.0	193.20.20.1
140.20.0.0	-
160.20.0.0	-
194.20.20.0	-

## 3 Configuration Networks of LAN 01

### 3.1 Configuration of the LAN 01 with FastEthernet (Fa)

```
interface fa0/0
ip address 10.20.20.254 255.0.0.0
no shut
do wr
exit
```

### 3.2 Configuration of the LAN 01 with Serial (Se)

```
interface se2/0
ip address 194.20.20.5 255.255.255.0
clock rate 6400
no shut
do wr
exit
```

```
interface se3/0
ip address 20.20.20.3 255.0.0.0
no shut
do wr
exit
```

## 4 Configuration Networks of LAN 02

### 4.1 Configuration of the LAN 02 with FastEthernet (Fa)

```
interface fa0/0
ip address 160.20.20.254 255.255.0.0
no shut
do wr
exit
```

### 4.2 Configuration of the LAN 02 with Serial (Se)

```
interface se2/0
ip address 140.20.20.6 255.255.0.0
no shut
do wr
exit
```

```

interface se3/0
ip address 194.20.20.6 255.255.255.0
no shut
do wr
exit

```

## 5 Configuration Networks of LAN 03

### 5.1 Configuration of the LAN 03 with FastEthernet (Fa)

```

interface fa0/0
ip address 193.20.20.254 255.255.255.0
no shut
do wr
exit

```

### 5.2 Configuration of the LAN 03 with Serial (Se)

```

interface se2/0
ip address 140.20.20.5 255.255.0.0
clock rate 6400
no shut
do wr
exit

interface se3/0
ip address 20.20.20.4 255.0.0.0
clock rate 6400
no shut
do wr
exit

```

## 6 Configuration of BGP Protocol

### What is the BGP protocol?

BGP is a path-vector protocol used to exchange routing information between different autonomous systems (AS). It is primarily used in large networks such as the Internet. BGP is essential for inter-domain routing, providing control over policy-based routing and is highly scalable. Additionally, it enables load balancing and redundancy across multiple connections, enhancing network resilience and performance.

Furthermore, BGP supports route aggregation, reducing the size of routing tables and improving the efficiency of the routing process. Its support for various attributes, such as AS path and next-hop, enables networks to make more informed routing decisions, which is crucial in optimizing traffic flow and avoiding congestion.

### Structure of BGP Protocol

```

router bgp 100
neighbor 194.20.20.6 remote-as 200
neighbor 20.20.20.4 remote-as 300
network 10.0.0.0 mask 255.0.0.0
exit

```

### Explanation of the BGP configuration, broken down step by step:

**AS Configuration:** The command `router bgp 100` initializes the BGP configuration mode and assigns the router to Autonomous System (AS) 100. This AS number uniquely identifies the local network in the BGP domain.

**Neighbor Relationships:** The `neighbor` commands establish BGP peer connections with routers in other ASes. `neighbor 194.20.20.6 remote-as 200` sets up a BGP session with a neighbor in AS 200, and `neighbor 20.20.20.4 remote-as 300` establishes another session with a neighbor in AS 300. These are external BGP (eBGP) relationships since the AS numbers differ.

**Network Advertisement:** The `network 10.0.0.0 mask 255.0.0.0` command advertises the 10.0.0.0/8 network to BGP neighbors, allowing the specified network to be included in BGP updates if a matching route exists in the router's table.

**Exiting Configuration:** The `exit` command ends the BGP configuration session, finalizing the setup.

### Using BGP Protocol of the LAN 01

```
router bgp 200
neighbor 194.20.20.6 remote-as 201
neighbor 20.20.20.4 remote-as 202
network 10.0.0.0 mask 255.0.0.0
exit
```

### Using BGP Protocol of the LAN 02

```
router bgp 201
neighbor 194.20.20.5 remote-as 200
neighbor 140.20.20.5 remote-as 202
network 160.20.0.0 mask 255.255.0.0
exit
```

### Using BGP Protocol of the LAN 03

```
router bgp 202
neighbor 20.20.20.3 remote-as 200
neighbor 140.20.20.6 remote-as 201
network 193.20.20.0 mask 255.255.255.0
exit
```

## 7 Ping Operation

Steps:-

- Open the command prompt on PC6
- Execute the command: `ping 10.20.20.4`
- Observe the ping results
- The ping command should display successful replies from PC1, indicating that ICMP packets have traversed the network from PC5 to PC1 and back without issues.

```

PC6

Physical  Config  Desktop  Programming  Attributes

Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.20.20.4

Pinging 10.20.20.4 with 32 bytes of data:

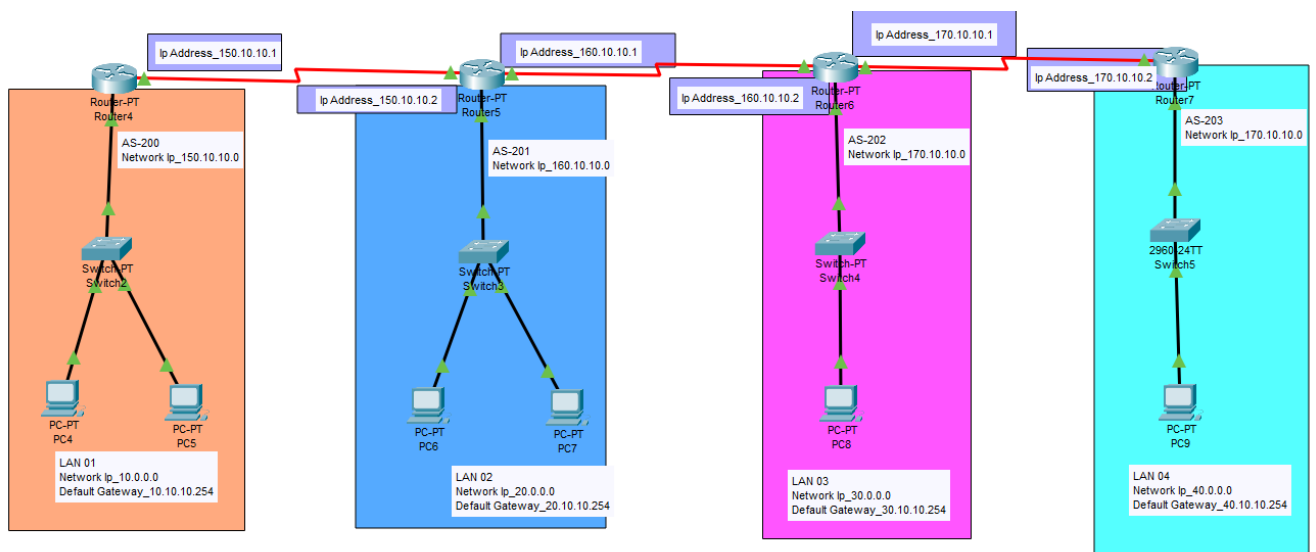
Reply from 10.20.20.4: bytes=32 time=23ms TTL=126
Reply from 10.20.20.4: bytes=32 time=9ms TTL=126
Reply from 10.20.20.4: bytes=32 time=21ms TTL=126
Reply from 10.20.20.4: bytes=32 time=22ms TTL=126

Ping statistics for 10.20.20.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 9ms, Maximum = 23ms, Average = 18ms

```

This output shows successful communication with the target host, indicating that the network is functioning correctly between the two points.

## 2 Design Implementation



### Configuration of the LAN 01 with FastEthernet (Fa)

```

interface fa0/0
ip address 10.10.10.254 255.0.0.0
no shut
do wr
exit

```

## Configuration of the LAN 01 with Serial (Se)

```
interface se2/0
ip address 150.10.10.1 255.255.0.0
clock rate 6400
no shut
do wr
exit
```

## Using BGP Protocol of the LAN 01

```
router bgp 200
neighbor 150.10.10.2 remote-as 201
network 10.0.0.0 mask 255.0.0.0
exit
```

## Configuration of the LAN 02 with FastEthernet (Fa)

```
interface fa0/0
ip address 20.10.10.254 255.0.0.0
no shut
do wr
exit
```

## Configuration of the LAN 02 with Serial (Se)

```
interface se2/0
ip address 160.10.10.1 255.255.0.0
clock rate 6400
no shut
do wr
exit
```

```
interface se2/0
ip address 160.10.10.1 255.255.0.0
clock rate 6400
no shut
do wr
exit
```

## Using BGP Protocol of the LAN 02

```
router bgp 201
neighbor 150.10.10.1 remote-as 200
neighbor 160.10.10.2 remote-as 202
network 20.0.0.0 mask 255.0.0.0
exit
```

## Configuration of the LAN 03 with FastEthernet (Fa)

```
interface fa0/0
ip address 30.10.10.254 255.0.0.0
no shut
do wr
exit
```

### Configuration of the LAN 03 with Serial (Se)

```
interface se2/0
ip address 160.10.10.2 255.255.0.0
no shut
do wr
exit

interface se3/0
ip address 170.10.10.1 255.255.0.0
no shut
do wr
exit
```

### Using BGP Protocol of the LAN 03

```
router bgp 202
neighbor 170.10.10.2 remote-as 203
neighbor 160.10.10.1 remote-as 201
network 30.0.0.0 mask 255.0.0.0
exit
```

### Configuration of the LAN 04 with FastEthernet (Fa)

```
interface fa0/0
ip address 40.10.10.254 255.0.0.0
no shut
do wr
exit
```

### Configuration of the LAN 04 with Serial (Se)

```
interface se3/0
ip address 170.10.10.2 255.255.0.0
no shut
do wr
exit
```

### Using BGP Protocol of the LAN 04

```
router bgp 203
neighbor 170.10.10.1 remote-as 202
network 40.0.0.0 mask 255.0.0.0
exit
```