

Campus Area Network Design

A campus area network (CAN) is a network of multiple interconnected local area networks (LAN) in a limited geographical area. A CAN is smaller than a wide area network (WAN) or metropolitan area network (MAN).

Tool used: Cisco Packet Tracer

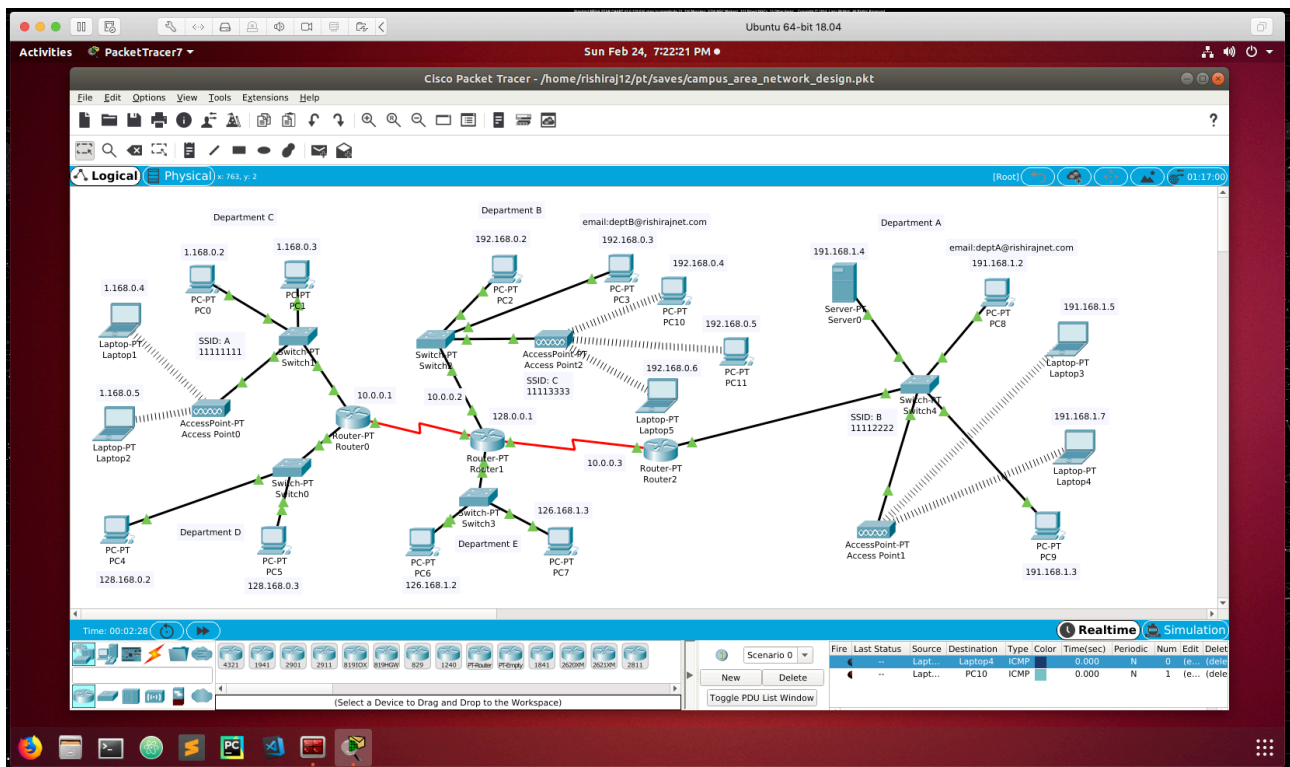
Steps:

1. Setting up network topology for various departments.
2. Packet transmission and reception check.

Setting up network topology for various departments:

Network Topology:

Setup the network topology as shown in the figure by dragging all the components from the components bar.



For each department setup at-least two PCs with one switch and one router and use automatically chosen connection type to connect the PCs with switches and routers. Laptops and wireless router can also be added.

Assign different IP for each PC and laptops with different IP range for Different departments.

PC0

Physical Config Desktop Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 1.168.0.2

Subnet Mask: 255.0.0.0

Default Gateway: 1.168.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::2D0:FFFF:FE5C:9C4A

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

Assign the PCs and laptops with IP and Default Gateway as shown in the figure above. The Subnet Mask gets assigned automatically once the IP is entered.

By clicking on router onfigure each router as follows:

- Assign IP Configuration with the Default Gateway of each department.
- The Subnet Mask is assigned automatically.
- In Serial 2/0 assign the IP address with 10.0.0.1 , the Subnet Mask is automatically assigned.

Router0

Physical Config CLI Attributes

FastEthernet0/0

Port Status: ☒ On

Bandwidth: ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address: 00D0.58AA.80D3

IP Configuration

IP Address: 1.168.0.1

Subnet Mask: 255.0.0.0

Tx Ring Limit: 10

Equivalent IOS Commands

```
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

☐ Top

Router0

Physical Config CLI Attributes

Serial2/0

Port Status: ☒ On

Duplex: ☒ Full Duplex

Clock Rate: 2000000

IP Configuration

IP Address: 10.0.0.1

Subnet Mask: 255.0.0.0

Tx Ring Limit: 10

Equivalent IOS Commands

```
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

☐ Top

By clicking on wireless access point configure each wireless access point as follows:

- Assign the SSID of each access point with random character (alphabet or numerical)
- Select the WPA-PSK and the assign the PSK Pass Phrase with 8-digit decimal value.

The screenshot shows the configuration window for 'Access Point0'. The 'Config' tab is active, displaying settings for 'Port 1'. The left sidebar has a tree view with 'GLOBAL' expanded, showing 'Settings' and 'INTERFACE'. Under 'INTERFACE', 'Port 1' is selected. The main configuration area includes: 'Port Status' (checked 'On'), 'SSID' (set to 'A'), '2.4 GHz Channel' (set to '6'), 'Coverage Range (meters)' (set to '140.00'), 'Authentication' (radio buttons for 'Disabled', 'WEP', and 'WPA-PSK', with 'WPA-PSK' selected), 'WEP Key' (empty field), 'PSK Pass Phrase' (set to '11111111'), 'User ID' (empty field), 'Password' (empty field), and 'Encryption Type' (set to 'AES'). A 'Top' button is at the bottom left.

A server can be added for DHCP routing.

The screenshot shows the configuration window for 'Server0'. The 'Config' tab is active, displaying settings for 'FastEthernet0'. The left sidebar has a tree view with 'GLOBAL' expanded, showing 'Settings', 'Algorithm Settings', and 'INTERFACE'. Under 'INTERFACE', 'FastEthernet0' is selected. The main configuration area includes: 'Port Status' (checked 'On'), 'Bandwidth' (radio buttons for '100 Mbps', '10 Mbps', and 'Auto', with 'Auto' selected), 'Duplex' (radio buttons for 'Half Duplex' and 'Full Duplex', with 'Full Duplex' selected), 'MAC Address' (set to '0060.5C86.5989'), 'IP Configuration' (radio buttons for 'DHCP' and 'Static', with 'Static' selected), 'IP Address' (set to '191.168.1.4'), 'Subnet Mask' (set to '255.255.0.0'), 'IPv6 Configuration' (radio buttons for 'DHCP', 'Auto Config', and 'Static', with 'Static' selected), 'IPv6 Address' (empty field), and 'Link Local Address' (set to 'FE80::260:5CFF:FE86:5989'). A 'Top' button is at the bottom left.

Configure the server as given in the image for DHCP routing.

The screenshot shows the configuration window for 'Server0'. The 'Services' tab is selected, and the 'DHCP' service is enabled. The configuration includes a pool named 'serverPool' on the 'FastEthernet0' interface, with a default gateway of 191.168.1.1 and a DNS server of 191.168.1.4. The IP range is 191.168.1.2 to 191.168.1.512 with a subnet mask of 255.255.0.0. The TFTP and WLC servers are set to 0.0.0.0.

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	191.168.1.1	191.168.1.4	191.168.1.2	255.255.0.0	512	0.0.0.0	0.0.0.0

For DHCP routing configure the PCs as given in the image below:

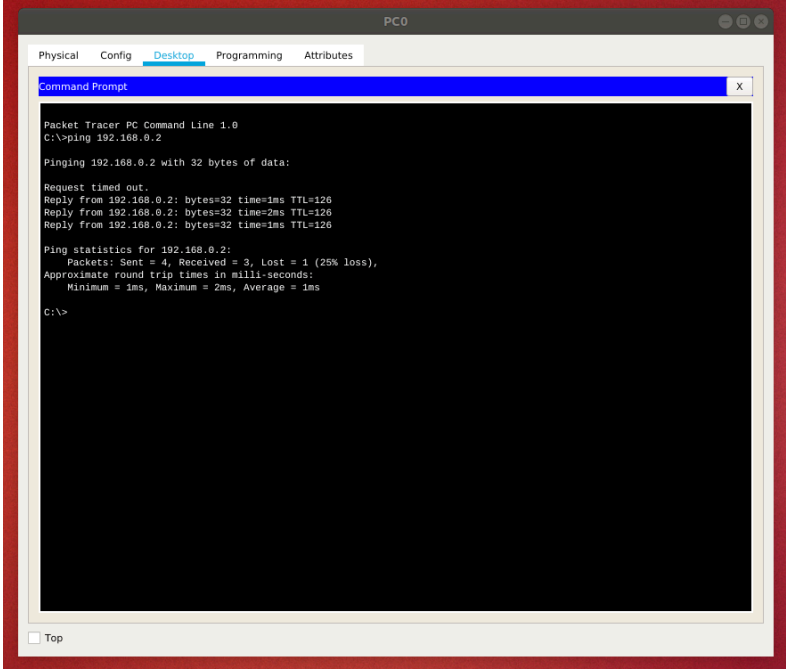
The screenshot shows the configuration window for 'PC8'. The 'Config' tab is selected, and the 'Global Settings' are configured. The 'Display Name' is 'PC8', and the 'Interfaces' are 'FastEthernet0'. The 'Gateway/DNS IPv4' settings are set to 'DHCP' with a gateway of 191.168.1.1 and a DNS server of 191.168.1.4. The 'Gateway/DNS IPv6' settings are set to 'Static'.

Packet Transmission And Reception Check:

Ping:

To check the connection conduct a ping test from on any random IP from the network topology. Click on any random PC, go to Desktop section in the navigation bar, select command Prompt and type the command to ping an IP.

Example: `ping 192.168.0.2`



```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.2
Pinging 192.168.0.2 with 32 bytes of data:
Request timed out.
Reply from 192.168.0.2: bytes=32 time=1ms TTL=126
Reply from 192.168.0.2: bytes=32 time=2ms TTL=126
Reply from 192.168.0.2: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms
C:\>
```

If there is a reply from the pinged IP then the connection is working properly.

Packet Transmission:

To simulate the packet transmission send a PDU (Protocol Data Unit) from one PC to PC or PC to Laptop or Laptop to Laptop. If the PDU is transferred successfully then a successful status is show at the bottom right. Run the simulation to watch the data transmission in action.

