



CSE 320 - Computer Networks

LAB Session 2

06.03.2024

Packet Tracer:

<https://www.packettracernetwork.com/download/download-packet-tracer.html>

<https://skillsforall.com/resources/lab-downloads?courseLang=en-US>

Packet Tracer Everywhere: <https://github.com/PTAnywhere/ptAnywhere-installation>

1. Learn about the Link Layer's operations, focusing on Ethernet switching, VLAN configuration, and inter-VLAN routing in a simulated network environment using Cisco Packet Tracer.

a. Step 1: Open Cisco Packet Tracer

Launch Cisco Packet Tracer on your computer. If you don't have it installed, you need to download and install it from Cisco Networking Academy's website.

b. Step 2: Place Devices

Add Switches:

- Go to the bottom left corner where the device types are listed.
- Select Switch and then choose a generic switch (e.g., 2960).
- Click on the workspace to place two switches.

Add PCs:

- Select End Devices from the device types.
- Choose a generic PC and click on the workspace to place four PCs.

c. Step 3: Create the Network

Wire the Devices:

- Click on the Connections type (represented by a lightning bolt or cable icon).
- Select an appropriate cable (Auto Connect is recommended for simplicity).

- Click on a PC, then click on a port (FastEthernet is common), and connect it to one of the switches. Repeat this step for each PC, distributing them between the two switches as you see fit.

d. Step 4: Configure PC IP Addresses

- Click on a PC to open its configuration window.
- Go to the Desktop tab, then click IP Configuration.
- Enter an IP address and subnet mask. For simplicity, use the following scheme:
 - PC0: IP Address: 192.168.1.2, Subnet Mask: 255.255.255.0
 - PC1: IP Address: 192.168.1.3, Subnet Mask: 255.255.255.0
 - PC2: IP Address: 192.168.1.4, Subnet Mask: 255.255.255.0
 - PC3: IP Address: 192.168.1.5, Subnet Mask: 255.255.255.0
- Make sure each device is in the same subnet (192.168.1.0/24 in this example) to ensure they can communicate.

e. Step 5: Testing Connectivity

- After configuring the IP addresses, test the network connectivity using the Ping command.
- Open the command prompt on a PC by clicking it, going to the Desktop tab, and selecting Command Prompt.
- Type ping [destination IP], for example, ping 192.168.1.3 from PC0 to test connectivity to PC1.
- If everything is configured correctly, you should see replies returning, indicating successful communication between the devices.

f. Step 6: Observing the Packet Flow (Optional)

- Use the Simulation Mode (the play and pause button at the bottom right) to observe how packets travel through the network.
- Choose Simple PDU, click on a source PC, then click on a destination PC to generate a packet.
- Press the Play button to see how the packet travels and is processed by each device.

g. Step 7: Save Your Work

Don't forget to save your Packet Tracer file by going to File > Save As, and give it a meaningful name.

2. Another Simple:

This will require configuring multiple VLANs on the switches, setting up a router to handle inter-VLAN routing, and ensuring PCs on different VLANs can communicate. This scenario is excellent for understanding VLANs, inter-VLAN routing, and basic router configurations.

Create a network with two VLANs, configure a router for inter-VLAN routing, and ensure PCs on different VLANs can communicate.

Equipment Used:

- 2 Switches (Cisco 2960)
- 1 Router (Cisco 2911)
- 4 PCs

a. Step 1: Design the Network

- Open Cisco Packet Tracer and start a new project.
- Place two switches and one router on the workspace.
- Add four PCs, connecting two to each switch.
- Switch1 connected to Router's GigabitEthernet0/0 interface.
- Switch2 connected to Router's GigabitEthernet0/1 interface.
- PCs connected to switches, distributed across VLANs 10 and 20.

b. Step 2: Configure VLANs on Switches

For both Switch1 and Switch2, you need to create VLANs and assign ports to them. The steps below show the configuration for Switch1. Repeat the process for Switch2.

```
Switch1> enable
Switch1# configure terminal
Switch1(config)# vlan 10
Switch1(config-vlan)# name Accounting
Switch1(config-vlan)# exit
Switch1(config)# vlan 20
Switch1(config-vlan)# name Sales
Switch1(config-vlan)# exit
Switch1(config)# interface FastEthernet0/1
Switch1(config-if)# switchport mode access
Switch1(config-if)# switchport access vlan 10
Switch1(config-if)# exit
Switch1(config)# interface FastEthernet0/2
Switch1(config-if)# switchport mode access
Switch1(config-if)# switchport access vlan 20
Switch1(config-if)# exit
```

c. Step 3: Configure the Router for Inter-VLAN Routing

You will use sub-interfaces for VLAN routing. Below is the configuration for the GigabitEthernet0/0 interface on the router.

```
Router> enable
```

```
Router# configure terminal
Router(config)# interface GigabitEthernet0/0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface GigabitEthernet0/0.10
Router(config-subif)# encapsulation dot1Q 10
Router(config-subif)# ip address 192.168.10.1 255.255.255.0
Router(config-subif)# exit
Router(config)# interface GigabitEthernet0/0.20
Router(config-subif)# encapsulation dot1Q 20
Router(config-subif)# ip address 192.168.20.1 255.255.255.0
Router(config-subif)# exit
```

d. Step 4: Configure PC IP Addresses

Configure each PC with an IP address, subnet mask, and default gateway according to their VLAN. Here is an example configuration for PC0 in VLAN 10:

IP Address: 192.168.10.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.10.1

e. Step 5: Test Connectivity

After configuring the PCs, switches, and router, test the connectivity. You should be able to ping between PCs in different VLANs. For example, from PC0 (in VLAN 10) you should be able to ping PC1 (in VLAN 20) by using their IP addresses

PC0> ping 192.168.20.2

f. Troubleshooting Tips

If ping between VLANs fails, double-check your VLAN configurations on the switches.

Ensure the router's sub-interface configurations are correct and that the encapsulation matches the VLAN IDs.

Verify the PC IP configurations, especially the default gateway settings.

Take Home:

Objective: Create a network with two VLANs, enable DHCP on a router to serve IP addresses to each VLAN, implement inter-VLAN routing, and secure the network using ACLs to restrict access between VLANs.

Equipment Needed:

2 Switches (e.g., Cisco 2960)

1 Router (e.g., Cisco 2911)

Multiple PCs (at least 2 per VLAN)

Connections (Ethernet cables)

Tasks:**Task 1: Create and Assign VLANs**

Configure two VLANs on each switch. For example, VLAN 10 (Finance) and VLAN 20 (HR).

Assign switch ports to each VLAN. Ensure that each PC is connected to its respective VLAN.

Task 2: Configure the Router for DHCP and Inter-VLAN Routing

Set up the router's sub-interfaces for each VLAN, ensuring the correct encapsulation configuration.

Enable DHCP on the router: Define DHCP pools for each VLAN.

Specify the network, default router, and DNS server for each pool.

Task 3: Implement Inter-VLAN Routing

Ensure the router is configured to route traffic between VLANs using the router-on-a-stick configuration you set up with sub-interfaces.

Task 4: Secure the Network with Access Control Lists (ACLs) (Optional)

Create an ACL that permits or denies specific traffic. For example, allow Finance VLAN to access resources in the HR VLAN but deny the opposite.

Apply the ACL to the appropriate router interface in the inbound or outbound direction.

Show your work with a screen recorder and upload the video to YouTube/Google Drive (it can be private, but make sure you give viewing access to the link created). Upload the “.txt” file showing the link to your video. You do not need to talk during the video.

Deadline: 20/03/2024 23:59