Lab 1: The lab Environment

Overview:

This lab manual aims to introduce you to the environment that you going to work on for this module. There are many network simulation environments which provide a range of services different in complexity. In this module, we will use Cisco Packet Tracer which can be installed on Windows, Linux, iOS and Android devices. Cisco Packet Tracer is a simulation and visualization software developed by Cisco Systems. It is designed to help students and networking professionals learn about and experiment with networking concepts in a virtual environment. Packet Tracer allows users to create network topologies, configure devices, simulate network behaviour, and troubleshoot networking issues without needing actual physical hardware.

Lab Objectives:

- Introduce and familiarize yourself with the lab environment.
- Create a simple network using Cisco Packet Tracer.
- Learn how to use existing topologies and build your own.

Cisco Packet Tracer:

Packet Tracer is a cross-platform visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks. The software allows users to simulate the configuration of Cisco routers and switches using a simulated command line interface. Packet Tracer is a powerful and dynamic tool that displays the various protocols used in networking, in either Real Time or Simulation mode. This includes layer 2 protocols such as Ethernet and PPP, layer 3 protocols such as IP, ICMP, and ARP, and layer 4 protocols such as TCP and UDP. Routing protocols can also be traced.

Installing Packet Tracer

Cisco Packet Tracer is free software that is generally available for download through the Cisco Networking Academy. If you're a student or a participant in a networking course, you might be able to download it from your course materials. So, we will go to the following link to download it. https://www.netacad.com/courses/packet-tracer

After opening this link, select "Getting Started with Cisco Packet Tracer". This will direct you to the course to enrol in to download and use Packet Tracer. When you click Get Started, you will be directed to a registration page (as shown in Figure 1) to register for Cisco Account or login if you have already registered before.

Remember, these credentials will be needed throughout the module to be able to use Packet Tracer.

Note: Cisco Packet Tracer is already installed on the lab machines and this guide is to allow you to install it on your personal computer for assessment and self-study work.

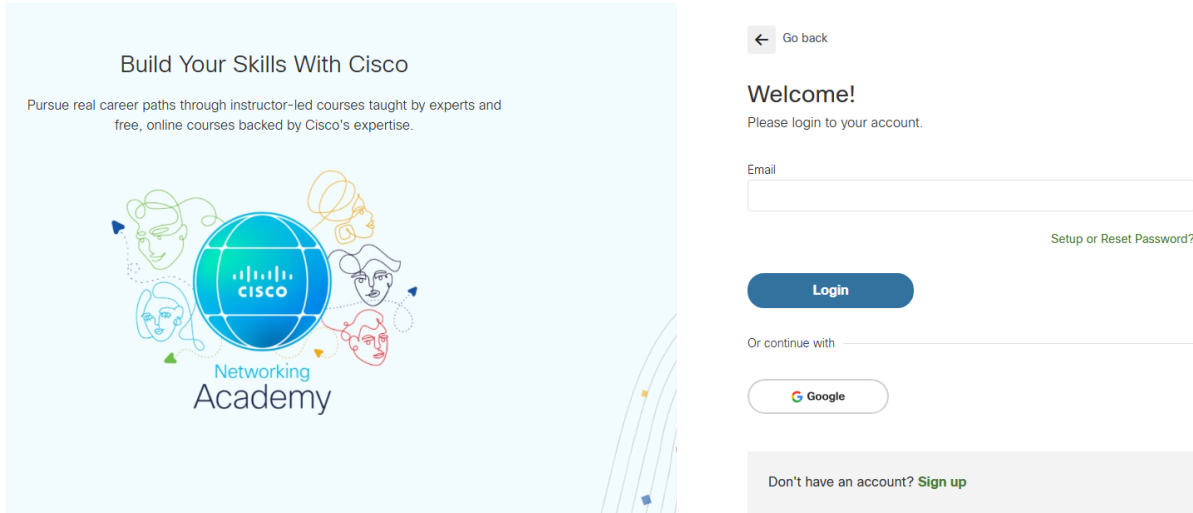After logging into this course, choose Download Cisco Packet Tracer or you can use this link https://skillsforall.com/resources/lab-downloads

Figure 1: Register for Cisco Account to be able to download or use Packet Tracer

This link will open a page that contains the Packet Tracer with various distribution that suits your system, as shown in Figure 2. Download the version that suits your system. There is also an installation instruction document if you want to get more information about installing the Packet Tracer on different Operating Systems.
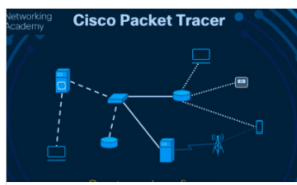

Figure 2: Packet Tracer for different Operating systems

After installing it, login using the account you have created to use the Packet Tracer.

Getting Started with Packet Tracer

It is time to familiarize yourself with the software and get to know the various functionality it can provide. Table 1 provides a summary of some of the functions that this software can provide. You are advised to go through the course of Cisco "**Getting Started with Cisco Packet Tracer**" to provide you with a good understanding of various elements of Cisco Packet Tracer.
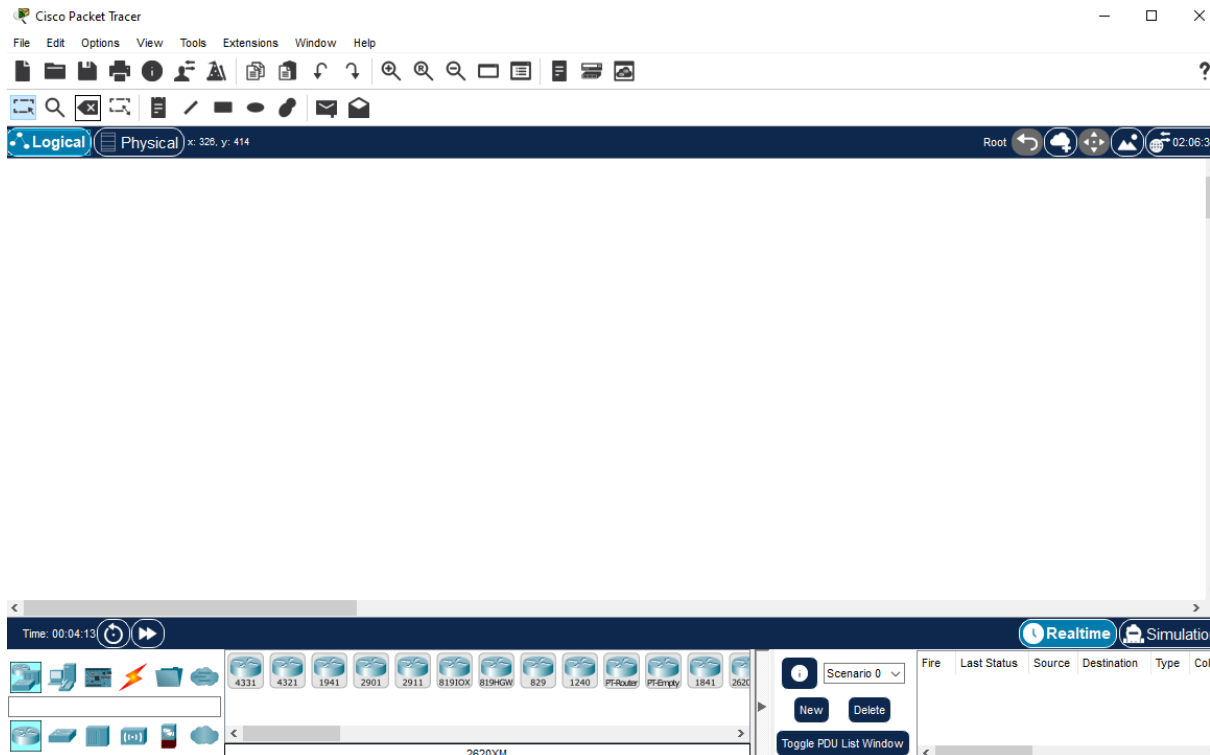
Figure 3: Packet Tracer Interface

Table 1: Some description of various bars and tools of the Cisco Packet Tracer

Menu Bar	This bar provides the **File**, **Edit**, **Options**, **View**, **Tools**, **Extensions**, and **Help** menus. You will find basic commands such as **Open**, **Save**, **Print**, and **Preferences** in these menus. You will also be able to access the **Activity Wizard** from the **Extensions** menu.
Main Tool Bar	This bar provides shortcut icons to the **File** and **Edit** menu commands. This bar also provides buttons for **Zoom**, the drawing **Palette**, and the **Device Template Manager**. On the right, you will also find the **Network Information** button, which you can use to enter a description for the current network (or any text you wish to include).
Common Tools Bar	This bar provides access to these commonly used workspace tools: **Select**, **Move Layout**, **Place Note**, **Delete**, **Inspect**, **Add Simple PDU**, and **Add Complex PDU**. See "Workspace Basics" for more information.
Logical/Physical Workspace and Navigation Bar	You can toggle between the Physical Workspace and the Logical Workspace with the tabs on this bar. In Logical Workspace, this bar also allows you to navigate through levels of a cluster, create a new **New Cluster**, **Move Object**, **Set Tiled Background**, and **Viewport**. In Physical Workspace, this bar allows you to navigate through physical locations, create a **New City**, create a **New Building**, create a **New Closet**, **Move Object**, apply **Grid** to the background, **Set Background**, and go to the **Working Closet**.
Workspace	This area is where you will create your network, watch simulations, and view many kinds of information and statistics.
Realtime/Simulation Bar	You can toggle between Realtime Mode and Simulation Mode with the tabs on this bar. This bar also provides buttons for **Power Cycle Devices** as well as the **Play Control** buttons and the **Event List** toggle button in Simulation Mode. Also, it contains a clock that displays the relative **Time** in Realtime Mode and Simulation Mode.
Network Component Box	This box is where you choose devices and connections to put into the workspace. It contains the **Device-Type Selection** Box and the **Device-Specific Selection** Box.

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Device-Type Selection Box	This box contains the type of devices and connections available in Packet Tracer 5.1. The **Device-Specific Selection** Box will change depending on which type of device you choose.
Device-Specific Selection Box	This box is where you choose specifically which devices you want to put in your network and which connections to make.
User-Created Packet Window*	This window manages the packets you put in the network during simulation scenarios. See the "Simulation Mode" section for more details.

Create a Simple Network

Part 1: Build a Simple Network

In this part, you will build a simple network by deploying and connecting the network devices in the Logical Workspace.

Step 1: Add network devices to the workspace.

In this step, you will add a PC, laptop, Wireless router, Internet cloud and cable modem to the Logical Workspace. A cable modem is a hardware device that allows communications with an Internet Service Provider (ISP). The coaxial cable from the ISP is connected to the cable modem, and an Ethernet cable from the local network is also connected. The cable modem converts the coaxial connection to an Ethernet connection.

Using the **Device-Type Selection** Box, add the following devices to the workspace. The category and sub-category associated with the device are listed below:

- **PC**: End Devices > End Devices > PC
- **Laptop**: End Devices > End Devices > Laptop
- **Cable Modem**: Network Devices > WAN Emulation > Cable Modem
- **Wireless Router**: Network Devices > Wireless Devices > Wireless Router
- **Internet cloud:** Network Devices > WAN Emulation > Cloud-PT

Step 2: Change the display names of the network devices.
a. To change the display names of the network devices, click the device icon in the Logical Workspace.
b. Click the **Config** tab in the device configuration window.
c. Enter the new name of the newly added device into the **Display Name** field: PC, Laptop, Wireless Router, Cloud, and Cable Modem.

Step 3: Add the physical cabling between devices on the workspace.

Using the **Device-Type Selection** Box, add the physical cabling between devices on the workspace.

a. The PC will need a copper straight-through cable to connect to the wireless router. Using the Device-Type Selection Box, click **Connections** (lightning bolt icon). Select the copper straight-through cable in the Device-Specific Selection Box and

attach it to the **FastEthernet0** interface of the PC and the **Ethernet 1** interface of the wireless router.

b. The wireless router will need a copper straight-through cable to connect to the cable modem. Select the copper straight-through cable in the Device-Specific Selection Box and attach it to the internet interface of the wireless router and the **Port 1** interface of the cable modem.

c. The cable modem will need a Coaxial cable to connect to the internet cloud. Select the Coaxial cable in the Device-Specific Selection Box and attach it to the **Port 0** interface of the cable modem and the **Coaxial 7** interface of the internet cloud. The connection should look like Figure 4.
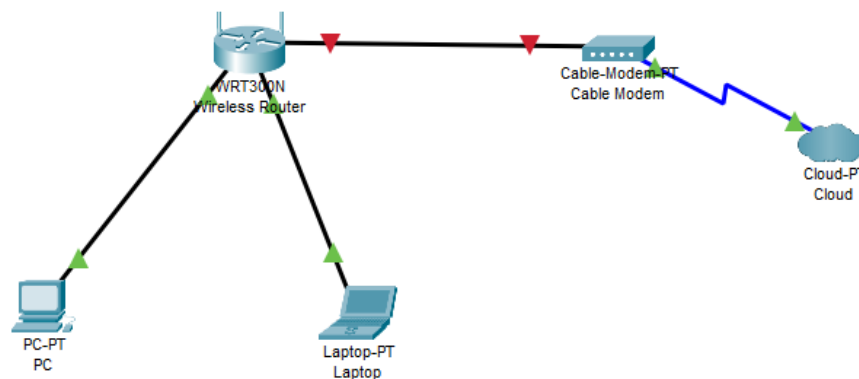

Figure 4: Connecting devices using appropriate cables.

Part 2: Configure the End Devices and Verify Connectivity

In this part, you will connect a PC and a laptop to the Wireless router. The PC will be connected to the network using an Ethernet cable. For the Laptop, you will replace the wired Ethernet network interface card (NIC) with a wireless NIC and connect the Laptop to the router wirelessly.

After both end devices are connected to the network, you will verify connectivity to cisco.srv. The PC and the Laptop will each be assigned an IP (Internet Protocol) address. Internet Protocol is a set of rules for routing and addressing data on the Internet. The IP addresses are used to identify the devices on a network and allow the devices to connect and transfer data on a network.

Step 1: Configure the PC.

You will configure the PC for the wired network in this step.

a. Click the **PC**. In the **Desktop** tab, navigate to **IP Configuration** to verify that DHCP is enabled, and the PC has received an IP address.

Select **DHCP** for the IP Configuration heading if you do not see an IP address for the IPv4 Address field. Observe the process as the PC is receiving an IP address from the DHCP server.

DHCP stands for dynamic host configuration protocol. This protocol assigns IP addresses to devices dynamically. In this simple network, the Wireless Router is configured to assign IP addresses to devices that request IP addresses. If DHCP

is disabled, you will need to assign an IP address and configure all the necessary information to communicate with other devices on the network and the internet.

    b. Close **IP Configuration**. In the **Desktop** tab, click **Command Prompt**.

    c. At the prompt, enter **ipconfig /all** to review the IPv4 addressing information from the DHCP server. The PC should have received an IPv4 address in the 192.168.0.x range.

        Note: There are two types of IP addresses: IPv4 and IPv6. An IPv4 (internet protocol version 4) address is a string of numbers in the form of x.x.x.x as you have been using in this lab. As the internet grew, the need for more IP addresses became necessary. So IPv6 (internet protocol version 6) was introduced in the late 1990s to address the limitations of IPv4. The details of IPv6 addressing are beyond the scope of this activity.

    d. Test connectivity to the wireless router (gateway) from the PC. From the command prompt, issue the command **ping** *IP address* **of Ethernet 1** of the wireless router. Investigate how you can find the Ip address of **Ethernet 1** of the wireless router?. It may take a few seconds for the ping to return. Four replies should be received.

Step 2: Configure the Laptop.

In this step, you will configure the laptop to access the wireless network.

    a. Click **Laptop**, and select the **Physical** tab.

    b. In the **Physical** tab, you will need to remove the Ethernet copper module and replace it with the Wireless WPC300N module.

        1) Power off the **Laptop** by clicking the power button on the side of the laptop.

        2) Remove the currently installed Ethernet copper module by clicking on the module on the side of the laptop and dragging it to the **MODULES** pane on the left of the laptop window.

        3) Install the wireless **WPC300N** module by clicking it in the **MODULES** pane and dragging it to the empty module port on the side of the laptop.

        4) Power on the **Laptop** by clicking the laptop power button again.

    c. With the wireless module installed, connect the laptop to the wireless network. Click the Desktop tab and select the PC Wireless.

    d. Select the **Connect** tab. After a slight delay, the wireless network **Default** (or whatever the name of the network is) will be visible in the list of wireless networks. Click **Refresh** if necessary to see the list of available networks. Select the **Default**. Click **Connect**.

    e. Close **PC Wireless**. Select **Command Prompt** in the Desktop tab. issue the command **ping** *IP address* **of Ethernet 1** of the wireless router.

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