Data and Digital Communications

Activity 1

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Packet Tracer - Network Representation

Objectives

The network model in this activity incorporates many of the technologies that you will master in your CCNA studies. It represents a simplified version of how a small to medium-sized business network might look. Feel free to explore the network on your own. When you are ready, proceed through the following steps and answer the questions.

Note: It is not important that you understand everything you see and do in this activity. Feel free to explore the network on your own. If you wish to proceed more systematically, follow the steps below. Answer the questions to the best of your ability.

Instructions

Step 1: Identify common components of a network as represented in Packet Tracer.

The icon toolbar at the bottom left-hand corner has various categories of networking components. You should see categories that correspond to intermediary devices, end devices, and media. The **Connections** category (with the lightning bolt icon) represents the networking media supported by Packet Tracer. There is also an **End Devices** category and two categories specific to Packet Tracer: **Custom Made Devices** and **Multiuser Connection**.

List the intermediary device categories.

1. Routers
2. Switchers
3. Hubs
4. Wireless Devices
5. Security
6. WAN Emulation

Without entering into the internet cloud or intranet cloud, how many icons in the topology represent endpoint devices (only one connection leading to them)?

<u>There are 17 endpoint devices.</u>

A. Home Office LAN	1. Home Desktop 2. Home Laptop 3. Tablet 4. Inkjet
B. Branch LAN	1. Branch Server 2. Laser 3. Smartphone 4. Guest 5. Accounting 6. Sales 7. PC5
C. Central LAN	1. Central Server 2. PC0 3. PC1 4. PC2 5. PC3 6. PC4

Without counting the two clouds, how many icons in the topology represent intermediary devices (multiple connections leading to them)?

<u>There are 12 intermediary devices</u>

A. Home Office LAN	1. WRS (Home Router in wireless device category) 2. Modem
B. Branch LAN	1. R4 (Router) 2. S4 (Switch) 3. Wireless AP (wireless device) 4. Switch0

C. Central LAN	1. R2 (Router)
	2. S3 (Switch)
	3. D2 (Switch)
	4. D1 (Switch)
	5. S1 (Switch)
	6. S2 (Switch)

How many end devices are **not** desktop computers?

<u>There are 8 endpoint devices that are not desktop.</u>

A. Home Office LAN	1. Home Laptop
	2. Tablet
	3. Inkjet
B. Branch LAN	1. Branch Server
	2. Laser
	3. Smartphone
	4. Guest
C. Central LAN	1. Central Server

How many different types of media connections are used in this network topology?

<u>There are 4 media connections</u>

<u>1. Ethernet (copper straight-through)</u>

<u>2. Serial links (WAN connections) (red lines)</u>

<u>3. Coaxial cable (blue line from modem)</u>

<u>4. Wireless (dotted lines to smartphone and guest laptop)</u>

Step 2: Explain the purpose of the devices.

a. In Packet Tracer, only the Server-PT device can act as a server. Desktop or Laptop PCs cannot act as a server. Based on your studies so far, explain the client-server model.
<u>In networking, the client-server model works by having clients, such as PCs, laptops, or smartphones, request resources or services like webpages, files, or print jobs. The server, such as the Server-PT device in Packet Tracer, is responsible for providing these services, which may include file sharing, web hosting, or DNS resolution. For example, in Packet Tracer, the PCs (clients) may request print services from a printer or web services from the BranchServer, demonstrating how clients depend on servers to access and use network resources.</u>

b. List at least two functions of intermediary devices.
   1. <u>Routers: Connect networks, forward data between LANs and WANs.</u>
   2. <u>Switches: Forward frames within a LAN, reduce network congestion.</u>
   3. <u>Access Point: Provides wireless access to mobile devices.</u>
   4. <u>Modem: Converts digital data to analog for transmission over ISP lines.</u>

c. List at least two criteria for choosing a network media type.
   - <u>Speed (bandwidth requirements)</u>
   - <u>Distance (how far the media must carry signals)</u>
   - <u>Cost (budget of company)</u>
   - <u>Environment (wireless needed vs. wired security/stability)</u>

Step 3: Compare and contrast LANs and WANs.

a. Explain the difference between a LAN and a WAN. Give examples of each.
<u>A LAN is a network infrastructure that spans a small geographical area. For instance, in the Packet Tracer network, inside the branch office or central office. On the other hand, WAN is a network infrastructure that spans a wide geographical area. For instance, in the Packet Tracer network, the red serial links between Central, Intranet, and Branch.</u>

b. In the Packet Tracer network, how many WANs do you see?
<u>There are two (2) WAN, the internet and intranet that connects the 3 LANs.</u>

c. How many LANs do you see?
<u>There are three (3) LANs--Central, Branch and Home Office.</u>

d. The internet in this Packet Tracer network is overly simplified and does not represent the structure and form of the real internet. Briefly describe the internet.
<u>Internet is a global network of computers and other electronic devices. So, it connects all components in the Packet Tracer network together. Simply, the internet is a global system of interconnected networks using TCP/IP. It allows worldwide communication and data exchange.</u>

e. What are some of the common ways a home user connects to the internet?
<u>They can connect their cable, satellite, dial-up, WI-FI, or DSL.</u>

f. What are some common methods that businesses use to connect to the internet in your area?

Challenge Question

Now that you have had an opportunity to explore the network represented in this Packet Tracer activity, you may have picked up a few skills that you would like to try out. Or maybe you would like the opportunity to explore this network in more detail. Realizing that most of what you see and experience in Packet Tracer is currently beyond your skill level, here are some challenges you might want to attempt. Do not worry if you cannot do them all. You will be a Packet Tracer master user and network designer soon enough.

- Add an end device to the topology and connect it to one of the LANs with a media connection. What else does this device need to send data to other end users? Can you provide the information? Is there a way to verify that you correctly connected the device?

  I added a PC named PC6 and connect it to Home Office LAN using a copper straight-through. After connecting, I configure it by giving an IP address, subnet mask, default gateway, DNS server so it can communicate, and clicked the "automatic". Afterwards, I used a terminal and prompt ping by testing its connectivity/ it responds.

- Add a new intermediary device to one of the networks and connect it to one of the LANs or WANs with a media connection. What else does this device need to serve as an intermediary to other devices in the network?

  In Branch LAN, I added a switch and connect it to another switch named S4 using a copper straight-through. Configuring by giving an IP address, subnet mask, default gateway, DNS server. Setting up like this is to expand the network and allow more devices to connect and communicate with other devices.

- Open a new instance of Packet Tracer. Create a new network with at least two LANs connected by a WAN. Connect all the devices. Investigate the original Packet Tracer activity to see what else you might need to do to make your new network functional. Record your thoughts and save your Packet Tracer file. You may want to revisit your network later after you have mastered a few more skills.

  ### I.   Setting up the Local Area Networks (LANs)

  First, I created two separate **Local Area Networks (LANs)**. Each LAN is a collection of devices that are all on the same subnet.

  - **LAN 1** has three PCs: PC0 (10.10.0.1), PC1 (10.10.0.2), and PC2 (10.10.0.3). These PCs are all connected to a **2960-24TT Switch** which I've labeled "Switch0". All devices on this LAN have IP addresses on the **10.10.0.0/24 network**, meaning they can communicate with each other directly through the switch.
  - **LAN 2** is a similar setup with three PCs: PC3 (20.20.0.1), PC4 (20.20.0.2), and PC5 (20.20.0.3). These are all connected to a different switch, "Switch1". The IP addresses for these devices are on the **20.20.0.0/24 network**, so they can communicate within their own LAN.
  - I configure each PCs in both LAN of its gateway and subnet. LAN 1 gateway is 10.10.0.4, whilst LAN 2 is 20.20.0.4. Their subnet is automatically filled out that is based on its IP addresses.

  ### II.   Connecting the LANs

I used a **2901 Routers**, which I've labeled "PH" and "Singapore", to connect LAN 1 and LAN 2.

- I configure its physical of the two routers. Put a copper straight-through.
- I put the gateway/IP address of router PH and router Singapore 10.10.0.4 and 20.20.0.4, respectively in the GigaEthernet.
- Connect the two routers using the serial media and add set up in the serial category.
- In RIP, I added networks: 221.10.0.0, 10.10.0.0, 20.20.0.0.
- To test, I prompt ping. Everything is all good and working.

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