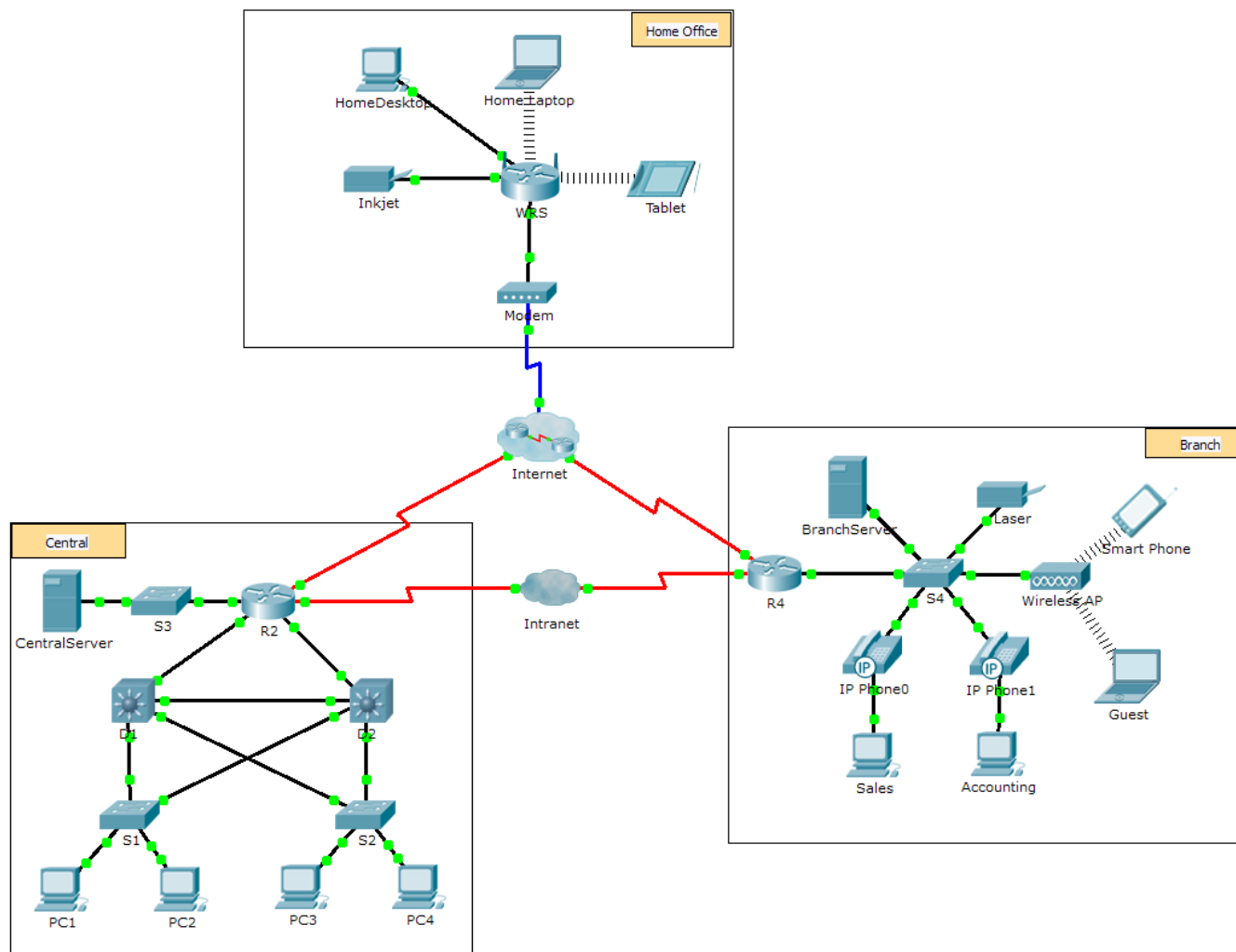# Packet Tracer – Network Representation

Topology

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.

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

a. 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**.

b. List the intermediary device categories.

   - WRS, Modem, R4, S4, Wireless AP, R2, S3, D1, D2, S1, S2;

   - Intermediary device include the following: Switches, wireless access points, routers, and firewalls;

   - Intermediary device examples include the following: Wireless Router, LAN Switch, Multilayer Switch, Firewall Appliance, Router, etc…;

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

   - ~15 icons; Home Desktop, Home Lap Top, Tablet, Inkjet, PC1-PC4, Smart Phone, Guest Lap Top, Accounting PC, Sales PC, Laser Printer, Branch Server and Central Server;

   - Other examples of end devices listed include: Servers, Desktop Computer, Laptop, Printer, IP Phone, Wireless Tablet, and TelePresence Endpoint;

d. Without counting the two clouds, how many icons in the topology represent intermediary devices (multiple connections leading to them)? ~ 11 icons; WRS, S1-S4, R2 & R4, D1-D2, Wireless AP, and Modem;

e. How many end devices are **not** desktop computers? ~ 8 end devices; Home Lap Top, Tablet, Inkjet, Smart Phone, Guest Lap Top, Laser Printer, Branch Server and Central Server;

f. How many different types of media connections are used in this network topology? ~ 4 media connections; Examples of media connections include: Wireless Media, LAN Media, and WAN Media.

2. Explain the purpose of the devices.

-End Devices: either the source or destination of a message transmitted over the network. To distinguish one end device from another, each end device on a network is identified by an address. When an end device initiates communication, it uses the address of the destination end device to specify where the message should be sent. Devices between the source and destination are responsible for choosing the best path and forwarding messages sent between end devices. Examples of end devices include: Desktop Computer, Laptop, Printer, IP Phone, Wireless Tablet, and TelePresence Endpoint.

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-End Devices (1.2.1.2)

-Intermediary devices: connect the individual end devices to the network and can connect multiple individual networks to form an internetwork; provide connectivity and ensure that date flows across the network; use the destination end device address, in conjunction with information about the network interconnections, to determine the path that messages should take through the network; Examples of intermediary devices include: Wireless Router, LAN Switch, Router, Multilayer Switch, Firewall Appliance.

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-Intermediary Network Devices (1.2.1.3)

-Network Media: interconnect devices, providing the pathway over which data can be transmitted. Different types of network media have different features and benefits. Not all network media have the same characteristics, nor are they all appropriate for the same purpose.

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-Network Media (1.2.1.4)

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.

The device requesting the information is called a client and the device responding to the request is called a server. Client and server processes are considered to be in the application layer. The client begins the exchange by requesting data from the server, which responds by sending one or more streams of data to the client. Application layer protocols describe the format of the requests and responses between clients and servers. In addition to the actual data transfer, this exchange may also require user authentication and the identification of a data file to be transferred.

One example of a client-server network is using an ISP's email service to send, receive, and store email.

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-Client-Server Model (10.1.2.1)

b. List at least two functions of intermediary devices.

-Intermediary network devices perform some or all of these functions:

-Regenerate and retransmit data signals

-Maintain information about what pathways exist through the network and internetwork

-Notify other devices of errors and communication failures

-Direct data along alternate pathways where there is a link failure

-Classify and direct messages according to priorities

-Permit or deny the flow of data, based on security settings

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-Intermediary Network Devices (1.2.1.3)

    c.   List at least two criteria for choosing a network media type.

-Criteria to consider when choosing network media includes the following:

-What is the maximum distance that the media can successfully carry a signal?

-Info what type of environment will the media be installed?

-What is the amount of data and the speed at which it must be transmitted?

-What is the cost of the media and installation?

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-Network Media (1.2.1.4)

3.   **Compare and contrast LANs and WANs.**

    a.   Explain the difference between a LAN and a WAN. Give examples of each.

Two of the most common types of networks infrastructures are LANS and WANS.

-Local Area Network (LAN) - A network infrastructure that provides access to users and end devices in a small geographical area, which is typically an enterprise, home, or small business network owned and managed by an individual or IT department.

-Specific features of LANS include:

-LANS interconnect end devices in a limited area such as a home, school, office building, or campus.

-A LAN is usually administered by a single organization or individual.

-LANS provide high-speed bandwidth to internal end devices and intermediary devices.

-Wide Area Network (WAN) - A network infrastructure that provides access to other networks over a wide geographical area, which is typically owned and managed by a telecommunications services provider.

-Specific features of WANS include:

-WANS interconnect LANs over wide geographical areas such as between cities, states, provinces, countries, or continents.

-WANS are usually administers by multiple services providers.

-WANS typically provide slower-speed linked between LANS.

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-LANs and WANs (1.2.2)

-Local Area Networks (1.2.2.2)

-Wide Area Networks (1.2.2.3)

    b.   In the Packet Tracer network, how many WANs do you see?

~ 2; Internet and Intranet; Modem —> Internet; Internet —> R4; R4 —> Intranet; Intranet —> R2; R2 —> Internet;

    c.   How many LANs do you see?

~3; (HomeDesktop —> WRS; Inkjet —> WRS; WRS —> Modem;) (CentralServer —> S3; S3 —> R2; R2 —> D1; R2 —> D2; D1 —> S1; D1 —> S2; D1 —> D2; D2 —> S2; D2 —> S1; S1 —> PC1; S1 —> PC2; S2 —> PC3; S2 —> PC4;) (R4 —> S4; BranchServer —> S4; Laser —> S4; Wireless —> S4; IP Phone1 —> S4; Accounting —> IP Phone1; IP Phone0 —> S4; Sales —> IP Phone0);

    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.

-The Internet is a network of networks that connects hundreds of millions of computers world-wide.

-Most individuals need to communicate with a resource on another network outside of the local network within the home, campus, or organization. This is done using the Internet.

-The Internet is a worldwide collection of interconnected networks (internetwork or internet for short).

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-Networks of Many Sizes (1.1.2.1)

-The Internet, Intranets, and Extranets (1.2.3)

-The Internet (1.2.3.1)

e. What are some of the common ways a home user connects to the Internet?

-Cable - Typically offered by cable television service providers, the Internet data signal is carried on the same cable that delivers cable television. It provides a high bandwidth, always on, connection to the Internet.

-DSL - Digital Subscriber Lines provide a high bandwidth, always on, connection to the Internet. DSL runs over a telephone line. In general, small office, and home office users connect using Asymmetrical DSL (ADSL), which means that the download speed is faster than the upload speed.

-Cellular - Cellular Internet access uses a cell phone network to connect. Wherever you can get a cellular signal, you can get cellular Internet access. Performance will be limited by the capabilities of the phone and the cell tower to which it is connected.

-Satellite - The availability of satellite Internet access is a real benefit in those areas that would otherwise have no Internet connectivity at all. Satellite dishes require a clear line of sight to the satellite.

-Dial-up Telephone - An inexpensive option that uses any phone line and a modem. The low bandwidth provided by a dial-up modem connection is usually not sufficient for large data transfer, although it is useful for mobile access while traveling.

The choice of connection varies depending on geographical location and service provider availability.

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-Home and Small Office Internet Connections (1.2.4.2)

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

-Dedicated Leased Line - Leased lines are actually reserved circuits within the service provider's network that connect geographically separated offices for private voice and/or data networking. The circuits are typically rented at a monthly or yearly rate. They can be expensive.

-Ethernet WAN - Ethernet WANS extend LAN access technology into the WAN. Ethernet is a LAN technology. The benefits of Ethernet are now being extended into the WAN.

-DSL - Business DSL is available in various formats. A popular choice is Symmetric Digital Subscriber Lines (SDSL), which is similar to the consumer version of DSL but provides uploads and downloads at the same speeds.

-Satellite - Similar to small office and home office users, satellite service can provide a connection when a wired solution is not available.

The choice of connection varies depending on geographical location and service provider availability.

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-Businesses Internet Connections (1.2.4.3)

Challenge

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?
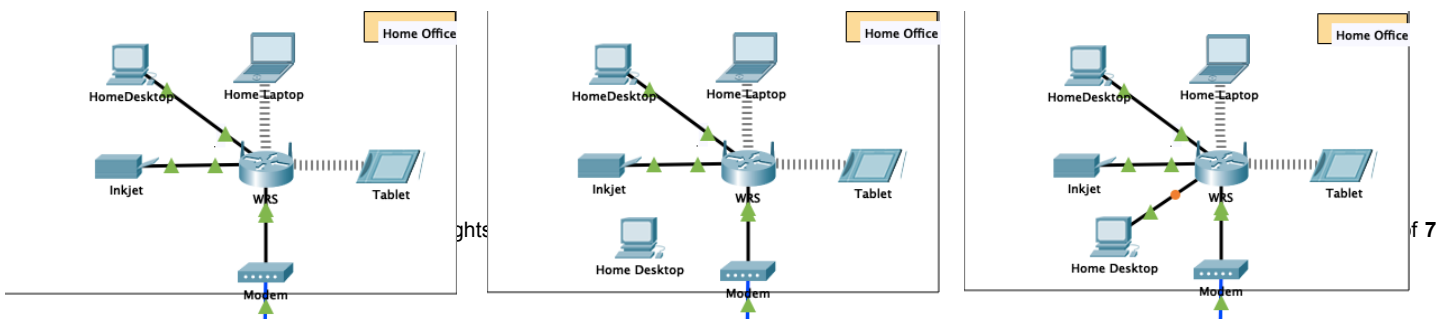
-End Device: Home Desktop;

-Connect to LANS: Home Office —> Home Desktop —> WRS;

-Media connection: LANS;

-End Devices include: Desktop Computer, Laptop, Printer, IP Phone, Wireless Tablet, TelePresence Endpoint, etc…;

-Intermediary Network Devices connect the individual end devices to the network and can connect multiple individual networks to form an internetwork. These intermediary devices provide connectivity and ensure that data flows across the network. Intermediary devices use the destination end device address, in conjunction with information about the network interconnections, to determine the path that messages should take through the network.

-End devices communicate across the internetwork.

-Intermediary network devices perform some or all of these functions:
    -Regenerate and retransmit data signals;
    -Maintain information about what pathways exist through the network and internetwork;
    -Notify other devices of errors and communication failures;
    -Direct data along alternate pathways where there is a link failure;
    -Classify and direct messages according to priorities;
   -Permit or deny the flow of data, based on security settings

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-Intermediary Network Devices (1.2.1.3)

-Communication across a network is carried on a medium. The medium provides the channel over which the message travels from source to destination. Modern networks primarily use three types of media to interconnect devices and to provide the pathway over which data can be transmitted.

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-Network Media (1.2.1.4)
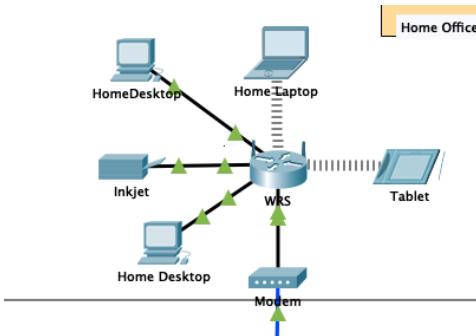
- Add a new intermediary device to one of the networks and connect it to one of the LANs or WANs with a media connection. What else does this device need to serve as an intermediary to other devices in the network?
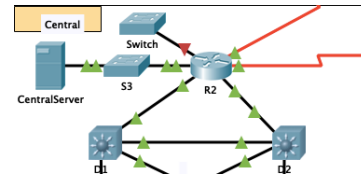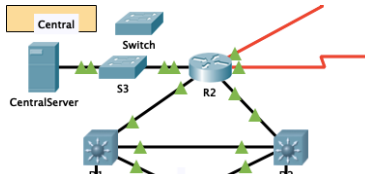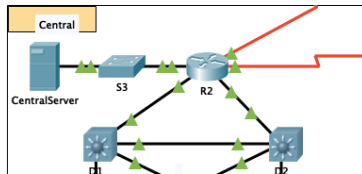
-Intermediary Device: Switch;

-Connect to LANS or WANS: Central —> Switch —> Router —>;

-Media connection: LANS;

-Needs end device and media;

-Intermediary Devices include: Wireless Router, LAN Switch, Router, Multilayer Switch, Firewall Appliance, etc…;

-Network Interface Card: A NIC, or LAN adapter, provides the physical connection to the network at the PC or other end device. The media that are connecting the PC to the networking device plug directly into the NIC.

-Physical Port: A connector or outlet on a networking device where the media is connected to an end device or another networking device.

-Interface: Specialized ports on a networking device that connect to individual networks. Because routers are used to interconnect networks, the ports on a router are referred to as network interfaces.

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-Network Representations (1.2.1.5)

- 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.
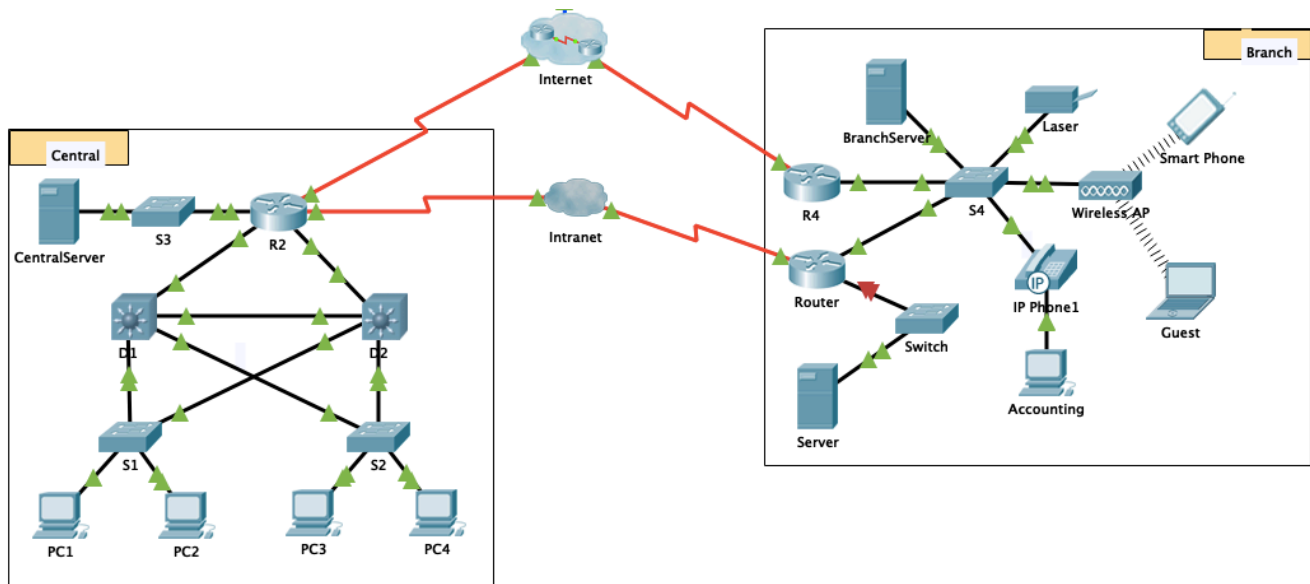
Suggested Scoring Rubric

Question Location	Possible Points	Earned Points
Step 1b	5	
Step 1c	5	
Step 1d	5	
Step 1e	5	
Step 1f	5	
Step 2a	5	
Step 2b	5	
Step 2c	5	
Step 3a	5	
Step 3b	5	
Step 3c	5	
Step 3d	5	
Step 3e	5	
Step 3f	5	
Total Score	**70**	