NETWORKING ESSENTIALS WORKBOOK 1

Name: Lidia Pascu
Course Date: 17/06/2025
Programme:

Contents

COMMUNICATIONS IN A CONNECTED WORLD

Task 1a:

Define the following network terminologies

Terminology	Definition
Internet	A global network of interconnected computers and devices that communicate using standardised protocols (like TCP/IP) to share information and services.
Local Network	A Local Area Network (LAN) is a network that connects computers and devices within a limited area, such as a home, school, or office building.
Wide Area Networks	WANs (wide area networks) are large networks that connect devices over long distances, often spanning cities, countries, or even continents (e.g., the internet).
Connected Home Devices	These Internet-connected gadgets, also known as smart home devices, include smart thermostats, lights, cameras, and appliances, and can be controlled remotely or programmed to automate tasks.

Task 1b:

Match the following categories to their definition from below

Volunteered data	• This is created and explicitly shared by individuals, such as social network profiles. This type of data might include video files, pictures, text or audio files.
Observed data	• This is captured by recording the actions of individuals, such as location data when using cell phones.
Inferred data	• This is data such as a credit score, which is based on analysis of volunteered or observed data.

Task 1c:

There are 3 types of data transmission signals. List them in the table below and provide a brief description of each.

Type #	Data Type	Definition
1	**Electrical transmission**	**Electrical transmission** refers to the transfer of data using **electrical signals** through physical media such as **wires or cables**. (ex.,copper wires)
2	**Optical transmission**	**Optical transmission** is the process of sending data using **light signals** through **fiber-optic cables**. Instead of using electrical signals (like in copper cables), it uses **pulses of light**, typically generated by **lasers or LEDs**.
3	**Wireless transmission**	**Wireless transmission** is the transfer of data between devices **without physical cables**, using **electromagnetic waves** such as **radio, infrared, or microwave signals**.

Task 1d:

Complete the table below by filling in the blanks.

Unit of Bandwidth	Abbreviation	Equivalence
Bits per second	**bps**	**1 bps = fundamental unit of bandwidth**
Kilobyte: Thousands of bits per second	**kbps**	**1 kbps = 1,000 bps = 10^3 bps**
Megabyte: Millions of bits per second	**Mbps**	**1 Mbps = 1,000,000 bps = 10^6 bps**
Gigabyte: Billions of bits per second	**Gbps**	**1 Gbps = 1,000,000,000 bps = 10^9 bps**
Terabyte: Trillions of bits per second	**Tbps**	**1 Tbps = 1,000,000,000,000 bps = 10^{12} bps**

Task 1f:

Take a close look at the network you have at home or school. Record the network and end-user devices that are connected on the local network.

Example

Manufacturer	Device	Location	Connection	Media
Apple	iPhone	Mobile	Wireless	WiFi & cell phone
Samsung	Galaxy Smart Phone	Mobile	Wireless	WiFi & cell phone
Cisco	Cable Modem	Home office	Wired	Cable TV coaxial cable and Ethernet cable.
Linksys	Wireless Router	Home office	Wired	Ethernet cable.

Your Local Network

Manufacturer	Device	Location	Connection	Media
LG	Smart TV	Home	Wireless & Wired	WiFi & Ethernet cable
Xbox	Console	Home	Wireless	WiFi
Alexa	EchoDot Speaker	Home	Wireless	WiFi
Sonos One	Smart Speaker	Home	Wireless & Wired	WiFi & Ethernet cable
Dell	PC	Home office	Wireless	WiFi
Vodafone	Wireless Router	Home	Wired	Ethernet cable
HP	Printer	Home office	Wireless	WiFi
Tapo	Smart Bulb light	Home	Wireless	WiFi

Reflection

1. Are there other electronic devices that are not connected to the local network to share information or resources? What would be the benefit of having these devices online?

Yes, there may be other electronic devices that are not connected to the local network, such as standalone DVD/Blu-ray players, digital cameras and non-smart appliances like microwaves and washing machines. If supported, the benefit of connecting these devices to the network would be:
- Remote control and monitoring (e.g. starting a washing cycle via a smartphone).
- Software updates to improve performance or fix bugs
- Data sharing or backups, such as transferring photos from a camera directly to a computer or the cloud.
- Enhanced functionality, such as voice control or integration with smart home systems.

2. Which type of connectivity is used most frequently in your local network, wired or wireless?

Wireless connectivity is the most frequently used option. Most of the listed devices, such as the smart TV, Xbox, Alexa, Smart speaker, and PC, are connected wirelessly via Wi-Fi. Only the router and, optionally, the smart TV and the Smart speaker are connected via wired Ethernet, which is less common due to the convenience and flexibility of Wi-Fi.

ONLINE CONNECTIONS

Task 2b:

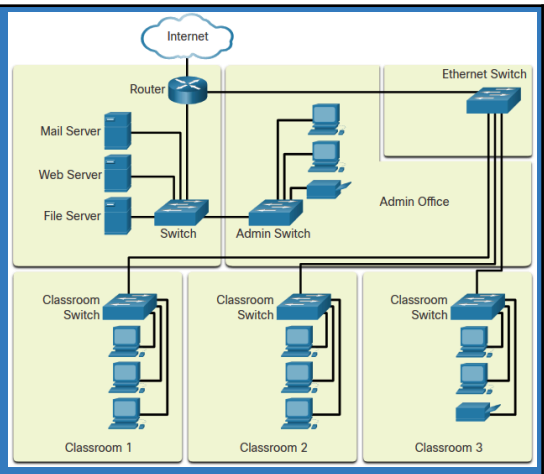
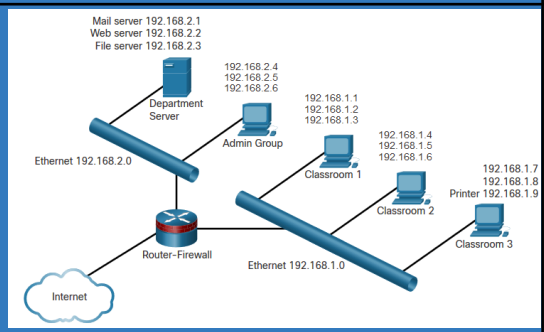
In your own words, describe the following LAN components:

LAN COMPONENT	DESCRIPTION
Hosts	Hosts send and receive user traffic. A host is a generic name for most end-user devices. A host has an IP address. Think of computers, laptops, smartphones, printers, or tablets that connect to the LAN to send and receive data.
Peripherals	Shared peripheral devices do not connect directly on the network. Instead, peripherals rely on their connected host to perform all network operation. Ex. of shared peripherals are cameras, scanners, and locally attached printers.
Network Devices	Networking devices connect other devices, mainly hosts. These devices move and control network traffic. Ex. of network devices include hubs, switches, and routers.
Network Media	Network media provides connections between hosts and network devices. Network media can be wired, such as copper and fiber optic, or use wireless technologies.

Task 2c:

Using images below, state their documentation name:

Image	Topology

	Physical Topology
	Logical Topology

Task 2d:

The command ipconfig

The **ipconfig** command provides you with the IP address, subnet mask and default gateway.

a. Open a **Command Prompt**. Click **Start**. Search for **Command Prompt**.

b. At the prompt, enter **ipconfig** to determine the IP address assigned to each network adapter on your computer.

```
C:\Users\Student> ipconfig

Ethernet adapter Ethernet0:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::ac29:44a8:6409:c30e%6
   IPv4 Address. . . . . . . . . . . : 192.168.1.11
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.1.1
```

Questions:

What is the IPv4 address of the computer?

192.168.1.15

What is the subnet mask of the computer?

255.255.255.0

What is the default gateway of the computer?

192.168.1.1

The command ipconfig /all

c. At the prompt, enter **ipconfig /all** command to view IP configuration on PC-A.

```
C:\Users\Student> ipconfig /all

Ethernet adapter Ethernet0:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) 82574L Gigabit Network Connection
   Physical Address. . . . . . . . . : 00-50-56-B3-E8-C1
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::ac29:44a8:6409:c30e%6(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.1.11(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : Sunday, July 24, 2016 9:33:49 AM
   Lease Expires . . . . . . . . . . : Monday, July 25, 2016 10:33:17 AM
   Default Gateway . . . . . . . . . : 192.168.1.1
   DHCP Server . . . . . . . . . . . : 192.168.1.1
   DHCPv6 IAID . . . . . . . . . . . : 50334761
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-25-84-55-DE-00-50-56-B3-E8-C1
   DNS Servers . . . . . . . . . . . : 8.8.8.8
                                       8.8.4.4
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

Questions:

What are the DNS servers for the computer?

2a0a:ef40:109f:4001:fc1d:bf48:7d84:d2

192.168.1.1

What is the MAC address (physical address) of the network adapter?

8A-88-4B-20-2C-48

Is DHCP enabled? If yes, what is the IP address of the DHCP server?

192.168.1.1

If DHCP is enabled, on what date was the Lease Obtained? On what date does the Lease Expire?

Lease Obtained: 13 June 2025

Lease Expires: 25 July 2161

Test the Network Interface TCP/IP Stack.

Test TCP/IP stack using the loopback address.

To verify that the TCP/IP protocol is functioning, pinging your loopback address (127.0.0.1). Enter the **ping 127.0.0.1** command at the prompt.

```
C:\Users\Student> ping 127.0.0.1
```

Test TCP/IP stack using the configured IP address.

You can also ping your IP address. In this example, enter the **ping 192.168.1.11** command at the prompt.

Question:

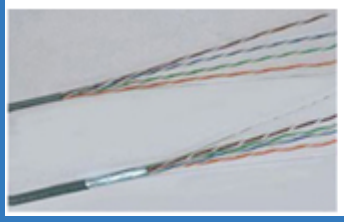
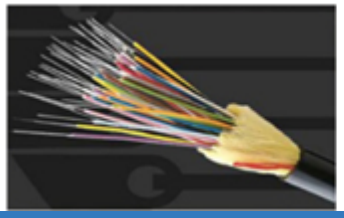
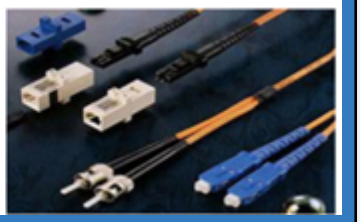
Record one of the replies from your ping command. If the ping was not successful, ask your instructor for assistance.

Reply from 127.0.0.1: bytes=32 time<1ms TTL=128

BULD A SIMPLE NETWORK

Task 3a:

Use images below to specify what type of media they are.

Media	Type
 	Twisted pair and Coaxial cables (Metal wires within cables)
 	Fibre-optic cables (Glass or plastic fibres within cables)
 	Wireless transmission (through electromagnetic waves)

Task 3b:

State the characteristics of the following Twisted-Pair cable are:

Cable		Characteristics
STP	1	They are immune to EMI (Electromagnetic Interference) and RFI (Radio Frequency Interference) interference
	2	They are expensive, not as flexible, and have additional requirements because of the shielding.
UTP	1	More affordable and easier to install than STP. Used to connect workstations, hosts and network devices.

	2	Consists of 4 pairs of twisted cables. Each pair is identified by a specific color code. Less protection against EMI/RFI but sufficient for most standard environments.

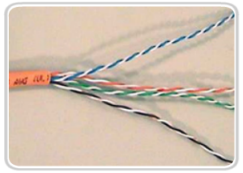
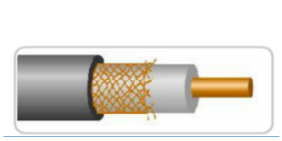
Task 3c:

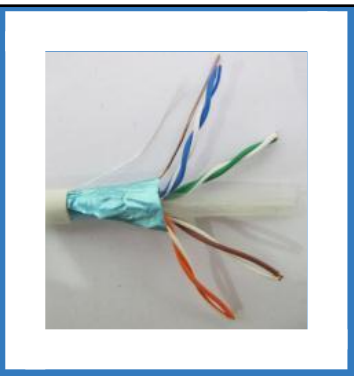
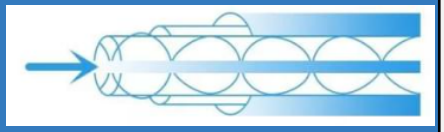
Complete the below table by entering the missing category and speed.

Category	Speed
Cat 3 UTP	10 Mbps at 16 MHz
Cat 5 UTP	100Mbps at 100MHz
Cat 5e UTP	1000 Mbps at 100 MHz
Cat 6 UTP	1000 Mbps at 250 MHz
Cat 6a UTP	1000 Mbps at 500 MHz
Cat 7 ScTP	10 Gbps at 600 MHz

Tak 3d:

Using the images in the table below, state the media type the image represents and then provide a short description of the media.

Media	Type	Description
	UTP	Consists of 4 pairs of twisted cables. Each pair is identified by a specific color code. Used to connect workstations, hosts and network devices.
	Coaxial	It is a type of electrical cable used in networking and communication systems to transmit data, video, and voice signals.

	**STP**	STP stands for Shielded Twisted Pair. These cables are a type of network cable used to reduce interference and ensure cleaner data transmission. Industrial or **high-interference environments.** Secure network installations. Some types of Ethernet connections (e.g., Cat 6a STP)
	**SMF**	SMF stands for Single-Mode Fiber, a type of fiber-optic cable used in high-speed, long-distance network communication. A fiber-optic cable that uses a single light path (or mode) to transmit data. The core is very thin (about 8–10 micrometers in diameter). Light travels in a straight path, reducing reflection and loss.
	**MMF**	MMF stands for Multimode Fiber, a type of fiber-optic cable used in short to medium-distance high-speed data communication. A fiber-optic cable with a larger core (typically 50–62.5 micrometers in diameter). Supports multiple light paths (modes) traveling through the core at the same time. Typically uses LED light sources.

Task 3e:

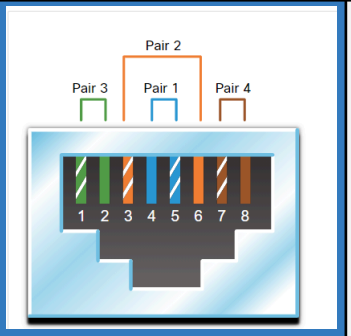
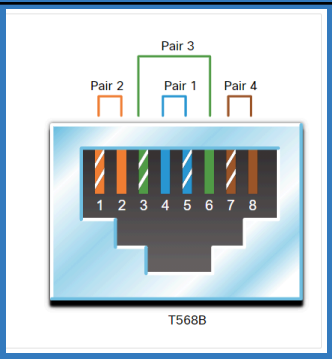
Match the following cable parts to their description from the below list.

Cable Part	Description
Jacket	• Typically, a PVC jacket that protects the fiber against abrasion, moisture, and other contaminants.
Strengthening Material	• Surrounds the buffer, prevents the fiber cable from being stretched when it is being pulled
Buffer	• Used to help shield the core and cladding from damage.

Cladding	• Made from slightly different chemicals than those used to create the core. It tends to act like a mirror.
Core	• The light transmission element at the center of the optical fiber. Light pulses travel through the fiber core.

Task 3f

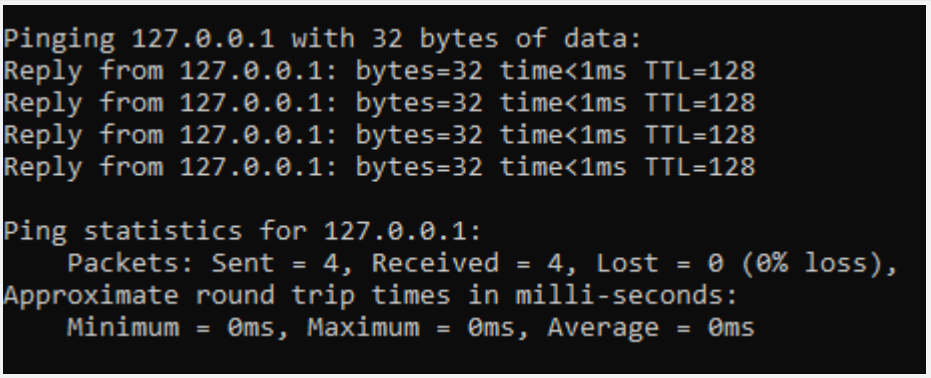
Fill in the table below by providing the name of the standard and the cable being used between two PCs.

Image	Standard	Image	Cable Used
	T568A		Crossover Cable To connect to a similar device PC - PC
	T568B		

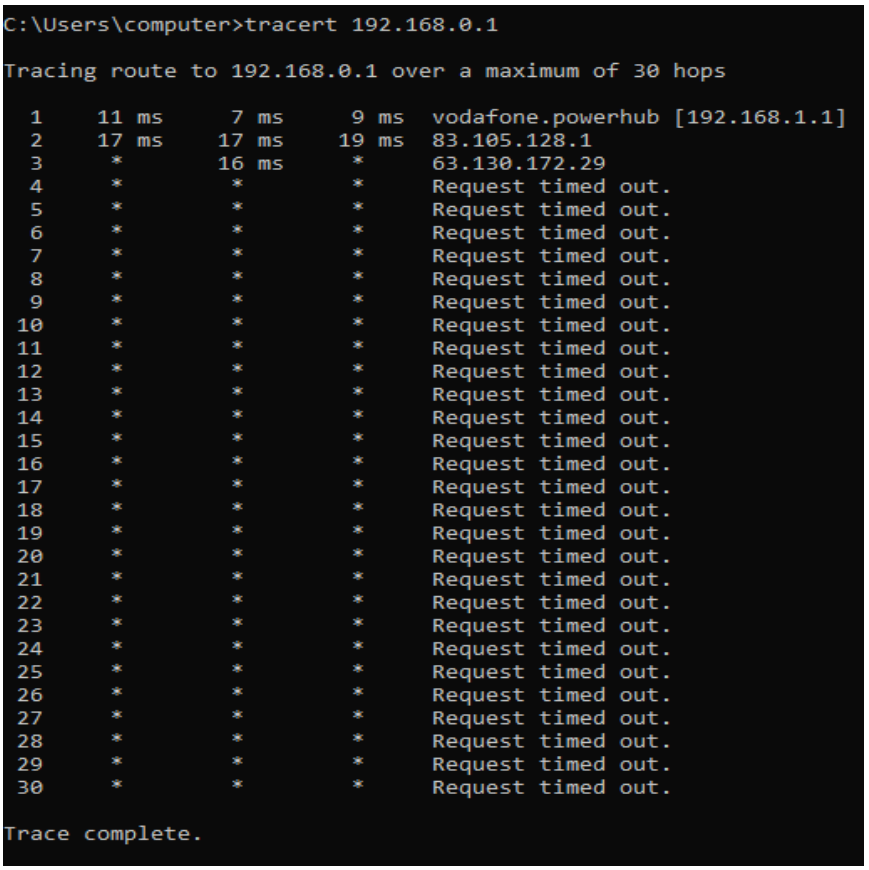
Task 3g:

Using Command Prompt on your computer, provide evidence that you can use PING and Traceroute commands.

Command	Screenshot

Ping	
Traceroute	

Does this happen when you traceroute the IP address 192.168.1.0? Just curious.



COMMUNICATIONS PRINCIPLES

Task 4a:

From the sentences relating to communications principles below, identify the missing words:

All communication methods have three elements in common: 1. The first of these elements is the **message source**, or sender. Message sources are people, or electronic devices, that need to communicate a message to other individuals or devices. 2. The second element of communication is the destination, or **receiver**, of the message. The destination receives the message and interprets it. 3. The third element is called **medium,** or channel. It provides the pathway over which the message can travel from source to destination.		
Missing Words		
Missing word 1: message source	Missing word 2: receiver	Missing words 3: medium

Task 4b:

Read the statement for why protocols matter and insert its correct characteristic from the list below.

Message format	Message size	timing	encoding	encapsulation	Message pattern

Protocol Characteristic	Description
Encoding	Messages sent across the network are first converted into bits by the sending host. Each bit is encoded into a pattern of sounds, light waves, or electrical impulses. The destination host receives and decodes the signals in order to interpret the message.
Message Size	The rules that govern the size of the pieces communicated across the network are very strict and can be different, depending on the channel used. It may be necessary to break a longer message into smaller pieces in order to ensure that the message can be delivered reliably.

Encapsulation	Each message transmitted on a network must include a header that contains addressing information that identifies the source and destination hosts. Encapsulation is the process of adding this information to the pieces of data that make up the message.
Message Pattern	Some messages require an acknowledgment before the next message can be sent. This type of request/response pattern is a common aspect of many networking protocols.
Message format	When a message is sent, it must use a specific format or structure. Message formats depend on the type of message and the channel that is used to deliver the message.
Timing	Many network communication functions are dependent on timing. Timing determines the speed at which the bits are transmitted across the network. It also affects when an individual host can send data and the total amount of data that can be sent in any one transmission.

Task 4c:

Complete the OSI model by identifying the layer number and the layer name based on the given description below.

Description	Layer Number	Layer Name
This layer contains protocols used for process-to-process communications. End users will interact with various protocols at this layer.	7	Application
This layer describes the mechanical, electrical, functional, and procedural means to activate, maintain, and de-activate physical connections for a bit transmission to and from a network device.	1	Physical
This layer describes methods for exchanging data frames between devices over a common media. MAC addresses reside at this layer.	2	Data Link
This layer establishes, maintains, and terminates connections between applications across the network.	5	Session
This layer provides IPv4 and IPv6 addressing, allowing for exchange of individual pieces of data over the network.	3	Network
This layer defines services to segment, transfer, and reassemble the data for individual communications between the end devices.	4	Transport

Protocols such as TCP and UDP will be used at this layer.		
Provides for common representation of the data transferred between application layer services.	2	

Task 4d

Complete the missing words for the TCP/IP Model

OSI Mode	TCP/IP Model
Application	Application
Presentation	
Session	
Transport	Transport
Network	Internet
Data Link	Network Access
Physical	

NETWORK DESIGN AND THE ACCESS LAYER

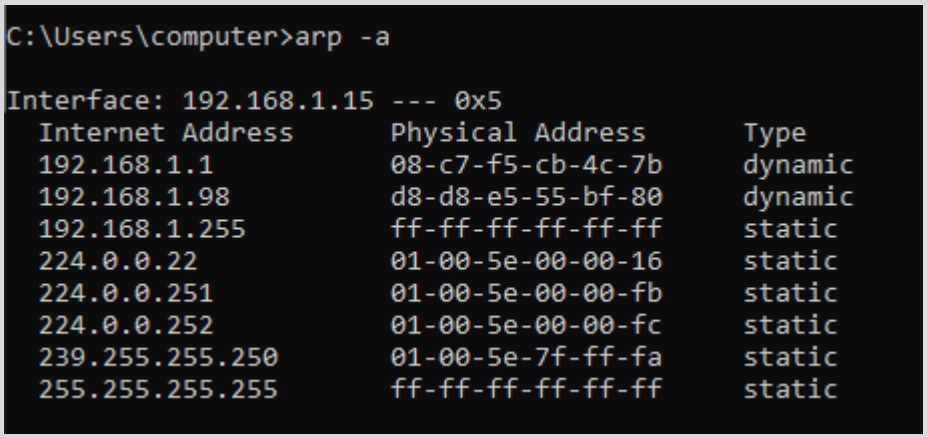
Task 5b:

Using images from the table below, name the device and then provide a summary of it.

Image	Device Name	Description
	Server	A **server** is a system that provides data or services to other computers over a network. A server listens for and responds to requests from clients. For example, a web server delivers web pages, a file server stores and shares files, and a database server manages database queries.
	Modem	A **modem** (short for **modulator-demodulator**) is a device that enables a computer or network to connect to the internet by converting digital data into a signal that can be transmitted over telephone lines, cable systems, or fiber optics, and vice versa.
	Hub	A **hub** is a basic network device that connects multiple devices and sends incoming data to all connected devices, without filtering or directing traffic.
	Switch	A **network switch** is a device that connects multiple devices within a **local area network (LAN)** and uses **MAC addresses** to forward data only to the specific device it is intended for. It operates at the **data link layer (Layer 2)** of the OSI model.
	VoIP adapter	A **VoIP adapter** (Voice over Internet Protocol adapter) is a device that converts **analog voice signals** from a traditional telephone into **digital signals** that can be transmitted over the **internet** using a VoIP service. It essentially allows you to use a **regular landline phone** to make and receive calls over the internet instead of traditional phone lines.
	Router	A **router** is a networking device that forwards data packets between computer networks. It acts as a dispatcher, directing traffic on the internet or local networks by determining the best path for data to travel from a source to a destination.

Task 5c:

Using Command Prompt on your computer, provide evidence of the ARP table.



```
C:\Users\computer>arp -a

Interface: 192.168.1.15 --- 0x5
  Internet Address      Physical Address      Type
  192.168.1.1           08-c7-f5-cb-4c-7b     dynamic
  192.168.1.98          d8-d8-e5-55-bf-80     dynamic
  192.168.1.255         ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static
```

What is the purpose of the ARP table?

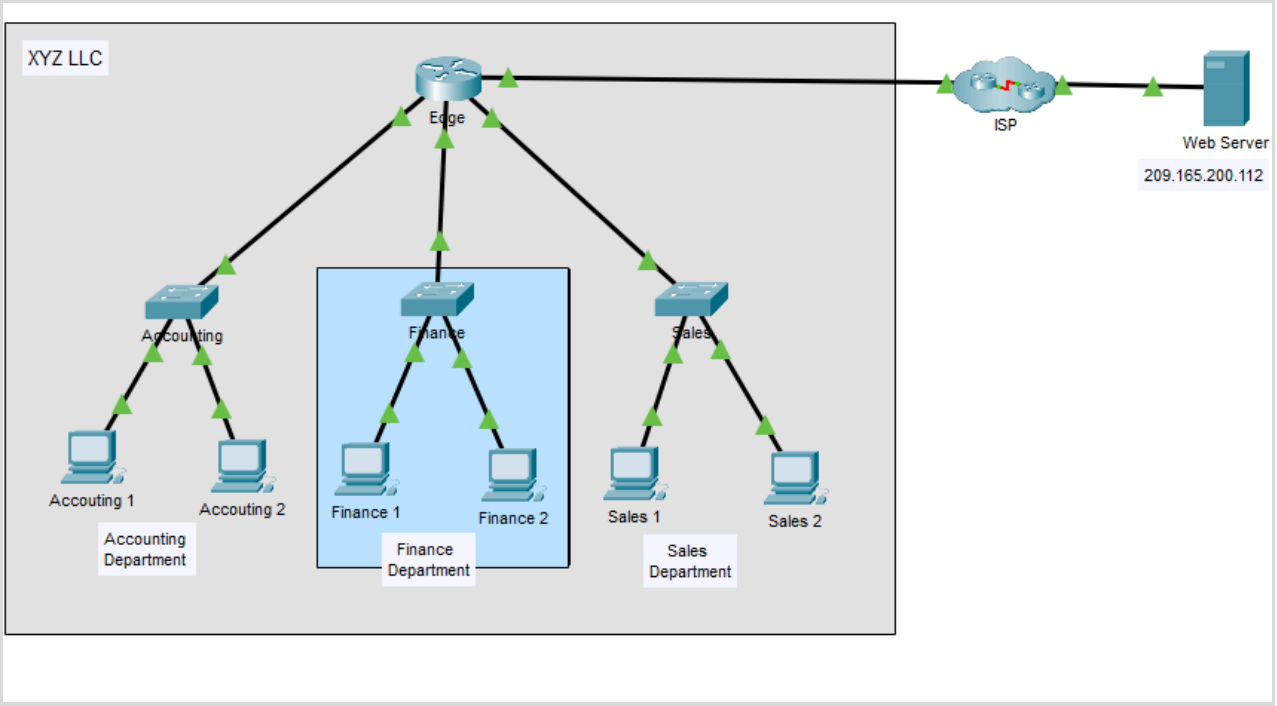
An **ARP table** (Address Resolution Protocol table) is a data structure stored in a computer or network device (like a router or switch) that maps **IP addresses** to their corresponding **MAC addresses** (hardware addresses) on a local network.

Its purpose is to map IP addresses to MAC (Media Access Control) addresses on a local network. The ARP table ensures efficient local network communication by linking IP addresses with their associated MAC addresses.

ROUTING BETWEEN NETWORKS

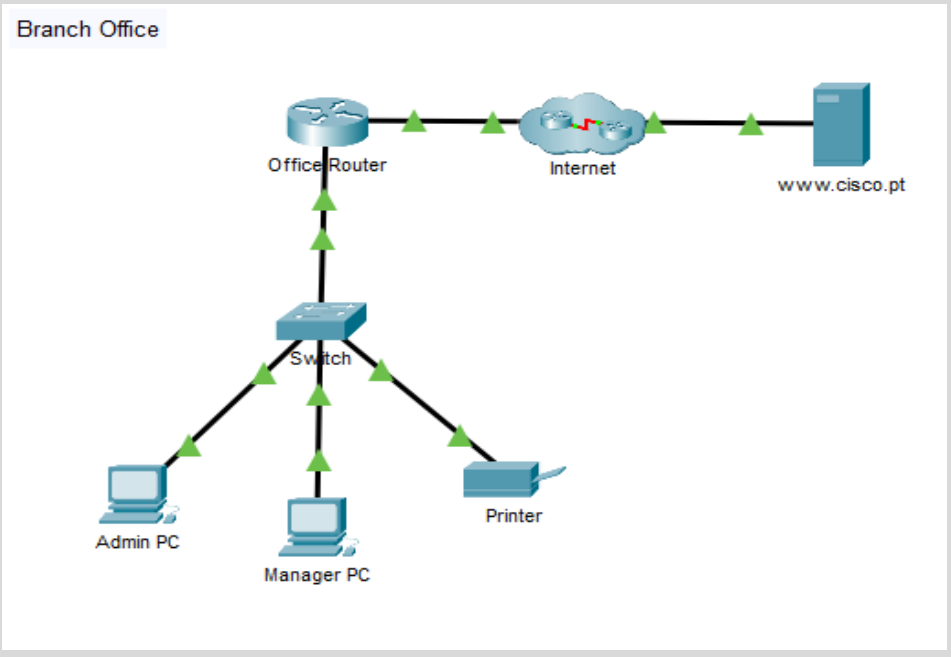
Task 6a:

Once you have completed creating simple network and examined the routing table, paste the screenshot in the box below.



Task 6b:

Once you have completed Create a simple LAN with ISP, paste the screenshot in the box below.



THE INTERNET PROTOCOL

Task 7a:

Convert the following decimal numbers to their binary equivalent.

Decimal	Binary
200	11001000
192	11000000
224	111000000
168	10101000

Task 7b:

Complete the table below by identifying the range of each class of IP addresses and then identify which range is the 'private range' of IP address.

IP Class	Range	Private
A	0.0.0.0/8 - 127.0.0.0/8	10.0.0.0 – 10.255.255.255
B	128.0.0.0/16 - 191.255.0.0/16	172.16.0.0 – 172.31.255.255
C	192.0.0.0/24 - 223.255.255.0/24	192.168.0.0 – 192.168.255.255
D	224.0.0.0 - 239.0.0.0	Multicast addresses
E	240.0.0.0 - 255.0.0.0	Experimental addresses

Task 7c:

Using the IP addresses below, identify whether they are private or public IP addresses.

172.16.35.2
Private

200.168.3.5
Public

10.1.3.15
Private

64.104.0.22
Public

Task 7d:

Match the description to their corresponding descriptions.

Transmission	Description
Unicast	Used for normal host-to-host communication in both a client/server and a peer-to-peer network.
Multicast	Allowing a host to send a single packet to a selected set of hosts that subscribe to a group.
Broadcast	Send communication to all hosts in the network.
Anycast	Sends communication to the first device on the network, which then forwards the communication to the next device. Usually used in IPv6 networks.

Task 7e: Extension (Subnetting)

Using the following IP address of 192.168.200.200/25, identify number of subnets and hosts, and complete the table:

Number of Subnets	2
Number of Hosts	126
Incremental Value	128

Network ID	192.168.200.128	
First Host	192.168.200.129	
Last Host	192.168.200.254	
Broadcast	192.168.200.255	

In which Network Id does the IP address belong to?

192.168.200.128

DYNAMIC ADDRESSING WITH DHCP

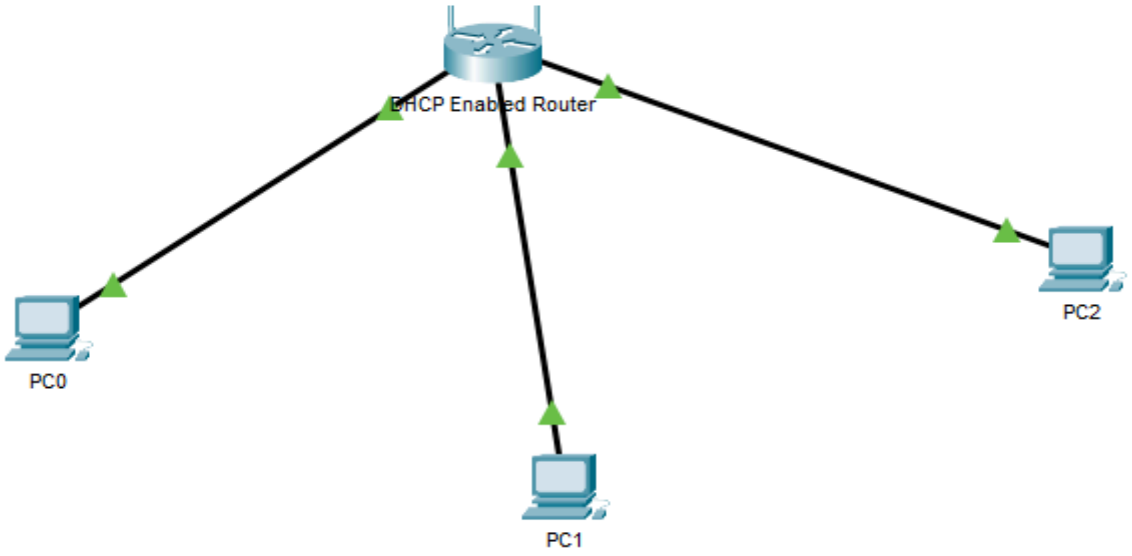
Task 8a:

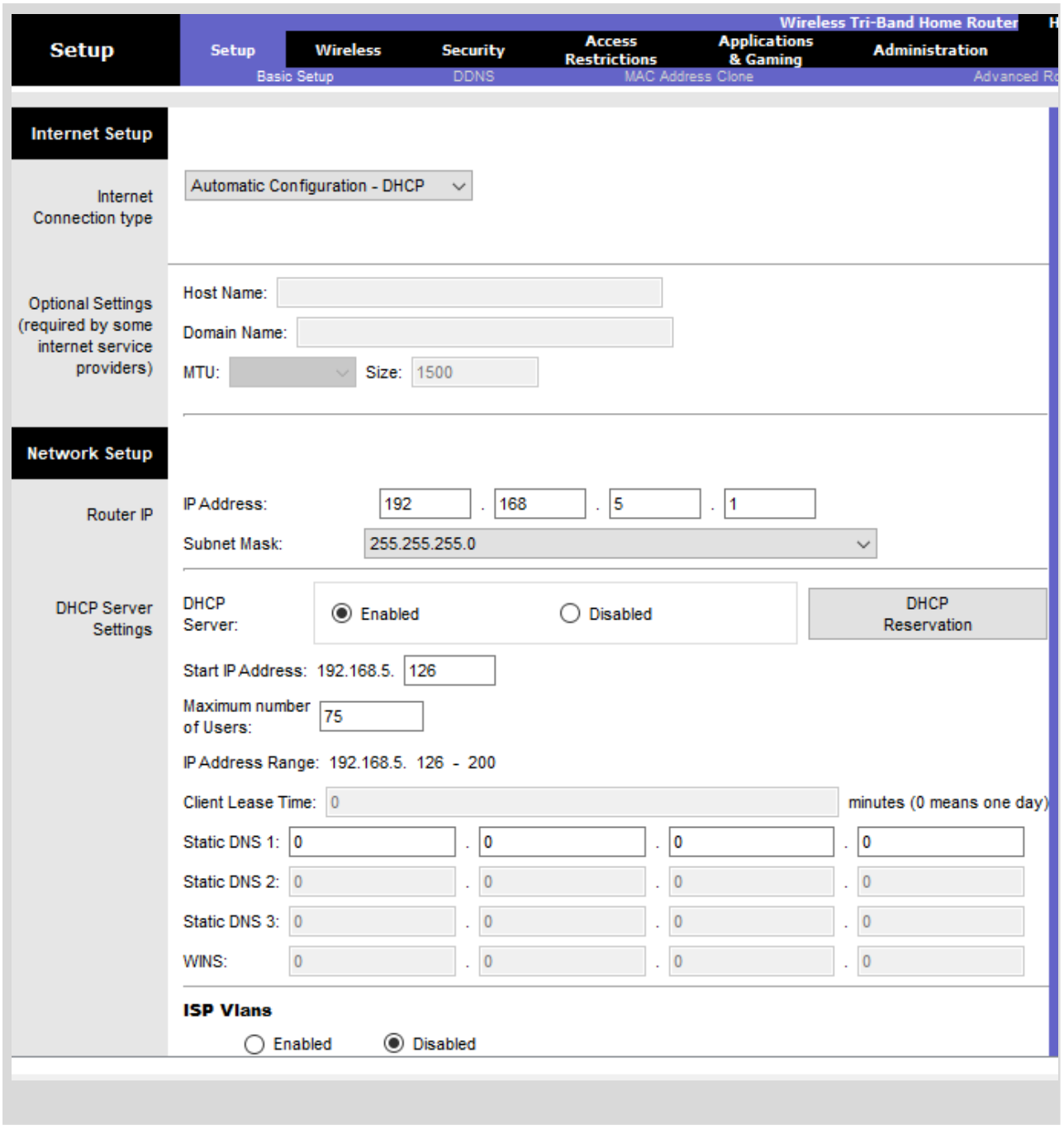
Use the table below to identify the order of DHCP operation.

Operation Number	Description
4	The DHCP server responds with a DHCPACK message to grant the request from the client.
2	A DHCP server responds with a DHCPOFFER message with a set of IPv4 addressing information.
3	The client then sends a DHCPREQUEST message to request the use of IPv4 addressing information offered by the DHCP server.
1	The client sends a DHCPDISCOVER message using broadcast.

Task 8b:

Once you have configured DHCP on a server, paste your image in the box below.

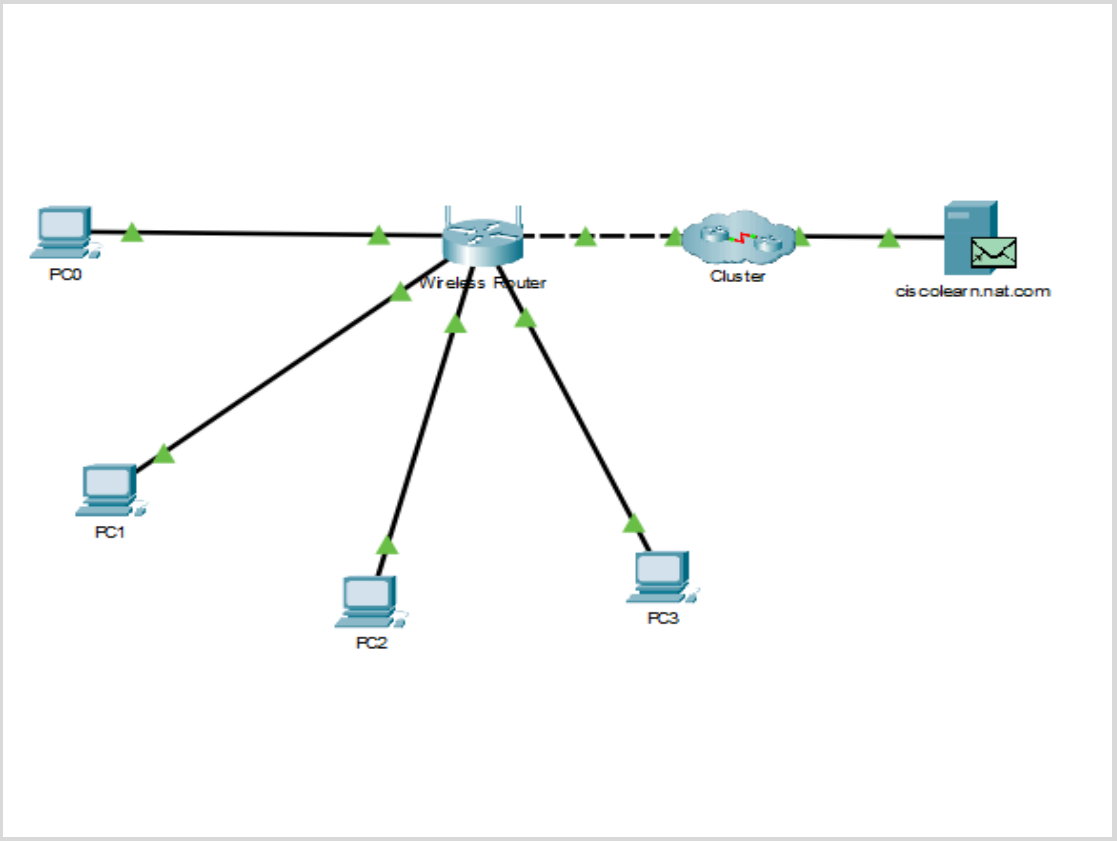


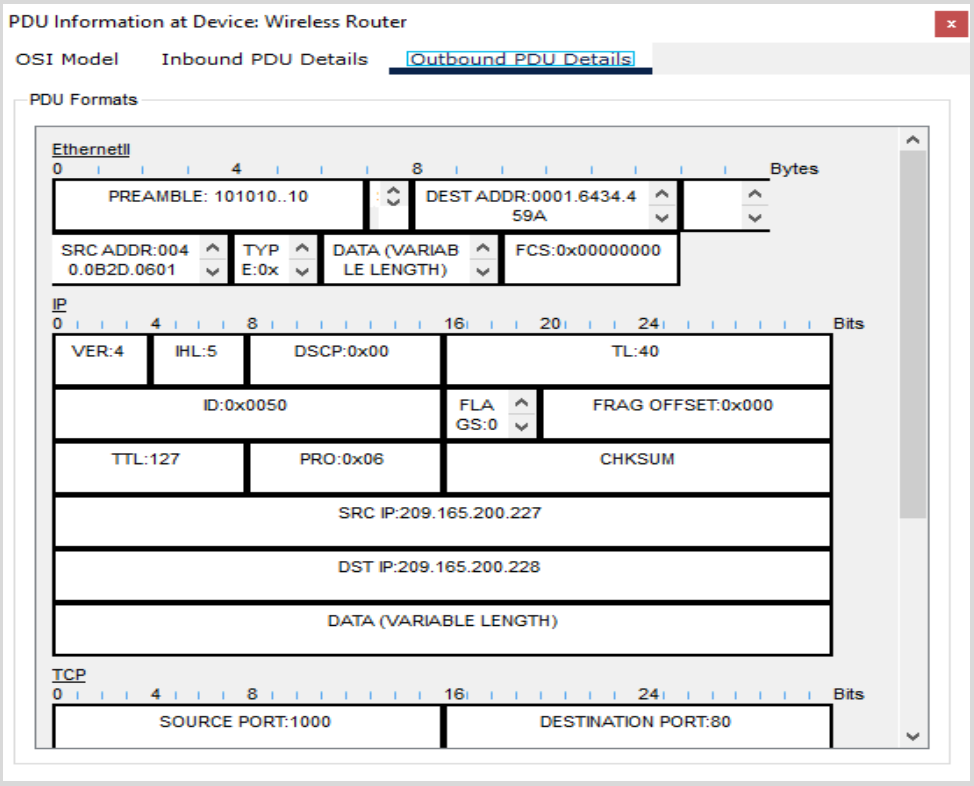

Setup
Wireless Tri-Band Home Router
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Basic Setup
DDNS
MAC Address Clone
Internet Setup
Internet Connection type
Automatic Configuration - DHCP
Optional Settings (required by some internet service providers)
Host Name:
Domain Name:
MTU:
Size:
1500
Network Setup
Router IP
IP Address:
192
168
5
1
Subnet Mask:
255.255.255.0
DHCP Server Settings
DHCP Server:
Enabled
Disabled
DHCP Reservation
Start IP Address: 192.168.5.
126
Maximum number of Users:
75
IP Address Range: 192.168.5. 126 - 200
Client Lease Time:
0
minutes (0 means one day)
Static DNS 1:
Static DNS 2:
Static DNS 3:
WINS:
ISP Vlans
Enabled
Disabled

IPv4 & IPv6 ADDRESS MANAGEMENT

Task 9a:

Once you have completed Packet Tracer – Examine NAT on a Wireless Router activity, paste the image below.





Task 9c:

Compress the following IPv6 addresses from their original fully expanded size

Fully Expanded	Compressed
2001:0DB8:0000:1111:0000:0000:0000:0200	2001:DB8:0:1111::200
2345:0425:2CA1:0000:0000:0567:5673:23b5	2345:425:2CA1::567:5673:23b5
2001:0DB8:0000:2F3B:02AA:00FF:FE28:9C5A	2001:DB8::2F3B:2AA:FF:FE28:9C5A

Task 9d:

Match the IPv6 addresses to their corresponding address type. Notice that the addresses have been compressed to their abbreviated notation and that the slash network prefix number is not shown. Some answer choices must be used more than once.

a. Loopback address
b. Global unicast address
c. Link-local address
d. Unique-local address
e. Multicast
f. Public
g. Private
h. APIPA

Ipv6 Addresses	Address type	IPv4 Addresses	IPv4 Address type Equivalent
2001:0db8:1:acad::fe55:6789:b210	Global Unicast	200.0.0.1	Public
::1	Loopback	127.0.0.1	Loopback
fc00:22:a:2::cd4:23e4:76fa	Unique-Local	192.168.0.1	Private
2033:db8:1:1:22:a33d:259a:21fe	Global Unicast	11.0.125.1	Public

fe80::3201:cc01:65b1	Link-Local	169.254.39.92	APIPA
ff00::	Multicast	224.0.0.1	Multicast
ff00::db7:4322:a231:67c	Multicast	224.224.0.1	Multicast
ff02::2	Multicast	224.0.200.15	Multicast
2001:0db8:1:acad::fe55:6789:b210	Global Unicast	7.20.5.200	Public

TRANSPORT LAYER SERVICES

Task 10a:

Match the below list of words to their correct resource address.

URN	URL	URI	Fragment

Resource	Description
https://www.example.com/author/book.html#page 155	URI
www.example.com/author/book.html	URN
#page155	Fragment
https://www.example.com/author/book.html	URL

Task 10b:

Complete the table below by inserting correct layer of the OSI model

Protocol	OSI Layer
HTTP, FTP, DNS, SMTP, Telnet, DHCP	Layer 7
TCP/UDP	Layer 4
IP	Layer 3

Task 10c:

From the statements below, decide whether they describe TCP or UDP

TCP	UDP
• If the sender does not receive an acknowledgment within a certain period, it assumes that the segments were lost and retransmits only the missing portion of the message.	• A 'best effort' delivery system that does not require acknowledgment of receipt
• Breaks up a message into small pieces (segments)	• It is preferable for applications that use time-sensitive technology such as streaming audio and voice over IP (VoIP).

Task 10d:

Complete the table below by inserting the missing Port Number and Application Protocol.

Port Number	Transport	Application Protocol
20	TCP	File Transfer Protocol (FTP) - Data
21	TCP	File Transfer Protocol (FTP) - Control
22	TCP	Secure Shell (SSH)
23	TCP	Telnet
25	TCP	Simple Mail Transfer Protocol (SMTP)
53	UDP, TCP	Domain Name Service (DNS)
67	UDP	Dynamic Host Configuration Protocol (DHCP) – Server
68	UDP	Dynamic Host Configuration Protocol - Client
69	UDP	Trivial File Transfer Protocol (TFTP)
80	TCP	Hypertext Transfer Protocol (HTTP)
110	TCP	Post Office Protocol version 3 (POP3)
143	TCP	Internet Message Access Protocol (IMAP)
161	UDP	Simple Network Management Protocol (SNMP)
443	TCP	Hypertext Transfer Protocol Secure (HTTPS)

Task 10e:

On your computer, use the ***netstat*** command to show your active network connections.

```
C:\Users\computer>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.1.15:2772      74.248.74.212:https    ESTABLISHED
  TCP    192.168.1.15:2992      170.72.239.151:https   ESTABLISHED
  TCP    192.168.1.15:3215      52.112.103.12:https    ESTABLISHED
  TCP    192.168.1.15:4844      128.116.33.3:https     ESTABLISHED
  TCP    192.168.1.15:4847      server-18-244-143-99:https  ESTABLISHED
  TCP    192.168.1.15:4881      170.72.239.84:https    ESTABLISHED
  TCP    192.168.1.15:4885      ec2-3-223-216-151:https  ESTABLISHED
  TCP    192.168.1.15:4906      server-18-154-84-65:https  ESTABLISHED
  TCP    192.168.1.15:4909      52.167.161.91:https    ESTABLISHED
  TCP    192.168.1.15:4911      ec2-54-172-47-74:https  ESTABLISHED
  TCP    192.168.1.15:4912      server-108-138-233-53:https  ESTABLISHED
  TCP    192.168.1.15:4914      ec2-23-23-190-90:https  ESTABLISHED
  TCP    192.168.1.15:4915      52.168.117.168:https   ESTABLISHED
  TCP    192.168.1.15:4916      52.112.103.48:https    ESTABLISHED
  TCP    192.168.1.15:4917      ec2-52-1-190-197:https  ESTABLISHED
  TCP    192.168.1.15:4918      ec2-44-218-145-37:https  ESTABLISHED
  TCP    192.168.1.15:4919      server-18-244-143-99:https  ESTABLISHED
  TCP    192.168.1.15:4921      lbip6179900:https      ESTABLISHED
  TCP    192.168.1.15:4922      lbip6179900:https      ESTABLISHED
  TCP    192.168.1.15:4923      server-18-165-227-113:https  ESTABLISHED
  TCP    192.168.1.15:4925      ec2-18-170-100-76:https  ESTABLISHED
  TCP    192.168.1.15:4928      5:https                CLOSE_WAIT
  TCP    192.168.1.15:4929      185.151.204.51:https   ESTABLISHED
  TCP    192.168.1.15:4931      5:https                CLOSE_WAIT
  TCP    192.168.1.15:4937      ec2-18-211-126-234:https  ESTABLISHED
  TCP    192.168.1.15:4942      ec2-52-6-92-57:https   ESTABLISHED
  TCP    192.168.1.15:4943      5:https                CLOSE_WAIT
  TCP    192.168.1.15:4944      5:https                CLOSE_WAIT
  TCP    192.168.1.15:4945      ec2-52-1-157-191:https  ESTABLISHED
```

What is the state of most of those connections?

The state of most of the connections is “Established”.

Are there any connections that have been ended? How do you know if they have been ended?

Yes, some were closed “CLOSE_WAIT”. Their IP address no longer appears.

APPLICATION LAYER SERVICES

Task 11a:

Complete the table below by inserting the missing words.

DNS	FTP	DHCP	SMTP
SSH	HTTP	IMAP	POP

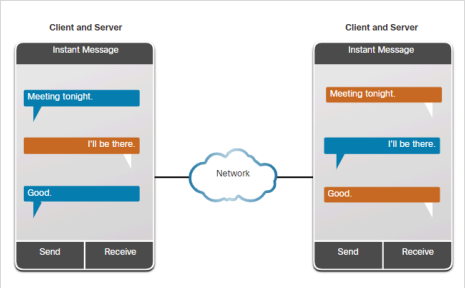
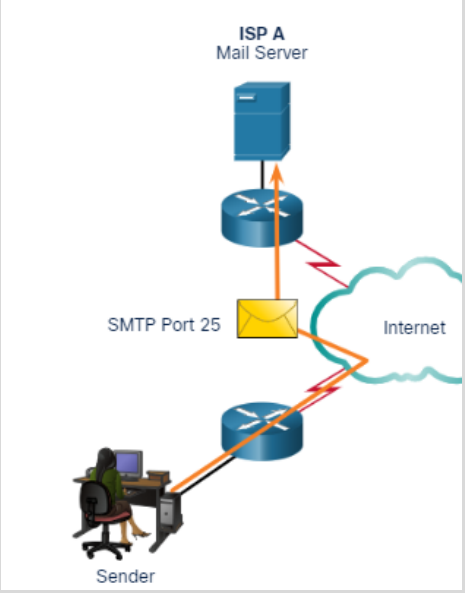
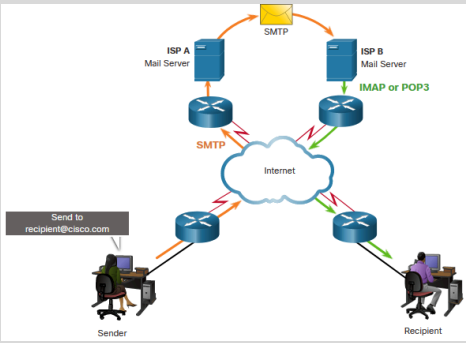
Protocol	Description
DNS	Resolves Internet names to IP addresses.
SSH	Used to provide secure remote access to servers and networking devices.
SMTP	Sends email messages and attachments from clients to servers and from servers to other email servers.
POP	Used by email clients to retrieve email and attachments from a remote server. Usually deletes emails once they have been retrieved.
IMAP	Used by email clients to retrieve email and attachments from a remote server.
DHCP	Used to automatically configure devices with IP addressing and other necessary information to enable them to communicate over the internet.
HTTP	Used by web browsers to request web pages and web servers to transfer the files that make up web pages of the World Wide Web.
FTP	Used for interactive file transfer between systems.

Task 11b:

Match the image in the table with the words from below list.

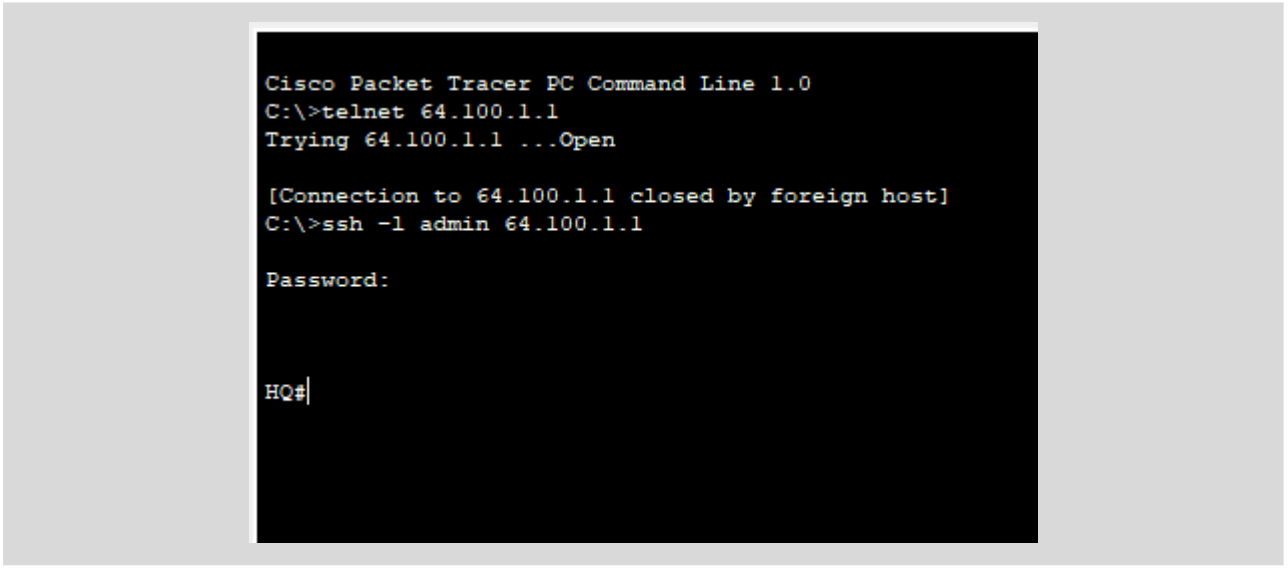
VoIP	Telnet	Email	Protocol	Text Messaging

Image	Description

	Text Messaging
	VoIP
	Protocol
	Email

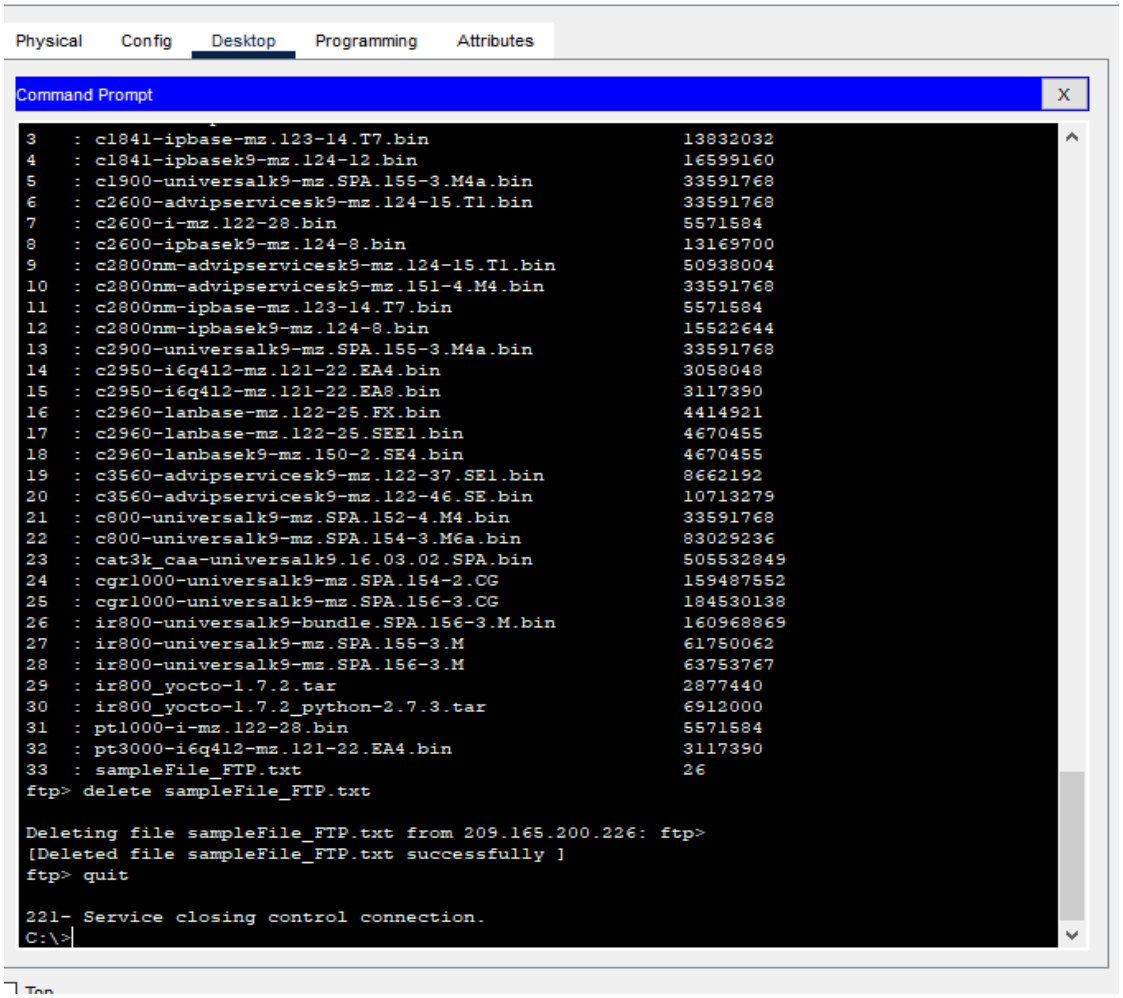
Task 11c:

Once you have completed Packet Tracer - Connecting using SSH activity, paste the image of the connection in the table below.



Task 11d:

Once you have completed ***Packet Tracer - Uploading file to FTP server*** activity, paste the image of the connection in the table below.



END OF WORKBOOK

Please check through your work thoroughly before submitting and update the table of contents.