



Republic of Rwanda
City of Kigali



GASABO DISTRICT

EXAM TITLE: SETUP LAN

SECTOR: ICT

SUBSECTOR: NETWORKING

LEVEL 4 NETWORKING

DURATION: 3 Hours

INSTRUCTIONS:

This paper consists of two sections, A and B

Section A: Attempt all questions

55 marks

Section B: Attempt two (3) questions of your choice:

45 marks

Section A: Attempt all questions

55 marks

1. Select the best answer for the following questions **[2 Marks for each question]**

- a) What does protocol defines?
 - i) Protocol defines what data is communicated.
 - ii) Protocol defines how data is communicated.
 - iii) Protocol defines when data is communicated.
 - iv) **All of above (answer)**
- b) Full Form of NIC?
 - i) New Internet Connection
 - ii) Network Interface Card
 - iii) Network Interface Connection
 - iv) **Net Interface Card (answer)**
- c) Which of the following is true example of Mac address:
 - i) **18:3D:A2:83:B5:1F (answer)**
 - ii) 00:3G:F2:83:9C:67
 - iii) 18:3D:A2:8F:B5:AO
 - iv) N8:3D:E0:83:B5:1F
- d) Router operates in which layer of OSI Reference Model?
 - i) Layer 1 (Physical Layer)
 - ii) **Layer 3 (Network Layer) (answer)**
 - iii) Layer4 (Transport Layer)
 - iv) Layer 7 (Application Layer)
- a) You need to troubleshoot your network IP connectivity. Which of the following commands would you use to find the IP address on your Ethernet 0 interface?
 - i) ping
 - ii) IPConfig
 - iii) traceroute
 - iv) **Show interface Ethernet 0 (answer)**
- b) Which of the following prompts indicates your router is in Privileged EXEC mode?
 - i) Router>
 - ii) **Router# (answer)**
 - iii) Router&
 - iv) Router\$

c) You are configuring your Cisco router and need to go back to User EXEC mode. What command will take you back to User EXEC mode?

- i) Router1#enable
- ii) Router1#exit
- iii) Router1#configure terminal
- iv) Router1#disable (answer)**

d) What is the uses of subnetting?

- i) It divides one large network into several smaller ones(answer)**
- ii) It divides network into network classes
- iii) It speeds up the speed of network
- iv) None of above

e) Which one of the following protocol is not used in internet?

- i) HTTP
- ii) DHCP
- iii) DNS
- iv) None of the mentioned (answer)**

f) 18.13.241.8 address lies in which class

- i) class A (answer)**
- ii) class B
- iii) class D
- iv) class E

g) . IPV4 Address is

- i) . 8 bit
- ii) 16 bit
- iii) 32 bit (answer)**
- iv) 64 bit

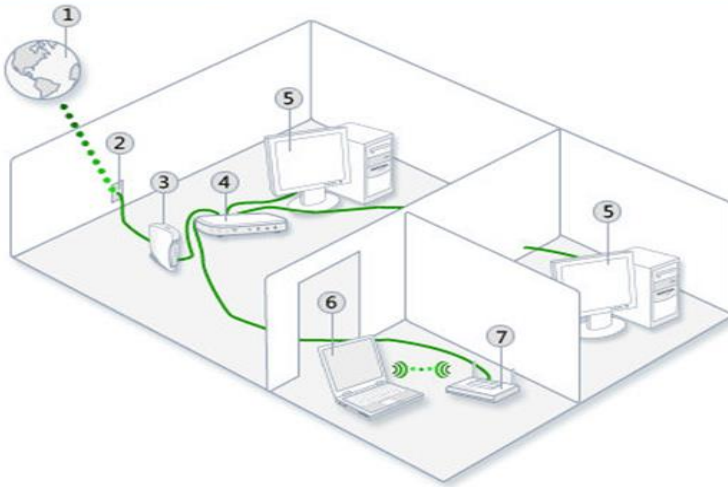
h) Star topology is based on a central device that can be.....?

- i) Hub
- ii) Switch
- iii) Only i
- iv) Both i and ii (answer)**

i) How much wire does a twisted pair cable have?

- i) 1
- ii) 2
- iii) 4
- iv) 8 (answer)**

2. Name the parts of the network below accordingly: [7marks]



Answer:

- 1) internet
 - 2) Modem
 - 3) Router
 - 4) Switch
 - 5) Computer(desktop)
 - 6) Computer(laptop)
 - 7) Wireless router
3. What are the purpose of having a network, especially LAN [4marks]
4. Match the column A with their corresponding in Column B: [8marks]

Column A	Column B	answer
1. Packet tracer	A. Refers to layout of a network: how different nodes in a network are connected to each other and how they communicate.	1=D
2. LAN ports	B. is a type of connector commonly used for Ethernet networking	2=H
3. RJ45	C. is a high-speed device that receives incoming data packets and redirects them to their destination on a LAN	3=B
4. NIC	D. Tool utilized in training for Network certifications by allowing students to create networks with an almost unlimited number of devices and to experience troubleshooting	4=G

	without having to buy real Cisco routers or switches.	
5. Wireless access point	E. A common network communication standard, which is used to define a method of exchanging data over a computer network.	5=F
6. A switch	F. Is a device that performs the functions of a router and also includes the functions of a wireless access point. It is used to provide access to the Internet or a private computer network.	6=C
7. A network protocol	G. It is a computer hardware component that connects a computer to a computer network.	7=E
8. Network Topology	H. Ports where you connect network devices such as client machines, server and other network devices	8=A

5. List different methods you may use to access router [3marks]

Answer:

Access methods

The CLI on routers may be accessed using one of the following ways:

- Console port
- Auxiliary port
- Virtual terminal lines.

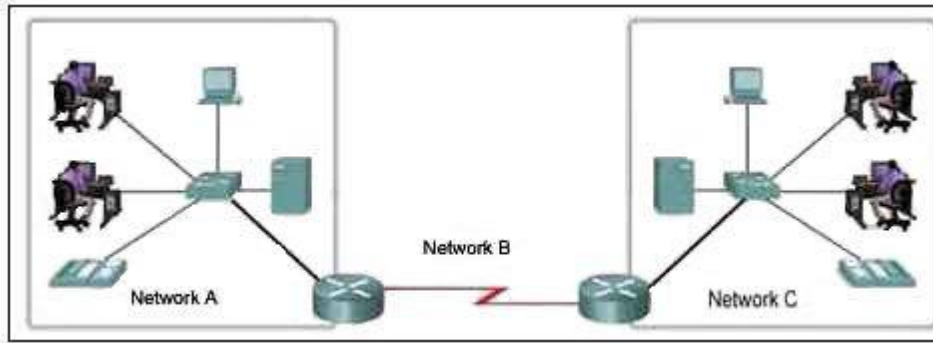
6. What is MAC address? How does it differ from an IP address? [4marks]

Answer: MAC and IP are the address that uniquely defines a device and a connection in a network. A MAC address is a number assigned to the NIC card by the manufacturer. IP address is a number assigned to the connection in a network. The basic difference between MAC address and IP address is that a **MAC** address uniquely identifies a device that wants to take part in a network. On the other hand, an **IP** address uniquely defines a connection of a network with an interface of a device.

7. Refer to the exhibit. Which three labels correctly identify the network types for the network segments that are shown? (Choose three) [3marks]

a) Network A — WAN

- b) Network B — WAN
- c) Network C — LAN
- d) Network B — MAN
- e) Network C — WAN
- f) Network A — LAN



Answer:

- c) Network C — LAN
- d) Network B — MAN
- f) Network A — LAN

Section B: Attempt two (3) questions of your choice: [15 marks for each question]

8. List and explain all steps required to identify network problems? [15marks]

Answer:

1. Make Sure It's Actually Your Network Problem

. Power Cycle Everything and Check Other Devices

There's no need to get upset right away, as the fix to your problem might be as simple as rebooting your equipment. Restarting fixes a ton of issues, so make sure it's your first response to network problems, too.

Go ahead and reboot your PC, as well as your modem and router. To clear the modem and router caches, wait 60 seconds before you turn them back on again. When you plug everything back in, plug your modem in first and wait for it to power on before connecting your router.

Turning everything off and back on first ensures that it isn't a temporary network problem. It's better to reboot now than to waste 30 minutes continuing on when you don't need to.

Once you've restarted, if you have another computer (or a mobile device), try getting online with that machine. If you find that no devices can connect, it's likely an issue with your equipment or your ISP.

Should you find that only one computer can't get online, you can continue to narrow down the problem. On that device, make sure to run an antivirus scan to ensure you don't have malware interfering with your connection. You should also make sure that your firewall settings aren't blocking the connection.

Finally, try using a different browser to see if your usual one is somehow damaged.

2. Check Physical Connections

Does your network problem persist after rebooting? Before you start diving into settings and tests, the next step to check is that you're physically connected.

If you use an Ethernet cable to connect to your router, check to make sure that it's not unplugged or damaged. If your laptop has a physical wireless switch, make sure that it's not set to the off position.

Once you've verified a proper connection, check your equipment. Are the lights on your router and/or modem flashing green as normal? If no lights come on after the reboot, the device could be dead or malfunctioning. However, if you get red lights, or a power light but no connection light, your ISP is likely experiencing disruption.

3. Run the Windows Network Troubleshooter

Windows includes some built-in troubleshooters that can automatically find and fix issues. To run the troubleshooter for network problems, right-click the network icon in your System Tray and choose **Troubleshoot Problems**. Once the troubleshooter runs, it could fix issues, find issues but fail to fix them, or find nothing.

If the troubleshooter finds a problem that it fixes, try to connect again. If you get a specific error or problem name that Windows can't fix automatically, take note of it for later research.

4. Check for a Valid IP Address

At this point, you've verified that the problem is not temporary and that all your hardware works. Since Windows can't fix the problem on its own, we need to pinpoint the spot along the connection where the problem is occurring.

It's a good idea to make sure that you don't have any strange IP settings selected. To check this, open **Settings** and go to **Network & Internet > Status**. Below the **Change your network settings** header, choose **Change adapter options**. In the resulting window, double-click the name of your network.

Unless you've set up a static IP (if you don't know what this is, you probably don't use one), make sure you have both **Obtain an IP address automatically** and **obtain DNS server address automatically** checked. Repeat this process for **Internet Protocol Version 6** to ensure everything is automatic there, as well.

Reviewing Your IP Address Validity

Once you've done this, you can check to confirm the router is giving you a valid IP address. Open up a Command Prompt window by typing **cmd** into the Start Menu. Enter **ipconfig** and look for the text under **Ethernet adapter** (for wired connections) or **Wireless LAN Adapter** (for wireless connections).

If **IPv4 Address** starts with **169.x.x.x**, your computer is not receiving a valid IP address from your router. Typing the following two commands will release your computer's current IP address and request a new one, which may resolve this:

```
ipconfig /release  
ipconfig /renew
```

Should you still have a **169.x.x.x** address after typing the above commands and **ipconfig** again, your machine still isn't receiving an IP from the router. Try plugging your PC directly into the modem with an Ethernet cable and see if you can get online. If so, your router is the problem.

5. Try a Ping and Trace Its Route

If your IP address starts with anything other than **169** when you run **ipconfig**, you have a valid IP address from your router. At this point, you've confirmed the problem is somewhere between your router and the internet.

Type this command to ping Google's DNS servers to see if you can get online (you can replace **8.8.8.8** with anything, such as **www.msn.com**):

```
ping 8.8.8.8
```

This will send four packets to Google. If they fail to send, you'll see some basic info about the failure. In case you want to continue pinging indefinitely so you can monitor it while troubleshooting, just add a **-t** to the end, like so:

```
ping 8.8.8.8 -t
```

You can press **Ctrl + C** to stop pinging at any time. For more information, type this command to trace the route between your computer and Google's DNS servers:

```
tracert 8.8.8.8
```

The above command gives you a step-by-step breakdown of the path the information takes to reach the destination you specify. Watch it, and if it fails, check to see where the problem occurs. If an error pops up early in the route, the issue is likely with your local network.

6. Contact Your ISP

Should all the above steps complete successfully, you've now verified that your equipment is working and confirmed you have a valid IP address from the router. Also, you're sure that the problem is occurring outside of the network for multiple devices. If this is the case, your next best option is to find out if your ISP is having issues.

7. Wait the Network Problems Out

Once you've let your ISP know of the issue and confirmed that it's not just one computer having a problem, all you can do is wait. Many times, you can't fix network issues on your own.

9. State and explain all network troubleshooting tools you know [15marks]

Answer:

- **Ping**

This utility is used to provide a basic connectivity test between the requesting host and a destination host. This is done by using the Internet Control Message Protocol (ICMP) which has the ability to send an echo packet to a destination host and a mechanism to listen for a response from this host.

- **Tracert/ traceroute**

Typically, once the ping utility has been used to determine basic connectivity, the tracert/ traceroute utility can be used to determine more specific information about the path to the destination host including the route the packet takes and the response time of these intermediate hosts.

- **Ipconfig/ifconfig**

The utilities that can be used to find out this IP configuration information

- **Nslookup**

The nslookup utility can be used to lookup the specific IP address(es) associated with a domain name. If this utility is unable to resolve this information, there is a DNS issue.

- **Netstat**

It is also possible to use the netstat utility to determine which services on a host that is associated with specific active ports.

- **PuTTY/Tera Term**

When connecting to a variety of different types of equipment, a telnet, SSH or serial client is required; when this is required both the PuTTY and Tera Term programs are able to provide these functionalities.

- **Subnet and IP Calculator**

One of the most important tools in the belt of a junior network engineer is an IP network calculator. These can be used to ensure a correct IP address selection and with this a correct IP address configuration.

- **Speedtest.net/pingtest.net**

The speedtest.net site provides the ability to determine the amount of bandwidth that is available to a specific host at a specific point in time; this is often a good tool to use when measuring how long it is going to take to upload or download information from a local to remote host.

- **Pathping/mtr**

These tools take the functionality and information that can be obtained from these types of tools and provide a more detailed single picture of the path characteristics from a specific host to a specific destination.

- **Route**

The last of the tools covered in this article is the route utility. This utility is used to display the current status of the routing table on a host.

10. List and explain IOS Configuration mode [15marks]

Answer:

1. User executive mode

This is the main or the first mode that one can access on a router. It is limited to few verification and troubleshooting commands. By default, authentication is not required but as best practice we will configure security so as to ensure protection of our routers.

On accessing the router, you will notice the prompt that ends with this symbol ">" after the router's name. By default the name of the router is usually "Router". This prompt is shown below.

Router>

In this mode, we can view basic information using the "show" command.

2. Privileged executive mode

This is the second mode in the IOS CLI. In this mode, we can view various troubleshooting and verification commands such as "show and debug". By default, this mode is also not secured, as best practice we will also secure this mode using a password.

This mode is denoted by the HASH (#) symbol preceded by the name of the router. To enter this mode, we issue the command "enable" from the user exec mode.

Router#

NOTE: To move from the user exec mode to the privileged mode the command – "enable" should be entered from the user exec mode.

The "disable" command is used to exit the privileged exec mode and return to the user exec mode.

3. Global configuration mode

The main configuration on a router is executed in this mode. Parameters such as the router's name, ip domain lookup, banners among others can be configured. In this mode, we can also gain access to other specific configuration parameters such as interface configuration.

The global configuration mode is shown by the prompt: (config)# as shown below:

Router (config)#

NOTE: To enter this mode from the privileged exec mode we enter the command: "*Configure terminal*"

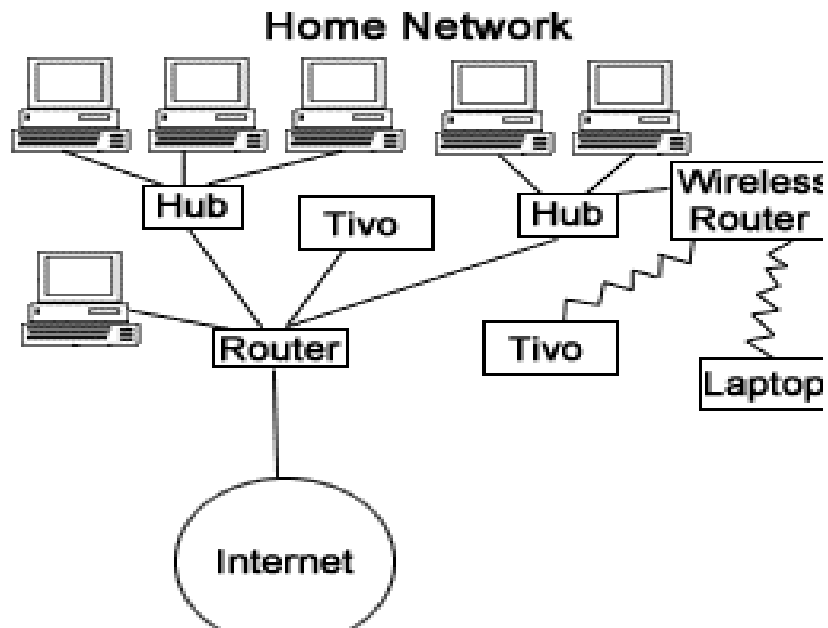
To exit we to the privileged mode we enter the command: *“exit”*

4. Specific configuration mode.

There are other specific configuration modes on the router. These are entered in the global configuration mode and are used to configure various functions and options on the router such as the interfaces, routing options, console lines among others. The specific configuration mode commands will be discussed progressively throughout the course.

11. Design a LAN that can allow six wired computers and two wireless devices to share the internet [15marks]

Answer:



12. Enumerate all tools and steps required to make Ethernet cable. [15marks]

Answer:

Before you get started, make sure you have the necessary tools, and decide whether you're going to use Cat 5e or Cat 6 network cables.

What you'll need:

- Unshielded twisted pair (UTP) patch cable
- Modular connector (8P8C plug, RJ45)
- Crimping tool
- Cable tester (optional, but recommended)

STEPS

- **Step 1:** Strip the cable jacket about 1.5 inch down from the end.
- **Step 2:** Spread the four pairs of twisted wire apart. For Cat 5e, you can use the pull string to strip the jacket farther down if you need to, then cut the pull string. Cat 6 cables have a spine that will also need to be cut.
- **Step 3:** Untwist the wire pairs and neatly align them in the T568B orientation. Be sure not to untwist them any farther down the cable than where the jacket begins; we want to leave as much of the cable twisted as possible.
- **Step 4:** Cut the wires as straight as possible, about 0.5 inch above the end of the jacket.
- **Step 5:** Carefully insert the wires all the way into the modular connector, making sure that each wire passes through the appropriate guides inside the connector.
- **Step 6:** Push the connector inside the crimping tool and squeeze the crimper all the way down.
- **Step 7:** Repeat steps 1-6 for the other end of the cable.
- **Step 8:** To make sure you've successfully terminated each end of the cable, use a cable tester to test each pin.