

JANUARY 2014



**UNIVERSITI KUALA LUMPUR KAMPUS KOTA
MALAYSIAN INSTITUTE OF INFORMATION TECHNOLOGY**

Name of Course	CCNA 1: NETWORK FUNDAMENTALS
Course Code	IFD10304
Lecturer	IRMA SYARLINA BINTI HJ CHE ILIAS
Semester / Year	JANUARY 2014
Date	11TH OR 12TH FEBRUARY 2014

Assessment	LABORATORY WORKS 1.1
Weight age	10% (LAB EXERCISE)
Course Outcome to achieve: <ul style="list-style-type: none">• CLO 1 - Explain how communication works in data networks and the Internet.	

Student Name:

Student ID No:

INSTRUCTIONS:

- **What to do?**
 - Answer ALL questions.
 - Install packet tracer at least version 5.3.3
- **What to submit?**
 - Hard copy – print out & write your answer (leave in box outside room 609)
 - Soft copy – packet tracer (upload at Elearn)
- **When to submit?**
 - Week 9
 - Friday
 - 11/04/14
 - Before 12pm

1.1.1 INTRODUCTION – PACKET TRACER

1. Download packet tracer 5.3.3 or latest.
2. Answer the following questions:
 - a. Define Packet Tracer.

- b. Identify **THREE (3)** Packet Tracer features

- i.

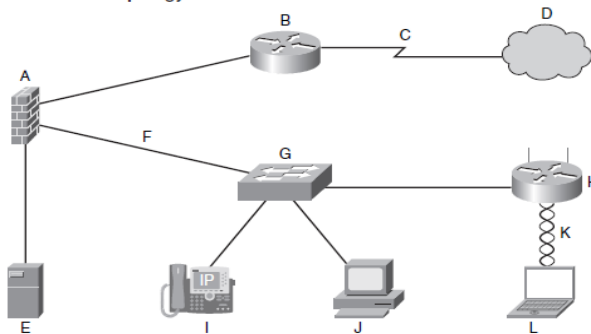
- ii.

- iii.

1.1.2 Chapter 1 Living in a Network-Centric World & Communicating Over the Network

1. Provide the name of each element in the network topology shown in Figure 1-1.

Figure 1-1 Network Topology Icons



2. In table 2-4, match the term on the left with the correct symbol number from Figure 2-1.

Figure 2-1 Common Data Network Symbols

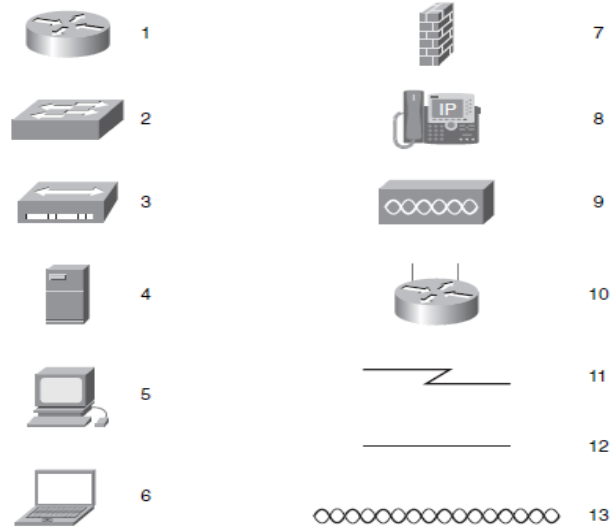


Table 2-4 LANs, WANs and Internetworks

Device	Number
Router	
Firewall	
Wireless access point	
LAN hub	
LAN switch	
IP phone	
Wireless router	
Wireless media	
Server	
Laptop	
LAN media	
Desktop computer	
WAN media	



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Assessment	LABORATORY WORKS 1.2
Weight age	10% (LAB EXERCISE)
Course Outcome to achieve:	
<ul style="list-style-type: none"> CLO 1 - Explain how communication works in data networks and the Internet. 	

Student Name:

Student ID No:

Chapter 1 Living in a Network-Centric World & Communicating Over the Network

1.2.1 Skills Integration Challenge-Introduction to Packet Tracer

Topology Diagram:

Nearly complete logical topology provided as starting point.

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1-ISP	Fa0/0	192.168.254.253	255.255.255.0	N/A
	S0/0/0	10.10.10.6	255.255.255.252	
R2-Central	Fa0/0	172.16.255.254	255.255.0.0	N/A
	S0/0/0	10.10.10.5	255.255.255.252	
S1-Central	VLAN 1	172.16.254.1	255.255.0.0	172.16.255.254
PC 1A	NIC	172.16.1.1	255.255.0.0	172.16.255.254
PC 1B	NIC	172.16.1.2	255.255.0.0	172.16.255.254
Eagle Server	NIC	192.168.254.254	255.255.255.0	192.168.254.253

Task 1: Explore the PT interface

Step 1 – Logical Workplace

When Packet Tracer starts, it presents a logical view of the network in real-time mode. The main part of the PT interface is the **(a)**. This is the large area where devices are placed and connected.

Step 2 – Symbols Navigation

The lower left portion of the PT interface, below the yellow bar, is the portion of the interface that you **(b)**. The first box in the lower left contains symbols that **(c)**. As you move the mouse pointer over these symbols, **(d)**. When you click on one of these symbols, **(e)**. As you point to the specific devices, **(f)**. Click on each of the groups and study the various devices that are available and their symbols.

Task 2: Explore PT operations

Step 1 – Connect the devices using auto connect

Click on the connections group symbol. The specific connection symbols provide **(g)**. The first specific type, the gold lightning bolt, **(h)**. When you click on this symbol, the pointer **(i)**.

To connect two devices click the auto connection symbol, click the first device, and then click the second device. Using the auto connection symbol, make the following connection:

- Connect the Eagle Server to the R1-ISP router.
- Connect PC-PT 1A to the S1-Central switch.

Draw and explain the new connection.

Step 2 – Examine device configuration with a mouse over

Move your mouse over the devices found in the logical workplace. As you move the mouse pointer over these symbols the **(j)**.

1. **A router** will display **(k)**
2. **A server** will display **(l)**
3. **A switch** will display **(m)**
4. **A PC** will display **(n)**

Step 3 – Examine device configuration

Left mouse click on each device type found in the logical workplace to view **(o)**

1. **Router and Switch devices** contain three tabs. These tabs are **(p)**. Explain on each tab.
2. **Server and Hub devices** contain two tabs. These tabs are **(q)** Explain on each tab.

3. **PC devices** contain three tabs. These tabs are **(r)** Explain on each tab.

Task 3: Review the standard lab setup

Step 1 – **Overview** of the devices

The standard lab setup will consist of **(s)** Each of these devices will be pre-configured with such information as **(t)**

Q1. What you have learnt from above tasks?

1.2.2: Skills Integration Challenge-Examining Packets

Topology Diagram:

A nearly complete standard lab topology is provided as starting point.

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1-ISP	Fa0/0	192.168.254.253	255.255.255.0	N/A
	S0/0/0	10.10.10.6	255.255.255.252	
R2-Central	Fa0/0	172.16.255.254	255.255.0.0	N/A
	S0/0/0	10.10.10.5	255.255.255.252	
S1-Central	VLAN 1	172.16.254.1	255.255.0.0	172.16.255.254
PC 1A	NIC	172.16.1.1	255.255.0.0	172.16.255.254
PC 1B	NIC	172.16.1.2	255.255.0.0	172.16.255.254
Eagle Server	NIC	192.168.254.254	255.255.255.0	192.168.254.253

Task 1: Complete the Topology

Add a PC to the workspace. Configure it the following parameters (device PC 1B): IP Address **(a)**, Subnet Mask **(b)**, Default Gateway **(c)**, DNS Server **(d)**, Display Name "**(e)**" (do not include the quotation marks). Connect PC 1B to the Fa0/2 port of the S1-Central Switch and check your work with the **Check Results** button **(f)**

Draw and explain the new connection.

Task 2: Add Simple PDUs in Realtime Mode

Wait until the switch link lights are green. Using the Add Simple PDU, send a test message between PC 1B and Eagle Server. Note that this packet will appear in the lower right as a user created PDU that can be manipulated for testing purposes. The first time you issue this one-shot ping message, it will show as **Failed**--this is because of **(g)**. Double clicking the

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"Fire" button in the PDU List Window, send this single test ping a second time. This time it will be successful. Please do this prior to the next task.

Task 3: Analyze PDUs in Simulation Mode (Packet Tracing)

Switch to simulation mode. Use the **Capture / Forward** button to (h). Click on the packet envelope, or on the colored square in the Info column of the Event List, (i).

Write down at least TWO (2) results.

Task 4: Experiment with the model of the standard lab setup

The standard lab setup will consist (j). Each of these devices is pre-configured. Try creating different combinations of test packets and analyzing their journey through the network.

Q1. What you have learnt from above tasks?

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Assessment	LABORATORY WORKS 2
Weight age	10% (LAB EXERCISE)
Course Outcome to achieve: <ul style="list-style-type: none">• CLO 1 - Explain how communication works in data networks and the Internet.	

Student Name:

Student ID No:

INSTRUCTIONS: Answer ALL questions.

Chapter 2 Application Layer Functionality and Protocols & OSI Transport Layer

2.1 Network Representations

Task 1: Configure services and support

Step 1. Configure DNS on the Server.

Click the Server. The server configuration window opens, Click the **Config** tab. The **(a)** appear. Click the button on the left for **DNS**. Verify the service is **On**. Set the **Domain Name** to **www.example.com** and the **IP Address** to **192.168.1.254**. Click the **Add** button. Additional domain names can be added in this fashion.

Q1. Write down the setting made.

Step 2. Configure HTTP on the Server.

Click the button to select **HTTP**. Turn the service **On**. The **Default Page Content** window contains the page that is **(b)**. This page is in **(c)** format. This page can be changed if you would like to customize it.

Q2. Write down the HTML codes.

Step 3. Configure DNS support on the PC labeled Client

Click the PC Client. The PC configuration window opens, Click the **Config** tab. The **(d)** appear. Set the **DNS Server** to **192.168.1.254**, the IP address on the Server. Close the PC configuration window.

At the end of this task your completion rate should be 100%.

Step 4: Check the result

Q3. If you success, write down the assessment items.

Task 2: Verify Connectivity in Realtime Mode

Step 1. Ping the server using the URL.

Select the PC and click the **Desktop** tab. Click the **Command Prompt** button. A Command Prompt window opens. Type **ping www.example.com** (the URL of the Server) and press **Enter**.

Q4. Write down the result.

Step 2. From the PC, Open a Web Page.

From the PC desktop, click the **Web Browser** button. A simulated web browser opens. Type **www.example.com** (the URL of the Server) into the **URL** box and click the **Go** button.

Q5. Write down the result.

Task 3: View how DNS and HTTP work Together using Simulation Mode

Step 1. From the PC, ping the Server using the URL

Enter Simulation mode. Click the PC Client. The PC configuration window opens. Click the **Desktop** tab. Click the **Command Prompt** button. A Command Prompt window opens. Type **ping www.example.com** (the URL of the Server) and press **Enter**. Minimize the simulated Command Prompt window. Use **Capture/Forward** to view the DNS and ICMP packets on the network. Each time you click the **Capture/Forward** button, the packet transfer process will proceed. During this process, you can click the colored square in the **Info** column to open the PDU information and view encapsulation and device processing details.

Q6. Click at least 4 times, write down the result appear in Event list column

Close the Command Prompt window; click the Reset Simulation button.

Step 2. From the PC, open a web page on the Server using the URL

Click the **Web Browser** button. A simulated web browser opens. Type **www.example.com** (the URL of the Server) into the **URL** box and click the **Go** button. Minimize the simulated browser window. Use **Capture/Forward** to examine the DNS and HTTP packets. For each packet in the event list, click the colored square in the **Info** column to open the PDU information and view encapsulation and device processing details.

Q7. Click at least 4 times, write down the result appear in Event list column

Close the Command Prompt window; click the Reset Simulation button.

Q8. What you have learnt from above tasks?

2.2 UDP and TCP Port Numbers

Task 1: Setup and run the simulation

Step 1. Enter simulation mode

Click the **Simulation** tab to **(a)**

Step 2. Set Event List Filters

We want to capture only DNS and HTTP events. In the **Event List Filters** section, click the **Edit Filters** button and make sure only DNS and HTTP events are selected.

Step 3. From the PC, request a web page from the Server

Click on the PC in the logical workplace. Open the **Web Browser** on the **Desktop**. Type **udptcpexample.com** into the URL box and click the **Go** button.

Q1. Write down the result (what have been displayed by Web Browser?).

Minimize the simulated browser window.

Step 4. Run the simulation

Click the **Auto Capture / Play** button. The exchange between the PC and the server is animated and the events are added to the **Event List**. These events represent the client PC's **(b)**. The server **(c)**.

Task 2: Examine the results

Step 1. Access specific PDUs

In the **Simulation Panel Event List** section, the last column contains a colored box that provides **(d)**. Click the colored box in the last column for the first event. The **PDU Information** window opens.

Step 2. Examine the contents of the PDU Information Window

In this activity, we will focus only on event information only at Layers 4 and 7. The first tab in the **PDU Information** window contains information about the inbound and outbound PDU as it relates to the OSI model. Click the **Layer 4:** and **Layer 7:** boxes for both the inbound and outbound layers and read the content of the box and description in the box below the layers. Note that DNS uses **(e)** and HTTP uses **(f)**. Pay attention to the port numbers. Port **(g)** represents DNS, the application protocol that **(h)**. Port **(i)** represents HTTP the application protocol that **(j)**. The other port is generated by the client PC from the range of port numbers greater than 1023. Click the **Outbound PDU Details** tab. In the TCP segment, note the initial sequence number. What is the sequence no? **(k)**

Q2. What you have learnt from above tasks?

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Assessment	LABORATORY WORKS 3.1
Weight age	10% (LAB EXERCISE)
Course Outcome to achieve: <ul style="list-style-type: none">• CLO 3 - Calculate subnet masks and addresses to fulfill given requirements	

Student Name:

Student ID No:

Chapter 3 OSI Network Layer & Addressing the Network – IPv4

3.1 Routers Segment Broadcast Domains

Task 1: Run the Simulation Using Scenario 0 - switched

Step 1. Enter simulation mode

Click between the **Simulation** and **Realtime** modes three or four times to **(a)** leave Packet Tracer in **Simulation** mode.

Step 2. Step through Scenario 0

The file will have loaded with Scenario 0, consisting of a Simple PDU (one shot ping) from PC 0 to the broadcast address of **(b)**. Click on the colored **Info** square next to this packet's listing in the **Event List** (or equivalently, click on **(c)**) and examine the **OSI Model** and **Outbound PDU Details** views of the packet. Then click the **Capture / Forward** button and watch the broadcast travel to all devices in the switched network. Examine the packet at different points in its journey. If you receive a **"(d)"** message, click the **View Previous Events** button. The extent of these broadcasts defines **(e)**. You may want to run the animation again using the **Reset Simulation** button and the **Auto Capture / Play** button.

Q1. Briefly explain on the results appear on Event lists after packet transmission is successful

Q2. What you have learnt between utilization of **Capture / Forward** and **Auto Capture / Play** button?

Task 2: Run the simulation Using Scenario 1 - routed

Step 1. Switch to Scenario 1

Near the lower right of the GUI, the scenario is currently set at Scenario 0. Use the pull down menu to go to Scenario 1, where a broadcast packet is being sent from PC 6 to the broadcast address of **(f)**.

Step 2. Step through the Scenario 1

Click on the colored **Info** square next to this packet's listing in the **(g)** (or equivalently, click on the packet envelope displayed at PC 6) and examine the **OSI Model** and **Outbound PDU Details** views of the packet. Then click the **Capture / Forward** button and watch the **(h)**. Examine the packet at different points in its journey. If you receive a "Buffer Full" message, click the **(i)** button. The extent of these broadcasts defines **(j)**, which **(k)**. You may want to run the animation again using the **Reset Simulation** button and the **Auto Capture / Play** button or create your own scenarios where you add test packets to the network.

Q3. Briefly explain on the results appear on Event lists after packet transmission is successful.

Q4. What you have learnt between utilization of **Capture / Forward** and **Auto Capture / Play** button?

Q5. What you have learnt between Scenario 0 & scenario 1?

3.2 Router Packet Forwarding

Step 1. Enter Simulation mode and send the packet.

The file loads with Scenario 0, which has a predefined packet from PC_A to PC_B, listed in the User Created PDU window at the lower right. Double click on the **Fire** button once in Realtime mode that **(a)**. Click the **Simulation** tab to enter Simulation mode. The test packet will appear in both the **Event List** and on the logical topology. Use the **Inspect Tool ((b))** to open up the routing tables for Router0, Router1, and Router2. The routing table windows may overlap each others; move them to compare all three tables at one time.

Q1. What are the details in all routing tables?

Tips: Inspect the packet by clicking on the colored square in the **Info** column of the **Event List**.

Step 2. Trace the packet.

Use the **Capture / Forward** button to move the packet through the network. Inspect the packet at each step, particularly at the routers.

Q2. What you have learnt from the results in Event list?

Task 2: Run the simulation using Scenario 1, from PC_A to PC_C

Step 1. Move to Scenario 1.

Once you are done with Scenario 0, change to Scenario 1. You will still be in Simulation mode, so switch to Realtime mode long enough to allow the ping from PC_A to PC_C to show "Failed" in the **Last Status** column. This will (c). Switch back to Simulation mode. Inspect the packet by clicking on the colored square in the **Info** column of the **Event List**.

Step 2. Trace the packet.

Use the **Capture / Forward** button to move the packet through the network UNTIL it gets to PC_C. Click the **Capture / Forward** button to pause the packet. Inspect the packet at each step until PC_C, particularly at Router0 and Router1.

Q3. What you have learnt from the results in Event list?

Task 3: Continue running the simulation using Scenario 1, From PC_C to PC_A

Step 1. Trace the packet.

Use the **Capture / Forward** button to move the packet through the network. Inspect the packet at each step, in particular at Router1.

Q4. What you have learnt from Task 2 & Task 3?

Q5. What you have learnt between scenario 0 and scenario 1?



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Assessment	LABORATORY WORKS 3.2
Weight age	10% (LAB EXERCISE)
Course Outcome to achieve: CLO 3 - Calculate subnet masks and addresses to fulfill given requirements	

Student Name:

Student ID No:

INSTRUCTIONS: Answer ALL questions.

Chapter 3.2 OSI Network Layer & Addressing the Network – IPv4

3.2.1 Create a subnetting worksheet to show and record all work for each problem.

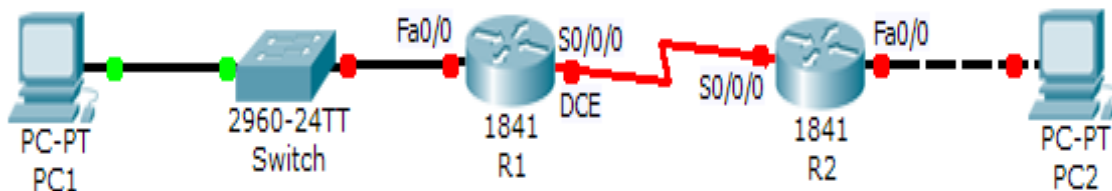


Figure 3.2.1.1

Task 1: Subnet the Address Space.

Step 1: Examine the network requirements.

You have been given the **192.168.1.0/24** address space to use in your network design. The network consists of the following segments:

- The LAN connected to router R1 will require enough IP addresses to support 15 hosts.
- The LAN connected to router R2 will require enough IP addresses to support 30 hosts.

- The link between router R1 and router R2 will require IP addresses at each end of the link.

Step 2: Consider the following questions when creating your network design.

Q1. How many subnets are needed for this network? _____

Q2. What is the subnet mask for this network in dotted decimal format?

Q3. What is the subnet mask for the network in slash format? _____

Q4. How many usable hosts are there per subnet? _____

Step 3: Assign subnetwork addresses to the Topology Diagram.

1. Assign second subnet to the network attached to R1.
2. Assign third subnet to the link between R1 and R2.
3. Assign fourth subnet to the network attached to R2.

Task 2: Determine Interface Addresses.

Step 1: Assign appropriate addresses to the device interfaces. Fill in Table 3.2.1.1

1. Assign the first valid host address in second subnet to the LAN interface on R1.
2. Assign the last valid host address in second subnet to PC1.
3. Assign the first valid host address in third subnet to the WAN interface on R1.
4. Assign the last valid host address in third subnet to the WAN interface on R2.
5. Assign the first valid host address in fourth subnet to the LAN interface of R2.
6. Assign the last valid host address in fourth subnet to PC2.

Table 3.2.1.1

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0			N/A
	S0/0/0			N/A
R2	Fa0/0			N/A
	S0/0/0			N/A
PC1	NIC			
PC2	NIC			

3.2.2 Create a variable-length subnet mask (VLSM) worksheet to show and record all work for each problem.

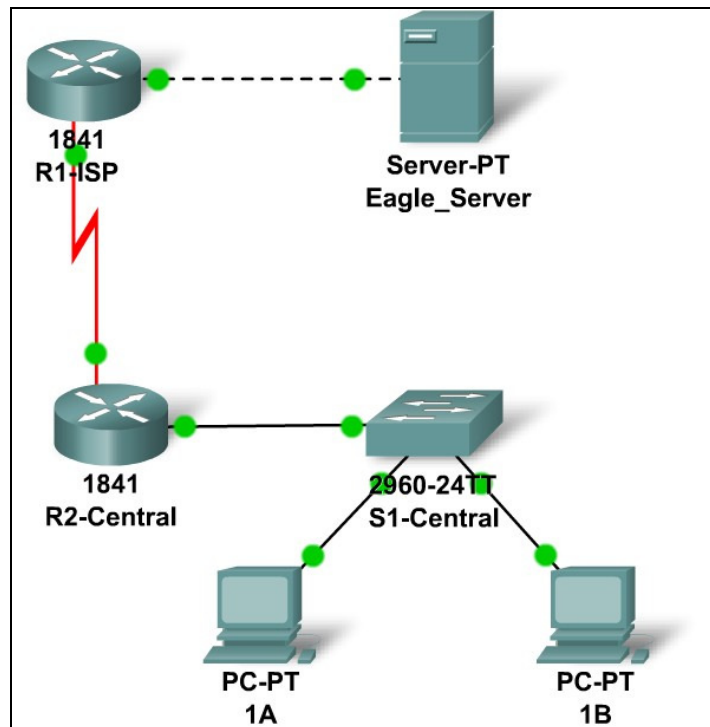


Figure 3.2.2.1

Task 1: IP Subnet Planning.

You have been given an IP address block of 192.168.23.0 /24. You must provide for existing networks as well as future growth.

Subnet assignments are:

- 1st subnet, existing student LAN (off of router R2-Central), up to 60 hosts;
- 2nd subnet, future student LAN, up to 28 hosts;
- 3rd subnet, existing ISP LAN, up to 12 hosts;
- 4th subnet, future ISP LAN, up to 6 hosts;

- 5th subnet, existing WAN, point-to-point link;
- 6th subnet, future WAN, point-to-point link;
- 7th subnet, future WAN, point-to-point link

Q1. Fill in Table **3.2.2.1**

Table 3.2.2.1

Subnet	Network Prefix	Subnet Mask	Network Address	Lowest host Address	Highest host Address	Broadcast Address
1st subnet, existing student LAN (off of router R2-Central), up to 60 hosts;						
2nd subnet, future student LAN, up to 28 hosts;						
3rd subnet, existing ISP LAN, up to 12 hosts;						
4th subnet, future ISP LAN, up to 6 hosts;						
5th subnet, existing WAN, point-to-point link;						
6th subnet, future WAN, point-to-point link;						
7th subnet, future WAN, point-to-point link.						

Interface IP addresses:

- For the server, configure the second highest usable IP address on the existing ISP LAN subnet.
- For R1-ISP's Fa0/0 interface, configure the highest usable IP address on the existing ISP LAN subnet.
- For R1-ISP's S0/0/0 interface, configure the highest usable address on the existing WAN subnet.

- For R2-Central's S0/0/0 interface, use the lowest usable address on the existing WAN subnet.
- For R2-Central's Fa0/0 interface, use the highest usable address on the existing student LAN subnet.
- For hosts 1A and 1B, use the first 2 IP addresses (two lowest usable addresses) on the existing student LAN subnet.

Q2. Fill in Table 3.2.2.2

Table 3.2.2.2

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1-ISP	Fa0/0			N/A
	S0/0/0			N/A
R2-Central	Fa0/0			N/A
	S0/0/0			N/A
PC 1A	NIC			
PC 1B	NIC			
Eagle Server	NIC			

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Assessment	LABORATORY WORKS 4
Weight age	10% (LAB EXERCISE)
Course Outcome to achieve: CLO 1 - Explain how communication works in data networks and the Internet.	

Student Name:

Student ID No:

INSTRUCTIONS: Answer ALL questions.

Chapter 4 Data Link Layer & OSI Physical Layer

4.1 Packet Tracing Across An Internetwork

Task 1: Trace HTTP-initiated Packets.

Step 1. Initialize the Network.

While in Realtime mode, open the **Web Browser** from the **Desktop** of the PC Client. Type **192.0.2.7** into the **URL** and press the **Go** button. The web page should be retrieved.

Q1. Draw the result appear on the web browser.

This process helps **(a)**.

Step 2. Set Event List Filters.

Switch to Simulation mode. We only want to capture HTTP events. In the **Event List Filters** section, click the **Edit Filters** button. Make sure only HTTP events is selected. By viewing HTTP events only, **(b)** are still occurring, but are not displayed. Sometimes, if an HTTP packet is buffered it causes **(c)**. This happens because **(d)**.

Step 3. Step through the simulation.

From the PC client's browser, click the **Go** button to request the web page again. Click the **Capture / Forward** button once and examine the packet. Then click **Capture / Forward** again and again, opening the packet for examination at each step in the process.

Q2. Briefly explain what you have learnt from the result appear in Event List.

When you are done analyzing the packets, switch to Realtime mode, and click on the **Power Cycle Devices** button to (e). When the link lights turn from red to green, return to Simulation mode.

Task 2: Observe the same situation, viewing more than just HTTP-initiated packets.

Step 1. View more protocols.

In the **Event List Filters** section, click the **Edit Filters** button. Select HTTP, DNS, TCP, UDP, ARP, and RIP. This will provide (a). It is similar (b).

Step 2. Step through the simulation.

Open the **Web Browser** of the PC client and type **eagle-server.example.com** into the **URL** and press the **Enter** key. Click the **Go** button. Click the **Capture / Forward** button repeatedly and view the complexities of this seemingly simple interaction of protocols. After the exchange the (c). This exchange will (d).

Q3. Briefly explain what you have learnt from the result appear in Event List.

4.2 Simple Wireless LAN Model

Task 1: Examine the Wireless network.

Step 1. Open the various devices and examine their configurations.

Examine the devices that make up the wireless network using both the **Physical** and the **Config** tabs. Note especially the following:

- Both the PC and the printer have a (a). Also click the **PC Wireless** button on the PC's **Desktop** tab.
- On the wireless router, also examine the contents of the **GUI** tab.
- The "Model of ISP" device is a Packet Tracer cluster. Click on it to open it and display the devices that it contains. When finished examining the devices, click (b) to close it.

Step 2. Verify connectivity in Realtime mode by opening a web page.

While in Realtime mode, open the **Web Browser** of the Home PC and type **myispweb.com** into the **URL** and press the **Go** button. The web page should be retrieved. This process helps (c).

Q1. Draw the result appear on the Web Browser.

Task 2: Run the simulation.

Step 1. Start the simulation.

Switch to Simulation mode. We want to capture only ICMP events. In the **Event List Filters** section, verify that only ICMP events are selected. The packet at the Home PC is a (a)

Step 2. Examine a ping packet at each step from the Home PC to the web server and back.

Examine the packet at the Home PC. Then click **Capture / Forward** again and again, opening the packet for examination at each step in the process.

Q2. Briefly explain what you have learnt from Event List.