CSE 421
Lab 2 :Observing DNS and ARP in Packet Tracer
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Introduction:

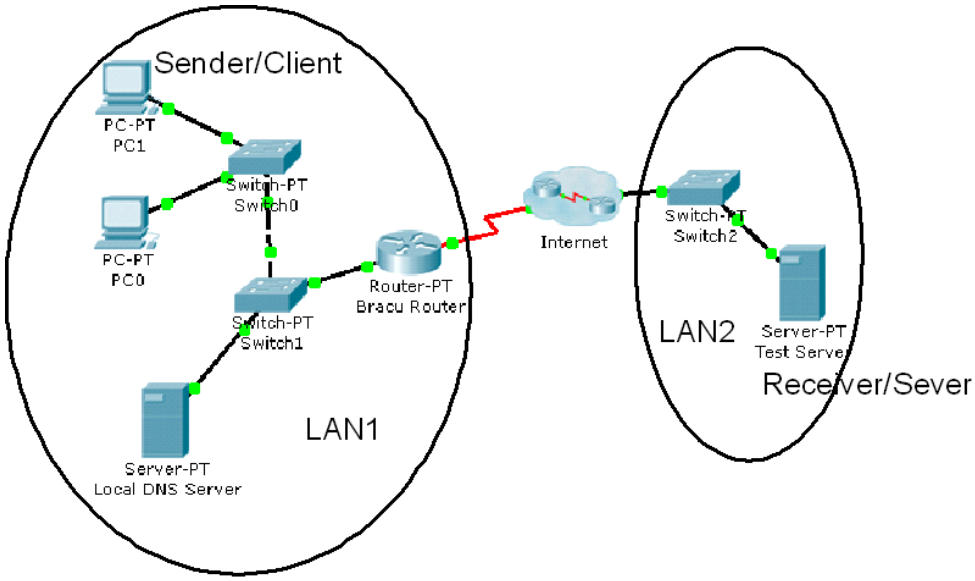
Simulation mode in Packet Tracer captures all network traffic flowing through the entire network . You will observe the packets involved in DNS and ARP process. These two protocols are the helping protocols when a web page is requested using HTTP.

Objectives:

1. Explore how PT uses the OSI Model and TCP/IP Protocols.
    - Creating a Simple PDU (test packet)
    - Switching from Realtime to Simulation Mode

2. Examine a Web Request Packet Processing and Contents
    - Accessing the PDU Information Window, OSI Model View
    - Investigating the layers and addresses in the OSI Model View
    - Animations of packet Flow

Task 1: Observe the network topology shown.

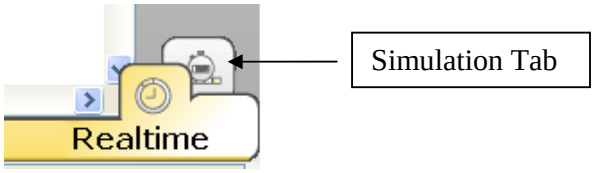


- **PC0**, **PC1** and the **Local DNS server**, **BRACU router** is part of a Local area network. BRACU router connects this LAN to the Internet through an ISP. The **Test server** shown is on another Local area network.
- You will access the web page **www.test.com** which is stored in the Test Web Server through PC1's web browser.
- To access this web page this activity will show you how and what packets are created and how the packets move through the network.
- For this activity we will only focus on DNS and ARP.

Task 1: Capture a web request using a URL from a PC.

Step 1 – Switching from Realtime to Simulation Mode

- In the far lower right of the PT interface is the toggle between Realtime and Simulation mode. PT always starts in realtime mode, in which networking protocols operate with realistic timings.



- In simulation mode, you can visually see the flow of packets when you send data from an application. A new window named "**Event List**" will appear. This window will show the packets (PDUs) as colored envelopes.
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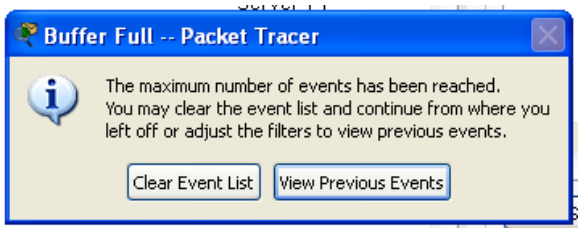
Step 2 – Run the simulation and capture the traffic.

- Click on the PC1. Click on the **Desktop tab**. Open the **Web Browser** from the **Desktop**.
- Write **www.test.com** into the browser. Clicking on **Go** will initiate a web server request. **Minimize** the PC1 Client window.
- Look at the Event List Window. Two packets appear in the **Event List**, a **DNS request** from **PC1** to the **Local DNS server** needed to resolve the URL "www.test.com" to the IP address of the Test server.
- Before the DNS request can be sent, we need to know the DNS Server's MAC address. So the 2nd PDU is the **ARP request** needed to resolve the IP address of the DNS server to its hardware MAC address.
- Now click the **Auto Capture / Play** button in the Event List Window to run the simulation and capture events.
- Sit tight and observe the packets flowing through the network.

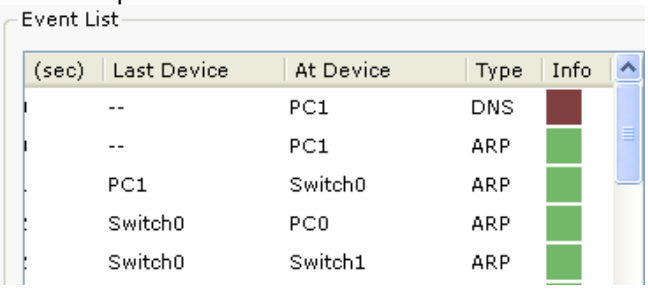


- When the above message appears Click "View Previous Events".
- Click on PC1. The web browser will now display a web page.
- Minimize the PC1 window again.

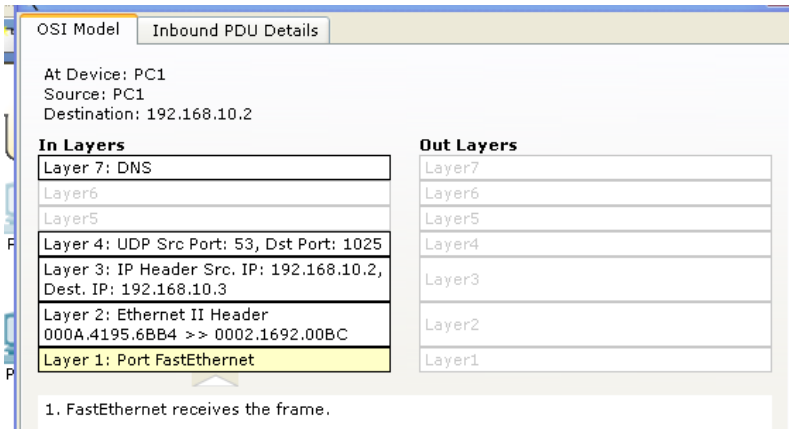
Step 3 – Examine the following captured traffic.

	Last Device	At Device	Type
1.	PC1	Switch 0	ARP
2.	Local DNS Server	Switch 1	ARP
3.	PC1	Switch 0	DNS
4.	Local DNS Server	Switch 1	DNS
5.	--	PC1	HTTP

- Find the following packets given in the table above in the **Event List**, and click on the colored square in the **Info** column.



- When you click on the Info square for a packet in the event list the **PDU information** window opens.



- This windows displays the OSI layers and the information at each layer for each device. (At Device).
- If you click on these layers, the algorithm used by the device (in this case, the PC) is displayed. View what is going on at each layer.
- Examine the PDU information for the remaining events in the exchange.

Packets 1&2 representing ARP packets:

Packet 1 represents the ARP request by PC1. Which devices' MAC addresses are included as source and destination?

The MAC address of PC1 is included as the source but there's no MAC address for the destination yet.

Why is PC1 sending an ARP packet?

PC1 needs to know the IP address of the test server from the DNS server. However, PC1 has the IP address of the DNS server not the MAC address. As a result, PC1 is sending ARP packet so that it gets to know the MAC address of the DNS server and ask for the IP address of the test server.

Why was this packet sent to all devices?

This packet was sent to all the devices because ARP is broadcasted unlike DNS packet which is sent to some particular devices. Broadcasting helps PC1 to get the MAC address of a device by matching the IP address with all the devices near to it.

Packet 2 represents the ARP reply by the Local DNS server. What is the difference in the devices' MAC addresses are included as source and destination?

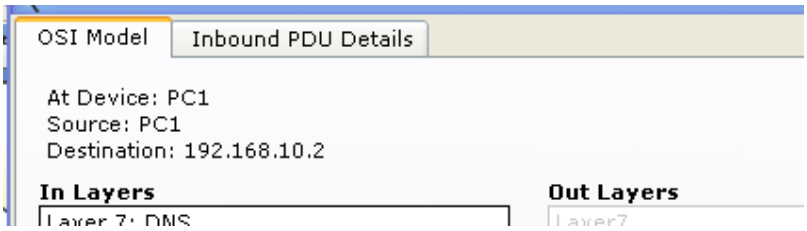
The difference in the device's MAC addresses are that packet 2 has the MAC address of the DNS server as the sender and the MAC address of PC1 as the destination.

Packets 3&4 representing DNS packets:

Packet 3 represents the DNS request made by PC1, why? Which devices' IP addresses are included as source and destination?

As PC1 got the MAC address of the Local DNS server, it now needs to go to Local DNS to get the IP address of the Test server. This is why a DNS request has been made by PC1. The IP address in the

source is that of PC1 and the IP address in the destination is that of the Local DNS server.



Click onto “Inbound PDU details” tab. Scroll down, you should come across “DNS Query”.
What is the purpose of this DNS Query?

The purpose of DNS query is to find out the IP address of the URL www.test.com that it contains.

Packet 4 is the reply from the DNS server, what is the difference between Packet 1 and Packet 2 source and destination IP addresses?

As packet 4 is the reply from the Local DNS server, the difference between the two packets is that the first one had the IP addresses of PC1 and the DNS server respectively as source and destination. However, the later one had the IP addresses of the DNS server and PC1 as the source and the destination.

For packet 4, click onto “Inbound PDU details” tab. Scroll down, do you see anything different after the DNS query?

Yes, something different I can see is that there is the DNS answer field which contains the IP address of the URL www.test.com.

Packets 5 is the HTTP request for the web page made by PC1.

Details of this packet will be observed later.