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

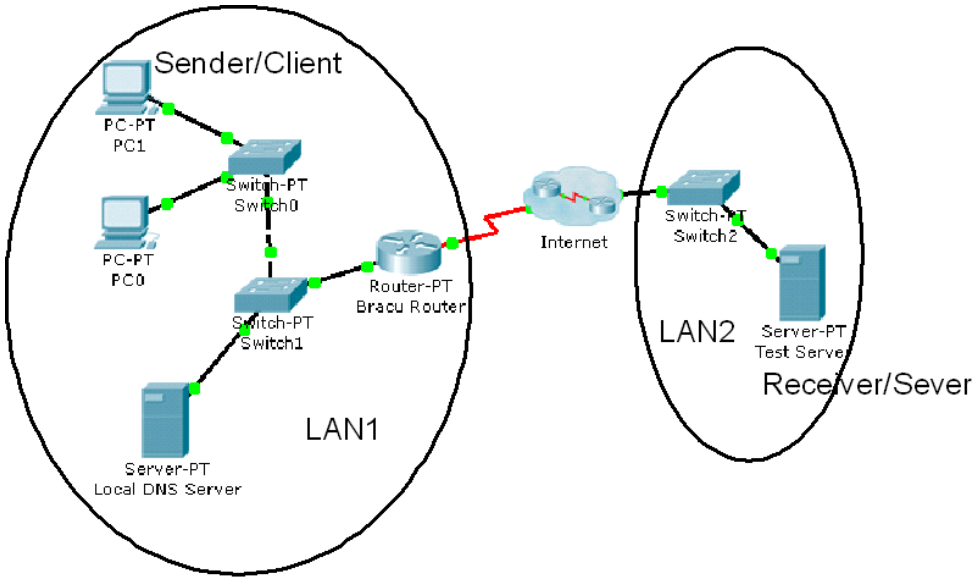
Simulation mode in Packet Tracer captures all network traffic flowing through the entire network . You will observe the packets involved in DNS and ARP process. These two protocols are the helping protocols when a web page is requested using HTTP.

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.

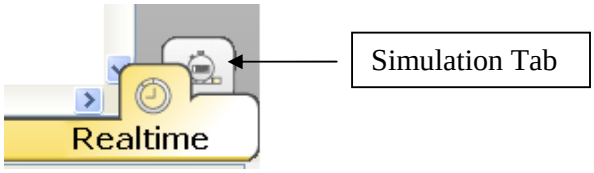


- **PC0**, **PC1** and the **Local DNS server**, **BRACU router** is part of a Local area network. BRACU router connects this LAN to the Internet through an ISP. The **Test server** shown is on another Local area network.
- You will access the web page **www.test.com** which is stored in the Test Web 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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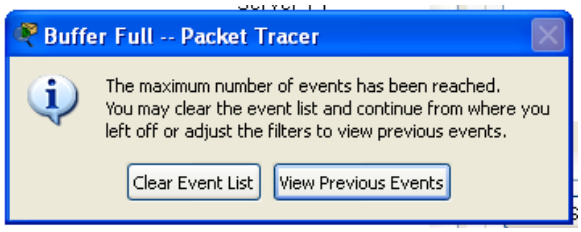
Step 2 – Run the simulation and capture the traffic.

- 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.

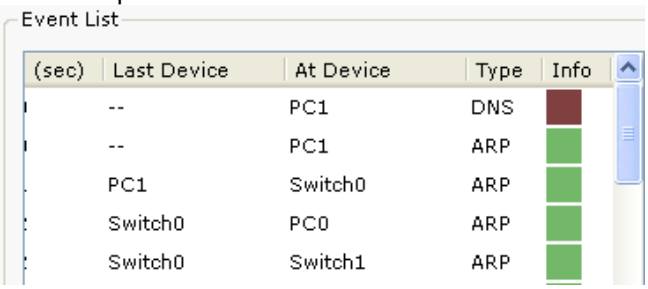


- When the above message appears Click "View Previous Events".
- Click on PC1. The web browser will now display a web page.
- Minimize the PC1 window again.

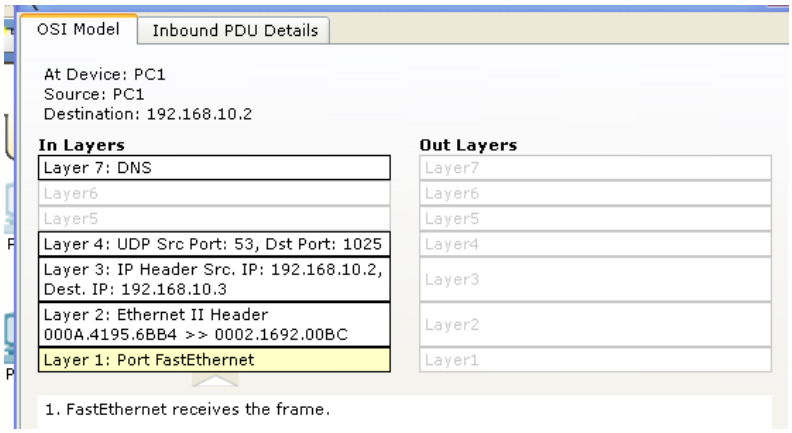
Step 3 – Examine the following captured traffic.

	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?

Since PC1 requested, its MAC address is the source. As it's a broadcast request for the local DNS server's MAC address, the destination MAC address is undefined.

Why is PC1 sending an ARP packet?

PC1 is sending an ARP packet to find the website's IP address; it must query a local DNS server. PC1 doesn't know DNS server's MAC address, so it can't request it. Therefore, it sends an ARP request for DNS server's MAC address.

Why was this packet sent to all devices?

As this was a broadcasting request, this packet was sent to all devices. If any device's IP address matches with the IP address provided in the request, PC1 will get the MAC address of that device and send it to all other devices.

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?

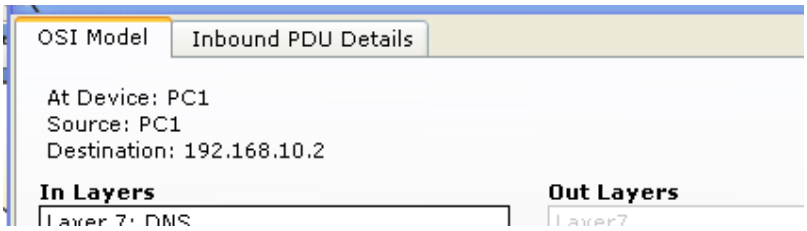
The MAC addresses of the local DNS servers are used as the source address in the ARP reply, while the MAC address of PC1 is used as the destination address. PC1 was unaware of the MAC address of the DNS servers, and as a result, it did not include the destination MAC address in its response. However, the DNS server was aware of the MAC address of PC1 when it responded to PC1.

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?

PC1's DNS request is represented by Packet 3, whose source IP address is PC1. In addition, PC1 will require the website's IP address. Now it's making a DNS request

to the host computer's DNS server. Due to the type of the request, the IP address of the DNS server is included in the destination IP address.



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 this DNS query is to know the www.test.com website's IP address as the class & type of this DNS query is 1.

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

In Packet 1, PC1's IP address is the source IP address and the DNS servers' IP address is the destination IP address. In Packet 2, however, PC1's IP address is the destination and the DNS servers' IP address is the source.

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

Yes, a concluding DNS response has been included.

The website's IP address has been provided by the DNS server in response to the DNS query.

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

Details of this packet will be observed later.