

COMPUTER NETWORKS LABORATORY

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5 'A'

WEEK – 7- Using Cisco packet tracer to understand the life of packet in internet.

Date: 28/10/2020

Create the following topology in packet tracer.

/---DNS

A – R1—R2

\--- Web Server

Open the browser in A and access the webserver using sitename (not using IP Address). Traverse each packet (in simulation mode) and answer the following for each packet Src IP, Dstn IP, Src Mac, Dstn MAC, pkt type (e.g. DNS, ARP, HTTP, TCP)

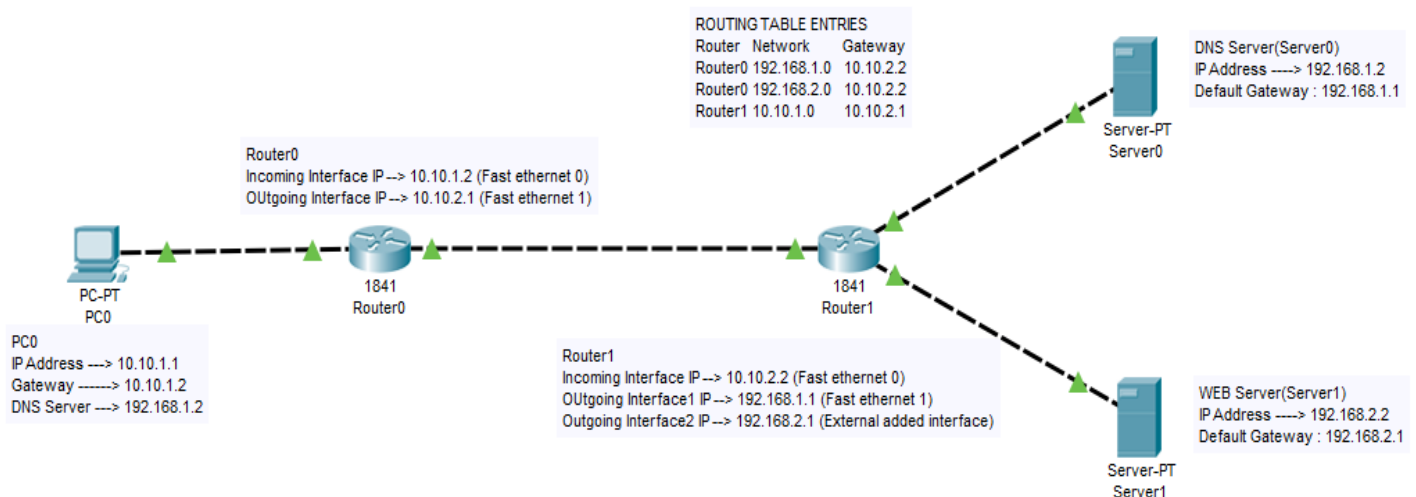
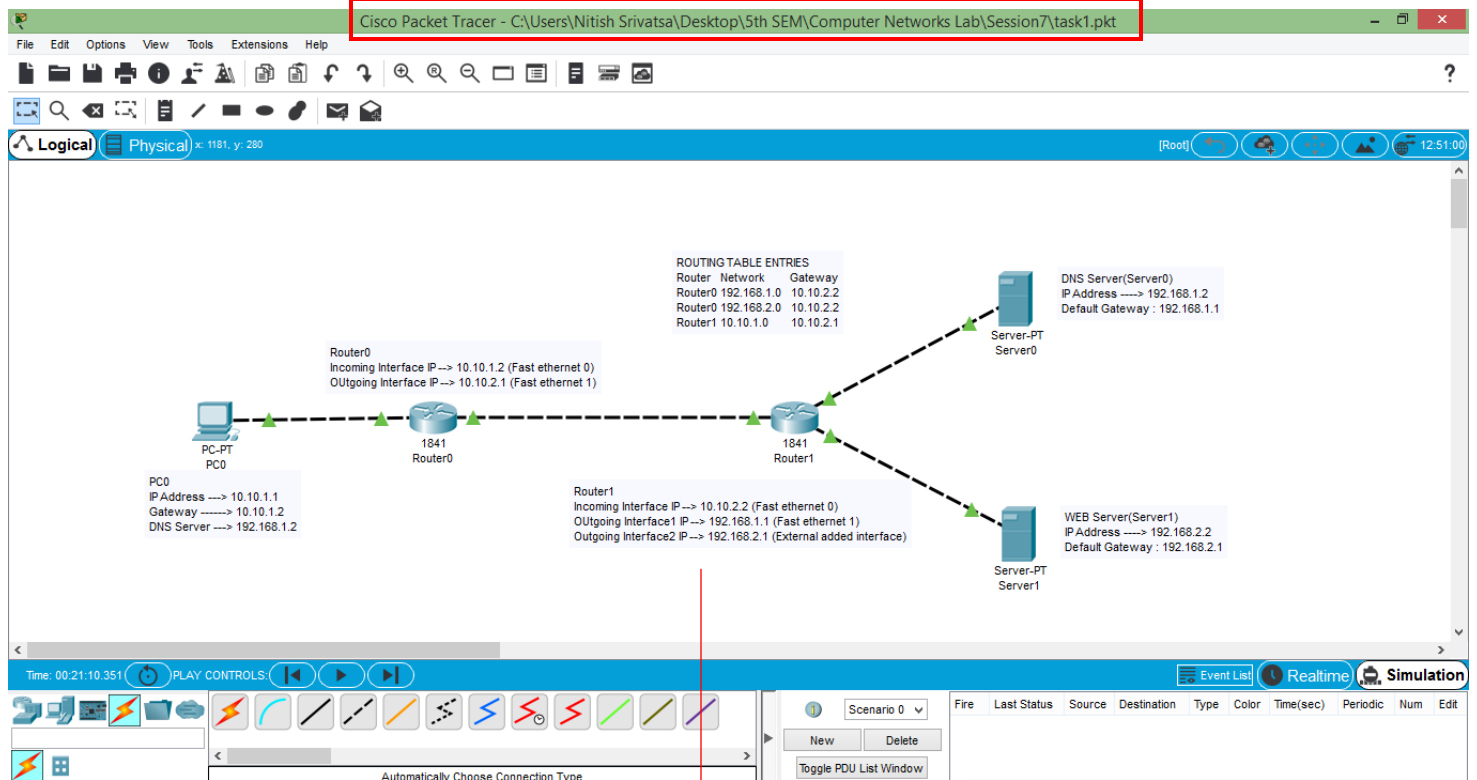
Observation: Does the number of packets traversed in the network change with second invocation of web request.

Experiment : Understanding the life of packet in internet.

Components Used : PC-Devices, DNS server, Web Server, Routers (everything on cisco packet tracer)

STEPS OF EXECUTION:

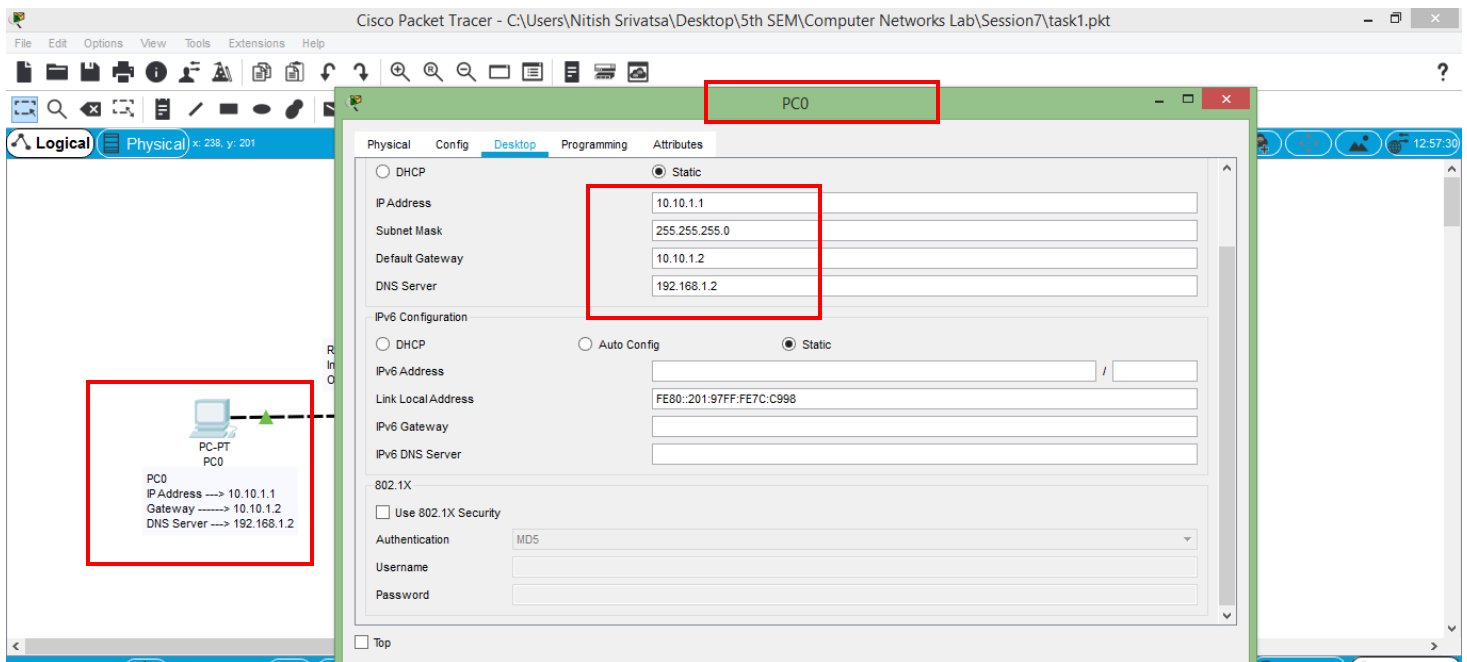
Step-1) The topology was constructed and configured using the given details.



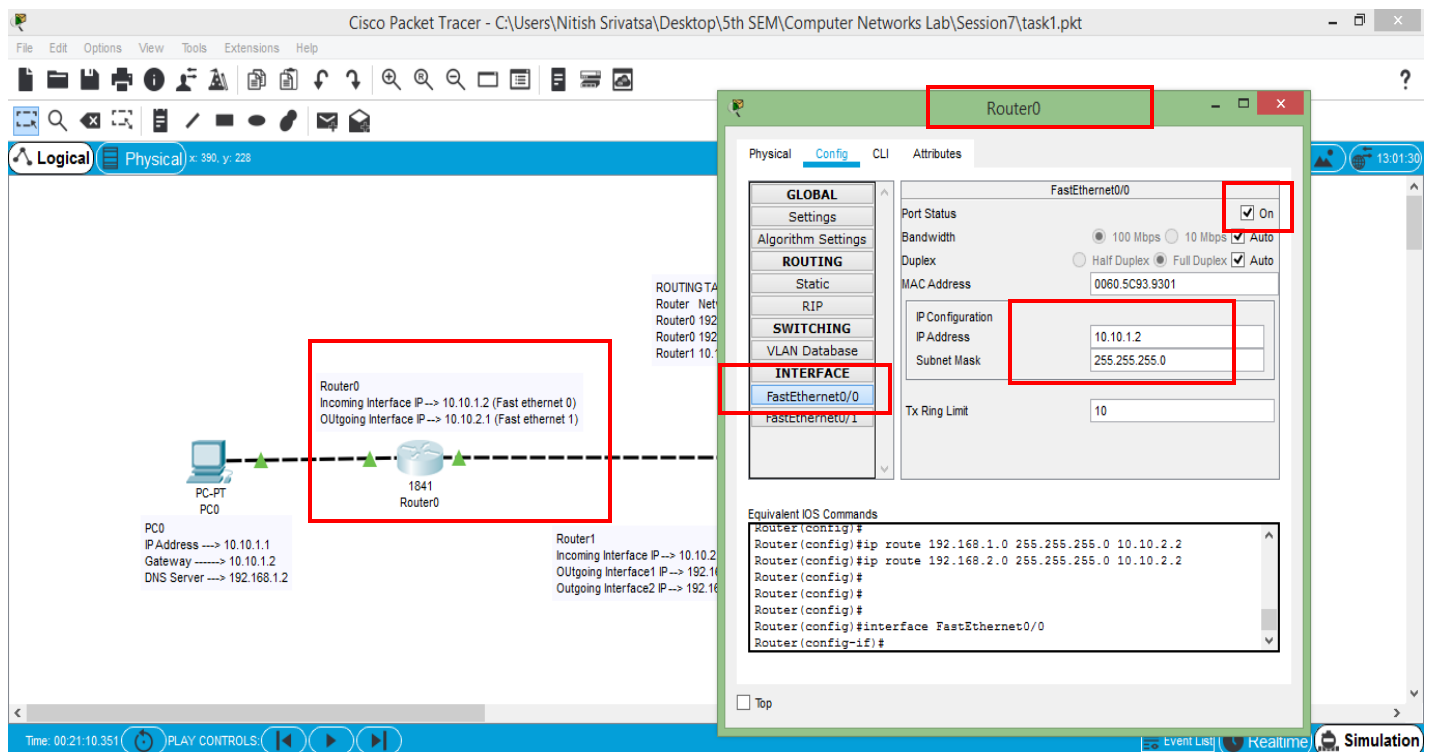
All the configurations made to the PCs, routers and the servers are named in boxes next to each of them.

Procedure of how configurations were made are shown for one PC, one router and one Server . Similar procedure are followed for all the other PCs, routers and Servers.

CONFIGURATION PROCEDURE FOR A PC:-



CONFIGURATION PROCEDURE FOR A ROUTER:-



Cisco Packet Tracer - C:\Users\Nitish Srivatsa\Desktop\5th SEM\Computer Networks Lab\Session7\task1.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 390, y: 228

ROUTING TABLE

Router0
Incoming Interface IP -> 10.10.1.2 (Fast ethernet 0)
OUTgoing Interface IP -> 10.10.2.1 (Fast ethernet 1)

PC0
IP Address -> 10.10.1.1
Gateway -> 10.10.1.2
DNS Server -> 192.168.1.2

Router1
Incoming Interface IP -> 10.10.2.2
OUTgoing Interface1 IP -> 192.168.1.1
OUTgoing Interface2 IP -> 192.168.1.2

Router0

FastEthernet0/1

Port Status ☒ On

Bandwidth 100 Mbps 10 Mbps ☒ Auto

Duplex Half Duplex Full Duplex ☒ Auto

MAC Address 0060.5C93.9302

IP Configuration

IP Address 10.10.2.1

Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#interface FastEthernet0/0  
Router(config-if)#  
Router(config-if)#exit  
Router(config)#interface FastEthernet0/1  
Router(config-if)#
```

ROUTING TABLE ENTRY FOR THE ROUTER0:-

Cisco Packet Tracer - C:\Users\Nitish Srivatsa\Desktop\5th SEM\Computer Networks Lab\Session7\task1.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 390, y: 228

ROUTING TABLE

Router0
Incoming Interface IP -> 10.10.1.2 (Fast ethernet 0)
OUTgoing Interface IP -> 10.10.2.1 (Fast ethernet 1)

PC0
IP Address -> 10.10.1.1
Gateway -> 10.10.1.2
DNS Server -> 192.168.1.2

Router1
Incoming Interface IP -> 10.10.2.2
OUTgoing Interface1 IP -> 192.168.1.1
OUTgoing Interface2 IP -> 192.168.1.2

Router0

Static Routes

Network

Mask

Next Hop

Add

Network Address

192.168.1.0/24 via 10.10.2.2

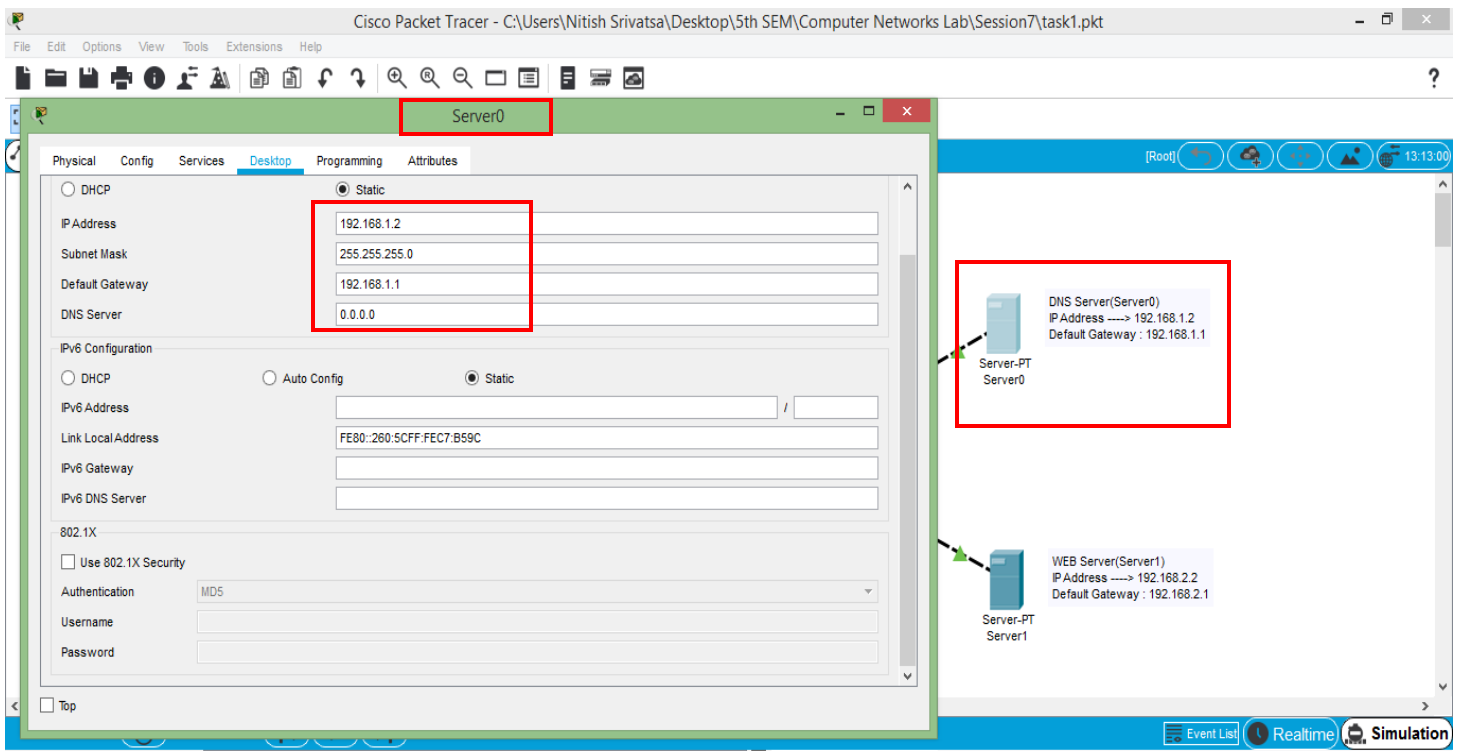
192.168.2.0/24 via 10.10.2.2

Remove

Equivalent IOS Commands

```
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#interface FastEthernet0/1  
Router(config-if)#  
Router(config-if)#exit  
Router(config)#  
Router(config)#
```

CONFIGURATION PROCEDURE FOR SERVER0 (DNS Server):-

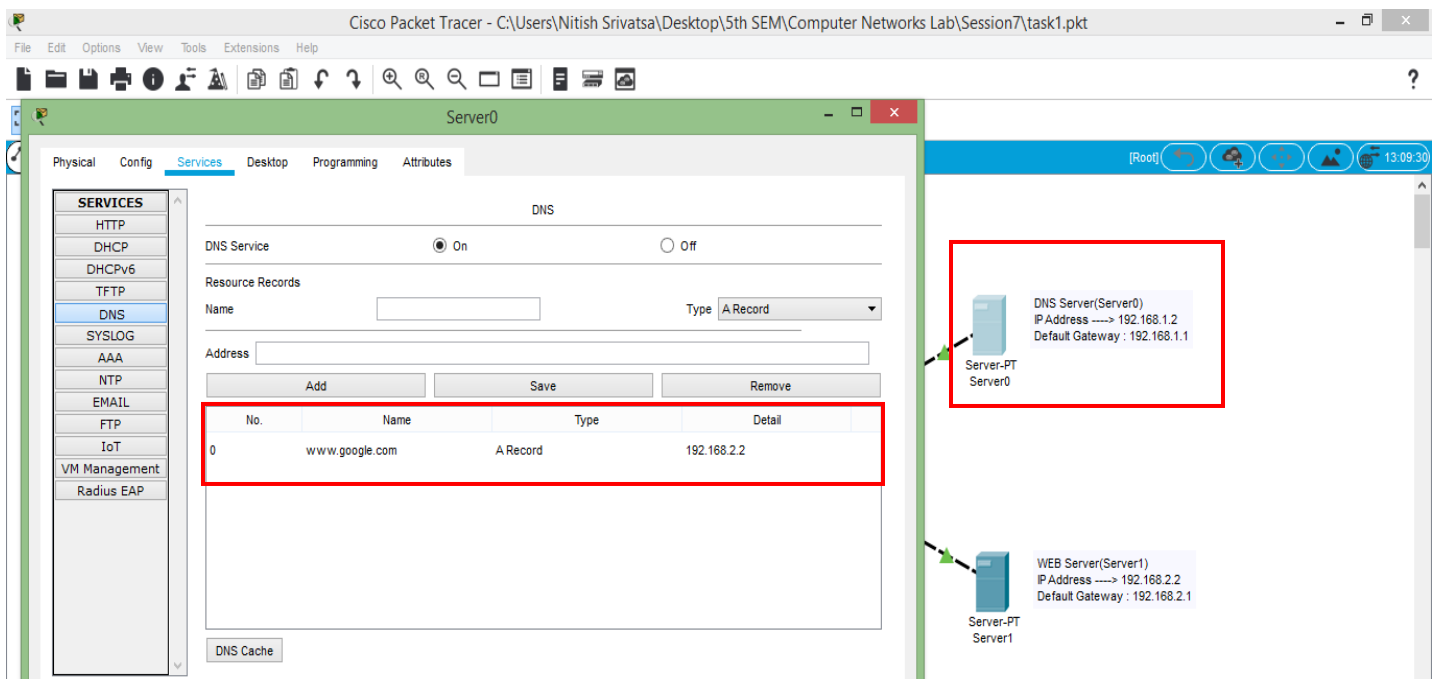


While configuring the DNS server (with the above information), a type-A record was also added:

Record-type: Type-A

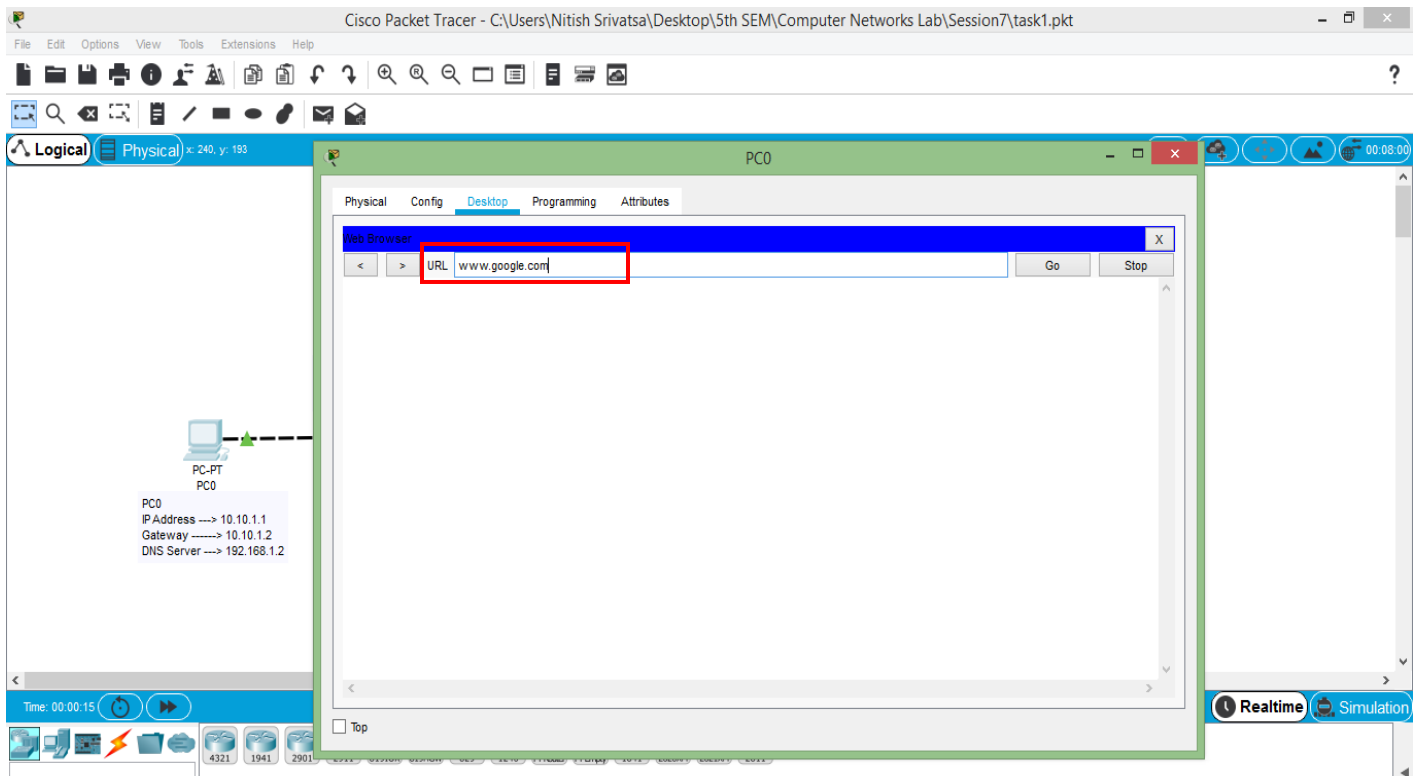
Name: google.com (NAME OF THE DOMAIN)

Address: IP address of web-server i.e. 192.168.2.2 (DOMAIN'S IP Address)



While configuring the Web Server (with the above information), the HTML page in the HTTP config information is checked and we can add information over there to see the output over there.

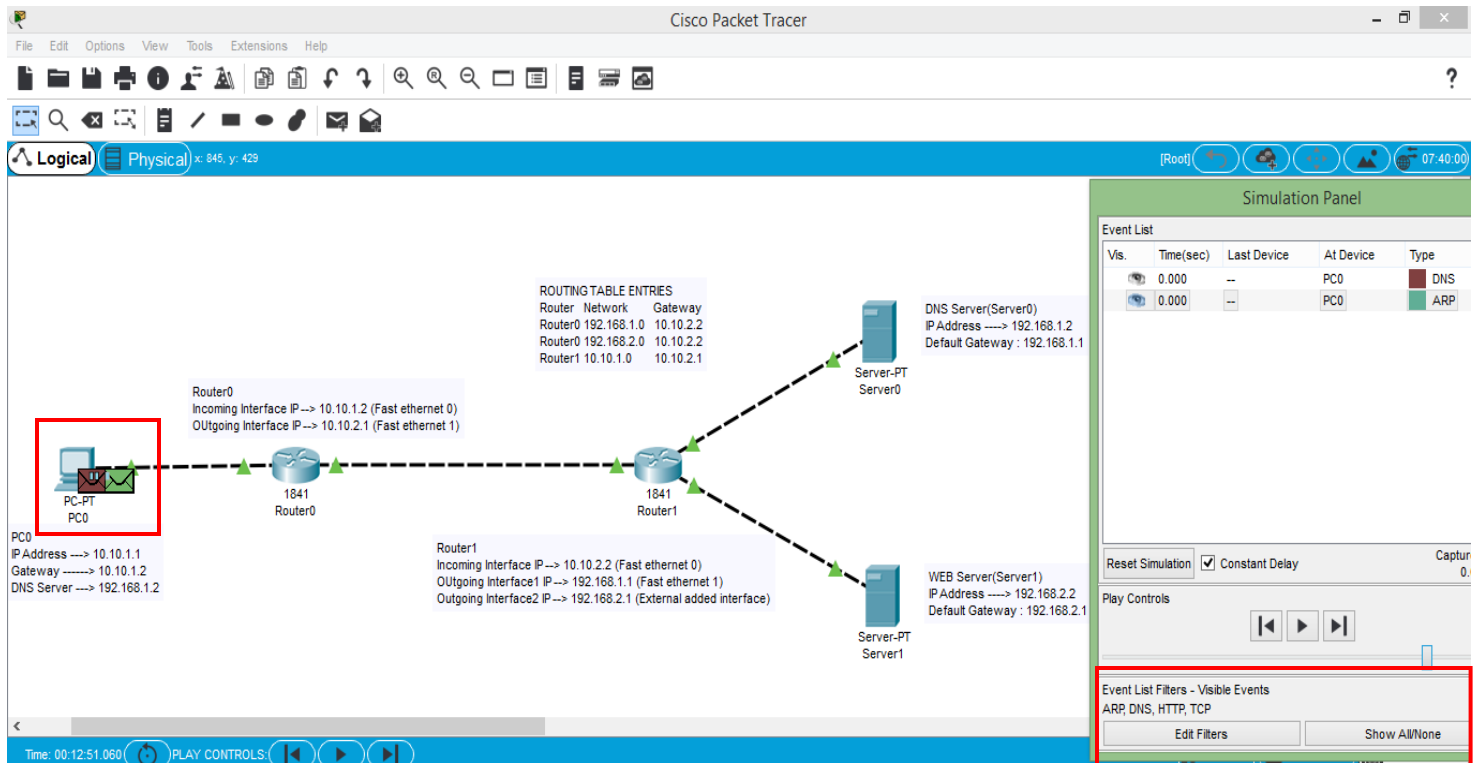
Step-2) As the topology is created and all the devices are configured, we open the PC's Web Browser on the cisco packet tracer and type the name of the domain to be looked for as "google.com".



Step-3) Now we open the packet tracer in the SIMULATION MODE and apply the filters on it for capturing only the following protocols :

- a. Transmission Control Protocol
- b. Address Resolution Protocol
- c. Domain Name Service
- d. Hyper Text Transfer Protocol

Simulation ready to begin:



The screenshot shows the Cisco Packet Tracer interface with a network topology. The network consists of two routers, Router0 and Router1, connected by a serial link. Router0 is connected to PC0 and a DNS Server. Router1 is connected to a WEB Server. The simulation is ready to begin, with the time set to 00:12:51.060.

ROUTING TABLE ENTRIES

Router	Network	Gateway
Router0	192.168.1.0	10.10.2.2
Router0	192.168.2.0	10.10.2.2
Router1	10.10.1.0	10.10.2.1

Router0
Incoming Interface IP → 10.10.1.2 (Fast ethernet 0)
Outgoing Interface IP → 10.10.2.1 (Fast ethernet 1)

Router1
Incoming Interface IP → 10.10.2.2 (Fast ethernet 0)
Outgoing Interface1 IP → 192.168.1.1 (Fast ethernet 1)
Outgoing Interface2 IP → 192.168.2.1 (External added interface)

PC0
IP Address → 10.10.1.1
Gateway → 10.10.1.2
DNS Server → 192.168.1.2

DNS Server(Server0)
IP Address → 192.168.1.2
Default Gateway : 192.168.1.1

WEB Server(Server1)
IP Address → 192.168.2.2
Default Gateway : 192.168.2.1

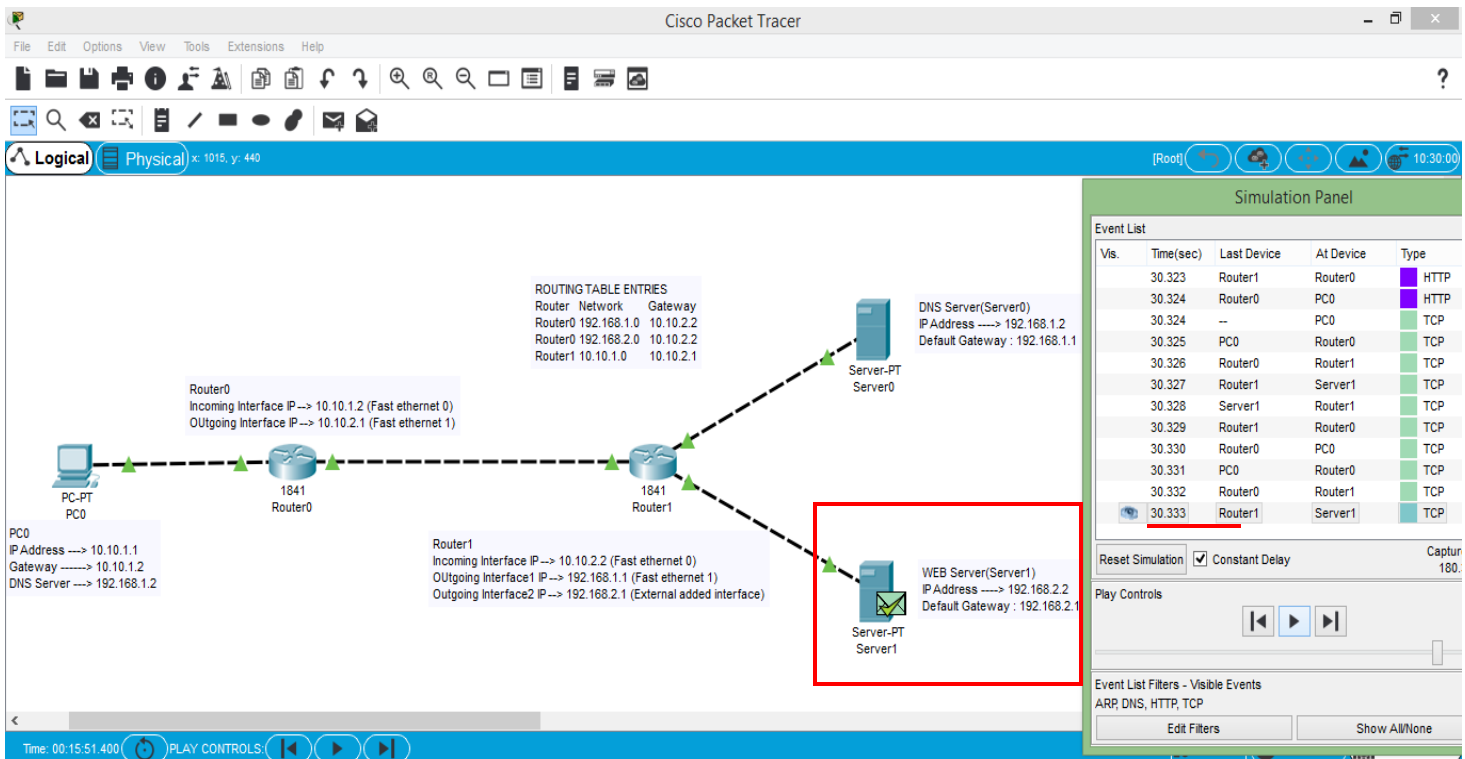
Simulation Panel

Vis.	Time(sec)	Last Device	At Device	Type
<input checked="" type="checkbox"/>	0.000	--	PC0	DNS
<input checked="" type="checkbox"/>	0.000	--	PC0	ARP

Event List Filters - Visible Events
ARP, DNS, HTTP, TCP

Event List Filters - Visible Events
ARP, DNS, HTTP, TCP

The First time Request:- (Screenshot shows completed execution)



The screenshot shows the Cisco Packet Tracer interface with the same network topology. The simulation has completed execution, and the time is now 00:15:51.400. The Event List shows the first time request (HTTP) from PC0 to the WEB Server (Server1) via Router0 and Router1.

ROUTING TABLE ENTRIES

Router	Network	Gateway
Router0	192.168.1.0	10.10.2.2
Router0	192.168.2.0	10.10.2.2
Router1	10.10.1.0	10.10.2.1

Router0
Incoming Interface IP → 10.10.1.2 (Fast ethernet 0)
Outgoing Interface IP → 10.10.2.1 (Fast ethernet 1)

Router1
Incoming Interface IP → 10.10.2.2 (Fast ethernet 0)
Outgoing Interface1 IP → 192.168.1.1 (Fast ethernet 1)
Outgoing Interface2 IP → 192.168.2.1 (External added interface)

PC0
IP Address → 10.10.1.1
Gateway → 10.10.1.2
DNS Server → 192.168.1.2

DNS Server(Server0)
IP Address → 192.168.1.2
Default Gateway : 192.168.1.1

WEB Server(Server1)
IP Address → 192.168.2.2
Default Gateway : 192.168.2.1

Simulation Panel

Vis.	Time(sec)	Last Device	At Device	Type
<input checked="" type="checkbox"/>	30.323	Router1	Router0	HTTP
<input checked="" type="checkbox"/>	30.324	Router0	PC0	HTTP
<input checked="" type="checkbox"/>	30.324	--	PC0	TCP
<input checked="" type="checkbox"/>	30.325	PC0	Router0	TCP
<input checked="" type="checkbox"/>	30.326	Router0	Router1	TCP
<input checked="" type="checkbox"/>	30.327	Router1	Server1	TCP
<input checked="" type="checkbox"/>	30.328	Server1	Router1	TCP
<input checked="" type="checkbox"/>	30.329	Router1	Router0	TCP
<input checked="" type="checkbox"/>	30.330	Router0	PC0	TCP
<input checked="" type="checkbox"/>	30.331	PC0	Router0	TCP
<input checked="" type="checkbox"/>	30.332	Router0	Router1	TCP
<input checked="" type="checkbox"/>	30.333	Router1	Server1	TCP

Event List Filters - Visible Events
ARP, DNS, HTTP, TCP

Event List Filters - Visible Events
ARP, DNS, HTTP, TCP

ENLARGED AND COMPLETE SIMULATION PANEL SCREENSHOT DURING THE FIRST REQUEST:-

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC0	DNS
	0.000	--	PC0	ARP
	0.001	PC0	Router0	ARP
	0.002	Router0	PC0	ARP
	0.002	--	PC0	DNS
	0.003	PC0	Router0	DNS
	0.003	--	Router0	ARP
	0.004	Router0	Router1	ARP
	0.005	Router1	Router0	ARP
	15.001	--	PC0	DNS
	15.002	PC0	Router0	DNS
	15.003	Router0	Router1	DNS
	15.003	--	Router1	ARP
	15.004	Router1	Server0	ARP
	15.005	Server0	Router1	ARP
	30.002	--	PC0	DNS
	30.003	PC0	Router0	DNS
	30.004	Router0	Router1	DNS
	30.005	Router1	Server0	DNS
	30.006	Server0	Router1	DNS
	30.007	Router1	Router0	DNS
	30.008	Router0	PC0	DNS
	30.008	--	PC0	TCP
	30.009	PC0	Router0	TCP
	30.010	Router0	Router1	TCP
	30.010	--	Router1	ARP

Reset Simulation ☒ Constant Delay Captured 180.340

Play Controls

Event List Filters - Visible Events
ARP, DNS, HTTP, TCP

Edit Filters Show All/None

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	30.010	--	Router1	ARP
	30.011	Router1	Server1	ARP
	30.012	Server1	Router1	ARP
	30.311	--	PC0	TCP
	30.312	PC0	Router0	TCP
	30.313	Router0	Router1	TCP
	30.314	Router1	Server1	TCP
	30.315	Server1	Router1	TCP
	30.316	Router1	Router0	TCP
	30.317	Router0	PC0	TCP
	30.317	--	PC0	HTTP
	30.318	PC0	Router0	TCP
	30.318	--	PC0	HTTP
	30.319	PC0	Router0	HTTP
	30.319	Router0	Router1	TCP
	30.320	Router0	Router1	HTTP
	30.320	Router1	Server1	TCP
	30.321	Router1	Server1	HTTP
	30.322	Server1	Router1	HTTP
	30.323	Router1	Router0	HTTP
	30.324	Router0	PC0	HTTP
	30.324	--	PC0	TCP
	30.325	PC0	Router0	TCP
	30.326	Router0	Router1	TCP
	30.327	Router1	Server1	TCP
	30.328	Server1	Router1	TCP

Reset Simulation ☒ Constant Delay Captured 180.340

Play Controls

Event List Filters - Visible Events
ARP, DNS, HTTP, TCP

Edit Filters Show All/None

Simulation Panel

Event List

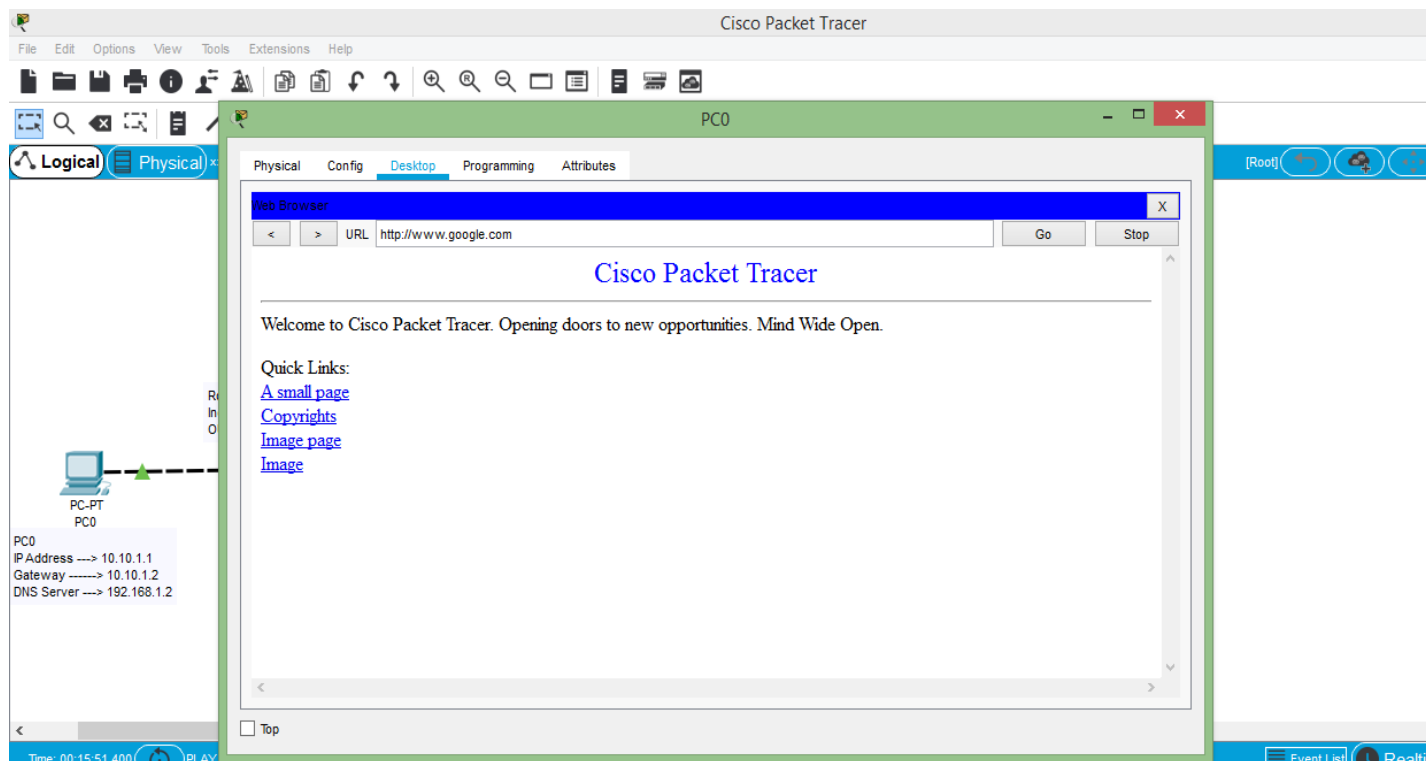
Vis.	Time(sec)	Last Device	At Device	Type
	30.313	Router0	Router1	TCP
	30.314	Router1	Server1	TCP
	30.315	Server1	Router1	TCP
	30.316	Router1	Router0	TCP
	30.317	Router0	PC0	TCP
	30.317	--	PC0	HTTP
	30.318	PC0	Router0	TCP
	30.318	--	PC0	HTTP
	30.319	PC0	Router0	HTTP
	30.319	Router0	Router1	TCP
	30.320	Router0	Router1	HTTP
	30.320	Router1	Server1	TCP
	30.321	Router1	Server1	HTTP
	30.322	Server1	Router1	HTTP
	30.323	Router1	Router0	HTTP
	30.324	Router0	PC0	HTTP
	30.324	--	PC0	TCP
	30.325	PC0	Router0	TCP
	30.326	Router0	Router1	TCP
	30.327	Router1	Server1	TCP
	30.328	Server1	Router1	TCP
	30.329	Router1	Router0	TCP
	30.330	Router0	PC0	TCP
	30.331	PC0	Router0	TCP
	30.332	Router0	Router1	TCP
	30.333	Router1	Server1	TCP

Reset Simulation ☒ Constant Delay Captured 180.340

Play Controls

Event List Filters - Visible Events
ARP, DNS, HTTP, TCP

Edit Filters Show All/None



On complete simulation, the above contents are displayed in the Web Browser tab of PC0 where the request was given.

For the first time request, the time taken to fetch the page is: 30.33sec (underlined in the screenshot).

The Second time Request:- (Screenshot shows completed execution)

The screenshot shows the network topology in Cisco Packet Tracer. The network consists of a PC-PT (PC0) connected to Router0 (1841), which is connected to Router1 (1841). Router1 is connected to two servers: DNS Server (Server0) and WEB Server (Server1). The configuration for each device is as follows:

- PC0:** IP Address 10.10.1.1, Gateway 10.10.1.2, DNS Server 192.168.1.2
- Router0 (1841):** Incoming Interface IP 10.10.1.2 (Fast ethernet 0), Outgoing Interface IP 10.10.2.1 (Fast ethernet 1)
- Router1 (1841):** Incoming Interface IP 10.10.2.2 (Fast ethernet 0), Outgoing Interface1 IP 192.168.1.1 (Fast ethernet 1), Outgoing Interface2 IP 192.168.2.1 (External added interface)
- DNS Server (Server0):** IP Address 192.168.1.2, Default Gateway 192.168.1.1
- WEB Server (Server1):** IP Address 192.168.2.2, Default Gateway 192.168.2.1

The Event List panel on the right shows the sequence of events for the second request. The table below represents the data from the Event List:

Vis.	Time(sec)	Last Device	At Device	Type
	0.016	Router1	Server1	HTT
	0.017	Server1	Router1	HTT
	0.018	Router1	Router0	HTT
	0.019	Router0	PC0	HTT
	0.019	---	PC0	TCP
	0.020	PC0	Router0	TCP
	0.021	Router0	Router1	TCP
	0.022	Router1	Server1	TCP
	0.023	Server1	Router1	TCP
	0.024	Router1	Router0	TCP
	0.025	Router0	PC0	TCP
	0.026	PC0	Router0	TCP
	0.027	Router0	Router1	TCP
	0.028	Router1	Server1	TCP

The Event List panel also includes a 'Reset Simulation' button, a 'Constant Delay' checkbox, and a 'Captured to:' field showing '300.506 s'. The 'Play Controls' section shows the simulation is running.

ENLARGED AND COMPLETE SIMULATION PANEL SCREENSHOT DURING THE SECOND REQUEST:-

Simulation Panel				
Event List				
Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC0	DNS
	0.001	PC0	Router0	DNS
	0.002	Router0	Router1	DNS
	0.003	Router1	Server0	DNS
	0.004	Server0	Router1	DNS
	0.005	Router1	Router0	DNS
	0.006	Router0	PC0	DNS
	0.006	--	PC0	TCP
	0.007	PC0	Router0	TCP
	0.008	Router0	Router1	TCP
	0.009	Router1	Server1	TCP
	0.010	Server1	Router1	TCP
	0.011	Router1	Router0	TCP
	0.012	Router0	PC0	TCP
	0.012	--	PC0	HTTP
	0.013	PC0	Router0	HTTP
	0.013	--	PC0	HTTP
	0.014	PC0	Router0	HTTP
	0.014	Router0	Router1	TCP
	0.015	Router0	Router1	HTTP
	0.015	Router1	Server1	TCP
	0.016	Router1	Server1	HTTP
	0.017	Server1	Router1	HTTP
	0.018	Router1	Router0	HTTP
	0.019	Router0	PC0	HTTP
	0.019	--	PC0	TCP
	0.020	PC0	Router0	TCP
	0.021	Router0	Router1	TCP

☒ Constant Delay
 Capture 300.5

Play Controls

Event List Filters - Visible Events
ARR, DNS, HTTP, TCP

Simulation Panel				
Event List				
Vis.	Time(sec)	Last Device	At Device	Type
	0.007	PC0	Router0	TCP
	0.008	Router0	Router1	TCP
	0.009	Router1	Server1	TCP
	0.010	Server1	Router1	TCP
	0.011	Router1	Router0	TCP
	0.012	Router0	PC0	TCP
	0.012	--	PC0	HTTP
	0.013	PC0	Router0	TCP
	0.013	--	PC0	HTTP
	0.014	PC0	Router0	HTTP
	0.014	Router0	Router1	TCP
	0.015	Router0	Router1	HTTP
	0.015	Router1	Server1	TCP
	0.016	Router1	Server1	HTTP
	0.017	Server1	Router1	HTTP
	0.018	Router1	Router0	HTTP
	0.019	Router0	PC0	HTTP
	0.019	--	PC0	TCP
	0.020	PC0	Router0	TCP
	0.021	Router0	Router1	TCP
	0.022	Router1	Server1	TCP
	0.023	Server1	Router1	TCP
	0.024	Router1	Router0	TCP
	0.025	Router0	PC0	TCP
	0.026	PC0	Router0	TCP
	0.027	Router0	Router1	TCP
	0.028	Router1	Server1	TCP

☒ Constant Delay
 Capture 300.5

Play Controls

Event List Filters - Visible Events
ARR, DNS, HTTP, TCP

On complete simulation, the same contents are displayed in the Web Browser tab of PC0 where the request for the page was made.

But during the second time request , the time taken to fetch the request is: 0.028sec (underlined in the screenshot)

The reason for such a difference in time in the 2 requests(First request 30.33sec and second request 0.028sec) being that DNS upon the first request of the web-server from the client cached the DNS-name and the IP address in its local DNS

cache and on the subsequent request again doesn't need to search for the web-server again.

The ARP packets flowing were only seen in the first DNS request and not in the subsequent request as because of the DNS cache. All other packets i.e. TCP, HTTP and DNS were seen in both the web-server requests.

OBSERVATIONS:-

The color coding was observed in the simulation mode :

ARP : Dark green

HTTP : Purple

DNS : Brown

TCP : Green
