LAB-3

DATA COMMUNICATIONS NETWORKS

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15010473 - section 8

“ Introduction to Packet Tracer“ Lab Report

&

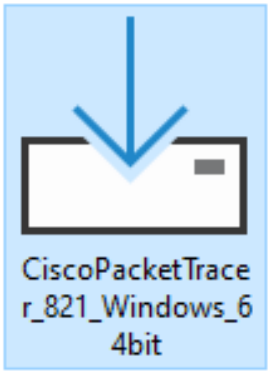
A Short 2-Page Report About “Ping and ICMP”

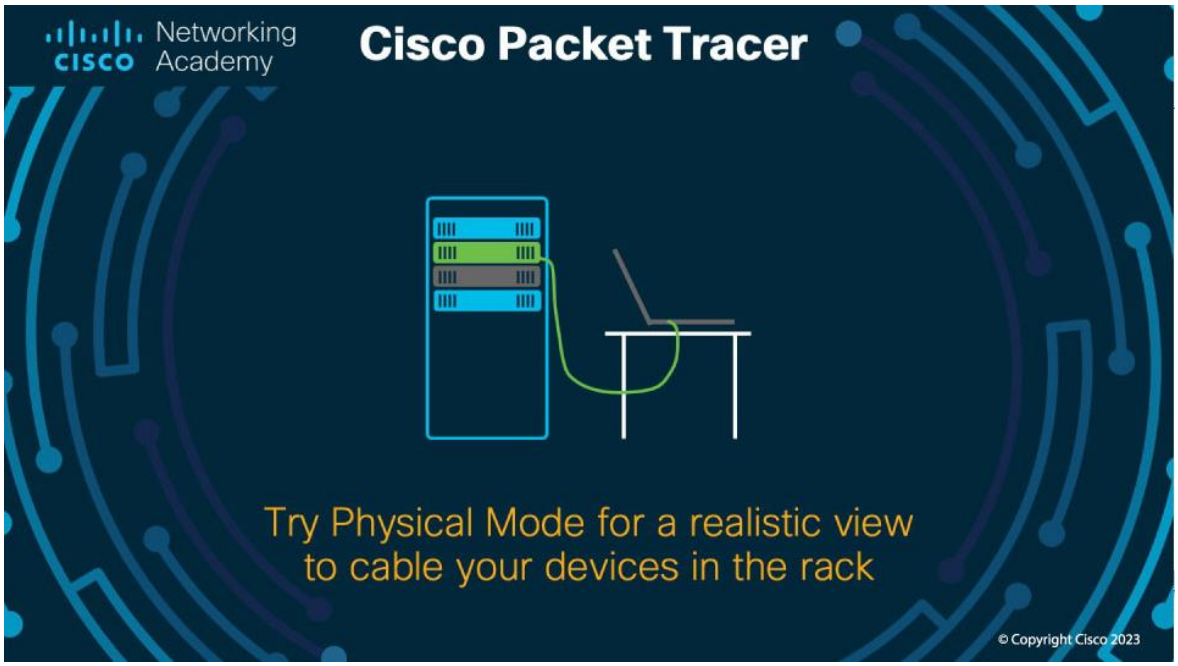
1. “ Introduction to Packet Tracer“ Lab Report

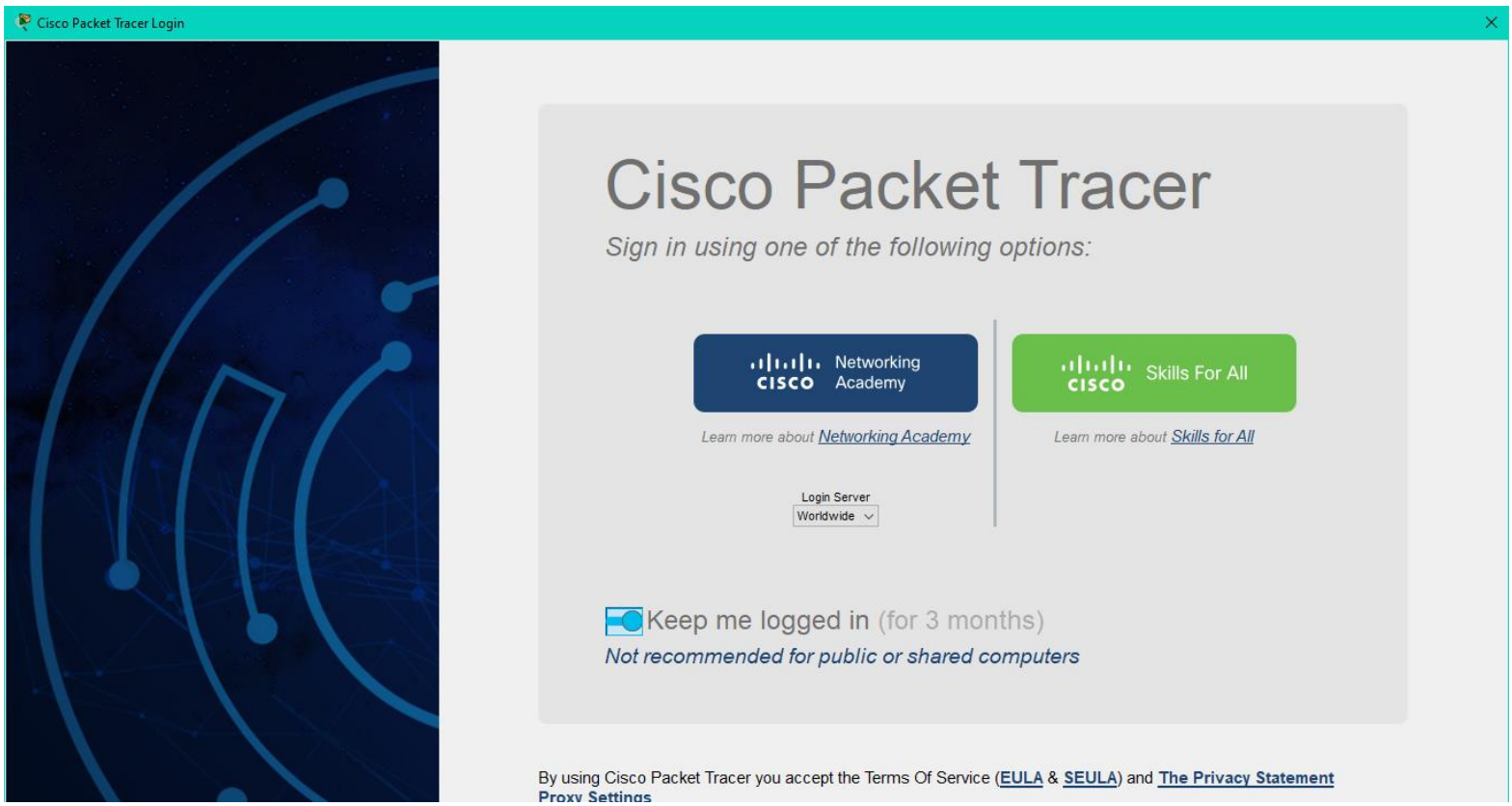
Part 1:Packet Tracer:

Introduction to the Packet Tracer Interface using a simple network (Hub and PCs):

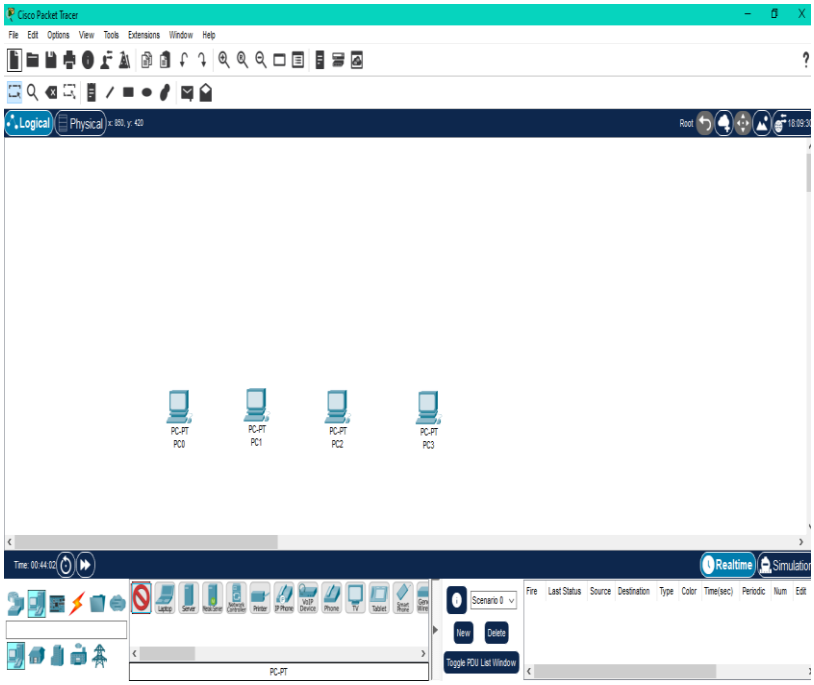
Downloading & installation:

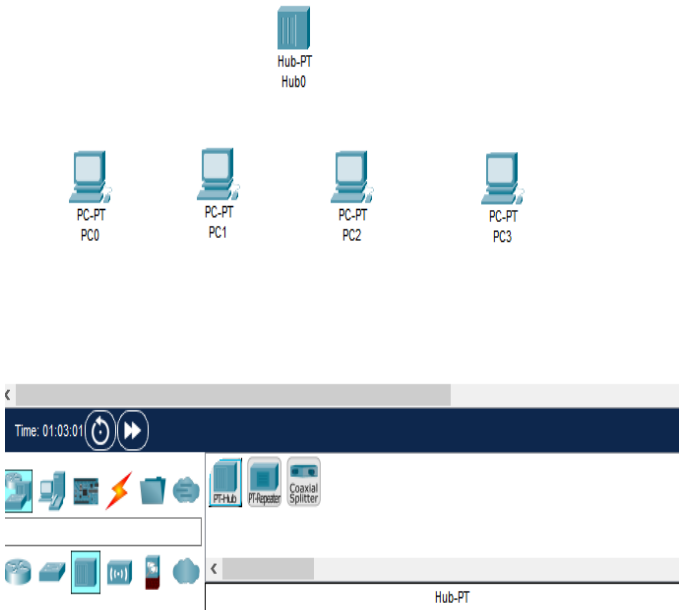




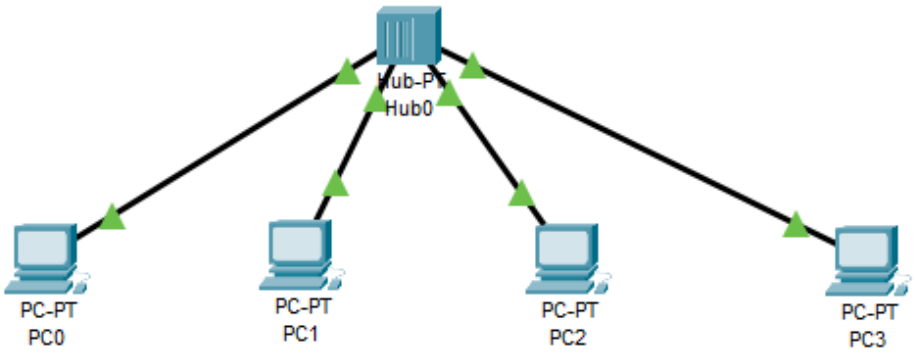


Step 1,2,&3 :

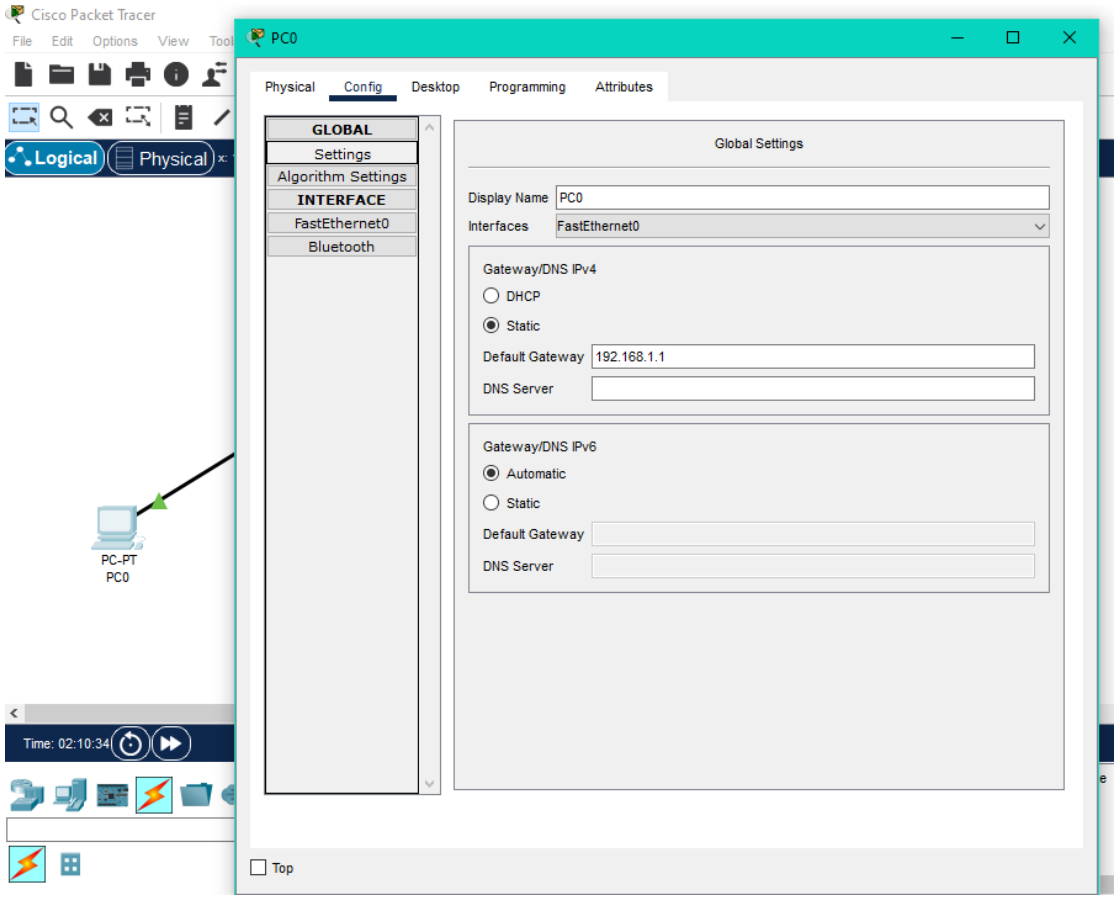


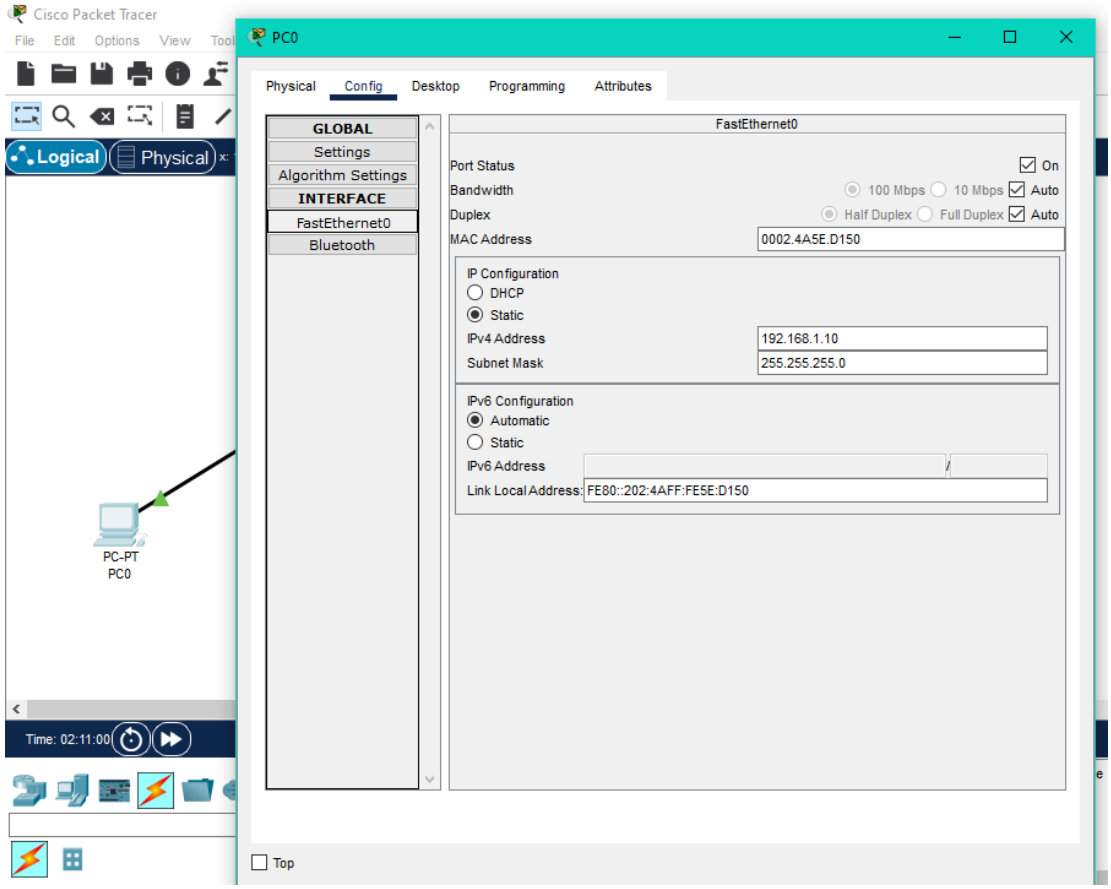


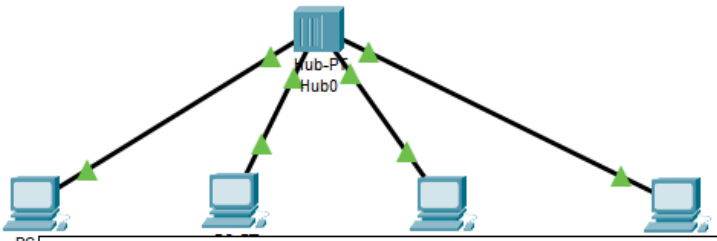
Step 4:



Step 5:


Cisco Packet Tracer
File Edit Options View Tool
Logical Physical
PC-PT
PC0
Time: 02:10:34
PC0
Physical Config Desktop Programming Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name PC0
Interfaces FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway 192.168.1.1
DNS Server
Gateway/DNS IPv6
Automatic
Static
Default Gateway
DNS Server
Top


Cisco Packet Tracer
File Edit Options View Tool
Logical Physical
PC-PT
PC0
Time: 02:11:00
PC0
Physical Config Desktop Programming Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
FastEthernet0
Port Status On
Bandwidth 100 Mbps 10 Mbps Auto
Duplex Half Duplex Full Duplex Auto
MAC Address 0002.4A5E.D150
IP Configuration
DHCP
Static
IPv4 Address 192.168.1.10
Subnet Mask 255.255.255.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address FE80::202:4AFF:FE5E:D150
Top

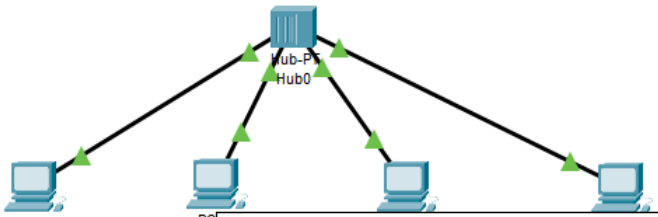



```
Device Name: PC0
Device Model: PC-PT

Port            Link   IP Address         IPv6 Address                          MAC Address
FastEthernet0   Up     192.168.1.10/24    <not set>                             0002.4A5E.D150
Bluetooth       Down   <not set>          <not set>                             0090.21C1.1C6D

Gateway: 192.168.1.1
DNS Server: <not set>
Line Number:  <not set>

Physical Location: Intercity > Home City > Corporate Office > PC0
```

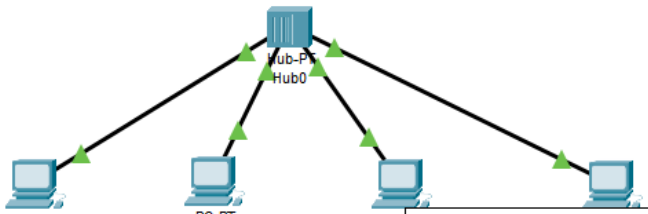



```
Device Name: PC1
Device Model: PC-PT

Port            Link   IP Address         IPv6 Address                          MAC Address
FastEthernet0   Up     192.168.1.11/24    <not set>                             0001.64E0.0749
Bluetooth       Down   <not set>          <not set>                             0030.F20D.05B2

Gateway: 192.168.1.1
DNS Server: <not set>
Line Number:  <not set>

Physical Location: Intercity > Home City > Corporate Office > PC1
```

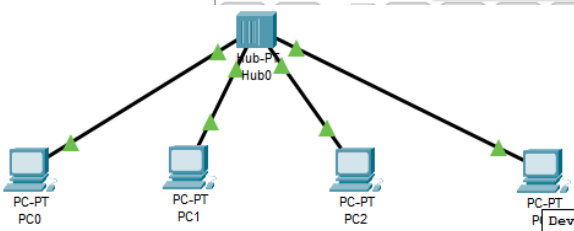



```
Device Name: PC2
Device Model: PC-PT

Port            Link   IP Address         IPv6 Address                          MAC Address
FastEthernet0   Up     192.168.1.12/24    <not set>                             0060.70A3.BC31
Bluetooth       Down   <not set>          <not set>                             000B.BE28.B850

Gateway: 192.168.1.1
DNS Server: <not set>
Line Number:  <not set>

Physical Location: Intercity > Home City > Corporate Office > PC2
```



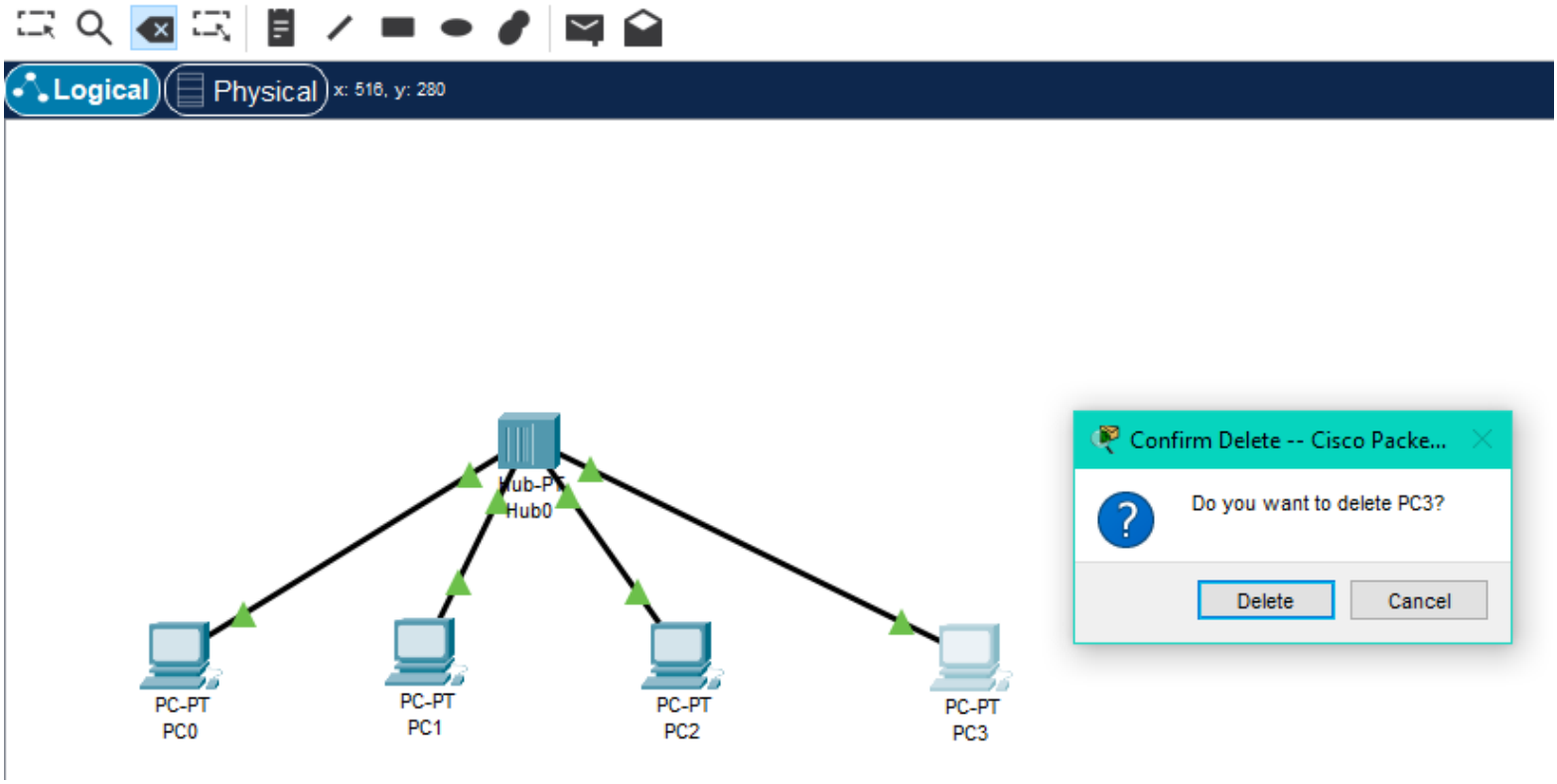

```
Device Name: PC3
Device Model: PC-PT

Port            Link   IP Address         IPv6 Address                          MAC Address
FastEthernet0   Up     192.168.1.13/24    <not set>                             0090.0C2C.582B
Bluetooth       Down   <not set>          <not set>                             0060.700B.1A82

Gateway: 192.168.1.1
DNS Server: <not set>
Line Number:  <not set>

Physical Location: Intercity > Home City > Corporate Office > PC3
```

Last Step In Part 1: Deleting a Device or Link:



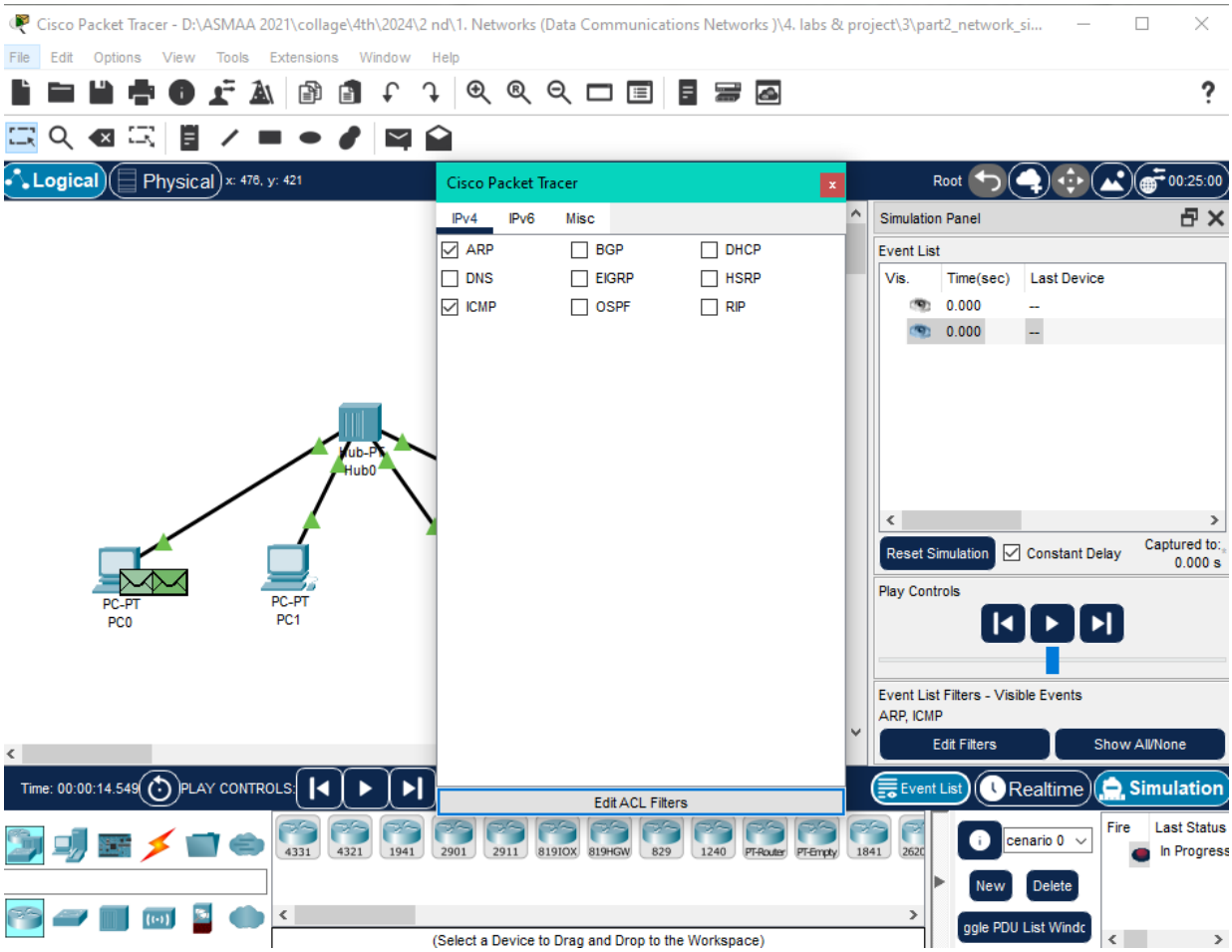
Part 2 :Network Simulation: by using the simulator to simulate traffic between hosts.

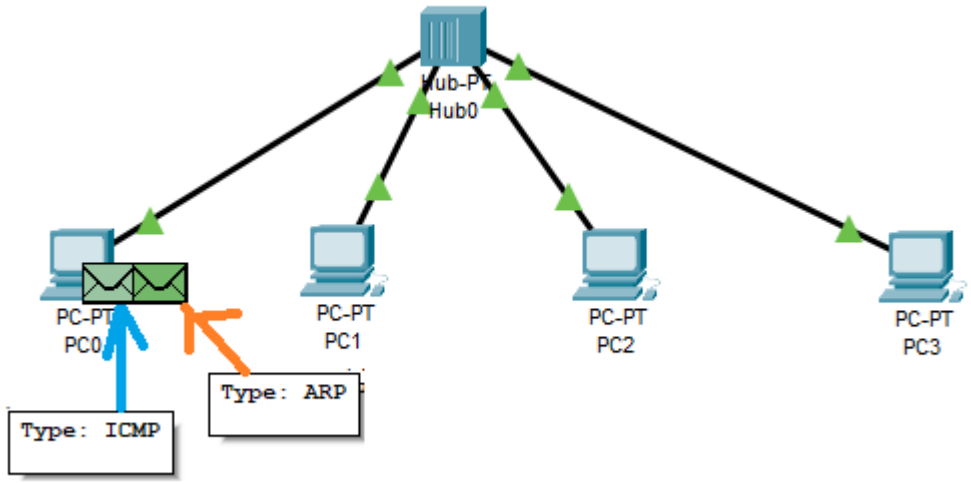
Task1: Observing the flow of data from PC0 to PC3 after creating network traffic:

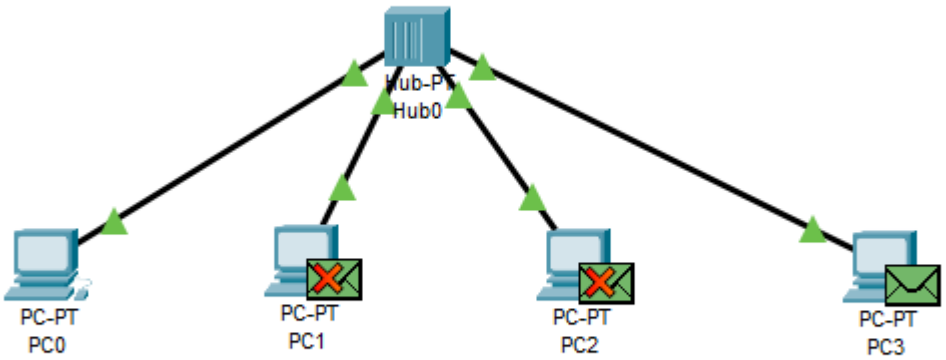
A. PC0 pinging PC3 Using the "Add Simple PDU" tool

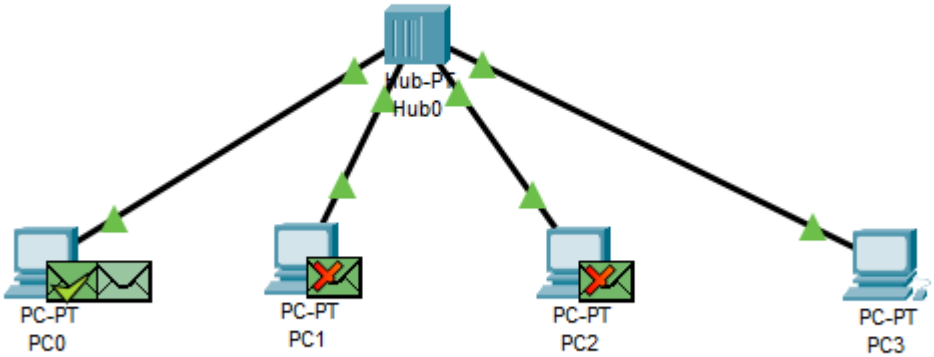
After running the simulation play button, We can easily notice that:

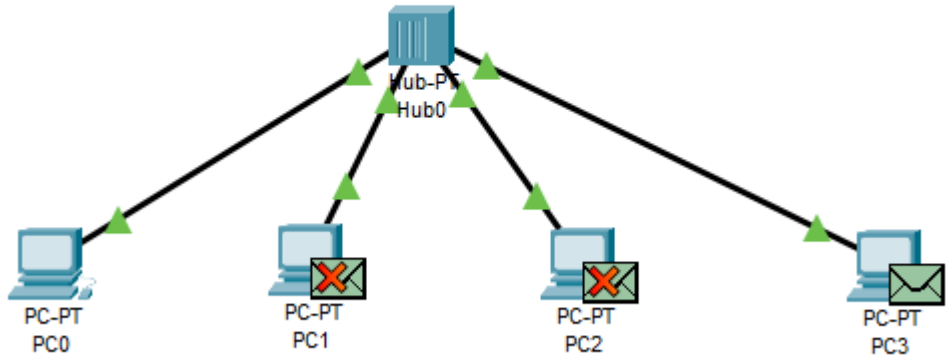
1. An ARP Request might first be sent before the ICMP Echo Request, ping, is even sent out by the PC0.
2. Choosing the Reset Simulation button in the Simulation window will make the ARP envelope is no longer present. Because, this has reset the simulation but has not cleared any configuration changes or MAC / ARP table entries.

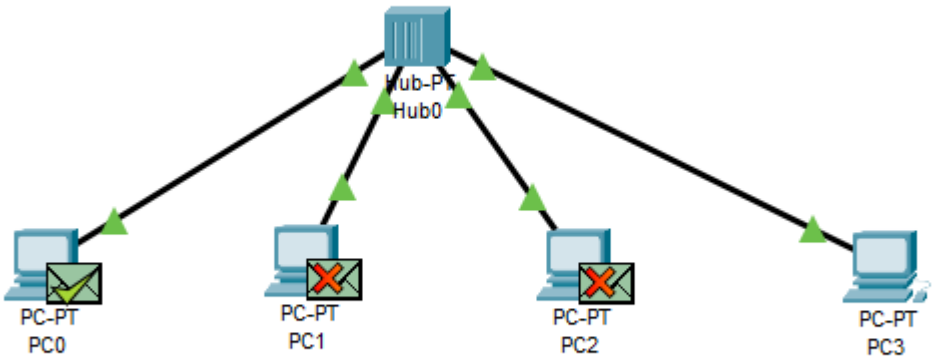


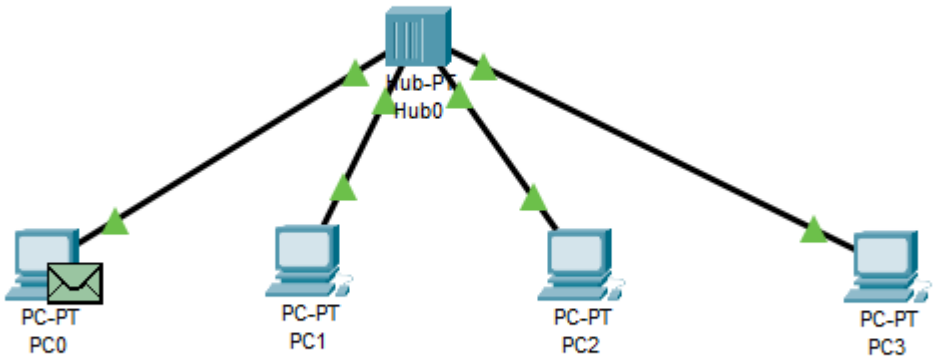

Hub-PT
Hub0
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3
Type: ICMP
Type: ARP

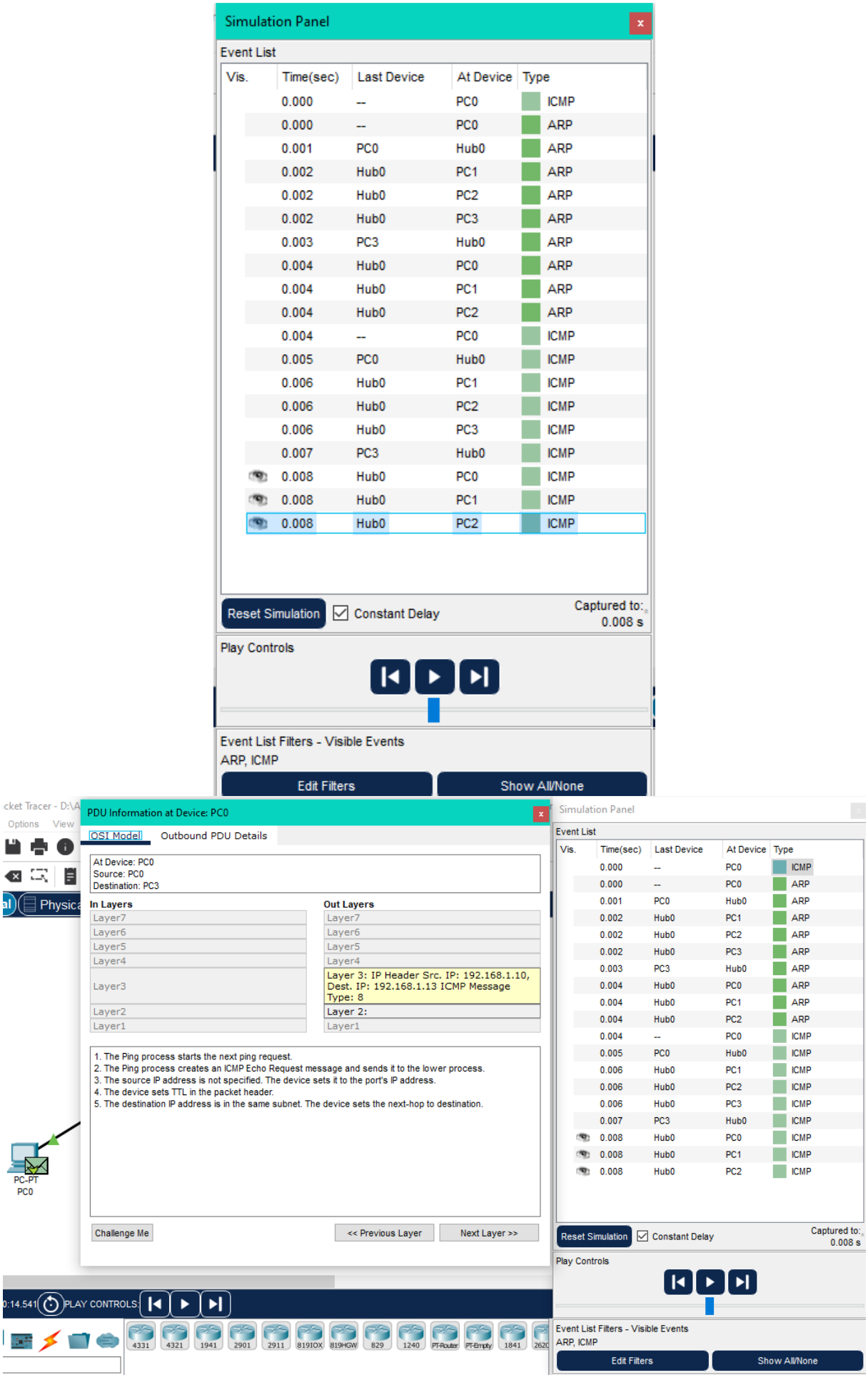

Hub-PT
Hub0
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3

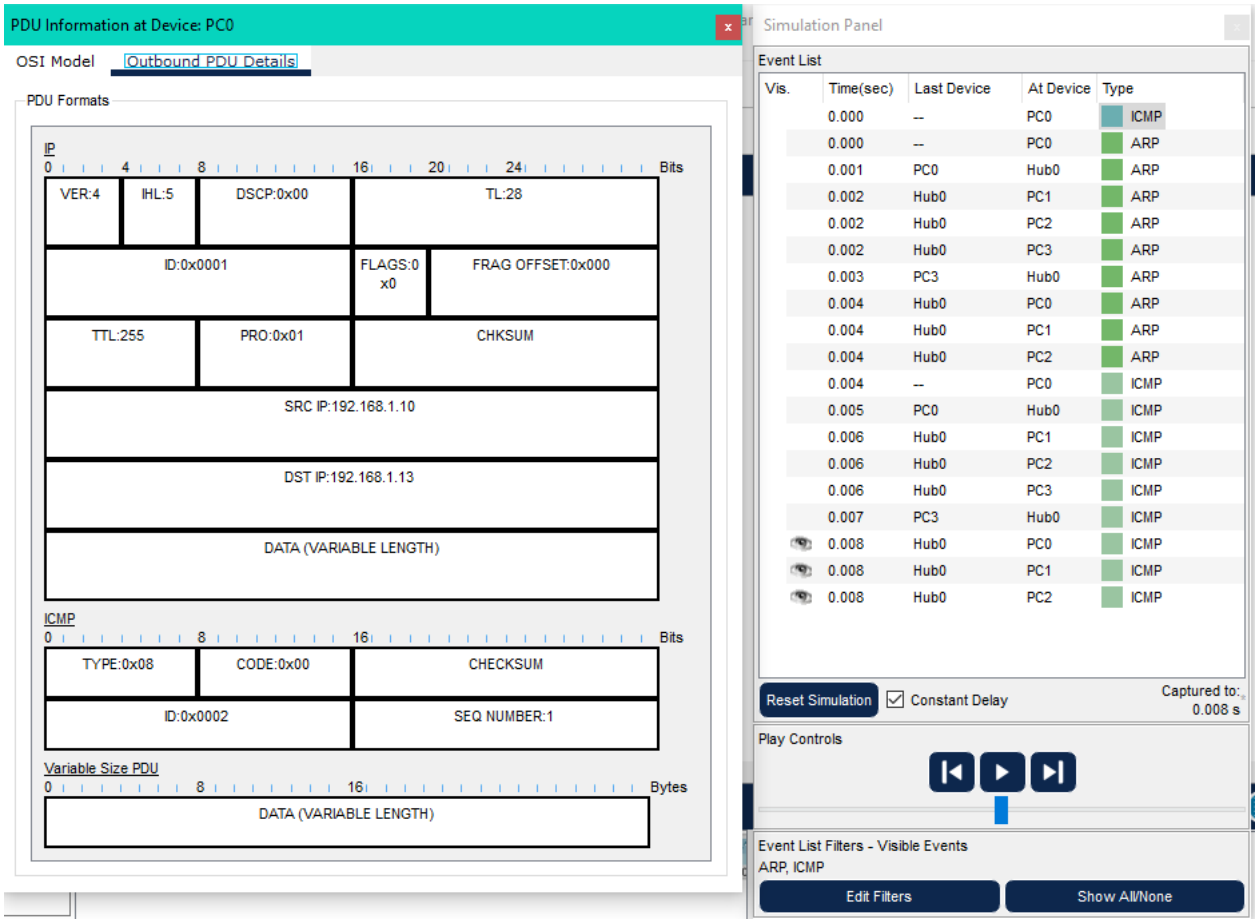

Hub-PT
Hub0
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3

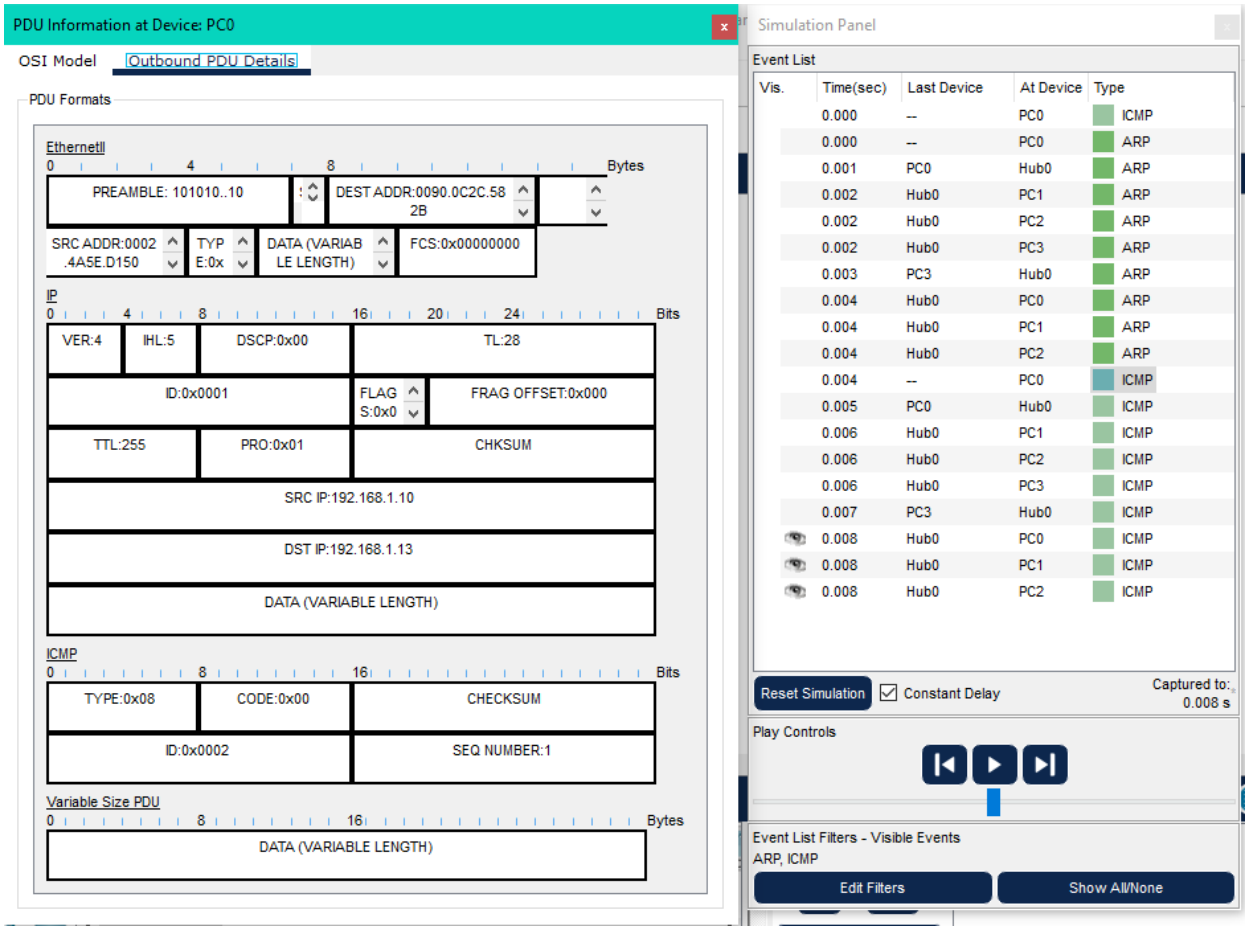

Hub-PT
Hub0
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3


Hub-PT
Hub0
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3

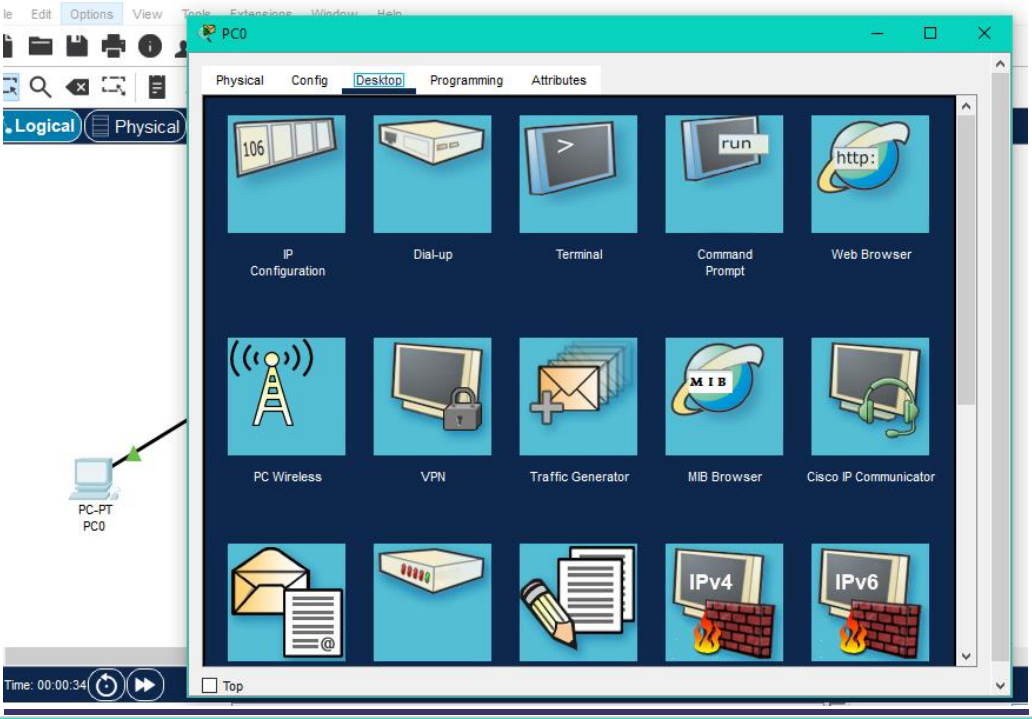

Hub-PT
Hub0
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3

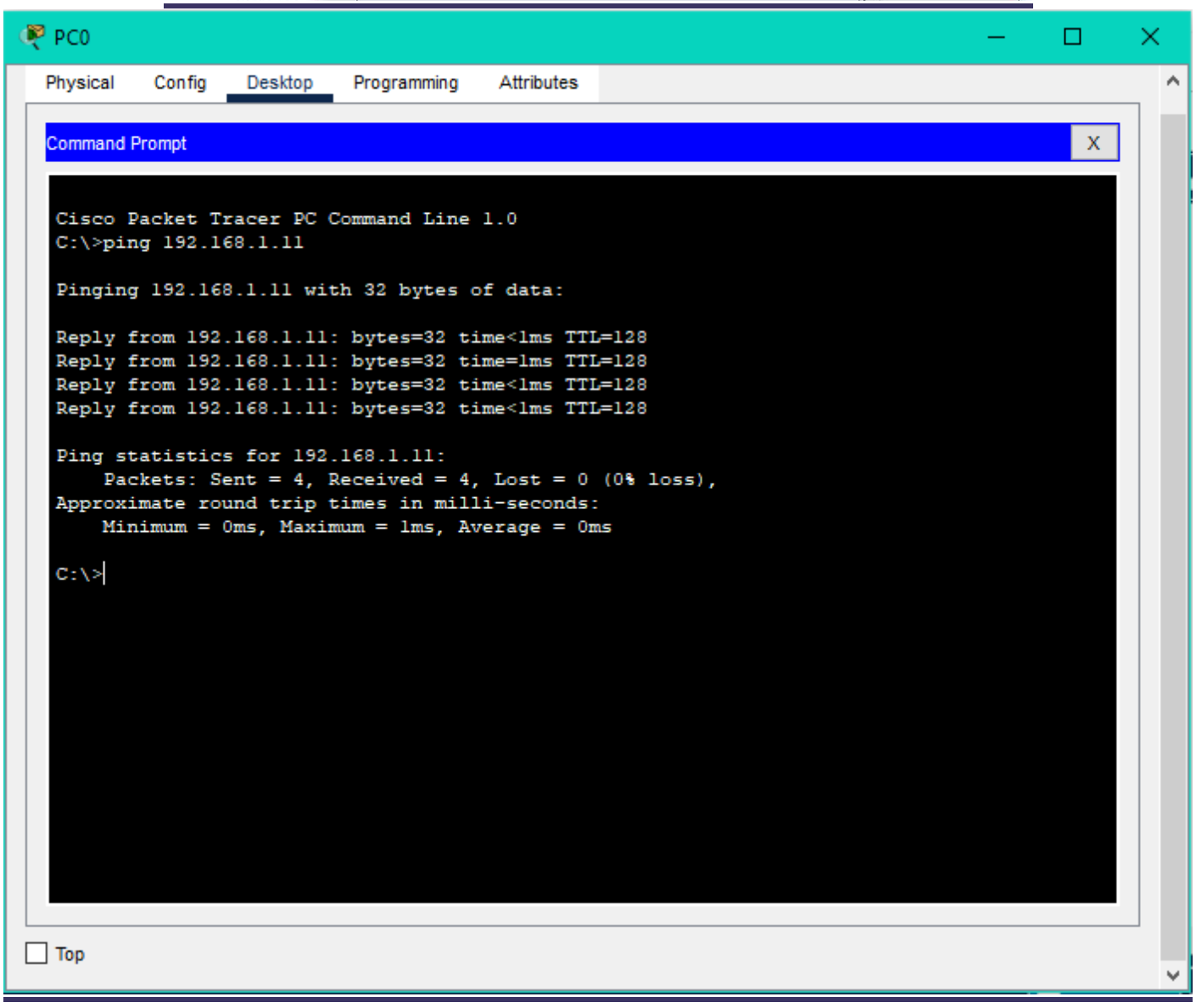

Simulation Panel
Event List
Vis. Time(sec) Last Device At Device Type
0.000 -- PC0 ICMP
0.000 -- PC0 ARP
0.001 PC0 Hub0 ARP
0.002 Hub0 PC1 ARP
0.002 Hub0 PC2 ARP
0.002 Hub0 PC3 ARP
0.003 PC3 Hub0 ARP
0.004 Hub0 PC0 ARP
0.004 Hub0 PC1 ARP
0.004 Hub0 PC2 ARP
0.004 -- PC0 ICMP
0.005 PC0 Hub0 ICMP
0.006 Hub0 PC1 ICMP
0.006 Hub0 PC2 ICMP
0.006 Hub0 PC3 ICMP
0.007 PC3 Hub0 ICMP
0.008 Hub0 PC0 ICMP
0.008 Hub0 PC1 ICMP
0.008 Hub0 PC2 ICMP
Reset Simulation
Constant Delay
Captured to: 0.008 s
Play Controls
Event List Filters - Visible Events
ARP, ICMP
Edit Filters
Show All/None
PDU Information at Device: PC0
OSI Model
Outbound PDU Details
At Device: PC0
Source: PC0
Destination: PC3
In Layers
Out Layers
Layer7
Layer6
Layer5
Layer4
Layer3
Layer2
Layer1
Layer 3: IP Header Src. IP: 192.168.1.10, Dest. IP: 192.168.1.13 ICMP Message Type: 8
Layer 2:
1. The Ping process starts the next ping request.
2. The Ping process creates an ICMP Echo Request message and sends it to the lower process.
3. The source IP address is not specified. The device sets it to the port's IP address.
4. The device sets TTL in the packet header.
5. The destination IP address is in the same subnet. The device sets the next-hop to destination.
Challenge Me
<< Previous Layer
Next Layer >>
PC-PT PC0
PLAY CONTROLS:
4331
4321
1941
2901
2911
819IOX
819HGW
829
1240
PT-Router
PT-Empty
1841


PDU Information at Device: PC0
OSI Model
Outbound PDU Details
PDU Formats
IP
0 4 8 16 20 24 Bits
VER:4
IHL:5
DSCP:0x00
TL:28
ID:0x0001
FLAGS:0 x0
FRAG OFFSET:0x000
TTL:255
PRO:0x01
CHKSUM
SRC IP:192.168.1.10
DST IP:192.168.1.13
DATA (VARIABLE LENGTH)
ICMP
0 8 16 Bits
TYPE:0x08
CODE:0x00
CHECKSUM
ID:0x0002
SEQ NUMBER:1
Variable Size PDU
0 8 16 Bytes
DATA (VARIABLE LENGTH)
Simulation Panel
Event List
Vis. Time(sec) Last Device At Device Type
0.000 -- PC0 ICMP
0.000 -- PC0 ARP
0.001 PC0 Hub0 ARP
0.002 Hub0 PC1 ARP
0.002 Hub0 PC2 ARP
0.002 Hub0 PC3 ARP
0.003 PC3 Hub0 ARP
0.004 Hub0 PC0 ARP
0.004 Hub0 PC1 ARP
0.004 Hub0 PC2 ARP
0.004 -- PC0 ICMP
0.005 PC0 Hub0 ICMP
0.006 Hub0 PC1 ICMP
0.006 Hub0 PC2 ICMP
0.006 Hub0 PC3 ICMP
0.007 PC3 Hub0 ICMP
0.008 Hub0 PC0 ICMP
0.008 Hub0 PC1 ICMP
0.008 Hub0 PC2 ICMP
Reset Simulation
Constant Delay
Captured to: 0.008 s
Play Controls
Event List Filters - Visible Events
ARP, ICMP
Edit Filters
Show All/None


PDU Information at Device: PC0
OSI Model
Outbound PDU Details
PDU Formats
EthernetII
0 4 8 Bytes
PREAMBLE: 101010..10
DEST ADDR:0090.0C2C.582B
SRC ADDR:0002.4A5E.D150
TYPE:0x
DATA (VARIABLE LENGTH)
FCS:0x00000000
IP
0 4 8 16 20 24 Bits
VER:4
IHL:5
DSCP:0x00
TL:28
ID:0x0001
FLAGS:0x0
FRAG OFFSET:0x000
TTL:255
PRO:0x01
CHKSUM
SRC IP:192.168.1.10
DST IP:192.168.1.13
DATA (VARIABLE LENGTH)
ICMP
0 8 16 Bits
TYPE:0x08
CODE:0x00
CHECKSUM
ID:0x0002
SEQ NUMBER:1
Variable Size PDU
0 8 16 Bytes
DATA (VARIABLE LENGTH)
Simulation Panel
Event List
Vis. Time(sec) Last Device At Device Type
0.000 -- PC0 ICMP
0.000 -- PC0 ARP
0.001 PC0 Hub0 ARP
0.002 Hub0 PC1 ARP
0.002 Hub0 PC2 ARP
0.002 Hub0 PC3 ARP
0.003 PC3 Hub0 ARP
0.004 Hub0 PC0 ARP
0.004 Hub0 PC1 ARP
0.004 Hub0 PC2 ARP
0.004 -- PC0 ICMP
0.005 PC0 Hub0 ICMP
0.006 Hub0 PC1 ICMP
0.006 Hub0 PC2 ICMP
0.006 Hub0 PC3 ICMP
0.007 PC3 Hub0 ICMP
0.008 Hub0 PC0 ICMP
0.008 Hub0 PC1 ICMP
0.008 Hub0 PC2 ICMP
Reset Simulation
Constant Delay
Captured to: 0.008 s
Play Controls
Event List Filters - Visible Events
ARP, ICMP
Edit Filters
Show All/None

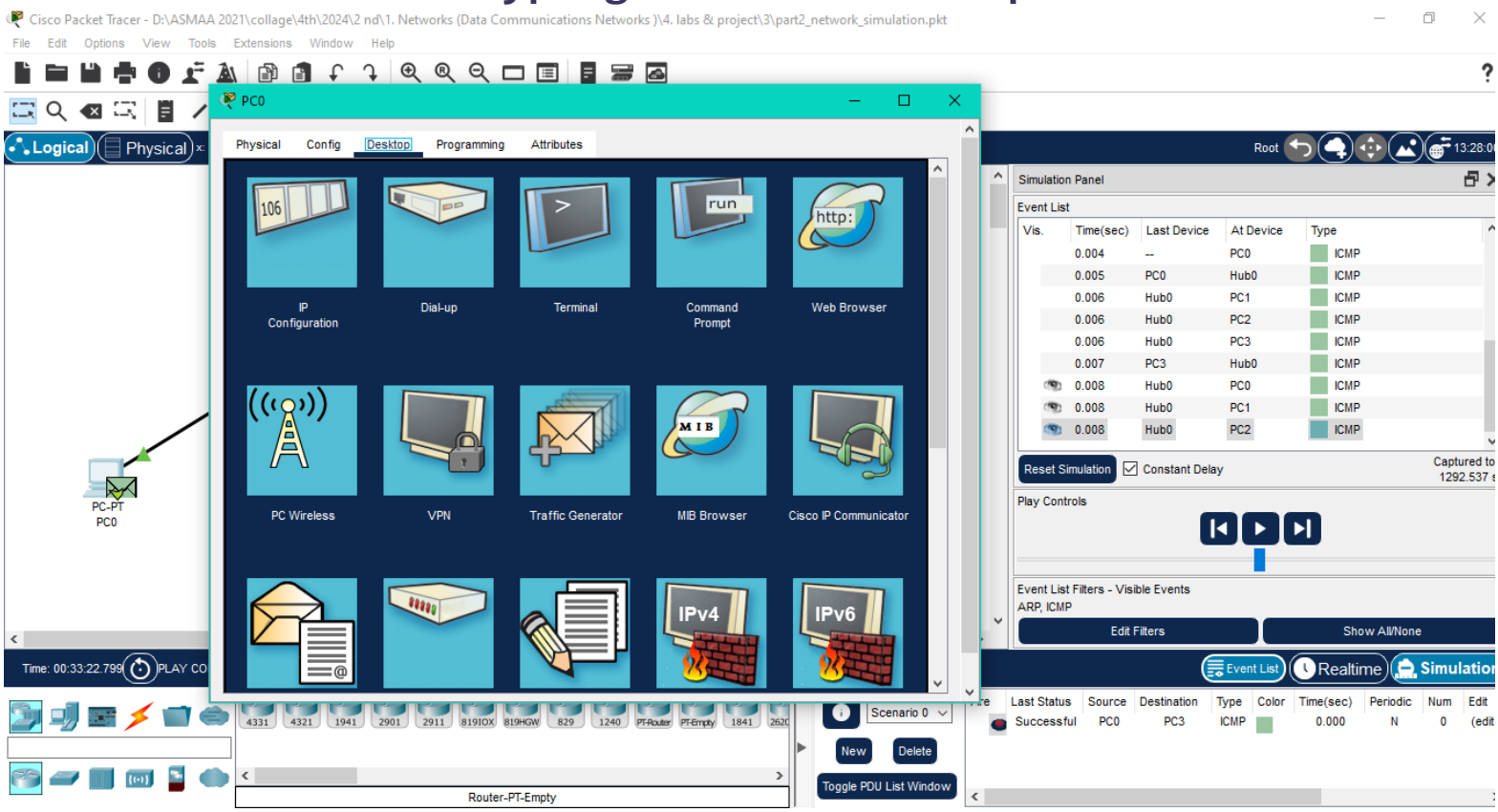
B. PC0 test pinging PC3 Using the “COMMAND PROMPT”:

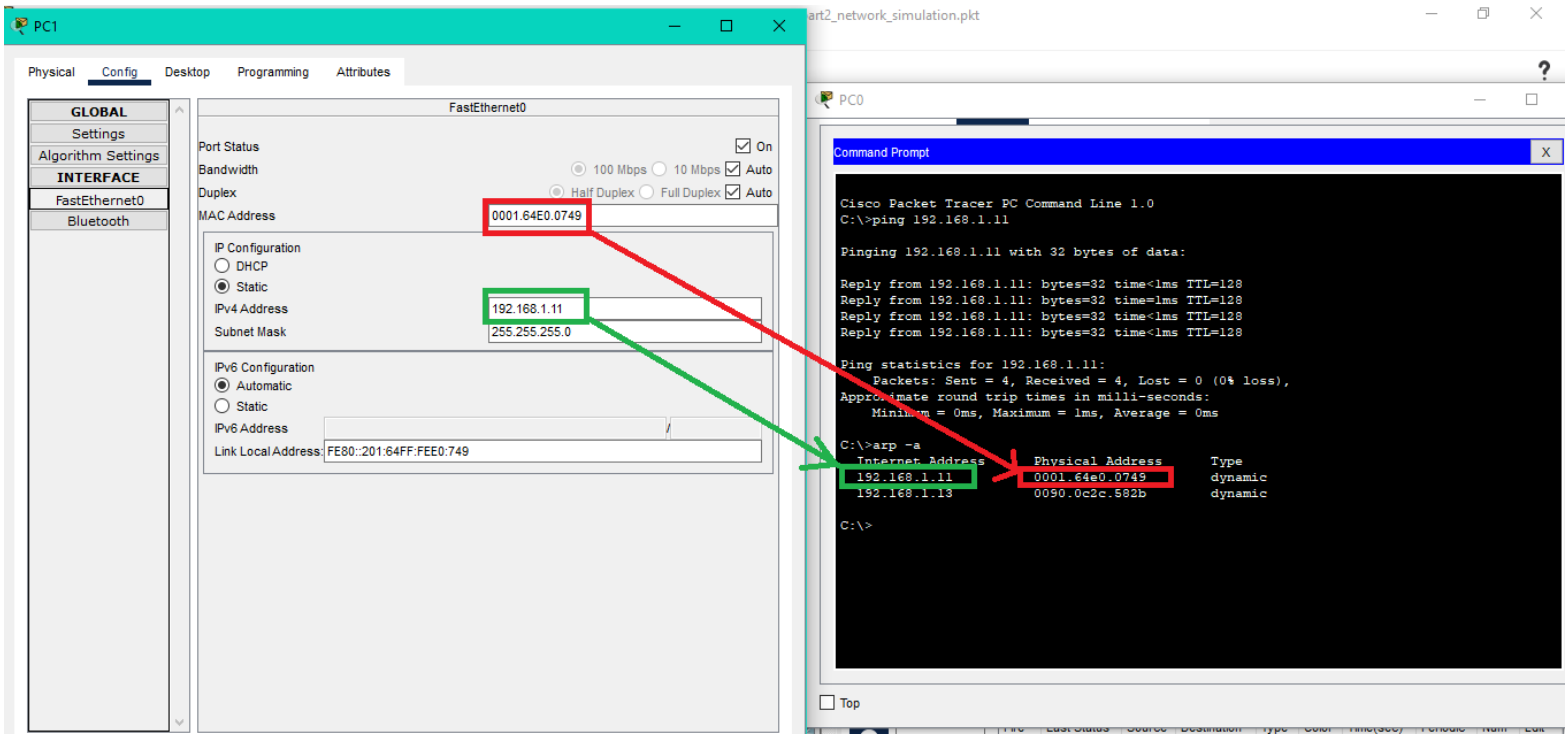




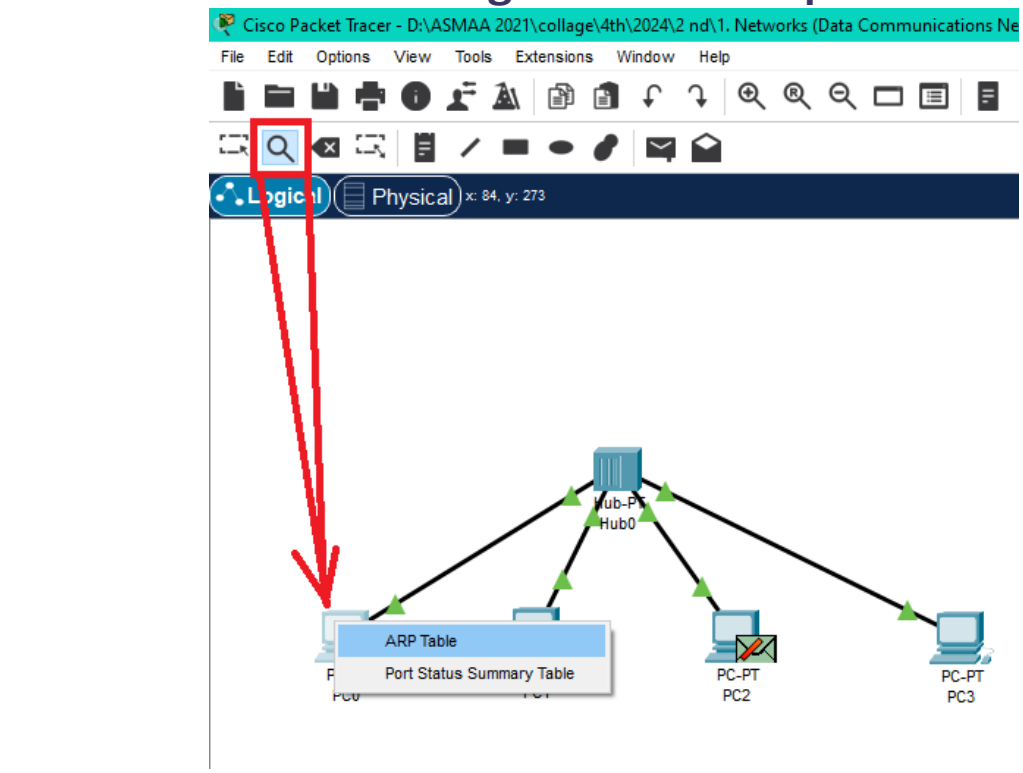
Task 2: View ARP Tables on each PC:

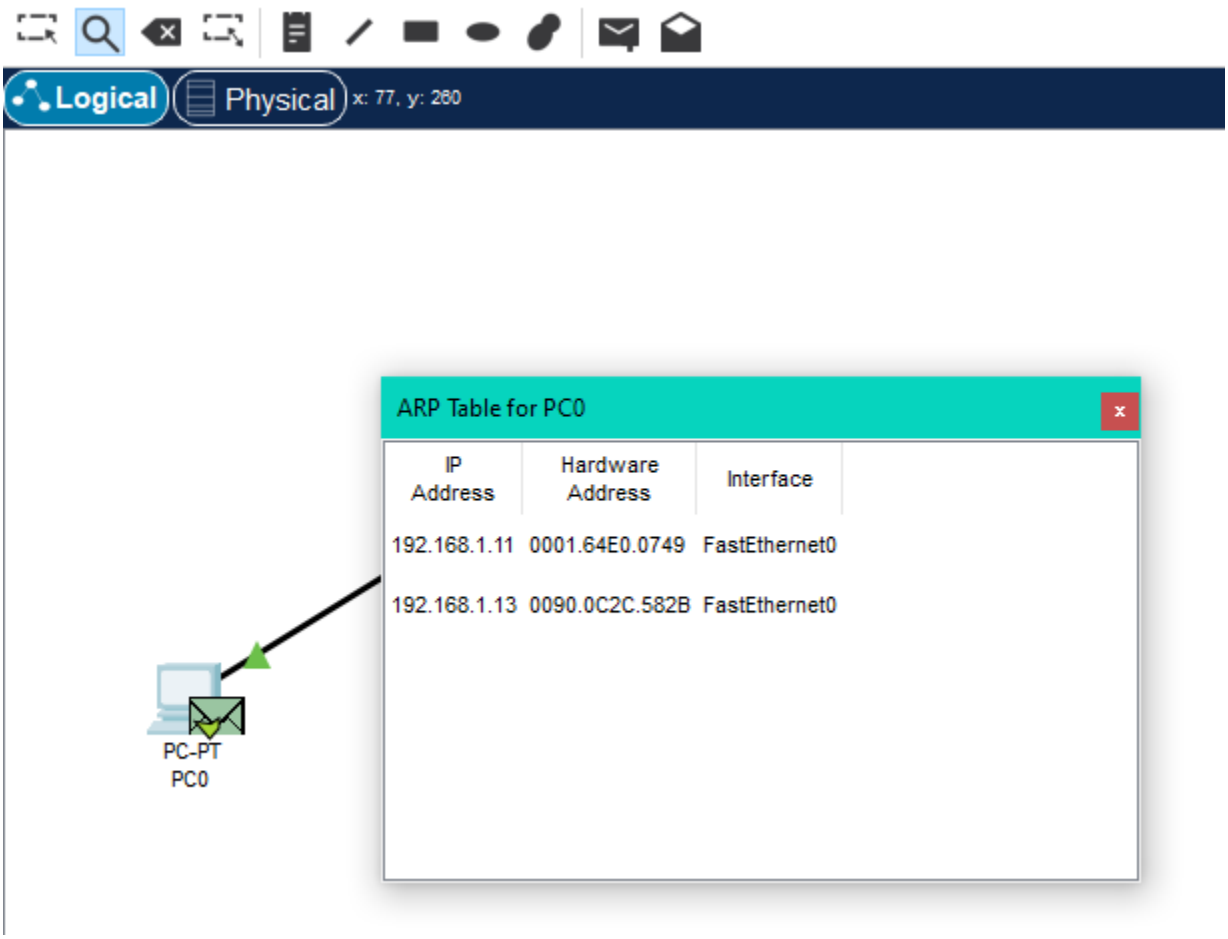
1. First method: typing the command arp –a



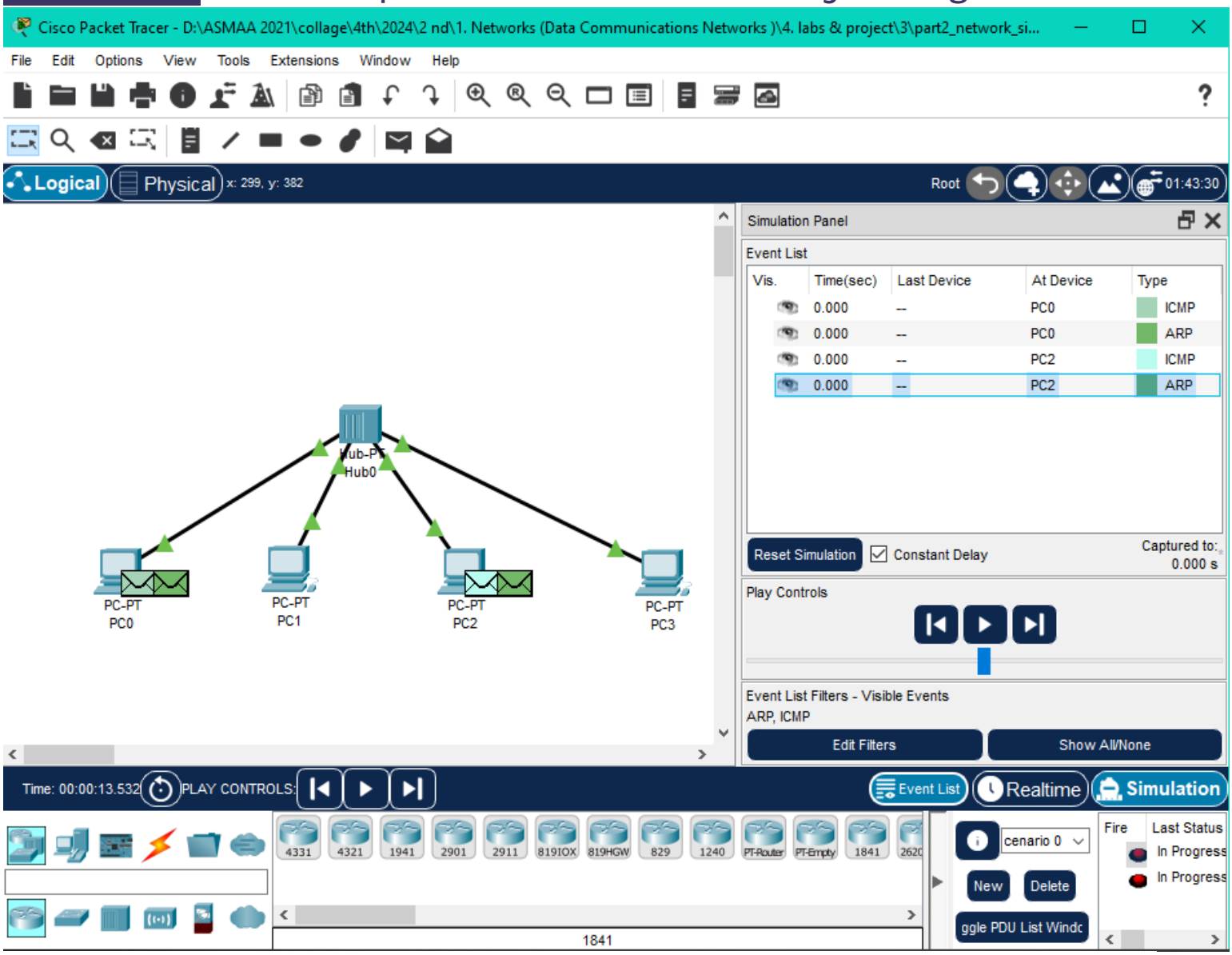


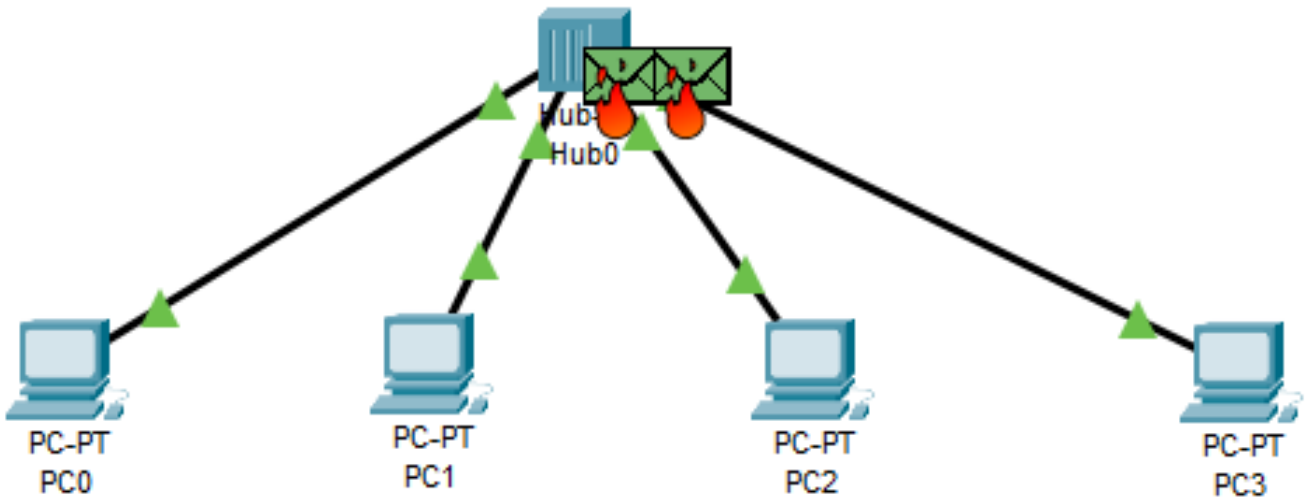
2. second method: clicking on the inspect tool :

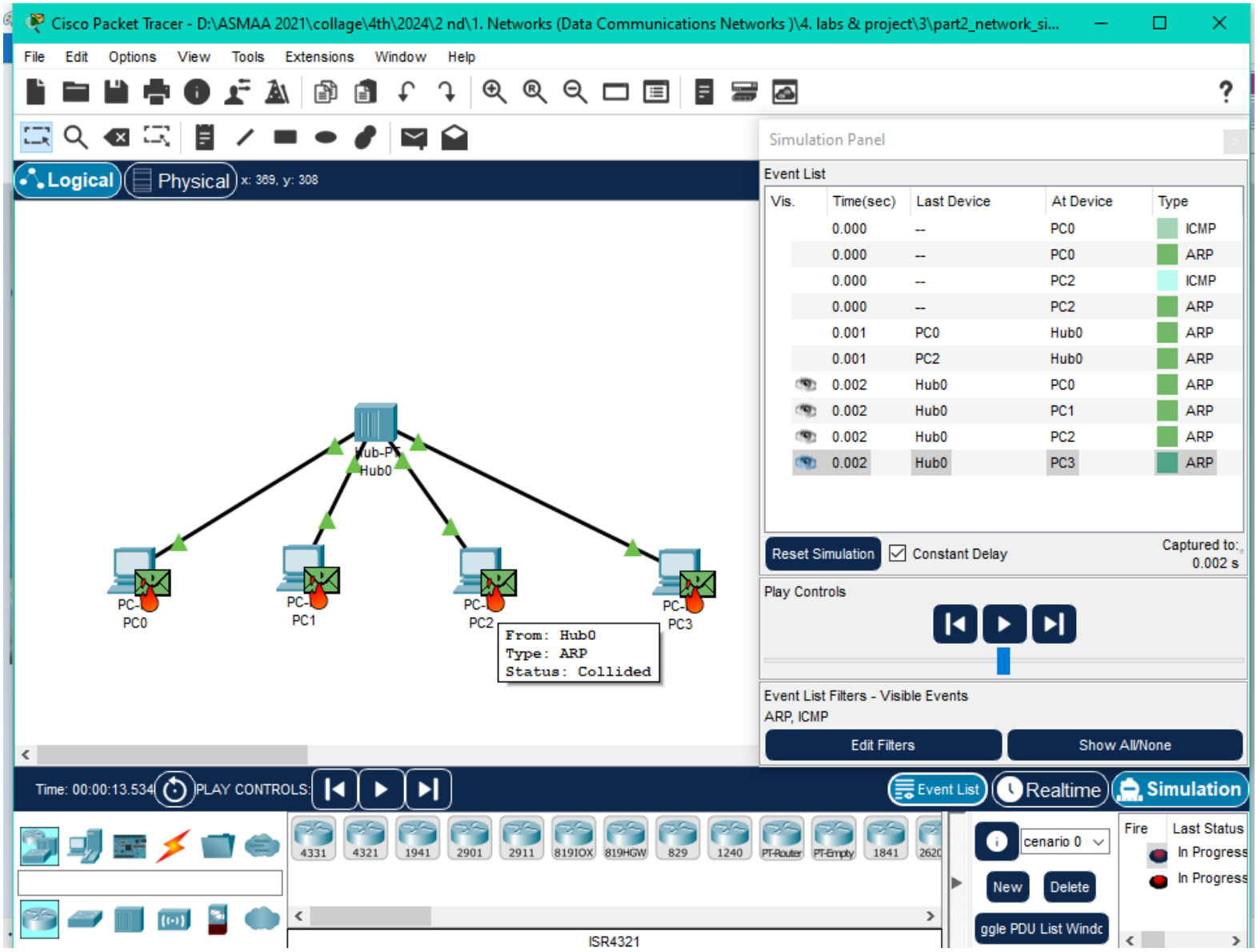




Task 3: To view packet collision and jam signal:





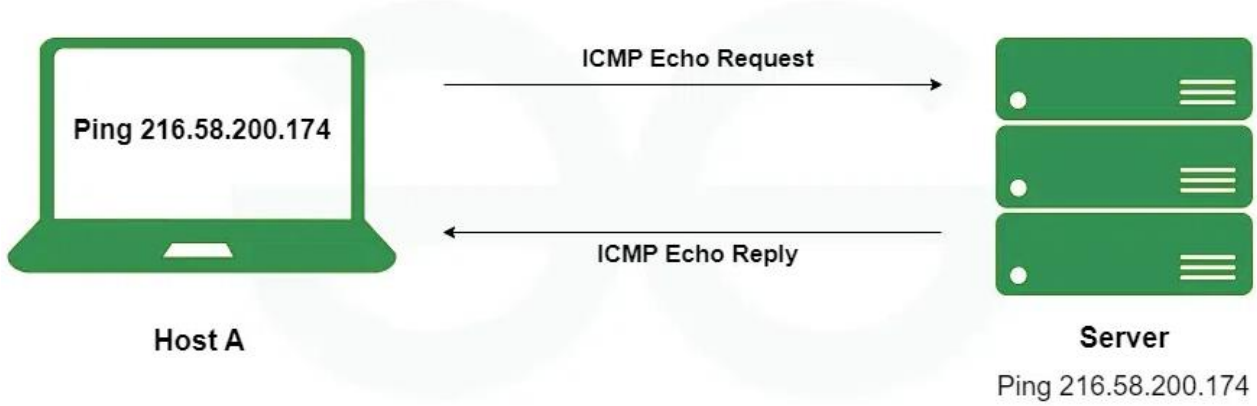

Cisco Packet Tracer - D:\ASMAA 2021\collage\4th\2024\2 nd\1. Networks (Data Communications Networks)\4. labs & project\3\part2_network_si...
File Edit Options View Tools Extensions Window Help
Logical Physical x: 369, y: 308
Hub-PT Hub0
PC-PT PC0
PC-PT PC1
PC-PT PC2
PC-PT PC3
From: Hub0
Type: ARP
Status: Collided
Simulation Panel
Event List
Vis. Time(sec) Last Device At Device Type
0.000 -- PC0 ICMP
0.000 -- PC0 ARP
0.000 -- PC2 ICMP
0.000 -- PC2 ARP
0.001 PC0 Hub0 ARP
0.001 PC2 Hub0 ARP
0.002 Hub0 PC0 ARP
0.002 Hub0 PC1 ARP
0.002 Hub0 PC2 ARP
0.002 Hub0 PC3 ARP
Reset Simulation
Constant Delay
Captured to: 0.002 s
Play Controls
Event List Filters - Visible Events
ARP, ICMP
Edit Filters
Show All/None
Time: 00:00:13.534
PLAY CONTROLS:
Event List
Realtime
Simulation
4331 4321 1941 2901 2911 819IOX 819HGW 829 1240 PT-Router PT-Empty 1841
ISR4321
cenario 0
New
Delete
ggle PDU List Windc
Fire
Last Status
In Progress
In Progress

2. A Short 2-Page Report About "Ping and ICMP"

a. Ping Utility:

A ping is a basic Internet command that allows a user to test and verify whether a given destination IP address exists and can accept requests in computer network administration. Ping is also used for diagnosis to confirm that the computer the user tries to reach is operational. Ping can be used with any operating system (OS) that supports networking, including the majority of embedded network administration software.

- **What is Ping?**
  Ping (Packet Internet Groper) is a method for determining communication latency between two networks or ping is a method of determining the time it takes for data to travel between two devices or across a network. As communication latency decreases, communication effectiveness improves. A low ping time is critical in situations where the timely delivery of data is more important than the quantity and quality of the desired information.
- **How Does Ping Work?**
  Ping sends an Internet Control Message Protocol (ICMP) Echo Request to a network interface and then waits for a response. When the ping command is executed, a ping signal is delivered to the provided address. When the target host receives the echo request, it answers with an echo reply packet. This method has two distinct purposes: calculating round-trip time (RTT) or latency and ensuring that the target host is available. RTT is a measure of the time it takes to receive a response. Measured in milliseconds (ms), the process begins when a browser submits a request to a server and concludes when the server responds. RTT is an important performance figure for online applications.



b. ICMP Protocol:

Since IP does not have an inbuilt mechanism for sending error and control messages. It depends on Internet Control Message Protocol(ICMP) to provide error control.

- **What is ICMP?**
  ICMP is Internet Control Message Protocol which is used for reporting errors and management queries. It is a supporting protocol and is used by network

devices like routers for sending error messages and operations information. For example, the requested service is not available or a host or router could not be reached.

Another important use of ICMP protocol is used to perform network diagnosis by making use of traceroute and ping utility.

Traceroute: Traceroute utility is used to know the route between two devices connected over the internet. It routes the journey from one router to another, and a traceroute is performed to check network issues before data transfer.

Ping: Ping is a simple kind of traceroute known as the echo-request message, it is used to measure the time taken by data to reach the destination and return to the source, these replies are known as echo-replies messages.

- **Frequently Asked Question on ICMP:**

What is ICMP used for?

Internet Control Message Protocol (ICMP) is used for error reporting. Error Reporting by ICMP works by sending messages to the sender from the receiver in the case when data is not received.

Is ICMP the same as ping?

ICMP and ping are two different things, but they are somehow related. ICMP is a protocol that manages the messages between the devices and Ping is produced using ICMP.

How does ICMP ping work?

ICMP ping is a way to check whether there is a connection established between two devices on the internet. We can check packet loss or any delay that happens within the network with the help of ICMP ping.

What is the role of ICMP in IPv6?

ICMPv6 is utilised in IPv6 for more than only fault reporting and signalling. It is utilised for: Neighbour Discovery, which functions similarly to ARP in IPv4. Multicast address management and host configuration are handled by the Router Discovery function.

ICMP is operate at which layer?

ICMP is operated at Network Layer of the OSI Model.


thank you


BYE