Lab Assignment-8

Indian Institute of Technology Roorkee Department of Computer Science and Engineering

CSN-361: Computer Networks Laboratory (Autumn 2019-2020)

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B.Tech CSE 3rd Year.

Problem Statement 1:

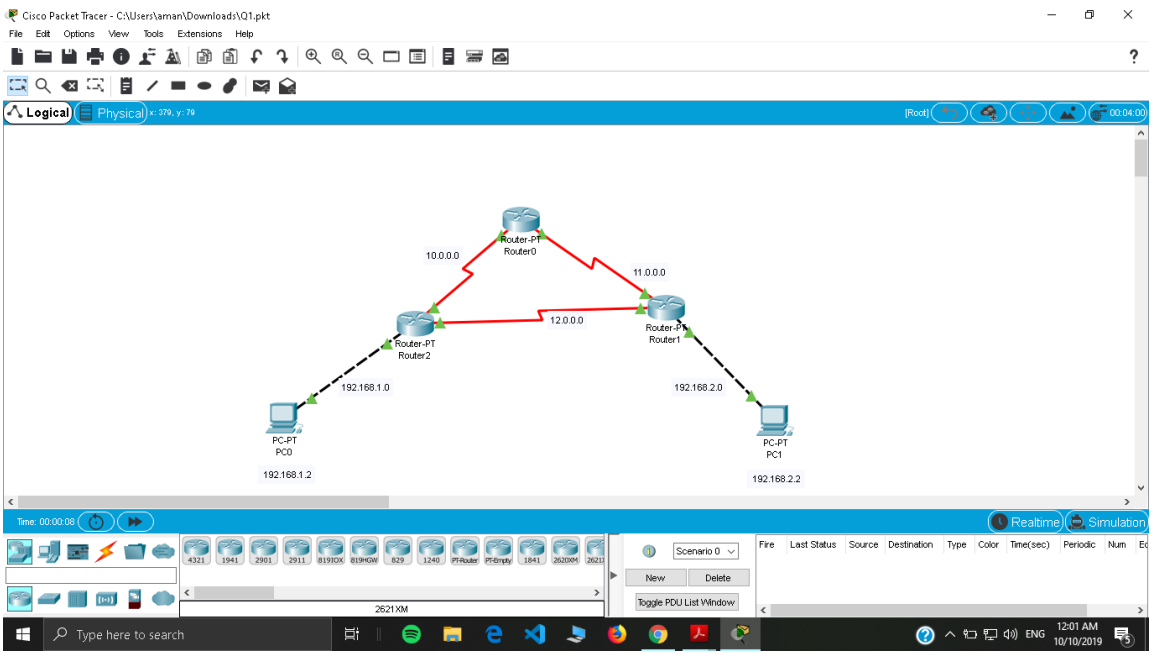
Use CISCO packet tracer to create a network topology as shown in Fig. 1, and configure the network with Open Shortest Path First (OSPF) protocol.

Data Structure and algorithm:

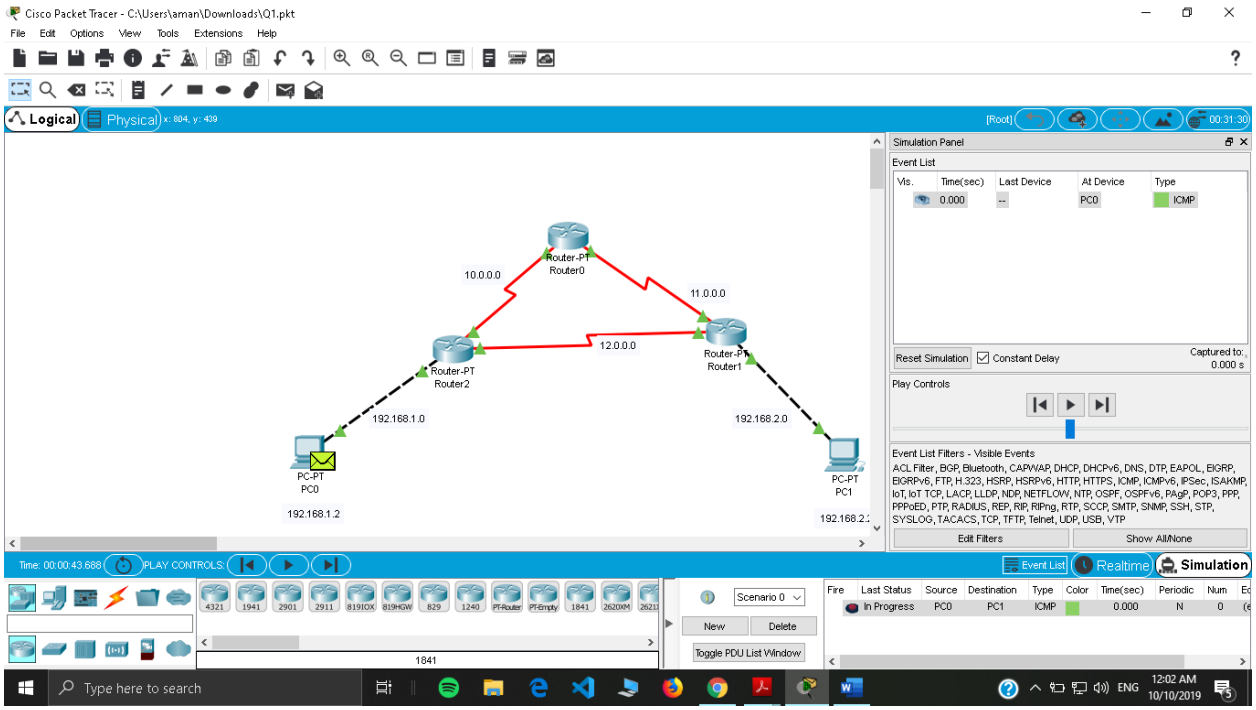
- Router: A router is a physical or virtual appliance that passes information between two or more packet-switched computer networks.
- Ethernet: a system for connecting a number of computer systems to form a local area network, with protocols to control the passing of information and to avoid simultaneous transmission by two or more systems.

Open shortest path first (OSPF) router roles –

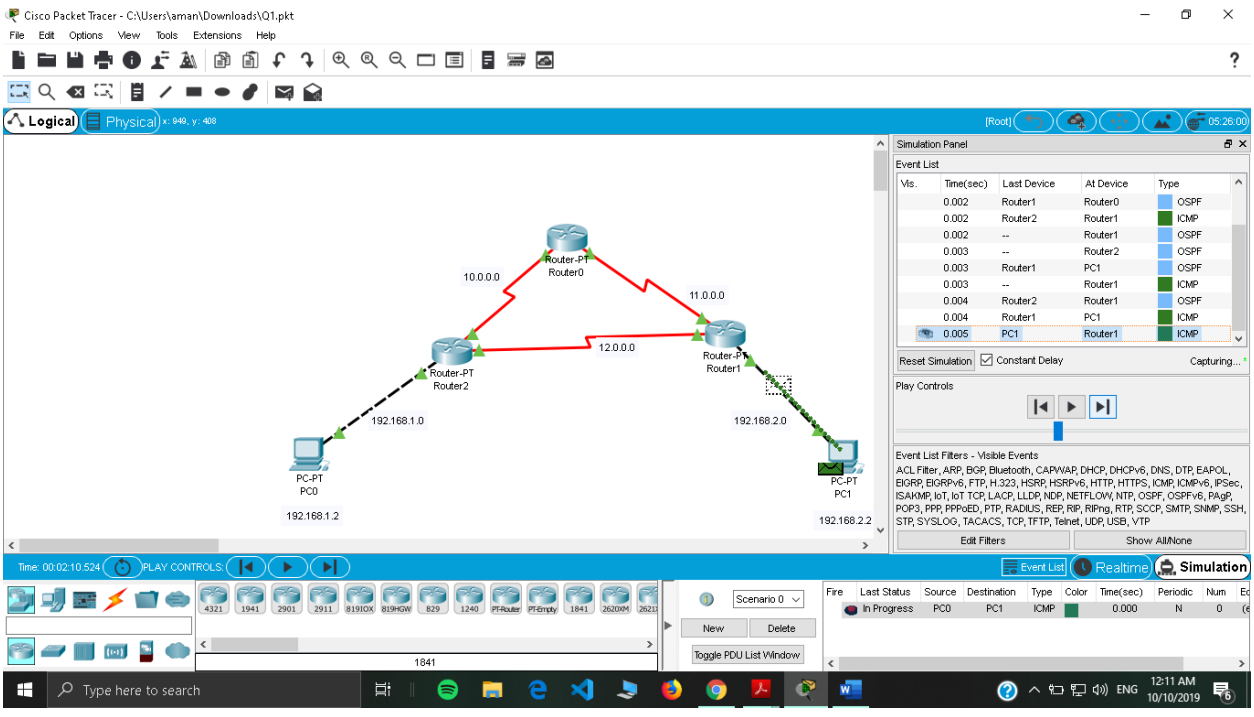
An area is a group of contiguous network and routers. Routers belonging to same area shares a common topology table and area I'd. The area I'd is associated with router's interface as a The ICMP(Internet Control Message Protocol) is an error-reporting protocol for network devices like routers which use to generate error messages to the source IP address, when network problems prevent delivery of IP packets. Also, the routers send the OSPF hello messages among themselves and to all the links they are connected with so as to get the shortest path for to send the message packets router can belong to more than one area.



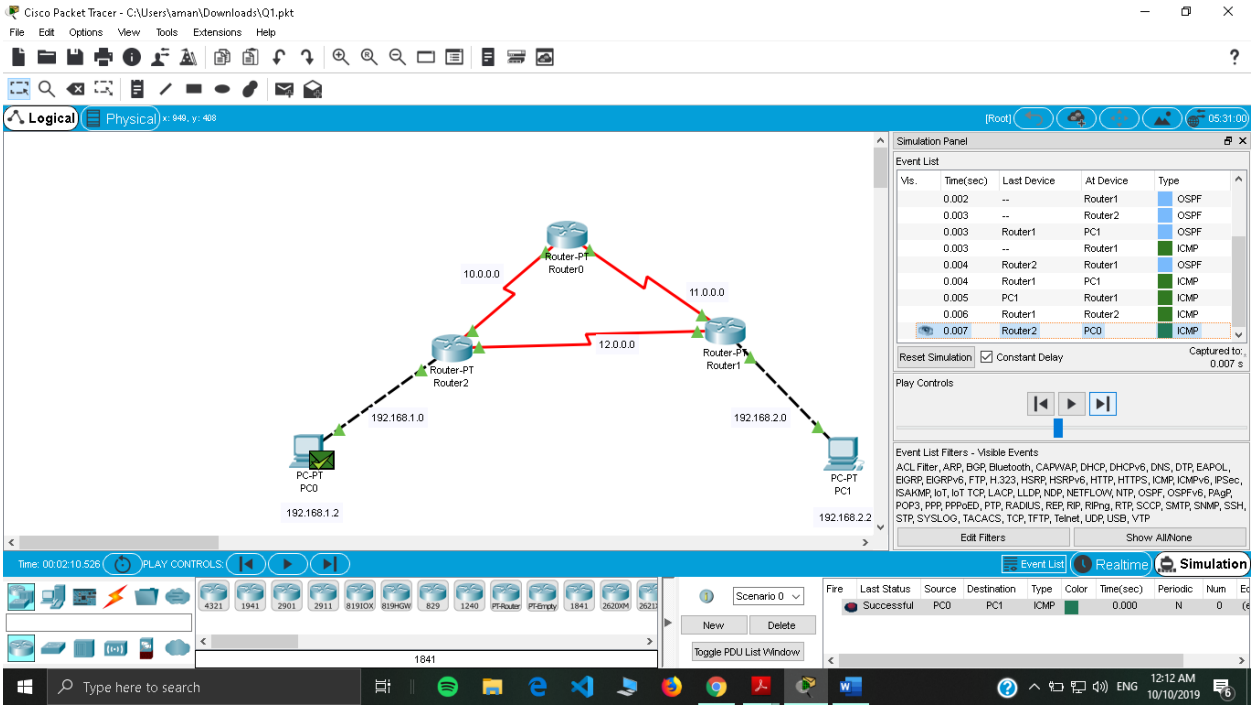
1. Sending ICMP packet from PC-0 to PC-1



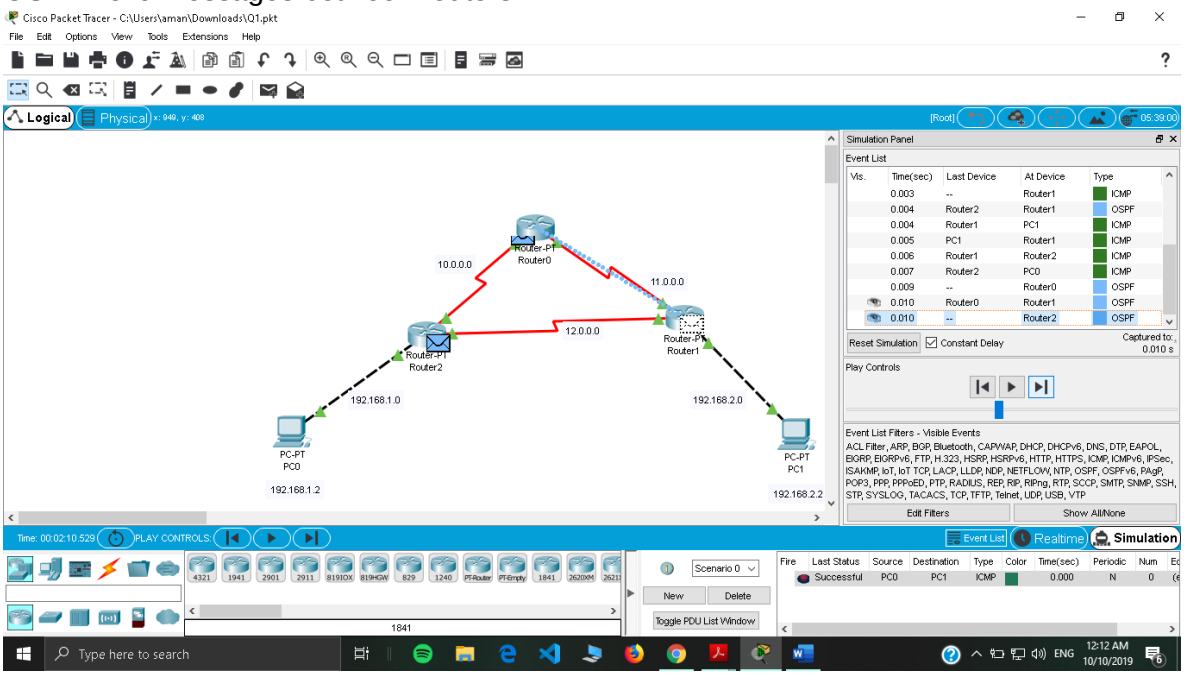
Packet received by PC-1 through PC-0 -> Router1 -> Router2 -> PC1

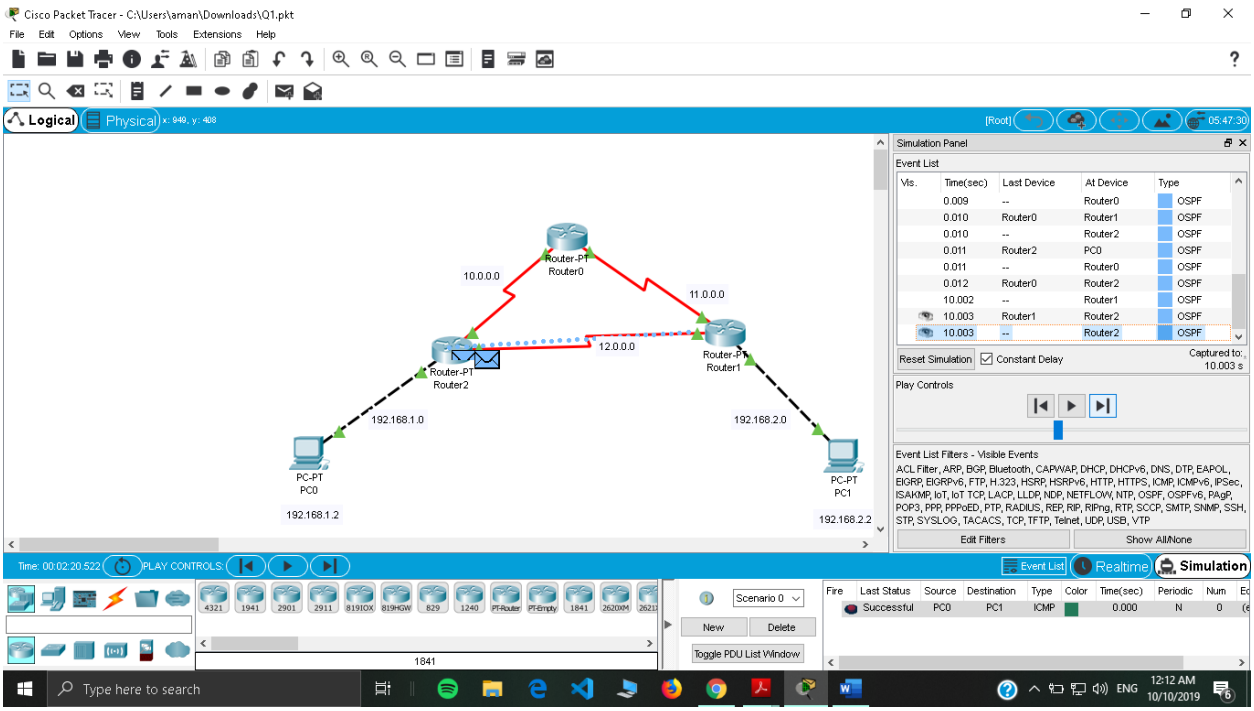


PC-1 sends the acknowledgement through the same route as above and PC-1 accepts it.



OSPF hello messages between routers




Cisco Packet Tracer - C:\Users\aman\Downloads\Q1.pkt
File Edit Options View Tools Extensions Help
Logical
Physical
Router-PT
Router0
Router-PT
Router2
Router-PT
Router1
10.0.0.0
11.0.0.0
12.0.0.0
192.168.1.0
192.168.2.0
PC-PT
PC0
PC-PT
PC1
192.168.1.2
192.168.2.2
Simulation Panel
Event List
Vis. Time(sec) Last Device At Device Type
0.009 -- Router0 OSPF
0.010 Router0 Router1 OSPF
0.010 -- Router2 OSPF
0.011 Router2 PC0 OSPF
0.011 -- Router0 OSPF
0.012 Router0 Router2 OSPF
10.002 -- Router1 OSPF
10.003 Router1 Router2 OSPF
10.003 -- Router2 OSPF
Reset Simulation
Constant Delay
Captured to: 10.003 s
Play Controls
Event List Filters - Visible Events
ACL Filter, ARP, BGP, Bluetooth, CAPWAP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoED, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP
Edit Filters
Show All/None
Time: 00:02:20.522
PLAY CONTROLS:
Event List
Realtime
Simulation
1841
Scenario 0
New
Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num
Successful PC0 PC1 ICMP 0.000 N 0
Type here to search
ENG
12:12 AM
10/10/2019

Problem Statement 2:

Use CISCO packet tracer to demonstrate Address Resolution Protocol (ARP) in a ring topology.

Data Structure and algorithm:

- HUB- Like Router passes information between packet-switched computer networks

Address Resolution Protocol (ARP) is a protocol used by the Internet Protocol (IP) [RFC826], specifically IPv4, to map IP network addresses to the hardware addresses (MAC Address) used by a data link protocol.

This definition of ARP has 2-main aspects:

1. Used by Internet Protocol (IP)
2. To map IP network address (IP Address) to hardware address (MAC Address)

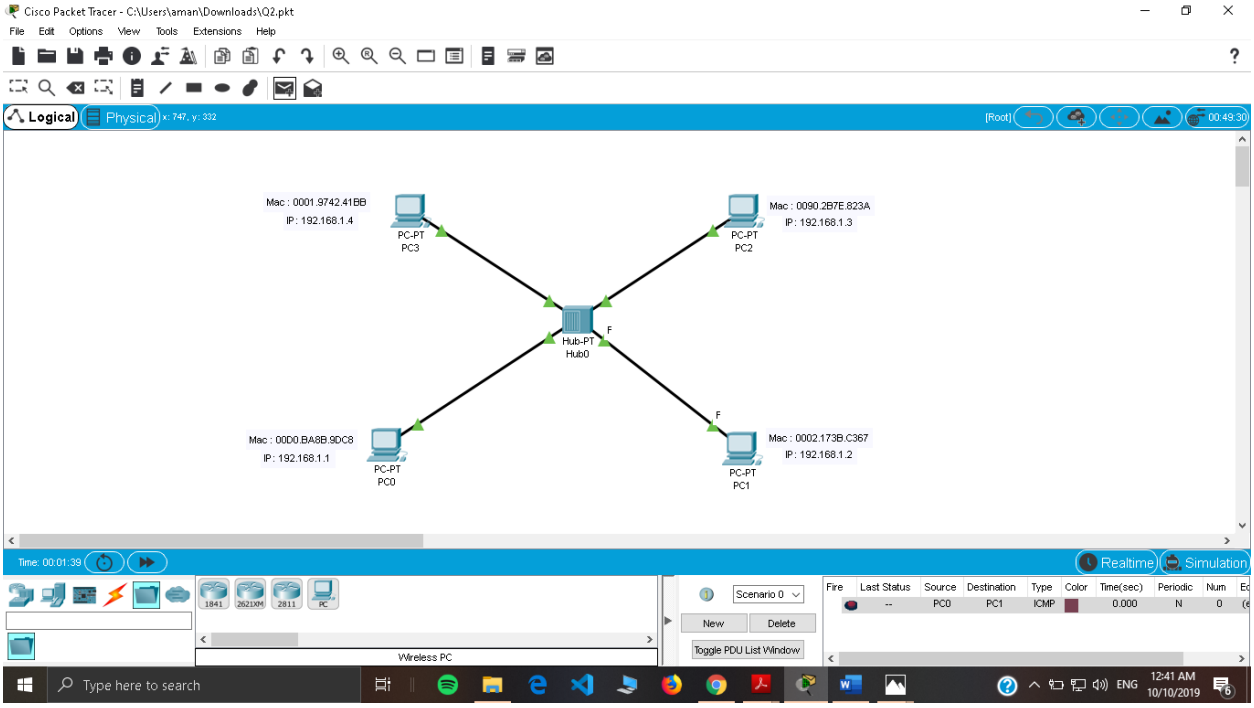
The Topology consists of 1-Hub and 4-PCs and we will ping the PC-1 from PC-3 and generate traffic on PC-3. Traffic Generator will send the traffic (ping) to the destination.

Two types of packets will appear on PC-3:

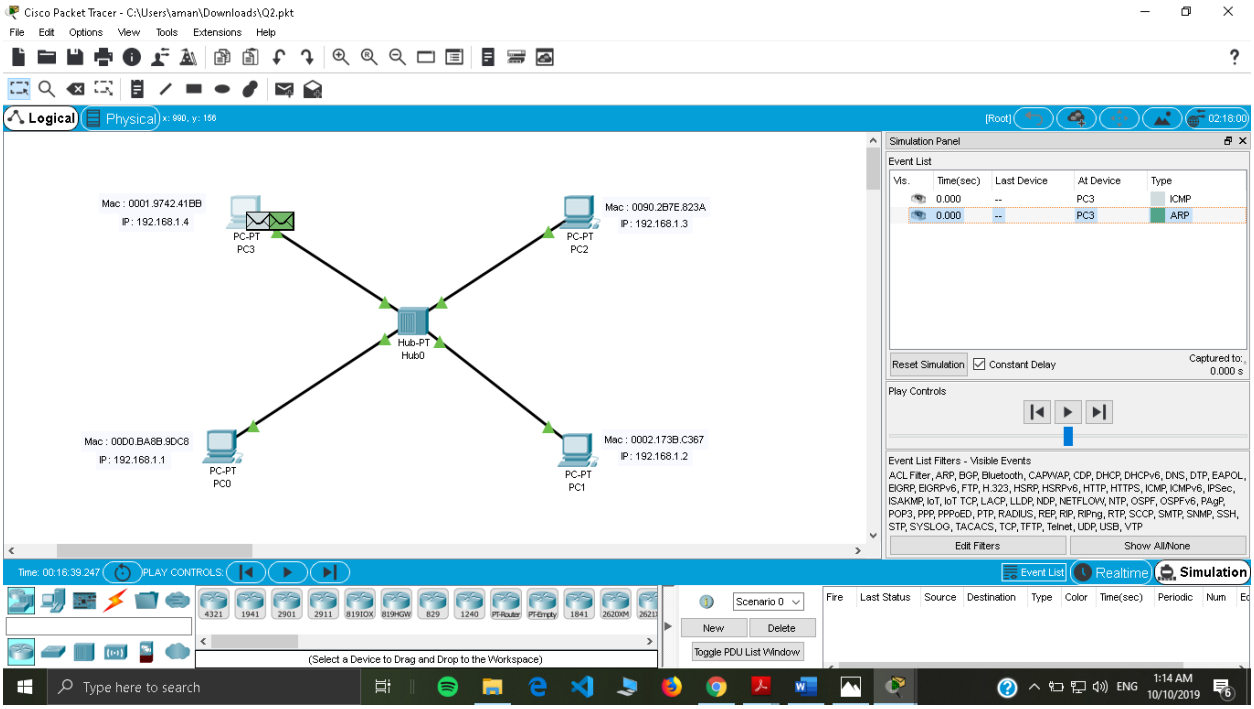
• ARP Packet

• ICMP (ping) Packet

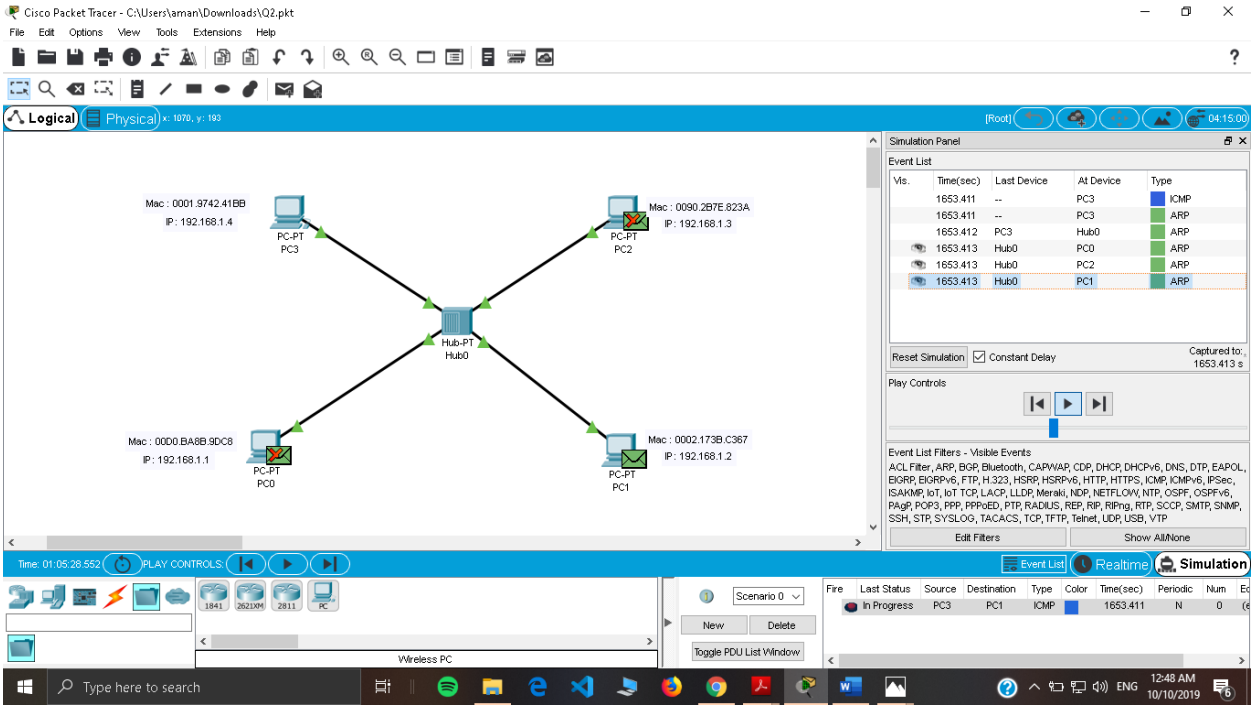
Before sending the ICMP packets to the destination (PC-1 here) on the LAN, the MAC address of the destination device, should be the ARP table of the source device (PC-3 here). ARP will first collect the MAC address of the destination device, only then the ICMP will be able to send its traffic to destination device.



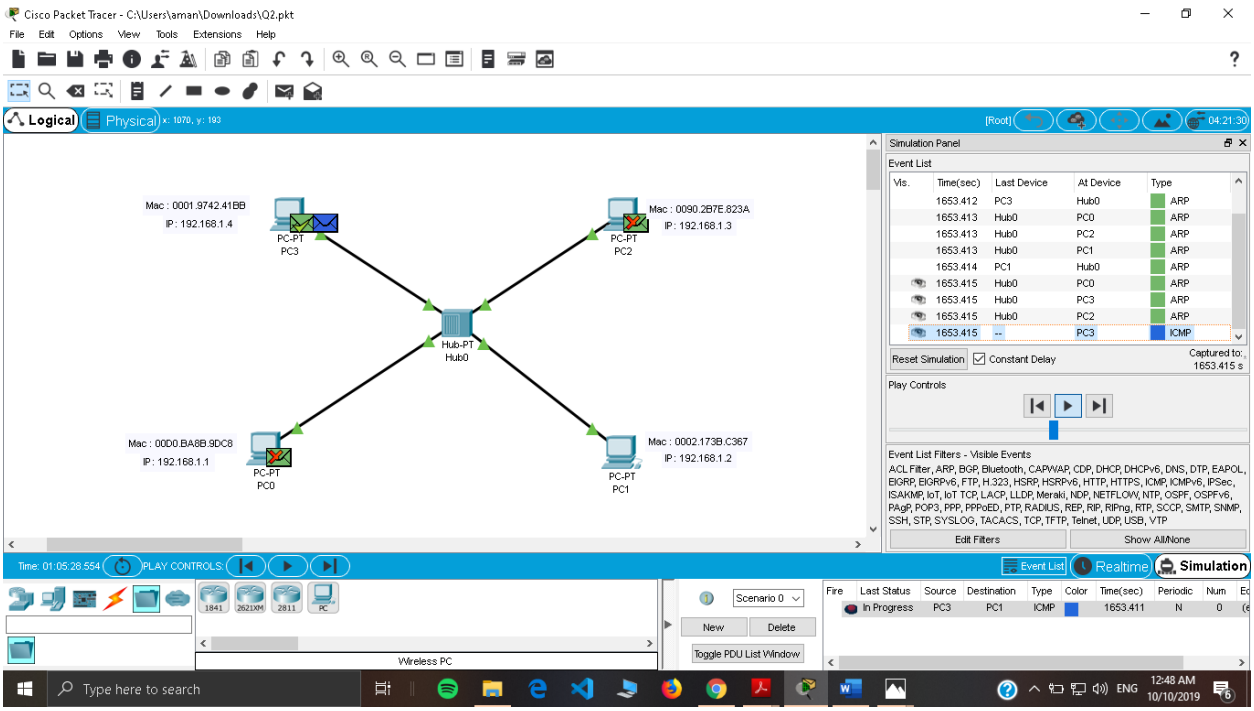
PC-3 will first collect the MAC address of the destination device by sending ARP packet



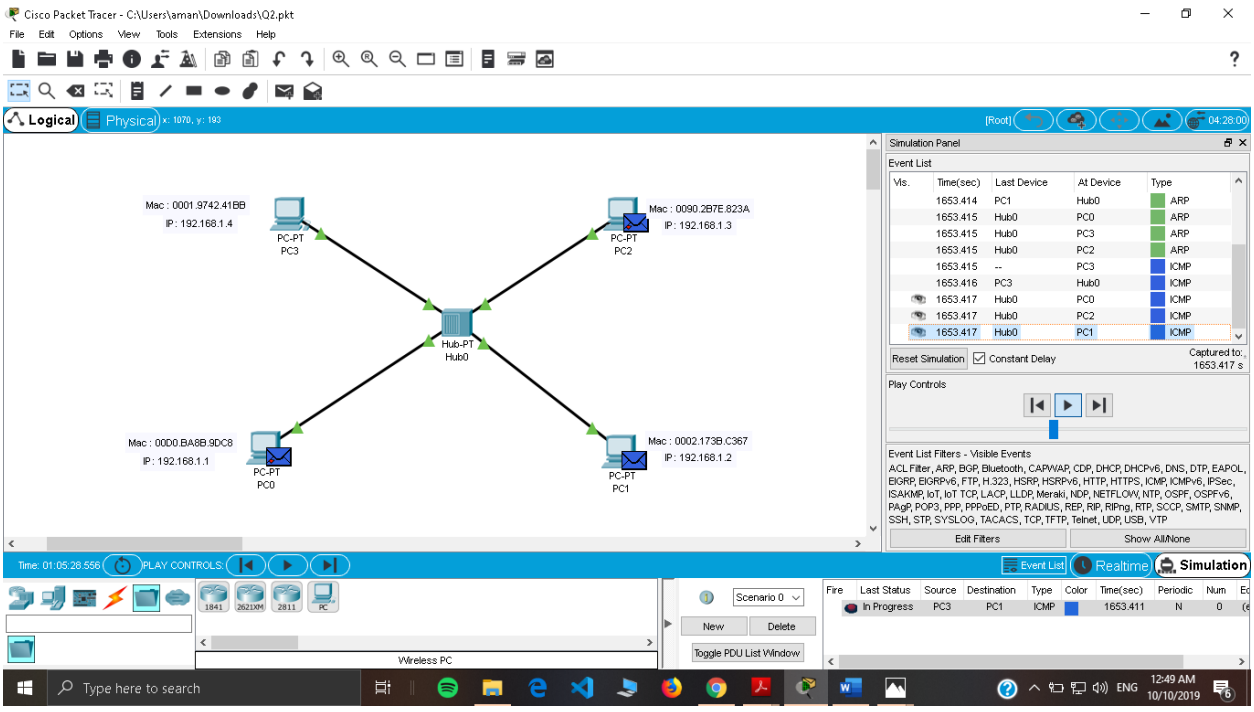
Hub transmit the ARP packet it to every PC but only the destination PC(PC-1) accepts it rest of them drops the packet



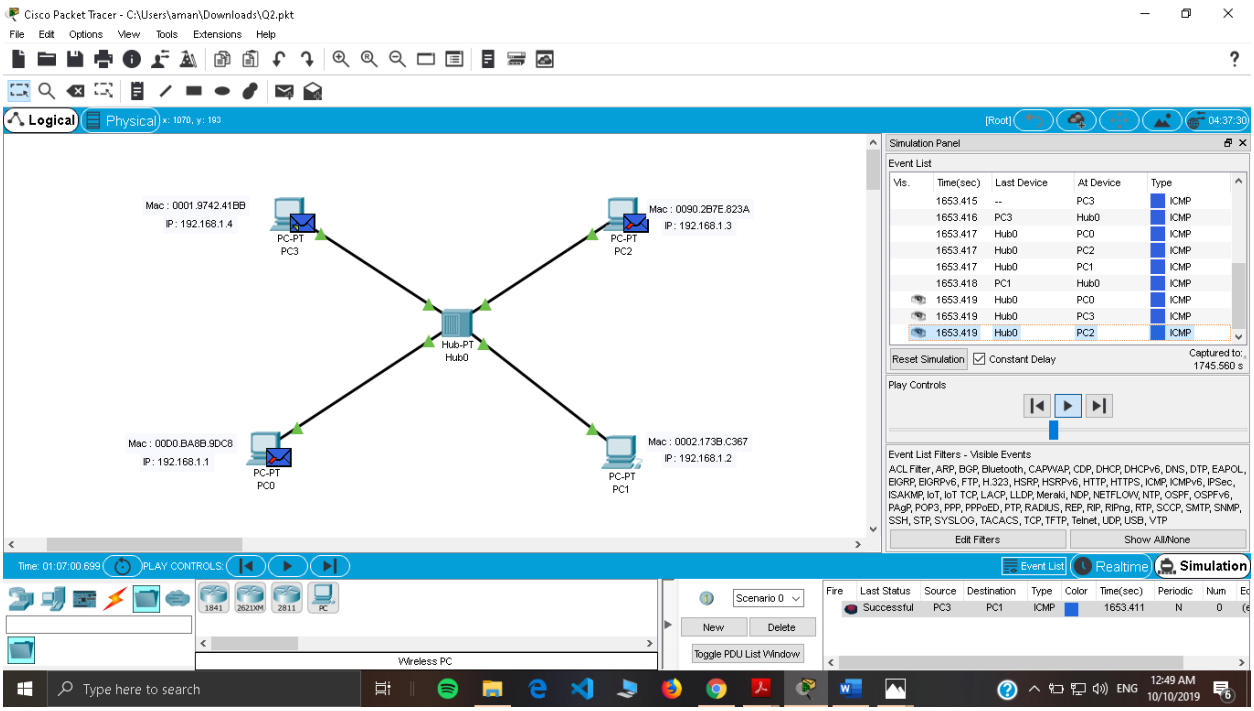
The PC-1 sends the acknowledgement to Hub which transmit it to every PC but accepted by only PC-3



Now PC-3 sends the ICMP (ping) Packet to the hub which transmit it to every PC but accepted by only PC-1.



Now PC-1 sends the acknowledgement of ICMP Packet to the hub which transmit it to every PC but accepted by only PC-3.


Cisco Packet Tracer - C:\Users\aman\Downloads\Q2.pkt
File Edit Options View Tools Extensions Help
Logical
Physical
Mac : 0001.9742.41BB
IP : 192.168.1.4
PC-PT
PC3
Mac : 0090.2B7E.823A
IP : 192.168.1.3
PC-PT
PC2
Hub-PT
Hub0
Mac : 00D0.BA8B.9DC8
IP : 192.168.1.1
PC-PT
PC0
Mac : 0002.173B.C367
IP : 192.168.1.2
PC-PT
PC1
Simulation Panel
Event List
Vis. Time(sec) Last Device At Device Type
1653.415 -- PC3 ICMP
1653.416 PC3 Hub0 ICMP
1653.417 Hub0 PC0 ICMP
1653.417 Hub0 PC2 ICMP
1653.417 Hub0 PC1 ICMP
1653.418 PC1 Hub0 ICMP
1653.419 Hub0 PC0 ICMP
1653.419 Hub0 PC3 ICMP
1653.419 Hub0 PC2 ICMP
Reset Simulation
Constant Delay
Captured to:
1745.560 s
Play Controls
Event List Filters - Visible Events
ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoED, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP
Edit Filters
Show All/None
Time: 01:07:00.699
PLAY CONTROLS:
Event List
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Wireless PC
Fire Last Status Source Destination Type Color Time(sec) Periodic Num
Successful PC3 PC1 ICMP 1653.411 N 0
Type here to search
ENG
12:49 AM
10/10/2019