

# **APPLIED INDUSTRIAL INTERNET OF THINGS**

## **CONFIGURATION OF ADDRESS RESOLUTION PROTOCOL (ARP)**

### **Aim:**

Construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP) using Cisco Packet Tracer. Utilize PCs, 8 port switch and LAN cable.

### **Problem statement:**

The goal is to construct a **basic Local Area Network (LAN)** using PCs, a switch, and LAN cables in **Cisco Packet Tracer**, and then observe how **ARP** works to resolve IP addresses to MAC addresses when devices communicate within the LAN.

### **Scope of the solution:**

#### **1. LAN Construction & Connectivity:**

- Demonstrates how to design and implement a basic LAN using PCs, a switch, and cables in Cisco Packet Tracer.
- Covers IP addressing and subnetting for devices within a single subnet.
- Validates end-to-end connectivity through ping tests.

#### **2. Understanding ARP Operations:**

- Shows how devices in a LAN use ARP to map IP addresses to MAC addresses.
- Demonstrates ARP broadcast request and unicast reply.
- Provides practical exposure to the ARP cache table (arp -a) and its role in packet forwarding.

#### **3. Simulation of Real-World Networking:**

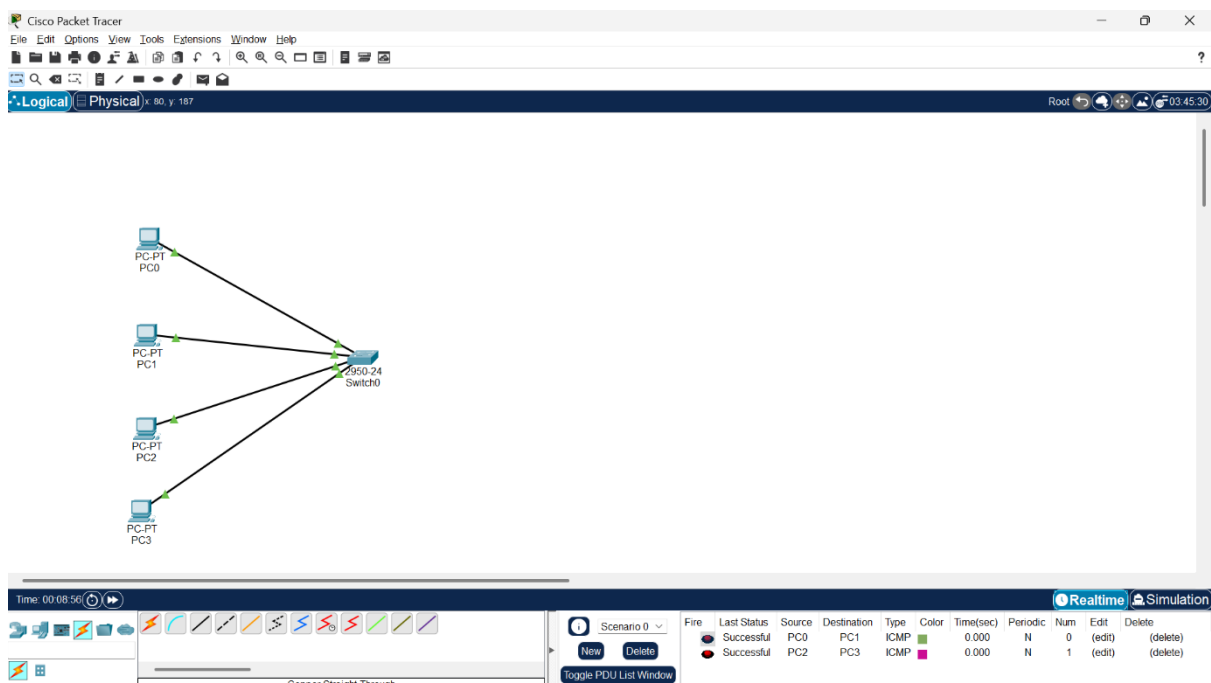
- Replicates how actual PCs communicate in a local area network.
- Highlights the role of a switch in frame forwarding based on MAC addresses.

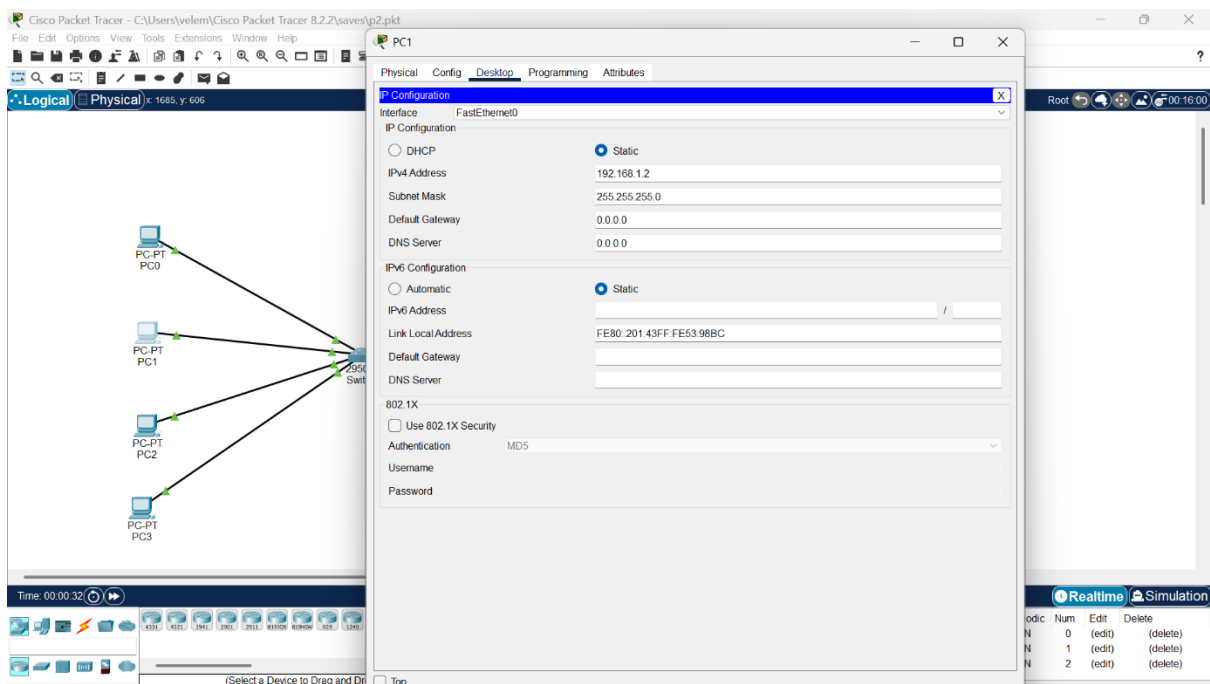
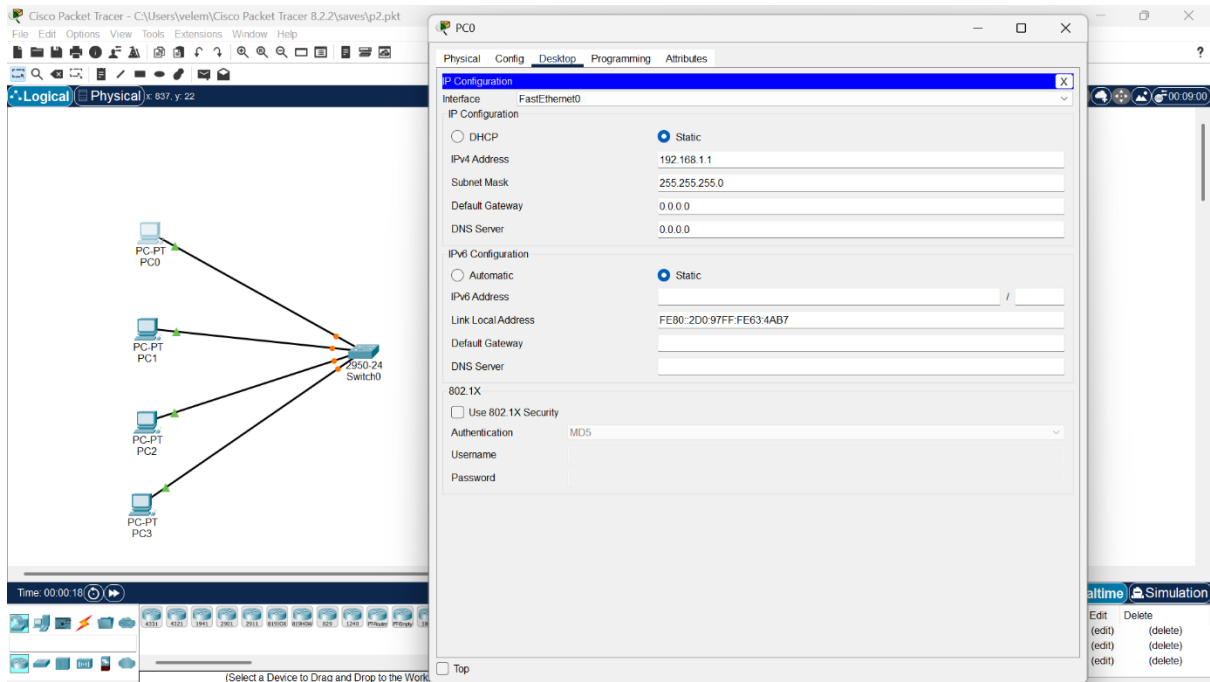
#### **4. Educational & Training Use:**

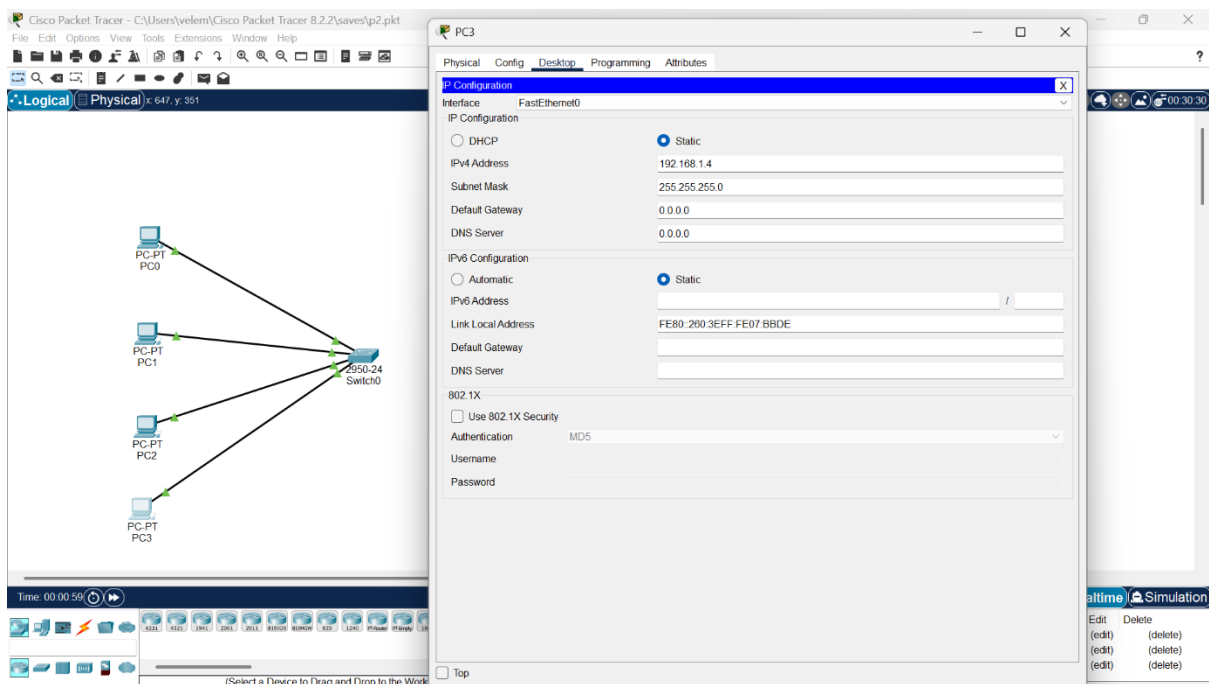
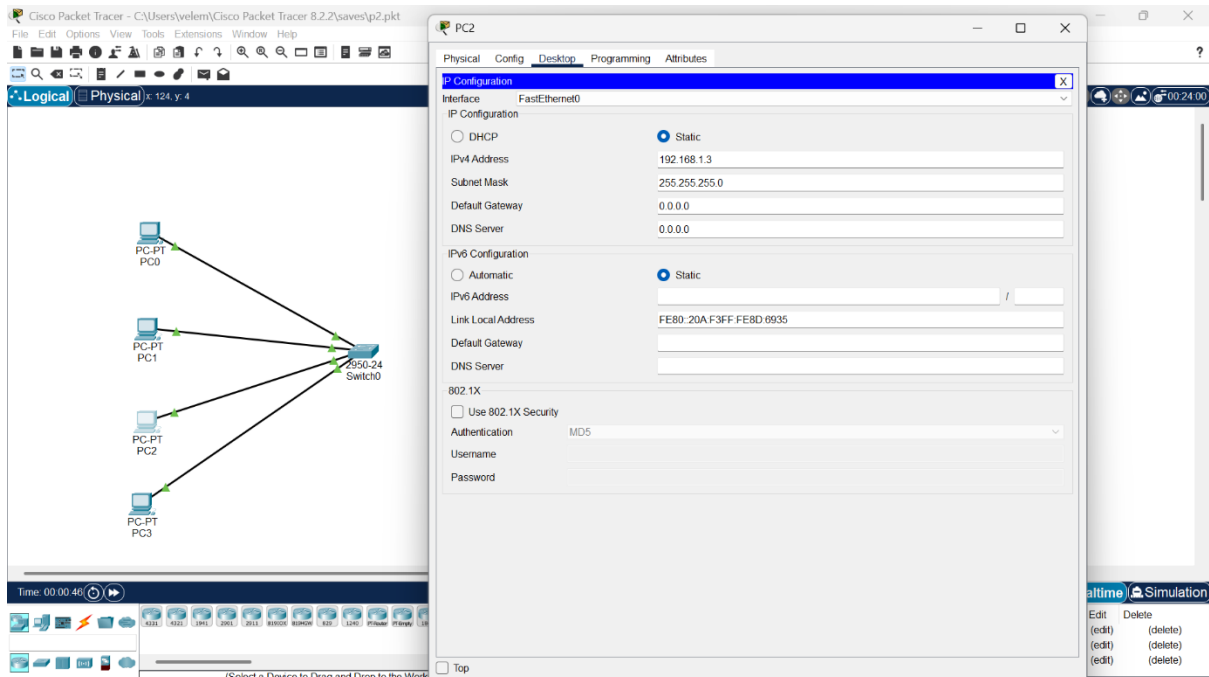
- Helps learners understand basic networking concepts (LAN setup, addressing, ARP).
- Useful for CCNA beginners and practical labs in networking courses.

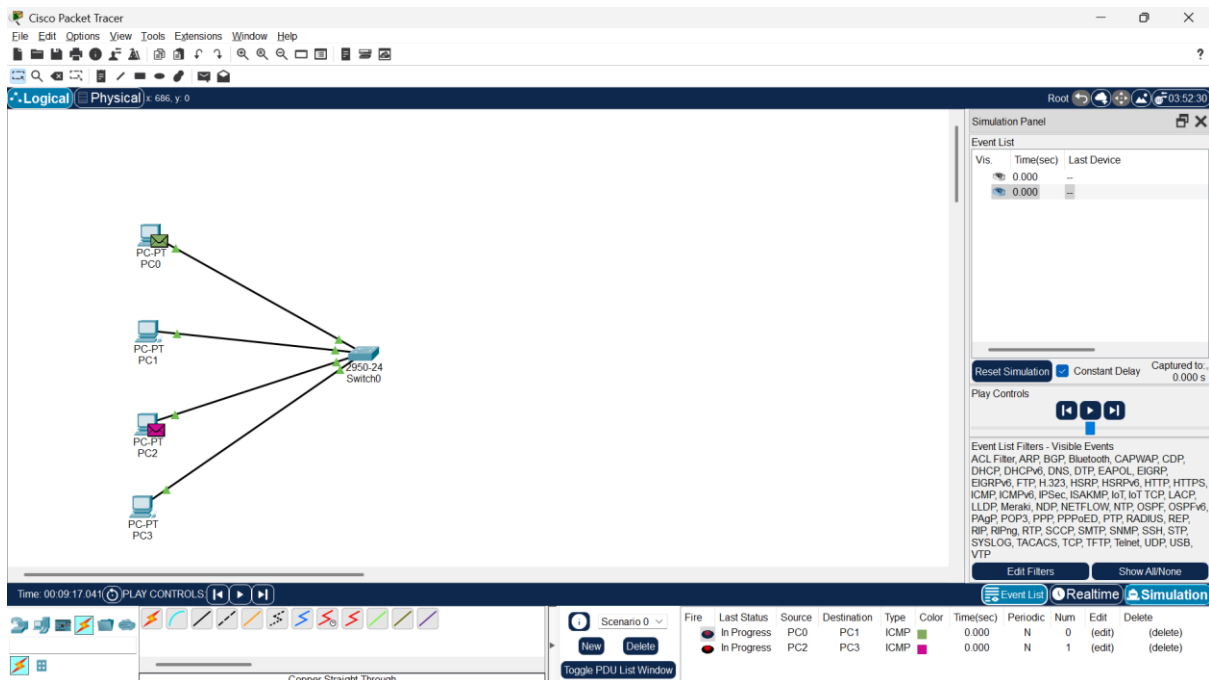
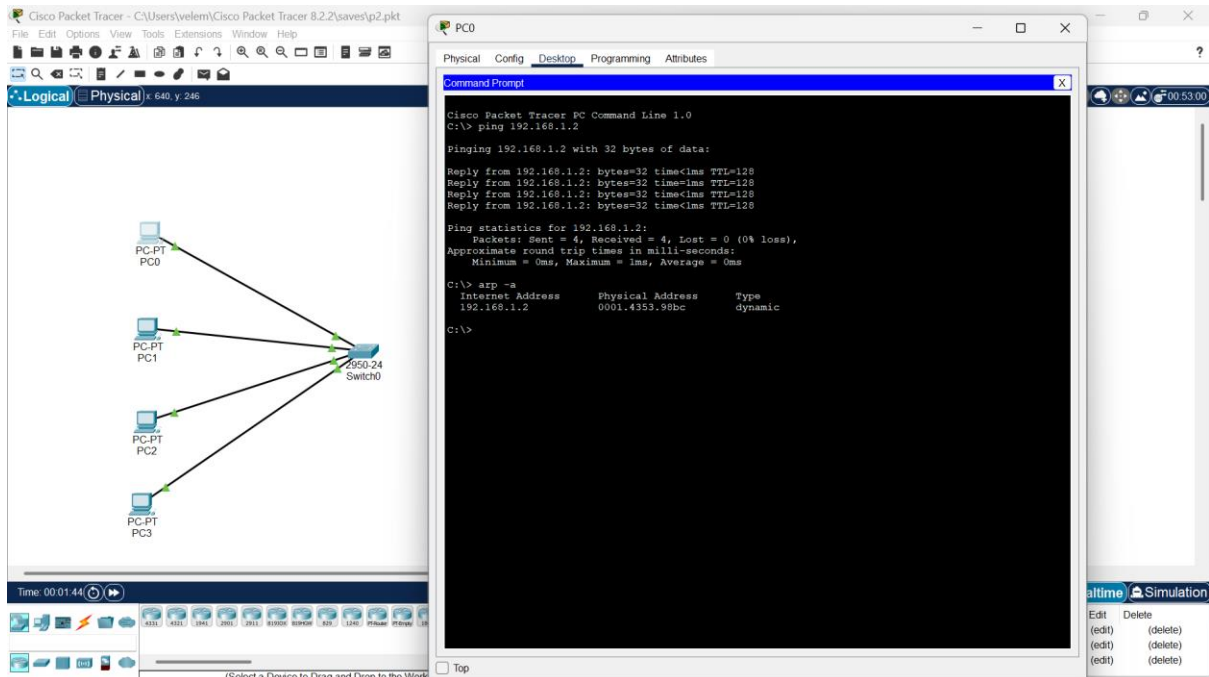
**Required components to develop solutions:**

- **2 or more PCs** (PC0, PC1, PC2...)
- **1 Switch** (8-port switch, e.g., 2960)
- **Straight-through Ethernet cables** (Copper Straight-Through)
- **Cisco Packet Tracer**









**PDU Information at Device: PC0**

**OST Model Outbound PDU Details**

At Device: PC0  
Source: PC0  
Destination: PC1

**In Layers**

- Layer 7
- Layer 6
- Layer 5
- Layer 4
- Layer 3
- Layer 2
- Layer 1

**Out Layers**

- Layer 7
- Layer 6
- Layer 5
- Layer 4
- Layer 3: IP Header Src. IP: 192.168.1.1, Dest. IP: 192.168.1.2  
ICMP Message Type: 8
- Layer 2: Ethernet II Header  
00D0.9763.4AB7 >> 0001.4353.98BC
- Layer 1: Port(s): FastEthernet0

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 >>

Time: 00:09:17.041 PLAY CONTROLS

Scenario 0

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
In Progress	In Progress	PC0	PC1	ICMP		0.000	N	0	(edit)	(delete)
In Progress	In Progress	PC2	PC3	ICMP		0.000	N	1	(edit)	(delete)

Toggle PDU List Window

**PDU Information at Device: PC2**

**OST Model Outbound PDU Details**

At Device: PC2  
Source: PC2  
Destination: PC3

**In Layers**

- Layer 7
- Layer 6
- Layer 5
- Layer 4
- Layer 3
- Layer 2
- Layer 1

**Out Layers**

- Layer 7
- Layer 6
- Layer 5
- Layer 4
- Layer 3: IP Header Src. IP: 192.168.1.3, Dest. IP: 192.168.1.4  
ICMP Message Type: 8
- Layer 2: Ethernet II Header  
000A.F38D.6935 >> 0060.3E07.BBDE
- Layer 1: Port(s): FastEthernet0

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 >>

Time: 00:09:17.041 PLAY CONTROLS

Scenario 0

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
In Progress	In Progress	PC0	PC1	ICMP		0.000	N	0	(edit)	(delete)
In Progress	In Progress	PC2	PC3	ICMP		0.000	N	1	(edit)	(delete)

Toggle PDU List Window

PDU Information at Device: Switch0

OSI Model Outbound PDU Details

At Device: Switch0  
Source: Switch0  
Destination: STP Multicast Address

In Layers  
Layer7  
Layer6  
Layer5  
Layer4  
Layer3  
Layer2  
Layer1

Out Layers  
Layer7  
Layer6  
Layer5  
Layer4  
Layer3  
Layer2: IEEE 802.3 Header  
0001.C92E.0D03 >> 0100.0CCC.CCCD  
LLC SNAP STP BPDU  
Layer 1: Port(s): FastEthernet0/2, FastEthernet0/1, FastEthernet0/4, FastEthernet0/3

1. The STP process sends out a configuration BPDU.  
2. The device encapsulates the PDU into an Ethernet frame.  
3. The switch uses the first VLAN number used in the trunk as the outgoing VLAN number in the IEEE 802.1q Header.  
4. The STP process sends out a configuration BPDU.  
5. The device encapsulates the PDU into an Ethernet frame.  
6. The switch uses the first VLAN number used in the trunk as the outgoing VLAN number in the IEEE 802.1q Header.  
7. The STP process sends out a configuration BPDU.  
8. The device encapsulates the PDU into an Ethernet frame.  
9. The switch uses the first VLAN number used in the trunk as the outgoing VLAN number in the IEEE 802.1q Header.  
10. The STP process sends out a configuration BPDU.

Challenge Me << Previous Layer Next Layer >>

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
	7.119	--
	7.120	Switch0
	8.931	--
	8.932	--
	8.932	--
	8.932	--
	8.932	Switch0
	8.932	Switch0
	8.932	Switch0
	8.932	Switch0

Reset Simulation Constant Delay Captured to: 8.932 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, PPPoE, PTP, RADIUS, REP, RIP, RIPv2, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show All/None

Event List Realtime Simulation

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	PC1	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC2	PC3	ICMP		0.000	N	1	(edit)	(delete)