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Subject: Computer Network and Security Lab

Assignment 01 Writeup

Subject: Computer Networks lab.

Title: Wireless LAN setup

Problem statement:

Setup a wired LAN using Layer-2 switch. It includes preparation of cable, testing of cable using line tester, configuration machine using IP addresses, testing using PING utility & demonstrating the PING packets captured traces using Wireshark Packet Analyzer Tool.

Requirements: Cisco Packet Tracer, Wireshark Packet Analyzer Tool, RJ45 connector, Crimping Tool, line tester (This was shown virtually due to covid, by our lab teacher.)

Description:

Computer Networks:
→ According to Tenenbaum
1) Computer Network is a collection of autonomous computers interconnected by a single technology.
2) Two computers are said to be interconnected if they are able to exchange information.
3) The connection need not be via a copper wire; fiber optics, microwaves, infrared & communication satellites can also be used.

Table: Layers Summary (OSI, TCP/IP)

Sr. No	OSI	TCP/IP Layer	Network Device	Packet Data Unit (PDU)	Address	Function	Protocol
1)	Application	Application	—	Message	—	Access to Network	HTTP, SMTP etc.
2)	Presentation		—	Message	—	Data translation, compression, encryption etc.	NCP, LPP, JPEG etc
3)	Session		Gateway	Message	—	Session establishment, management & termination.	ZIP, SDP, SMPP, RPC, PPP.
4)	Transport	Transport	Firewall	Segment (TCP), Datagram (UDP)	Port	Control flow of data & error handling	TCP, UDP, RDP
5)	Network	Internet	Router	Packet	IP Address	Logical to physical addr. translation.	IPv4, IPv6, IPX etc.
6)	Data Link	Link	Switch, Bridge, Access Point	Frame	MAC Address	multiplexing data streams, data frames detection, medium access	ATM, ethernet, HDLC, Token Ring etc.
7)	Physical		Hub, NIC, cable, wireless	Bit	—	transmit raw bit stream over medium.	Bluetooth, DSL, Wi-Fi, 10BaseTetc.

difference between LAN, MAN & WAN:
(Note: Analysis is relative to each other)

Property	Network Type		
	LAN	MAN	WAN
Full form	Local Area Network	Metropolitan Area Network	Wide Area Network.
Ownership	Mostly private	private/public	Mostly public
Speed & Bandwidth	High & (up to 100Mbps)	Moderate (up to 100mbps)	Slower (up to 10Mbps)
Maintainance	Less	Moderate	High
Coverage.	10m to 1km	1 to 100 km	100 to 1000 km
Places of use	Room, Building, Campus, hospitals	City, small towns	Country, Continent.
Examples	Intranet, resource sharing in offices.	Cable Network	Military services, Airlines, Railways

Types of cables:

Property	Cable Type		
	Twisted Pair cable	Co-axial Cable	Optical fiber
1> Noise immunity	low	Moderate	Highest
2> Influence of external magnetic field.	Highly affected	Less affected	Not affected
3> Cost	Very Low.	Moderate	Very high
4> Power loss	High (conduction & radiation)	Moderate (conduction)	Low (absorption & scattering)
5> Bandwidth & speed.	low	Moderate	High.
6> Attenuation	Very High	Low	Very low
7> Signal & Transmission	In electrical form	In electrical form	In optical form
8> speed of data transfer.	Low	Moderate	High.
9> Applications	LAN	Broadband internet, cable TV, ethernet	internet communication

Wireshark Packet Analyzer Tool:-

1) Wireshark is a network analysis tool.

2) It captures packets in real time & display them in human-readable format.

3) Promiscuous mode:
    i) Normally a network interface will only recieve packets directly addressed to the interface.
    ii) Promiscous mode allows the interface to recieve all packets that it sees wheather they are addressed to the interface/not.
    iii) To enable promisious mode:
      go to:
        Home Screen → Capture → Options → Input → mark checkbox "Enable promiscuous mode on all interfaces".

4) To start capturing packets:
    select network connection → select start capture.
    · To stop capturing packets:
    There is a ▣ symbol in red colour.

5) Wireshark captures each packet sent to & from your system.

Steps of a wired LAN setup

1. Installation of ethernet card in machine.
2. Ethernet cable crimping using crimping tool
3. Make straight cable in order to form a star topology network to connect 2 different types of components eg PC to switch.
4. Make cross cable in order to form a star topology network to connect 2 same types of components. eg pc to pc.
5. Connect switch & machines using cable. (STAR Topology)
6. Assign IP address to the machines.
7. Ping from one machine to another machine.

Troubleshooting:

i) Always start with fresh scenario. You can delete any previous scenario if that is not in use.

ii) Before capture alway add simple PDU in cisco packet tracer.

iii) Always capture packets in simulation mode.

iv) Assign IP address properly.

mouse click on machine $\rightarrow$ Desktop $\rightarrow$ IP confi. $\rightarrow$ static (type IP address)

take down note of IP addresses.

Conclusion:

In this assignment/experiment I have setup & wired LAN & observed how packets are transfered from one machine to another in star topology. Also studied about IP address & PING command to PING other devices.

Screenshots of performance:
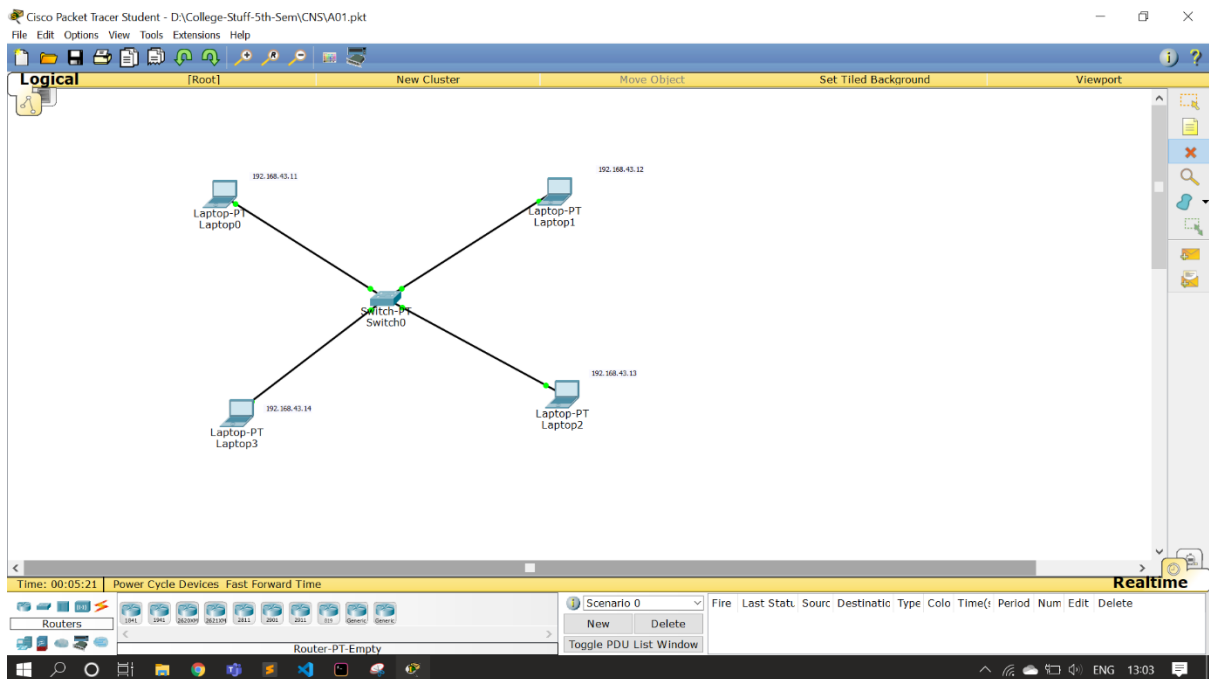
Screenshot-1: figure show wired LAN setup using star topology in CPT (Cisco Packet Tracer)
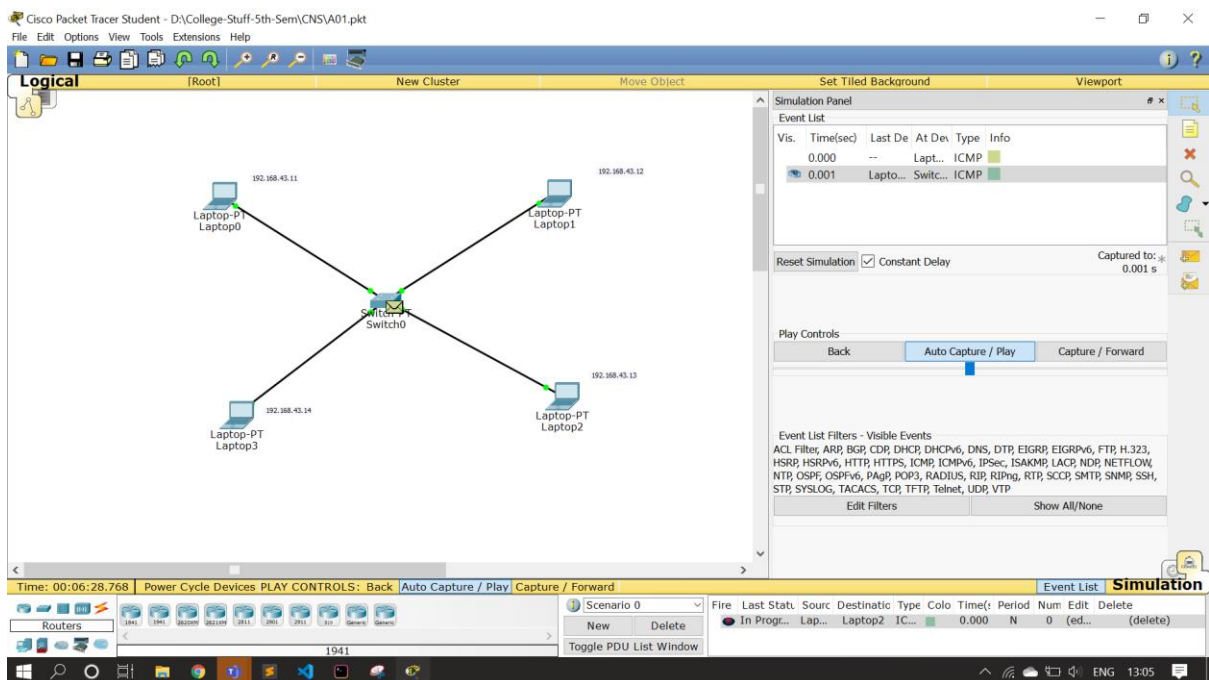
Screenshot-2: figure shows transfer of packet from machine-1 to switch
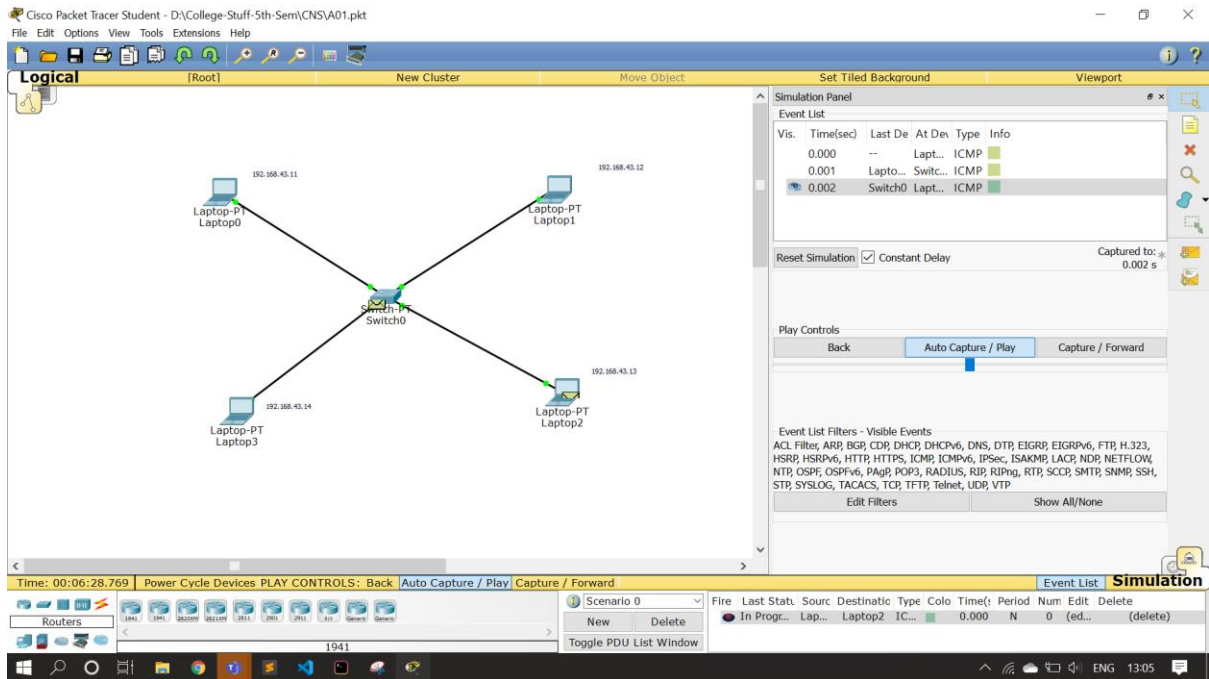
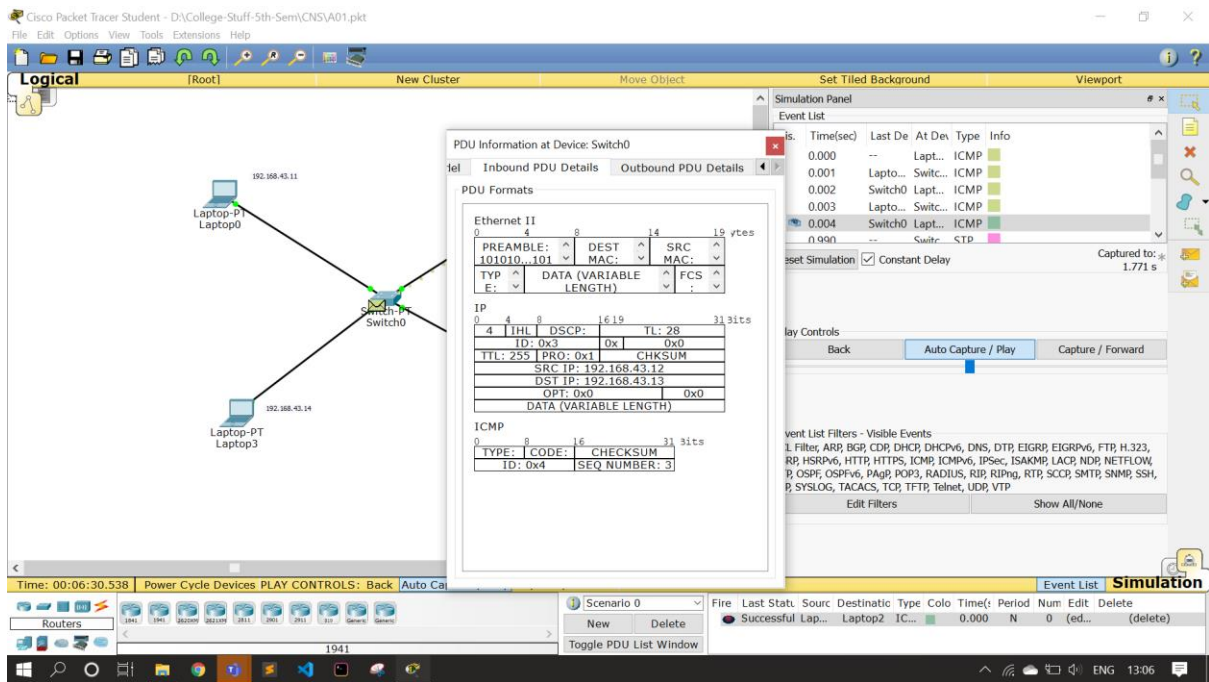Screenshot-3: figure shows transfer of packet from switch to machine-2
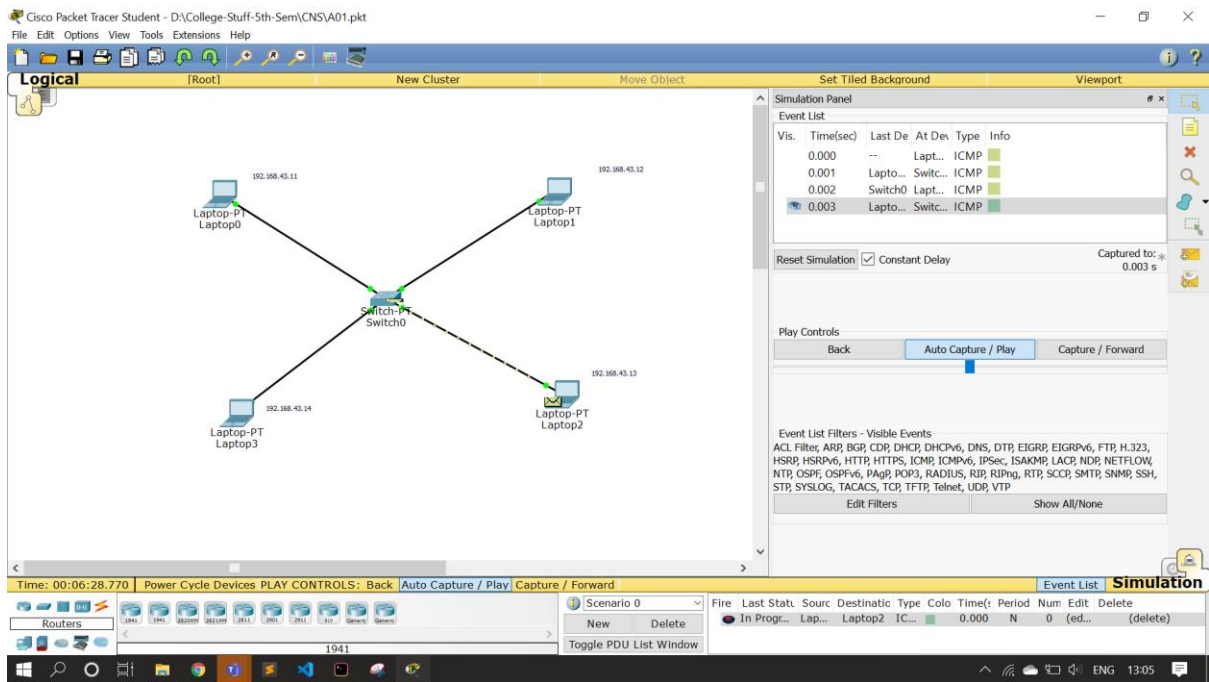
Screenshot-4: figure shows transfer of packet from machine-2 to switch
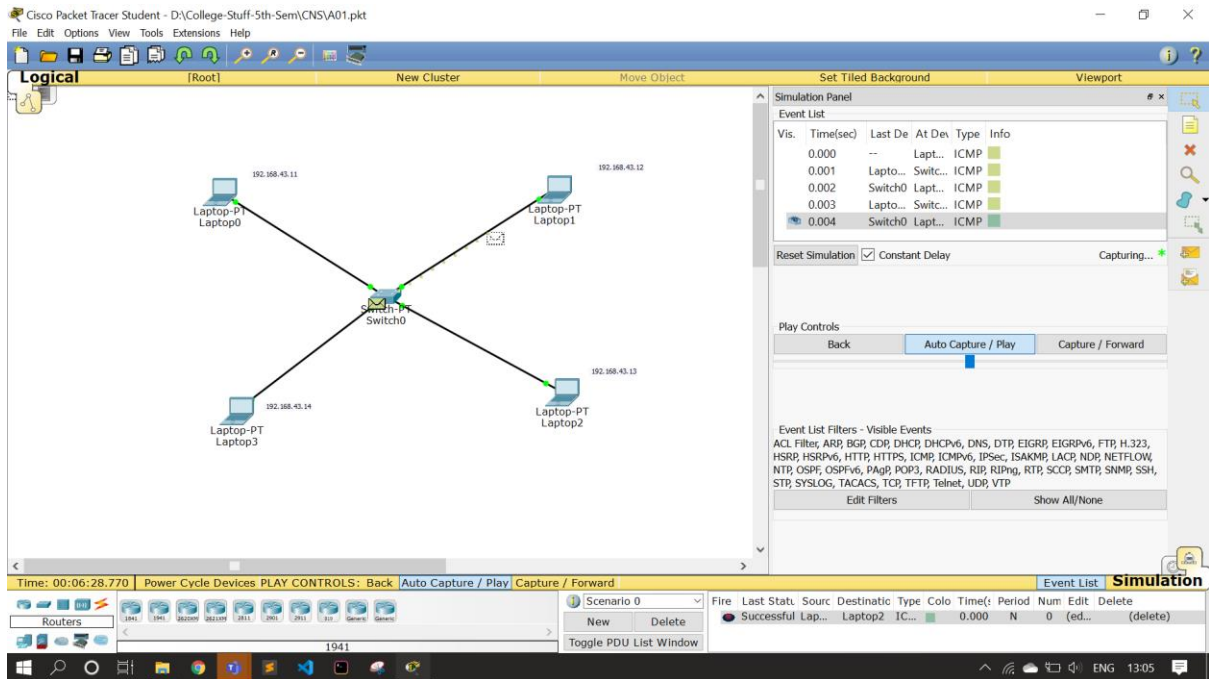
Screenshot-5: figure shows transfer of packet from switch to machine-1

Screenshot-6: figure showing intermediate packet details

Screenshot-7: IP address of my machine
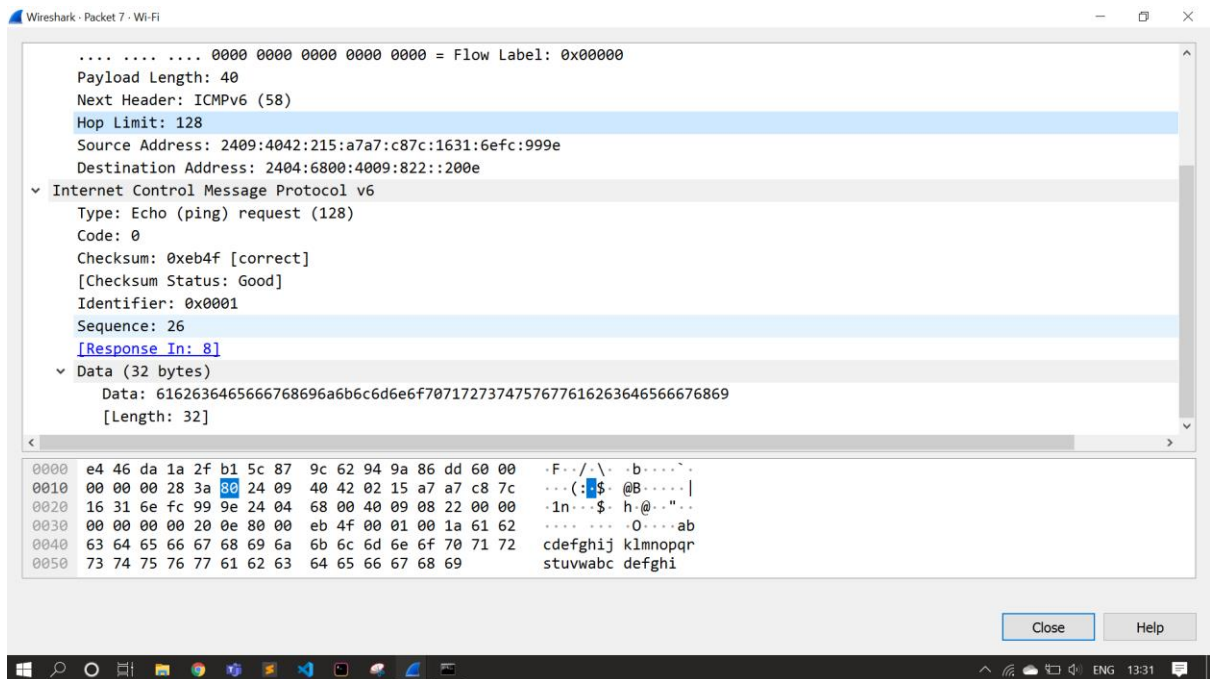

Screenshot-8: Ping command in command prompt
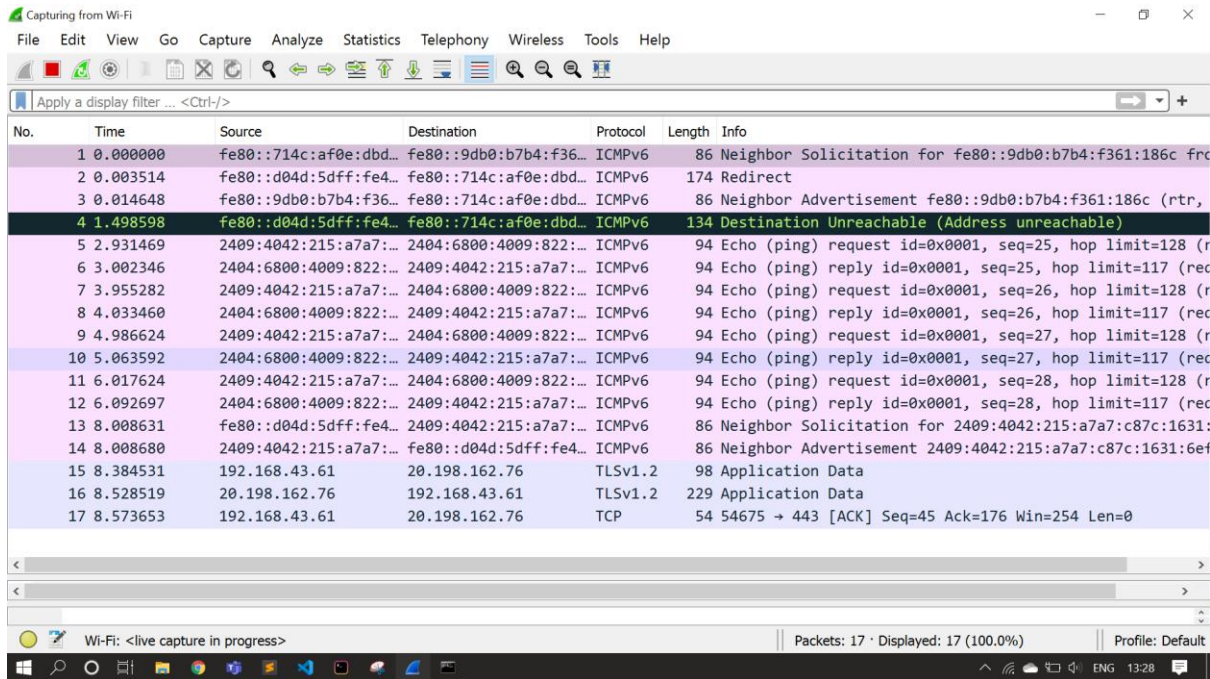
Screenshot-9: Captured packets in Wireshark Packet Analyzer Tool

Screenshot-10: IPv6 details

Thank You!