Fr. Conceicao Rodrigues College of Engineering

Department of Computer Engineering

Academic Term : July-Nov 2023-24

Class : T.E. (Computer B)
Subject Name: Computer network Lab
Subject Code : CSL 502

Experiment No:	4
Date of Performance:	17/08/2023
Roll No:	9614
Name of the Student:	Aqib Firdous Khan

AIM: Use Wire shark to understand the operation of TCP/IP layers:

- Ethernet Layer: Frame header, Frame size etc.
- Data Link Layer: MAC address, ARP (IP and MAC address binding)
- Network Layer: IP Packet (header, fragmentation), ICMP (Query and Echo)
- Transport Layer: TCP Ports, TCP handshake segments etc.

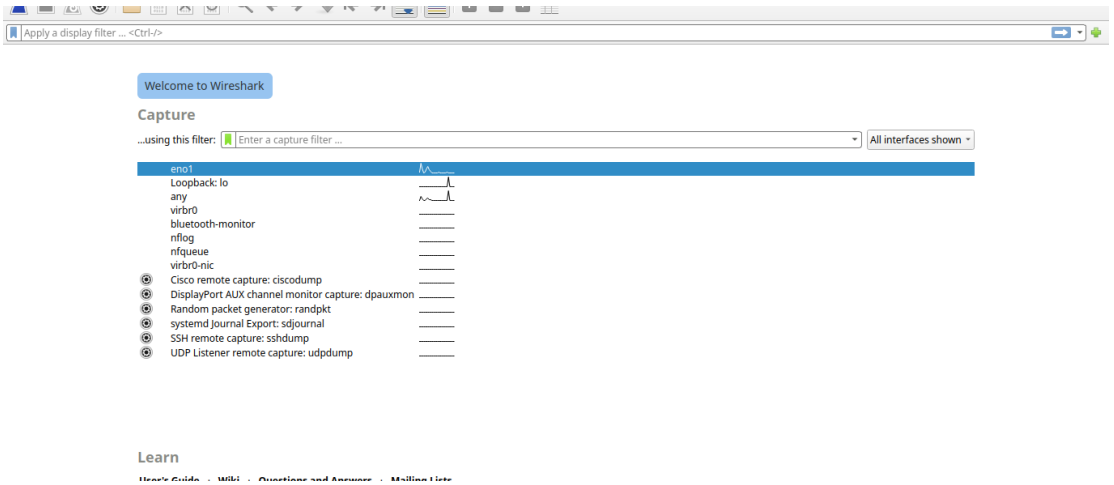
Application Layer: DHCP, FTP, HTTP header formats

THEORY:

Wireshark, a network analysis tool formerly known as Ethereal, captures packets in real time and displays them in human-readable format. Wireshark includes filters, color coding, and other features that let you dig deep into network traffic and inspect individual packets.

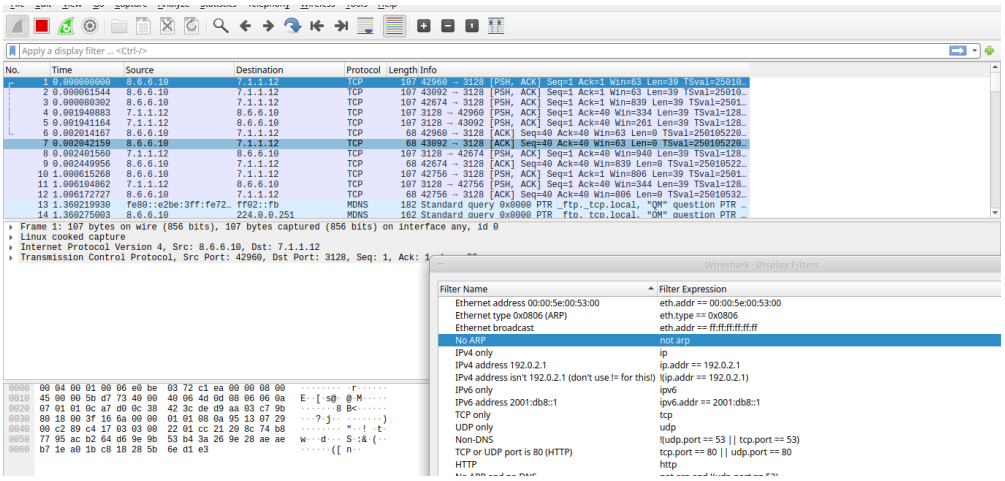
Capturing Packets

After downloading and installing Wireshark, you can launch it and double-click the name of a network interface under Capture to start capturing packets on that interface. For example, if you want to capture traffic on your wireless network, click your wireless interface. You can configure advanced features by clicking Capture > Options, but this isn't necessary for now.

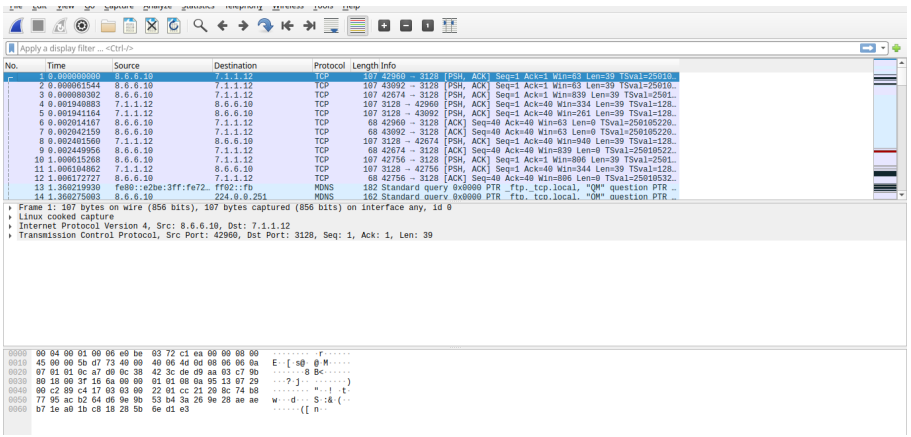


As soon as you click the interface's name, you'll see the packets start to appear in real time. Wireshark captures each packet sent to or from your system.

If you have promiscuous mode enabled—it's enabled by default—you'll also see all the other packets on the network instead of only packets addressed to your network adapter. To check if promiscuous mode is enabled, click Capture > Options and verify the "Enable promiscuous mode on all interfaces" checkbox is activated at the bottom of this window.



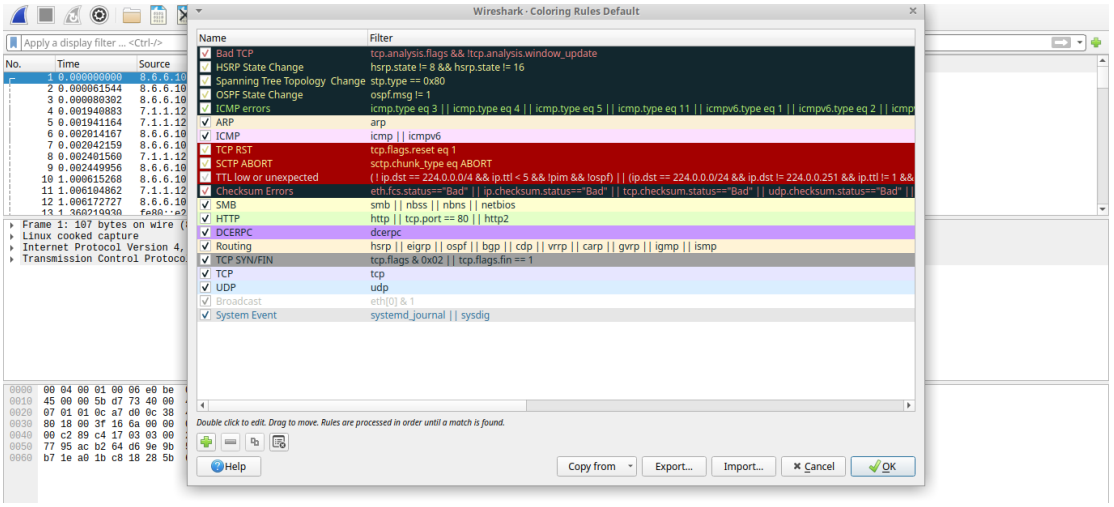
Click the red "Stop" button near the top left corner of the window when you want to stop capturing traffic.



Color Coding

You'll probably see packets highlighted in a variety of different colors. Wireshark uses colors to help you identify the types of traffic at a glance. By default, light purple is TCP traffic, light blue is UDP traffic, and black identifies packets with errors—for example, they could have been delivered out of order.

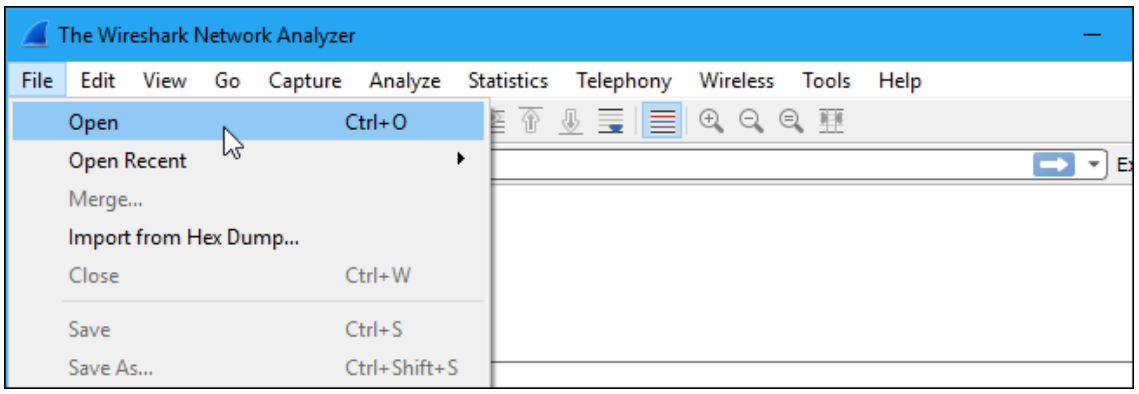
To view exactly what the color codes mean, click View > Coloring Rules. You can also customize and modify the coloring rules from here, if you like.



Sample Captures

If there's nothing interesting on your own network to inspect, Wireshark's wiki has you covered. The wiki contains a page of sample capture files that you can load and inspect. Click File > Open in Wireshark and browse for your downloaded file to open one.

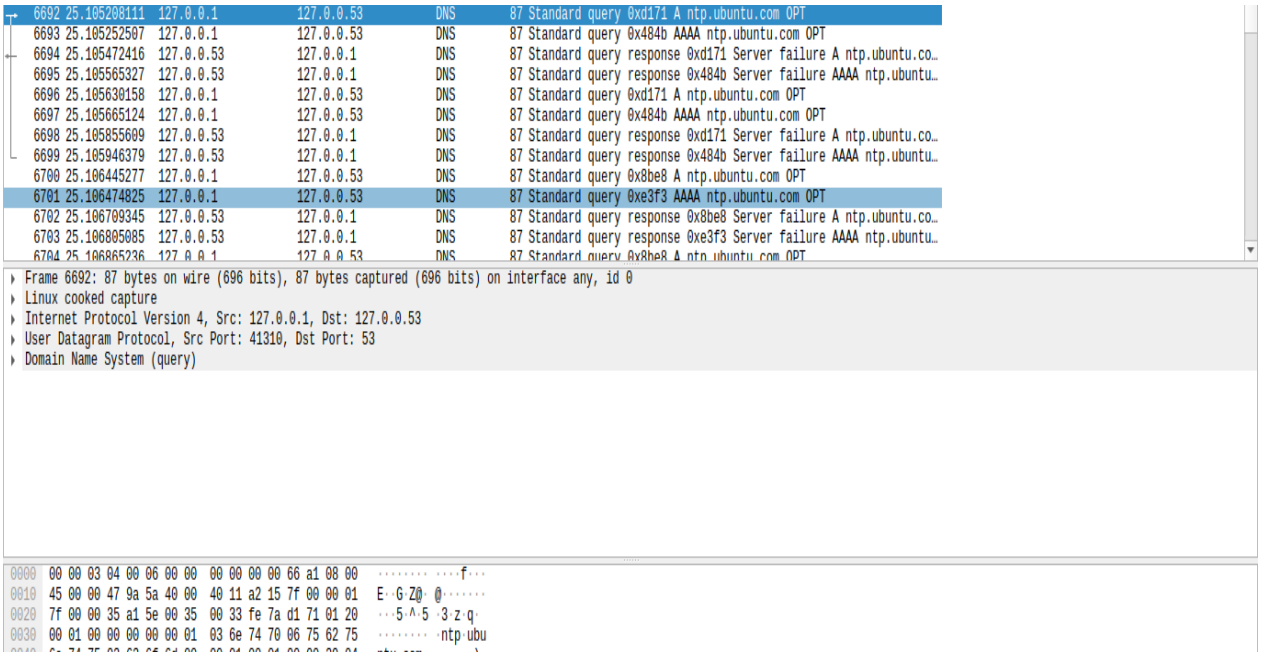
You can also save your own captures in Wireshark and open them later. Click File > Save to save your captured packets.



Filtering Packets

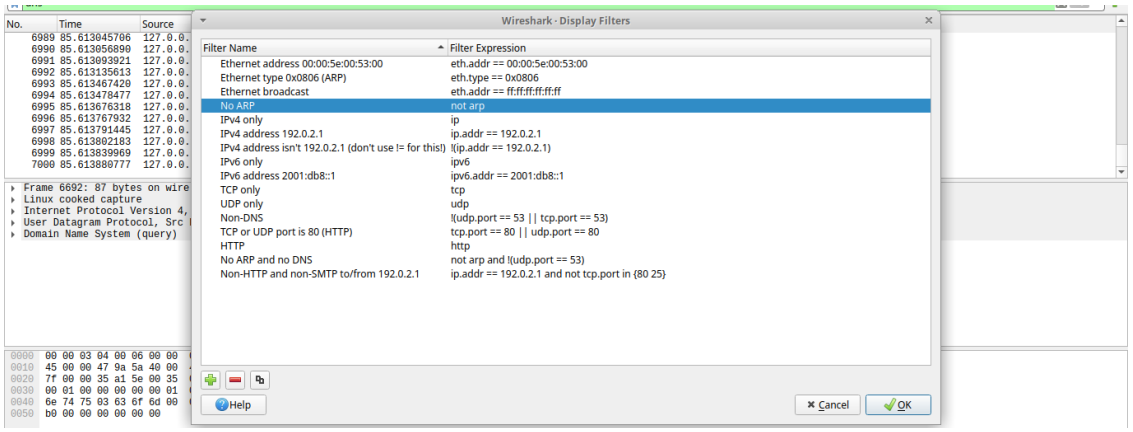
If you're trying to inspect something specific, such as the traffic a program sends when phoning home, it helps to close down all other applications using the network so you can narrow down the traffic. Still, you'll likely have a large amount of packets to sift through. That's where Wireshark's filters come in.

The most basic way to apply a filter is by typing it into the filter box at the top of the window and clicking Apply (or pressing Enter). For example, type "dns" and you'll see only DNS packets. When you start typing, Wireshark will help you autocomplete your filter.



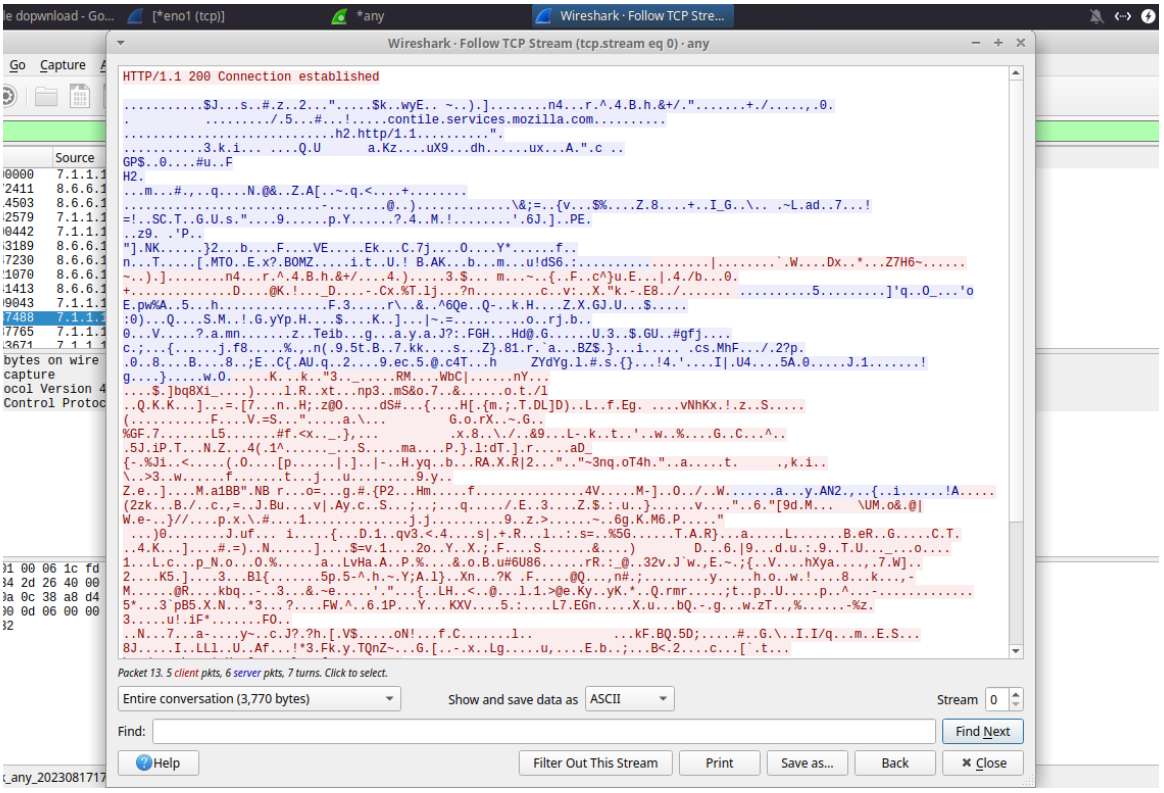
You can also click Analyze > Display Filters to choose a filter from among the default filters included in Wireshark. From here, you can add your own custom filters and save them to easily access them in the future.

For more information on Wireshark's display filtering language, read the Building display filter expressions page in the official Wireshark documentation.

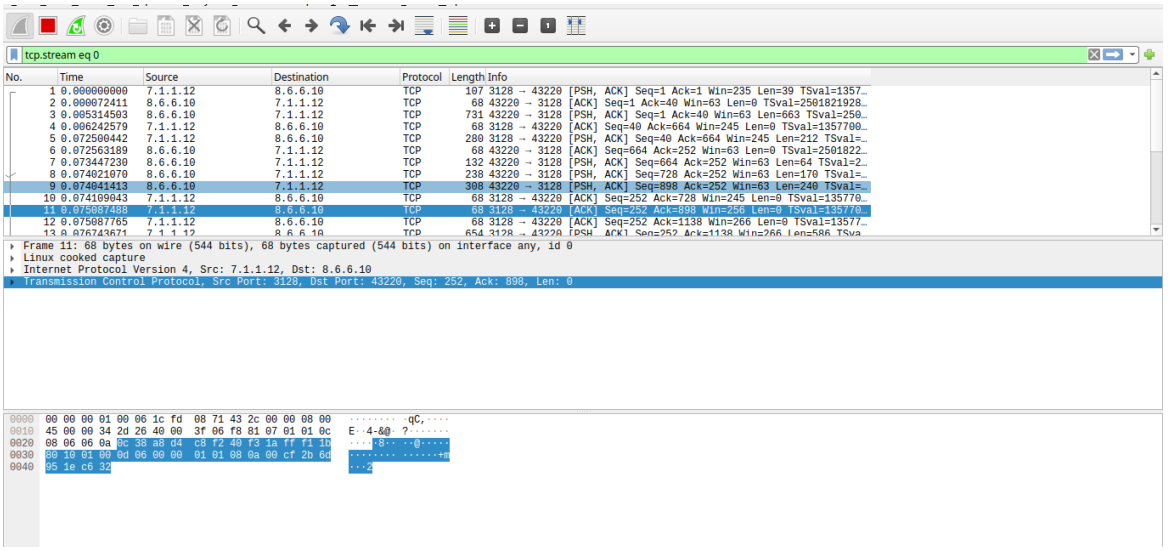


Another interesting thing you can do is right-click a packet and select Follow > TCP Stream.

You'll see the full TCP conversation between the client and the server. You can also click other protocols in the Follow menu to see the full conversations for other protocols, if applicable.

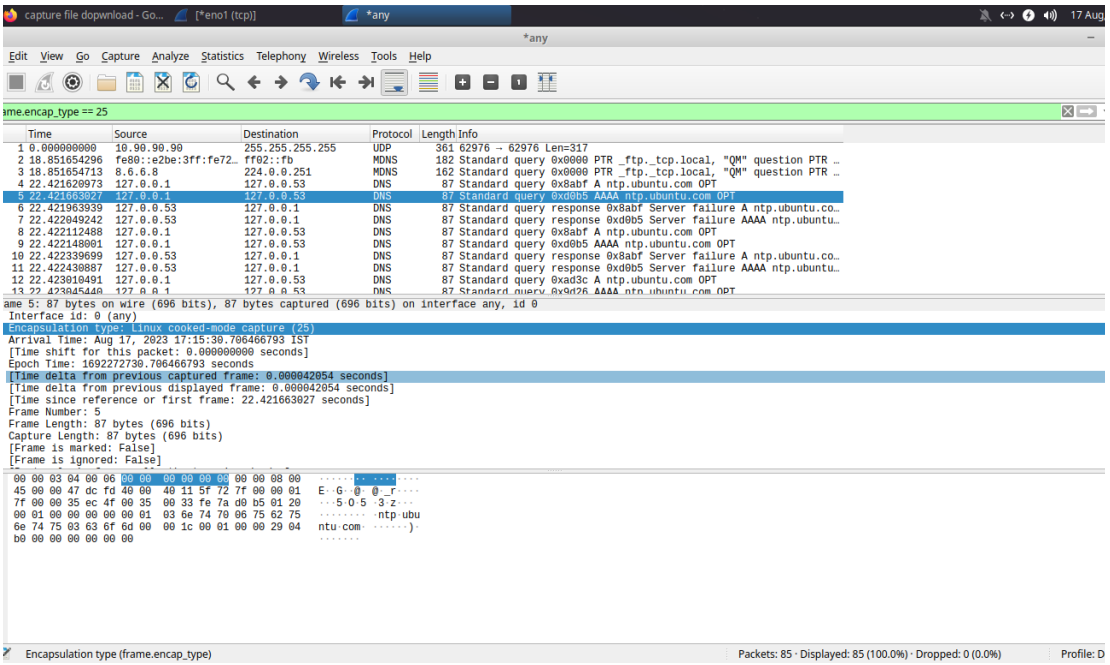


Close the window and you'll find a filter has been applied automatically. Wireshark is showing you the packets that make up the conversation.

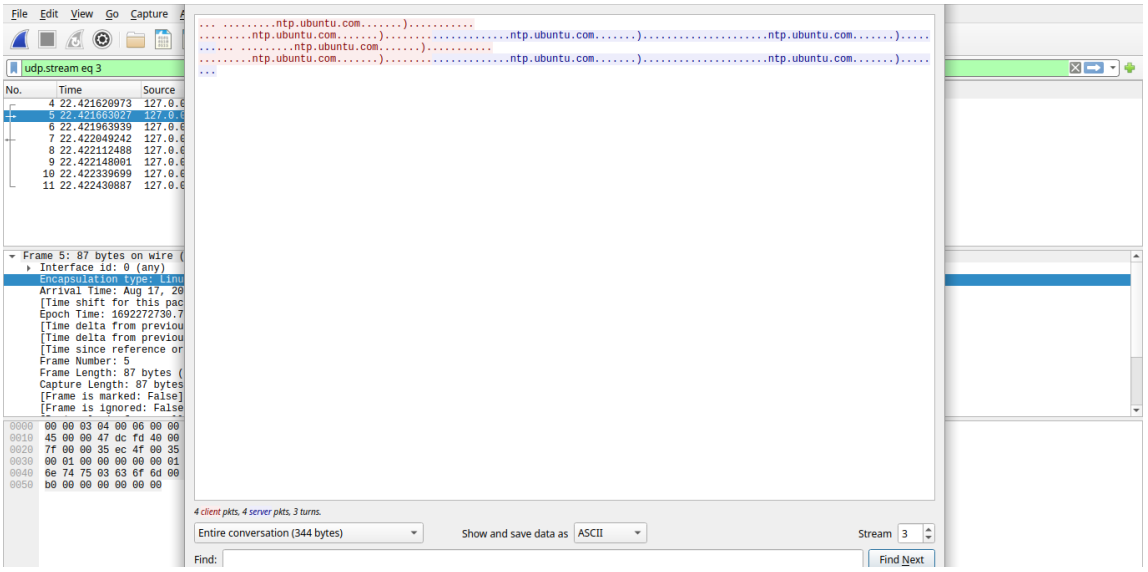


Inspecting Packets

Click a packet to select it and you can dig down to view its details.



You can also create filters from here — just right-click one of the details and use the Apply as Filter submenu to create a filter based on it.



Wireshark is an extremely powerful tool, and this tutorial is just scratching the surface of what you can do with it. Professionals use it to debug network protocol implementations, examine security problems and inspect network protocol internals.

CONCLUSION: Thus, we have studied the working of Wire Shark.

Post Lab Assignments:

1. **What is Ethernet?**

Ans: Ethernet is the traditional technology for connecting devices in a wired local area network (LAN) or wide area network (WAN). It enables devices to communicate with each other via a protocol, which is a set of rules or common network language.

Ethernet describes how network devices format and transmit data so other devices on the same LAN or campus network can recognize, receive and process the information. An Ethernet cable is the physical, encased wiring over which the data travels.

Connected devices that use cables to access a geographically localized network -- instead of a wireless connection -- likely use Ethernet. From businesses to gamers, diverse end users rely on the benefits of Ethernet connectivity, which include reliability and security.

Compared to wireless LAN (WLAN) technology, Ethernet is typically less vulnerable to disruptions. It can also offer a greater degree of network security and control than wireless technology because devices must connect using physical cabling. This makes it difficult for outsiders to access network data or hijack bandwidth for unsanctioned devices.

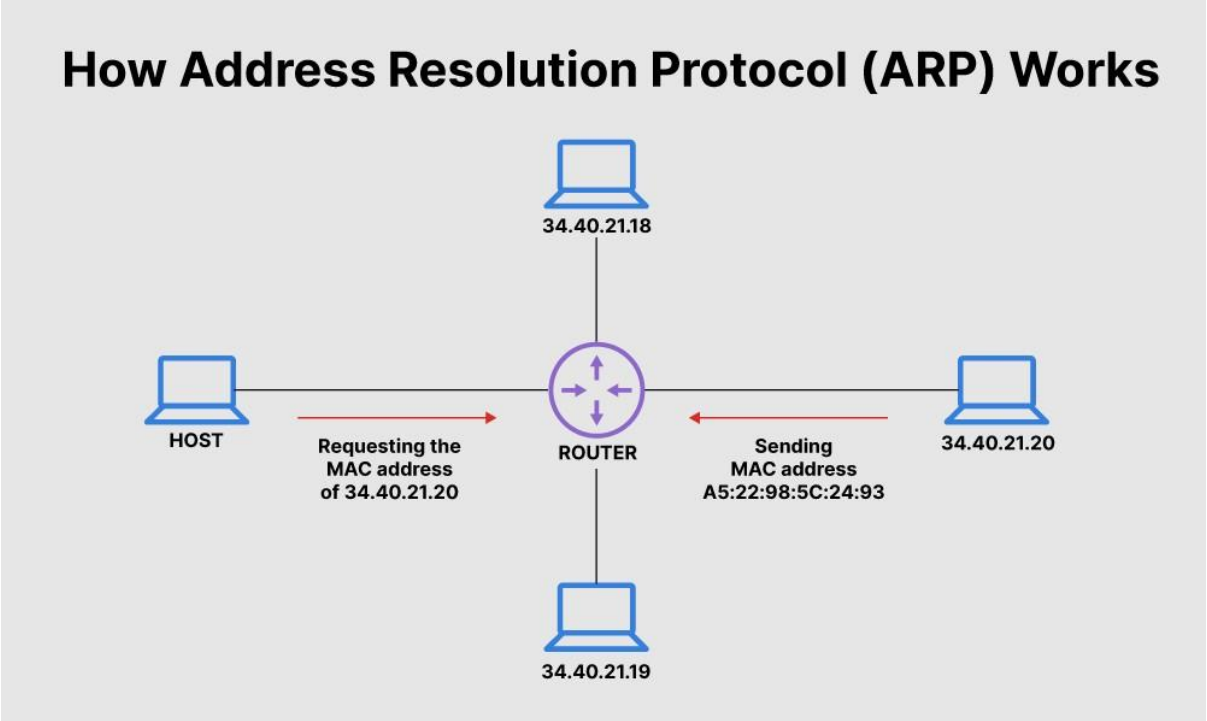
2. Explain the significance of ARP and RARP

ANS: Address Resolution Protocol (ARP) is a protocol or procedure that connects an ever-changing Internet Protocol (IP) address to a fixed physical machine address, also known as a media access control (MAC) address, in a local-area network (LAN).

This mapping procedure is important because the lengths of the IP and MAC addresses differ, and a translation is needed so that the systems can recognize one another. The most used IP today is IP version 4 (IPv4). An IP address is 32 bits long. However, MAC addresses are 48 bits long. ARP translates the 32-bit address to 48 and vice versa.

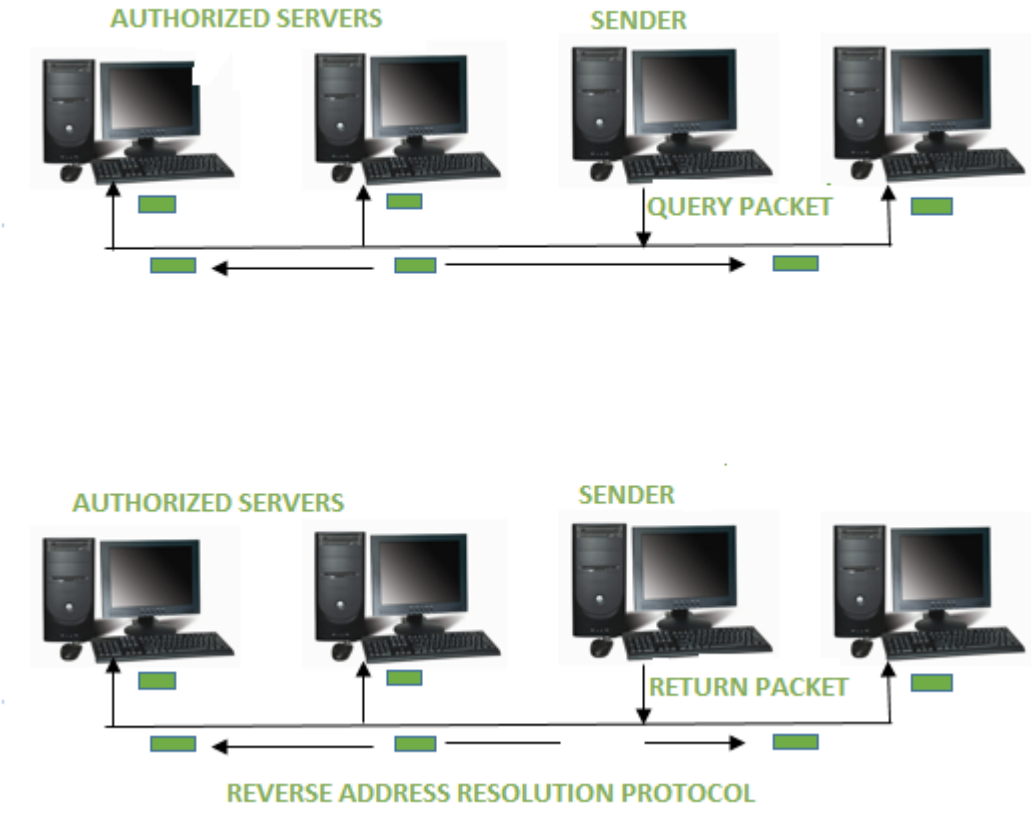
There is a networking model known as the Open Systems Interconnection (OSI) model. First developed in the late 1970s, the OSI model uses layers to give IT teams a visualization of what is going on with a particular networking system. This can be helpful in determining which layer affects which application, device, or software installed on the network, and further, which IT or engineering professional is responsible for managing that layer.

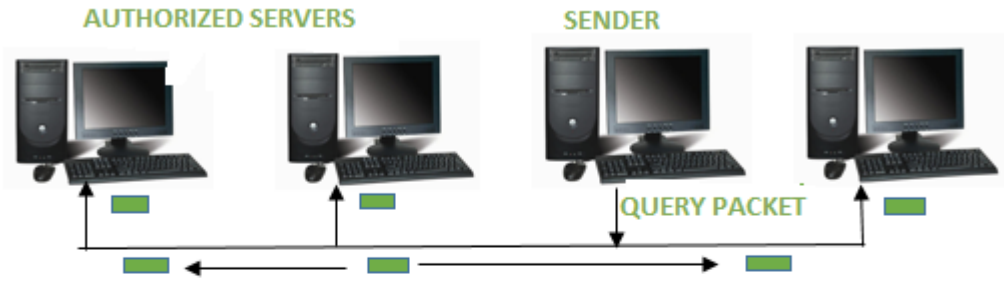
The MAC address is also known as the data link layer, which establishes and terminates a connection between two physically connected devices so that data transfer can take place. The IP address is also referred to as the network layer or the layer responsible for forwarding packets of data through different routers. ARP works between these layers.

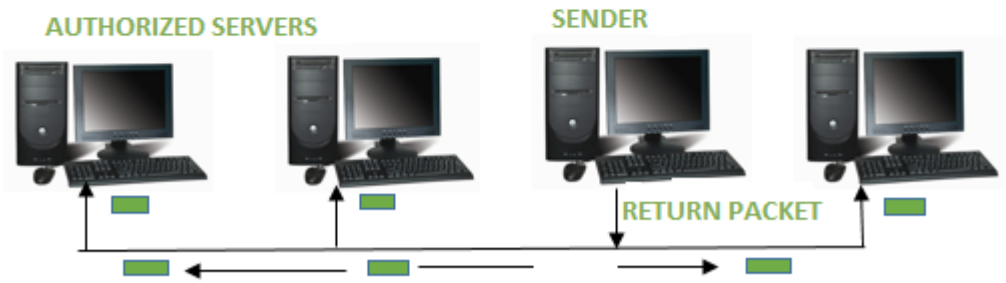


RARP is abbreviation of Reverse Address Resolution Protocol which is a protocol based on computer networking which is employed by a client computer to request its IP address from a gateway server's Address Resolution Protocol table or cache. The network administrator creates a table in gateway-router, which is used to map the MAC address to corresponding IP address.

This protocol is used to communicate data between two points in a server. The client doesn't necessarily need prior knowledge the server identities capable of serving its request. Media Access Control (MAC) addresses requires individual configuration on the servers done by an administrator. RARP limits to the serving of IP addresses only.
When a replacement machine is set up, the machine may or might not have an attached disk that may permanently store the IP Address so the RARP client program requests IP Address from the RARP server on the router. The RARP server will return the IP address to the machine under the belief that an entry has been setup within the router table.







REVERSE ADDRESS RESOLUTION PROTOCOL