CS23532 -COMPUTER NETWORKS

Practical-5

AIM Experiments on Packet capture tool: Wireshark

Packet Sniffer

- Sniffs messages being sent/received from/by your computer
- Store and displaythe contents of the various protocol fields in the messages
- Passive program
  - neversends packets itself
  - no packets addressed to it
  - receives a copy of all packets (sent/received)

Packet Sniffer Structure Diagnostic Tools

- Tcpdump
  - E.g. tcpdump -enx host 10.129.41.2 -w exe3.out
- Wireshark
  - wireshark -r exe3.out

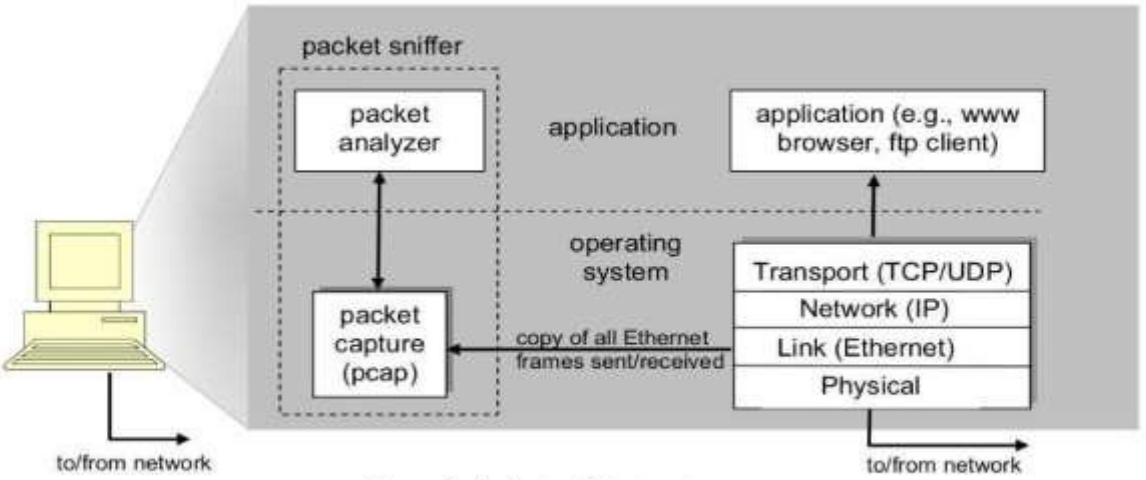


Figure 1: Packet sniffer structure

DESCRIPTION:

WIRESHARK

Wireshark, a network analysis tool formerly known as Ethereal, captures packets in real time and display 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. You can use Wireshark to inspect a suspicious program's network traffic, analyze the traffic flow on your network, or troubleshoot network problems.

What we can do with Wireshark:

- Capturenetwork traffic
- Decode packet protocols using dissectors
- Define filters – capture and display
- Watchsmart statistics
- Analyze problems
- Interactivelybrowse that traffic

Wiresharkused for:

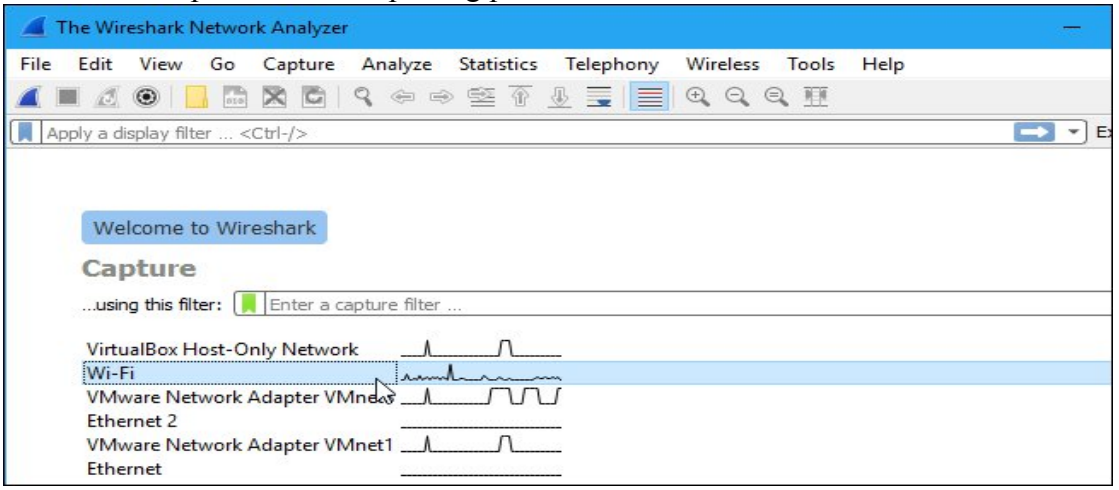
- Network administrators: troubleshoot network problems
- Network security engineers: examine security problems
- Developers: debug protocol implementations
- People: learn **network protocol internals**

Getting Wireshark

Wireshark can be downloaded for Windows or macOS from its official website. For Linux or another UNIX-like system, Wireshark will be found in its package repositories. For Ubuntu, Wireshark will be found in the Ubuntu Software Center.

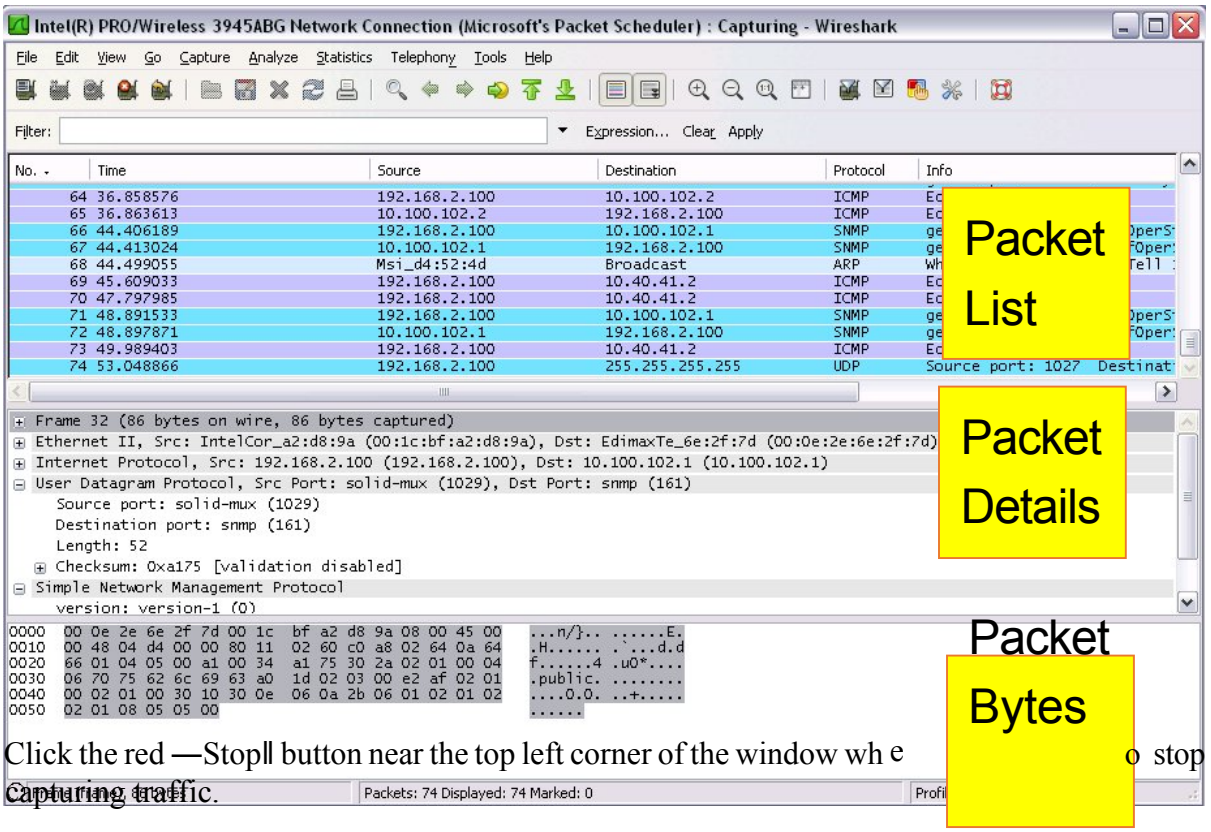
Capturing Packets

After downloading and installing Wireshark, launch it and double-click the name of a network interface under Capture to start capturing packets on that interface



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 —Stopll button near the top left corner of the window wh e o stop capturing traffic.

The "Packet List" Pane

The packet list pane displays all the packets in the current capture file. The —Packet Listll pane Each line in the packet list corresponds to one packet in the capture file. If you select a line in this pane, more details will be displayed in the —Packet Detailsll and —Packet Bytesll panes.

The "Packet Details" Pane

The packet details pane shows the current packet (selected in the —Packet Listll pane) in a more detailed form. This pane shows the protocols and protocol fields of the packet selected in the —Packet Listll pane. The protocols and fields of the packet shown in a tree which can be expanded and collapsed.

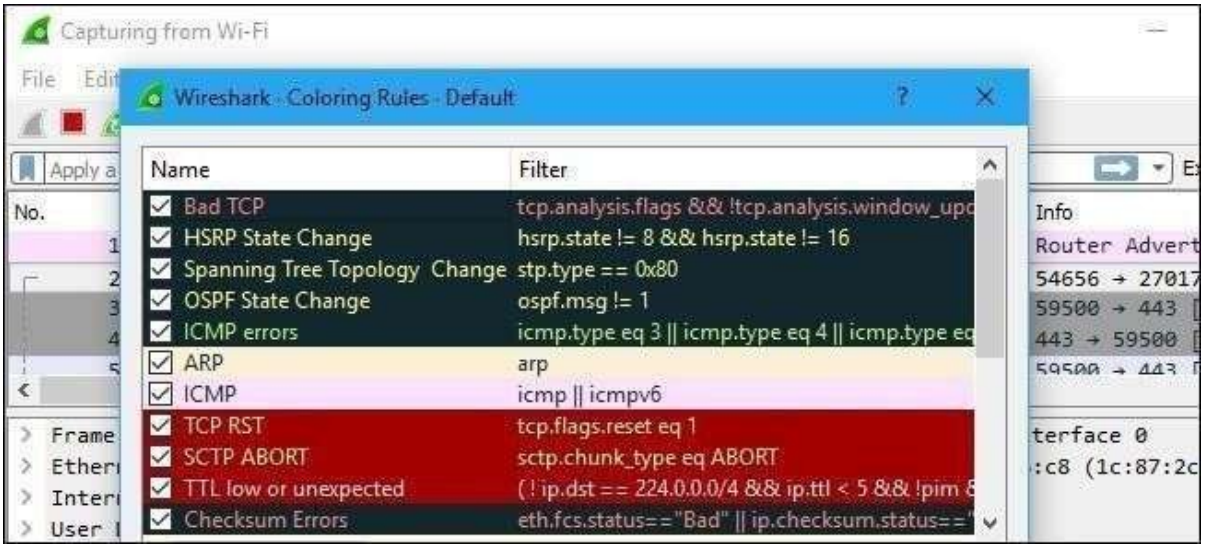
The "Packet Bytes" Pane

The packet bytes pane shows the data of the current packet (selected in the —Packet Listll pane) in a hexdump style.

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.

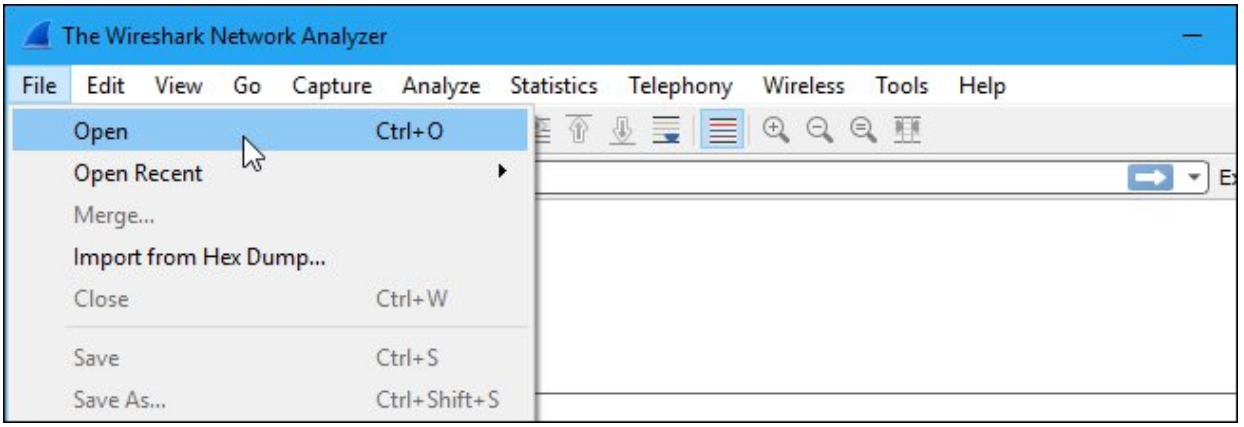
To view exactly what the color codes mean, click View > Coloring Rules. You can also customize and modify the coloring rules from here, if you like.



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.

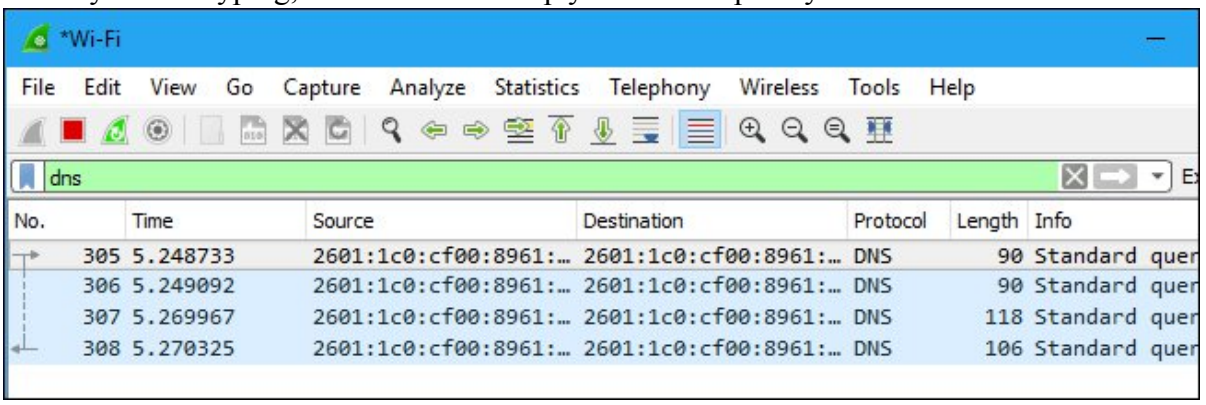
You can also save your own captures in Wireshark and open them later. Click File > Save to save your captured packets.



Filtering Packets

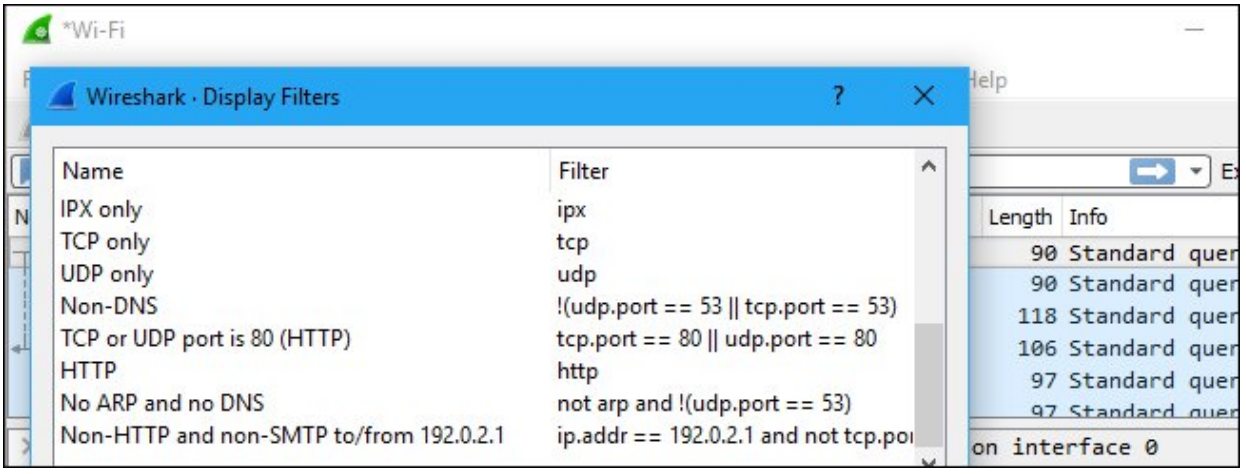
If you're trying to inspect something specific, such as the traffic a program sends when phoning home, it helps to close down all other applications using the network so you can narrow down the traffic. Still, you'll likely have a large amount of packets to sift through. That's where Wireshark's filters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

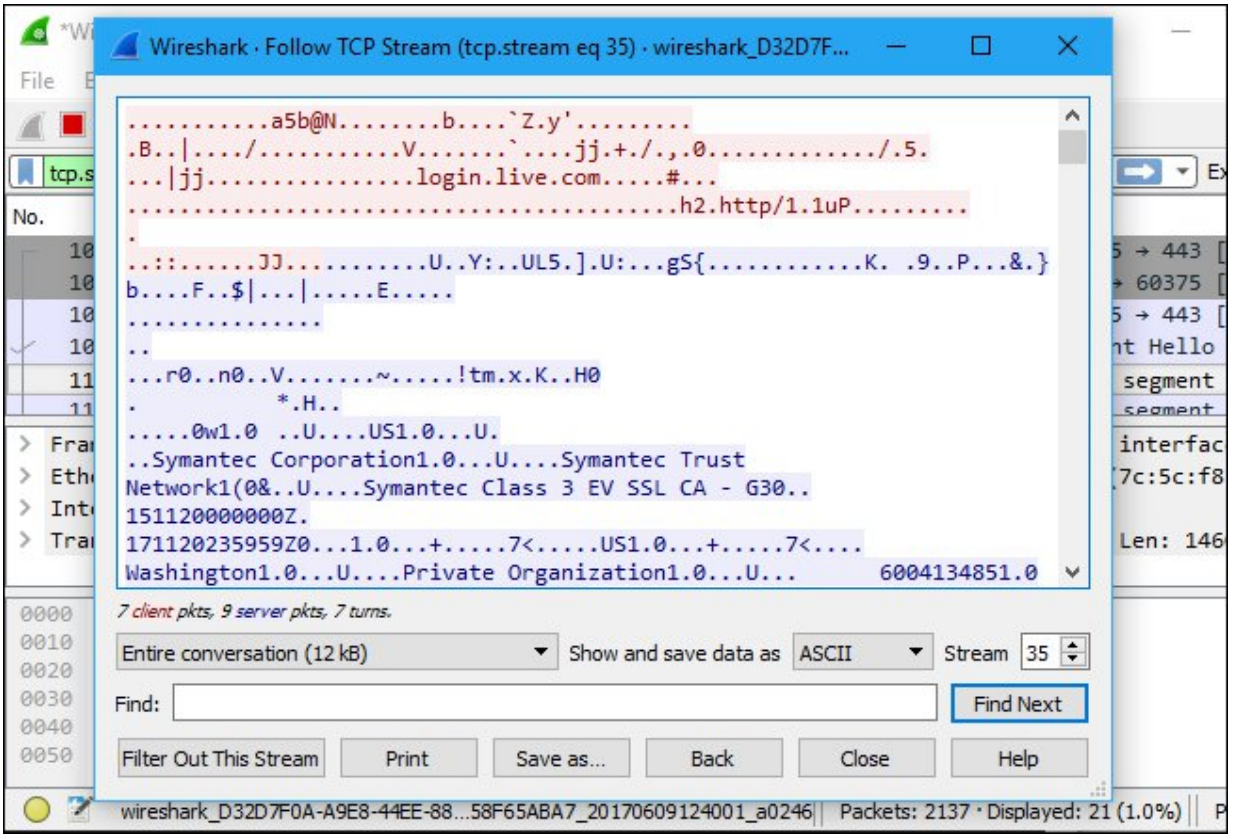


You can also click Analyze > Display Filters to choose a filter from among the default filters included in Wireshark. From here, you can add your own custom filters and save them to easily access them in the future.

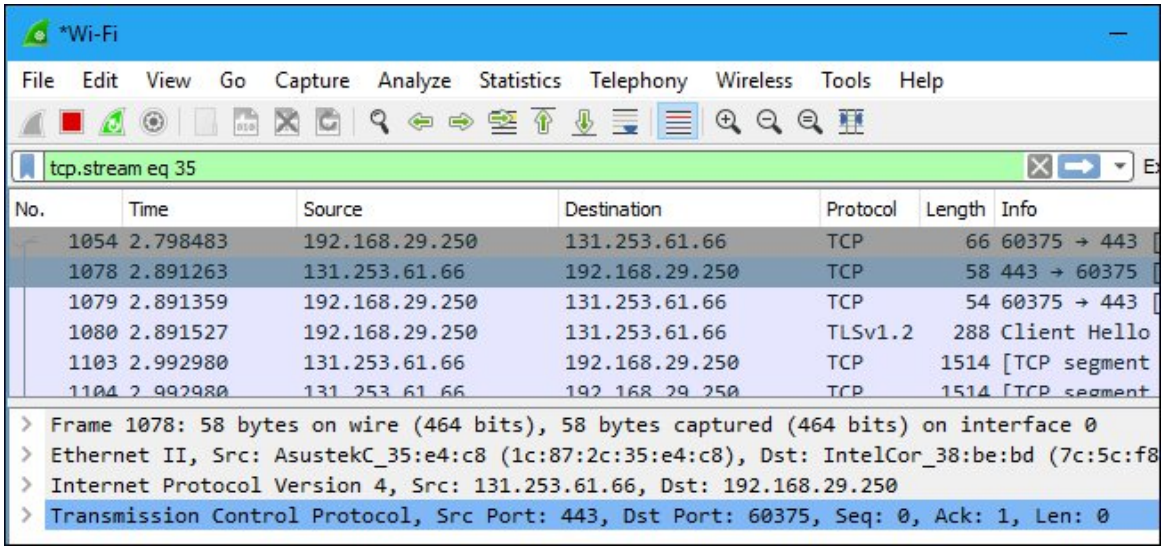
For more information on Wireshark's display filtering language, read the Building display filter expressions page in the official Wireshark documentation.



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.

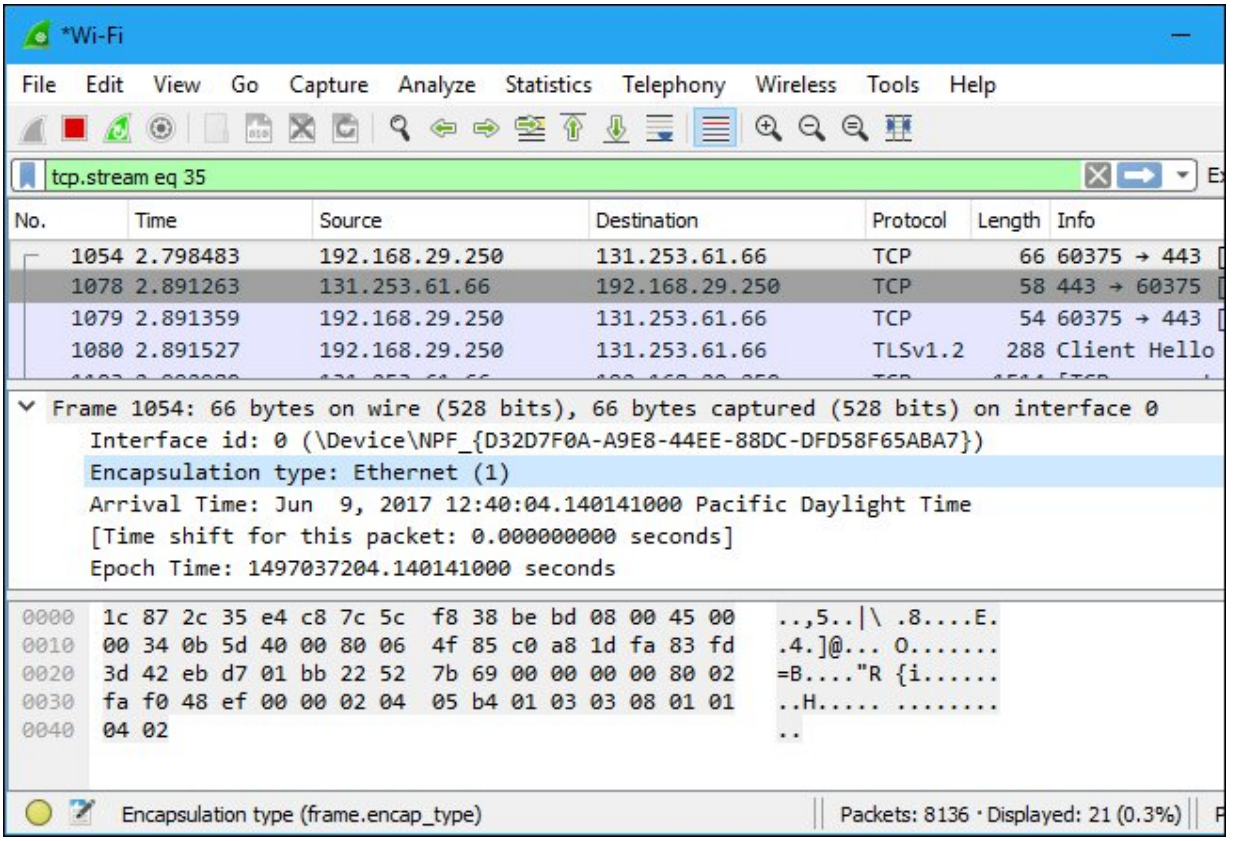


Close the window and you'll find a filter has been applied automatically. Wireshark is showing you the packets that make up the conversation.

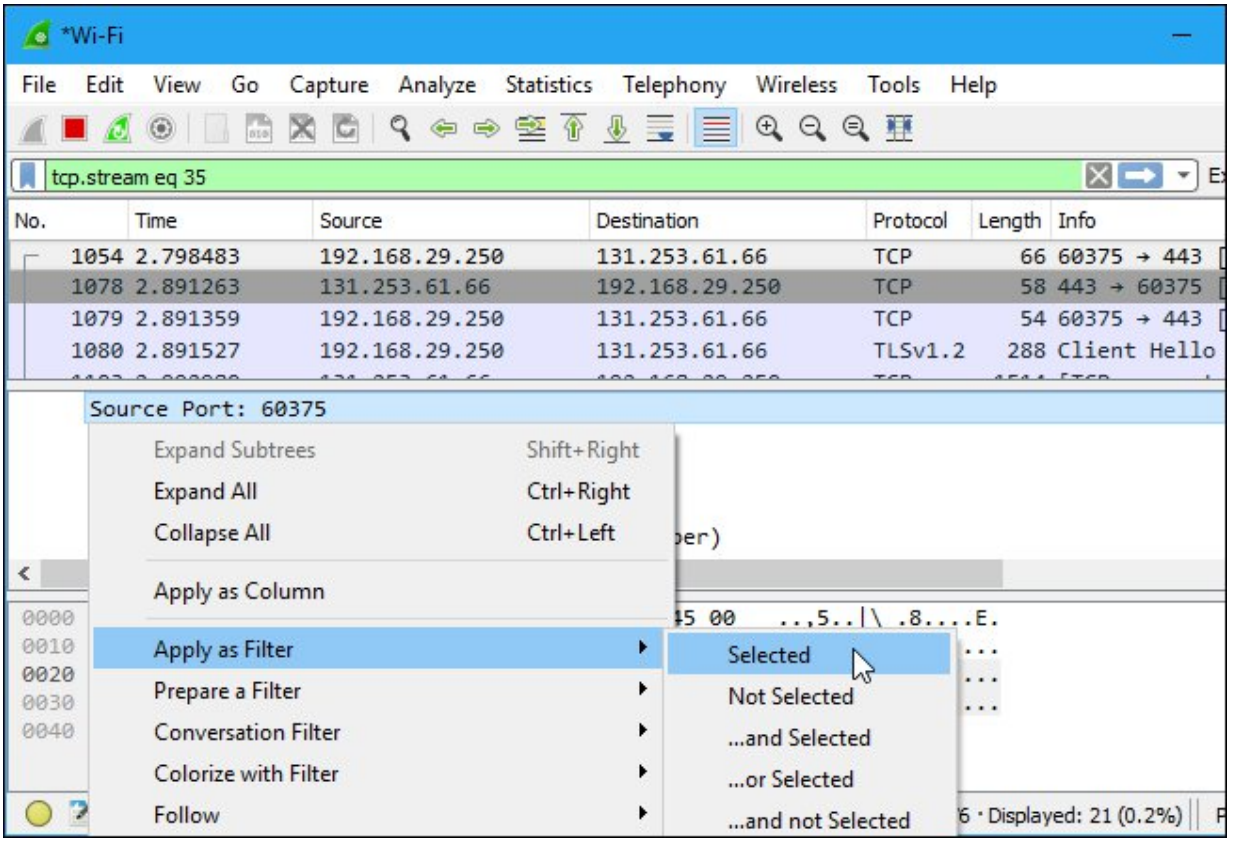


Inspecting Packets

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

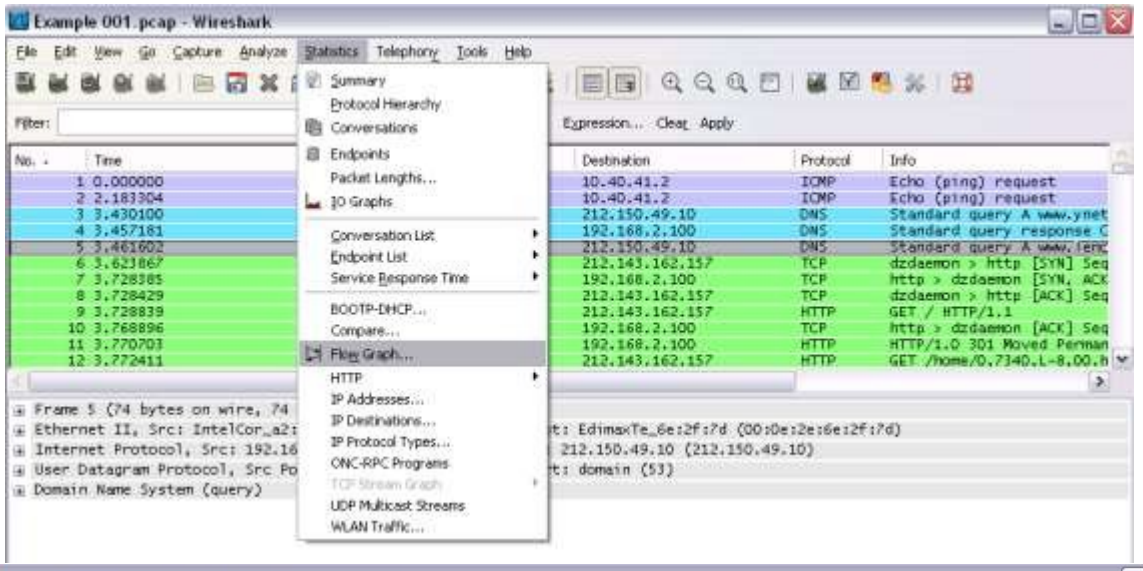


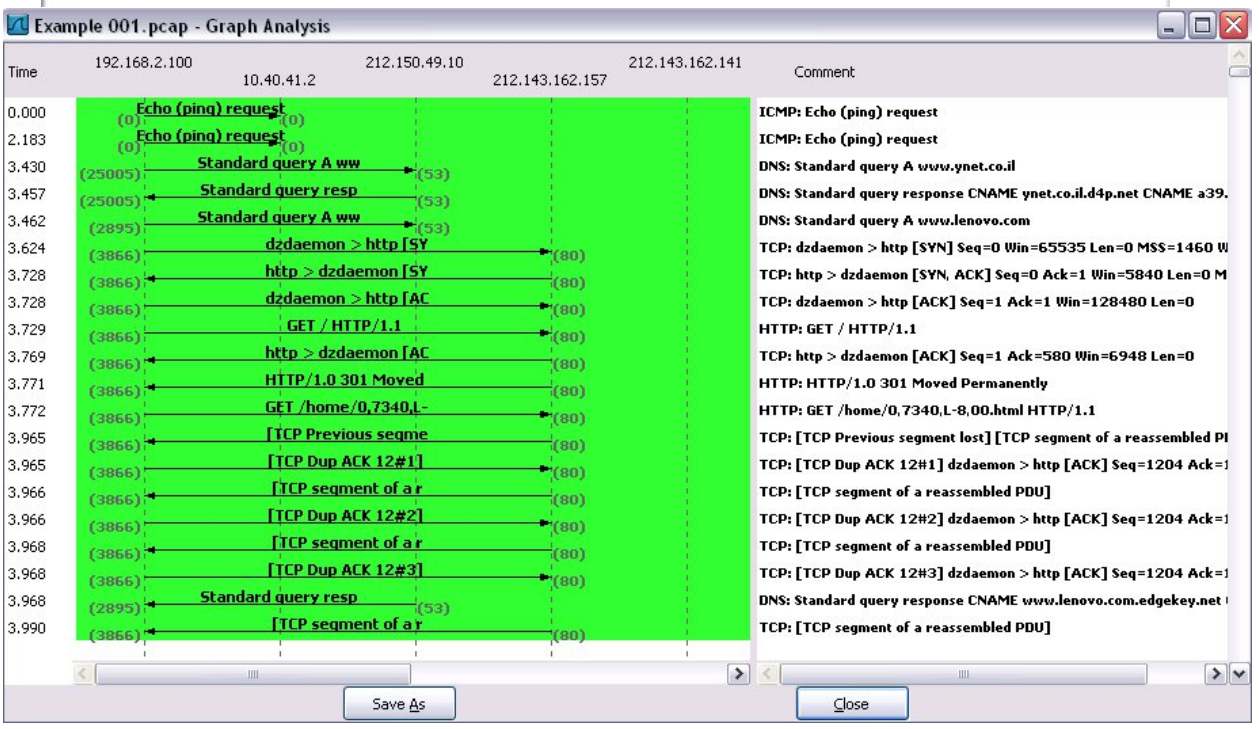
You can also create filters from here — just right-click one of the details and use the Apply as Filter submenu to create a filter based on it.



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.

Flow Graph: Gives a better understanding of what we see.





CS23532 -COMPUTER NETWORKS

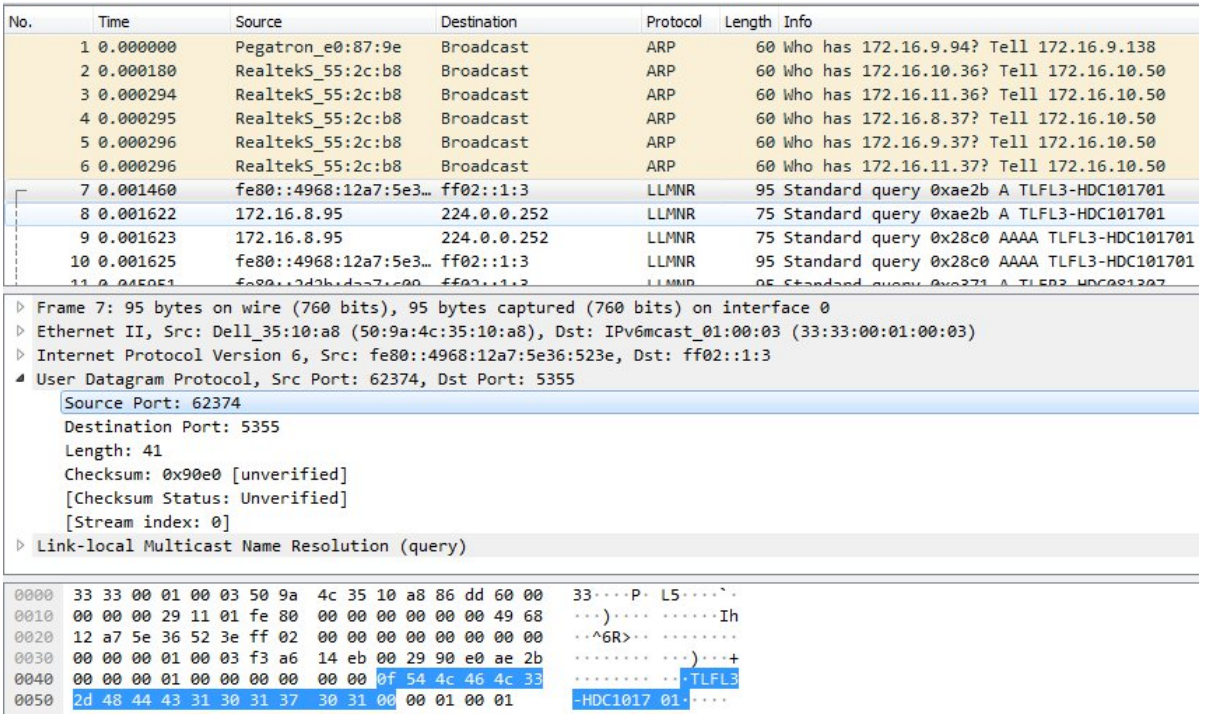
CAPTURING AND ANALYSING PACKETS USING WIRESHARK TOOL

To filter, capture, view, packets in Wireshark Tool.
Capture 100 packets from the Ethernet: IEEE 802.3 LAN Interface and save it.

Procedure

- Select Local Area Connection in Wireshark.
- Go to capture ☾ option
- Select stop capture automatically after 100 packets.
- Then click Start capture.
- Savethe packets.

Output



No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	Pegatron_e0:87:9e	Broadcast	ARP	60	Who has 172.16.9.94? Tell 172.16.9.138
2	0.000180	RealtekS_55:2c:b8	Broadcast	ARP	60	Who has 172.16.10.36? Tell 172.16.10.50
3	0.000294	RealtekS_55:2c:b8	Broadcast	ARP	60	Who has 172.16.11.36? Tell 172.16.10.50
4	0.000295	RealtekS_55:2c:b8	Broadcast	ARP	60	Who has 172.16.8.37? Tell 172.16.10.50
5	0.000296	RealtekS_55:2c:b8	Broadcast	ARP	60	Who has 172.16.9.37? Tell 172.16.10.50
6	0.000296	RealtekS_55:2c:b8	Broadcast	ARP	60	Who has 172.16.11.37? Tell 172.16.10.50
7	0.001460	fe80::4968:12a7:5e3…	ff02::1:3	LLMNR	95	Standard query 0xae2b A TLFL3-HDC101701
8	0.001622	172.16.8.95	224.0.0.252	LLMNR	75	Standard query 0xae2b A TLFL3-HDC101701
9	0.001623	172.16.8.95	224.0.0.252	LLMNR	75	Standard query 0x28c0 AAAA TLFL3-HDC101701
10	0.001625	fe80::4968:12a7:5e3…	ff02::1:3	LLMNR	95	Standard query 0x28c0 AAAA TLFL3-HDC101701

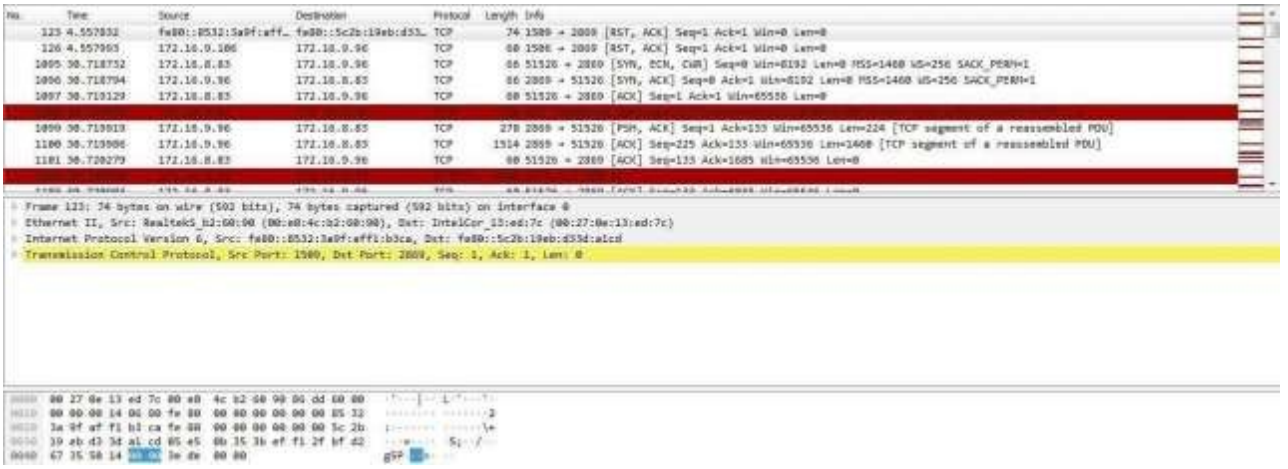
```
▷ Frame 7: 95 bytes on wire (760 bits), 95 bytes captured (760 bits) on interface 0
▷ Ethernet II, Src: Dell_35:10:a8 (50:9a:4c:35:10:a8), Dst: IPv6mcast_01:00:03 (33:33:00:01:00:03)
▷ Internet Protocol Version 6, Src: fe80::4968:12a7:5e36:523e, Dst: ff02::1:3
◢ User Datagram Protocol, Src Port: 62374, Dst Port: 5355
    Source Port: 62374
    Destination Port: 5355
    Length: 41
    Checksum: 0x90e0 [unverified]
    [Checksum Status: Unverified]
    [Stream index: 0]
▷ Link-local Multicast Name Resolution (query)
```

```
0000  33 33 00 01 00 03 50 9a  4c 35 10 a8 86 dd 60 00   33····P· L5····`·
0010  00 00 00 29 11 01 fe 80  00 00 00 00 00 00 49 68   ···)···· ·····Ih
0020  12 a7 5e 36 52 3e ff 02  00 00 00 00 00 00 00 00   ··^6R>·· ········
0030  00 00 00 01 00 03 f3 a6  14 eb 00 29 90 e0 ae 2b   ········ ···)···+
0040  00 00 00 01 00 00 00 00  00 00 0f 54 4c 46 4c 33   ········ ···TLFL3
0050  2d 48 44 43 31 30 31 37  30 31 00 00 01 00 01      -HDC1017 01·····
```

1. **Create a Filter to display only TCP/UDP packets, inspect the packets and provide the flow graph**

Procedure

- Select Local Area Connection in Wireshark.
- Go to capture ☾ option
- Select stop capture automatically after 100 packets.
- Thenclick Start capture.
- Search TCP packets in search bar.
- To see flow graph click Statistics ☾ Flow graph.
- Savethe packets.



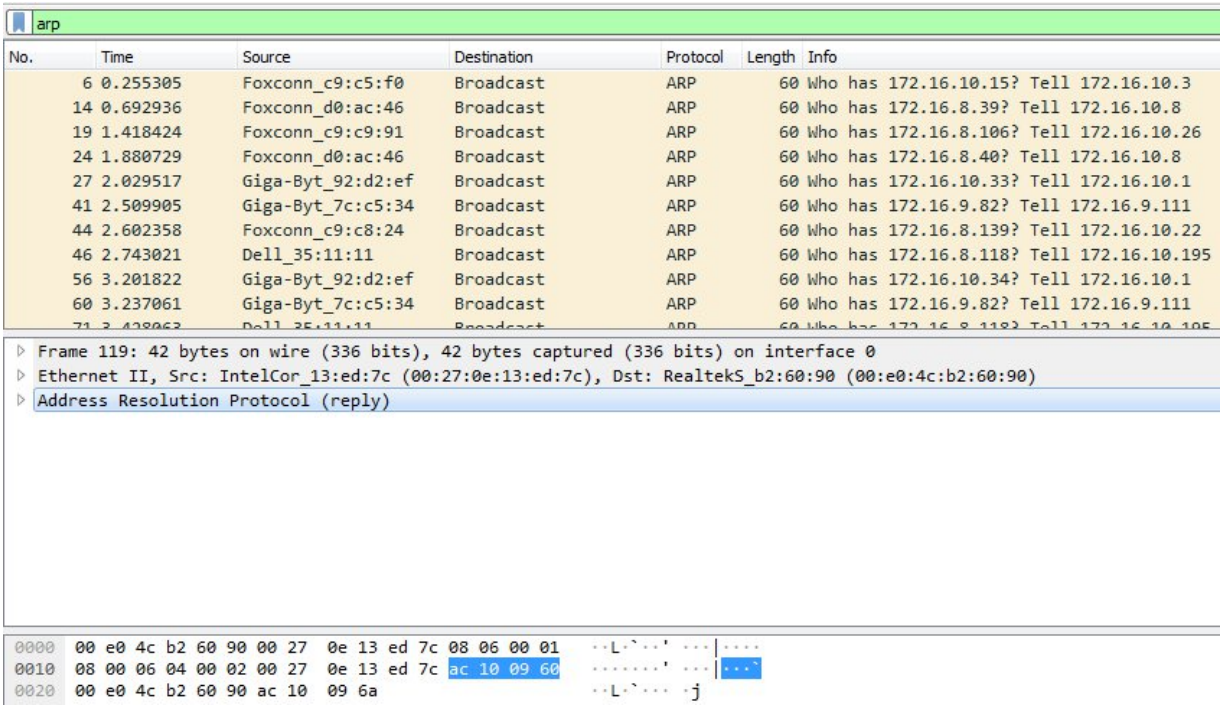
Flow Graph

2. Create a Filter to display only ARP packets and inspect the packets.

Procedure

- Go to capture ☾ option
- Select stop capture automatically after 100 packets.
- Thenclick Start capture.
- Search ARP packets in search bar.
- Savethe packets.

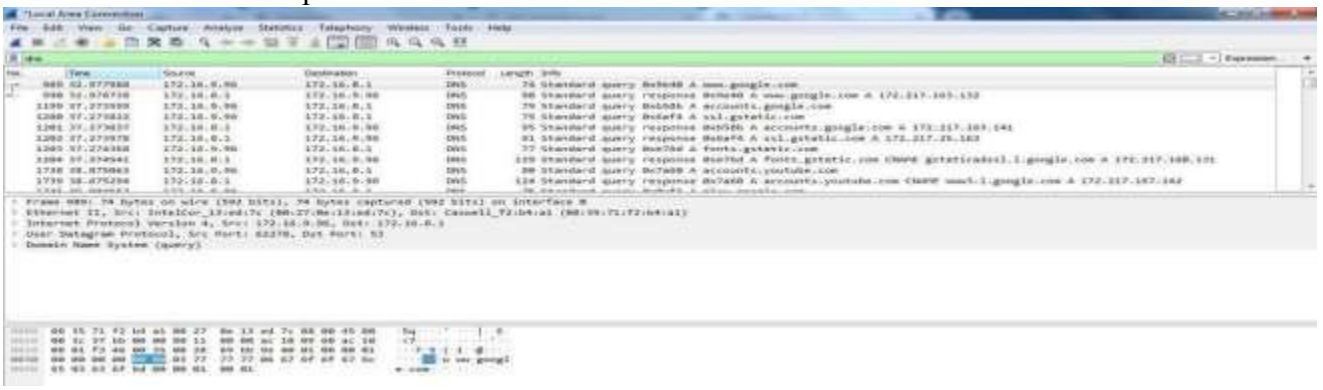
Output

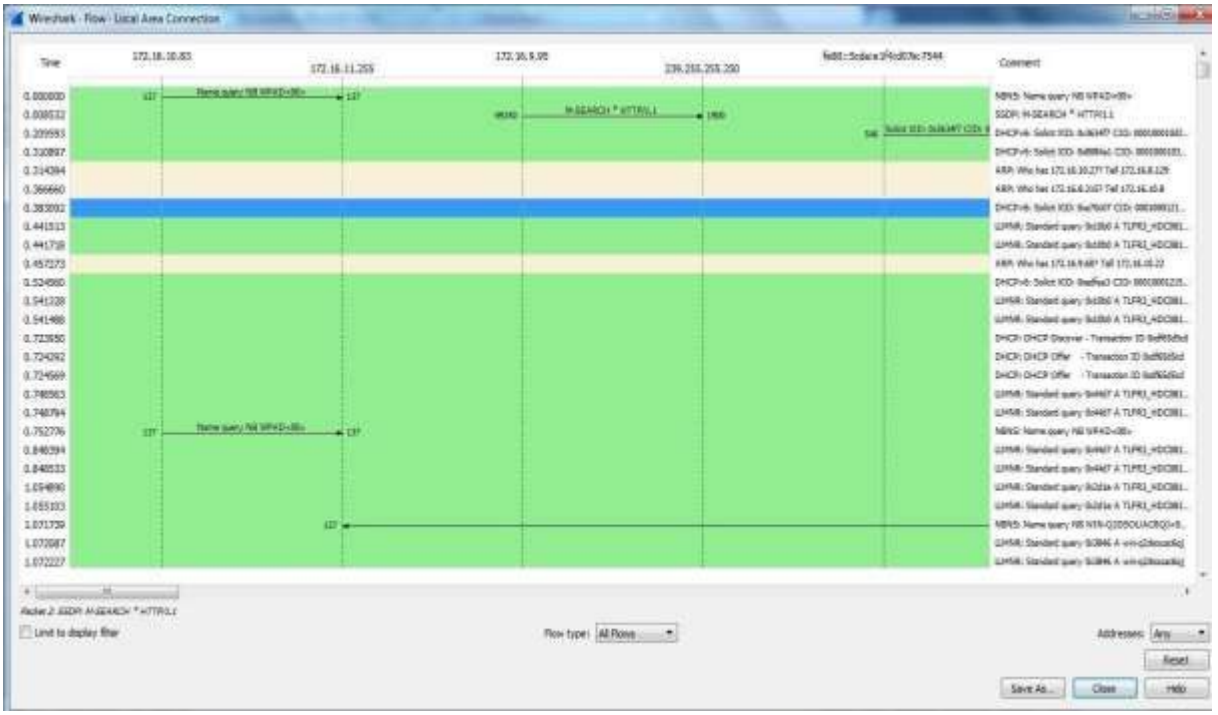


3. Create a Filter to display only DNS packets and provide the flow graph.

Procedure

- Go to capture ☾ option
- Select stop capture automatically after 100 packets.
- Thenclick Start capture.
- Search DNS packets in search bar.
- To see flow graph click Statistics ☾ Flow graph.
- Savethe packets.

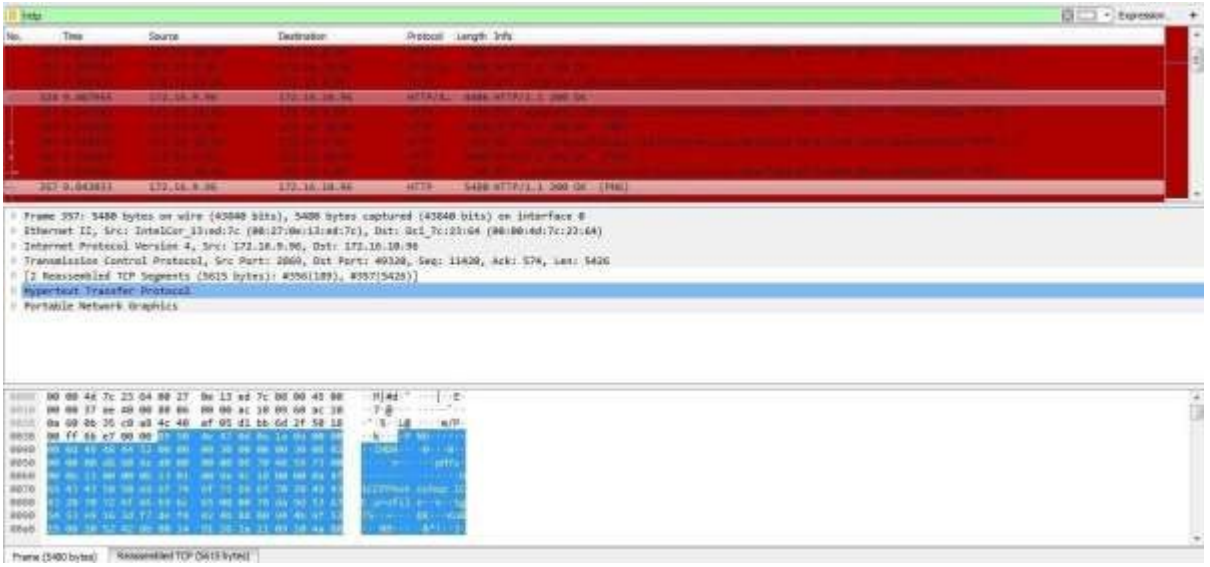




4. Create a Filter to display only HTTP packets and inspect the packets

Procedure

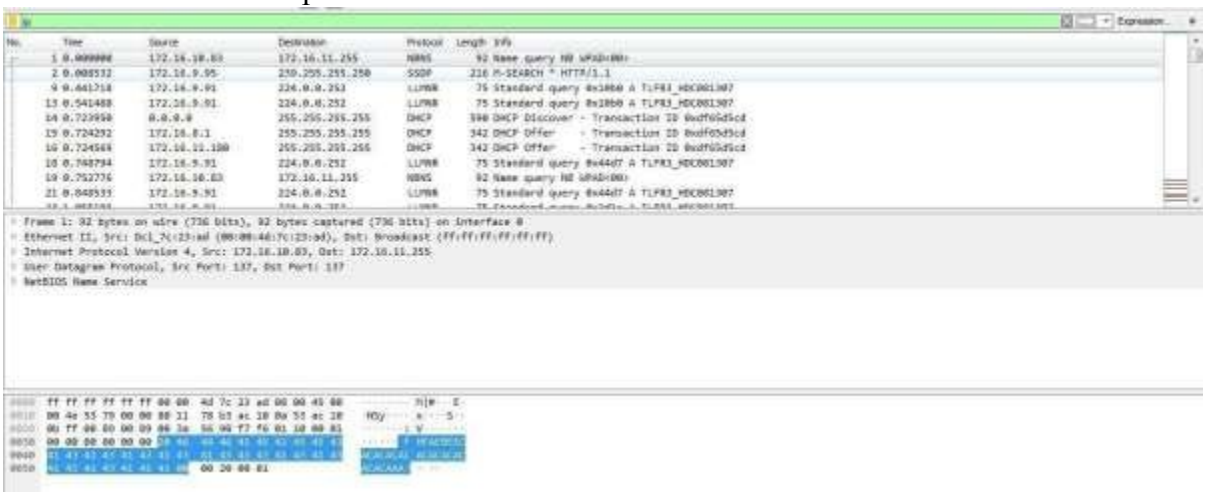
- Select Local Area Connection in Wireshark.
- Go to capture ☾ option
- Select stop capture automatically after 100 packets.
- Thenclick Start capture.
- Search HTTP packets in search bar.
- Savethe packets.



5. Create a Filter to display only IP/ICMP packets and inspect the packets.

Procedure

- Select Local Area Connection in Wireshark.
- Go to capture ☾ option
- Select stop capture automatically after 100 packets.
- Thenclick Start capture.
- Search ICMP/IP packets in search bar.
- Savethe packets

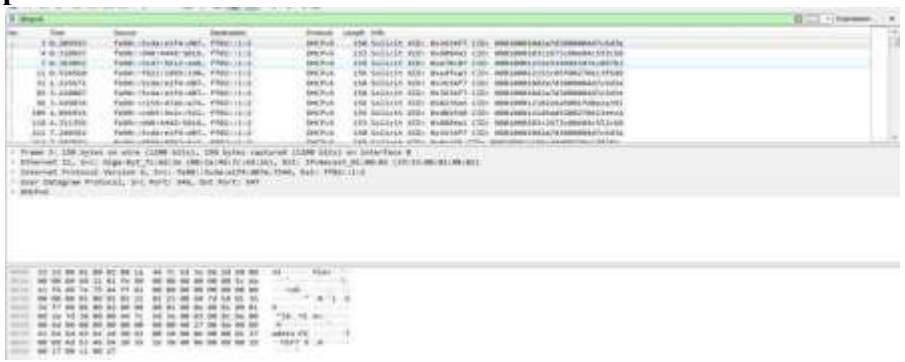


6. Create a Filter to display only DHCP packets and inspect the packets.

Procedure

- Select Local Area Connection in Wireshark.
- Go to capture ☾ option
- Select stop capture automatically after 100 packets.
- Thenclick Start capture.
- Search DHCP packets in search bar.
- Savethe packets

Output



Student observation:

1. **What is promiscuous mode?**
2. **Does ARP packets has transport layer header? Explain.**
3. **Which transport layer protocol is used by DNS?**
4. **What is the port number used by http protocol?**
5. **What is a broadcast ip address?**