

Ex.No - 05

Date - 13/08/2024

WIRESHARK

AIM:

To do experiments on Packet capture tool: Wireshark

THEORY:

Packet Sniffer

- Sniffs messages being sent/received from/by your computer
- Store and display the contents of the various protocol fields in the messages
- Passive program
 - never sends 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

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:

- Capture network traffic
- Decode packet protocols using dissectors
- Define filters – capture and display
- Watch smart statistics
- Analyze problems
- Interactively browse that traffic

Wireshark used for:

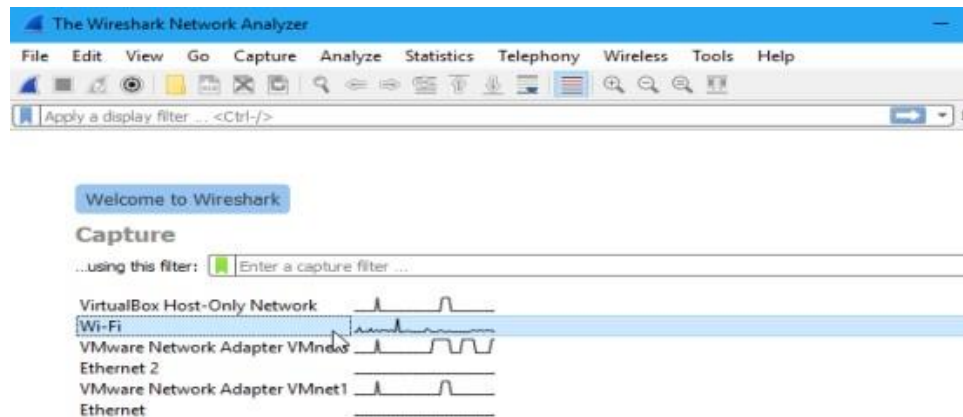
- Network administrators: troubleshoot network problems
- Network security engineers: examine security problems
- Developers: debug protocol implementations
- People: learn network protocol internals

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

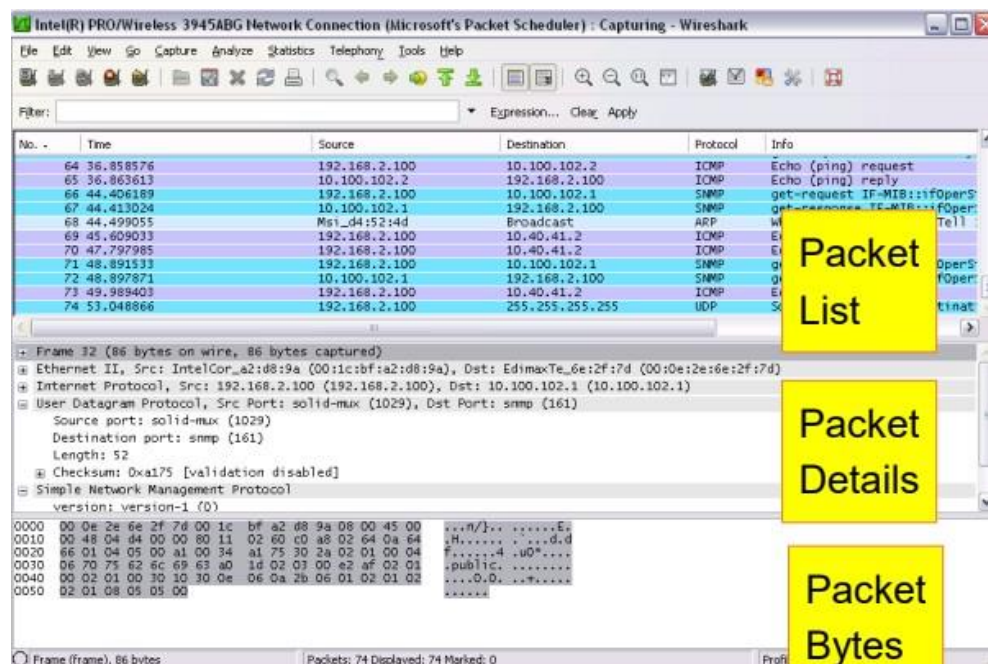
After downloading and installing Wireshark, launch it and double-click the name of a network interface under Capture to start capturing packets on that interface



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 “Stop” button near the top left corner of the window when you want to stop capturing traffic.

The “Packet List” Pane

The packet list pane displays all the packets in the current capture file. The “Packet List” 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 Details” and “Packet Bytes” panes.

The “Packet Details” Pane

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

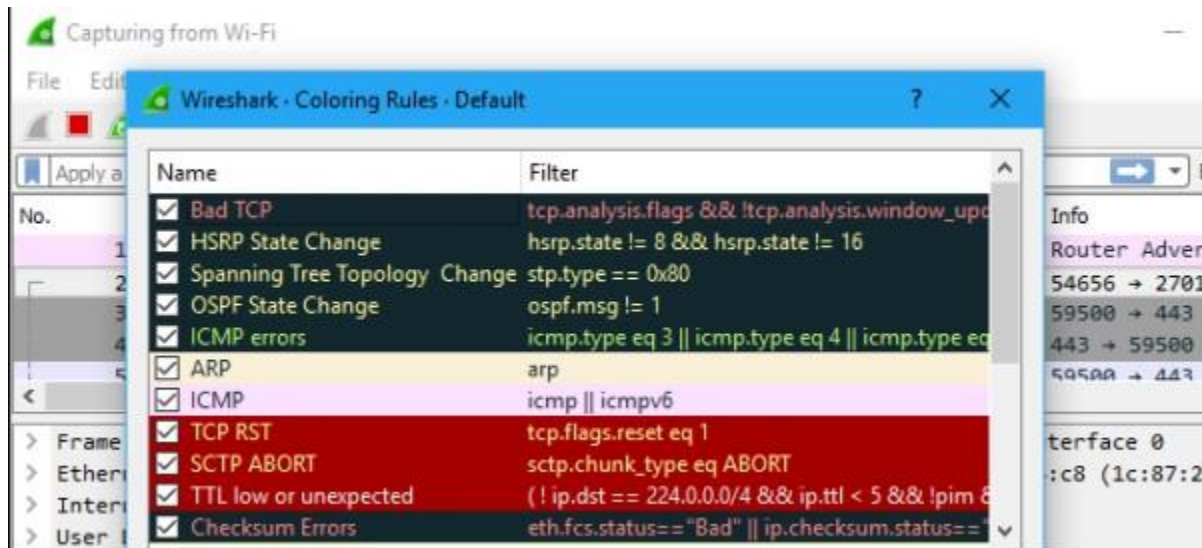
The “Packet Bytes” Pane

The packet bytes pane shows the data of the current packet (selected in the “Packet List” 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.

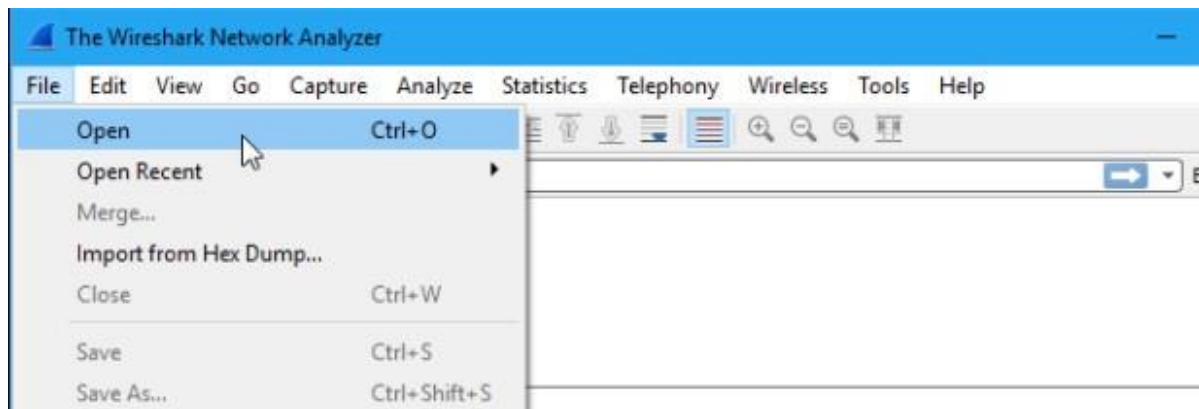
To view exactly what the color codes mean, click View > Coloring Rules. You can also customize and modify the coloring rules from here, if you like.



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.

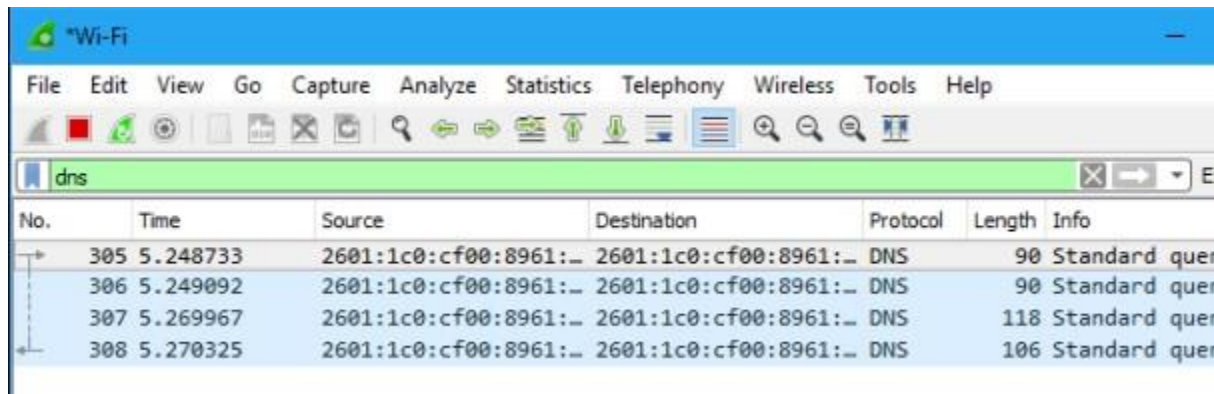


Filtering Packets

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.

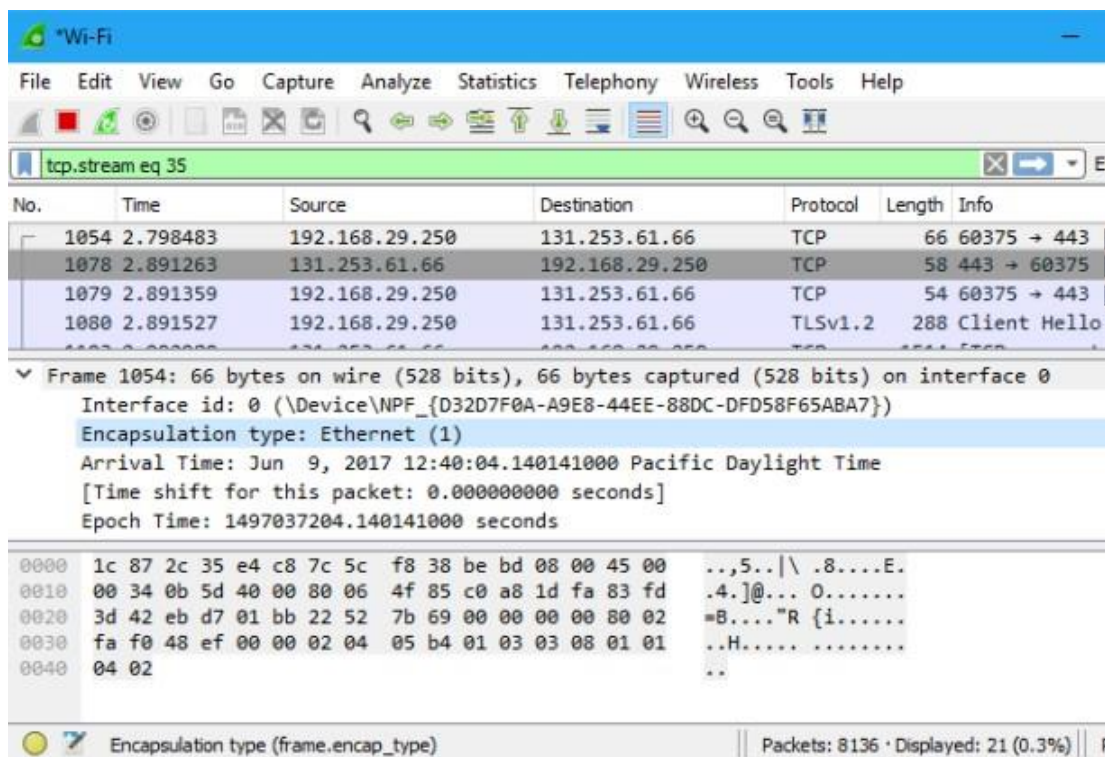
When you start typing, Wireshark will help you autocomplete your filter.



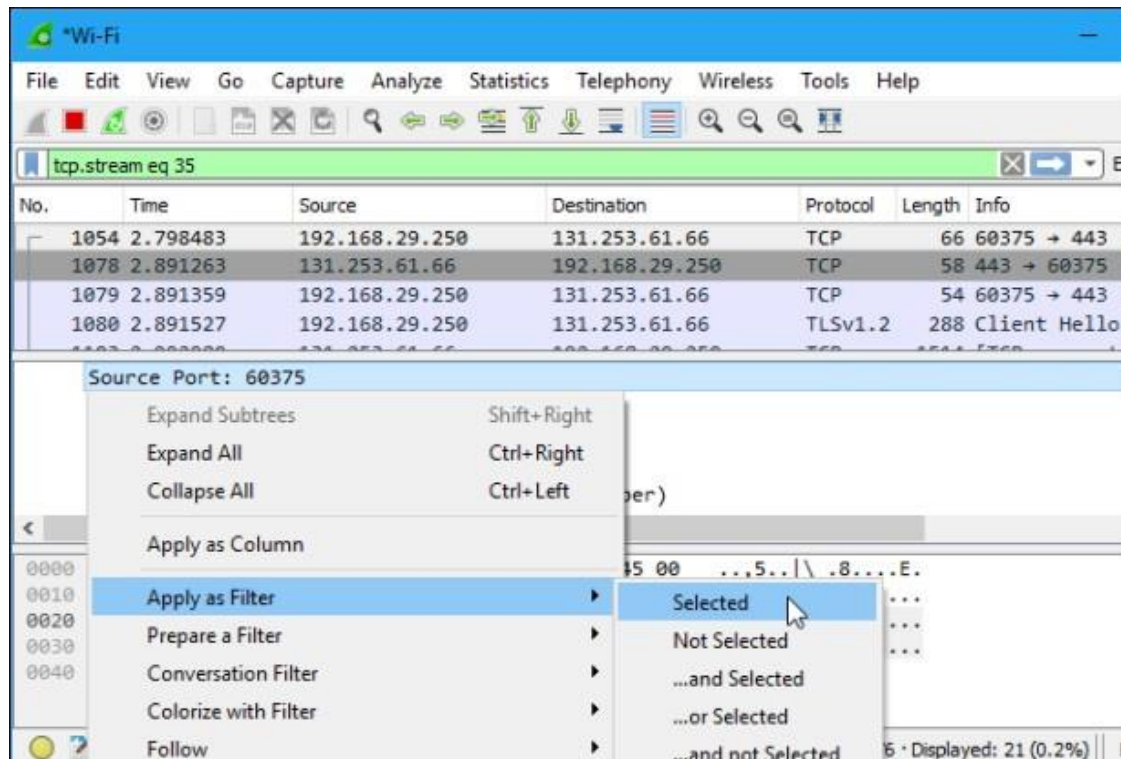
You can also click Analyze > Display Filters to choose a filter from among the default filters included in Wireshark. From here, you can add your own custom filters and save them to easily access them in the future.

Inspecting Packets

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

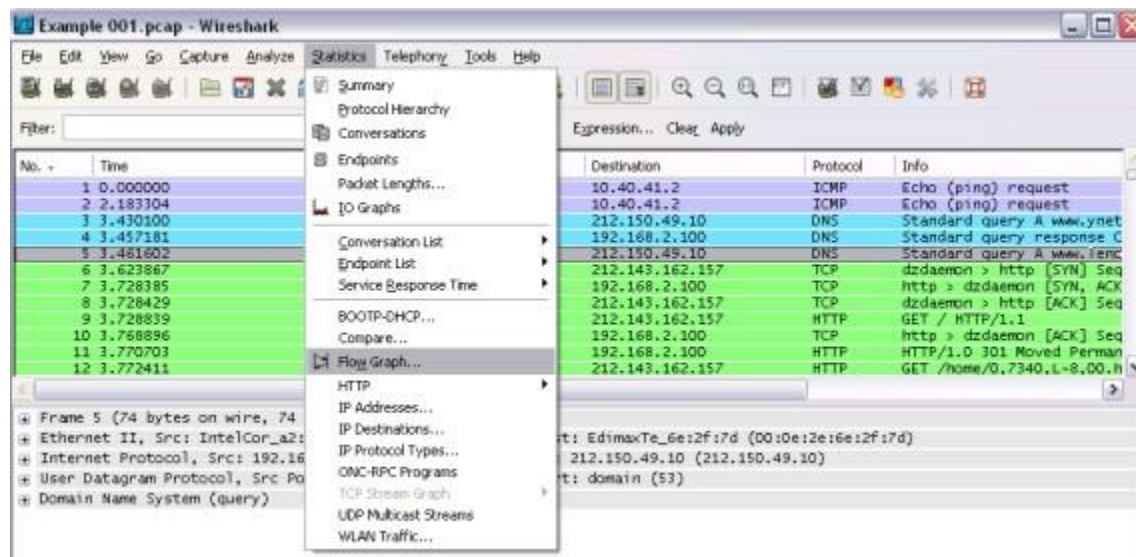


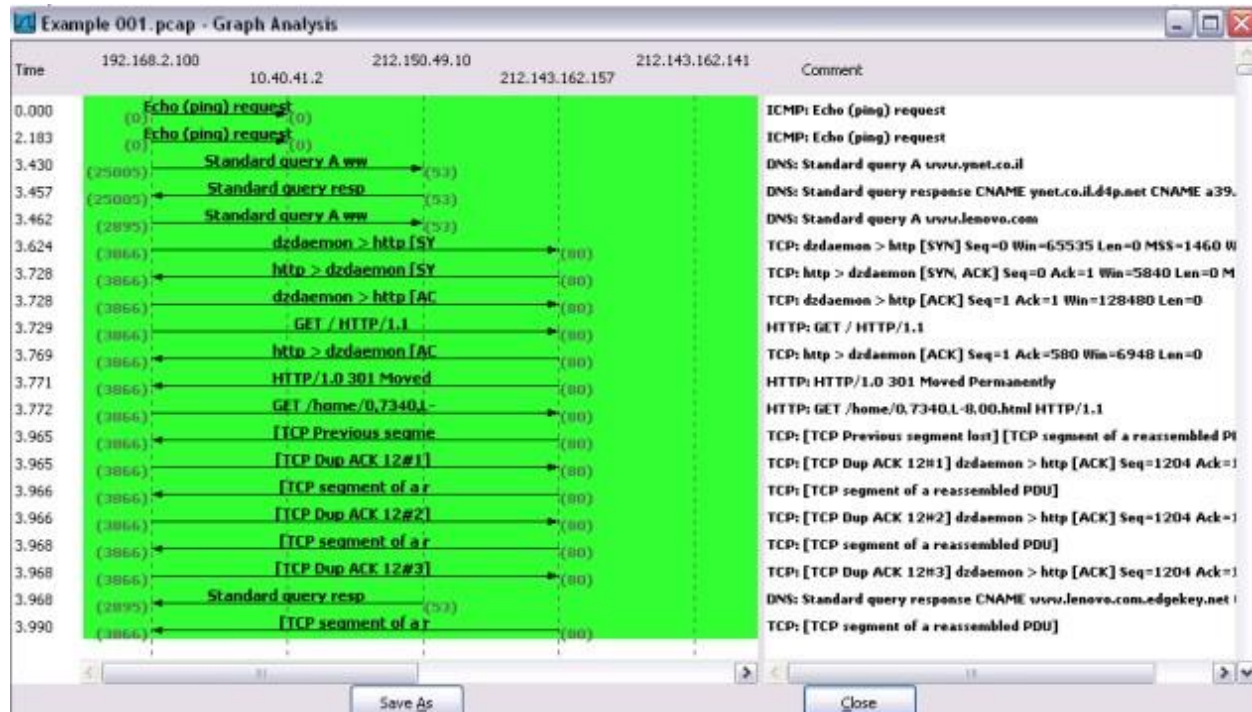
You can also create filters from here — just right-click one of the details and use the Apply as Filter submenu to create a filter based on it.



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.

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





CAPTURING AND ANALYZING 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.
- Save the 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
11	0.046061	fe80::3d3b:dca7:1e00... ff02::1:3		LLMNR	95	Standard query 0xa271 A 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.
- Then click Start capture.
- Search TCP packets in search bar.
- To see flow graph click StatisticsFlow graph.
- Save the packets.

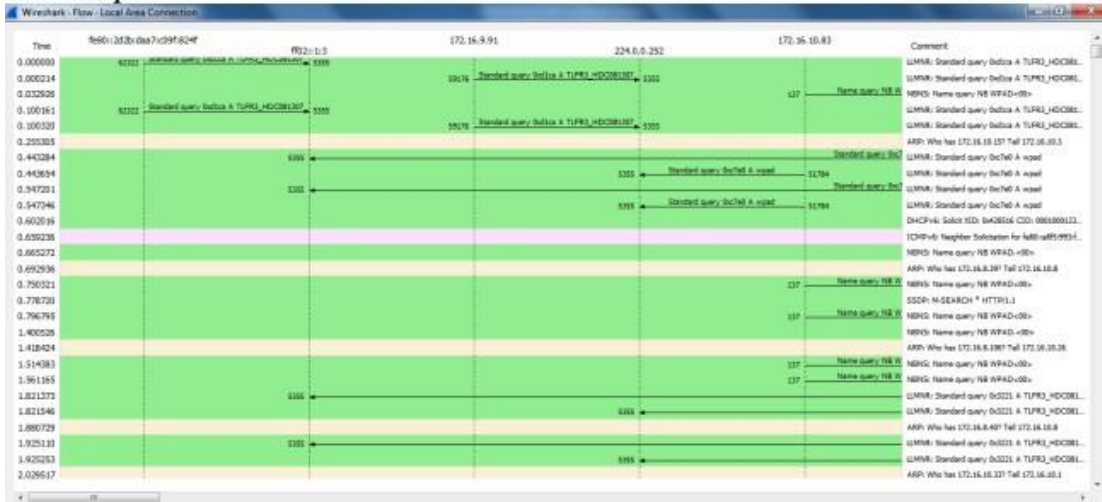
No.	Time	Source	Destination	Protocol	Length	Info
123	4.557832	fe80::8532:3a8f:aff... fe80::5c2b:19eb:d33...		TCP	74	1508 → 2869 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
124	4.557993	172.16.9.106	172.16.9.96	TCP	60	1508 → 2869 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
1095	30.718732	172.16.8.83	172.16.9.96	TCP	60	51526 → 2869 [SYN, ECN, CWR] Seq=0 Win=0 Len=0 MSS=1460 WS=256 SACK_PERM=1
1096	30.718794	172.16.9.96	172.16.8.83	TCP	60	2869 → 51526 [SYN, ACK] Seq=0 Ack=1 Win=0 Len=0 MSS=1460 WS=256 SACK_PERM=1
1097	30.719129	172.16.8.83	172.16.9.96	TCP	60	51526 → 2869 [ACK] Seq=1 Ack=1 Win=0 Len=0
1099	30.719419	172.16.9.96	172.16.8.83	TCP	278	2869 → 51526 [PSH, ACK] Seq=1 Ack=133 Win=0 Len=204 [TCP segment of a reassembled PDU]
1100	30.719460	172.16.9.96	172.16.8.83	TCP	1154	2869 → 51526 [ACK] Seq=235 Ack=133 Win=0 Len=0 [TCP segment of a reassembled PDU]
1101	30.720279	172.16.8.83	172.16.9.96	TCP	60	51526 → 2869 [ACK] Seq=133 Ack=1085 Win=0 Len=0
1102	30.720302	172.16.8.83	172.16.9.96	TCP	60	51526 → 2869 [ACK] Seq=133 Ack=1085 Win=0 Len=0

▶ Frame 123: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0
 ▶ Ethernet II, Src: RealtekS_32:8d:90 (08:00:4c:b2:8d:90), Dst: IntelCor_13:ed:7c (08:27:0e:13:ed:7c)
 ▶ Internet Protocol Version 6, Src: fe80::8532:3a8f:aff1:b5ca, Dst: fe80::5c2b:19eb:d33:afcd
 ▶ Transmission Control Protocol, Src Port: 1508, Dst Port: 2869, Seq: 1, Ack: 1, Len: 0

```

0000  00 27 0e 13 ed 7c 8d 90  4c b2 08 90 85 d8 00 00  00...L...2
0010  00 00 00 14 00 00 fe 00  00 00 00 00 00 00 00 52   ....S:
0020  3a 8f af f1 b5 ca fe 00  00 00 00 00 00 00 5c 2b   ....S:
0030  19 eb d3 3d a1 00 05 a5  00 35 3e ff f1 2f ff d2   ....gP
0040  67 35 50 34 3e de 00 00  00 00 00 00 00 00 00 00   ....
  
```


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.
- Then click Start capture.
- Search ARP packets in search bar.
- Save the packets.

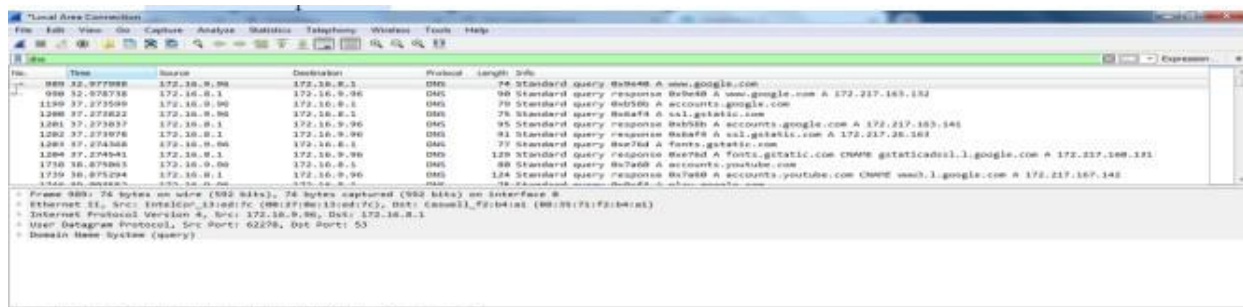
Output

arp						
No.	Time	Source	Destination	Protocol	Length	Info
6	0.255305	Foxconn_c9:c5:f0	Broadcast	ARP	60	Who has 172.16.10.15? Tell 172.16.10.3
14	0.692936	Foxconn_d0:ac:46	Broadcast	ARP	60	Who has 172.16.8.39? Tell 172.16.10.8
19	1.418424	Foxconn_c9:c9:91	Broadcast	ARP	60	Who has 172.16.8.106? Tell 172.16.10.26
24	1.880729	Foxconn_d0:ac:46	Broadcast	ARP	60	Who has 172.16.8.40? Tell 172.16.10.8
27	2.029517	Giga-Byt_92:d2:ef	Broadcast	ARP	60	Who has 172.16.10.33? Tell 172.16.10.1
41	2.509905	Giga-Byt_7c:c5:34	Broadcast	ARP	60	Who has 172.16.9.82? Tell 172.16.9.111
44	2.602358	Foxconn_c9:c8:24	Broadcast	ARP	60	Who has 172.16.8.139? Tell 172.16.10.22
46	2.743021	Dell_35:11:11	Broadcast	ARP	60	Who has 172.16.8.118? Tell 172.16.10.195
56	3.201822	Giga-Byt_92:d2:ef	Broadcast	ARP	60	Who has 172.16.10.34? Tell 172.16.10.1
60	3.237061	Giga-Byt_7c:c5:34	Broadcast	ARP	60	Who has 172.16.9.82? Tell 172.16.9.111
71	3.430062	Dell_35:11:11	Broadcast	ARP	60	Who has 172.16.8.118? Tell 172.16.10.195
Frame 119: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface 0 Ethernet II, Src: IntelCor_13:ed:7c (00:27:0e:13:ed:7c), Dst: RealtekS_b2:60:90 (00:e0:4c:b2:60:90) Address Resolution Protocol (reply)						
0000	00 e0 4c b2 60 90 00 27	0e 13 ed 7c	08 06 00 01	..L..*	
0010	08 00 06 04 00 02 00 27	0e 13 ed 7c	ac 10 09 60*	
0020	00 e0 4c b2 60 90 ac 10	09 6a	..L..*	..j		

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

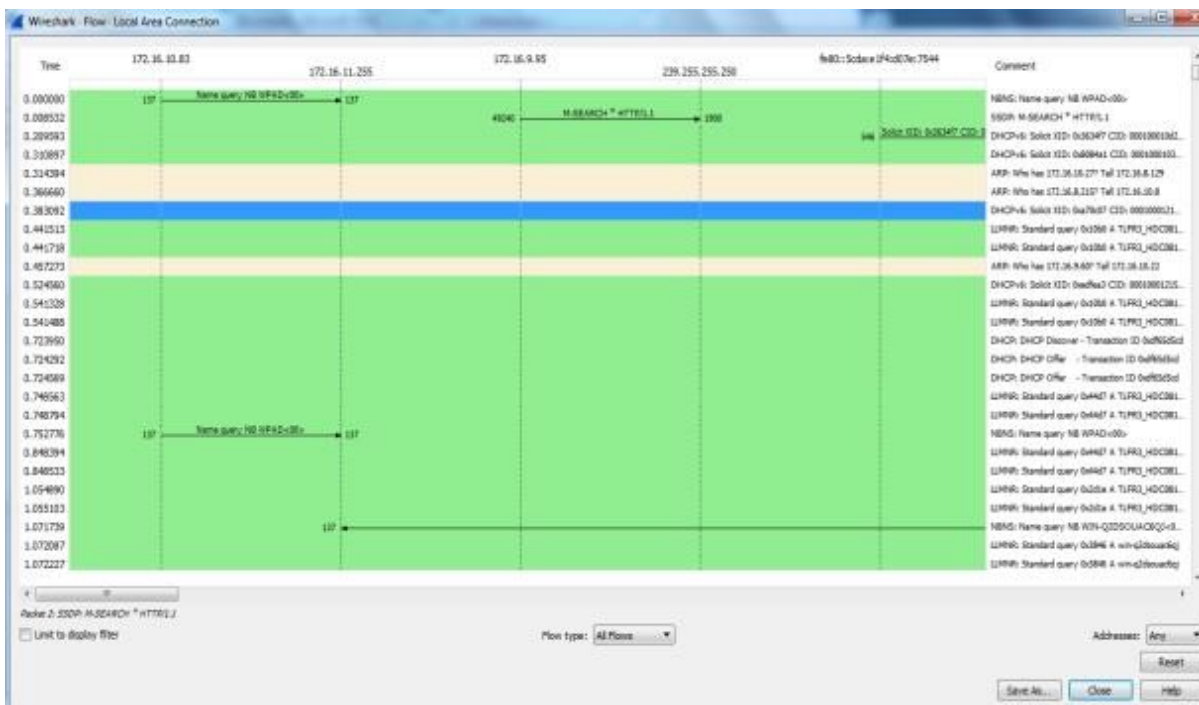
Procedure

- Go to capture option
- Select stop capture automatically after 100 packets.
- Then click Start capture.
- Search DNS packets in search bar.
- To see flow graph click StatisticsFlow graph.
- Save the packets.



The screenshot shows the Wireshark packet list pane. The top toolbar includes buttons for File, Edit, View, Go, Capture, Analyze, Statistics, Telephony, Windows, Tools, and Help. The packet list table has columns for No., Time, Source, Destination, Protocol, Length, and Info. The list contains several DNS packets, including standard queries and responses for domains like www.google.com and accounts.google.com. A packet details pane on the right shows the selected packet's structure, including Ethernet II, Internet Protocol Version 4, User Datagram Protocol, and Domain Name System (query).

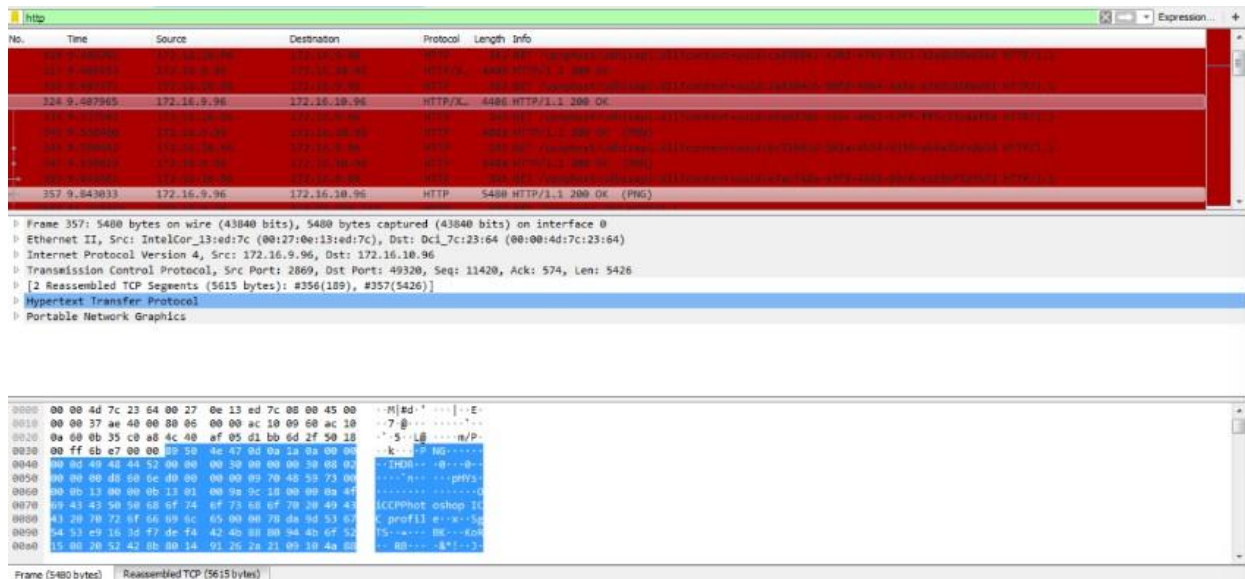
No.	Time	Source	Destination	Protocol	Length	Info
988	32.977999	172.16.0.98	172.16.0.1	DNS	74	Standard query 84848 A www.google.com
989	32.978738	172.16.0.1	172.16.0.98	DNS	90	Standard query response 84848 A www.google.com A 172.217.163.142
1199	37.273599	172.16.0.98	172.16.0.1	DNS	70	Standard query 84850 A accounts.google.com
1200	37.273822	172.16.0.98	172.16.0.1	DNS	78	Standard query 84848 A cal.gstatic.com
1201	37.273937	172.16.0.1	172.16.0.98	DNS	95	Standard query response 84850 A accounts.google.com A 172.217.163.142
1202	37.273976	172.16.0.1	172.16.0.98	DNS	81	Standard query response 84848 A cal.gstatic.com A 172.217.163.142
1203	37.274368	172.16.0.98	172.16.0.1	DNS	72	Standard query 84851 A fonts.gstatic.com
1204	37.274941	172.16.0.1	172.16.0.98	DNS	128	Standard query response 84851 A fonts.gstatic.com CNAME.gstaticcdns1.l.google.com A 172.217.168.121
1710	38.878861	172.16.0.98	172.16.0.1	DNS	80	Standard query 84740 A accounts.youtube.com
1739	38.875294	172.16.0.1	172.16.0.98	DNS	124	Standard query response 84740 A accounts.youtube.com CNAME.waah.l.google.com A 172.217.167.142



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

Procedure

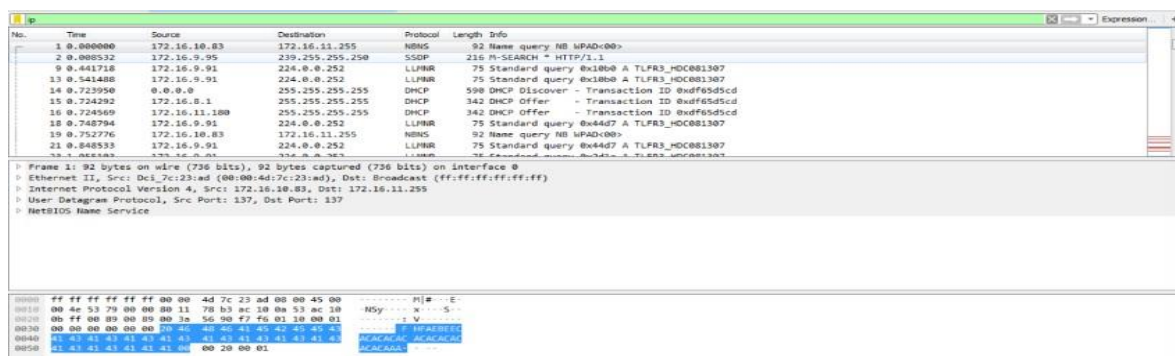
- Select Local Area Connection in Wireshark.
- Go to capture -> option
- Select stop capture automatically after 100 packets.
- Then click Start capture.
- Search HTTP packets in search bar.
- Save the packets.



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.
- Then click Start capture.
- Search ICMP/IP packets in search bar.
- Save the packets

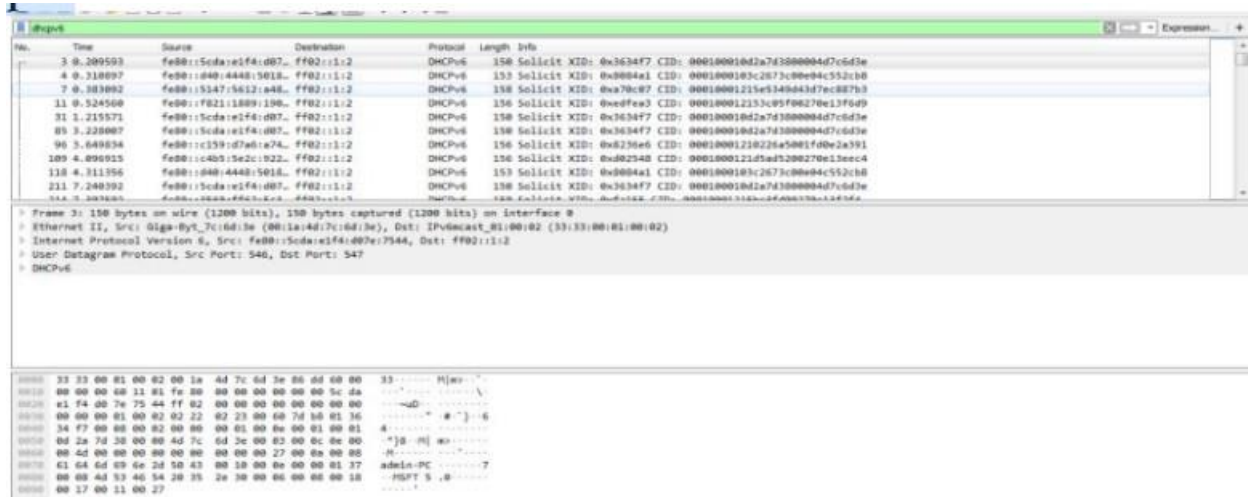


6. Create a Filter to display only DHCP packets and inspect the packets.

Procedure

- Select Local Area Connection in Wireshark.
- Go to capture option
- Select stop capture automatically after 100 packets.
- Then click Start capture.
- Search DHCP packets in search bar.
- Save the packets

Output



The screenshot shows the Wireshark interface with a list of captured DHCP packets. The packet list table is as follows:

No.	Time	Source	Destination	Protocol	Length	Info
3	0.209593	fe80::5cda:e1fa:d07...	ff02::1:2	DHCPv6	150	Solicit XID: 0x3634f7 CID: 000100010d2a7d3000004d7c6d3e
4	0.310097	fe80::d40:4440:5018...	ff02::1:2	DHCPv6	153	Solicit XID: 0x0004a1 CID: 000100010b3c2673c00e04c552cb0
7	0.303002	fe80::5347:5612:a48...	ff02::1:2	DHCPv6	150	Solicit XID: 0xa70c07 CID: 00010001215e349643d7ec887b3
11	0.524500	fe80::f021:1009:100...	ff02::1:2	DHCPv6	150	Solicit XID: 0x0dfea3 CID: 000100012133c05f06270e13f6d9
31	1.215571	fe80::5cda:e1fa:d07...	ff02::1:2	DHCPv6	150	Solicit XID: 0x3634f7 CID: 000100010d2a7d3000004d7c6d3e
85	3.225007	fe80::5cda:e1fa:d07...	ff02::1:2	DHCPv6	150	Solicit XID: 0x3634f7 CID: 000100010d2a7d3000004d7c6d3e
90	3.649834	fe80::c159:d7a0:a74...	ff02::1:2	DHCPv6	150	Solicit XID: 0x8230a6 CID: 00010001230226a5061f0b2a391
109	4.090925	fe80::c405:5e2c:922...	ff02::1:2	DHCPv6	150	Solicit XID: 0xd02340 CID: 0001000123d5ad5200270e13ec4
110	4.311356	fe80::d40:4440:5018...	ff02::1:2	DHCPv6	153	Solicit XID: 0x0004a1 CID: 000100010b3c2673c00e04c552cb0
211	7.240392	fe80::5cda:e1fa:d07...	ff02::1:2	DHCPv6	150	Solicit XID: 0x3634f7 CID: 000100010d2a7d3000004d7c6d3e
344	9.309305	fe80::d40:4440:5018...	ff02::1:2	DHCPv6	150	Solicit XID: 0x0004a1 CID: 000100010b3c2673c00e04c552cb0

The packet details pane for the selected packet (No. 3) shows the following structure:

- Frame 3: 150 bytes on wire (1200 bits), 150 bytes captured (1200 bits) on interface 0
- Ethernet II, Src: Oiga-Byt_ (08:1a:ad:7c:6d:3e), Dst: IPmulticast_01:00:02 (33:33:00:01:00:02)
- Internet Protocol Version 6, Src: fe80::5cda:e1fa:d07e:7944, Dst: ff02::1:2
- User Datagram Protocol, Src Port: 546, Dst Port: 547
- DHCPv6

The packet bytes pane shows the raw data in hexadecimal and ASCII:

```
0000 33 33 00 01 00 02 00 1a ad 7c 6d 3e 26 d0 00 00 33 .....Hjao...
0010 80 00 00 00 11 81 fe 80 80 00 00 00 00 00 5c da .....
0020 e1 f4 00 7e 75 44 ff 82 00 00 00 00 00 00 00 00 .....
0030 00 00 00 01 00 02 02 22 82 21 00 60 7d 50 01 36 .....
0040 34 f7 80 00 00 02 00 00 00 01 00 0e 00 01 00 01 4.....
0050 0d 2a 7d 30 00 00 4d 7c 6d 3e 00 02 00 0c 0e 00 ..]0..n].....
0060 00 4d 00 00 00 00 00 00 00 00 27 00 0a 00 05 ..-.....7...
0070 61 64 6d 69 6e 2d 50 43 00 10 00 0a 00 00 01 77 adaJa-PC.....7
0080 00 00 4d 53 46 54 20 35 26 30 00 06 00 00 00 18 .....MSPT S..0.....
0090 00 17 00 11 00 27 .....

```

RESULT:

The Wireshark tool has been studied.