Note: Version of Wireshark program that used for this assignment is 2.6.5.

Q1: DHCP

When connecting to a new network, 4 new type of DHCP requests occur. Here is a screenshot taken from wireshark program while connecting a new network.

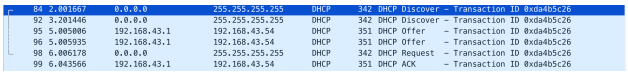


Figure 1: DHCP

These 4 type of requests are:

DHCP DISCOVER: A discover request that uses broadcast channel(FF.FF.FF.FF) for finding a DHCP server.
DHCP OFFER: DHCP server decides whis addres to be given to the client and sends this address as an offer to the client.
DHCP REQUEST: Client accepts the address.
DHCP ACKNOWLEDGEMENT: Server confirms the acceptance.

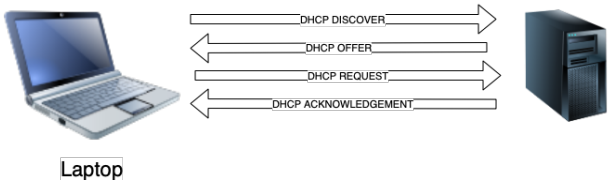


Figure 2: DHCP Diagram

Q2: Video and Voice Traffic

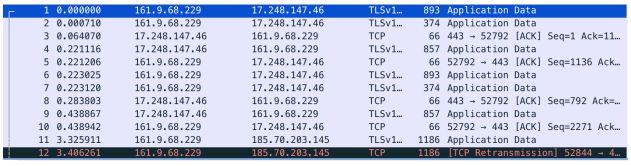
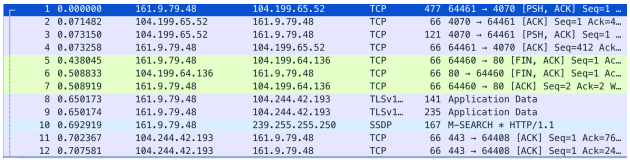


Figure 3: Youtube

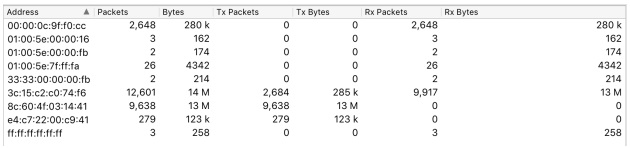
There was no UDP connection from youtube.com nor another video website. Retransmissions occured in TCP because of lack of acknowledgement and timeout.

Q3: Audio



1	0.000000	161.9.79.48	104.199.65.52	TCP	477	64461 → 4070 [PSH, ACK] Seq=1 …
2	0.071482	104.199.65.52	161.9.79.48	TCP	66	4070 → 64461 [ACK] Seq=1 Ack=4…
3	0.073150	104.199.65.52	161.9.79.48	TCP	121	4070 → 64461 [PSH, ACK] Seq=1 …
4	0.073258	161.9.79.48	104.199.65.52	TCP	66	64461 → 4070 [ACK] Seq=412 Ack…
5	0.438045	161.9.79.48	104.199.64.136	TCP	66	64460 → 80 [FIN, ACK] Seq=1 Ac…
6	0.508833	104.199.64.136	161.9.79.48	TCP	66	80 → 64460 [FIN, ACK] Seq=1 Ac…
7	0.508919	161.9.79.48	104.199.64.136	TCP	66	64460 → 80 [ACK] Seq=2 Ack=2 W…
8	0.650173	161.9.79.48	104.244.42.193	TLSv1…	141	Application Data
9	0.650174	161.9.79.48	104.244.42.193	TLSv1…	235	Application Data
10	0.692919	161.9.79.48	239.255.255.250	SSDP	167	M-SEARCH * HTTP/1.1
11	0.702367	104.244.42.193	161.9.79.48	TCP	66	443 → 64408 [ACK] Seq=1 Ack=76…
12	0.707581	104.244.42.193	161.9.79.48	TCP	66	443 → 64408 [ACK] Seq=1 Ack=24…

Figure 4: Audio-1



Address	Packets	Bytes	Tx Packets	Tx Bytes	Rx Packets	Rx Bytes
00:00:0c:9f:f0:cc	2,648	280 k	0	0	2,648	280 k
01:00:5e:00:00:16	3	162	0	0	3	162
01:00:5e:00:00:fb	2	174	0	0	2	174
01:00:5e:7f:ff:fa	26	4342	0	0	26	4342
33:33:00:00:00:fb	2	214	0	0	2	214
3c:15:c2:c0:74:f6	12,601	14 M	2,684	285 k	9,917	13 M
8c:60:4f:03:14:41	9,638	13 M	9,638	13 M	0	0
e4:c7:22:00:c9:41	279	123 k	279	123 k	0	0
ff:ff:ff:ff:ff:ff	3	258	0	0	3	258

Figure 5: Audio-2

Statistics:

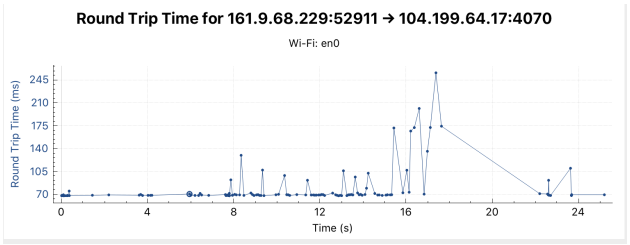


Figure 6: RTT

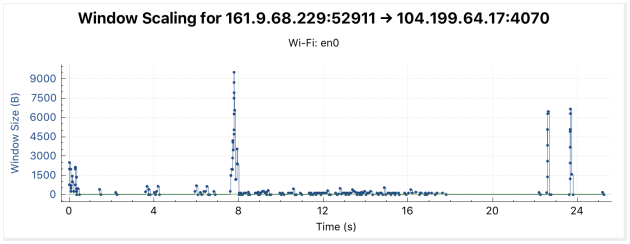


Figure 7: Window

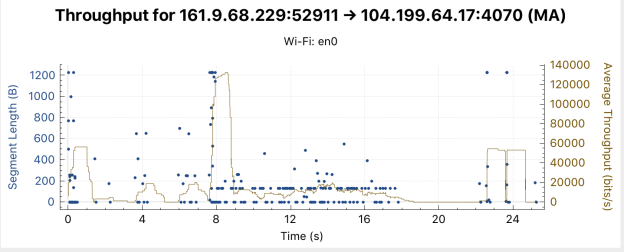
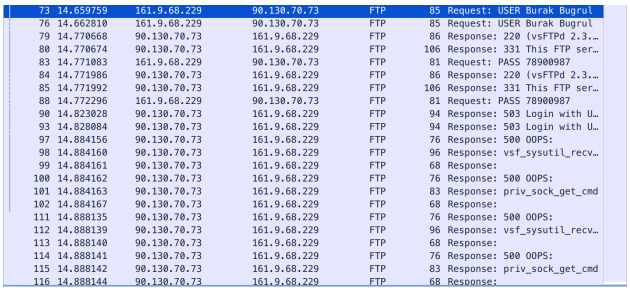


Figure 8: Throughput

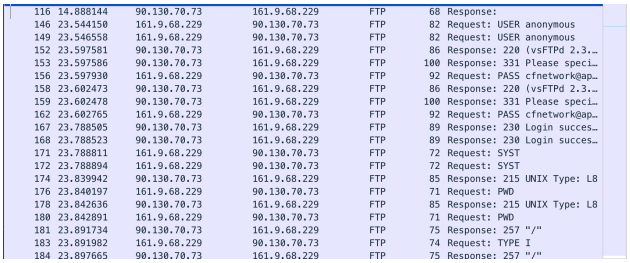
Q4: FTP

Wireshark ss while it is watching file transfer:



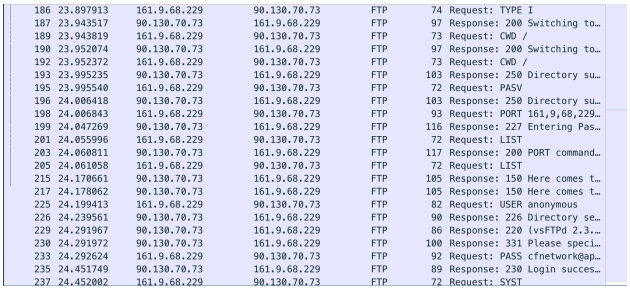
73	14.659759	161.9.68.229	90.130.70.73	FTP	85	Request: USER Burak Bugrul
76	14.662810	161.9.68.229	90.130.70.73	FTP	85	Request: USER Burak Bugrul
79	14.770668	90.130.70.73	161.9.68.229	FTP	86	Response: 220 (vsFTPd 2.3.…
80	14.770674	90.130.70.73	161.9.68.229	FTP	106	Response: 331 This FTP ser…
83	14.771083	161.9.68.229	90.130.70.73	FTP	81	Request: PASS 78900987
84	14.771986	90.130.70.73	161.9.68.229	FTP	86	Response: 220 (vsFTPd 2.3.…
85	14.771992	90.130.70.73	161.9.68.229	FTP	106	Response: 331 This FTP ser…
88	14.772296	161.9.68.229	90.130.70.73	FTP	81	Request: PASS 78900987
90	14.823028	90.130.70.73	161.9.68.229	FTP	94	Response: 503 Login with U…
93	14.828084	90.130.70.73	161.9.68.229	FTP	94	Response: 503 Login with U…
97	14.884156	90.130.70.73	161.9.68.229	FTP	76	Response: 500 OOPS:
98	14.884160	90.130.70.73	161.9.68.229	FTP	96	Response: vsf_sysutil_recv…
99	14.884161	90.130.70.73	161.9.68.229	FTP	68	Response:
100	14.884162	90.130.70.73	161.9.68.229	FTP	76	Response: 500 OOPS:
101	14.884163	90.130.70.73	161.9.68.229	FTP	83	Response: priv_sock_get_cmd
102	14.884167	90.130.70.73	161.9.68.229	FTP	68	Response:
111	14.888135	90.130.70.73	161.9.68.229	FTP	76	Response: 500 OOPS:
112	14.888139	90.130.70.73	161.9.68.229	FTP	96	Response: vsf_sysutil_recv…
113	14.888140	90.130.70.73	161.9.68.229	FTP	68	Response:
114	14.888141	90.130.70.73	161.9.68.229	FTP	76	Response: 500 OOPS:
115	14.888142	90.130.70.73	161.9.68.229	FTP	83	Response: priv_sock_get_cmd
116	14.888144	90.130.70.73	161.9.68.229	FTP	68	Response:

Figure 9: FTP-1



116	14.888144	90.130.70.73	161.9.68.229	FTP	68	Response:
146	23.544150	161.9.68.229	90.130.70.73	FTP	82	Request: USER anonymous
149	23.546558	161.9.68.229	90.130.70.73	FTP	82	Request: USER anonymous
152	23.597581	90.130.70.73	161.9.68.229	FTP	86	Response: 220 (vsFTPd 2.3.…
153	23.597586	90.130.70.73	161.9.68.229	FTP	100	Response: 331 Please speci…
156	23.597930	161.9.68.229	90.130.70.73	FTP	92	Request: PASS cfnetwork@ap…
158	23.602473	90.130.70.73	161.9.68.229	FTP	86	Response: 220 (vsFTPd 2.3.…
159	23.602478	90.130.70.73	161.9.68.229	FTP	100	Response: 331 Please speci…
162	23.602765	161.9.68.229	90.130.70.73	FTP	92	Request: PASS cfnetwork@ap…
167	23.788505	90.130.70.73	161.9.68.229	FTP	89	Response: 230 Login succes…
168	23.788523	90.130.70.73	161.9.68.229	FTP	89	Response: 230 Login succes…
171	23.788811	161.9.68.229	90.130.70.73	FTP	72	Request: SYST
172	23.788894	161.9.68.229	90.130.70.73	FTP	72	Request: SYST
174	23.839942	90.130.70.73	161.9.68.229	FTP	85	Response: 215 UNIX Type: L8
176	23.840197	161.9.68.229	90.130.70.73	FTP	71	Request: PWD
178	23.842636	90.130.70.73	161.9.68.229	FTP	85	Response: 215 UNIX Type: L8
180	23.842891	161.9.68.229	90.130.70.73	FTP	71	Request: PWD
181	23.891734	90.130.70.73	161.9.68.229	FTP	75	Response: 257 "/"
183	23.891982	161.9.68.229	90.130.70.73	FTP	74	Request: TYPE I
184	23.897665	90.130.70.73	161.9.68.229	FTP	75	Response: 257 "/"

Figure 10: FTP-2



186	23.897913	161.9.68.229	90.130.70.73	FTP	74	Request: TYPE I
187	23.943517	90.130.70.73	161.9.68.229	FTP	97	Response: 200 Switching to…
189	23.943819	161.9.68.229	90.130.70.73	FTP	73	Request: CWD /
190	23.952074	90.130.70.73	161.9.68.229	FTP	97	Response: 200 Switching to…
192	23.952372	161.9.68.229	90.130.70.73	FTP	73	Request: CWD /
193	23.995235	90.130.70.73	161.9.68.229	FTP	103	Response: 250 Directory su…
195	23.995540	161.9.68.229	90.130.70.73	FTP	72	Request: PASV
196	24.006418	90.130.70.73	161.9.68.229	FTP	103	Response: 250 Directory su…
198	24.006843	161.9.68.229	90.130.70.73	FTP	93	Request: PORT 161,9,68,229…
199	24.047269	90.130.70.73	161.9.68.229	FTP	116	Response: 227 Entering Pas…
201	24.055996	161.9.68.229	90.130.70.73	FTP	72	Request: LIST
203	24.060811	90.130.70.73	161.9.68.229	FTP	117	Response: 200 PORT command…
205	24.061058	161.9.68.229	90.130.70.73	FTP	72	Request: LIST
215	24.170661	90.130.70.73	161.9.68.229	FTP	105	Response: 150 Here comes t…
217	24.178062	90.130.70.73	161.9.68.229	FTP	105	Response: 150 Here comes t…
225	24.199413	161.9.68.229	90.130.70.73	FTP	82	Request: USER anonymous
226	24.239561	90.130.70.73	161.9.68.229	FTP	90	Response: 226 Directory se…
229	24.291967	90.130.70.73	161.9.68.229	FTP	86	Response: 220 (vsFTPd 2.3.…
230	24.291972	90.130.70.73	161.9.68.229	FTP	100	Response: 331 Please speci…
233	24.292624	161.9.68.229	90.130.70.73	FTP	92	Request: PASS cfnetwork@ap…
235	24.451749	90.130.70.73	161.9.68.229	FTP	89	Response: 230 Login succes…
237	24.452002	161.9.68.229	90.130.70.73	FTP	72	Request: SYST

Figure 11: FTP-3

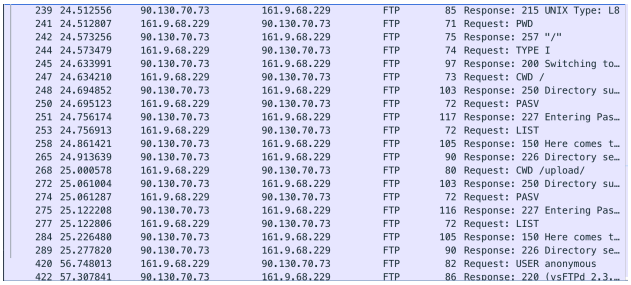


Figure 12: FTP-4

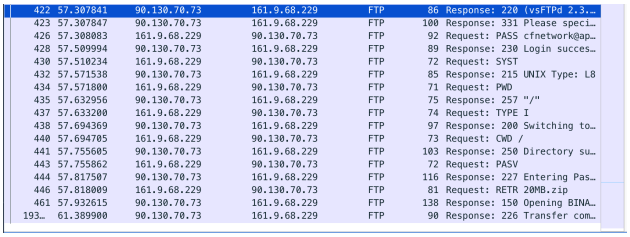


Figure 13: FTP-5

In the beginning user wants to see the inside of the directory. Server sends it, then asks for username. User sends the usename and can not pass the auth. step. Server sends an error. Then user accesses the system as a guest. Server shows the files. Then users sends a dowload request. Server allows it and sends the file in packets.

Q5: Protocols

a) Protocols that captured by Wireshark are: TCP, DNS, DHCP, TLS, FTP

b)

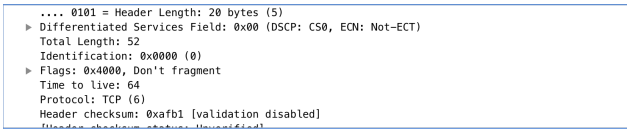


Figure 14: TCP-NUMBER

Protocol number of TCP is 6.

Figure 15: UDP-NUMBER

Protocol number of UDP is 17.

Figure 16: ICMP-NUMBER

Protocol number of ICMP is 1.