

CS39006: Networks Lab

Assignment 1: Exploring Packet Sniffer & Packet Analyzer

Assignment 1 Solution Submission

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Assignment 1 Submission

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Link of the pcap file:

https://drive.google.com/file/d/1h_Ti72CmamvhrjuEbJBtQY6nz9QoVI7Q/view?usp=sharing

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My Setup:

- Connected to Samsung J7 Vodafone mobile hotspot.
 - Disabled Promiscuous mode on all interfaces
 - Used a Google Chrome browser to connect to <http://iitkgp.ac.in/> and <https://www.cornell.edu/>
-

Answers to the questions :

1.a. Protocols of the Application layer present in the wireshark packet traces are :

- Hypertext Transfer Protocol [HTTP]
eg. No. : 587
Time : 12.613228 sec
Source ip : 2402:3a80:a05:289:e98b:1832:1e21:c83d
Destination ip : 64:ff9b::cb6e:f5f4
Protocol : HTTP
Length : 518
Info : GET / HTTP/1.1
- Simple Service Discovery Protocol [SSDP]
eg. No. : 5
Time : 0.060493 sec
Source ip : 192.168.43.146
Destination ip : 239.255.255.250
Protocol : SSDP
Length : 213
Info : M-SEARCH * HTTP/1.1
- Network Time Protocol [NTP]
eg. No. : 3120
Time : 186.851270 sec
Source ip : 2001:67c:1560:8003::c7
Destination ip : 2402:3a80:a05:289:e98b:1832:1e21:c83d
Protocol : NTP

Length : 110

Info : NTP Version 4, server

The protocols lying at the interface of Application and Transport layer and are present in the packets are :

- Domain Name Server [DNS]
eg. No. : 576
Time : 12.318085 sec
Source ip : fe80::bd6d:93a5:f125:ec9d
Destination ip : fe80::56b8:2ff:febf:6046
Protocol : DNS
Length : 92
Info : Standard query 0x454f A iitkgp.ac.in
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1.b. Protocols of the Transport layer present in the wireshark packet traces are :

- Transfer Control Protocol [TCP]
eg. No. : 11
Time : 0.119286 sec
Source ip : 2402:3a80:a05:289:e98b:1832:1e21:c83d
Destination ip : 2404:6800:4009:801::2003
Protocol : TCP
Length : 94
Info : 50878 → 443 [SYN] Seq=0 Win=64800 Len=0 MSS=1440 SACK_PERM=1
TSval=348916395 TSecr=0 WS=128
 - QUIC Protocol
eg. No. : 24
Time : 0.374296 sec
Source ip : 2402:3a80:a05:289:e98b:1832:1e21:c83d
Destination ip : 2404:6800:4009:820::200d
Protocol : QUIC
Length : 1392
Info : Client Hello
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1.c. Protocols of the Networks layer present in the wireshark packet traces are :

- Sixth version of Internet Control Message Protocol [ICMPv6]
eg. No. : 9
Time : 0.118760 sec
Source ip : fe80::bd6d:93a5:f125:ec9d
Destination ip : fe80::56b8:2ff:febf:6046
Protocol : ICMPv6
Length : 173
Info : Destination Unreachable (Port unreachable)
- Fourth version of Internet Protocol [IPv4]
eg. 192.168.43.146
- Sixth version of Internet Protocol [IPv6]
eg. 2402:3a80:a05:289:e98b:1832:1e21:c83d

The protocols lying at the interface of Networks and Data link layer and are present in the packets are :

- Address Resolution Protocol [ARP]

eg. No. : 317

Time : 5.115716 sec

Source ip : SamsungE_bf:60:46

Destination ip : HonHaiPr_ac:d3:25

Protocol : ARP

Length : 42

Info : Who has 192.168.43.146? Tell 192.168.43.1

2.a. On accessing <http://iitkgp.ac.in/> , I obtained 2633 packets having a total length of 2153412 bytes.

2.b. On accessing <https://www.cornell.edu/> , I obtained 602 packets having a total length of 197202 bytes.

3.a. The following table displays the list of all domains with their ipv4 and ipv6 addresses. Some domains have multiple ipv4 and ipv6 being displayed in a single response. I have considered all possible ipv4 and ipv6 for a given domain name.

[Domain and Ip pairs of all A and AAAA type records are considered]

Domain Name : clientservices.googleapis.com , IP : 172.217.174.227
Domain Name : clientservices.googleapis.com , IP : 172.217.174.227
Domain Name : clientservices.googleapis.com , IP : 172.217.174.227
Domain Name : clientservices.googleapis.com , IP : 172.217.174.227
Domain Name : clientservices.googleapis.com , IP : 2404:6800:4009:801::2003
Domain Name : accounts.google.com , IP : 142.250.183.13
Domain Name : accounts.google.com , IP : 2404:6800:4009:820::200d
Domain Name : www.google.com , IP : 216.58.203.36
Domain Name : www.google.com , IP : 2404:6800:4009:80f::2004
Domain Name : ws.mailtrack.io , IP : 34.249.6.34
Domain Name : ws.mailtrack.io , IP : 52.210.126.235
Domain Name : ws.mailtrack.io , IP : 52.209.88.111
Domain Name : ws.mailtrack.io , IP : 52.17.241.162
Domain Name : ws.mailtrack.io , IP : 108.128.65.19
Domain Name : ws.mailtrack.io , IP : 108.128.74.148
Domain Name : www.googleapis.com , IP : 2404:6800:4009:824::200a
Domain Name : www.googleapis.com , IP : 2404:6800:4009:81d::200a
Domain Name : www.googleapis.com , IP : 2404:6800:4009:81f::200a
Domain Name : www.googleapis.com , IP : 2404:6800:4009:820::200a
Domain Name : www.googleapis.com , IP : 142.250.183.10
Domain Name : www.googleapis.com , IP : 142.250.183.138
Domain Name : www.googleapis.com , IP : 172.217.167.170
Domain Name : www.googleapis.com , IP : 172.217.174.234
Domain Name : www.googleapis.com , IP : 216.58.203.42

Domain Name : www.googleapis.com , IP : 142.250.67.138
Domain Name : www.googleapis.com , IP : 142.250.67.170
Domain Name : www.googleapis.com , IP : 142.250.67.202
Domain Name : www.googleapis.com , IP : 142.250.76.170
Domain Name : www.googleapis.com , IP : 172.217.160.170
Domain Name : www.googleapis.com , IP : 172.217.166.74
Domain Name : www.googleapis.com , IP : 172.217.160.202
Domain Name : www.googleapis.com , IP : 142.250.67.234
Domain Name : www.googleapis.com , IP : 142.250.77.42
Domain Name : www.googleapis.com , IP : 142.250.182.202
Domain Name : www.googleapis.com , IP : 142.250.182.234
Domain Name : ws.mailtrack.io , IP : 64:ff9b::3411:f1a2
Domain Name : ws.mailtrack.io , IP : 64:ff9b::6c80:4113
Domain Name : ws.mailtrack.io , IP : 64:ff9b::6c80:4a94
Domain Name : ws.mailtrack.io , IP : 64:ff9b::22f9:622
Domain Name : ws.mailtrack.io , IP : 64:ff9b::34d2:7eeb
Domain Name : ws.mailtrack.io , IP : 64:ff9b::34d1:586f
Domain Name : clients4.google.com , IP : 142.250.67.174
Domain Name : clients4.google.com , IP : 2404:6800:4009:812::200e
Domain Name : fonts.gstatic.com , IP : 142.250.67.227
Domain Name : fonts.gstatic.com , IP : 2404:6800:4009:814::2003
Domain Name : oauthaccountmanager.googleapis.com , IP : 216.58.203.10
Domain Name : oauthaccountmanager.googleapis.com , IP : 2404:6800:4009:80c::200a
Domain Name : ogs.google.com , IP : 142.250.77.46
Domain Name : ogs.google.com , IP : 2404:6800:4009:81c::200e
Domain Name : www.gstatic.com , IP : 2404:6800:4009:815::2003
Domain Name : ssl.gstatic.com , IP : 2404:6800:4009:812::2003
Domain Name : apis.google.com , IP : 216.58.203.46
Domain Name : www.gstatic.com , IP : 172.217.174.67
Domain Name : ssl.gstatic.com , IP : 142.250.67.163
Domain Name : apis.google.com , IP : 2404:6800:4009:80f::200e
Domain Name : play.google.com , IP : 172.217.166.174
Domain Name : play.google.com , IP : 2404:6800:4009:80e::200e
Domain Name : mtalk.google.com , IP : 74.125.200.188
Domain Name : mtalk.google.com , IP : 2404:6800:4003:c04::bc
Domain Name : update.googleapis.com , IP : 142.250.67.163
Domain Name : update.googleapis.com , IP : 2404:6800:4009:812::2003
Domain Name : iitkgp.ac.in , IP : 203.110.245.244
Domain Name : iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f4
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.60
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.59
Domain Name : erp.iitkgp.ac.in , IP : 64:ff9b::cb6e:f53b
Domain Name : erp.iitkgp.ac.in , IP : 64:ff9b::cb6e:f53c
Domain Name : www.rajbhasha.iitkgp.ac.in , IP : 203.110.245.243
Domain Name : www.rajbhasha.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f3
Domain Name : www.sric.iitkgp.ac.in , IP : 203.110.245.243
Domain Name : www.sric.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f3
Domain Name : kgpchronicle.iitkgp.ac.in , IP : 203.110.242.132
Domain Name : international.iitkgp.ac.in , IP : 203.110.242.133
Domain Name : international.iitkgp.ac.in , IP : 64:ff9b::cb6e:f285
Domain Name : kgpchronicle.iitkgp.ac.in , IP : 64:ff9b::cb6e:f284
Domain Name : som.iitkgp.ac.in , IP : 203.110.240.154
Domain Name : som.iitkgp.ac.in , IP : 64:ff9b::cb6e:f09a
Domain Name : gate.iitkgp.ac.in , IP : 203.110.245.11

Domain Name : gate.iitkgp.ac.in , IP : 64:ff9b::cb6e:f50b
Domain Name : www.cep.iitkgp.ac.in , IP : 203.110.245.243
Domain Name : www.cep.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f3
Domain Name : www.counsellingcentre.iitkgp.ac.in , IP : 203.110.245.243
Domain Name : www.counsellingcentre.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f3
Domain Name : www.dak.iitkgp.ernet.in , IP : 203.110.246.11
Domain Name : www.dak.iitkgp.ernet.in , IP : 64:ff9b::cb6e:f60b
Domain Name : www.gian.iitkgp.ac.in , IP : 203.110.245.243
Domain Name : www.gian.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f3
Domain Name : www.international.iitkgp.ac.in , IP : 203.110.245.243
Domain Name : www.international.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f3
Domain Name : www.library.iitkgp.ac.in , IP : 203.110.245.243
Domain Name : www.library.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f3
Domain Name : www.som.iitkgp.ac.in , IP : 203.110.245.243
Domain Name : www.som.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f3
Domain Name : www.tgh.iitkgp.ac.in , IP : 203.110.245.243
Domain Name : www.tgh.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f3
Domain Name : iitkgpmail.iitkgp.ac.in , IP : 203.110.245.235
Domain Name : iitkgpmail.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5eb
Domain Name : www.iitkgp.ac.in , IP : 203.110.245.244
Domain Name : www.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f4
Domain Name : www1.iitkgp.ac.in , IP : 203.110.245.243
Domain Name : www1.iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f3
Domain Name : mail.google.com , IP : 172.217.26.229
Domain Name : mail.google.com , IP : 2404:6800:4009:805::2005
Domain Name : twitter.com , IP : 104.244.42.193
Domain Name : twitter.com , IP : 64:ff9b::68f4:2ac1
Domain Name : www.facebook.com , IP : 31.13.79.35
Domain Name : www.facebook.com , IP : 2a03:2880:f12f:183:face:b00c:0:25de
Domain Name : www.nvsp.in , IP : 117.239.183.240
Domain Name : www.nvsp.in , IP : 64:ff9b::75ef:b7f0
Domain Name : www.linkedin.com , IP : 2620:1ec:21::14
Domain Name : www.linkedin.com , IP : 13.107.42.14
Domain Name : www.jeeadv.ac.in , IP : 35.192.176.149
Domain Name : www.pmrfin.in , IP : 64:ff9b::23d0:91b1
Domain Name : www.pmrfin.in , IP : 35.208.145.177
Domain Name : www.youtube.com , IP : 216.58.196.78
Domain Name : www.youtube.com , IP : 172.217.160.174
Domain Name : www.youtube.com , IP : 172.217.166.78
Domain Name : www.youtube.com , IP : 172.217.27.206
Domain Name : www.youtube.com , IP : 172.217.160.206
Domain Name : www.youtube.com , IP : 172.217.166.46
Domain Name : www.youtube.com , IP : 172.217.166.174
Domain Name : www.youtube.com , IP : 142.250.67.238
Domain Name : www.youtube.com , IP : 142.250.183.142
Domain Name : www.youtube.com , IP : 172.217.167.174
Domain Name : www.youtube.com , IP : 172.217.174.238
Domain Name : www.youtube.com , IP : 216.58.203.14
Domain Name : www.youtube.com , IP : 142.250.67.174
Domain Name : www.youtube.com , IP : 142.250.76.206
Domain Name : www.youtube.com , IP : 172.217.26.238
Domain Name : www.youtube.com , IP : 216.58.203.142
Domain Name : www.youtube.com , IP : 2404:6800:4009:81a::200e
Domain Name : www.youtube.com , IP : 2404:6800:4009:811::200e

Domain Name : www.youtube.com , IP : 2404:6800:4009:812::200e
Domain Name : www.youtube.com , IP : 2404:6800:4009:813::200e
Domain Name : www.vidyalakshmi.co.in , IP : 121.240.246.10
Domain Name : www.vidyalakshmi.co.in , IP : 64:ff9b::79f0:f60a
Domain Name : www.jeeadv.ac.in , IP : 64:ff9b::23c0:b095
Domain Name : update.googleapis.com , IP : 142.250.67.163
Domain Name : update.googleapis.com , IP : 142.250.67.163
Domain Name : update.googleapis.com , IP : 2404:6800:4009:812::2003
Domain Name : update.googleapis.com , IP : 142.250.67.163
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.59
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.60
Domain Name : erp.iitkgp.ac.in , IP : 64:ff9b::cb6e:f53c
Domain Name : erp.iitkgp.ac.in , IP : 64:ff9b::cb6e:f53b
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.60
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.59
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.59
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.60
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.59
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.60
Domain Name : erp.iitkgp.ac.in , IP : 64:ff9b::cb6e:f53b
Domain Name : erp.iitkgp.ac.in , IP : 64:ff9b::cb6e:f53c
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.59
Domain Name : erp.iitkgp.ac.in , IP : 203.110.245.60
Domain Name : safebrowsing.googleapis.com , IP : 172.217.166.42
Domain Name : safebrowsing.googleapis.com , IP : 2404:6800:4009:80c::200a
Domain Name : iitkgp.ac.in , IP : 203.110.245.244
Domain Name : iitkgp.ac.in , IP : 64:ff9b::cb6e:f5f4
Domain Name : www.google.com , IP : 2404:6800:4009:80f::2004
Domain Name : www.google.com , IP : 216.58.203.36
Domain Name : beacons.gcp.gvt2.com , IP : 216.58.199.179
Domain Name : beacons.gcp.gvt2.com , IP : 2404:6800:4009:807::2013
Domain Name : www.cornell.edu , IP : 20.42.25.107
Domain Name : www.cornell.edu , IP : 20.42.25.107
Domain Name : www.cornell.edu , IP : 20.42.25.107
Domain Name : use.typekit.net , IP : 104.94.18.176
Domain Name : use.typekit.net , IP : 104.94.18.177
Domain Name : use.typekit.net , IP : 2402:3a80:c000:25::2a6a:a237
Domain Name : use.typekit.net , IP : 2402:3a80:c000:25::2a6a:a230
Domain Name : www.cornell.edu , IP : 64:ff9b::142a:196b
Domain Name : embanner.univcomm.cornell.edu , IP : 20.42.25.107
Domain Name : embanner.univcomm.cornell.edu , IP : 64:ff9b::142a:196b
Domain Name : ssl.google-analytics.com , IP : 172.217.26.232
Domain Name : ssl.google-analytics.com , IP : 2404:6800:4009:80c::2008
Domain Name : cdnsecakmi.kaltura.com , IP : 23.209.112.140
Domain Name : cdnsecakmi.kaltura.com , IP : 64:ff9b::17d1:708c
Domain Name : 6120104.global.siteimproveanalytics.io , IP : 18.158.85.68
Domain Name : 6120104.global.siteimproveanalytics.io , IP : 18.159.119.149
Domain Name : 6120104.global.siteimproveanalytics.io , IP : 64:ff9b::129e:5544
Domain Name : 6120104.global.siteimproveanalytics.io , IP : 64:ff9b::129f:7795
Domain Name : p.typekit.net , IP : 2600:140f:d400:19a::19fd
Domain Name : p.typekit.net , IP : 2600:140f:d400:189::19fd
Domain Name : p.typekit.net , IP : 2600:140f:d400:19a::19fd
Domain Name : p.typekit.net , IP : 2600:140f:d400:189::19fd
Domain Name : p.typekit.net , IP : 2600:140f:d400:189::19fd

Domain Name : p.typekit.net , IP : 2600:140f:d400:19a::19fd
Domain Name : p.typekit.net , IP : 104.122.1.130
Domain Name : p.typekit.net , IP : 104.122.1.130
Domain Name : p.typekit.net , IP : 104.122.1.130

3.b. Yes, We can find the IP of the DNS servers using the DNS packets.

- The two columns 'Source' and 'Destination' represent the IP addresses (ipv4 or ipv6) of the sender and receiver servers respectively.
- When my computer sends a 'Standard query' to the DNS server, in the DNS packet, 'Source' is the IP address of my computer and 'Destination' is the IP address of the DNS server to which the query is sent.
- When the DNS server sends a 'Standard Query Response' to my computer, 'Source' is the IP address of the DNS server that responds to my computer with the ip address of the query domain and 'Destination' is the IP address of my computer.
- By noticing the 'Destination' column for a 'Standard Query' in the DNS packet, we obtain the IP address of the DNS server to which my computer makes a query.
- Similarly, by noticing the 'Source' column for a 'Standard Query Response' in the DNS packet, we obtain the IP address of the DNS server that responds to my computer's query.
- Example, consider the given packet :

```
{  
  "Frame Number": 7,  
  "Time": 0.109663 sec ,  
  "Source IP": "192.168.43.1 ",  
  "Destination IP": "192.168.43.146 ",  
  "Length" : 105  
  "Info": "Standard query response 0x9135 A clientservices.googleapis.com A  
172.217.174.227 "  
}
```

For packet 7, at time 0.109663 sec from the beginning of capturing, a 'Standard Query Response' of A type for query '0x9135' is sent from a DNS server to my computer. The IP of this DNS server is "192.168.43.1" and the IP of my computer is "192.168.43.146".

Thus, the IP of the DNS server at any time can be obtained by observing the DNS packet of the corresponding time.

4.a. I observed 19 HTTP GET requests. These requests are :

```
{  
  "Frame Number": 587,  
  "Time": 12.613228 sec,  
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
```

```

    "Destination IP": "64:ff9b::cb6e:f5f4",
    "Info": "GET / HTTP/1.1 "
  }
  {
    "Frame Number": 601,
    "Time": 13.480792000000001 sec,
    "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
    "Destination IP": "64:ff9b::cb6e:f5f4",
    "Info": "GET
/resources/css/bootstrap.min.css;jsessionid=76A88D856B0ED30EB80BF03563873DD0
HTTP/1.1 "
  }
  {
    "Frame Number": 602,
    "Time": 13.482828 sec,
    "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
    "Destination IP": "64:ff9b::cb6e:f5f4",
    "Info": "GET
/resources/css/font-awesome.css;jsessionid=76A88D856B0ED30EB80BF03563873DD0
HTTP/1.1 "
  }
  {
    "Frame Number": 640,
    "Time": 13.661615 sec,
    "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
    "Destination IP": "64:ff9b::cb6e:f5f4",
    "Info": "GET
/resources/common_css/common_stylesheets.css;jsessionid=76A88D856B0ED30EB80BF03563
873DD0 HTTP/1.1 "
  }
  {
    "Frame Number": 641,
    "Time": 13.661667999999999 sec,
    "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
    "Destination IP": "64:ff9b::cb6e:f5f4",
    "Info": "GET
/resources/css/home_style.css;jsessionid=76A88D856B0ED30EB80BF03563873DD0 HTTP/1.1
"
  }
  {
    "Frame Number": 642,
    "Time": 13.661717000000001 sec,
    "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
    "Destination IP": "64:ff9b::cb6e:f5f4",
    "Info": "GET
/resources/images/hindi.png;jsessionid=76A88D856B0ED30EB80BF03563873DD0 HTTP/1.1 "
  }
  {
    "Frame Number": 720,
    "Time": 13.845257 sec,
    "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
    "Destination IP": "64:ff9b::cb6e:f5f4",
    "Info": "GET
/resources/images/logo.png;jsessionid=76A88D856B0ED30EB80BF03563873DD0 HTTP/1.1 "

```



```

}
{
  "Frame Number": 721,
  "Time": 13.846953 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET
/resources/css/override.css;jsessionid=76A88D856B0ED30EB80BF03563873DD0 HTTP/1.1 "
}
{
  "Frame Number": 1663,
  "Time": 19.334221 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET
/resources/banners/adm_vgsom.jpg;jsessionid=76A88D856B0ED30EB80BF03563873DD0
HTTP/1.1 "
}
{
  "Frame Number": 1799,
  "Time": 19.502053 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET
/resources/images/nvsp3.png;jsessionid=76A88D856B0ED30EB80BF03563873DD0 HTTP/1.1
"
}
{
  "Frame Number": 1808,
  "Time": 19.539479999999998 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET /resources/js/jquery.js;jsessionid=76A88D856B0ED30EB80BF03563873DD0
HTTP/1.1 "
}
{
  "Frame Number": 1809,
  "Time": 19.540098 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET
/resources/js/bootstrap.min.js;jsessionid=76A88D856B0ED30EB80BF03563873DD0 HTTP/1.1 "
}
{
  "Frame Number": 1810,
  "Time": 19.540166 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET /resources/js/override.js;jsessionid=76A88D856B0ED30EB80BF03563873DD0
HTTP/1.1 "
}
{
  "Frame Number": 1811,
  "Time": 19.540224 sec,

```

```
"Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
"Destination IP": "64:ff9b::cb6e:f5f4",
"Info": "GET
/resources/js/navigation.js;jsessionId=76A88D856B0ED30EB80BF03563873DD0 HTTP/1.1 "
}
{
  "Frame Number": 1857,
  "Time": 19.704038 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET
/resources/page_js/jquery.tickerNews.min.js;jsessionId=76A88D856B0ED30EB80BF03563873
DD0 HTTP/1.1 "
}
{
  "Frame Number": 1895,
  "Time": 19.959937 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET
/resources/js/jquery.bootstrap.newsbox.min.js;jsessionId=76A88D856B0ED30EB80BF0356387
3DD0 HTTP/1.1 "
}
{
  "Frame Number": 1906,
  "Time": 19.975719 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET
/resources/page_js/home_page.js;jsessionId=76A88D856B0ED30EB80BF03563873DD0
HTTP/1.1 "
}
{
  "Frame Number": 2005,
  "Time": 20.436114 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET
/resources/common_js/common_js.js;jsessionId=76A88D856B0ED30EB80BF03563873DD0
HTTP/1.1 "
}
{
  "Frame Number": 2291,
  "Time": 22.072820999999998 sec,
  "Source IP": "2402:3a80:a05:289:e98b:1832:1e21:c83d",
  "Destination IP": "64:ff9b::cb6e:f5f4",
  "Info": "GET
/resources/images/index.png;jsessionId=76A88D856B0ED30EB80BF03563873DD0 HTTP/1.1 "
}
```

4.b. (i) and (ii) For each HTTP GET request, the corresponding no. of TCP segments and amount of data received as TCP segment and file in the HTTP Response are given below :

```
{
  "HTTP GET request frame Number ": 587,
  "HTTP GET response frame Number ": 1804,
  "No. of TCP segments received ": 521,
  "Amount of data received as TCP segments(in bytes) ": 934075,
  "Amount of data in the file received as response(in bytes) ": 932903
}
{
  "HTTP GET request frame Number ": 601,
  "HTTP GET response frame Number ": 1050,
  "No. of TCP segments received ": 91,
  "Amount of data received as TCP segments(in bytes) ": 141167,
  "Amount of data in the file received as response(in bytes) ": 140990
}
{
  "HTTP GET request frame Number ": 602,
  "HTTP GET response frame Number ": 820,
  "No. of TCP segments received ": 22,
  "Amount of data received as TCP segments(in bytes) ": 35495,
  "Amount of data in the file received as response(in bytes) ": 35319
}
{
  "HTTP GET request frame Number ": 640,
  "HTTP GET response frame Number ": 779,
  "No. of TCP segments received ": 12,
  "Amount of data received as TCP segments(in bytes) ": 19706,
  "Amount of data in the file received as response(in bytes) ": 19530
}
{
  "HTTP GET request frame Number ": 641,
  "HTTP GET response frame Number ": 712,
  "No. of TCP segments received ": 5,
  "Amount of data received as TCP segments(in bytes) ": 8718,
  "Amount of data in the file received as response(in bytes) ": 8543
}
{
  "HTTP GET request frame Number ": 642,
  "HTTP GET response frame Number ": 718,
  "No. of TCP segments received ": 3,
  "Amount of data received as TCP segments(in bytes) ": 2196,
  "Amount of data in the file received as response(in bytes) ": 2020
}
{
  "HTTP GET request frame Number ": 720,
  "HTTP GET response frame Number ": 850,
  "No. of TCP segments received ": 13,
  "Amount of data received as TCP segments(in bytes) ": 17250,
  "Amount of data in the file received as response(in bytes) ": 17073
}
{
}
```

```

}
{
  "HTTP GET request frame Number ": 721,
  "HTTP GET response frame Number ": 807,
  "No. of TCP segments received ": 4,
  "Amount of data received as TCP segments(in bytes) ": 6815,
  "Amount of data in the file received as response(in bytes) ": 6640
}
{
  "HTTP GET request frame Number ": 1663,
  "HTTP GET response frame Number ": 2289,
  "No. of TCP segments received ": 138,
  "Amount of data received as TCP segments(in bytes) ": 239321,
  "Amount of data in the file received as response(in bytes) ": 239142
}
{
  "HTTP GET request frame Number ": 1799,
  "HTTP GET response frame Number ": 1853,
  "No. of TCP segments received ": 6,
  "Amount of data received as TCP segments(in bytes) ": 9123,
  "Amount of data in the file received as response(in bytes) ": 8947
}
{
  "HTTP GET request frame Number ": 1808,
  "HTTP GET response frame Number ": 2001,
  "No. of TCP segments received ": 60,
  "Amount of data received as TCP segments(in bytes) ": 95981,
  "Amount of data in the file received as response(in bytes) ": 95791
}
{
  "HTTP GET request frame Number ": 1809,
  "HTTP GET response frame Number ": 2137,
  "No. of TCP segments received ": 19 ,
  "Amount of data received as TCP segments(in bytes) ": 37058,
  "Amount of data in the file received as response(in bytes) ": 36868
}
{
  "HTTP GET request frame Number ": 1810,
  "HTTP GET response frame Number ": 1904,
  "No. of TCP segments received ": 6,
  "Amount of data received as TCP segments(in bytes) ": 8012,
  "Amount of data in the file received as response(in bytes) ": 7823
}
{
  "HTTP GET request frame Number ": 1811,
  "HTTP GET response frame Number ": 1881,
  "No. of TCP segments received ": 2,
  "Amount of data received as TCP segments(in bytes) ": 2176,
  "Amount of data in the file received as response(in bytes) ": 1987
}
{
  "HTTP GET request frame Number ": 1857,
  "HTTP GET response frame Number ": 2021,
  "No. of TCP segments received ": 4,
  "Amount of data received as TCP segments(in bytes) ": 4183,
  "Amount of data in the file received as response(in bytes) ": 3994
}

```

```
}
{
  "HTTP GET request frame Number ": 1895,
  "HTTP GET response frame Number ": 2072,
  "No. of TCP segments received ": 5,
  "Amount of data received as TCP segments(in bytes) ": 5456,
  "Amount of data in the file received as response(in bytes) ": 5267
}
{
  "HTTP GET request frame Number ": 1906,
  "HTTP GET response frame Number ": 2066,
  "No. of TCP segments received ": 5,
  "Amount of data received as TCP segments(in bytes) ": 4821,
  "Amount of data in the file received as response(in bytes) ": 4632
}
{
  "HTTP GET request frame Number ": 2005,
  "HTTP GET response frame Number ": 2097,
  "No. of TCP segments received ": 2,
  "Amount of data received as TCP segments(in bytes) ": 3024,
  "Amount of data in the file received as response(in bytes) ": 2835
}
{
  "HTTP GET request frame Number ": 2291,
  "HTTP GET response frame Number ": 2295,
  "No. of TCP segments received ": 2,
  "Amount of data received as TCP segments(in bytes) ": 5750,
  "Amount of data in the file received as response(in bytes) ": 5574
}
```