Part 1

Query: DNS Packet 115 from my trace.

No.	Time	Source	Destination	Protocol	Length	Info
115	5.110301	10.133.1.27	137.22.1.7	DNS	81	Standard query 0x0ad5 HTTPS update.googleapis.com

3. UDP since reliability is not important, and it just needs the response as fast as possible. If the message is lost, it can simply be retransmitted.

4.
    a. 1 Question
    b. Standard Query
    c. Recussion desired
    d. Name: update.googleapis.com
       [Name Length: 21]
       [Label Count: 3]
       Type: HTTPS (65) (HTTPS Specific Service Endpoints)
       Class: IN (0x0001)

Response:

117	5.115990	137.22.1.7	10.133.1.27	DNS	138	Standard query response 0x0ad5 HTTPS update.googleapis.com SOA ns1.google.com

5.
    a. 1 Response (packet #117)
    b. Name: googleapis.com, type: HTTPS, Class: IN, value: googleapis.com
    c. Response: message is a response, recursion is desired, recursion available

Part 2

1.
    a. Windows IP Configuration
       Host Name . . . . : Raaid
       Primary Dns Suffix . . . . :
       Node Type . . . . : Hybrid
       IP Routing Enabled. . . . . : No
       WINS Proxy Enabled. . . . . : No
       DNS Suffix Search List. . . . . . : carleton.edu

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . : Media disconnected
   Connection-specific DNS Suffix . :
   Description . . . . : Microsoft Wi-Fi Direct Virtual Adapter
   Physical Address. . . . . : A0-29-42-69-0E-93
   DHCP Enabled. . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . : Media disconnected
   Connection-specific DNS Suffix . :
   Description . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
   Physical Address. . . . . : A2-29-42-69-0E-92
   DHCP Enabled. . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix . : carleton.edu
   Description . . . . : Intel(R) Wi-Fi 6 AX201 160MHz
   Physical Address. . . . . : A0-29-42-69-0E-92
   DHCP Enabled. . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   IPv4 Address. . . . . : 10.133.1.27(Preferred)
   Subnet Mask . . . . : 255.255.224.0
   Lease Obtained. . . . . : Monday, November 10, 2025 11:05:32 AM
   Lease Expires . . . . : Monday, November 10, 2025 4:33:13 PM
   Default Gateway . . . . : 10.133.0.254
   DHCP Server . . . . : 137.22.94.2
   DNS Servers . . . . : 137.22.1.7
                      137.22.1.6
   NetBIOS over Tcpip. . . . . . . : Enabled

Ethernet adapter Ethernet:

   Media State . . . . : Media disconnected
   Connection-specific DNS Suffix . :
   Description . . . . : Realtek PCIe GbE Family Controller
   Physical Address. . . . . : C8-7F-54-C9-CF-34
   DHCP Enabled. . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

   b. 2

   c. 137.22.1.6

2.

; <<>> DiG 9.17.15 <<>> Youtube.com

;; global options: +cmd

;; Got answer:

;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 6475

;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9

;; OPT PSEUDOSECTION:

; EDNS: version: 0, flags:; udp: 1232

; COOKIE: 75d918eb7467d6f0df96771c69123bf0215b69a730bdce67 (good)

;; QUESTION SECTION:

;Youtube.com.   IN A

;; ANSWER SECTION:

youtube.com.   278 IN A 172.217.4.46

;; AUTHORITY SECTION:

youtube.com.   78241 IN NS ns2.google.com.

youtube.com.   78241 IN NS ns3.google.com.

youtube.com.   78241 IN NS ns1.google.com.

youtube.com.   78241 IN NS ns4.google.com.

;; ADDITIONAL SECTION:

ns2.google.com.   83228 IN A 216.239.34.10

ns1.google.com.   83228 IN A 216.239.32.10

ns3.google.com.   83228 IN A 216.239.36.10

ns4.google.com.   83228 IN A 216.239.38.10

ns2.google.com.   80578 IN AAAA 2001:4860:4802:34::a

ns1.google.com.   80578 IN AAAA 2001:4860:4802:32::a

ns3.google.com.   80578 IN AAAA 2001:4860:4802:36::a

ns4.google.com.   80578 IN AAAA 2001:4860:4802:38::a

;; Query time: 8 msec

;; SERVER: 137.22.1.7#53(137.22.1.7) (UDP)

;; WHEN: Mon Nov 10 13:24:32 Central Standard Time 2025

;; MSG SIZE rcvd: 347

B. 1. name: Youtube.com, TTL: 278, Type: A, class: IN, value: 172.217.4.46/

  2. qr rd ra

3. Hare, I see type A, but previously, I saw HTTPS as the type. Also, the name server for my Wireshark trace was google, but here it is Youtube.

3. A. ; <<>> DiG 9.17.15 <<>> youtube.com +trace
;; global options: +cmd

```
.                319114  IN      NS      e.root-servers.net.
.                319114  IN      NS      h.root-servers.net.
.                319114  IN      NS      f.root-servers.net.
.                319114  IN      NS      m.root-servers.net.
.                319114  IN      NS      d.root-servers.net.
.                319114  IN      NS      k.root-servers.net.
.                319114  IN      NS      l.root-servers.net.
.                319114  IN      NS      i.root-servers.net.
.                319114  IN      NS      j.root-servers.net.
.                319114  IN      NS      g.root-servers.net.
.                319114  IN      NS      c.root-servers.net.
.                319114  IN      NS      b.root-servers.net.
.                319114  IN      NS      a.root-servers.net.
.                386931  IN      RRSIG   NS 8 0 518400 20251124050000 20251111040000
```
61809 . R9kC1ovDDzMbmNj4yZys8xowO4Vs/Ur8SmdL+P2V/m7OJB8AZZhBZJK1
xfiu4s+8O0ntX3+vl3j/G1BNkoZ0bVLXuh7bnAuFj7/VXNvPJctEJp5m
nbQIGktI80KcLe0OK9Sq+Hk4vqKq283VqkHJqxMl0l5cpwy+t8cV/Jju
LOnVCmKluuYES2zVfseHTH8O/ewI34mNrgce2iiWI0If/EqDEKxSe/wz
9M7cksUVvjm0mjECjL1XjtSVeJTUs7AuxkO1CysyAqvHwir/cJCTP2mF
I5jyy/eRulq0FQZF1pRaFbm7zX2y3nxztqmsu49Rs0M/y3Qwq3MWY/P3 ioKIMw==
;; Received 1125 bytes from 137.22.1.7#53(137.22.1.7) in 4 ms

```
com.             172800  IN      NS      a.gtld-servers.net.
com.             172800  IN      NS      b.gtld-servers.net.
com.             172800  IN      NS      c.gtld-servers.net.
com.             172800  IN      NS      d.gtld-servers.net.
com.             172800  IN      NS      e.gtld-servers.net.
com.             172800  IN      NS      f.gtld-servers.net.
com.             172800  IN      NS      g.gtld-servers.net.
com.             172800  IN      NS      h.gtld-servers.net.
com.             172800  IN      NS      i.gtld-servers.net.
com.             172800  IN      NS      j.gtld-servers.net.
com.             172800  IN      NS      k.gtld-servers.net.
com.             172800  IN      NS      l.gtld-servers.net.
com.             172800  IN      NS      m.gtld-servers.net.
com.             86400   IN      DS      19718 13 2
```
8ACBB0CD28F41250A80A491389424D341522D946B0DA0C0291F2D3D7 71D7805A
```
com.             86400   IN      RRSIG   DS 8 1 86400 20251125170000 20251112160000
```
61809 . L8Wg03lEHatNHy0s/qDMwaFdwpErSsSZ6SIq9nB7SMk2OUqpAWgMaJlu

XQbk15rnuh8M915pYq9jUzs8XmsRojWb299ys+1kEeYQ75WiD3K/mhfc
Z4J8KLaSpojUogqJM1yY0Lru5tLMNyxe5C0pscE7B0hvgNtjtwh0+8Sn
r2Bgf+nXggXo/A6cl7s+OT5gSetAoYcKoVbncvC+Z93jYU+Jm8fZtQgx
aHSDLVqm5/wQrEQbA2JGH7XMM9YXpNiHFqxxeeeizb/MNJq2wZI1ftgW
kra9O6s61mFs2EV3VF6n0G7K2t3aRM+ndM5KU218zyMQgBk/tfQ9g6RD 6bgeGQ==
;; Received 1171 bytes from 192.203.230.10#53(e.root-servers.net) in 8 ms

```
youtube.com.          172800  IN    NS    ns2.google.com.
youtube.com.          172800  IN    NS    ns1.google.com.
youtube.com.          172800  IN    NS    ns3.google.com.
youtube.com.          172800  IN    NS    ns4.google.com.
```
CK0POJMG874LJREF7EFN8430QVIT8BSM.com. 900 IN NSEC3 1 1 0 -
CK0Q3UDG8CEKKAE7RUKPGCT1DVSSH8LL NS SOA RRSIG DNSKEY NSEC3PARAM
CK0POJMG874LJREF7EFN8430QVIT8BSM.com. 900 IN RRSIG NSEC3 13 2 900
20251119002640 20251111231640 46539 com.
sau3mG+oYBapwhm/FNYkHjba2EYBCC4xVnGUOsx/lAUJlgTkq6MIlP9w
6LcXD5Slk8ck1N0mesF+3ubljSQLdg==
H5AIV1BJHPEF1R6U8P4TD6BJRD9HIKDA.com. 900 IN NSEC3 1 1 0 -
H5AJ5DQDTCKM5F19LA4UB4HGPFK6F6S4 NS DS RRSIG
H5AIV1BJHPEF1R6U8P4TD6BJRD9HIKDA.com. 900 IN RRSIG NSEC3 13 2 900
20251119001842 20251111230842 46539 com.
fCpWd7+SztagrDiDqlPGhXU3Dox6H02RDoP8ql6FdGbKegSZDckiPWT0
krrnz8sps921hLvGDbzjjShhF2T04A==
;; Received 652 bytes from 192.42.93.30#53(g.gtld-servers.net) in 21 ms

```
youtube.com.          300     IN    A     142.250.191.174
```
;; Received 56 bytes from 216.239.32.10#53(ns1.google.com) in 34 ms

B.
- a. e.root-servers.net
- B. g TLD Google server (g.gtld-servers.net)
- C. ns1.google.com
- D.
  - Local: 4ms
  - Root: 8ms
  - TLD: 21ms
  - Authoritative: 34 ms

```
; <<>> DiG 9.17.15 <<>> youtube.com trace
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 16173
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 5df23125eac3bc7cf47fd2fc6914fd9d6792cf89c33b2b56 (good)
;; QUESTION SECTION:
;youtube.com.                 IN      A

;; ANSWER SECTION:
youtube.com.          285    IN     A      172.217.4.46

;; AUTHORITY SECTION:
youtube.com.          70403  IN     NS     ns1.google.com.
youtube.com.          70403  IN     NS     ns3.google.com.
youtube.com.          70403  IN     NS     ns4.google.com.
youtube.com.          70403  IN     NS     ns2.google.com.
```

```
;; ADDITIONAL SECTION:
ns2.google.com.        169767  IN    A      216.239.34.10
ns1.google.com.        169767  IN    A      216.239.32.10
ns3.google.com.        169767  IN    A      216.239.36.10
ns4.google.com.        169767  IN    A      216.239.38.10
ns2.google.com.        169767  IN    AAAA   2001:4860:4802:34::a
ns1.google.com.        169767  IN    AAAA   2001:4860:4802:32::a
ns3.google.com.        169767  IN    AAAA   2001:4860:4802:36::a
ns4.google.com.        169767  IN    AAAA   2001:4860:4802:38::a

;; Query time: 4 msec
;; SERVER: 137.22.1.7#53(137.22.1.7) (UDP)
;; WHEN: Wed Nov 12 15:35:25 Central Standard Time 2025
;; MSG SIZE  rcvd: 339

;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NXDOMAIN, id: 56814
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 5df23125eac3bc7ca70b29ae6914fd9ed85b11aacdbb4256 (good)
;; QUESTION SECTION:
;trace.                 IN    A

;; AUTHORITY SECTION:
.               10800  IN    SOA    a.root-servers.net. nstld.verisign-grs.com. 2025111201
1800 900 604800 86400

;; Query time: 9 msec
;; SERVER: 137.22.1.7#53(137.22.1.7) (UDP)
;; WHEN: Wed Nov 12 15:35:25 Central Standard Time 2025
;; MSG SIZE  rcvd: 137
```