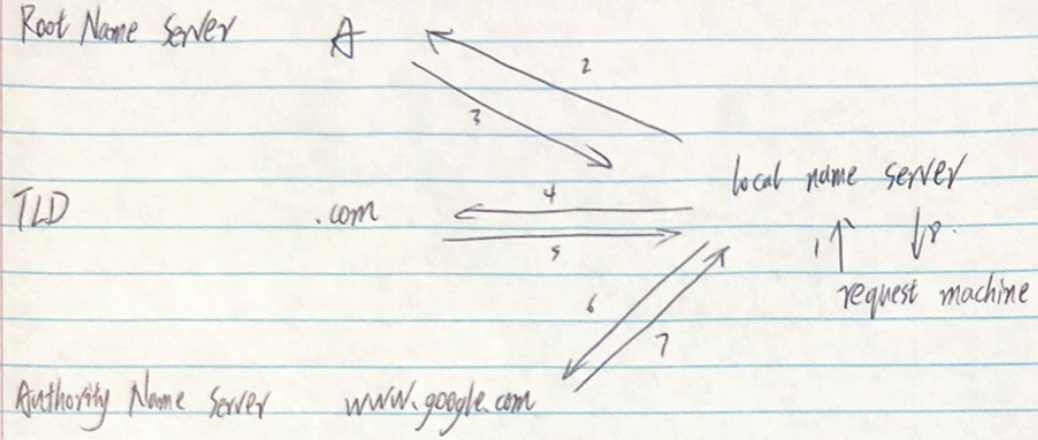
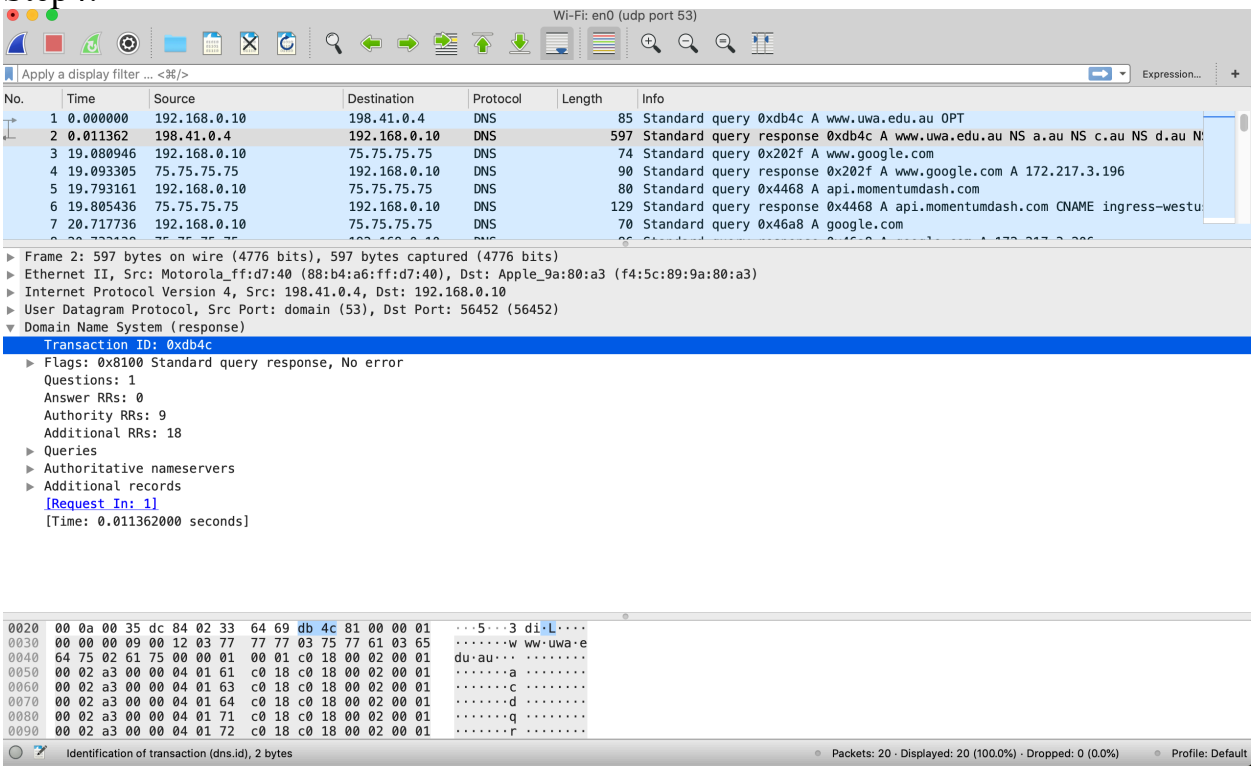
Step1:

```
~$ dig @198.41.0.4 www.uwa.edu.au

; <<>> DiG 9.10.6 <<>> @198.41.0.4 www.uwa.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 51242
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 9, ADDITIONAL: 18
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;www.uwa.edu.au.                        IN      A

;; AUTHORITY SECTION:
au.                     172800  IN      NS      d.au.
au.                     172800  IN      NS      v.au.
au.                     172800  IN      NS      u.au.
au.                     172800  IN      NS      q.au.
au.                     172800  IN      NS      t.au.
au.                     172800  IN      NS      s.au.
au.                     172800  IN      NS      r.au.
au.                     172800  IN      NS      a.au.
au.                     172800  IN      NS      c.au.

;; ADDITIONAL SECTION:
d.au.                   172800  IN      A       162.159.25.38
d.au.                   172800  IN      AAAA    2400:cb00:2049:1::a29f:1926
v.au.                   172800  IN      A       202.12.31.53
v.au.                   172800  IN      AAAA    2001:dd8:12::53
u.au.                   172800  IN      A       211.29.133.32
q.au.                   172800  IN      A       65.22.196.1
q.au.                   172800  IN      AAAA    2a01:8840:be::1
t.au.                   172800  IN      A       65.22.199.1
t.au.                   172800  IN      AAAA    2a01:8840:c1::1
s.au.                   172800  IN      A       65.22.198.1
s.au.                   172800  IN      AAAA    2a01:8840:c0::1
r.au.                   172800  IN      A       65.22.197.1
r.au.                   172800  IN      AAAA    2a01:8840:bf::1
a.au.                   172800  IN      A       58.65.254.73
a.au.                   172800  IN      AAAA    2407:6e00:254:306::73
c.au.                   172800  IN      A       162.159.24.179
c.au.                   172800  IN      AAAA    2400:cb00:2049:1::a29f:18b3

;; Query time: 10 msec
;; SERVER: 198.41.0.4#53(198.41.0.4)
;; WHEN: Thu Oct 10 20:56:39 PDT 2019
;; MSG SIZE  rcvd: 555

~$
```


Root Name Server
A
2
3
TLD
.com
4
5
local name server
1
8
request machine
6
7
Authority Name Server
www.google.com

Step4:



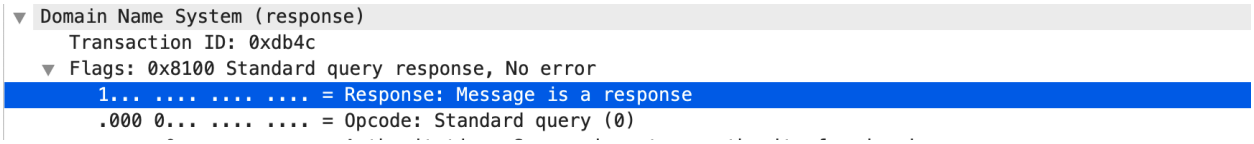
1. How many bits long is the Transaction ID? Based on this length, take your best guess as to how likely it is that concurrent transactions will use the same transaction ID.

Transaction ID is 0xdb4c, so its length is 16 bits.

2^16 concurrent transactions may cause collisions.

2. Which flag bit and what values signifies whether the DNS message is a query or response?

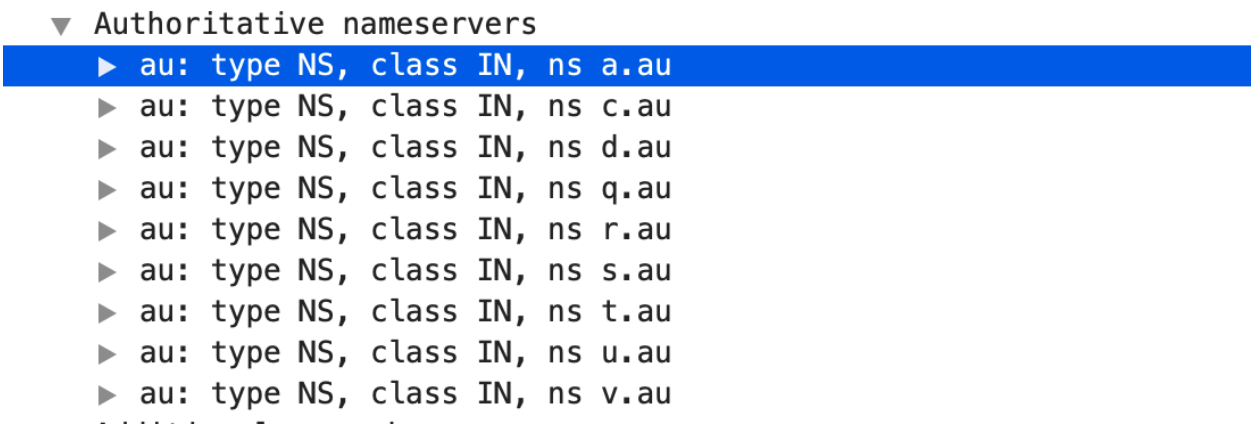
The first bit .



How many bytes long is the entire DNS header? Use information in the bottom status line when you select parts of the packet and the bottom panel to help you work this out.

DNS header is 12 bytes long.

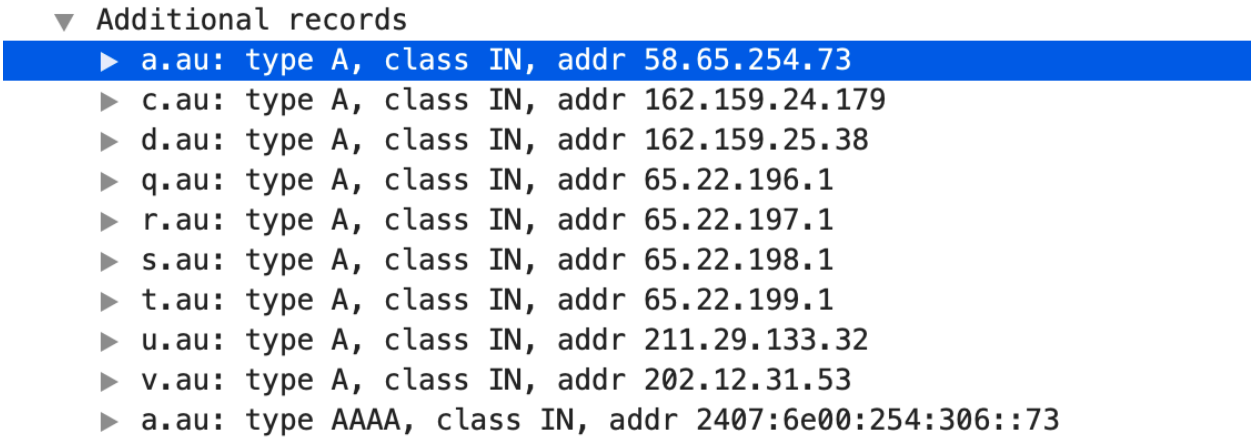
4. For the initial response, in what section are the names of the nameservers carried? What is the Type of the records that carry nameserver names?



Names of the nameservrs carried in Authoritative nameservers section.

Type is NS.

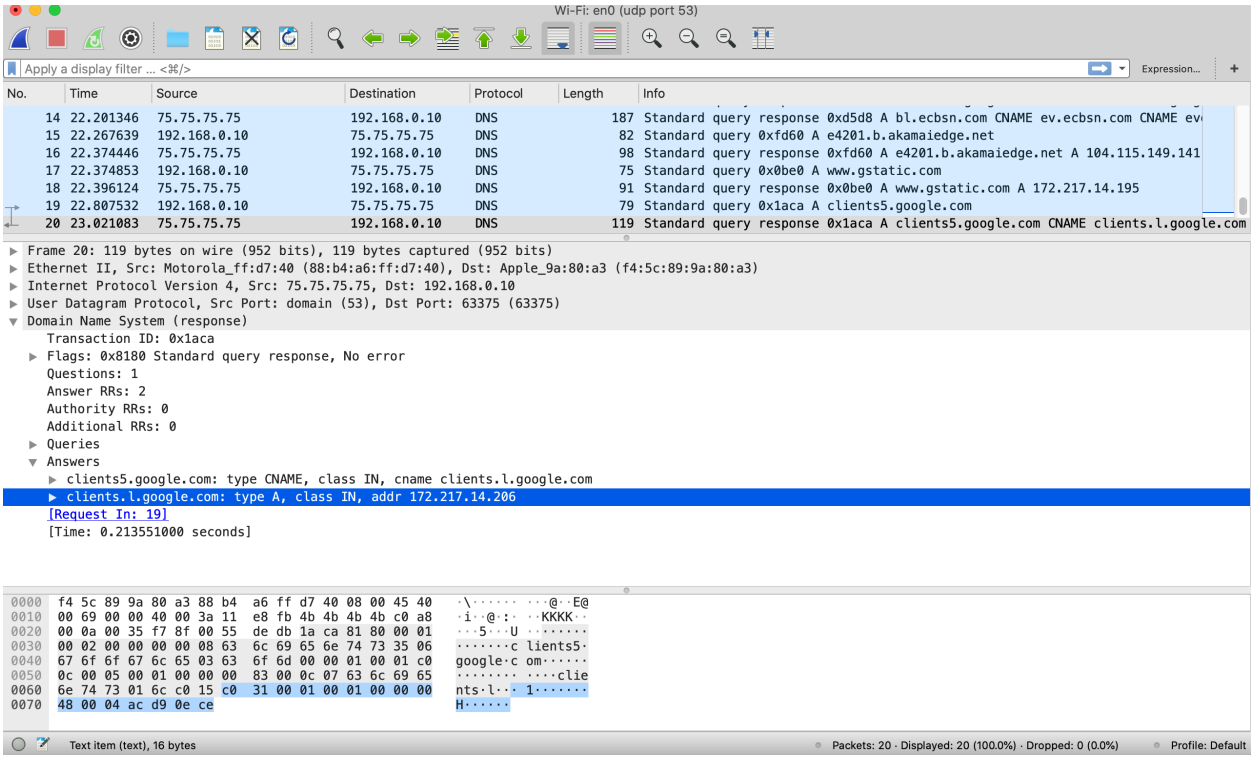
5. Similarly, in what section are the IP addresses of the nameservers carried, and what is the Type of the records that carry the IP addresses?



In the Additional records section.

IPv4 type is A, IPv6 type is AAAA.

For the final response, in what section is the IP address of the domain name carried?



In the Answers section.