

CS305-2022Spring Lab5 Report

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Lab Time: Thursday 10:20 a.m. to 12:10 p.m.

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Practice5-1: Query using dig

Step 1: Type the following in the command line:

```
dig www.sina.com.cn +trace
```

This is the screenshot of the output in the command line:

```
命令提示符
Microsoft Windows [版本 10.0.19042.1586]
(c) Microsoft Corporation. 保留所有权利。

C:\Users\16011>dig www.sina.com.cn +trace

; <<>> DiG 9.16.27 <<>> www.sina.com.cn +trace
;; global options: +cmd

214331 IN NS k.root-servers.net.
214331 IN NS l.root-servers.net.
214331 IN NS m.root-servers.net.
214331 IN NS b.root-servers.net.
214331 IN NS f.root-servers.net.
214331 IN NS e.root-servers.net.
214331 IN NS a.root-servers.net.
214331 IN NS d.root-servers.net.
214331 IN NS i.root-servers.net.
214331 IN NS g.root-servers.net.
214331 IN NS j.root-servers.net.
214331 IN NS h.root-servers.net.
214331 IN NS c.root-servers.net.
;; Received 795 bytes from 172.18.1.92#53(172.18.1.92) in 2 ms

cn. 172800 IN NS a.dns.cn.
cn. 172800 IN NS b.dns.cn.
cn. 172800 IN NS c.dns.cn.
cn. 172800 IN NS d.dns.cn.
cn. 172800 IN NS e.dns.cn.
cn. 172800 IN NS f.dns.cn.
cn. 172800 IN NS g.dns.cn.
cn. 172800 IN NS ns.cernet.net.
cn. 86400 IN DS 57724 8 2 5D0423633EB24A499BE78AA22D1C0C9BA36218FF49FD95A4CDF1A4AD 97C67
044
cn. 86400 IN RRSIG DS 8 1 86400 20220402050000 20220320040000 9799 . Wx7k3SCdiEK7/t6asJy9ay
yWNdtzCidRSgz9vjRHdL3IPqqHF/MQUt4b QnwX+jqNkhh1IPh9t0lnZaXBzsV6zPsFLnUnw6RT41VNph9NpTxmWvJh 18qoWX0gQydmMtgYzmoDNPu00ZRS
XhDpnu3FHRmegFJrkgucQu5IGGL1 7UHEQris84tWzUq3vVnT0YfqZksKtzWTcj4pxoRsKhjL+dqzE5Y/8Hsu ui84UbHqqwYobumNmW18iNovqFq9+fcMt+
rvkwC8Mk/UWVwb12dt7non GL6Bxy9jfABK4WdqXMDVAT+eqX2QA2BrjuczxlQwiEPglgdXuq7bwgd 0allzg==
;; Received 706 bytes from 198.97.190.53#53(h.root-servers.net) in 47 ms

sina.com.cn. 86400 IN NS ns1.sina.com.cn.
sina.com.cn. 86400 IN NS ns3.sina.com.cn.
sina.com.cn. 86400 IN NS ns2.sina.com.cn.
sina.com.cn. 86400 IN NS ns4.sina.com.cn.
GICE14DNTMDN31G43AUGVRKTKALVB8QC.com.cn. 21600 IN NSEC3 1 1 10 AEF123AB GKM1KHVFSNSLUTJUBF7JHHPG9F17BRFQ NS SOA RRSIG DN
SKEY NSEC3PARAM
GICE14DNTMDN31G43AUGVRKTKALVB8QC.com.cn. 21600 IN RRSIG NSEC3 8 3 21600 20220417034110 20220318030209 43326 com.cn. X0h4
AXtaeFefLntmfGhhnFVgnaPSYTuAxFRHUCS1UwvBfGbStmoMtm/w o/0JR5zaJks4zLVf+SUjkRww+Vt21rxl100czRcEjZzebNzTzjYxoPgT sbKuYFmPS1
knbrB4cPE4S3C6PKv+PIvsUwLqhsfVJ6GAHE4CpY2y1F37 Feo=
TDU124P7EGELLSS91RPV7H8S4DKOE2EH.com.cn. 21600 IN NSEC3 1 1 10 AEF123AB TS03D75GS4P652A8AG1BKC9U219DATCJ NS DS RRSIG
TDU124P7EGELLSS91RPV7H8S4DKOE2EH.com.cn. 21600 IN RRSIG NSEC3 8 3 21600 20220401214459 20220302204459 43326 com.cn. sEqH
gSaMyDW+ecI/B18rCBmkpqH16AS5ifzLCG+OCgA/OLKzdRwm8e+y Pm5F0CNe1CkSJyhOPQLTLz7QV+ZB006+DiusugcA+rrluwv6+dqTMmew aUEdlvWQZZ
Pkpxai0Mzzd3BLjJPbs+SuuJRitBZnukGtcVKHs7QglBFw 6B0=
;; Received 679 bytes from 203.119.28.1#53(d.dns.cn) in 53 ms

www.sina.com.cn. 60 IN CNAME spool.grid.sinaedge.com.
;; Received 81 bytes from 36.51.252.8#53(ns1.sina.com.cn) in 56 ms

C:\Users\16011>
```

Step 2: Packet Analysis

- RD and RA field in the query:

```

> Frame 5585: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface \Device\NPF_{89B...
Ethernet II, Src: IntelCor_ed:ef:59 (04:33:c2:ed:ef:59), Dst: JuniperN_d0:83:c1 (3c:8c:93:d0:83:c1)
  > Destination: JuniperN_d0:83:c1 (3c:8c:93:d0:83:c1)
  > Source: IntelCor_ed:ef:59 (04:33:c2:ed:ef:59)
  Type: IPv4 (0x0800)
> Internet Protocol Version 4, Src: 10.26.128.169, Dst: 192.112.36.4
> User Datagram Protocol, Src Port: 60343, Dst Port: 53
▼ Domain Name System (query)
  Transaction ID: 0x2483
  ▼ Flags: 0x0020 Standard query
    0... .. = Response: Message is a query
    .000 0... .. = Opcode: Standard query (0)
    .... ..0. .... = Truncated: Message is not truncated
    .... ..0 .... = Recursion desired: Don't do query recursively
    .... ..0.. .... = Z: reserved (0)
    .... ....1. .... = AD bit: Set
    .... ....0 .... = Non-authenticated data: Unacceptable

```

0000	00111100	10001100	10010011	11010000	10000011	11000001	00000100	00110011	<.....3
0008	11000010	11101101	11101111	01011001	00001000	00000000	01000101	00000000	...Y..E.
0010	00000000	01010100	01111010	01110000	00000000	00000000	10000000	00010001	·Tzp...
0018	00000000	00000000	00001010	00011010	10000000	10101001	11000000	01110000p
0020	00100100	00000100	11101011	10110111	00000000	00110101	00000000	01000000	\$...5.@
0028	01101111	10001001	00100100	10000011	00000000	00100000	00000000	00000001	o·\$·...
0030	00000000	00000000	00000000	00000000	00000000	00000001	00000011	01110111w
0038	01110111	01110111	00000100	01110011	01101001	01101110	01100001	00000011	ww·sina·
0040	01100011	01101111	01101101	00000010	01100011	01101110	00000000	00000000	com·cn·
0048	00000001	00000000	00000001	00000000	00000000	00101001	00010000	00000000)
0050	00000000	00000000	10000000	00000000	00000000	00001100	00000000	00001010
0058	00000000	00001000	00101101	10110101	01001000	01110001	01001011	01110110	...HqKv
0060	00011011	01000011							·C

RD RA

We can see the RD field is 1 bit 0 and RA field is 1 bit 0.

- Queries from localhost

First use `ipconfig` to get the ip of localhost:

C:\Users\16011>ipconfig

Windows IP 配置

以太网适配器 vEthernet (Default Switch):

```

连接特定的 DNS 后缀 . . . . . :
本地链接 IPv6 地址. . . . . : fe80::3d30:275c:3aae:436d%46
IPv4 地址 . . . . . : 172.24.240.1
子网掩码 . . . . . : 255.255.240.0
默认网关. . . . . :

```

无线局域网适配器 本地连接* 1:

```

媒体状态 . . . . . : 媒体已断开连接
连接特定的 DNS 后缀 . . . . . :

```

无线局域网适配器 本地连接* 2:

```

媒体状态 . . . . . : 媒体已断开连接
连接特定的 DNS 后缀 . . . . . :

```

以太网适配器 VMware Network Adapter VMnet1:

```

连接特定的 DNS 后缀 . . . . . :
本地链接 IPv6 地址. . . . . : fe80::9575:7e62:2599:a532%11
IPv4 地址 . . . . . : 192.168.47.1
子网掩码 . . . . . : 255.255.255.0
默认网关. . . . . :

```

以太网适配器 VMware Network Adapter VMnet8:

```

连接特定的 DNS 后缀 . . . . . :
本地链接 IPv6 地址. . . . . : fe80::21f1:1f6:b9b2:89dd%14
IPv4 地址 . . . . . : 192.168.163.1
子网掩码 . . . . . : 255.255.255.0
默认网关. . . . . :

```

无线局域网适配器 WLAN:

```

连接特定的 DNS 后缀 . . . . . : sustech.edu.cn
IPv6 地址 . . . . . : 2001:da8:201d:1109::10ab
本地链接 IPv6 地址. . . . . : fe80::61ab:db20:c5c7:ab0%15
IPv4 地址 . . . . . : 10.26.128.169
子网掩码 . . . . . : 255.252.0.0
默认网关. . . . . : fe80::3e8c:93ff:fed0:83c1%15
                        10.27.255.254

```

以太网适配器 蓝牙网络连接:

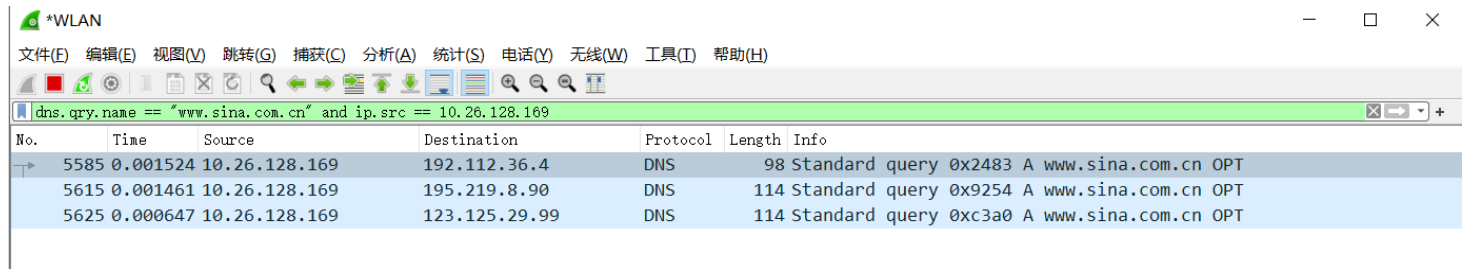
```

媒体状态 . . . . . : 媒体已断开连接
连接特定的 DNS 后缀 . . . . . :

```

C:\Users\16011>

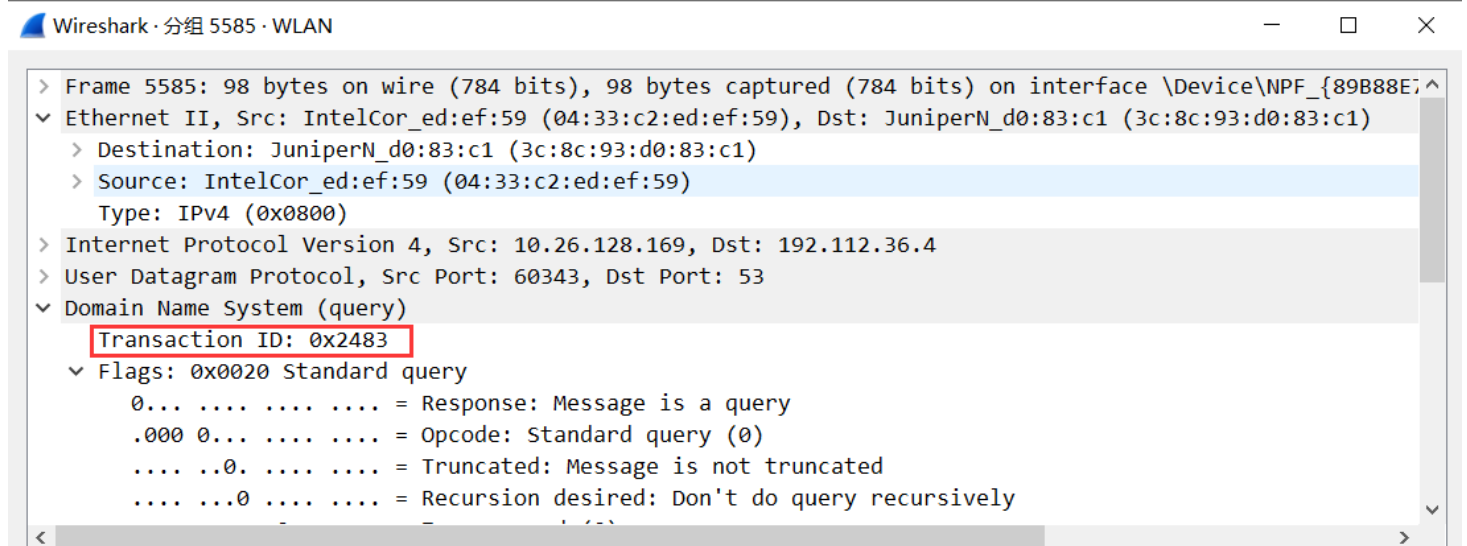
Then use wireshark to collect those data from localhost and to `www.sina.com.cn` . There are 3 queries:



Wireshark packet capture window titled '*WLAN'. The filter bar shows 'dns.qry.name == "www.sina.com.cn" and ip.src == 10.26.128.169'. The packet list shows three DNS standard queries. The packet details pane is empty.

No.	Time	Source	Destination	Protocol	Length	Info
5585	0.001524	10.26.128.169	192.112.36.4	DNS	98	Standard query 0x2483 A www.sina.com.cn OPT
5615	0.001461	10.26.128.169	195.219.8.90	DNS	114	Standard query 0x9254 A www.sina.com.cn OPT
5625	0.000647	10.26.128.169	123.125.29.99	DNS	114	Standard query 0xc3a0 A www.sina.com.cn OPT

Look at their transaction id :



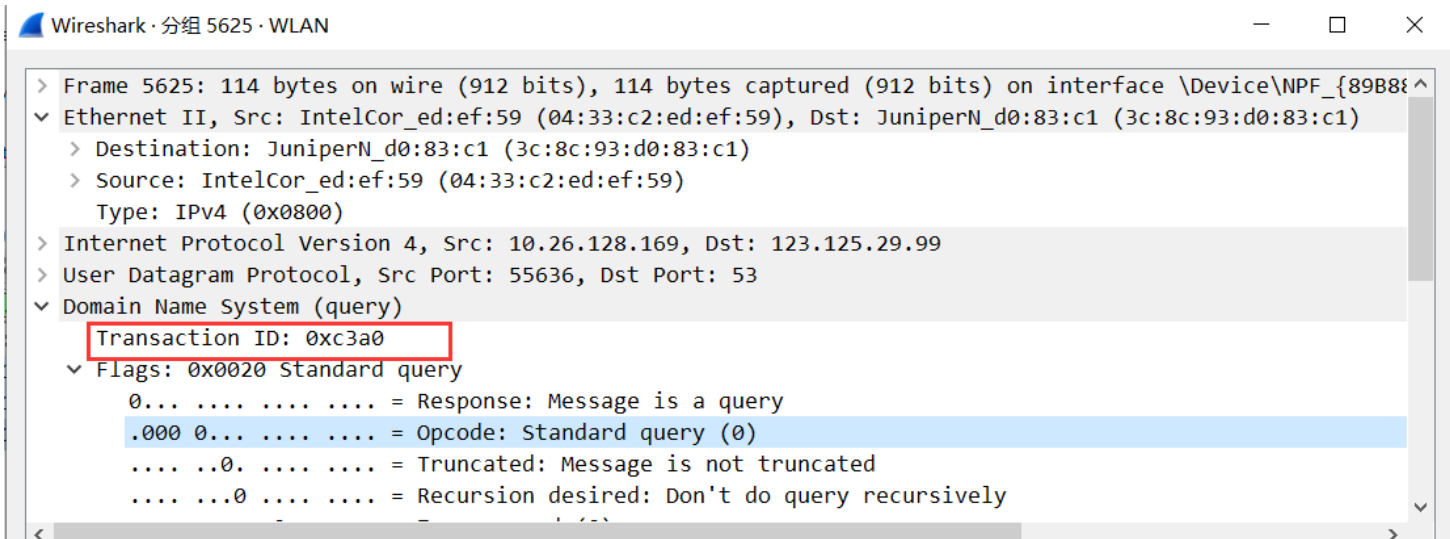
Wireshark packet details for frame 5585. The packet is a DNS standard query with Transaction ID 0x2483. The details pane shows the following information:

- Frame 5585: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface \Device\NPF_{89B88E7...}
- Ethernet II, Src: IntelCor_ed:ef:59 (04:33:c2:ed:ef:59), Dst: JuniperN_d0:83:c1 (3c:8c:93:d0:83:c1)
 - Destination: JuniperN_d0:83:c1 (3c:8c:93:d0:83:c1)
 - Source: IntelCor_ed:ef:59 (04:33:c2:ed:ef:59)
 - Type: IPv4 (0x0800)
- Internet Protocol Version 4, Src: 10.26.128.169, Dst: 192.112.36.4
- User Datagram Protocol, Src Port: 60343, Dst Port: 53
- Domain Name System (query)
 - Transaction ID: 0x2483
 - Flags: 0x0020 Standard query
 - 0... .. = Response: Message is a query
 - .000 0... .. = Opcode: Standard query (0)
 -0. = Truncated: Message is not truncated
 -0 = Recursion desired: Don't do query recursively



Wireshark packet details for frame 5615. The packet is a DNS standard query with Transaction ID 0x9254. The details pane shows the following information:

- Frame 5615: 114 bytes on wire (912 bits), 114 bytes captured (912 bits) on interface \Device\NPF_{89B88E7...}
- Ethernet II, Src: IntelCor_ed:ef:59 (04:33:c2:ed:ef:59), Dst: JuniperN_d0:83:c1 (3c:8c:93:d0:83:c1)
 - Destination: JuniperN_d0:83:c1 (3c:8c:93:d0:83:c1)
 - Source: IntelCor_ed:ef:59 (04:33:c2:ed:ef:59)
 - Type: IPv4 (0x0800)
- Internet Protocol Version 4, Src: 10.26.128.169, Dst: 195.219.8.90
- User Datagram Protocol, Src Port: 60507, Dst Port: 53
- Domain Name System (query)
 - Transaction ID: 0x9254
 - Flags: 0x0020 Standard query
 - 0... .. = Response: Message is a query
 - .000 0... .. = Opcode: Standard query (0)
 -0. = Truncated: Message is not truncated
 -0 = Recursion desired: Don't do query recursively



Their transaction ids are: 0x2483, 0x9254, 0xc3a0. So they do not share the same transaction id.

- Last Response

Considering the last line of the trace result:

*WLAN

文件(F) 编辑(E) 视图(V) 跳转(G) 捕获(C) 分析(A) 统计(S) 电话(Y) 无线(W) 工具(T) 帮助(H)

dns.qry.name == "www.sina.com.cn"

No.	Time	Source	Destination	Protocol	Length	Info
1169	0.002003	2001:da8:201d:1109:...	c.root-servers.net	DNS	118	Standard query 0xe377 A www.sina.com.cn OPT
1170	0.058535	c.root-servers.net	2001:da8:201d:1109:...	DNS	796	Standard query response 0xe377 A www.sina.com.cn NS b.dns.cn N...
1201	0.001593	10.26.128.169	f.dns.cn	DNS	114	Standard query 0x28fd A www.sina.com.cn OPT
1202	0.199600	f.dns.cn	10.26.128.169	DNS	721	Standard query response 0x28fd A www.sina.com.cn NS ns1.sina.c...
1211	0.000705	10.26.128.169	ns1.sina.com.cn	DNS	114	Standard query 0x2e63 A www.sina.com.cn OPT
1212	0.049729	ns1.sina.com.cn	10.26.128.169	DNS	123	Standard query response 0x2e63 A www.sina.com.cn CNAME spool.g...

*WLAN

文件(F) 编辑(E) 视图(V) 跳转(G) 捕获(C) 分析(A) 统计(S) 电话(Y) 无线(W) 工具(T) 帮助(H)

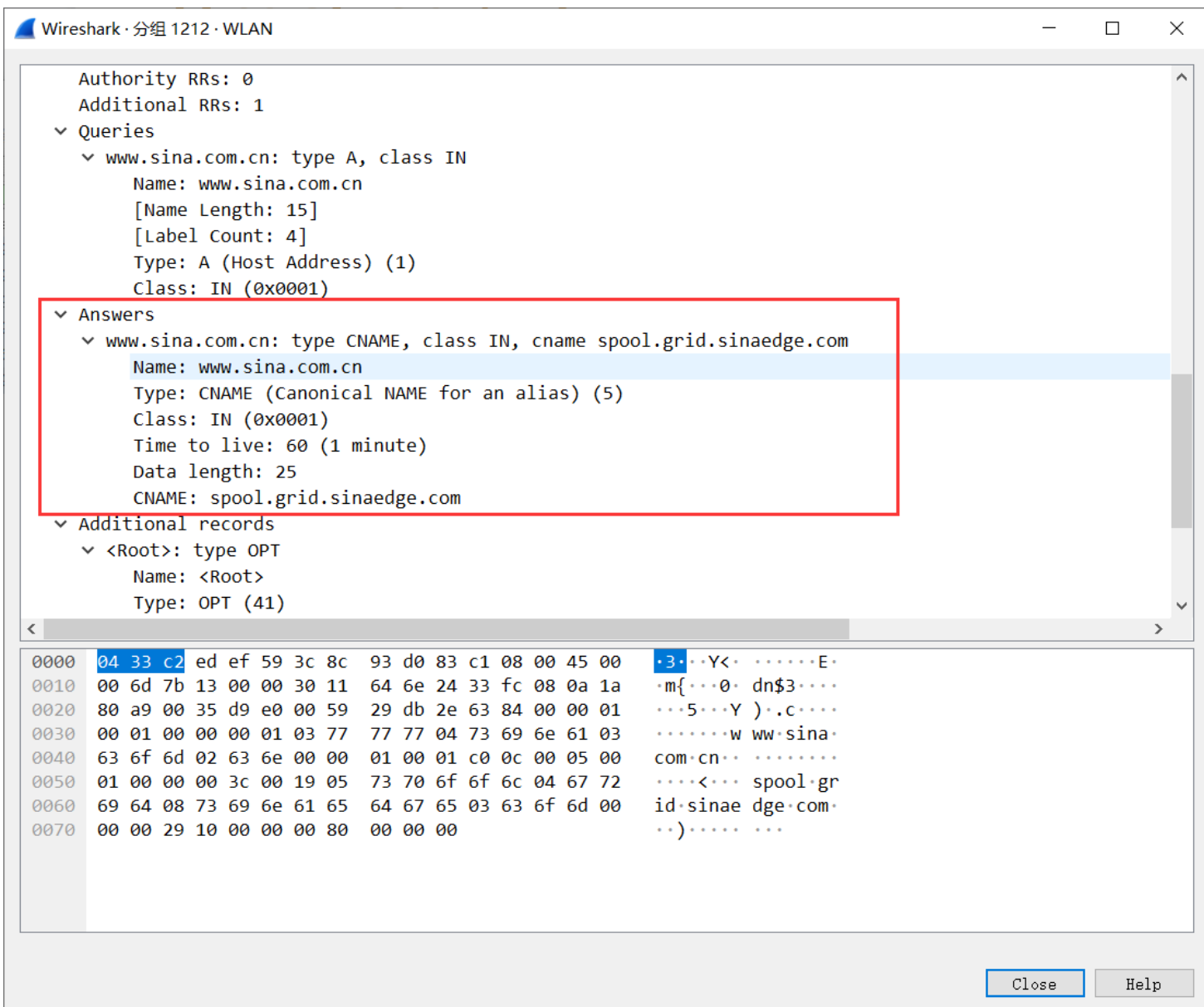
dns.qry.name == "www.sina.com.cn"

No.	Time	Source	Destination	Protocol	Length	Info
1169	0.002003	2001:da8:201d:1109:...	2001:500:2::c	DNS	118	Standard query 0xe377 A www.sina.com.cn OPT
1170	0.058535	2001:500:2::c	2001:da8:201d:1109:...	DNS	796	Standard query response 0xe377 A www.sina.com.cn NS b.dns.cn N...
1201	0.001593	10.26.128.169	195.219.8.90	DNS	114	Standard query 0x28fd A www.sina.com.cn OPT
1202	0.199600	195.219.8.90	10.26.128.169	DNS	721	Standard query response 0x28fd A www.sina.com.cn NS ns1.sina.c...
1211	0.000705	10.26.128.169	36.51.252.8	DNS	114	Standard query 0x2e63 A www.sina.com.cn OPT
1212	0.049729	36.51.252.8	10.26.128.169	DNS	123	Standard query response 0x2e63 A www.sina.com.cn CNAME spool.g...

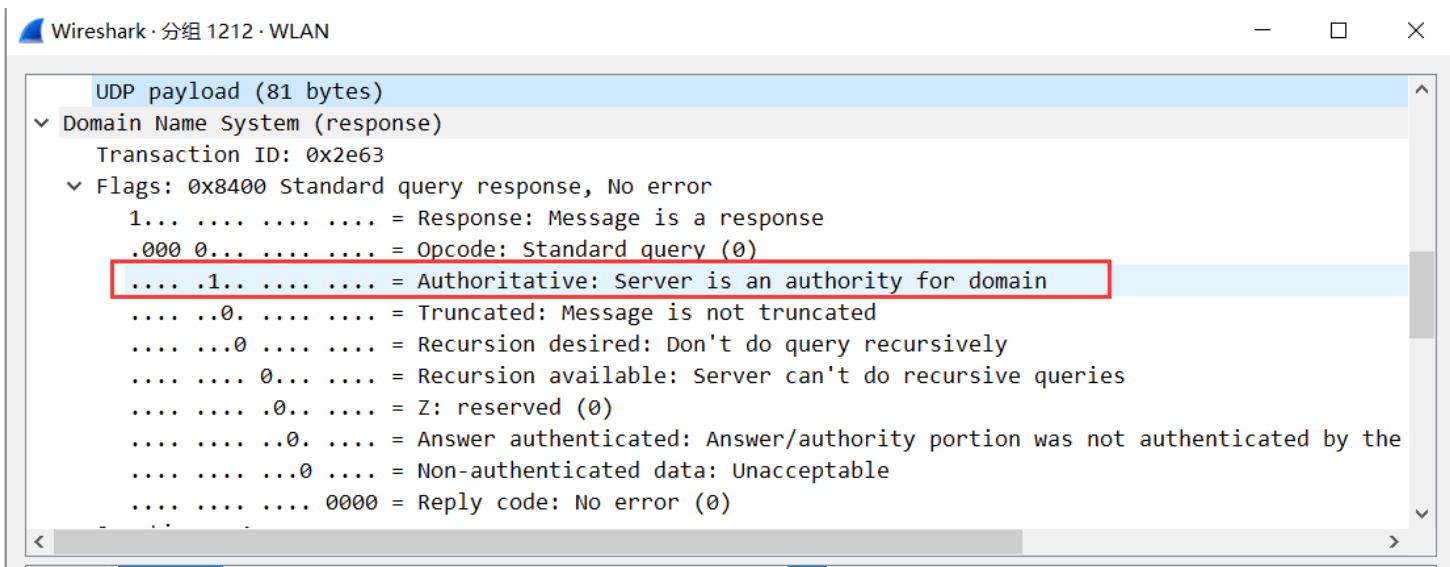
```
www.sina.com.cn.        60      IN      CNAME   spool.grid.sinaedge.com.
;; Received 81 bytes from 36.51.252.8#53(ns1.sina.com.cn) in 50 ms
```

We can see the name is ns1.sina.com.cn , source ip is 36.51.252.8 and port number is 53 .

There is one answer in the response:



And the value of AA is 1:



- Try again for the Same Query

*WLAN

文件(E) 编辑(E) 视图(V) 跳转(G) 捕获(C) 分析(A) 统计(S) 电话(Y) 无线(W) 工具(I) 帮助(H)

dns.qry.name == "www.sina.com.cn"

No.	Time	Source	Destination	Protocol	Length	Info
1169	0.002003	2001:da8:201d:1109:...	2001:500:2::c	DNS	118	Standard query 0xe377 A www.sina.com.cn OPT
1170	0.058535	2001:500:2::c	2001:da8:201d:1109:...	DNS	796	Standard query response 0xe377 A www.sina.com.cn NS b.dns.cn N...
1201	0.001593	10.26.128.169	195.219.8.90	DNS	114	Standard query 0x28fd A www.sina.com.cn OPT
1202	0.199600	195.219.8.90	10.26.128.169	DNS	721	Standard query response 0x28fd A www.sina.com.cn NS ns1.sina.c...
1211	0.000705	10.26.128.169	36.51.252.8	DNS	114	Standard query 0x2e63 A www.sina.com.cn OPT
1212	0.049729	36.51.252.8	10.26.128.169	DNS	123	Standard query response 0x2e63 A www.sina.com.cn CNAME spool.g...
10013	0.000987	10.26.128.169	193.0.14.129	DNS	98	Standard query 0x10db A www.sina.com.cn OPT
10014	0.089569	193.0.14.129	10.26.128.169	DNS	748	Standard query response 0x10db A www.sina.com.cn NS a.dns.cn N...
10043	0.001940	10.26.128.169	195.219.8.90	DNS	98	Standard query 0x0c4e A www.sina.com.cn OPT
10044	0.197558	195.219.8.90	10.26.128.169	DNS	721	Standard query response 0x0c4e A www.sina.com.cn NS ns1.sina.c...
10053	0.001203	10.26.128.169	121.14.1.22	DNS	98	Standard query 0x3382 A www.sina.com.cn OPT
10054	0.016969	121.14.1.22	10.26.128.169	DNS	123	Standard query response 0x3382 A www.sina.com.cn CNAME spool.g...

We can see the source ip address is not identical as previous, so they are different servers.

This can bring benefits for providing diverted ip address accessing.

Practice5-2: EDNS Query

Step 1: Send Query

Type the following in the command line:

```
dig www.bilibili.com +edns
```

Here are the running result in the command line:


```
命令提示符
C:\Users\16011>dig www.bilibili.com +edns

;<<>> DiG 9.16.27 <<>> www.bilibili.com +edns
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 38376
;; flags: qr rd ra; QUERY: 1, ANSWER: 7, AUTHORITY: 2, ADDITIONAL: 17

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;www.bilibili.com.                IN      A

;; ANSWER SECTION:
www.bilibili.com.      15      IN      CNAME   g.w.bilicdn1.com.
g.w.bilicdn1.com.     339     IN      A       8.134.64.214
g.w.bilicdn1.com.     339     IN      A       139.159.241.37
g.w.bilicdn1.com.     339     IN      A       139.159.246.60
g.w.bilicdn1.com.     339     IN      A       8.134.50.24
g.w.bilicdn1.com.     339     IN      A       139.159.252.156
g.w.bilicdn1.com.     339     IN      A       8.134.32.222

;; AUTHORITY SECTION:
bilicdn1.com.          25594   IN      NS       ns3.dnsv5.com.
bilicdn1.com.          25594   IN      NS       ns4.dnsv5.com.

;; ADDITIONAL SECTION:
ns4.dnsv5.com.         48601   IN      A       162.14.25.248
ns4.dnsv5.com.         48601   IN      A       183.192.164.119
```

Step 2: Analyze the Packets

Query Message

- Destination IP Address and Port

No.	Time	Source	Destination	Protocol	Length	Info
33570	0.005436	10.26.128.169	172.18.1.92	DNS	76	Standard query 0xf802 A www.bilibili.c
33571	0.000253	10.26.128.169	172.18.1.92	DNS	76	Standard query 0xc854 AAAA www.bilibil
33572	0.003009	172.18.1.92	10.26.128.169	DNS	521	Standard query response 0xf802 A www.b
33573	0.000912	172.18.1.92	10.26.128.169	DNS	176	Standard query response 0xc854 AAAA ww
1193...	0.032553	10.26.128.169	172.18.1.92	DNS	99	Standard query 0x95e8 A www.bilibili.c
1193...	0.017474	172.18.1.92	10.26.128.169	DNS	532	Standard query response 0x95e8 A www.b

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Header Checksum: 0x0000 [validation disabled]
 [Header checksum status: Unverified]
 Source Address: 10.26.128.169
 Destination Address: 172.18.1.92

▼ User Datagram Protocol, Src Port: 53884, Dst Port: 53
 Source Port: 53884
 Destination Port: 53
 Length: 42
 Checksum: 0x386d [unverified]
 [Checksum Status: Unverified]
 [Stream index: 1038]
 > [Timestamps]
 UDP payload (34 bytes)

▼ Domain Name System (query)
 Transaction ID: 0xf802

Destination IP Address is 172.18.1.92 and Port is 53 .

- Name, Type and Class

▼ Queries

▼ www.bilibili.com: type A, class IN

Name: www.bilibili.com
 [Name Length: 16]
 [Label Count: 3]
 Type: A (Host Address) (1)
 Class: IN (0x0001)

Name is www.bilibili.com , Type is A (Host Address) and Class is IN (0x0001) .

- Opcode

▼ Flags: 0x0100 Standard query

```
0... .. = Response: Message is a query
.000 0... .. = Opcode: Standard query (0)
.... ..0. .... = Truncated: Message is not truncated
.... ...1 .... = Recursion desired: Do query recursively
.... ....0... .. = Z: reserved (0)
.... ....0 .... = Non-authenticated data: Unacceptable
```

The opcode is 0000, indicating it is a standard query.

- Additional RRs

Wireshark · 分组 33570 · WLAN

Destination Port: 53
Length: 42
Checksum: 0x386d [unverified]
[Checksum Status: Unverified]
[Stream index: 1038]
> [Timestamps]
UDP payload (34 bytes)

▼ Domain Name System (query)
Transaction ID: 0xf802

▼ Flags: 0x0100 Standard query

```
0... .. = Response: Message is a query
.000 0... .. = Opcode: Standard query (0)
.... ..0. .... = Truncated: Message is not truncated
.... ...1 .... = Recursion desired: Do query recursively
.... ....0... .. = Z: reserved (0)
.... ....0 .... = Non-authenticated data: Unacceptable
```

Questions: 1
Answer RRs: 0
Authority RRs: 0
Additional RRs: 0

▼ Queries

▼ www.bilibili.com: type A, class IN

Name: www.bilibili.com
[Name Length: 16]
[Label Count: 3]
Type: A (Host Address) (1)
Class: IN (0x0001)
[\[Response In: 33572\]](#)

0020 01 5c d2 7c 00 35 00 2a 38 6d f8 02 01 00 00 01 ·\·|·5·* 8m·...
0030 00 00 00 00 00 00 03 77 77 77 08 62 69 6c 69 62w ww·bilib
0040 69 6c 69 03 63 6f 6d 00 00 01 00 01 ili·com·

Close Help

There is no additional RRs.

Response Message

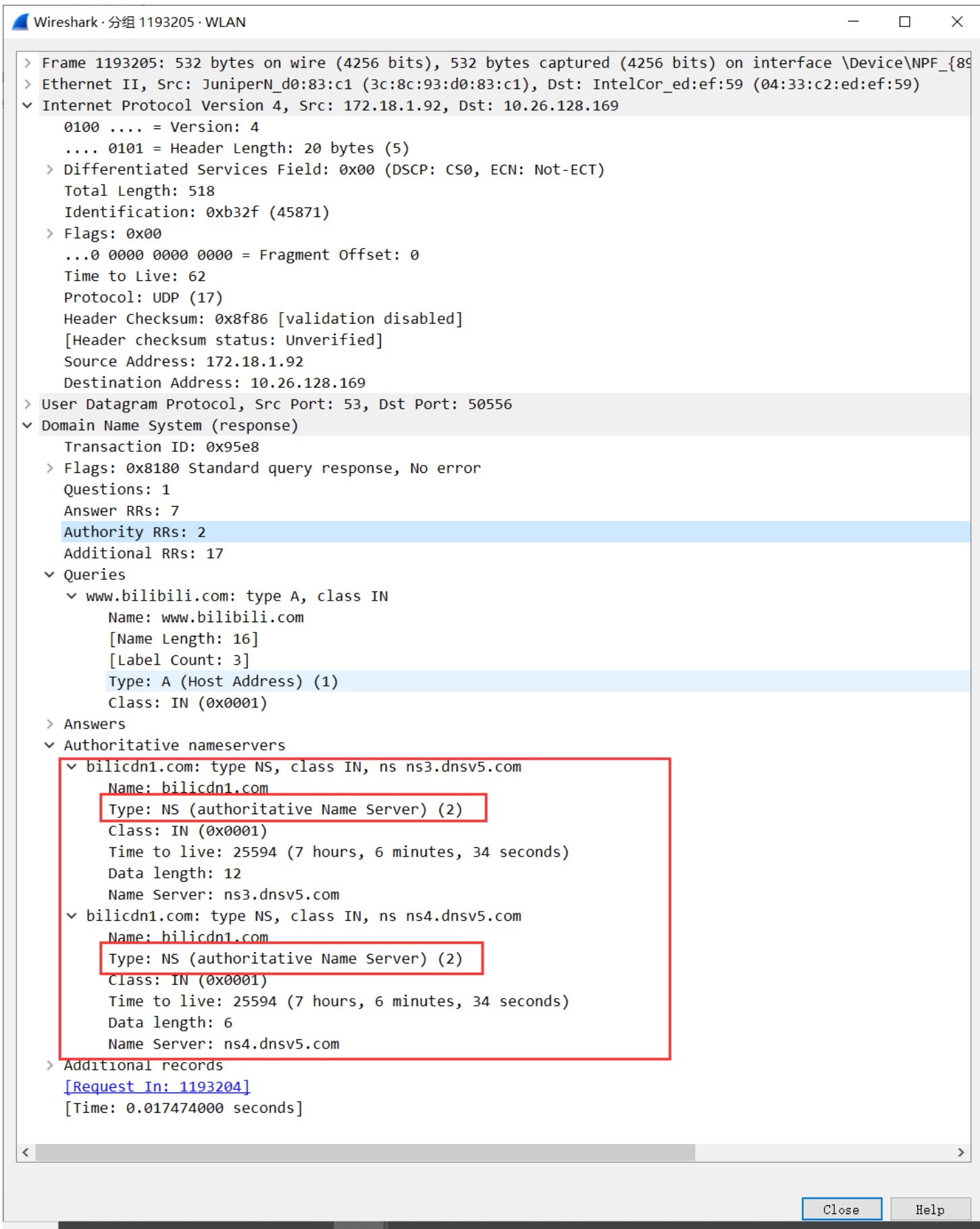
- Answers and TTLs

There are multiple answers, and their TTLs are shown in the following screenshots.

▼ Answers

- ▼ www.bilibili.com: type CNAME, class IN, cname g.w.bilicdn1.com
 - Name: www.bilibili.com
 - Type: CNAME (Canonical NAME for an alias) (5)
 - Class: IN (0x0001)
 - Time to live: 15 (15 seconds)
 - Data length: 15
 - CNAME: g.w.bilicdn1.com
- ▼ g.w.bilicdn1.com: type A, class IN, addr 8.134.64.214
 - Name: g.w.bilicdn1.com
 - Type: A (Host Address) (1)
 - Class: IN (0x0001)
 - Time to live: 339 (5 minutes, 39 seconds)
 - Data length: 4
 - Address: 8.134.64.214
- ▼ g.w.bilicdn1.com: type A, class IN, addr 139.159.241.37
 - Name: g.w.bilicdn1.com
 - Type: A (Host Address) (1)
 - Class: IN (0x0001)
 - Time to live: 339 (5 minutes, 39 seconds)
 - Data length: 4
 - Address: 139.159.241.37
- ▼ g.w.bilicdn1.com: type A, class IN, addr 139.159.246.60
 - Name: g.w.bilicdn1.com
 - Type: A (Host Address) (1)
 - Class: IN (0x0001)
 - Time to live: 339 (5 minutes, 39 seconds)
 - Data length: 4
 - Address: 139.159.246.60
- ▼ g.w.bilicdn1.com: type A, class IN, addr 8.134.50.24
 - Name: g.w.bilicdn1.com
 - Type: A (Host Address) (1)
 - Class: IN (0x0001)
 - Time to live: 339 (5 minutes, 39 seconds)
 - Data length: 4
 - Address: 8.134.50.24
- ▼ g.w.bilicdn1.com: type A, class IN, addr 139.159.252.156
 - Name: g.w.bilicdn1.com
 - Type: A (Host Address) (1)
 - Class: IN (0x0001)
 - Time to live: 339 (5 minutes, 39 seconds)
 - Data length: 4
 - Address: 139.159.252.156
- ▼ g.w.bilicdn1.com: type A, class IN, addr 8.134.32.222
 - Name: g.w.bilicdn1.com
 - Type: A (Host Address) (1)
 - Class: IN (0x0001)
 - Time to live: 339 (5 minutes, 39 seconds)
 - Data length: 4
 - Address: 8.134.32.222

- Authority RRs



There are 2 authority RRs. Their type is NS (authoritative Name Server) (2) .

Practice5-3: DNS Client Implementation

Source code:

```
import dns.resolver
import sys

domain = sys.argv[1]
queryType = sys.argv[2]

try:
    q = dns.resolver.resolve(qname=domain, rdtype=queryType, raise_on_no_answer=False)
    # print(q.rrset)
    # print(q.qname)
    # print(q.rdtype)
    # print(q.rdclass)
    print('Answer:', q.response)
    print()
    print('Who send the server?', q.nameserver)
    print()
    print('Port Number?', q.port)
    print()
    print('Is from authority name server?', 'AUTHORITY' in str(q.response))
    #print(q.port)
    #print(q.canonical_name)
except dns.resolver.NoAnswer as na:
    print('This request contains no content')
```

And the following screenshots shows the running results with different parameters:

- www.sina.com.cn A


```
D:\PycharmProjects\CS305\venv\Scripts\python.exe D:/PycharmProjects/CS305/DNSClient.py www.sina.com.cn A
What's the Answer? id 50881
opcode QUERY
rcode NOERROR
flags QR RD RA
;QUESTION
www.sina.com.cn. IN A
;ANSWER
www.sina.com.cn. 355 IN CNAME spool.grid.sinaedge.com.
spool.grid.sinaedge.com. 330 IN A 183.60.95.201
;AUTHORITY
sinaedge.com. 40101 IN NS ns4.sinaedge.com.
sinaedge.com. 40101 IN NS ns1.sinaedge.com.
sinaedge.com. 40101 IN NS ns3.sinaedge.com.
sinaedge.com. 40101 IN NS ns6.sinaedge.com.
sinaedge.com. 40101 IN NS ns2.sinaedge.com.
sinaedge.com. 40101 IN NS ns5.sinaedge.com.
;ADDITIONAL
ns5.sinaedge.com. 171868 IN A 123.125.29.251
ns6.sinaedge.com. 168522 IN A 36.51.254.87

Who send the server? 172.18.1.92

Port Number? 53

Is from authority name server? True

Process finished with exit code 0
```

- www.sina.com.cn AAAA

```
D:\PycharmProjects\CS305\venv\Scripts\python.exe D:/PycharmProjects/CS305/DNSClient.py www.sina.com.cn AAAA
What's the Answer? id 60463
opcode QUERY
rcode NOERROR
flags QR RD RA
;QUESTION
www.sina.com.cn. IN AAAA
;ANSWER
www.sina.com.cn. 232 IN CNAME spool.grid.sinaedge.com.
;AUTHORITY
sinaedge.com. 30 IN SOA ns1.sinaedge.com. null.sinaedge.com. 20100707 10800 60 604800 60
;ADDITIONAL

Who send the server? 172.18.1.92

Port Number? 53

Is from authority name server? True

Process finished with exit code 0
```

- www.sina.com.cn CNAME

What's the Answer? id 48679

opcode QUERY

rcode NOERROR

flags QR RD RA

;QUESTION

www.sina.com.cn. IN CNAME

;ANSWER

www.sina.com.cn. 174 IN CNAME spool.grid.sinaedge.com.

;AUTHORITY

sina.com.cn. 39485 IN NS ns1.sina.com.cn.

sina.com.cn. 39485 IN NS ns2.sina.com.cn.

sina.com.cn. 39485 IN NS ns4.sina.com.cn.

sina.com.cn. 39485 IN NS ns3.sina.com.cn.

;ADDITIONAL

ns4.sina.com.cn. 30252 IN A 121.14.1.22

ns2.sina.com.cn. 38630 IN A 180.149.138.199

ns1.sina.com.cn. 64434 IN A 36.51.252.8

ns3.sina.com.cn. 3592 IN A 123.125.29.99

Who send the server? 172.18.1.92

Port Number? 53

Is from authority name server? True

Process finished with exit code 0

- www.sina.com.cn NS

What's the Answer? id 4850

opcode QUERY

rcode NOERROR

flags QR RD RA

;QUESTION

www.sina.com.cn. IN NS

;ANSWER

www.sina.com.cn. 132 IN CNAME spool.grid.sinaedge.com.

;AUTHORITY

sinaedge.com. 1 IN SOA ns1.sinaedge.com. null.sinaedge.com. 20100707 10800 60 604800 60

;ADDITIONAL

Who send the server? 172.18.1.92

Port Number? 53

Is from authority name server? True

Process finished with exit code 0

- www.sina.com.cn MX

What's the Answer? id 37472

opcode QUERY

rcode NOERROR

flags QR RD RA

;QUESTION

www.sina.com.cn. IN MX

;ANSWER

www.sina.com.cn. 107 IN CNAME spool.grid.sinaedge.com.

;AUTHORITY

sinaedge.com. 1 IN SOA ns1.sinaedge.com. null.sinaedge.com. 20100707 10800 60 604800 60

;ADDITIONAL

Who send the server? 172.18.1.92

Port Number? 53

Is from authority name server? True

Process finished with exit code 0