

Компьютерные сети

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- 1) а) Я выбрал сайт правительства Китая:

```
(base) maybenexttime@i102559870:~$ nslookup www.gov.cn
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
www.gov.cn       canonical name = www.gov.cn.bsgslb.cn.
www.gov.cn.bsgslb.cn canonical name = zgovweb.v.bsgslb.cn.
Name:   zgovweb.v.bsgslb.cn
Address: 45.192.128.3
```

- б) Я выбрал СПбГУ:

```
(base) maybenexttime@i102559870:~$ nslookup -type=ns spbu.ru
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
spbu.ru nameserver = ns2.pu.ru.
spbu.ru nameserver = ns.pu.ru.
spbu.ru nameserver = ns7.spbu.ru.

Authoritative answers can be found from:

(base) maybenexttime@i102559870:~$
```

- в) У Оксфорда несколько ip адресов:

```
(base) maybenexttime@i102559870:~$ nslookup www.ox.ac.uk
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
Name:   www.ox.ac.uk
Address: 151.101.2.216
Name:   www.ox.ac.uk
Address: 151.101.194.216
Name:   www.ox.ac.uk
Address: 151.101.66.216
Name:   www.ox.ac.uk
Address: 151.101.130.216
```

У СПбГУ — один.

- 2) а) Вот они, отправлены протоколом DNS

5	1.124538861	2a00:1fa0:8626:bc4d...	2a00:1fa0:8626:bc4d...	DNS	92 Standard query 0x3477 A www.ietf.org
6	1.141302221	2a00:1fa0:8626:bc4d...	2a00:1fa0:8626:bc4d...	DNS	169 Standard query response 0x3477 A www.ietf.org Cl
7	1.141829892	2a00:1fa0:8626:bc4d...	2a00:1fa0:8626:bc4d...	DNS	111 Standard query 0xa452 AAAA www.ietf.org.cdn.clot
8	1.147446125	2a00:1fa0:8626:bc4d...	2a00:1fa0:8626:bc4d...	DNS	167 Standard query response 0xa452 AAAA www.ietf.org

- б) 53

- в) 2a00:1fa0:8626:bc4d. Совпадает

- г) Запрашивается запись типа Host Address, что такое ответы я не знаю

```
Queries
  www.ietf.org: type A, class IN
    Name: www.ietf.org
    [Name Length: 12]
    [Label Count: 3]
    Type: A (Host Address) (1)
    Class: IN (0x0001)
```

д) Приходит три ответа

```
Answers
  www.ietf.org: type CNAME, class IN, cname www.ietf.org.cdn.cloudflare.net
    Name: www.ietf.org
    Type: CNAME (Canonical NAME for an alias) (5)
    Class: IN (0x0001)
    Time to live: 1800 (30 minutes)
    Data length: 33
    CNAME: www.ietf.org.cdn.cloudflare.net
  www.ietf.org.cdn.cloudflare.net: type AAAA, class IN, addr 2606:4700::6810:2d63
    Name: www.ietf.org.cdn.cloudflare.net
    Type: AAAA (IPv6 Address) (28)
    Class: IN (0x0001)
    Time to live: 300 (5 minutes)
    Data length: 16
    AAAA Address: 2606:4700::6810:2d63
  www.ietf.org.cdn.cloudflare.net: type AAAA, class IN, addr 2606:4700::6810:2c63
    Name: www.ietf.org.cdn.cloudflare.net
    Type: AAAA (IPv6 Address) (28)
```

В двух из трех есть ipv6 адрес

е) Соответствует

```
57 6.099517568 2a00:1fa0:8626:bc4d... 2606:4700::6810:2c63 TCP 94 35612 → 443 [SYN]
58 6.185078538 2a00:1450:400f:80b:... 2a00:1fa0:8626:bc4d... TCP 86 [TCP ACKed unseen]
59 6.190882985 2606:4700::6810:2c63 2a00:1fa0:8626:bc4d... TCP 86 443 → 35612 [SYN]
60 6.190944279 2a00:1fa0:8626:bc4d... 2606:4700::6810:2c63 TCP 74 35612 → 443 [ACK]
61 6.191633944 2a00:1fa0:8626:bc4d... 2606:4700::6810:2c63 TLSv1.3 591 Client Hello

Frame 57: 94 bytes on wire (752 bits), 94 bytes captured (752 bits) on interface wlp59s0, id 0
Ethernet II, Src: RivetNet_c2:f7:e7 (9c:b6:d0:c2:f7:e7), Dst: 3a:f1:38:aa:72:1a (3a:f1:38:aa:72:1a)
Internet Protocol Version 6, Src: 2a00:1fa0:8626:bc4d:6c54:8bf5:7b3b:54e2, Dst: 2606:4700::6810:2c63
  0110 .... = Version: 6
  .... 0000 0000 .... = Traffic Class: 0x00 (DSCP: CS0, ECN: Not-ECT)
  .... 1101 0010 0111 0011 0110 = Flow Label: 0xd2736
  Payload Length: 40
  Next Header: TCP (6)
  Hop Limit: 254
  Source Address: 2a00:1fa0:8626:bc4d:6c54:8bf5:7b3b:54e2
  Destination Address: 2606:4700::6810:2c63
Transmission Control Protocol, Src Port: 35612, Dst Port: 443, Seq: 0, Len: 0
  Source Port: 35612
  Destination Port: 443
  [Stream index: 13]
  [TCP Segment Len: 0]
  Sequence Number: 0 (relative sequence number)
  Sequence Number (raw): 481688382
  [Next Sequence Number: 1 (relative sequence number)]
  Acknowledgment Number: 0
  Acknowledgment number (raw): 0
  Header Length: 40 bytes (10)
0000 3a f1 38 aa 72 1a 9c b6 d0 c2 f7 e7 86 dd 60 0d :.8.r.....
0010 27 36 00 28 06 fe 2a 00 1f a0 86 26 bc 4d 6c 54 '6.(.*...&.M1T
0020 8b f5 7b 3b 54 e2 26 06 47 00 00 00 00 00 00 00 ..{;T.&.G.....
0030 00 00 68 10 2c 63 8b 1c 01 bb 1c b5 fb 3e 00 00 ..h.,c.....>..
0040 00 00 a0 02 fd 20 56 24 00 00 02 04 05 a0 04 02 .....V$.....
0050 08 0a 6d 7d d1 a5 00 00 00 00 01 03 03 07 ...m}.....
```

ж) Нет, разве что стучится в analytics (может это и есть изображения)

3) а) 53, 53

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	2a00:1fa0:8626:bc4d...	2a00:1fa0:8626:bc4d...	DNS	91	Standard query 0x...
2	0.095948525	2a00:1fa0:8626:bc4d...	2a00:1fa0:8626:bc4d...	DNS	121	Standard query re...
3	0.097549506	2a00:1fa0:8626:bc4d...	2a00:1fa0:8626:bc4d...	DNS	87	Standard query 0x...
4	0.127544581	2a00:1fa0:8626:bc4d...	2a00:1fa0:8626:bc4d...	DNS	140	Standard query re...
5	0.664369813	192.168.23.194	149.154.167.41	SSL	283	Continuation Data
6	0.758979912	149.154.167.41	192.168.23.194	TCP	66	443 → 42062 [ACK]
7	2.131930497	2a02:6b8::1:24	2a00:1fa0:8626:bc4d...	TLSv1.2	117	Encrypted Alert
8	2.131930972	2a02:6b8::1:24	2a00:1fa0:8626:bc4d...	TCP	86	443 → 49380 [FIN]
9	2.131931065	2a02:6b8::1:24	2a00:1fa0:8626:bc4d...	TCP	117	[TCP Out-Of-Order]
10	2.131964940	2a00:1fa0:8626:bc4d...	2a02:6b8::1:24	TCP	86	49380 → 443 [ACK]
11	2.131997298	2a00:1fa0:8626:bc4d...	2a02:6b8::1:24	TCP	86	49380 → 443 [ACK]
12	2.668422082	192.168.23.194	3.68.61.181	TLSv1.2	120	Application Data
13	2.695261707	2a00:1fa0:8626:bc4d...	2a02:6b8:a::a	TCP	1464	58722 → 443 [ACK]
14	2.695274783	2a00:1fa0:8626:bc4d...	2a02:6b8:a::a	TLSv1.2	258	Application Data
15	2.695657012	2a00:1fa0:8626:bc4d...	2a02:6b8::1:24	TCP	86	49380 → 443 [RST]
16	2.696256840	2a00:1fa0:8626:bc4d...	2a02:6b8::1:24	TCP	94	49382 → 443 [SYN]
17	2.698530847	2a00:1fa0:8626:bc4d...	2a02:6b8:a::a	TLSv1.2	778	Application Data
18	2.745977499	3.68.61.181	192.168.23.194	TLSv1.2	122	Application Data
19	2.746010521	192.168.23.194	3.68.61.181	TCP	66	55328 → 443 [ACK]
20	2.750586686	2a02:6b8::1:24	2a00:1fa0:8626:bc4d...	TCP	94	443 → 49382 [SYN]

▶ Frame 1: 91 bytes on wire (728 bits), 91 bytes captured (728 bits) on interface wlp59s0, id 0
 ▶ Ethernet II, Src: RivetNet_c2:f7:e7 (9c:b6:d0:c2:f7:e7), Dst: 3a:f1:38:aa:72:1a (3a:f1:38:aa:72:1a)
 ▶ Internet Protocol Version 6, Src: 2a00:1fa0:8626:bc4d:6c54:8bf5:7b3b:54e2, Dst: 2a00:1fa0:8626:bc4d:6c54:8bf5:7b3b:54e2
 ▶ User Datagram Protocol, Src Port: 54195, Dst Port: 53
 ▼ Domain Name System (query)
 Transaction ID: 0x3320
 Flags: 0x0100 Standard query
 Questions: 1
 Answer RRs: 0
 Authority RRs: 0
 Additional RRs: 0
 ▼ Queries
 ▼ www.spbu.ru: type A, class IN
 Name: www.spbu.ru
 [Name Length: 11]
 [Label Count: 3]
 Type: A (Host Address) (1)
 Class: IN (0x0001)
 [Response In: 2]

- б) 2a00:1fa0:8626:bc4d. Совпадает
- в) 1 запрос с типом Host Address
- г) 2 ответа, alias и Host Address
- 4) а) 192.168.23.107, совпадает

105	1.491187125	192.168.23.194	192.168.23.107	DNS	67	Standard query 0x...
106	1.561759812	192.168.23.107	192.168.23.194	DNS	123	Standard query re...
107	2.085039123	2a02:6b8:a::a	2a00:1fa0:8626:bc4d...	TCP	86	443 → 54134 [ACK]
108	2.085067338	2a00:1fa0:8626:bc4d...	2a02:6b8:a::a	TCP	86	[TCP ACKed unseer...
109	2.902700766	2a02:6b8::1:24	2a00:1fa0:8626:bc4d...	TLSv1.2	117	Encrypted Alert
110	2.902701236	2a02:6b8::1:24	2a00:1fa0:8626:bc4d...	TCP	86	443 → 51932 [FIN]
111	2.902701331	91.105.192.100	192.168.23.194	HTTP	300	HTTP/1.1 200 OK
112	2.902741023	2a00:1fa0:8626:bc4d...	2a02:6b8::1:24	TCP	86	51932 → 443 [ACK]
113	2.904811050	192.168.23.194	91.105.192.100	HTTP	426	POST /api HTTP/1.
114	2.950292415	2a00:1fa0:8626:bc4d...	2a02:6b8::1:24	TCP	86	51932 → 443 [ACK]

▶ Frame 105: 67 bytes on wire (536 bits), 67 bytes captured (536 bits) on interface wlp59s0, id
 ▶ Ethernet II, Src: RivetNet_c2:f7:e7 (9c:b6:d0:c2:f7:e7), Dst: 3a:f1:38:aa:72:1a (3a:f1:38:aa:
 ▶ Internet Protocol Version 4, Src: 192.168.23.194, Dst: 192.168.23.107
 ▶ User Datagram Protocol, Src Port: 32885, Dst Port: 53
 ▼ Domain Name System (query)
 Transaction ID: 0xdb56
 ▶ Flags: 0x0100 Standard query
 Questions: 1
 Answer RRs: 0
 Authority RRs: 0
 Additional RRs: 0
 ▼ Queries
 ▼ spbu.ru: type NS, class IN
 Name: spbu.ru
 [Name Length: 7]
 [Label Count: 2]
 Type: NS (authoritative Name Server) (2)
 Class: IN (0x0001)
 [Response In: 106]

- б) 1 запрос, authoritative name server
- в) 3 ответа, по одному на каждый из авторитетных DNS серверов
- 5) а) 195.70.196.210, не совпадает, принадлежит ns2.ru.ru

18	2.646943860	192.168.23.194	192.168.23.107	DNS	69	Standard query 0x...
19	2.649696235	192.168.23.194	192.168.23.107	DNS	69	Standard query 0x...
20	2.805750663	192.168.23.107	192.168.23.194	DNS	85	Standard query re...
21	2.805750892	192.168.23.107	192.168.23.194	DNS	119	Standard query re...
22	2.806562987	192.168.23.194	195.70.196.210	DNS	71	Standard query 0x...
23	2.841298624	195.70.196.210	192.168.23.194	DNS	205	Standard query re...
24	2.842063954	192.168.23.194	195.70.196.210	DNS	67	Standard query 0x...
25	2.874568199	195.70.196.210	192.168.23.194	DNS	120	Standard query re...
26	3.000182562	2a00:1fa0:8626:bc4d...	2a02:6b8::1:24	TCP	86	52370 → 443 [RST]
27	3.003353996	2a00:1fa0:8626:bc4d...	2a02:6b8::1:24	TCP	94	52372 → 443 [SYN]
28	3.055525151	2a02:6b8::1:24	2a00:1fa0:8626:bc4d...	TCP	94	443 → 52372 [SYN]

▶ Frame 1: 315 bytes on wire (2520 bits), 315 bytes captured (2520 bits) on interface wlp59s0, :
 ▶ Ethernet II, Src: RivetNet_c2:f7:e7 (9c:b6:d0:c2:f7:e7), Dst: 3a:f1:38:aa:72:1a (3a:f1:38:aa:
 ▶ Internet Protocol Version 4, Src: 192.168.23.194, Dst: 149.154.167.41
 ▼ Transmission Control Protocol, Src Port: 42062, Dst Port: 443, Seq: 1, Ack: 1, Len: 249
 Source Port: 42062
 Destination Port: 443
 [Stream index: 0]
 [TCP Segment Len: 249]
 Sequence Number: 1 (relative sequence number)
 Sequence Number (raw): 3622492408
 [Next Sequence Number: 250 (relative sequence number)]
 Acknowledgment Number: 1 (relative ack number)
 Acknowledgment number (raw): 1827614999
 1000 = Header Length: 32 bytes (8)
 ▶ Flags: 0x018 (PSH, ACK)
 Window: 2262
 [Calculated window size: 2262]
 [Window size scaling factor: -1 (unknown)]
 Checksum: 0x164e [unverified]
 [Checksum Status: Unverified]
 Urgent Pointer: 0
 Options: (12 bytes) No-Operation (NOP), No-Operation (NOP), Timestamp

- б) 1 вопрос, Host Address

в) 8 ответов

6)