

Wireshark

No.	Time	Source	Destination	Protocol	Length	Info
795	2.563218510	192.168.1.1	192.168.1.40	DNS	126	Standard query response 0xacb6 AAAA akamai.com AAAA 2a02:2
796	2.563458317	192.168.1.40	23.0.214.43	UDP	70	48566 → 33434 Len=28
797	2.563491409	192.168.1.40	23.0.214.43	UDP	70	33408 → 33435 Len=28
798	2.563514164	192.168.1.40	23.0.214.43	UDP	70	54749 → 33436 Len=28
799	2.563535914	192.168.1.40	23.0.214.43	UDP	70	35084 → 33437 Len=28
800	2.563557417	192.168.1.40	23.0.214.43	UDP	70	41409 → 33438 Len=28
801	2.563577183	192.168.1.40	23.0.214.43	UDP	70	50279 → 33439 Len=28
802	2.563596158	192.168.1.40	23.0.214.43	UDP	70	46624 → 33440 Len=28
803	2.563615109	192.168.1.40	23.0.214.43	UDP	70	34118 → 33441 Len=28
804	2.563633875	192.168.1.40	23.0.214.43	UDP	70	35703 → 33442 Len=28
805	2.563652329	192.168.1.40	23.0.214.43	UDP	70	41999 → 33443 Len=28
806	2.563670437	192.168.1.40	23.0.214.43	UDP	70	42666 → 33444 Len=28
807	2.563688697	192.168.1.40	23.0.214.43	UDP	70	60737 → 33445 Len=28
808	2.563707011	192.168.1.40	23.0.214.43	UDP	70	56605 → 33446 Len=28
809	2.563724975	192.168.1.40	23.0.214.43	UDP	70	38326 → 33447 Len=28
810	2.563743404	192.168.1.40	23.0.214.43	UDP	70	51761 → 33448 Len=28
811	2.563761810	192.168.1.40	23.0.214.43	UDP	70	42628 → 33449 Len=28
812	2.564339491	192.168.1.1	192.168.1.40	ICMP	98	Time-to-live exceeded (Time to live exceeded in transit)
813	2.564443061	192.168.1.40	192.168.1.1	DNS	84	Standard query 0xc023 PTR 1.1.168.192.in-addr.arpa
814	2.564459038	192.168.1.1	192.168.1.40	ICMP	98	Time-to-live exceeded (Time to live exceeded in transit)
815	2.564459082	192.168.1.1	192.168.1.40	ICMP	98	Time-to-live exceeded (Time to live exceeded in transit)
816	2.565774030	192.168.1.1	192.168.1.40	DNS	84	Standard query response 0xc023 No such name PTR 1.1.168.192.in-addr.arpa
817	2.566613882	192.168.1.40	23.0.214.43	UDP	70	49272 → 33450 Len=28
818	2.566720790	5.19.0.225	192.168.1.40	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
819	2.566769241	192.168.1.40	23.0.214.43	UDP	70	36822 → 33451 Len=28

▶ Frame 796: 70 bytes on wire (560 bits), 70 bytes captured (560 bits) on interface wlp2s0, id 0
 ▶ Ethernet II, Src: IntelCor_b1:db:95 (88:78:73:b1:db:95), Dst: ZyxelCom_cb:ba:54 (5c:f4:ab:cb:ba:54)
 ▶ Internet Protocol Version 4, Src: 192.168.1.40, Dst: 23.0.214.43
 0100 = Version: 4
 0101 = Header Length: 20 bytes (5)
 ▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
 Total Length: 56
 Identification: 0xa249 (41545)
 ▶ Flags: 0x00
 Fragment Offset: 0
 ▶ Time to Live: 1
 Protocol: UDP (17)
 Header Checksum: 0x6870 [validation disabled]
 [Header checksum status: Unverified]
 Source Address: 192.168.1.40
 Destination Address: 23.0.214.43
 ▶ User Datagram Protocol, Src Port: 48566, Dst Port: 33434
 ▶ Data (28 bytes)

- 192.168.1.40
- Protocol: UDP (17)
- Header Length: 20 bytes. Если под полезной нагрузкой подразумевается все, кроме заголовка, то размер $56 - 20 = 36$. Если же подразумевается размер data, то 28.
- .
 - Всегда меняется Identification. Теоретически, Header Checksum меняться не обязана, но она тем не менее меняется
 - Не меняются все остальные поля, кроме Time to Live, который постепенно увеличивается. Совершенно точно не должны меняться Total Length, потому что мы его задали, и Source Address, Destination Address. Должны меняться Identification (всегда), Time to Live (не всегда). Checksum может меняться, а может нет.
 - Identification увеличивается на 1
- Identification: 0xa249, Time to Live: 1
- TTL у всех ответных пакетов выставлен в 64, а идентификаторы меняются
- Identification: 0x0000, Time to Live: 253
- .
 - Да, было создано 3 фрагмента

- b. Во фрагментах меняются поля Fragment Offset и Header Checksum. Еще у первых двух фрагментов поля Total Length и Flags совпадают, а у последнего они другие.

No.	Time	Source	Destination	Protocol	Length	Info
26	2.614431994	192.168.1.1	192.168.1.40	DNS	86	Standard query response 0xea0f A akamai.com A 104.89.5.190
27	2.615734686	192.168.1.1	192.168.1.40	DNS	126	Standard query response 0xec06 AAAA akamai.com AAAA 2a02:26f0:d6:391::b63 AAAA 2a
28	2.627694486	192.168.1.40	104.89.5.190	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=dc69) [Reassembled in #30]
29	2.627746903	192.168.1.40	104.89.5.190	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=dc69) [Reassembled in #30]
30	2.627758799	192.168.1.40	104.89.5.190	UDP	554	49330 → 33434 Len=3472
31	2.627849747	192.168.1.40	104.89.5.190	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=dc6a) [Reassembled in #33]
32	2.627864190	192.168.1.40	104.89.5.190	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=dc6a) [Reassembled in #33]
33	2.627881778	192.168.1.40	104.89.5.190	UDP	554	43171 → 33435 Len=3472
34	2.628013954	192.168.1.40	104.89.5.190	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=dc6b) [Reassembled in #36]
35	2.628032691	192.168.1.40	104.89.5.190	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=dc6b) [Reassembled in #36]
36	2.628041699	192.168.1.40	104.89.5.190	UDP	554	58199 → 33436 Len=3472
37	2.628140308	192.168.1.40	104.89.5.190	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=dc6c) [Reassembled in #39]
38	2.628157796	192.168.1.40	104.89.5.190	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=dc6c) [Reassembled in #39]
39	2.628169915	192.168.1.40	104.89.5.190	UDP	554	54153 → 33437 Len=3472
40	2.628261870	192.168.1.40	104.89.5.190	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=dc6d) [Reassembled in #42]
41	2.628273245	192.168.1.40	104.89.5.190	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=dc6d) [Reassembled in #42]
Frame 30: 554 bytes on wire (4432 bits), 554 bytes captured (4432 bits) on interface wlp2s0, id 0						
Ethernet II, Src: IntelCor_b1:db:95 (88:78:73:b1:db:95), Dst: ZyxelCom_cb:ba:54 (5c:f4:ab:cb:ba:54)						
Internet Protocol Version 4, Src: 192.168.1.40, Dst: 104.89.5.190						
0100 = Version: 4						
.... 0101 = Header Length: 20 bytes (5)						
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)						
Total Length: 540						
Identification: 0xdc69 (56425)						
Flags: 0x01						
Fragment Offset: 2960						
Time to Live: 1						
Protocol: UDP (17)						
Header Checksum: 0xaa0e [validation disabled]						
[Header checksum status: Unverified]						
Source Address: 192.168.1.40						
Destination Address: 104.89.5.190						
[3 IPv4 Fragments (3480 bytes): #28(1480), #29(1480), #30(520)]						
User Datagram Protocol, Src Port: 49330, Dst Port: 33434						
Data (3472 bytes)						

Эхо запросы через ICMP

```
margo@laptop:~/proga/networks/computer_networks_2022/lab10$ sudo python3 myPing.py akamai.com
time = 3.73 ms
rtt min/avg/max = 3.73/3.73/3.73 ms
lost 0.0%
***
lost 50.0%
time = 3.73 ms
rtt min/avg/max = 3.73/3.73/3.73 ms
lost 33.3%
time = 3.70 ms
rtt min/avg/max = 3.70/3.72/3.73 ms
lost 25.0%
time = 3.72 ms
rtt min/avg/max = 3.70/3.72/3.73 ms
lost 20.0%

margo@laptop:~/proga/networks/computer_networks_2022/lab10$ sudo python3 myPing.py stanford.org
time = 17.27 ms
rtt min/avg/max = 17.27/17.27/17.27 ms
lost 0.0%
time = 17.26 ms
rtt min/avg/max = 17.26/17.26/17.27 ms
lost 0.0%
time = 17.26 ms
rtt min/avg/max = 17.26/17.26/17.27 ms
lost 0.0%
time = 17.26 ms
rtt min/avg/max = 17.26/17.26/17.27 ms
lost 0.0%
time = 17.32 ms
rtt min/avg/max = 17.26/17.27/17.32 ms
lost 0.0%
```