```
No.
       Time
                         Source
                                              Destination
                                                                    Protocol Length Info
  3704 20:13:42.102448
                         128.193.15.13
                                              10.248.37.93
                                                                    DNS
                                                                            506
                                                                                   Standard query response 0x3c93 HTTPS
www.ietf.org CNAME www.ietf.org.cdn.cloudflare.net HTTPS NS ns1.cloudflare.net NS ns2.cloudflare.net NS ns5.cloudflare.net NS
ns4.cloudflare.net NS ns3.cloudflare.net A 173.245.59.31 AAAA 2400:cb00:2049:1::adf5:3b1f A 198.41.222.131 AAAA
2400:cb00:2049:1::c629:de83 A 198.41.222.31 AAAA 2400:cb00:2049:1::c629:de1f A 198.41.223.131 AAAA 2400:cb00:2049:1::c629:df83
A 198.41.223.31 AAAA 2400:cb00:2049:1::c629:df1f
Frame 3704: 506 bytes on wire (4048 bits), 506 bytes captured (4048 bits) on interface \Device\NPF_{52A93EF6-8BB7-488A-
AA9F-46C9AA036E99}, id 0
   Section number: 1
   Interface id: 0 (\Device\NPF_{52A93EF6-8BB7-488A-AA9F-46C9AA036E99})
       Interface name: \Device\NPF_{52A93EF6-8BB7-488A-AA9F-46C9AA036E99}
       Interface description: Wi-Fi
   Encapsulation type: Ethernet (1)
   Arrival Time: Jan 26, 2023 20:13:42.102448000 Pacific Standard Time
   [Time shift for this packet: 0.000000000 seconds]
   Epoch Time: 1674792822.102448000 seconds
   [Time delta from previous captured frame: 0.000000000 seconds]
   [Time delta from previous displayed frame: 0.000000000 seconds]
   [Time since reference or first frame: 5.774971000 seconds]
   Frame Number: 3704
   Frame Length: 506 bytes (4048 bits)
   Capture Length: 506 bytes (4048 bits)
   [Frame is marked: False]
   [Frame is ignored: False]
   [Protocols in frame: eth:ethertype:ip:udp:dns]
   [Coloring Rule Name: UDP]
   [Coloring Rule String: udp]
Ethernet II, Src: HewlettP_45:60:de (40:b9:3c:45:60:de), Dst: IntelCor_d8:24:30 (f8:e4:e3:d8:24:30)
   Destination: IntelCor_d8:24:30 (f8:e4:e3:d8:24:30)
       Address: IntelCor_d8:24:30 (f8:e4:e3:d8:24:30)
       .....0. .... = LG bit: Globally unique address (factory default)
       .... ...0 .... = IG bit: Individual address (unicast)
   Source: HewlettP_45:60:de (40:b9:3c:45:60:de)
       Address: HewlettP_45:60:de (40:b9:3c:45:60:de)
       .... ..0. .... (factory default)
       .... = IG bit: Individual address (unicast)
   Type: IPv4 (0x0800)
Internet Protocol Version 4, Src: 128.193.15.13, Dst: 10.248.37.93
   0100 .... = Version: 4
   .... 0101 = Header Length: 20 bytes (5)
   Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
       0000 00.. = Differentiated Services Codepoint: Default (0)
       .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
   Total Length: 492
   Identification: 0xfaba (64186)
   000. .... = Flags: 0x0
       0... = Reserved bit: Not set
       .0.. .... = Don't fragment: Not set
       ..0. .... = More fragments: Not set
   ...0 0000 0000 0000 = Fragment Offset: 0
   Time to Live: 55
   Protocol: UDP (17)
   Header Checksum: 0xc723 [validation disabled]
   [Header checksum status: Unverified]
   Source Address: 128.193.15.13
   Destination Address: 10.248.37.93
User Datagram Protocol, Src Port: 53, Dst Port: 58925
   Source Port: 53
   Destination Port: 58925
   Length: 472
   Checksum: 0xc048 [unverified]
   [Checksum Status: Unverified]
   [Stream index: 63]
   [Timestamps]
       [Time since first frame: 0.005817000 seconds]
       [Time since previous frame: 0.005817000 seconds]
   UDP payload (464 bytes)
Domain Name System (response)
   Transaction ID: 0x3c93
   Flags: 0x8180 Standard query response, No error
       1... ---- = Response: Message is a response
       .000 0... = Opcode: Standard query (0)
       .... .0.. .... = Authoritative: Server is not an authority for domain
       .... ..0. .... = Truncated: Message is not truncated
       .... 1 .... = Recursion desired: Do query recursively
       \ldots 1... = Recursion available: Server can do recursive queries
       .... = Z: reserved (0)
       .... ..... ..0. .... = Answer authenticated: Answer/authority portion was not authenticated by the server
       .... .... o .... = Non-authenticated data: Unacceptable
       .... .... 0000 = Reply code: No error (0)
```

```
Questions: 1
Answer RRs: 2
Authority RRs: 5
Additional RRs: 10
Queries
    www.ietf.org: type HTTPS, class IN
        Name: www.ietf.org
        [Name Length: 12]
        [Label Count: 3]
        Type: HTTPS (HTTPS Specific Service Endpoints) (65)
        Class: IN (0x0001)
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: 1638 (27 minutes, 18 seconds)
        Data length: 33
        CNAME: www.ietf.org.cdn.cloudflare.net
    www.ietf.org.cdn.cloudflare.net: type HTTPS, class IN
        Name: www.ietf.org.cdn.cloudflare.net
        Type: HTTPS (HTTPS Specific Service Endpoints) (65)
        Class: IN (0x0001)
        Time to live: 138 (2 minutes, 18 seconds)
        Data length: 67
        SvcPriority: 1
        TargetName: <Root>
        SvcParam: alpn=h3,h3-29,h2
            SvcParamKey: alpn (1)
            SvcParamValue length: 12
            ALPN length: 2
            ALPN: h3
            ALPN length: 5
            ALPN: h3-29
            ALPN length: 2
            ALPN: h2
        SvcParam: ipv4hint=104.16.44.99,104.16.45.99
            SvcParamKey: ipv4hint (4)
            SvcParamValue length: 8
            IP: 104.16.44.99
            IP: 104.16.45.99
        SvcParam: ipv6hint=2606:4700::6810:2c63,2606:4700::6810:2d63
            SvcParamKey: ipv6hint (6)
            SvcParamValue length: 32
            IP: 2606:4700::6810:2c63
            IP: 2606:4700::6810:2d63
Authoritative nameservers
    cloudflare.net: type NS, class IN, ns ns1.cloudflare.net
        Name: cloudflare.net
        Type: NS (authoritative Name Server) (2)
        Class: IN (0x0001)
        Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
        Data length: 6
        Name Server: ns1.cloudflare.net
    cloudflare.net: type NS, class IN, ns ns2.cloudflare.net
        Name: cloudflare.net
        Type: NS (authoritative Name Server) (2)
        Class: IN (0x0001)
        Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
        Data length: 6
        Name Server: ns2.cloudflare.net
    cloudflare.net: type NS, class IN, ns ns5.cloudflare.net
        Name: cloudflare.net
        Type: NS (authoritative Name Server) (2)
        Class: IN (0x0001)
        Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
        Data length: 6
        Name Server: ns5.cloudflare.net
    cloudflare.net: type NS, class IN, ns ns4.cloudflare.net
        Name: cloudflare.net
        Type: NS (authoritative Name Server) (2)
        Class: IN (0x0001)
        Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
        Data length: 6
        Name Server: ns4.cloudflare.net
    cloudflare.net: type NS, class IN, ns ns3.cloudflare.net
        Name: cloudflare.net
        Type: NS (authoritative Name Server) (2)
        Class: IN (0x0001)
        Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
```

```
Data length: 6
           Name Server: ns3.cloudflare.net
   Additional records
       ns1.cloudflare.net: type A, class IN, addr 173.245.59.31
           Name: ns1.cloudflare.net
           Type: A (Host Address) (1)
           Class: IN (0x0001)
           Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
           Data length: 4
           Address: 173.245.59.31
       ns1.cloudflare.net: type AAAA, class IN, addr 2400:cb00:2049:1::adf5:3b1f
           Name: ns1.cloudflare.net
           Type: AAAA (IPv6 Address) (28)
           Class: IN (0x0001)
           Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
           Data length: 16
           AAAA Address: 2400:cb00:2049:1::adf5:3b1f
       ns2.cloudflare.net: type A, class IN, addr 198.41.222.131
           Name: ns2.cloudflare.net
           Type: A (Host Address) (1)
           Class: IN (0x0001)
           Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
           Data length: 4
           Address: 198.41.222.131
       ns2.cloudflare.net: type AAAA, class IN, addr 2400:cb00:2049:1::c629:de83
           Name: ns2.cloudflare.net
           Type: AAAA (IPv6 Address) (28)
           Class: IN (0x0001)
           Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
           Data length: 16
           AAAA Address: 2400:cb00:2049:1::c629:de83
       ns3.cloudflare.net: type A, class IN, addr 198.41.222.31
           Name: ns3.cloudflare.net
           Type: A (Host Address) (1)
           Class: IN (0x0001)
           Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
           Data length: 4
           Address: 198.41.222.31
       ns3.cloudflare.net: type AAAA, class IN, addr 2400:cb00:2049:1::c629:de1f
           Name: ns3.cloudflare.net
           Type: AAAA (IPv6 Address) (28)
           Class: IN (0x0001)
           Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
           Data length: 16
           AAAA Address: 2400:cb00:2049:1::c629:de1f
       ns4.cloudflare.net: type A, class IN, addr 198.41.223.131
           Name: ns4.cloudflare.net
           Type: A (Host Address) (1)
           Class: IN (0x0001)
           Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
           Data length: 4
           Address: 198.41.223.131
       ns4.cloudflare.net: type AAAA, class IN, addr 2400:cb00:2049:1::c629:df83
           Name: ns4.cloudflare.net
           Type: AAAA (IPv6 Address) (28)
           Class: IN (0x0001)
           Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
           Data length: 16
           AAAA Address: 2400:cb00:2049:1::c629:df83
       ns5.cloudflare.net: type A, class IN, addr 198.41.223.31
           Name: ns5.cloudflare.net
           Type: A (Host Address) (1)
           Class: IN (0x0001)
           Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
           Data length: 4
           Address: 198.41.223.31
       ns5.cloudflare.net: type AAAA, class IN, addr 2400:cb00:2049:1::c629:df1f
           Name: ns5.cloudflare.net
           Type: AAAA (IPv6 Address) (28)
           Class: IN (0x0001)
           Time to live: 153010 (1 day, 18 hours, 30 minutes, 10 seconds)
           Data length: 16
           AAAA Address: 2400:cb00:2049:1::c629:df1f
   [Request In: 3694]
   [Time: 0.005817000 seconds]
       Time
                          Source
                                                 Destination
                                                                       Protocol Length Info
  3705 20:13:42.102643
                          10.248.37.93
                                                 104.96.163.139
                                                                       TCP
                                                                                 54
                                                                                        58656 → 443 [ACK] Seq=6996 Ack=1649511
Win=1059840 Len=0
Frame 3705: 54 bytes on wire (432 bits), 54 bytes captured (432 bits) on interface \Device\NPF_{52A93EF6-8BB7-488A-AA9F-46C9AA036E99},
id 0
```

No.

```
Section number: 1
   Interface id: 0 (\Device\NPF_{52A93EF6-8BB7-488A-AA9F-46C9AA036E99})
       Interface name: \Device\NPF_{52A93EF6-8BB7-488A-AA9F-46C9AA036E99}
       Interface description: Wi-Fi
   Encapsulation type: Ethernet (1)
   Arrival Time: Jan 26, 2023 20:13:42.102643000 Pacific Standard Time
   [Time shift for this packet: 0.000000000 seconds]
   Epoch Time: 1674792822.102643000 seconds
   [Time delta from previous captured frame: 0.000195000 seconds]
   [Time delta from previous displayed frame: 0.000195000 seconds]
   [Time since reference or first frame: 5.775166000 seconds]
   Frame Number: 3705
   Frame Length: 54 bytes (432 bits)
   Capture Length: 54 bytes (432 bits)
   [Frame is marked: False]
   [Frame is ignored: False]
   [Protocols in frame: eth:ethertype:ip:tcp]
   [Coloring Rule Name: TCP]
   [Coloring Rule String: tcp]
Ethernet II, Src: IntelCor_d8:24:30 (f8:e4:e3:d8:24:30), Dst: IETF-VRRP-VRID_01 (00:00:5e:00:01:01)
   Destination: IETF-VRRP-VRID_01 (00:00:5e:00:01:01)
       Address: IETF-VRRP-VRID_01 (00:00:5e:00:01:01)
       .... .0. .... = LG bit: Globally unique address (factory default)
       .... ...0 .... = IG bit: Individual address (unicast)
   Source: IntelCor_d8:24:30 (f8:e4:e3:d8:24:30)
       Address: IntelCor_d8:24:30 (f8:e4:e3:d8:24:30)
       .... .0. .... (factory default)
       .... = IG bit: Individual address (unicast)
   Type: IPv4 (0x0800)
Internet Protocol Version 4, Src: 10.248.37.93, Dst: 104.96.163.139
   0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
   Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
       0000 00.. = Differentiated Services Codepoint: Default (0)
       .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
   Total Length: 40
   Identification: 0x6e17 (28183)
   010. .... = Flags: 0x2, Don't fragment
       0... = Reserved bit: Not set
       .1.. .... = Don't fragment: Set
       ..0. .... = More fragments: Not set
   ...0 0000 0000 0000 = Fragment Offset: 0
   Time to Live: 128
   Protocol: TCP (6)
   Header Checksum: 0x0000 [validation disabled]
   [Header checksum status: Unverified]
   Source Address: 10.248.37.93
   Destination Address: 104.96.163.139
Transmission Control Protocol, Src Port: 58656, Dst Port: 443, Seq: 6996, Ack: 1649511, Len: 0
   Source Port: 58656
   Destination Port: 443
   [Stream index: 11]
   [Conversation completeness: Incomplete, DATA (15)]
   [TCP Segment Len: 0]
   Sequence Number: 6996
                           (relative sequence number)
   Sequence Number (raw): 2167851991
   [Next Sequence Number: 6996
                                (relative sequence number)]
   Acknowledgment Number: 1649511
                                   (relative ack number)
   Acknowledgment number (raw): 3999154652
   0101 .... = Header Length: 20 bytes (5)
   Flags: 0x010 (ACK)
       000. .... = Reserved: Not set
       ...0 .... = Accurate ECN: Not set
       .... 0... = Congestion Window Reduced: Not set
       .... .0.. .... = ECN-Echo: Not set
       .... ..0. .... = Urgent: Not set
       .... = Acknowledgment: Set
       .... 0... = Push: Not set
       .... .0.. = Reset: Not set
       .... .... ..0. = Syn: Not set
       .... .... ...0 = Fin: Not set
       [TCP Flags: ······A····]
   Window: 4140
   [Calculated window size: 1059840]
   [Window size scaling factor: 256]
   Checksum: 0x3c5b [unverified]
   [Checksum Status: Unverified]
   Urgent Pointer: 0
   [Timestamps]
       [Time since first frame in this TCP stream: 3.987224000 seconds]
```

[Time since previous frame in this TCP stream: 0.000195000 seconds] [SEQ/ACK analysis] $\label{eq:cond}$

[This is an ACK to the segment in frame: 3701]
[The RTT to ACK the segment was: 0.000195000 seconds]
[iRTT: 0.007714000 seconds]