Wireshark Evidence – ICMP to Google DNS using send()

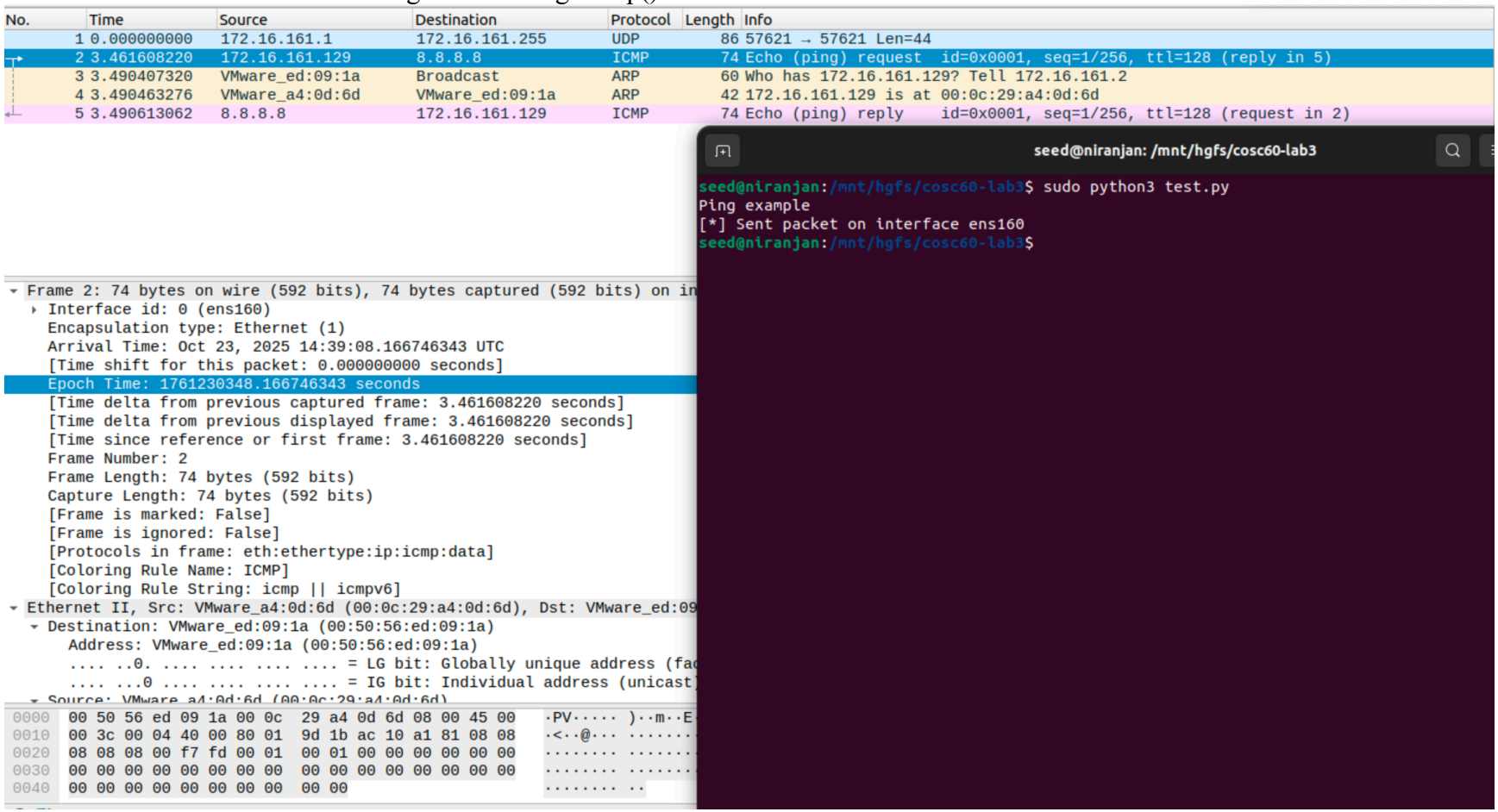
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	172.16.161.129	8.8.8.8	ICMP	74	Echo (ping) request id=0x0001, seq=1/256, ttl=128 (reply in 2)
2	0.019549165	8.8.8.8	172.16.161.129	ICMP	74	Echo (ping) reply id=0x0001, seq=1/256, ttl=128 (request in 1)

```
Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on in
  Interface id: 0 (ens160)
  Encapsulation type: Ethernet (1)
  Arrival Time: Oct 23, 2025 14:35:52.881012079 UTC
  [Time shift for this packet: 0.000000000 seconds]
  Epoch Time: 1761230152.881012079 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: 0.000000000 seconds]
  Frame Number: 1
  Frame Length: 74 bytes (592 bits)
  Capture Length: 74 bytes (592 bits)
  [Frame is marked: False]
  [Frame is ignored: False]
  [Protocols in frame: eth:ethertype:ip:icmp:data]
  [Coloring Rule Name: ICMP]
  [Coloring Rule String: icmp || icmpv6]
Ethernet II, Src: VMware_a4:0d:6d (00:0c:29:a4:0d:6d), Dst: VMware_ed:09
  Destination: VMware_ed:09:1a (00:50:56:ed:09:1a)
    Address: VMware_ed:09:1a (00:50:56:ed:09:1a)
    .... ..0. .... .... .... .... = LG bit: Globally unique address (fac
    .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
  Source: VMware_a4:0d:6d (00:0c:29:a4:0d:6d)
```

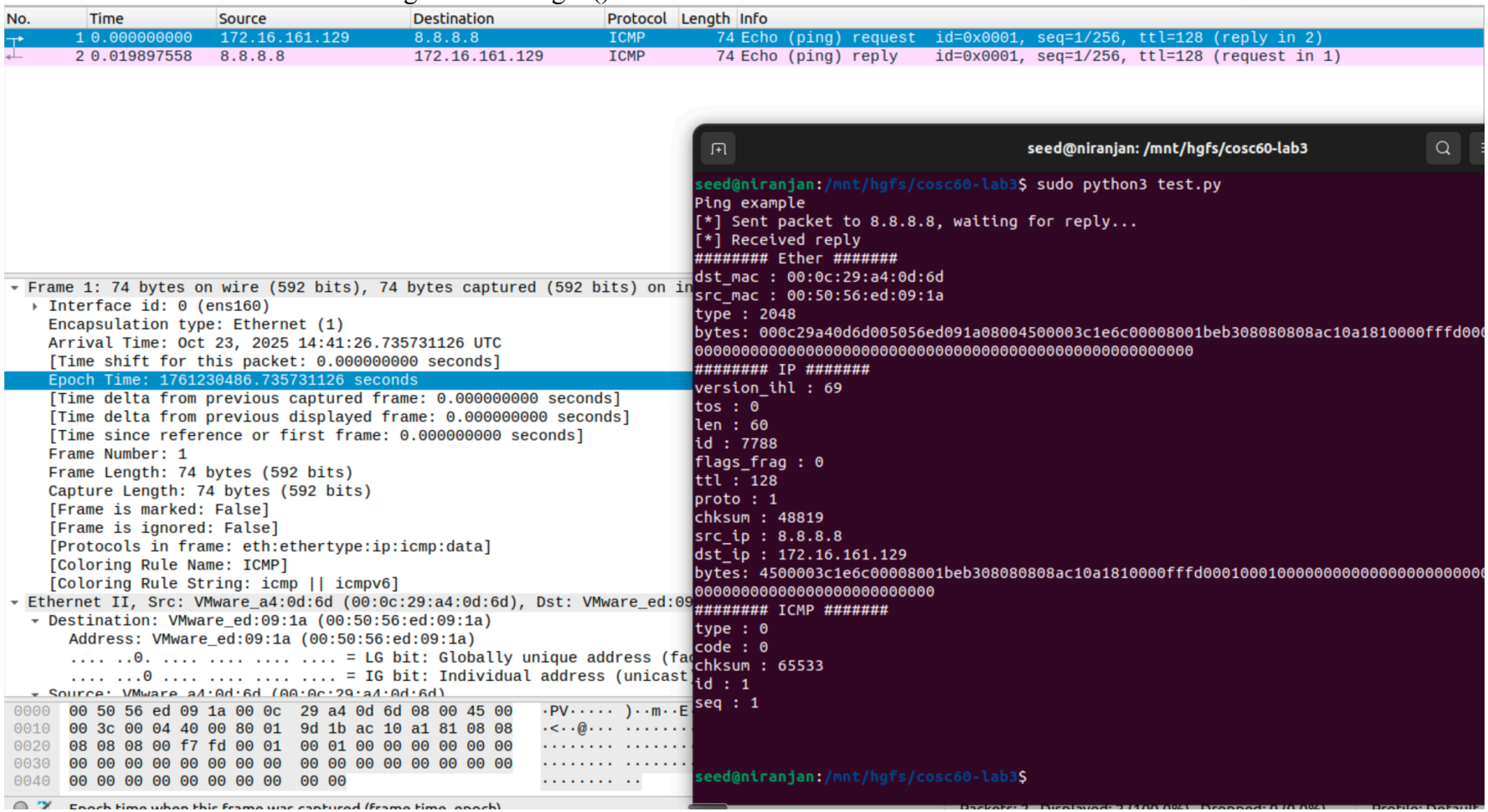
```
0000  00 50 56 ed 09 1a 00 0c  29 a4 0d 6d 08 00 45 00   ·PV····· )··m··E·
0010  00 3c 00 04 40 00 80 01  9d 1b ac 10 a1 81 08 08   ·<··@··· ········
0020  08 08 08 00 f7 fd 00 01  00 01 00 00 00 00 00 00   ········ ········
0030  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········ ········
0040  00 00 00 00 00 00 00 00  00 00                     ········ ··
```

```
seed@niranjan: /mnt/hgfs/cosc60-lab3
seed@niranjan:/mnt/hgfs/cosc60-lab3$ sudo python3 test.py
Ping example
[*] Sent packet to 8.8.8.8
seed@niranjan:/mnt/hgfs/cosc60-lab3$ sudo python3 test.py
Ping example
[*] Sent packet to 8.8.8.8
seed@niranjan:/mnt/hgfs/cosc60-lab3$
```

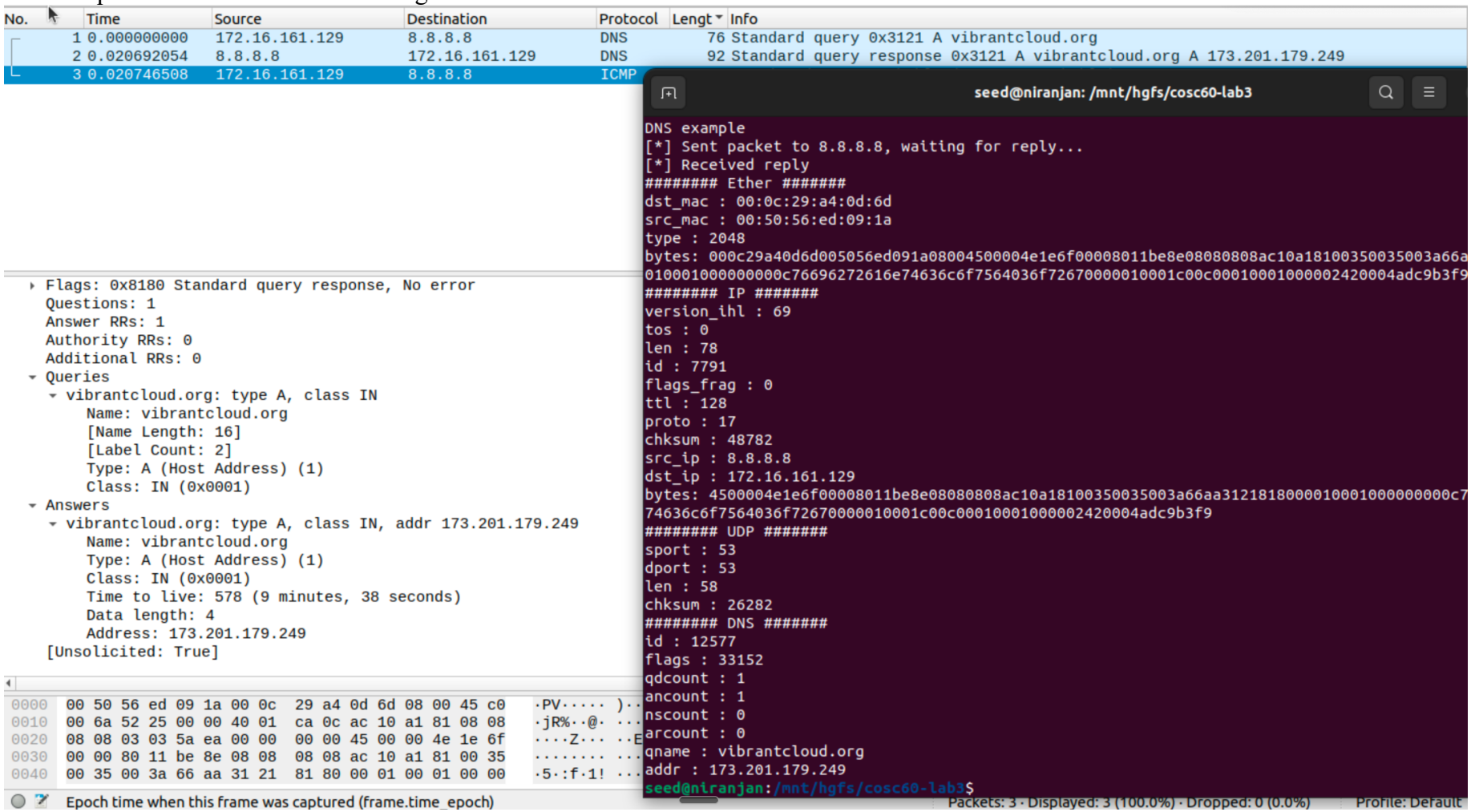
Wireshark Evidence – ICMP to Google DNS using sendp()



Wireshark Evidence – ICMP to Google DNS using sr()



DNS Request to resolve vibrantcloud.org:



Evidence for Making TCP/HTTP request to vibrantcloud.org

CODE:

```
#Example 2: DNS Resolution

    print("\nDNS example")
    domain_name = "vibrantcloud.org"
    pkt = Ether(src_mac=my_mac, dst_mac=dst_mac)/IP(src_ip=my_ip, dst_ip="8.8.8.8", proto=17)/UDP(sport=12345,
dport=53)/DNS(qname=domain_name)
    dns = sr(pkt)
    dns.show()
    dns_layer = dns.get_layer("DNS")  #helper method to get a specified layer
    #print(dns_layer.addr)
    addr = dns_layer.addr
    print("\n\n")

    # #Example 3: TCP/HTTP
    print("\nTCP example")
    sport = random.getrandbits(16)
    #turn off OS replying with RST after recieving SYN ACK reply from server
    command = ['sudo', 'iptables', '-A', 'OUTPUT', '-p', 'tcp', '-m', 'tcp', '--tcp-flags','RST', 'RST', '-j', 'DROP']
    # Execute the command
    result = subprocess.run(command, check=True, capture_output=True, text=True)
    print("STDOUT:", result.stdout)
    print("STDERR:", result.stderr)


    pkt = Ether(src_mac=my_mac, dst_mac=dst_mac)/IP(src_ip=my_ip, dst_ip=addr)/TCP(sport=sport, dport=80, flag='SYN')
    reply = sr(pkt)
    reply.show()
    tcp = reply.get_layer('TCP')

    my_seq = tcp.ack  #GenAI helped refactor this section to more cleanly track seq and ack
    my_ack = tcp.seq + 1
```

```
    pkt = Ether(src_mac=my_mac, dst_mac=dst_mac)/IP(src_ip=my_ip, dst_ip=addr)/TCP(sport=sport, dport=80, seq=my_seq,
ack=my_ack, flag='ACK')
    sendp(pkt, "ens160")

    http_request = f'GET / HTTP/1.1\r\nHost: vibrantcloud.org\r\n\r\n' # GenAI adjusted to correct formatting with this
    pkt = Ether(src_mac=my_mac, dst_mac=dst_mac)/IP(src_ip=my_ip, dst_ip=addr)/TCP(sport=sport, dport=80, seq=my_seq,
ack=my_ack, data=http_request, flag='PSH')
    rp = sr(pkt)
    rp.show()

    tcp_reply = rp.get_layer('TCP')
    rp = sniff("ens160")

    print("SNIFF")
    rp.show()
    tcp_reply = rp.get_layer('TCP')
    #print(tcp_reply.payload.decode())

    #reset firewall rules
    command = ['sudo', 'iptables', '-D', 'OUTPUT', '-p', 'tcp', '-m', 'tcp', '--tcp-flags', 'RST', 'RST', '-j', 'DROP']
    result = subprocess.run(command, check=True, capture_output=True, text=True)
    print("STDOUT:", result.stdout)
    print("STDERR:", result.stderr)
```

RESPONSE:
[*] Sent packet to 8.8.8.8, waiting for reply...
[*] Received reply
… DNS resolution responds, and we get the IP.

TCP example
STDOUT:
STDERR:

[*] Sent packet to 173.201.179.249, waiting for reply...
[*] Received reply
######## Ether #######
dst_mac : 00:0c:29:a4:0d:6d
src_mac : 00:50:56:ed:09:1a
type : 2048
bytes:
000c29a40d6d005056ed091a08004500002c20e9000080066a8eadc9b3f9ac10a1810050527627b163c5000000026012faf00f920000020405b40000
######## IP #######
version_ihl : 69
tos : 0
len : 44
id : 8425
flags_frag : 0
ttl : 128
proto : 6
chksum : 27278
src_ip : 173.201.179.249
dst_ip : 172.16.161.129
bytes: 4500002c20e9000080066a8eadc9b3f9ac10a1810050527627b163c5000000026012faf00f920000020405b40000
######## TCP #######
sport : 80
dport : 21110
seq : 665936837
ack : 2
offset_reserv_flags : 24594
window : 64240
chksum : 3986
urgptr : 0
offset : 6
message :
[*] Sent packet on interface ens160

[*] Sent packet to 173.201.179.249, waiting for reply...
[*] Received reply
######## Ether #######
dst_mac : 00:0c:29:a4:0d:6d
src_mac : 00:50:56:ed:09:1a
type : 2048
bytes:
000c29a40d6d005056ed091a08004500002820ea000080066a91adc9b3f9ac10a1810050527627b163c60000002c5010faf02725000000
0000000000
######## IP #######
version_ihl : 69
tos : 0
len : 40
id : 8426
flags_frag : 0
ttl : 128
proto : 6
chksum : 27281
src_ip : 173.201.179.249
dst_ip : 172.16.161.129
bytes: 4500002820ea000080066a91adc9b3f9ac10a1810050527627b163c60000002c5010faf027250000000000000000
######## TCP #######
sport : 80
dport : 21110
seq : 665936838
ack : 44
offset_reserv_flags : 20496
window : 64240
chksum : 10021
urgptr : 0
offset : 5
message :
[*] Captured packet

SNIFF
######## Ether #######
dst_mac : 00:0c:29:a4:0d:6d
src_mac : 00:50:56:ed:09:1a
type : 2048
bytes:
000c29a40d6d005056ed091a08004500027920eb00008006683fadc9b3f9ac10a1810050527627b163c60000002c5018faf0d7a3000048
5454502f312e3120323030204f4b0d0a446174653a205468752c203233204f6374203230323520313431343a35333a323020474d540d0a536
5727665723a204170616368650d0a557067726164653a2068322c6832630d0a436f6e6e656374696f6e3a20557067726164650d0a4c61
73742d4d6f6469666965643a204672692c203136204170722032303231323132303a31373a333020474d540d0a455461673a20223162323
13061352d3133372d3563303138376137383363830220d0a4163636570742d52616e6765733a2062797465730d0a436f6e74656e742d
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616d653d22617574686f722220636f6e74656e743d22416e6f6e223e0a0a3c2f686561643e0a0a3c626f64793e0a20203c68313e5669627
2616e74436c6f75643c2f68313e0a20203c703e546869732069732074686520666616d6f7573206696272616e74436c6f756420796f752
7766520686561726420736f206d7563682061626f75742e3c2f703e0a3c2f626f64793e0a3c2f68746d6c3e
######## IP #######
version_ihl : 69
tos : 0
len : 633
id : 8427
flags_frag : 0
ttl : 128
proto : 6
chksum : 26687
src_ip : 173.201.179.249
dst_ip : 172.16.161.129
bytes:
4500027920eb00008006683fadc9b3f9ac10a1810050527627b163c60000002c5018faf0d7a30000485454502f312e3120323030204f4b0
d0a446174653a205468752c203233204f6374203230323520313431343a35333a323020474d540d0a5365727665723a204170616368650d0a
557067726164653a2068322c6832630d0a436f6e6e656374696f6e3a20557067726164650d0a4c6173742d4d6f6469666965643a204672

692c203136204170722032303231203135 3a31373a333020474d540d0a455461673a2022316232313061352d3133372d356330313837
6137383336383022 0d0a4163636570742d52616e6765733a2062797465730d0a436f6e74656e742d4c656e6774683a203331310d0a566
172793a204163636570742d456e636f64696e670d0a436f6e74656e742d547970653a20746578742f68746d6c0d0a0d0a3c21646f63747
970652068746d6c3e0a0a3c68746d6c206c616e673d22656e223e0a3c686561643e0a20203c6d6574612063686172736574 3d22757466
2d38223e0a0a20203c7469746c653e56696272616e74436c6f75643c2f7469746c653e0a20203c6d657461206e616d653d226465736372
697074696f6e2220636f6e74656e743d2256696272616e74436c6f7564223e0a20203c6d657461206e616d653d22617574686f72222063
6f6e74656e743d22416e6f6e223e0a0a3c2f686561643e0a0a3c626f64793e0a20203c68313e56696272616e74436c6f75643c2f68313e0a
20203c703e5468697320697320746852066616d6f7573205669627 2616e74436c6f756420796f7527766520686561726420736f206d7
563682061626f75742e3c2f703e0a3c2f626f64793e0a3c2f68746d6c3e
######## TCP #######
sport : 80
dport : 21110
seq : 665936838
ack : 44
offset_reserv_flags : 20504
window : 64240
chksum : 55203
urgptr : 0
offset : 5
message : HTTP/1.1 200 OK
Date: Thu, 23 Oct 2025 14:53:20 GMT
Server: Apache
Upgrade: h2,h2c
Connection: Upgrade
Last-Modified: Fri, 16 Apr 2021 15:17:30 GMT
ETag: "1b210a5-137-5c0187a783680"
Accept-Ranges: bytes
Content-Length: 311
Vary: Accept-Encoding
Content-Type: text/html

<!doctype html>

```
<html lang="en">
<head>
  <meta charset="utf-8">

  <title>VibrantCloud</title>
  <meta name="description" content="VibrantCloud">
  <meta name="author" content="Anon">

</head>

<body>
  <h1>VibrantCloud</h1>
  <p>This is the famous VibrantCloud you've heard so much about.</p>
</body>
</html>
STDOUT:
STDERR:
```