

Computer Networks

Assignment – 2

Name: *B. Ajaykumar*

Roll No: B210497CS

Part I

ICMP using ping

Question 1:

What is the IP address of your host? What is the IP address of the destination host?

Solution:

IP address(IPv6) of host is 2409:4f03:101c:741:302a:3544:1d9d:42d5 and IP address(IPv6) of the destination host is 2404:6800:4007:806::2004.

```
Frame 1: 118 bytes on wire (944 bits), 118 bytes captured (944 bits) on interface wlo1, id 0  
Ethernet II, Src: AzureWav_91:b4:87 (34:6f:24:91:b4:87), Dst: 56:32:c7:b1:34:64 (56:32:c7:b1:34:64)  
Internet Protocol Version 6, Src: 2409:40f3:101c:741:302a:3544:1d9d:42d5, Dst: 2404:6800:4007:806::2004  
Internet Control Message Protocol v6
```

Question 2:

Why is it that an ICMP packet does not have source and destination port numbers?

Solution:

The ICMP packet does not have source and destination port numbers because it was designed to communicate network-layer information between hosts and routers, not between application layer processes. Each ICMP packet has a "Type" and a "Code". The Type/Code combination identifies the specific message being received. Since the network software itself interprets all ICMP messages, no port numbers are needed to direct the ICMP message to an application layer process.

Question 3:

Examine one of the ping request packets sent by your host. What are the ICMP type and code numbers? What other fields does this ICMP packet have? How many bytes are the checksum, sequence number and identifier fields?

Solution:

```
Internet Protocol Version 6/IPv6: Echo (ping) request (128)
Type: Echo (ping) request (128)
Code: 0
Checksum: 0x3fe3 [correct]
[Checksum Status: Good]
Identifier: 0x0009
Sequence: 1
[Response In: 2]
Data (56 bytes)
```

- **ICMP Type:** *Echo (ping) request (128)*
- **Code:** *0 indicating that it's a general Echo Request without any specific code associated with it.*
- *The other fields of ICMP packet are Checksum, Identifier, Sequence.*
- *Checksum is 2 bytes long, Sequence number is also 2 bytes long and Identifier field is also 2 bytes.*

Question 4:

Examine the corresponding ping reply packet. What are the ICMP type and code numbers? What other fields does this ICMP packet have? How many bytes are the checksum, sequence number and identifier fields?

Solution:

```
Internet Protocol Version 6/IPv6: Echo (ping) reply (129)
Type: Echo (ping) reply (129)
Code: 0
Checksum: 0x3ee3 [correct]
[Checksum Status: Good]
Identifier: 0x0009
Sequence: 1
[Response To: 1]
[Response Time: 281.573 ms]
Data (56 bytes)
```

- **ICMP Type:** *Echo (ping) reply (129)*
- **Code:** *0 indicating that it's a general Echo Reply without any specific code associated with it.*

- *The other fields of ICMP packet are Checksum, Identifier, Sequence and Response Time.*
- *Checksum is 2 bytes long, Sequence number is also 2 bytes long and Identifier field is also 2 bytes.*

Part 2

ICMP using traceroute

Question 1:

Select the first ICMP Echo Request message sent by your computer, and expand the Internet Protocol part of the packet in the packet details window.

Solution:

```

▼ Internet Protocol Version 4, Src: 172.20.10.8, Dst: 142.250.195.142
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  ▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 64
    Identification: 0xf8db (63707)
  ▶ 000. .... = Flags: 0x0
    ...0 0000 0000 0000 = Fragment Offset: 0
    Time to Live: 12
    Protocol: ICMP (1)
    Header Checksum: 0xad3c [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 172.20.10.8
    Destination Address: 142.250.195.142
  ▶ [Destination GeoIP: US]

```

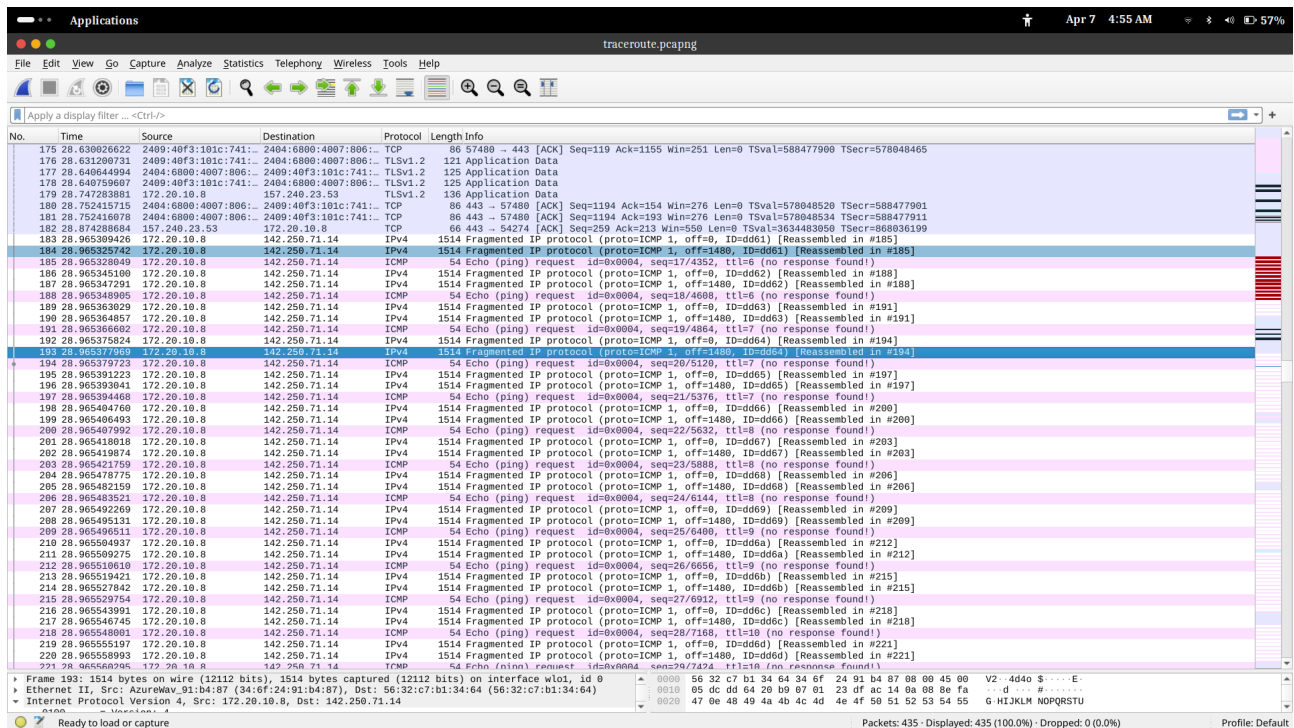
- **Header Length:** *Indicates the size of the IP header. Here it's 20 bytes.*
- **Differentiated Services Field (DSCP):** *Specifies priority or congestion control markings for quality of service.*
- **Total Length:** *Specifies the overall size of the IP datagram*
- **Identification:** *Provides a unique identifier for datagram fragments.*
- **Flags:** *Indicates fragmentation status and other special settings.*
- **Time to Live (TTL):** *Determines the maximum lifespan of a packet in the network.*
- **Protocol:** *Specifies the protocol used in the IP payload, such as ICMP.*

Question 2:

Which of the IP datagrams are fragmented?

Solution:

Datagrams for the traceroute -I www.youtube.com 3000 are fragmented.



No.	Time	Source	Destination	Protocol	Length	Info
175	28.630026622	2409:40f3:101c:7411::	2404:6800:4007:806::	TCP	86	57480 → 443 [ACK] Seq=119 Ack=1155 Win=251 Len=0 TSval=588477900 TSecr=578048465
176	28.631200731	2409:40f3:101c:7411::	2404:6800:4007:806::	TLSv1.2	121	Application Data
177	28.640644994	2404:6800:4007:806::	2409:40f3:101c:7411::	TLSv1.2	125	Application Data
178	28.640759667	2409:40f3:101c:7411::	2404:6800:4007:806::	TLSv1.2	125	Application Data
179	28.747283881	172.20.10.8	157.240.23.53	TLSv1.2	136	Application Data
180	28.752415715	2404:6800:4007:806::	2409:40f3:101c:7411::	TCP	86	443 → 57480 [ACK] Seq=1194 Ack=154 Win=276 Len=0 TSval=578048520 TSecr=588477901
181	28.752416076	2404:6800:4007:806::	2409:40f3:101c:7411::	TCP	86	443 → 57480 [ACK] Seq=1194 Ack=193 Win=276 Len=0 TSval=578048534 TSecr=588477911
182	28.874288664	157.240.23.53	172.20.10.8	TCP	66	443 → 54274 [ACK] Seq=259 Ack=213 Win=550 Len=0 TSval=3634483050 TSecr=868036199
183	28.965309426	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd61) [Reassembled in #185]
184	28.965329742	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd61) [Reassembled in #185]
185	28.965328049	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=17/4352, ttl=6 (no response found!)
186	28.965345100	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd62) [Reassembled in #188]
187	28.965347291	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd62) [Reassembled in #188]
188	28.965348905	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=18/4608, ttl=6 (no response found!)
189	28.965363029	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd63) [Reassembled in #191]
190	28.965364857	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd63) [Reassembled in #191]
191	28.965366602	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=19/4864, ttl=7 (no response found!)
192	28.965375824	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd64) [Reassembled in #194]
193	28.965377950	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd64) [Reassembled in #194]
194	28.965379723	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=20/5120, ttl=7 (no response found!)
195	28.965391223	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd65) [Reassembled in #197]
196	28.965393041	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd65) [Reassembled in #197]
197	28.965394468	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=21/5376, ttl=7 (no response found!)
198	28.965404760	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd66) [Reassembled in #200]
199	28.965406493	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd66) [Reassembled in #200]
200	28.965407992	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=22/5632, ttl=8 (no response found!)
201	28.965410018	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd67) [Reassembled in #203]
202	28.965419874	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd67) [Reassembled in #203]
203	28.965421759	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=23/5888, ttl=8 (no response found!)
204	28.965470775	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd68) [Reassembled in #206]
205	28.965482159	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd68) [Reassembled in #206]
206	28.965483521	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=24/6144, ttl=8 (no response found!)
207	28.965492269	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd69) [Reassembled in #209]
208	28.965495131	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd69) [Reassembled in #209]
209	28.965496511	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=25/6400, ttl=9 (no response found!)
210	28.965504937	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd6a) [Reassembled in #212]
211	28.965509275	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd6a) [Reassembled in #212]
212	28.965510610	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=26/6656, ttl=9 (no response found!)
213	28.965519421	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd6b) [Reassembled in #215]
214	28.965521842	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd6b) [Reassembled in #215]
215	28.965529754	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=27/6912, ttl=9 (no response found!)
216	28.965543991	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd6c) [Reassembled in #218]
217	28.965546745	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd6c) [Reassembled in #218]
218	28.965548061	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=28/7168, ttl=9 (no response found!)
219	28.965555197	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=dd6d) [Reassembled in #221]
220	28.965558993	172.20.10.8	142.250.71.14	IPV4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=dd6d) [Reassembled in #221]
221	28.965560796	172.20.10.8	142.250.71.14	ICMP	54	Echo (ping) request id=0x0004, seq=29/7424, ttl=9 (no response found!)

Frame 193: 1514 bytes on wire (12112 bits), 1514 bytes captured (on interface wlan0, id 0)
Ethernet II, Src: Azurewan_91:b4:87 (34:f6:24:91:b4:87), Dst: 56:32:c7:b1:34:64 (56:32:c7:b1:34:64)
Internet Protocol Version 4, Src: 172.20.10.8, Dst: 142.250.71.14

Packets: 435 · Displayed: 435 (100.0%) · Dropped: 0 (0.0%) Profile: Default

Question 3:

Which fields in the IP datagram always change from one datagram to the next within this series of ICMP messages sent by your computer?

Solution:

- Header Checksum (always change) and TTL changes but not frequently.

Question 4:

Which fields stay constant? Why?

Solution:

- **Version:** Utilizing IPv4 protocol consistently ensures a stable communication framework and addressing system.
- **Header Length:** The IP header length remains fixed, indicating a static structure for basic ping requests.
- **Differentiated Services Field (DSCP):** DSCP is likely to maintain a consistent configuration for prioritization or congestion control during ping operations.
- **Total Length:** The total datagram size remains constant, covering both the header and data segments throughout the series.
- **Protocol:** The identification of the ICMP protocol persists due to the ongoing series of ICMP echo requests (pings).
- **Source Address:** The sender's static IP address remains unchanged throughout the ping sequence.
- **Destination Address:** A consistent target IP address persists across repeated pings to the same host.

