

ECE 636

COMPUTER NETWORKING LABORATORY

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Troubleshooting Experiments with ICMP (Lab 3)

3.2. Lab Descriptions

```
Applications Places Terminal
ak2739@t3net04:~
```

```
File Edit View Search Terminal Help
```

```
To see your aliases, enter "alias"

t3net04-41 ~ >: ifconfig
em1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.10.100.13 netmask 255.255.255.0 broadcast 10.10.100.255
        inet6 fe80::15fc:e00a:f9ce prefixlen 64 scopeid 0x20<link>
        ether 6c:2b:59:e3:0e:eb txqueuelen 1000 (Ethernet)
        RX packets 361 bytes 26487 (25.8 KiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 52 bytes 6175 (6.0 KiB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
        device interrupt 16 memory 0xa5c00000-a5c20000

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
        inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
        loop txqueuelen 1000 (Local Loopback)
        RX packets 28 bytes 2412 (2.3 KiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 28 bytes 2412 (2.3 KiB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

p1p1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.10.201.13 netmask 255.255.255.0 broadcast 10.10.201.255
        inet6 fe80::b696:91ff:fe52:322e prefixlen 64 scopeid 0x20<link>
        ether b4:96:91:52:32:2e txqueuelen 1000 (Ethernet)
        RX packets 246303 bytes 140949293 (134.4 MiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 346933 bytes 374783697 (357.4 MiB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
        device memory 0xa5300000-a53fffff

virbr0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
        inet 192.168.122.1 netmask 255.255.255.0 broadcast 192.168.122.255
        ether 52:54:00:f5:6a:21 txqueuelen 1000 (Ethernet)
        RX packets 0 bytes 0 (0.0 B)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 0 bytes 0 (0.0 B)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

t3net04-42 ~ >: □
```

Workstation description using ifconfig command. Name of the workstation is t3net04. The em1 interface on this workstation has an IP address of 10.10.100.13 and p1p1 interface on this workstation has an IP address of 10.10.201.13.

3.2.1 ICMP Address Mask Request and Reply

- Using the command icmpaddrmask program for ICMP address mask request and reply

```
Applications Places Terminal
ak2739@t3net04:~>

File Edit View Search Terminal Help
t3net04-47 ~ >: icmpaddrmask afs.njit.edu
unknown host afs.njit.edu
t3net04-48 ~ >: icmpaddrmask afs2.njit.edu
timeout
t3net04-49 ~ >: □
```

- Used the commands icmpaddrmask afs.njit.edu and icmpaddrmask afs2.njit.edu on one terminal of the workstation.

```
Applications Places Terminal
ak2739@t3net04:~>

File Edit View Search Terminal Help
t3net04-47 ~ >: tcpdump icmp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
18:30:16.545828 IP t3net04 > afsconnect2.njit.edu: ICMP address mask request, length 12
^C
1 packet captured
1 packet received by filter
0 packets dropped by kernel
t3net04-48 ~ >: □
```

This command, `tcpdump icmp and host -i p1p1 ip address` runs on a different terminal to observe the `tcpdump`. There is no request/ reply when `afs.njit.edu` is used. There is an ICMP address mask request of length 12 when `afs2.njit.edu` is used.

3.2.2 ICMP Timestamp Request and Reply

Messages received from the `icmptime` command for `em1` and `p1p1` interfaces.

```
Applications Places Terminal
ak2739@t3net04:~>

File Edit View Search Terminal Help
t3net04-44 ~ >: icmptime 10.10.100.12
orig = 81567676, recv = 81567676
adjustment = 0 ms
correction = 0 sec, 0 usec
t3net04-45 ~ >: □
```

```
ak2739@t3net04:~  
File Edit View Search Terminal Help
```

To see your aliases, enter "alias"

```
t3net04-41 ~ >: icmpitime 10.10.201.12  
orig = 81303982, recv = 81303982  
adjustment = 0 ms  
correction = 0 sec, 0 usec  
t3net04-42 ~ >: []
```

tcp dump output for icmp time message for em1 interface (10.10.100.12)

```
Applications Places Terminal  
ak2739@t3net04:~  
File Edit View Search Terminal Help  
t3net04-47 ~ >: tcpdump icmp and host -i em1 10.10.100.13  
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode  
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes  
18:39:27.676550 IP t3net04 > 10.10.100.12: ICMP time stamp query id 18721 seq 14640, length 20  
18:39:27.676985 IP 10.10.100.12 > t3net04: ICMP time stamp reply id 18721 seq 14640: org 22:39:27.676, recv 22:39:27.676, xmit 22:39:27.676, length 20  
^C
```

For em1 interface

```
t3net04-48 ~ >: tcpdump icmp and host -i p1p1 10.10.201.13  
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode  
listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes  
18:42:12.333395 IP t3net04 > t3net03: ICMP time stamp query id 6179 seq 14640, length 20  
18:42:12.333879 IP t3net03 > t3net04: ICMP time stamp reply id 6179 seq 14640: org 22:42:12.333, recv 22:42:12.332, xmit 22:42:12.332, length 20  
^C  
2 packets captured  
2 packets received by filter  
0 packets dropped by kernel  
t3net04-49 ~ >: []
```

For p1p1 interface

- Output consists of a ICMP time query message of length 20 followed by a ICMP time reply message of length 20 from the em1 (10.10.100.12) interface and similarly for p1p1(10.10.201.13) interface. Total of 2 packets were received.

3.2.3 Ping program

- The host selected in the same subnet has IP addresses 10.10.100.12 and 10.10.201.12

```
To see your aliases, enter "alias"

t3net04-41 ~ >: arp -vn
Address           HWtype  HWaddress          Flags Mask      Iface
10.10.201.3      ether    00:e0:4c:a0:40:ca  C          p1p1
10.10.201.1      ether    78:8a:20:ba:1a:de  C          p1p1
10.10.100.1      ether    78:8a:20:ba:1e:b9  C          em1
10.10.201.12     ether    b4:96:91:51:cf:14  C          p1p1
10.10.100.12     ether    6c:2b:59:e3:3a:a1  C          em1
10.10.100.11     ether    6c:2b:59:e3:3a:4a  C          em1
Entries: 6      Skipped: 0      Found: 6
```

Using arp -vn command to check the arp cache for the MAC addresses of the selected workstation. The IP addresses, MAC addresses and interface names for the selected host have been marked in the figure above.

```
t3net04-42 ~ >: arp -d 10.10.100.12
```

```
t3net04-43 ~ >: arp -d 10.10.201.12
```

Using commands to delete those addresses from the ARP cache.

```
t3net04-44 ~ >: arp -vn
Address           HWtype  HWaddress          Flags Mask      Iface
10.10.201.3      ether    00:e0:4c:a0:40:ca  C          p1p1
10.10.201.1      ether    78:8a:20:ba:1a:de  C          p1p1
10.10.100.1      ether    78:8a:20:ba:1e:b9  C          em1
10.10.100.11     ether    6c:2b:59:e3:3a:4a  C          em1
Entries: 4      Skipped: 0      Found: 4
t3net04-45 ~ >: □
```

Updated ARP table

- Tcp outputs of arp and icmp packets are observed on 2 different terminals when ping 10.10.100.12(the selected workstation from the subnet) command was running.

```
To see your aliases, enter "alias"
```

```
t3net04-41 ~ >: ping 10.10.100.12
PING 10.10.100.12 (10.10.100.12) 56(84) bytes of data.
64 bytes from 10.10.100.12: icmp_seq=1 ttl=64 time=0.872 ms
64 bytes from 10.10.100.12: icmp_seq=2 ttl=64 time=0.348 ms
64 bytes from 10.10.100.12: icmp_seq=3 ttl=64 time=0.567 ms
64 bytes from 10.10.100.12: icmp_seq=4 ttl=64 time=0.626 ms
64 bytes from 10.10.100.12: icmp_seq=5 ttl=64 time=0.330 ms
64 bytes from 10.10.100.12: icmp_seq=6 ttl=64 time=0.390 ms
64 bytes from 10.10.100.12: icmp_seq=7 ttl=64 time=0.561 ms
64 bytes from 10.10.100.12: icmp_seq=8 ttl=64 time=0.720 ms
64 bytes from 10.10.100.12: icmp_seq=9 ttl=64 time=0.352 ms
64 bytes from 10.10.100.12: icmp_seq=10 ttl=64 time=0.709 ms
^C
--- 10.10.100.12 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9003ms
rtt min/avg/max/mdev = 0.330/0.547/0.872/0.179 ms
t3net04-42 ~ >: □
```

- Tcp dump output for icmp packets which consists of ICMP echo request and ICMP echo reply messages. Each message has a length of 64 with a particular sequence number. The sequence for request and the reply for the request is the same starting from 1.
- The round trip time for the first reply is 0.872 ms. The round trip time for the other successive replies is 0.348 ms, 0.567 ms, 0.626 ms and so on. The round trip for the first reply is larger than all the other replies. It can be explained by the tcpdump output as it would take more time to identify the destination for the first time as the switch will flood all of the interfaces in the subnet to identify which one is the destination by receiving the packet from the destination.

```
t3net04-50 ~ >: tcpdump icmp and host -i em1 10.10.100.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes
19:17:59.985695 IP t3net04 > 10.10.100.12: ICMP echo request, id 14781, seq 1, length 64
19:17:59.985939 IP 10.10.100.12 > t3net04: ICMP echo reply, id 14781, seq 1, length 64
19:18:00.986565 IP t3net04 > 10.10.100.12: ICMP echo request, id 14781, seq 2, length 64
19:18:00.986857 IP 10.10.100.12 > t3net04: ICMP echo reply, id 14781, seq 2, length 64
19:18:01.987063 IP t3net04 > 10.10.100.12: ICMP echo request, id 14781, seq 3, length 64
19:18:01.987580 IP 10.10.100.12 > t3net04: ICMP echo reply, id 14781, seq 3, length 64
19:18:02.986902 IP t3net04 > 10.10.100.12: ICMP echo request, id 14781, seq 4, length 64
19:18:02.987488 IP 10.10.100.12 > t3net04: ICMP echo reply, id 14781, seq 4, length 64
19:18:03.987190 IP t3net04 > 10.10.100.12: ICMP echo request, id 14781, seq 5, length 64
19:18:03.987463 IP 10.10.100.12 > t3net04: ICMP echo reply, id 14781, seq 5, length 64
19:18:04.987187 IP t3net04 > 10.10.100.12: ICMP echo request, id 14781, seq 6, length 64
19:18:04.987520 IP 10.10.100.12 > t3net04: ICMP echo reply, id 14781, seq 6, length 64
19:18:05.987184 IP t3net04 > 10.10.100.12: ICMP echo request, id 14781, seq 7, length 64
19:18:05.987688 IP 10.10.100.12 > t3net04: ICMP echo reply, id 14781, seq 7, length 64
19:18:06.988097 IP t3net04 > 10.10.100.12: ICMP echo request, id 14781, seq 8, length 64
19:18:06.988768 IP 10.10.100.12 > t3net04: ICMP echo reply, id 14781, seq 8, length 64
19:18:07.989192 IP t3net04 > 10.10.100.12: ICMP echo request, id 14781, seq 9, length 64
19:18:07.989489 IP 10.10.100.12 > t3net04: ICMP echo reply, id 14781, seq 9, length 64
19:18:08.988867 IP t3net04 > 10.10.100.12: ICMP echo request, id 14781, seq 10, length 64
19:18:08.989531 IP 10.10.100.12 > t3net04: ICMP echo reply, id 14781, seq 10, length 64
```

- Tcp dump output for arp packets which consists of ARP Request and Reply messages with Request messages with a length of 28 and reply messages with a length of 46.
- The tcp dump arp and icmp packets have been captured on the em1 interface.

```

Applications Places Terminal
ak2739@t3net04:~

File Edit View Search Terminal Help

To see your aliases, enter "alias"

t3net04-41 ~ >: tcpdump arp and host -i em1 10.10.100.12
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes
^C^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
t3net04-42 ~ >: clear
t3net04-43 ~ >: tcpdump arp and host -i em1 10.10.100.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes
19:17:59.985133 ARP, Request who-has 10.10.100.12 tell t3net04, length 28
19:17:59.985679 ARP, Reply 10.10.100.12 is-at 6c:2b:59:e3:3a:a1 (oui Unknown), length 46
19:18:04.999073 ARP, Request who-has t3net04 tell 10.10.100.12, length 46
19:18:04.999102 ARP, Reply t3net04 is-at 6c:2b:59:e3:0e:eb (oui Unknown), length 28

```

- Ping 10.10.201.12(the selected workstation from the subnet) command was running, which is the p1p1 interface of the selected host

```

File Edit View Search Terminal Help
t3net04-52 ~ >: ping 10.10.201.12
PING 10.10.201.12 (10.10.201.12) 56(84) bytes of data.
64 bytes from 10.10.201.12: icmp_seq=1 ttl=64 time=0.550 ms
64 bytes from 10.10.201.12: icmp_seq=2 ttl=64 time=0.763 ms
64 bytes from 10.10.201.12: icmp_seq=3 ttl=64 time=0.557 ms
64 bytes from 10.10.201.12: icmp_seq=4 ttl=64 time=0.639 ms
64 bytes from 10.10.201.12: icmp_seq=5 ttl=64 time=0.398 ms
64 bytes from 10.10.201.12: icmp_seq=6 ttl=64 time=0.374 ms
64 bytes from 10.10.201.12: icmp_seq=7 ttl=64 time=0.339 ms
64 bytes from 10.10.201.12: icmp_seq=8 ttl=64 time=0.371 ms
64 bytes from 10.10.201.12: icmp_seq=9 ttl=64 time=0.689 ms
64 bytes from 10.10.201.12: icmp_seq=10 ttl=64 time=0.714 ms
64 bytes from 10.10.201.12: icmp_seq=11 ttl=64 time=0.526 ms
64 bytes from 10.10.201.12: icmp_seq=12 ttl=64 time=0.668 ms
64 bytes from 10.10.201.12: icmp_seq=13 ttl=64 time=0.596 ms
64 bytes from 10.10.201.12: icmp_seq=14 ttl=64 time=0.754 ms
64 bytes from 10.10.201.12: icmp_seq=15 ttl=64 time=0.744 ms
64 bytes from 10.10.201.12: icmp_seq=16 ttl=64 time=0.346 ms
64 bytes from 10.10.201.12: icmp_seq=17 ttl=64 time=0.770 ms
64 bytes from 10.10.201.12: icmp_seq=18 ttl=64 time=0.779 ms
64 bytes from 10.10.201.12: icmp_seq=19 ttl=64 time=0.767 ms
64 bytes from 10.10.201.12: icmp_seq=20 ttl=64 time=0.369 ms
64 bytes from 10.10.201.12: icmp_seq=21 ttl=64 time=0.773 ms
64 bytes from 10.10.201.12: icmp_seq=22 ttl=64 time=0.757 ms
^C
--- 10.10.201.12 ping statistics ---
22 packets transmitted, 22 received, 0% packet loss, time 21009ms
rtt min/avg/max/mdev = 0.339/0.601/0.779/0.166 ms
t3net04-53 ~ >: []

```

- tcp dump output for arp on p1p1 interface. It consists of request and reply messages with different lengths 28 and 46.

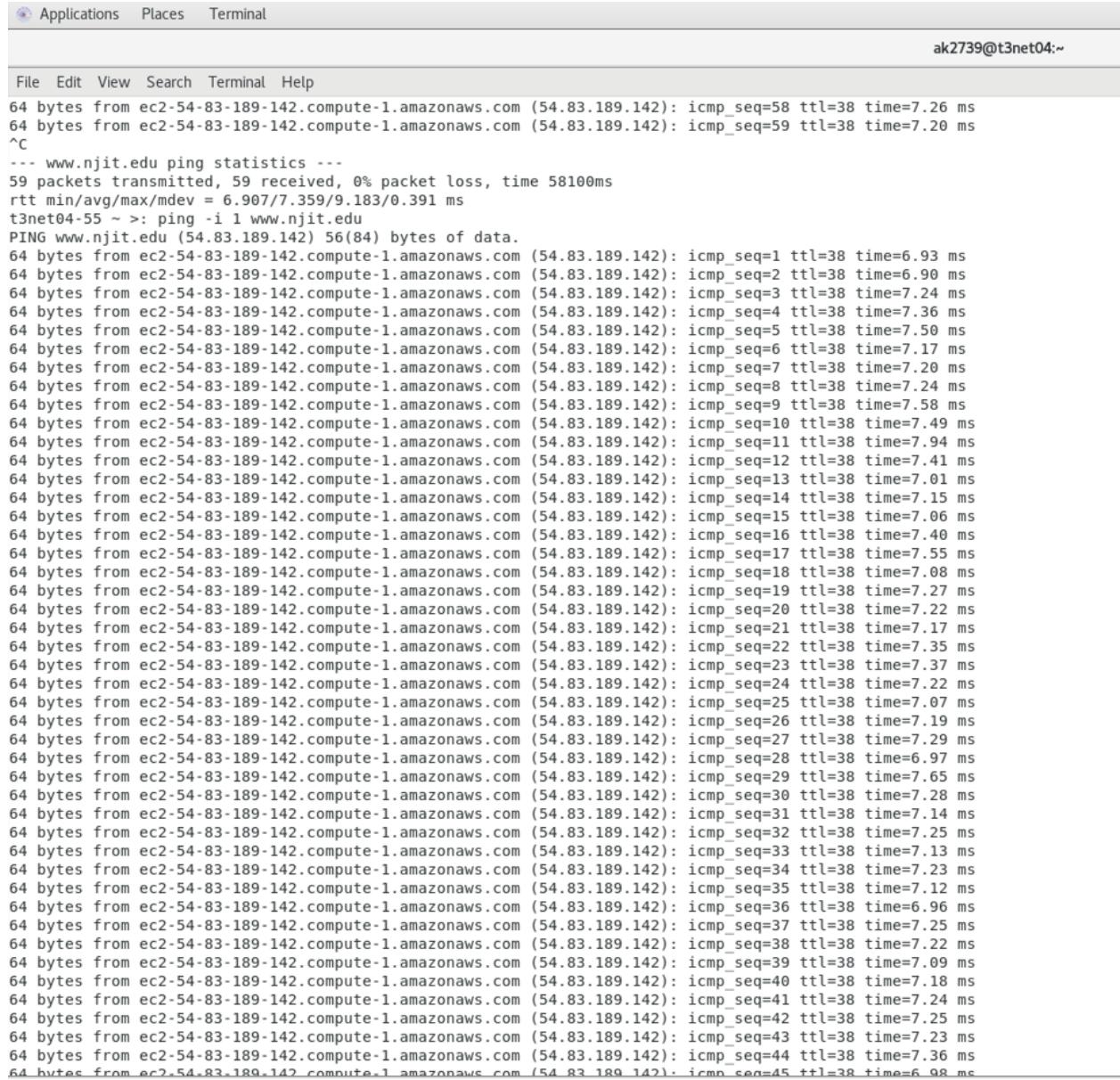
```
t3net04-47 ~ >: tcpdump arp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
19:24:50.098300 ARP, Request who-has t3net04 tell gateway, length 46
19:24:50.098321 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
19:25:01.335500 ARP, Request who-has t3net04 tell t3net03, length 46
19:25:01.335552 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
19:25:06.337002 ARP, Request who-has t3net03 tell t3net04, length 28
19:25:06.337542 ARP, Reply t3net03 is-at b4:96:91:51:cf:14 (oui Unknown), length 46
19:25:11.244980 ARP, Request who-has t3net04 tell t3net, length 46
19:25:11.245033 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
19:25:22.359512 ARP, Request who-has t3net04 tell t3net03, length 46
19:25:22.359539 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
^C
10 packets captured
10 packets received by filter
0 packets dropped by kernel
t3net04-48 ~ >: █
```

File Edit View Search Terminal Help

```
t3net04-43 ~ >: tcpdump icmp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
19:24:56.334414 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 1, length 64
19:24:56.334904 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 1, length 64
19:24:57.335106 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 2, length 64
19:24:57.335818 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 2, length 64
19:24:58.335908 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 3, length 64
19:24:58.336420 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 3, length 64
19:24:59.335882 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 4, length 64
19:24:59.336484 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 4, length 64
19:25:00.335925 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 5, length 64
19:25:00.336277 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 5, length 64
19:25:01.335915 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 6, length 64
19:25:01.336242 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 6, length 64
19:25:02.335852 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 7, length 64
19:25:02.336165 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 7, length 64
19:25:03.336143 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 8, length 64
19:25:03.336461 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 8, length 64
19:25:04.336185 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 9, length 64
19:25:04.336815 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 9, length 64
19:25:05.337239 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 10, length 64
19:25:05.337898 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 10, length 64
19:25:06.337901 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 11, length 64
19:25:06.338379 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 11, length 64
19:25:07.337936 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 12, length 64
19:25:07.338558 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 12, length 64
19:25:08.338080 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 13, length 64
19:25:08.338623 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 13, length 64
19:25:09.338855 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 14, length 64
19:25:09.339564 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 14, length 64
19:25:10.339065 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 15, length 64
19:25:10.339757 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 15, length 64
19:25:11.340062 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 16, length 64
19:25:11.340357 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 16, length 64
19:25:12.339932 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 17, length 64
19:25:12.340652 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 17, length 64
19:25:13.340866 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 18, length 64
19:25:13.341596 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 18, length 64
19:25:14.342096 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 19, length 64
19:25:14.342809 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 19, length 64
19:25:15.342849 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 20, length 64
19:25:15.343172 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 20, length 64
19:25:16.343201 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 21, length 64
19:25:16.343914 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 21, length 64
19:25:17.344047 IP t3net04 > t3net03: ICMP echo request, id 15768, seq 22, length 64
19:25:17.344776 IP t3net03 > t3net04: ICMP echo reply, id 15768, seq 22, length 64
^C
44 packets captured
44 packets received by filter
0 packets dropped by kernel
t3net04-44 ~ >: █
```

- tcp dump output for icmp packets for p1p1 interface. It consists of echo request and echo reply messages each with length 64.
- The tcp dump arp and icmp packets have been captured while the ping command for the p1p1 interface is running.

Ping Output of a host in a LAN



The screenshot shows a terminal window with a light gray header bar containing icons for Applications, Places, and Terminal, and the text "ak2739@t3net04:~". Below the header is a menu bar with File, Edit, View, Search, Terminal, and Help. The main area of the terminal displays the output of a ping command to www.njit.edu. The output shows 59 packets transmitted, 59 received, 0% packet loss, and a round-trip time of 58100ms. The rtt min/avg/max/mdev values are 6.907/7.359/9.183/0.391 ms. The terminal then shows a series of 45 ICMP echo requests (seq=1 to seq=45) sent to the target host at 54.83.189.142, with their respective times and TTL values.

```

File Edit View Search Terminal Help
ak2739@t3net04:~
File Edit View Search Terminal Help
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=58 ttl=38 time=7.26 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=59 ttl=38 time=7.20 ms
^C
--- www.njit.edu ping statistics ---
59 packets transmitted, 59 received, 0% packet loss, time 58100ms
rtt min/avg/max/mdev = 6.907/7.359/9.183/0.391 ms
t3net04-55 ~ >: ping -i 1 www.njit.edu
PING www.njit.edu (54.83.189.142) 56(84) bytes of data.
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=1 ttl=38 time=6.93 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=2 ttl=38 time=6.90 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=3 ttl=38 time=7.24 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=4 ttl=38 time=7.36 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=5 ttl=38 time=7.50 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=6 ttl=38 time=7.17 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=7 ttl=38 time=7.20 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=8 ttl=38 time=7.24 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=9 ttl=38 time=7.58 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=10 ttl=38 time=7.49 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=11 ttl=38 time=7.94 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=12 ttl=38 time=7.41 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=13 ttl=38 time=7.01 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=14 ttl=38 time=7.15 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=15 ttl=38 time=7.06 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=16 ttl=38 time=7.40 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=17 ttl=38 time=7.55 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=18 ttl=38 time=7.08 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=19 ttl=38 time=7.27 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=20 ttl=38 time=7.22 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=21 ttl=38 time=7.17 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=22 ttl=38 time=7.35 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=23 ttl=38 time=7.37 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=24 ttl=38 time=7.22 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=25 ttl=38 time=7.07 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=26 ttl=38 time=7.19 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=27 ttl=38 time=7.29 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=28 ttl=38 time=6.97 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=29 ttl=38 time=7.65 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=30 ttl=38 time=7.28 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=31 ttl=38 time=7.14 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=32 ttl=38 time=7.25 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=33 ttl=38 time=7.13 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=34 ttl=38 time=7.23 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=35 ttl=38 time=7.12 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=36 ttl=38 time=6.96 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=37 ttl=38 time=7.25 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=38 ttl=38 time=7.22 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=39 ttl=38 time=7.09 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=40 ttl=38 time=7.18 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=41 ttl=38 time=7.24 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=42 ttl=38 time=7.25 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=43 ttl=38 time=7.23 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=44 ttl=38 time=7.36 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=45 ttl=38 time=6.98 ms

```

```

Applications Places Terminal
ak2739@t3net04:~

File Edit View Search Terminal Help

64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=17 ttl=38 time=7.55 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=18 ttl=38 time=7.08 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=19 ttl=38 time=7.27 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=20 ttl=38 time=7.22 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=21 ttl=38 time=7.17 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=22 ttl=38 time=7.35 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=23 ttl=38 time=7.37 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=24 ttl=38 time=7.22 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=25 ttl=38 time=7.07 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=26 ttl=38 time=7.19 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=27 ttl=38 time=7.29 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=28 ttl=38 time=6.97 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=29 ttl=38 time=7.65 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=30 ttl=38 time=7.28 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=31 ttl=38 time=7.14 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=32 ttl=38 time=7.25 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=33 ttl=38 time=7.13 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=34 ttl=38 time=7.23 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=35 ttl=38 time=7.12 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=36 ttl=38 time=6.96 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=37 ttl=38 time=7.25 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=38 ttl=38 time=7.22 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=39 ttl=38 time=7.09 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=40 ttl=38 time=7.18 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=41 ttl=38 time=7.24 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=42 ttl=38 time=7.25 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=43 ttl=38 time=7.23 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=44 ttl=38 time=7.36 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=45 ttl=38 time=6.98 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=46 ttl=38 time=7.21 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=47 ttl=38 time=7.19 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=48 ttl=38 time=7.12 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=49 ttl=38 time=7.66 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=50 ttl=38 time=7.27 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=51 ttl=38 time=7.15 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=52 ttl=38 time=7.22 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=53 ttl=38 time=7.41 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=54 ttl=38 time=7.33 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=55 ttl=38 time=7.15 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=56 ttl=38 time=6.84 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=57 ttl=38 time=7.40 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=58 ttl=38 time=7.20 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=59 ttl=38 time=7.23 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=60 ttl=38 time=7.12 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=61 ttl=38 time=7.05 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=62 ttl=38 time=6.99 ms
64 bytes from ec2-54-83-189-142.compute-1.amazonaws.com (54.83.189.142): icmp_seq=63 ttl=38 time=6.96 ms
^C
--- www.njit.edu ping statistics ---
63 packets transmitted, 63 received, 0% packet loss, time 62091ms
rtt min/avg/max/mdev = 6.849/7.233/7.942/0.200 ms
t3net04-55 ~ >: 

```

Ping Statistics for 1 minute

63 packets Transmitted and 63 packets were received. There was a 0% packet loss
 Average value for round trip time was 7.233 ms and maximum and minimum value
 were 6.849 ms and 7.942 ms respectively.

The maximum deviation of the round trip time from the average value was 0.2 ms.

Ping a non-existing host in the same subnet as your workstation(for interface em1 of the workstation)

10.10.100.39 is a non-existing host in the same subnet as the workstation t3net04, em1 interface(10.10.100.13).

```
Applications Places Terminal
ak2739@t3net04:~
```

```
File Edit View Search Terminal Help
From 10.10.0.1 icmp_seq=60 Destination Host Unreachable
From 10.10.0.1 icmp_seq=61 Destination Host Unreachable
From 10.10.0.1 icmp_seq=62 Destination Host Unreachable
From 10.10.0.1 icmp_seq=63 Destination Host Unreachable
^C^C
-- 10.10.101.41 ping statistics --
65 packets transmitted, 0 received, +63 errors, 100% packet loss, time 64001ms
pipe 4
t3net04-64 ~ >: clear

t3net04-65 ~ >: ping 10.10.100.39
PING 10.10.100.39 (10.10.100.39) 56(84) bytes of data.
From 10.10.100.13 icmp_seq=1 Destination Host Unreachable
From 10.10.100.13 icmp_seq=2 Destination Host Unreachable
From 10.10.100.13 icmp_seq=3 Destination Host Unreachable
From 10.10.100.13 icmp_seq=4 Destination Host Unreachable
From 10.10.100.13 icmp_seq=5 Destination Host Unreachable
From 10.10.100.13 icmp_seq=6 Destination Host Unreachable
From 10.10.100.13 icmp_seq=7 Destination Host Unreachable
From 10.10.100.13 icmp_seq=8 Destination Host Unreachable
From 10.10.100.13 icmp_seq=9 Destination Host Unreachable
From 10.10.100.13 icmp_seq=10 Destination Host Unreachable
From 10.10.100.13 icmp_seq=11 Destination Host Unreachable
From 10.10.100.13 icmp_seq=12 Destination Host Unreachable
From 10.10.100.13 icmp_seq=13 Destination Host Unreachable
From 10.10.100.13 icmp_seq=14 Destination Host Unreachable
From 10.10.100.13 icmp_seq=15 Destination Host Unreachable
From 10.10.100.13 icmp_seq=16 Destination Host Unreachable
From 10.10.100.13 icmp_seq=17 Destination Host Unreachable
From 10.10.100.13 icmp_seq=18 Destination Host Unreachable
From 10.10.100.13 icmp_seq=19 Destination Host Unreachable
From 10.10.100.13 icmp_seq=20 Destination Host Unreachable
From 10.10.100.13 icmp_seq=21 Destination Host Unreachable
From 10.10.100.13 icmp_seq=22 Destination Host Unreachable
From 10.10.100.13 icmp_seq=23 Destination Host Unreachable
From 10.10.100.13 icmp_seq=24 Destination Host Unreachable
From 10.10.100.13 icmp_seq=25 Destination Host Unreachable
From 10.10.100.13 icmp_seq=26 Destination Host Unreachable
From 10.10.100.13 icmp_seq=27 Destination Host Unreachable
From 10.10.100.13 icmp_seq=28 Destination Host Unreachable
From 10.10.100.13 icmp_seq=29 Destination Host Unreachable
From 10.10.100.13 icmp_seq=30 Destination Host Unreachable
From 10.10.100.13 icmp_seq=31 Destination Host Unreachable
From 10.10.100.13 icmp_seq=32 Destination Host Unreachable
From 10.10.100.13 icmp_seq=33 Destination Host Unreachable
From 10.10.100.13 icmp_seq=34 Destination Host Unreachable
From 10.10.100.13 icmp_seq=35 Destination Host Unreachable
From 10.10.100.13 icmp_seq=36 Destination Host Unreachable
From 10.10.100.13 icmp_seq=37 Destination Host Unreachable
From 10.10.100.13 icmp_seq=38 Destination Host Unreachable
From 10.10.100.13 icmp_seq=39 Destination Host Unreachable
From 10.10.100.13 icmp_seq=40 Destination Host Unreachable
-----
```

Tcpdump output for icmp packets. There are no packets while the ping command is running to a non-existing host.

```
Applications Places Terminal
ak2739@t3net04:~
```

```
File Edit View Search Terminal Help
t3net04-65 ~ >: tcpdump icmp and host -i em1 10.10.100.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes

```

tcp dump output for arp packets while the ping command is running for a non-existing host in the same subnet as the workstation.

The arp packets consist of request and reply messages with message, “who-has 10.10.100.39” each with length of 28.

```
Applications Places Terminal ak2739@t3net04:~  
File Edit View Search Terminal Help  
t3net04-71 ~ >: tcpdump arp and host -i em1 10.10.100.13  
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode  
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes  
20:12:21.914956 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:22.916989 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:23.918851 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:25.916287 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:26.916883 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:27.918840 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:29.917200 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:30.918907 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:31.920867 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:33.918381 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:34.920956 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:35.922856 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:37.919508 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:38.920836 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:39.922866 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:41.920355 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:42.920796 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:43.922839 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:45.921449 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:46.922834 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:47.924863 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:49.923269 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:50.924847 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:51.926843 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:53.925525 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:54.926879 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:55.928794 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:57.926400 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:58.928794 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:12:59.930795 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:13:01.928525 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:13:02.928797 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:13:03.930866 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:13:05.929331 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:13:06.930868 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:13:07.932866 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
20:13:09.930187 ARP, Request who-has 10.10.100.39 tell t3net04, length 28  
^C  
37 packets captured  
37 packets received by filter  
0 packets dropped by kernel  
t3net04-72 ~ >: 
```

Ping a non-existing host in the same subnet as your workstation(for interface p1p1 of the workstation)

10.10.201.39 is a non-existing host in the same subnet as the workstation t3net04, p1p1 interface(10.10.201.13).

```
t3net04-68 ~ >: ping 10.10.201.39
PING 10.10.201.39 (10.10.201.39) 56(84) bytes of data.
From 10.10.201.13 icmp_seq=1 Destination Host Unreachable
From 10.10.201.13 icmp_seq=2 Destination Host Unreachable
From 10.10.201.13 icmp_seq=3 Destination Host Unreachable
From 10.10.201.13 icmp_seq=4 Destination Host Unreachable
From 10.10.201.13 icmp_seq=5 Destination Host Unreachable
From 10.10.201.13 icmp_seq=6 Destination Host Unreachable
From 10.10.201.13 icmp_seq=7 Destination Host Unreachable
From 10.10.201.13 icmp_seq=8 Destination Host Unreachable
From 10.10.201.13 icmp_seq=9 Destination Host Unreachable
From 10.10.201.13 icmp_seq=10 Destination Host Unreachable
From 10.10.201.13 icmp_seq=11 Destination Host Unreachable
From 10.10.201.13 icmp_seq=12 Destination Host Unreachable
From 10.10.201.13 icmp_seq=13 Destination Host Unreachable
From 10.10.201.13 icmp_seq=14 Destination Host Unreachable
From 10.10.201.13 icmp_seq=15 Destination Host Unreachable
From 10.10.201.13 icmp_seq=16 Destination Host Unreachable
From 10.10.201.13 icmp_seq=17 Destination Host Unreachable
From 10.10.201.13 icmp_seq=18 Destination Host Unreachable
From 10.10.201.13 icmp_seq=19 Destination Host Unreachable
From 10.10.201.13 icmp_seq=20 Destination Host Unreachable
From 10.10.201.13 icmp_seq=21 Destination Host Unreachable
From 10.10.201.13 icmp_seq=22 Destination Host Unreachable
From 10.10.201.13 icmp_seq=23 Destination Host Unreachable
From 10.10.201.13 icmp_seq=24 Destination Host Unreachable
From 10.10.201.13 icmp_seq=25 Destination Host Unreachable
From 10.10.201.13 icmp_seq=26 Destination Host Unreachable
From 10.10.201.13 icmp_seq=27 Destination Host Unreachable
From 10.10.201.13 icmp_seq=28 Destination Host Unreachable
From 10.10.201.13 icmp_seq=29 Destination Host Unreachable
From 10.10.201.13 icmp_seq=30 Destination Host Unreachable
From 10.10.201.13 icmp_seq=31 Destination Host Unreachable
From 10.10.201.13 icmp_seq=32 Destination Host Unreachable
^C
--- 10.10.201.39 ping statistics ---
33 packets transmitted, 0 received, +32 errors, 100% packet loss, time 32010ms
pipe 4
t3net04-69 ~ >: 
```

ak2739@t3net04:~ ak2739@t3net04:~ ak2739@t3net04:~

Tcpdump output for icmp packets. There are no packets while the ping command is running to a non-existing host.

```
t3net04-65 ~ >: tcpdump icmp and host -i em1 10.10.100.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
t3net04-66 ~ >: tcpdump icmp and host -i plpl1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on plpl1, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
t3net04-67 ~ >: 
```

ak2739@t3net04:~ ak2739@t3net04:~ ak2739@t3net04:~

tcp dump output for arp packets while the ping command is running for a non-existing host in the same subnet as the workstation.

The arp packets consist of request and reply messages with message, “who-has 10.10.201.39” each with length of 28.

```
t3net04-73 ~ >: tcpdump arp and host -i plpl1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on plpl1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:23:27.096459 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:28.096862 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:29.098839 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:31.097142 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:32.098924 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:33.100856 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:35.098016 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:36.100848 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:37.102864 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:39.100523 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:40.100800 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:40.881105 ARP, Request who-has t3net tell t3net04, length 28
20:23:40.881538 ARP, Reply t3net is-at 00:e0:4c:a0:40:ca (oui Unknown), length 46
20:23:41.102987 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:43.102382 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:44.104963 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:45.106798 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:47.104196 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:48.104856 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
20:23:49.106874 ARP, Request who-has 10.10.201.39 tell t3net04, length 28
^C
20 packets captured
20 packets received by filter
0 packets dropped by kernel
t3net04-73 ~ >: □
```

Ping a live host of both interfaces in the same subnet as your workstation

10.10.100.12 is a live host in the same subnet as the workstation t3net04, em1 interface(10.10.100.13).

```
t3net04-56 ~ >: ping 10.10.100.12
PING 10.10.100.12 (10.10.100.12) 56(84) bytes of data.
64 bytes from 10.10.100.12: icmp_seq=1 ttl=64 time=0.581 ms
64 bytes from 10.10.100.12: icmp_seq=2 ttl=64 time=0.753 ms
64 bytes from 10.10.100.12: icmp_seq=3 ttl=64 time=0.647 ms
64 bytes from 10.10.100.12: icmp_seq=4 ttl=64 time=0.717 ms
64 bytes from 10.10.100.12: icmp_seq=5 ttl=64 time=0.534 ms
64 bytes from 10.10.100.12: icmp_seq=6 ttl=64 time=0.278 ms
64 bytes from 10.10.100.12: icmp_seq=7 ttl=64 time=0.654 ms
64 bytes from 10.10.100.12: icmp_seq=8 ttl=64 time=0.550 ms
64 bytes from 10.10.100.12: icmp_seq=9 ttl=64 time=0.374 ms
64 bytes from 10.10.100.12: icmp_seq=10 ttl=64 time=0.725 ms
64 bytes from 10.10.100.12: icmp_seq=11 ttl=64 time=0.554 ms
64 bytes from 10.10.100.12: icmp_seq=12 ttl=64 time=0.498 ms
64 bytes from 10.10.100.12: icmp_seq=13 ttl=64 time=0.729 ms
64 bytes from 10.10.100.12: icmp_seq=14 ttl=64 time=0.517 ms
64 bytes from 10.10.100.12: icmp_seq=15 ttl=64 time=0.540 ms
64 bytes from 10.10.100.12: icmp_seq=16 ttl=64 time=0.556 ms
64 bytes from 10.10.100.12: icmp_seq=17 ttl=64 time=0.533 ms
64 bytes from 10.10.100.12: icmp_seq=18 ttl=64 time=0.561 ms
64 bytes from 10.10.100.12: icmp_seq=19 ttl=64 time=0.727 ms
64 bytes from 10.10.100.12: icmp_seq=20 ttl=64 time=0.368 ms
64 bytes from 10.10.100.12: icmp_seq=21 ttl=64 time=0.389 ms
64 bytes from 10.10.100.12: icmp_seq=22 ttl=64 time=0.415 ms
64 bytes from 10.10.100.12: icmp_seq=23 ttl=64 time=0.447 ms
64 bytes from 10.10.100.12: icmp_seq=24 ttl=64 time=0.373 ms
64 bytes from 10.10.100.12: icmp_seq=25 ttl=64 time=0.375 ms
64 bytes from 10.10.100.12: icmp_seq=26 ttl=64 time=0.358 ms
64 bytes from 10.10.100.12: icmp_seq=27 ttl=64 time=0.369 ms
64 bytes from 10.10.100.12: icmp_seq=28 ttl=64 time=0.547 ms
64 bytes from 10.10.100.12: icmp_seq=29 ttl=64 time=0.422 ms
64 bytes from 10.10.100.12: icmp_seq=30 ttl=64 time=0.736 ms
64 bytes from 10.10.100.12: icmp_seq=31 ttl=64 time=0.713 ms
^C
--- 10.10.100.12 ping statistics ---
31 packets transmitted, 31 received, 0% packet loss, time 30007ms
rtt min/avg/max/mdev = 0.278/0.533/0.753/0.139 ms
t3net04-57 ~ >: □
```

tcp dump output for icmp packets while the ping command is running for a live host in the same subnet as the workstation.

The icmp packets consist of echo request and echo reply messages with sequence number starting from 1 and echo request and echo reply have the same sequence number. The id = 21721 is the same for all the packets. Every icmp packet is 64 length.

```
Applications Places Terminal
ak2739@t3net04:~
```

```
File Edit View Search Terminal Help
^C
62 packets captured
62 packets received by filter
0 packets dropped by kernel
t3net04-60 ~ >: clear

t3net04-61 ~ >: tcpdump icmp and host -i em1 10.10.100.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:05:20.638083 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 1, length 64
20:05:20.638579 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 1, length 64
20:05:21.639194 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 2, length 64
20:05:21.639777 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 2, length 64
20:05:22.639855 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 3, length 64
20:05:22.640298 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 3, length 64
20:05:23.639936 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 4, length 64
20:05:23.640425 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 4, length 64
20:05:24.639892 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 5, length 64
20:05:24.640241 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 5, length 64
20:05:25.639854 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 6, length 64
20:05:25.640342 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 6, length 64
20:05:26.639848 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 7, length 64
20:05:26.640357 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 7, length 64
20:05:27.639898 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 8, length 64
20:05:27.640472 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 8, length 64
20:05:28.639872 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 9, length 64
20:05:28.640471 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 9, length 64
20:05:29.639863 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 10, length 64
20:05:29.640166 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 10, length 64
20:05:30.639868 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 11, length 64
20:05:30.640475 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 11, length 64
20:05:31.640091 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 12, length 64
20:05:31.640762 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 12, length 64
20:05:32.640856 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 13, length 64
20:05:32.641334 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 13, length 64
20:05:33.640900 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 14, length 64
20:05:33.641378 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 14, length 64
20:05:34.641186 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 15, length 64
20:05:34.641638 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 15, length 64
20:05:35.642149 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 16, length 64
20:05:35.642847 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 16, length 64
20:05:36.642848 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 17, length 64
20:05:36.643427 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 17, length 64
20:05:37.643095 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 18, length 64
20:05:37.643746 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 18, length 64
20:05:38.643933 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 19, length 64
20:05:38.644544 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 19, length 64
20:05:39.644133 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 20, length 64
20:05:39.644782 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 20, length 64
20:05:40.644856 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 21, length 64
20:05:40.645433 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 21, length 64
20:05:41.644908 IP t3net04 > 10.10.100.11: ICMP echo request, id 21721, seq 22, length 64
20:05:41.645362 IP 10.10.100.11 > t3net04: ICMP echo reply, id 21721, seq 22, length 64
```

tcp dump output for arp packets while the ping command is running for a non-existing host in the same subnet as the workstation.

The arp packets consist of request and reply messages with message, “who-has 10.10.201.39” each with length of 28.

```
ak2739@t3net04:~
```

```
File Edit View Search Terminal Help
t3net04-67 ~ >: tcpdump arp and host -i em1 10.10.100.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:04:54.094840 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:04:55.096854 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:04:56.098866 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:04:58.096665 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:04:59.096859 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:00.098866 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:02.097237 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:03.098832 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:04.100865 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:06.098513 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:07.100952 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:08.102866 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:10.099493 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:11.100968 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:12.102949 ARP, Request who-has 10.10.100.10 tell t3net04, length 28
20:05:25.648838 ARP, Request who-has 10.10.100.11 tell t3net04, length 28
20:05:25.649310 ARP, Reply 10.10.100.11 is-at 6c:2b:59:e3:3a:4a (oui Unknown), length 46
20:05:31.653846 ARP, Request who-has t3net04 tell 10.10.100.11, length 46
20:05:31.653878 ARP, Reply t3net04 is-at 6c:2b:59:e3:0e:eb (oui Unknown), length 28
□
```

The ARP packet tcp dump is for the em1 interface of the workstation when a ping command for a live host from the same subnet.

10.10.201.12 is a live host in the same subnet as the workstation t3net04, p1p1 interface(10.10.201.13).

```
File Edit View Search Terminal Help
t3net04-70 ~ >: ping 10.10.201.12
PING 10.10.201.12 (10.10.201.12) 56(84) bytes of data.
64 bytes from 10.10.201.12: icmp_seq=1 ttl=64 time=0.473 ms
64 bytes from 10.10.201.12: icmp_seq=2 ttl=64 time=0.587 ms
64 bytes from 10.10.201.12: icmp_seq=3 ttl=64 time=0.435 ms
64 bytes from 10.10.201.12: icmp_seq=4 ttl=64 time=0.675 ms
64 bytes from 10.10.201.12: icmp_seq=5 ttl=64 time=0.582 ms
64 bytes from 10.10.201.12: icmp_seq=6 ttl=64 time=0.419 ms
64 bytes from 10.10.201.12: icmp_seq=7 ttl=64 time=0.320 ms
64 bytes from 10.10.201.12: icmp_seq=8 ttl=64 time=0.670 ms
64 bytes from 10.10.201.12: icmp_seq=9 ttl=64 time=0.647 ms
64 bytes from 10.10.201.12: icmp_seq=10 ttl=64 time=0.407 ms
64 bytes from 10.10.201.12: icmp_seq=11 ttl=64 time=0.747 ms
64 bytes from 10.10.201.12: icmp_seq=12 ttl=64 time=0.615 ms
^C
--- 10.10.201.12 ping statistics ---
12 packets transmitted, 12 received, 0% packet loss, time 11002ms
rtt min/avg/max/mdev = 0.320/0.548/0.747/0.127 ms
t3net04-71 ~ >: □
```

tcp dump output for icmp packets while the ping command is running for a live host (p1p1 interface) in the same subnet as the workstation.

The icmp packets consist of echo request and echo reply messages with sequence number starting from 1 and echo request and echo reply have the same sequence number. The id = 214370 is the same for all the packets. Every icmp packet is 64 length.

```
File Edit View Search Terminal Help
t3net04-68 ~ >: tcpdump icmp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:25:37.430448 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 1, length 64
20:25:37.430863 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 1, length 64
20:25:38.431190 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 2, length 64
20:25:38.431716 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 2, length 64
20:25:39.432097 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 3, length 64
20:25:39.432479 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 3, length 64
20:25:40.431941 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 4, length 64
20:25:40.432569 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 4, length 64
20:25:41.431915 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 5, length 64
20:25:41.432451 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 5, length 64
20:25:42.431860 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 6, length 64
20:25:42.432234 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 6, length 64
20:25:43.431814 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 7, length 64
20:25:43.432108 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 7, length 64
20:25:44.431910 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 8, length 64
20:25:44.432534 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 8, length 64
20:25:45.431857 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 9, length 64
20:25:45.432460 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 9, length 64
20:25:46.431938 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 10, length 64
20:25:46.432292 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 10, length 64
20:25:47.432071 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 11, length 64
20:25:47.432765 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 11, length 64
20:25:48.432864 IP t3net04 > t3net03: ICMP echo request, id 24370, seq 12, length 64
20:25:48.433432 IP t3net03 > t3net04: ICMP echo reply, id 24370, seq 12, length 64
```

tcp dump output for arp packets while the ping command is running for a live host in the same subnet (p1p1 interface) as the workstation.

The arp packets consist of request and reply messages with message, “who-has b4:96:91:52:32:2e” each with length of 28 and another request comment with length 46. Where instead of IP address of the live host MAC address is used in the request and reply packets.

```
ak2739@t3net04:~>
File Edit View Search Terminal Help
t3net04-74 ~ >: tcpdump arp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:25:41.197104 ARP, Request who-has t3net04 tell t3net, length 46
20:25:41.197147 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:25:42.432842 ARP, Request who-has t3net03 tell t3net04, length 28
20:25:42.433191 ARP, Reply t3net03 is-at b4:96:91:51:c1:14 (oui Unknown), length 46
20:25:42.434055 ARP, Request who-has t3net04 tell gateway, length 46
20:25:42.434072 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:25:48.439364 ARP, Request who-has t3net04 tell t3net03, length 46
20:25:48.439385 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:25:50.721113 ARP, Request who-has gateway tell t3net04, length 28
20:25:50.721472 ARP, Reply gateway is-at 78:8a:20:ba:1a:de (oui Unknown), length 46
```

Ping a non-existing host in a different subnet than your workstation

10.10.104.41 is a non-existing host in the different subnet as the workstation t3net04, em1 interface(10.10.100.13).

```
Applications Places Terminal
ak2739@t3net04:~
File Edit View Search Terminal Help
t3net04-63 ~ >: ping 10.10.101.41
PING 10.10.101.41 (10.10.101.41) 56(84) bytes of data.
From 10.10.0.1 icmp_seq=1 Destination Host Unreachable
From 10.10.0.1 icmp_seq=2 Destination Host Unreachable
From 10.10.0.1 icmp_seq=3 Destination Host Unreachable
From 10.10.0.1 icmp_seq=4 Destination Host Unreachable
From 10.10.0.1 icmp_seq=5 Destination Host Unreachable
From 10.10.0.1 icmp_seq=6 Destination Host Unreachable
From 10.10.0.1 icmp_seq=7 Destination Host Unreachable
From 10.10.0.1 icmp_seq=8 Destination Host Unreachable
From 10.10.0.1 icmp_seq=9 Destination Host Unreachable
From 10.10.0.1 icmp_seq=10 Destination Host Unreachable
From 10.10.0.1 icmp_seq=11 Destination Host Unreachable
From 10.10.0.1 icmp_seq=12 Destination Host Unreachable
From 10.10.0.1 icmp_seq=13 Destination Host Unreachable
From 10.10.0.1 icmp_seq=14 Destination Host Unreachable
From 10.10.0.1 icmp_seq=15 Destination Host Unreachable
From 10.10.0.1 icmp_seq=16 Destination Host Unreachable
From 10.10.0.1 icmp_seq=17 Destination Host Unreachable
From 10.10.0.1 icmp_seq=18 Destination Host Unreachable
From 10.10.0.1 icmp_seq=19 Destination Host Unreachable
From 10.10.0.1 icmp_seq=20 Destination Host Unreachable
From 10.10.0.1 icmp_seq=21 Destination Host Unreachable
From 10.10.0.1 icmp_seq=22 Destination Host Unreachable
From 10.10.0.1 icmp_seq=23 Destination Host Unreachable
From 10.10.0.1 icmp_seq=24 Destination Host Unreachable
From 10.10.0.1 icmp_seq=25 Destination Host Unreachable
From 10.10.0.1 icmp_seq=26 Destination Host Unreachable
From 10.10.0.1 icmp_seq=27 Destination Host Unreachable
From 10.10.0.1 icmp_seq=28 Destination Host Unreachable
From 10.10.0.1 icmp_seq=29 Destination Host Unreachable
From 10.10.0.1 icmp_seq=30 Destination Host Unreachable
From 10.10.0.1 icmp_seq=31 Destination Host Unreachable
From 10.10.0.1 icmp_seq=32 Destination Host Unreachable
From 10.10.0.1 icmp_seq=33 Destination Host Unreachable
From 10.10.0.1 icmp_seq=34 Destination Host Unreachable
From 10.10.0.1 icmp_seq=35 Destination Host Unreachable
From 10.10.0.1 icmp_seq=36 Destination Host Unreachable
From 10.10.0.1 icmp_seq=37 Destination Host Unreachable
From 10.10.0.1 icmp_seq=38 Destination Host Unreachable
From 10.10.0.1 icmp_seq=39 Destination Host Unreachable
From 10.10.0.1 icmp_seq=40 Destination Host Unreachable
From 10.10.0.1 icmp_seq=41 Destination Host Unreachable
From 10.10.0.1 icmp_seq=42 Destination Host Unreachable
From 10.10.0.1 icmp_seq=43 Destination Host Unreachable
From 10.10.0.1 icmp_seq=44 Destination Host Unreachable
From 10.10.0.1 icmp_seq=45 Destination Host Unreachable
From 10.10.0.1 icmp_seq=46 Destination Host Unreachable
From 10.10.0.1 icmp_seq=47 Destination Host Unreachable
From 10.10.0.1 icmp_seq=48 Destination Host Unreachable
From 10.10.0.1 icmp_seq=49 Destination Host Unreachable
From 10.10.0.1 icmp_seq=50 Destination Host Unreachable
From 10.10.0.1 icmp_seq=51 Destination Host Unreachable
```

tcp dump output for arp packets while the ping command is running for a non-existing host in a different subnet (em1 interface) as the workstation.

```
ak2739@t3net04:~
File Edit View Search Terminal Help
t3net04-69 ~ >: tcpdump arp and host -i em1 10.10.100.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes
^C^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
t3net04-70 ~ >: []
```

tcp dump output for icmp packets while the ping command is running for a non-existing host in a different subnet (em1 interface) as the workstation.

```
Applications Places Terminal ak2739@t3net04:~  
File Edit View Search Terminal Help  
t3net04-63 ~ >: tcpdump icmp and host -i em1 10.10.100.13  
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode  
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes  
^C  
0 packets captured  
0 packets received by filter  
0 packets dropped by kernel  
t3net04-64 ~ >: □
```

10.10.224.50 is a non-existing host in the different subnet as the workstation t3net04, p1p1 interface(10.10.201.13).

```
t3net04-71 ~ >: ping 10.10.224.50  
PING 10.10.224.50 (10.10.224.50) 56(84) bytes of data.  
From 10.10.0.6 icmp_seq=1 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=2 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=3 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=4 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=5 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=6 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=7 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=8 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=9 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=10 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=11 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=12 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=13 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=14 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=15 Destination Host Unreachable  
From 10.10.0.6 icmp_seq=16 Destination Host Unreachable  
^C  
--- 10.10.224.50 ping statistics ---  
19 packets transmitted, 0 received, +16 errors, 100% packet loss, time 18003ms  
pipe 4  
t3net04-72 ~ >: □
```

tcp dump output for arp packets while the ping command is running for a non-existing host in a different subnet (p1p1 interface) as the workstation. The arp packets consist of request and reply messages with message, “who-has b4:96:91:52:32:2e” each with length of 28 and another request comment with

length 46. Where instead of IP address of the live host MAC address is used in the request and reply packets.

```
Applications Places Terminal
ak2739@t3net04:~
```

```
File Edit View Search Terminal Help
t3net04-74 ~ >: tcpdump arp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:25:41.197104 ARP, Request who-has t3net04 tell t3net, length 46
20:25:41.197147 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:25:42.432842 ARP, Request who-has t3net03 tell t3net04, length 46
20:25:42.433191 ARP, Reply t3net03 is-at b4:96:91:51:c1:14 (oui Unknown), length 46
20:25:42.434055 ARP, Request who-has t3net04 tell gateway, length 46
20:25:42.434072 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:25:48.439364 ARP, Request who-has t3net04 tell t3net03, length 46
20:25:48.439385 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:25:50.721113 ARP, Request who-has gateway tell t3net04, length 28
20:25:50.721472 ARP, Reply gateway is-at 78:8a:20:ba:1a:de (oui Unknown), length 46
20:26:11.276785 ARP, Request who-has t3net04 tell t3net, length 46
20:26:11.276802 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:26:20.689103 ARP, Request who-has gateway tell t3net04, length 28
20:26:20.689442 ARP, Reply gateway is-at 78:8a:20:ba:1a:de (oui Unknown), length 46
20:26:33.266055 ARP, Request who-has t3net04 tell gateway, length 46
20:26:33.266084 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
^C
16 packets captured
16 packets received by filter
0 packets dropped by kernel
t3net04-75 ~ >: tcpdump arp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:26:41.356676 ARP, Request who-has t3net04 tell t3net, length 46
20:26:41.356691 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:26:50.272993 ARP, Request who-has gateway tell t3net04, length 28
20:26:50.273320 ARP, Reply gateway is-at 78:8a:20:ba:1a:de (oui Unknown), length 46
```

tcp dump output for icmp packets while the ping command is running for a non-existing host in a different subnet (em1 interface) as the workstation. It consists of different echo request and reply messages to reach the host 10.10.224.50 which is non-existent.

```
t3net04-69 ~ >: tcpdump icmp and host -i plpl 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on plpl, link-type EN10MB (Ethernet), capture size 262144 bytes
20:26:32.263642 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 5, length 64
20:26:33.262895 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 6, length 64
20:26:34.262918 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 7, length 64
20:26:35.262915 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 8, length 64
20:26:35.266025 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:35.266082 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:35.266095 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:35.266105 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:36.264406 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 9, length 64
20:26:37.264041 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 10, length 64
20:26:38.263927 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 11, length 64
20:26:39.263825 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 12, length 64
20:26:39.265864 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:39.265891 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:39.265915 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:39.265977 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:40.265092 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 13, length 64
20:26:41.264856 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 14, length 64
20:26:42.265183 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 15, length 64
20:26:43.264921 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 16, length 64
20:26:43.265933 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:43.265973 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:43.265984 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:43.266009 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:44.265812 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 17, length 64
20:26:45.266200 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 18, length 64
20:26:46.265931 IP t3net04 > 10.10.224.50: ICMP echo request, id 24536, seq 19, length 64
20:26:47.274099 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:47.274146 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
20:26:47.274155 IP 10.10.0.6 > t3net04: ICMP host 10.10.224.50 unreachable, length 92
```

Ping a live host of both interfaces in a different subnet than your workstation.

Ping commands for 10.10.200.12 which is a live host from a different subnet.

```
ak2739@t3net04:~
```

```
File Edit View Search Terminal Help
```

```
To see your aliases, enter "alias"
```

```
t3net04-41 ~ >: ping 10.10.200.12
PING 10.10.200.12 (10.10.200.12) 56(84) bytes of data.
^C
--- 10.10.200.12 ping statistics ---
70 packets transmitted, 0 received, 100% packet loss, time 68999ms
```

```
t3net04-42 ~ >: 
```

tcp dump output for icmp packets when the ping command for 10.10.200.12 is running on another terminal. As the host to which the ping command is running is live there are no icmp packets captured in the tcpdump. It shows that 0 packets have been received and 0 packets have been dropped and captured.

```
To see your aliases, enter "alias"

t3net04-41 ~ >: tcpdump icmp and host -i em1 10.10.100.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes
^C^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
t3net04-42 ~ >: █
```

For the tcp dump output for arp packets when the ping command for 10.10.100.13 is running on another terminal is for the em1 interface. There are no arp packets captured and it shows that there are 0 packets captured, received and dropped.

```
ak2739@t3net04:~ - □ ×

File Edit View Search Terminal Help

To see your aliases, enter "alias"

t3net04-41 ~ >: tcpdump arp and host -i em1 10.10.100.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes
^?^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
t3net04-42 ~ >: █
```

For the p1p1 interface the ping command is for 10.10.226.12 which is a live host from another subnet from the workstation t3net04.

```
t3net04-72 ~ >: ping 10.10.226.12
PING 10.10.226.12 (10.10.226.12) 56(84) bytes of data.
64 bytes from 10.10.226.12: icmp_seq=1 ttl=62 time=1.28 ms
64 bytes from 10.10.226.12: icmp_seq=2 ttl=62 time=1.34 ms
64 bytes from 10.10.226.12: icmp_seq=3 ttl=62 time=1.29 ms
64 bytes from 10.10.226.12: icmp_seq=4 ttl=62 time=1.33 ms
64 bytes from 10.10.226.12: icmp_seq=5 ttl=62 time=1.35 ms
64 bytes from 10.10.226.12: icmp_seq=6 ttl=62 time=1.22 ms
64 bytes from 10.10.226.12: icmp_seq=7 ttl=62 time=1.21 ms
64 bytes from 10.10.226.12: icmp_seq=8 ttl=62 time=1.37 ms
64 bytes from 10.10.226.12: icmp_seq=9 ttl=62 time=1.33 ms
64 bytes from 10.10.226.12: icmp_seq=10 ttl=62 time=1.25 ms
64 bytes from 10.10.226.12: icmp_seq=11 ttl=62 time=1.37 ms
64 bytes from 10.10.226.12: icmp_seq=12 ttl=62 time=1.16 ms
64 bytes from 10.10.226.12: icmp_seq=13 ttl=62 time=1.24 ms
64 bytes from 10.10.226.12: icmp_seq=14 ttl=62 time=1.03 ms
64 bytes from 10.10.226.12: icmp_seq=15 ttl=62 time=1.12 ms
64 bytes from 10.10.226.12: icmp_seq=16 ttl=62 time=1.34 ms
64 bytes from 10.10.226.12: icmp_seq=17 ttl=62 time=1.41 ms
64 bytes from 10.10.226.12: icmp_seq=18 ttl=62 time=1.36 ms
64 bytes from 10.10.226.12: icmp_seq=19 ttl=62 time=1.34 ms
64 bytes from 10.10.226.12: icmp_seq=20 ttl=62 time=1.44 ms
64 bytes from 10.10.226.12: icmp_seq=21 ttl=62 time=1.35 ms
64 bytes from 10.10.226.12: icmp_seq=22 ttl=62 time=1.24 ms
^C
--- 10.10.226.12 ping statistics ---
22 packets transmitted, 22 received, 0% packet loss, time 21033ms
rtt min/avg/max/mdev = 1.031/1.294/1.449/0.102 ms
t3net04-73 ~ >: □
```

This is the tcpdump for icmp packets running on another terminal when the ping command for a live host in a different subnet for the p1p1 interface is running. It shows the echo request and reply packets each with length 64. The sequence number for echo request and echo reply is the same starting from 1. The id is same for all of the icmp packets received which is 24687.

```
Applications Places Terminal
ak2739@t3net04:~
```

```
File Edit View Search Terminal Help
t3net04-69 ~ >: tcpdump icmp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:27:44.053904 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 1, length 64
20:27:44.055134 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 1, length 64
20:27:45.055653 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 2, length 64
20:27:45.056940 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 2, length 64
20:27:46.057237 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 3, length 64
20:27:46.058502 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 3, length 64
20:27:47.058807 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 4, length 64
20:27:47.060080 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 4, length 64
20:27:48.060345 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 5, length 64
20:27:48.061649 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 5, length 64
20:27:49.061917 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 6, length 64
20:27:49.063092 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 6, length 64
20:27:50.063355 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 7, length 64
20:27:50.064526 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 7, length 64
20:27:51.064811 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 8, length 64
20:27:51.066122 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 8, length 64
20:27:52.066564 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 9, length 64
20:27:52.067852 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 9, length 64
20:27:53.068175 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 10, length 64
20:27:53.069381 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 10, length 64
20:27:54.069680 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 11, length 64
20:27:54.071003 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 11, length 64
20:27:55.071452 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 12, length 64
20:27:55.072560 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 12, length 64
20:27:56.072822 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 13, length 64
20:27:56.073991 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 13, length 64
20:27:57.074146 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 14, length 64
20:27:57.075149 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 14, length 64
20:27:58.075323 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 15, length 64
20:27:58.076399 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 15, length 64
20:27:59.076695 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 16, length 64
20:27:59.077994 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 16, length 64
20:28:00.078382 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 17, length 64
20:28:00.079772 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 17, length 64
20:28:01.080154 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 18, length 64
20:28:01.081464 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 18, length 64
20:28:02.081918 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 19, length 64
20:28:02.083210 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 19, length 64
20:28:03.083510 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 20, length 64
20:28:03.084909 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 20, length 64
20:28:04.085367 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 21, length 64
20:28:04.086672 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 21, length 64
20:28:05.087111 IP t3net04 > t3net15: ICMP echo request, id 24687, seq 22, length 64
20:28:05.088309 IP t3net15 > t3net04: ICMP echo reply, id 24687, seq 22, length 64
^C
44 packets captured
44 packets received by filter
0 packets dropped by kernel
t3net04-69 ~ >: □
```

This is tcp dump output for the arp packets that are received for the p1p1 interface. It shows the request and reply messages with mac address b4:96:91:52:32:2e. The request and reply messages have timestamp and request messages are of the length 28 and the reply messages are of the length 46.

```
t3net04-75 ~ >: tcpdump arp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
Listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:26:41.356676 ARP, Request who-has t3net04 tell t3net, length 46
20:26:41.356691 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:26:50.272993 ARP, Request who-has gateway tell t3net04, length 28
20:26:50.273320 ARP, Reply gateway is-at 78:8a:20:ba:1a:de (oui Unknown), length 46
20:26:57.970023 ARP, Request who-has t3net04 tell gateway, length 46
20:26:57.970051 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:27:11.437004 ARP, Request who-has t3net04 tell t3net, length 46
20:27:11.437043 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:27:20.513024 ARP, Request who-has gateway tell t3net04, length 28
20:27:20.513399 ARP, Reply gateway is-at 78:8a:20:ba:1a:de (oui Unknown), length 46
20:27:25.730087 ARP, Request who-has t3net04 tell gateway, length 46
20:27:25.730109 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
`C
12 packets captured
12 packets received by filter
0 packets dropped by kernel
t3net04-75 ~ >: tcpdump arp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
Listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:27:41.517082 ARP, Request who-has t3net04 tell t3net, length 46
20:27:41.517122 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
20:27:50.064817 ARP, Request who-has gateway tell t3net04, length 28
20:27:50.065137 ARP, Reply gateway is-at 78:8a:20:ba:1a:de (oui Unknown), length 46
20:27:55.074160 ARP, Request who-has t3net04 tell gateway, length 46
20:27:55.074194 ARP, Reply t3net04 is-at b4:96:91:52:32:2e (oui Unknown), length 28
`C
5 packets captured
5 packets received by filter
0 packets dropped by kernel
t3net04-75 ~ >: □
```

3.2.4 Traceroute program

a. another host of both interfaces in the same subnet

Traceroute 10.10.100.12 which is a live host from the same subnet as the workstation.

```
Applications Places Terminal
ak2739@t3net04:~>

File Edit View Search Terminal Help

To see your aliases, enter "alias"

t3net04-41 ~ >: traceroute 10.10.100.12
traceroute to 10.10.100.12 (10.10.100.12), 30 hops max, 60 byte packets
 1 10.10.100.12 (10.10.100.12) 0.554 ms 0.492 ms 0.431 ms
t3net04-42 ~ >: traceroute 10.10.201.12
traceroute to 10.10.201.12 (10.10.201.12), 30 hops max, 60 byte packets
 1 t3net03 (10.10.201.12) 0.639 ms 0.558 ms 0.500 ms
t3net04-43 ~ >: traceroute 10.10.200.12
traceroute to 10.10.200.12 (10.10.200.12), 30 hops max, 60 byte packets
 1 gateway (10.10.201.1) 0.585 ms 0.503 ms 0.352 ms
 2 * * *
 3 * * *
 4 * * *
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28 * * *
29 * * *
30 * * *

t3net04-44 ~ >: traceroute 10.10.226.12
traceroute to 10.10.226.12 (10.10.226.12), 30 hops max, 60 byte packets
 1 gateway (10.10.201.1) 0.540 ms 0.388 ms 0.373 ms
 2 10.10.0.6 (10.10.0.6) 0.717 ms 0.776 ms 0.640 ms
 3 t3net15 (10.10.226.12) 0.914 ms 0.831 ms 0.710 ms
t3net04-45 ~ >: traceroute www.njit.edu
traceroute to www.njit.edu (54.83.189.142), 30 hops max, 60 byte packets
 1 gateway (10.10.201.1) 0.448 ms 0.412 ms 0.332 ms
 2 wlan26-gw.njit.edu (128.235.248.1) 9.657 ms 9.845 ms 10.141 ms
 3 core-fmh4-tn-gw.tcn.njit.edu (10.240.8.134) 0.864 ms 0.878 ms 0.780 ms
 4 ner-northsouth-gw.tcn.njit.edu (10.240.8.1) 1.249 ms 1.206 ms 1.162 ms
e * *
```

b. another host of both interfaces in the other subnet

Traceroute 10.10.226.12 which is a live host from a different subnet as the workstation.

```
t3net04-44 ~ >: traceroute 10.10.226.12
traceroute to 10.10.226.12 (10.10.226.12), 30 hops max, 60 byte packets
1 gateway (10.10.201.1) 0.540 ms 0.388 ms 0.373 ms
2 10.10.0.6 (10.10.0.6) 0.717 ms 0.776 ms 0.640 ms
3 t3net15 (10.10.226.12) 0.914 ms 0.831 ms 0.710 ms
```

c. a remote host inside NJIT domain, for example, www.njit.edu.

Traceroute www.njit.edu which is a remote host inside the NJIT domain.

```
t3net04-45 ~ >: traceroute www.njit.edu
traceroute to www.njit.edu (54.83.189.142), 30 hops max, 60 byte packets
1 gateway (10.10.201.1) 0.448 ms 0.412 ms 0.332 ms
2 vlan26-gw.njit.edu (128.235.248.1) 9.657 ms 9.845 ms 10.141 ms
3 core-fmh4-tn-gw.tcn.njit.edu (10.240.8.134) 0.864 ms 0.878 ms 0.780 ms
4 ner-northsouth-gw.tcn.njit.edu (10.240.8.1) 1.249 ms 1.206 ms 1.162 ms
5 * * *
6 * * *
7 * * *
8 * * *
9 * * *
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11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
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20 * * *
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27 * * *
28 * * *
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30 * * *
```

d. a remote host outside NJIT, for example, www.google.com

Traceroute www.google.com which is a remote host outside of NJIT domain.

```
t3net04-46 ~ >: traceroute www.google.com
traceroute to www.google.com (142.250.64.100), 30 hops max, 60 byte packets
 1 gateway (10.10.201.1)  0.410 ms  0.351 ms  0.329 ms
 2 vlan26-gw.njit.edu (128.235.248.1)  2.628 ms  2.866 ms  3.123 ms
 3 core-fmh4-tn-gw.tcn.njit.edu (10.240.8.134)  0.674 ms  0.577 ms  0.751 ms
 4 ner-northsouth-gw.tcn.njit.edu (10.240.8.1)  1.655 ms  1.640 ms  1.616 ms
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
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25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *
t3net04-47 ~ >: □
```

tcp dump ICMP packets for both interfaces

tcp dump for ICMP packets for **em1 interface** is running on another terminal when the traceroute programs are running. First, it consists of icmp packets with 10.10.100.12 ip address and udp port with a message unreachable each with a length of 68. The ICMP packets also consist of echo request and echo reply messages each with a length of 64 with the same id 27443.

```
Applications Places Terminal
ak2739@t3net04:~
```

File Edit View Search Terminal Help

To see your aliases, enter "alias"

```
t3net04:41 ~ >: tcpdump icmp and host -i em1 10.10.100.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on em1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:35:47.795987 IP 10.10.100.12 > t3net04: ICMP 10.10.100.12 udp port traceroute unreachable, length 68
20:35:47.796031 IP 10.10.100.12 > t3net04: ICMP 10.10.100.12 udp port 33435 unreachable, length 68
20:35:47.796042 IP 10.10.100.12 > t3net04: ICMP 10.10.100.12 udp port 33436 unreachable, length 68
20:35:47.796053 IP 10.10.100.12 > t3net04: ICMP 10.10.100.12 udp port 33437 unreachable, length 68
20:35:47.796063 IP 10.10.100.12 > t3net04: ICMP 10.10.100.12 udp port 33438 unreachable, length 68
20:35:47.796074 IP 10.10.100.12 > t3net04: ICMP 10.10.100.12 udp port 33439 unreachable, length 68
20:37:54.690613 IP 10.10.100.12 > t3net04: ICMP echo request, id 27443, seq 1, length 64
20:37:54.690707 IP t3net04 > 10.10.100.12: ICMP echo reply, id 27443, seq 1, length 64
20:37:55.690829 IP 10.10.100.12 > t3net04: ICMP echo request, id 27443, seq 2, length 64
20:37:55.690899 IP t3net04 > 10.10.100.12: ICMP echo reply, id 27443, seq 2, length 64
20:37:56.691897 IP 10.10.100.12 > t3net04: ICMP echo request, id 27443, seq 3, length 64
20:37:56.691966 IP t3net04 > 10.10.100.12: ICMP echo reply, id 27443, seq 3, length 64
```

tcp dump output for icmp packets for the p1p1 interface. AS p1p1 interface from the workstation is connected to the internet it has icmp packets with echo request and echo reply messages along with destination unreachable icmp packets and time exceeded icmp packets for specific udp ports.

Applications Places Terminal
 ak2739@t3net04:~
 File Edit View Search Terminal Help

To see your aliases, enter "alias"

```

t3net04:41 ~ >: tcpdump icmp and host -i p1p1 10.10.201.13
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on p1p1, link-type EN10MB (Ethernet), capture size 262144 bytes
20:35:59.665057 IP t3net03 > t3net04: ICMP t3net03 udp port traceroute unreachable, length 68
20:35:59.665102 IP t3net03 > t3net04: ICMP t3net03 udp port 33435 unreachable, length 68
20:35:59.665114 IP t3net03 > t3net04: ICMP t3net03 udp port 33436 unreachable, length 68
20:35:59.665124 IP t3net03 > t3net04: ICMP t3net03 udp port 33437 unreachable, length 68
20:35:59.665134 IP t3net03 > t3net04: ICMP t3net03 udp port 33438 unreachable, length 68
20:35:59.665170 IP t3net03 > t3net04: ICMP t3net03 udp port 33439 unreachable, length 68
20:36:32.208805 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:36:32.208865 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:36:32.208886 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256376 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256424 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256442 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256842 IP 10.10.0.6 > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256881 IP 10.10.0.6 > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256963 IP 10.10.0.6 > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.257185 IP t3net15 > t3net04: ICMP t3net15 udp port 33441 unreachable, length 68
20:37:28.257215 IP t3net15 > t3net04: ICMP t3net15 udp port 33440 unreachable, length 68
20:37:28.257243 IP t3net15 > t3net04: ICMP t3net15 udp port 33442 unreachable, length 68
20:37:28.257524 IP t3net15 > t3net04: ICMP t3net15 udp port 33443 unreachable, length 68
20:37:28.257552 IP t3net15 > t3net04: ICMP t3net15 udp port 33444 unreachable, length 68
20:37:28.257563 IP t3net15 > t3net04: ICMP t3net15 udp port 33446 unreachable, length 68
20:37:39.849449 IP t3net03 > t3net04: ICMP echo request, id 27414, seq 1, length 64
20:37:39.849543 IP t3net04 > t3net03: ICMP echo reply, id 27414, seq 1, length 64
20:37:40.849830 IP t3net03 > t3net04: ICMP echo request, id 27414, seq 2, length 64
20:37:40.849905 IP t3net04 > t3net03: ICMP echo reply, id 27414, seq 2, length 64
20:37:41.850768 IP t3net03 > t3net04: ICMP echo request, id 27414, seq 3, length 64
20:37:41.850848 IP t3net04 > t3net03: ICMP echo reply, id 27414, seq 3, length 64
20:37:42.034657 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:42.034694 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:42.034710 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:42.035470 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.035494 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.035537 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.036016 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.036052 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.036062 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.044089 IP vlan26-gw.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.044338 IP vlan26-gw.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.044694 IP vlan26-gw.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.915996 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:38:23.916039 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:38:23.916087 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:38:23.916645 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.916688 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.916872 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.917837 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.917876 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36

```

Applications Places Terminal

ak2739@t3net04:~

```

File Edit View Search Terminal Help
20:35:59.665057 IP t3net03 > t3net04: ICMP t3net03 udp port traceroute unreachable, length 68
20:35:59.665102 IP t3net03 > t3net04: ICMP t3net03 udp port 33435 unreachable, length 68
20:35:59.665114 IP t3net03 > t3net04: ICMP t3net03 udp port 33436 unreachable, length 68
20:35:59.665124 IP t3net03 > t3net04: ICMP t3net03 udp port 33437 unreachable, length 68
20:35:59.665134 IP t3net03 > t3net04: ICMP t3net03 udp port 33438 unreachable, length 68
20:35:59.665170 IP t3net03 > t3net04: ICMP t3net03 udp port 33439 unreachable, length 68
20:36:32.208805 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:36:32.208865 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:36:32.208886 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256376 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256424 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256442 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256842 IP 10.10.0.6 > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256881 IP 10.10.0.6 > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.256963 IP 10.10.0.6 > t3net04: ICMP time exceeded in-transit, length 68
20:37:28.257185 IP t3net15 > t3net04: ICMP t3net15 udp port 33441 unreachable, length 68
20:37:28.257215 IP t3net15 > t3net04: ICMP t3net15 udp port 33440 unreachable, length 68
20:37:28.257243 IP t3net15 > t3net04: ICMP t3net15 udp port 33442 unreachable, length 68
20:37:28.257524 IP t3net15 > t3net04: ICMP t3net15 udp port 33443 unreachable, length 68
20:37:28.257553 IP t3net15 > t3net04: ICMP t3net15 udp port 33444 unreachable, length 68
20:37:28.257563 IP t3net15 > t3net04: ICMP t3net15 udp port 33446 unreachable, length 68
20:37:39.849449 IP t3net03 > t3net04: ICMP echo request, id 27414, seq 1, length 64
20:37:39.849543 IP t3net04 > t3net03: ICMP echo reply, id 27414, seq 1, length 64
20:37:40.849830 IP t3net03 > t3net04: ICMP echo request, id 27414, seq 2, length 64
20:37:40.849905 IP t3net04 > t3net03: ICMP echo reply, id 27414, seq 2, length 64
20:37:41.850768 IP t3net03 > t3net04: ICMP echo request, id 27414, seq 3, length 64
20:37:41.850848 IP t3net04 > t3net03: ICMP echo reply, id 27414, seq 3, length 64
20:37:42.034657 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:42.034698 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:42.034710 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:37:42.035470 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.035494 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.035537 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.036016 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.036052 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.036062 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.044089 IP vlan26-gw.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.044438 IP vlan26-gw.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:37:42.044694 IP vlan26-gw.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.915996 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:38:23.916039 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:38:23.916087 IP gateway > t3net04: ICMP time exceeded in-transit, length 68
20:38:23.916645 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.916688 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.916872 IP core-fmh4-tn-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.917837 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.917876 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.917912 IP ner-northsouth-gw.tcn.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.918475 IP vlan26-gw.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.918769 IP vlan26-gw.njit.edu > t3net04: ICMP time exceeded in-transit, length 36
20:38:23.919082 IP vlan26-gw.njit.edu > t3net04: ICMP time exceeded in-transit, length 36

```

Continuation of the icmp packets captured by the tcpdump when the traceroute program is running for the p1p1 interface.