

## WEEK6(Experiment 7) – IPv4 Addressing and Static Routing

Date : 7/3/2021

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Task 1 : Setting up manual IP addresses:

Ha's IP address is manually set to 172.16.10.1/24

```
student@CSELAB: ~  
student@CSELAB:~$ ifconfig  
enp2s0  Link encap:Ethernet  HWaddr b8:ae:ed:a5:a5:99  
        inet addr:172.16.10.1  Bcast:172.16.10.255  Mask:255.255.255.0  
        inet6 addr: fe80::f59d:f4f6:2a12:567e/64 Scope:Link  
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
        RX packets:133 errors:0 dropped:0 overruns:0 frame:0  
        TX packets:131 errors:0 dropped:0 overruns:0 carrier:0  
        collisions:0 txqueuelen:1000  
        RX bytes:17658 (17.6 KB)  TX bytes:15214 (15.2 KB)  
  
lo      Link encap:Local Loopback  
        inet addr:127.0.0.1  Mask:255.0.0.0  
        inet6 addr: ::1/128 Scope:Host  
        UP LOOPBACK RUNNING  MTU:65536  Metric:1  
        RX packets:282 errors:0 dropped:0 overruns:0 frame:0  
        TX packets:282 errors:0 dropped:0 overruns:0 carrier:0  
        collisions:0 txqueuelen:1  
        RX bytes:20381 (20.3 KB)  TX bytes:20381 (20.3 KB)
```

R1's IP address is manually set to 172.16.10.201/24(internal) and 172.16.11.1/24(external)

```
student@cselab: ~
student@cselab:~$ ifconfig
enp2s0    Link encap:Ethernet  HWaddr b8:ae:ed:a5:a6:32
          inet addr:172.16.10.201  Bcast:172.16.10.255  Mask:255.255.255.0
          inet6 addr: fe80::f6f5:4985:ac63:eb26/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:9038 errors:0 dropped:0 overruns:0 frame:0
          TX packets:617 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1024303 (1.0 MB)  TX bytes:66920 (66.9 KB)

enxd03745b8f0e3 Link encap:Ethernet  HWaddr d0:37:45:b8:f0:e3
          inet addr:172.16.11.1  Bcast:172.16.11.255  Mask:255.255.255.0
          inet6 addr: fe80::f763:9849:dbb1:d6db/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:506 errors:0 dropped:0 overruns:0 frame:0
          TX packets:547 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:53487 (53.4 KB)  TX bytes:54500 (54.5 KB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:379 errors:0 dropped:0 overruns:0 frame:0
          TX packets:379 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:28554 (28.5 KB)  TX bytes:28554 (28.5 KB)
```

R2's IP address is manually set to 172.16.11.201/24(external) and 172.16.12.1(internal)

```
Terminal File Edit View Search Terminal Help
student@CSELab:~$ ifconfig
enp2s0    Link encap:Ethernet  HWaddr b8:ae:ed:a5:a6:b5
          inet addr:172.16.12.1  Bcast:172.16.12.255  Mask:255.255.255.0
          inet6 addr: fe80::e7fc:966:8dd:e6e0/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:6484 errors:0 dropped:0 overruns:0 frame:0
          TX packets:614 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:736140 (736.1 KB)  TX bytes:65733 (65.7 KB)

enx00594d6e8a00 Link encap:Ethernet  HWaddr 00:59:4d:6e:8a:00
          inet addr:172.16.11.201  Bcast:172.16.11.255  Mask:255.255.255.0
          inet6 addr: fe80::84e5:4dc1:386f:f5e9/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:434 errors:0 dropped:0 overruns:0 frame:0
          TX packets:315 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:35962 (35.9 KB)  TX bytes:34014 (34.0 KB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:300 errors:0 dropped:0 overruns:0 frame:0
          TX packets:300 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:19702 (19.7 KB)  TX bytes:19702 (19.7 KB)
```

Hd's IP address is manually set to 172.16.12.201/24

```
student@CSELAB:~$ ifconfig
enp2s0    Link encap:Ethernet  HWaddr b8:ae:ed:a5:a6:0e
          inet addr:172.16.12.201  Bcast:172.16.12.255  Mask:255.255.255.0
          inet6 addr: fe80::c162:8de8:5422:b474/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:2259 errors:0 dropped:0 overruns:0 frame:0
          TX packets:287 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:288428 (288.4 KB)  TX bytes:28969 (28.9 KB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:328 errors:0 dropped:0 overruns:0 frame:0
          TX packets:328 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:24849 (24.8 KB)  TX bytes:24849 (24.8 KB)
```

At the Host machines Ha and Hd, accepting ICMP redirect packets are disabled

```
student@CSELAB:~$ sudo sysctl -w net.ipv4.conf.all.accept_redirects=0
[sudo] password for student:
net.ipv4.conf.all.accept_redirects = 0
```

At the routers, sending ICMP redirect packets are disabled

```
Terminal File Edit View Search Terminal Help
student@CSELab:~$ sudo sysctl -w net.ipv4.conf.all.send_redirects=0
net.ipv4.conf.all.send_redirects = 0
student@CSELab:~$
```

Task2:

Check if forwarding is enabled or not using sysctl:

sysctl net.ipv4.ip\_forward

```
Terminal File Edit View Search Terminal Help
student@CSELab:~$ sysctl net.ipv4.ip_forward
net.ipv4.ip_forward = 0
student@CSELab:~$
```

Command to set the value of net.ipv4.ip\_forward in R1 & R2 is given below:

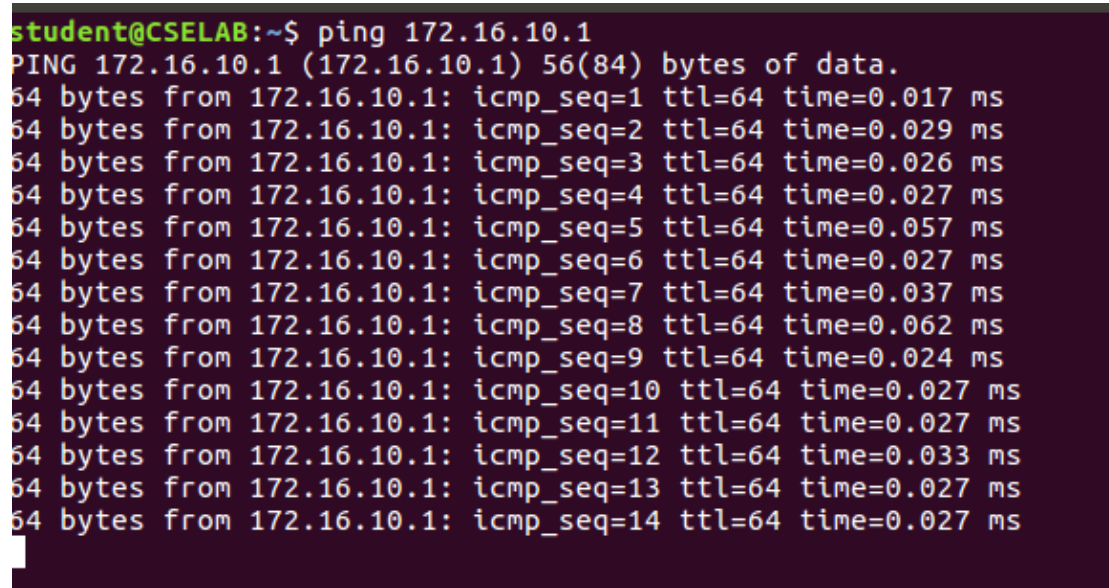
`sudo sysctl -w net.ipv4.ip_forward=1`



```
Terminal File Edit View Search Terminal Help
student@CSELab:~$ sudo sysctl -w net.ipv4.ip_forward=1
net.ipv4.ip_forward = 1
student@CSELab:~$
```

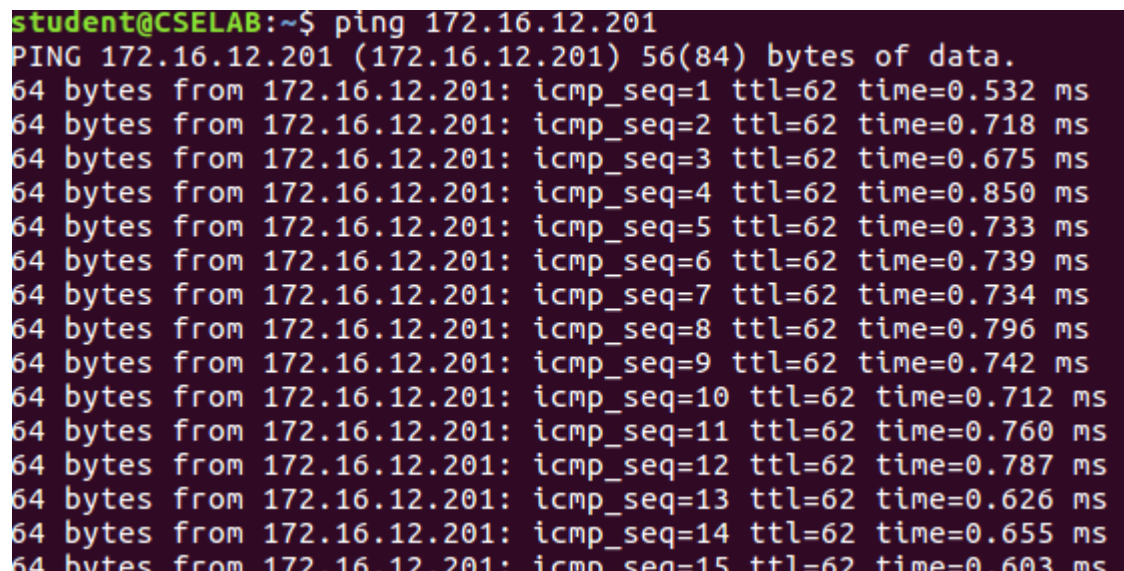
Task 3:

At Ha, ping itself



```
student@CSELAB:~$ ping 172.16.10.1
PING 172.16.10.1 (172.16.10.1) 56(84) bytes of data.
64 bytes from 172.16.10.1: icmp_seq=1 ttl=64 time=0.017 ms
64 bytes from 172.16.10.1: icmp_seq=2 ttl=64 time=0.029 ms
64 bytes from 172.16.10.1: icmp_seq=3 ttl=64 time=0.026 ms
64 bytes from 172.16.10.1: icmp_seq=4 ttl=64 time=0.027 ms
64 bytes from 172.16.10.1: icmp_seq=5 ttl=64 time=0.057 ms
64 bytes from 172.16.10.1: icmp_seq=6 ttl=64 time=0.027 ms
64 bytes from 172.16.10.1: icmp_seq=7 ttl=64 time=0.037 ms
64 bytes from 172.16.10.1: icmp_seq=8 ttl=64 time=0.062 ms
64 bytes from 172.16.10.1: icmp_seq=9 ttl=64 time=0.024 ms
64 bytes from 172.16.10.1: icmp_seq=10 ttl=64 time=0.027 ms
64 bytes from 172.16.10.1: icmp_seq=11 ttl=64 time=0.027 ms
64 bytes from 172.16.10.1: icmp_seq=12 ttl=64 time=0.033 ms
64 bytes from 172.16.10.1: icmp_seq=13 ttl=64 time=0.027 ms
64 bytes from 172.16.10.1: icmp_seq=14 ttl=64 time=0.027 ms
```

At Hd, ping itself



```
student@CSELAB:~$ ping 172.16.12.201
PING 172.16.12.201 (172.16.12.201) 56(84) bytes of data.
64 bytes from 172.16.12.201: icmp_seq=1 ttl=62 time=0.532 ms
64 bytes from 172.16.12.201: icmp_seq=2 ttl=62 time=0.718 ms
64 bytes from 172.16.12.201: icmp_seq=3 ttl=62 time=0.675 ms
64 bytes from 172.16.12.201: icmp_seq=4 ttl=62 time=0.850 ms
64 bytes from 172.16.12.201: icmp_seq=5 ttl=62 time=0.733 ms
64 bytes from 172.16.12.201: icmp_seq=6 ttl=62 time=0.739 ms
64 bytes from 172.16.12.201: icmp_seq=7 ttl=62 time=0.734 ms
64 bytes from 172.16.12.201: icmp_seq=8 ttl=62 time=0.796 ms
64 bytes from 172.16.12.201: icmp_seq=9 ttl=62 time=0.742 ms
64 bytes from 172.16.12.201: icmp_seq=10 ttl=62 time=0.712 ms
64 bytes from 172.16.12.201: icmp_seq=11 ttl=62 time=0.760 ms
64 bytes from 172.16.12.201: icmp_seq=12 ttl=62 time=0.787 ms
64 bytes from 172.16.12.201: icmp_seq=13 ttl=62 time=0.626 ms
64 bytes from 172.16.12.201: icmp_seq=14 ttl=62 time=0.655 ms
64 bytes from 172.16.12.201: icmp_seq=15 ttl=62 time=0.603 ms
```

Enter the routing table entries:

At Ha:

sudo ip route add 172.16.12.0/24 via 172.16.10.201

sudo ip route add 172.16.11.0/24 via 172.16.10.201

```
student@CSELAB:~$ ip route show
169.254.0.0/16 dev enp2s0 scope link metric 1000
172.16.10.0/24 dev enp2s0 proto kernel scope link src 172.16.10.1 metric 100
172.16.11.0/24 via 172.16.10.201 dev enp2s0
172.16.12.0/24 via 172.16.10.201 dev enp2s0
```

At R1:

sudo ip route add 172.16.12.0/24 via 172.16.11.201

At R2:

sudo ip route add 172.16.10.0/24 via 172.16.11.1

```
student@CSELab:~$ ip route show
169.254.0.0/16 dev enp2s0 scope link metric 1000
172.16.10.0/24 via 172.16.11.1 dev enx00594d6e8a00
172.16.11.0/24 dev enx00594d6e8a00 proto kernel scope link src 172.16.11.201 metric 100
172.16.12.0/24 dev enp2s0 proto kernel scope link src 172.16.12.1 metric 100
student@CSELab:~$
```

At Hd:

sudo ip route add 172.16.10.0/24 via 172.16.12.1

sudo ip route add 172.16.11.0/24 via 172.16.12.1

```
student@CSELAB:~$ ip route show
169.254.0.0/16 dev enp2s0 scope link metric 1000
172.16.10.0/24 via 172.16.12.1 dev enp2s0
172.16.11.0/24 via 172.16.12.1 dev enp2s0
172.16.12.0/24 dev enp2s0 proto kernel scope link src 172.16.12.201 metric 100
```

Task 5:

Ping Hd from Ha



```

student@CSELAB:~$ ping 172.16.12.201
PING 172.16.12.201 (172.16.12.201) 56(84) bytes of data.
64 bytes from 172.16.12.201: icmp_seq=1 ttl=62 time=0.532 ms
64 bytes from 172.16.12.201: icmp_seq=2 ttl=62 time=0.718 ms
64 bytes from 172.16.12.201: icmp_seq=3 ttl=62 time=0.675 ms
64 bytes from 172.16.12.201: icmp_seq=4 ttl=62 time=0.850 ms
64 bytes from 172.16.12.201: icmp_seq=5 ttl=62 time=0.733 ms
64 bytes from 172.16.12.201: icmp_seq=6 ttl=62 time=0.739 ms
64 bytes from 172.16.12.201: icmp_seq=7 ttl=62 time=0.734 ms
64 bytes from 172.16.12.201: icmp_seq=8 ttl=62 time=0.796 ms
64 bytes from 172.16.12.201: icmp_seq=9 ttl=62 time=0.742 ms
64 bytes from 172.16.12.201: icmp_seq=10 ttl=62 time=0.712 ms
64 bytes from 172.16.12.201: icmp_seq=11 ttl=62 time=0.760 ms
64 bytes from 172.16.12.201: icmp_seq=12 ttl=62 time=0.787 ms
64 bytes from 172.16.12.201: icmp_seq=13 ttl=62 time=0.626 ms
64 bytes from 172.16.12.201: icmp_seq=14 ttl=62 time=0.655 ms
64 bytes from 172.16.12.201: icmp_seq=15 ttl=62 time=0.603 ms

```

Ping Ha from Hd

```

student@CSELAB:~$ ping 172.16.10.1
PING 172.16.10.1 (172.16.10.1) 56(84) bytes of data.
64 bytes from 172.16.10.1: icmp_seq=1 ttl=64 time=0.017 ms
64 bytes from 172.16.10.1: icmp_seq=2 ttl=64 time=0.029 ms
64 bytes from 172.16.10.1: icmp_seq=3 ttl=64 time=0.026 ms
64 bytes from 172.16.10.1: icmp_seq=4 ttl=64 time=0.027 ms
64 bytes from 172.16.10.1: icmp_seq=5 ttl=64 time=0.057 ms
64 bytes from 172.16.10.1: icmp_seq=6 ttl=64 time=0.027 ms
64 bytes from 172.16.10.1: icmp_seq=7 ttl=64 time=0.037 ms
64 bytes from 172.16.10.1: icmp_seq=8 ttl=64 time=0.062 ms
64 bytes from 172.16.10.1: icmp_seq=9 ttl=64 time=0.024 ms
64 bytes from 172.16.10.1: icmp_seq=10 ttl=64 time=0.027 ms
64 bytes from 172.16.10.1: icmp_seq=11 ttl=64 time=0.027 ms
64 bytes from 172.16.10.1: icmp_seq=12 ttl=64 time=0.033 ms
64 bytes from 172.16.10.1: icmp_seq=13 ttl=64 time=0.027 ms

```

Task 6:

Verify the connections:

Ha:

```

student@CSELAB: ~
student@CSELAB:~$ ip neigh show
172.16.10.201 dev enp2s0 lladdr b8:ae:ed:a5:a6:32 REACHABLE

```

R1:

```

student@cselab:~$ ip neigh show
172.16.10.1 dev enp2s0 lladdr b8:ae:ed:35:c2:46 STALE
172.16.11.201 dev enx03745b8f0e3 lladdr 00:59:4d:6e:8a:00 REACHABLE

```

R2:

```
student@CSELab:~$ ip neigh show
172.16.12.201 dev enp2s0 lladdr b8:ae:ed:a5:a6:0e STALE
172.16.11.1 dev enx00594d6e8a00 lladdr d0:37:45:b8:f0:e3 STALE
student@CSELab:~$
```

Hd:

```
student@CSELAB:~$ ip neigh show
172.16.12.1 dev enp2s0 lladdr b8:ae:ed:a5:a6:b5 REACHABLE
```

Task 7:

At Ha, ping Hd and the following ICMP packets are captured in Wireshark...

At Ha:

|              |                   |               |      |     |   |                                  |
|--------------|-------------------|---------------|------|-----|---|----------------------------------|
| 6.809237224  | 172.16.10.1       | 172.16.12.201 | ICMP | 100 | Echo (ping) request                     | id=0xc5e, seq=2/512, ttl=64 (req |
| 6.809984767  | 172.16.12.201     | 172.16.10.1   | ICMP | 100 | Echo (ping) reply                       | id=0xc5e, seq=2/512, ttl=62 (rec |
| 7.808247802  | 172.16.10.1       | 172.16.12.201 | ICMP | 100 | Echo (ping) request                     | id=0xc5e, seq=3/768, ttl=64 (req |
| 7.809021894  | 172.16.12.201     | 172.16.10.1   | ICMP | 100 | Echo (ping) reply                       | id=0xc5e, seq=3/768, ttl=62 (rec |
| 8.807963158  | 172.16.10.1       | 172.16.12.201 | ICMP | 100 | Echo (ping) request                     | id=0xc5e, seq=4/1024, ttl=64 (re |
| 8.808653207  | 172.16.12.201     | 172.16.10.1   | ICMP | 100 | Echo (ping) reply                       | id=0xc5e, seq=4/1024, ttl=62 (re |
| 9.807975804  | 172.16.10.1       | 172.16.12.201 | ICMP | 100 | Echo (ping) request                     | id=0xc5e, seq=5/1280, ttl=64 (re |
| 9.808720367  | 172.16.12.201     | 172.16.10.1   | ICMP | 100 | Echo (ping) reply                       | id=0xc5e, seq=5/1280, ttl=62 (re |
| 10.807910517 | 172.16.10.1       | 172.16.12.201 | ICMP | 100 | Echo (ping) request                     | id=0xc5e, seq=6/1536, ttl=64 (re |
| 10.808618722 | 172.16.12.201     | 172.16.10.1   | ICMP | 100 | Echo (ping) reply                       | id=0xc5e, seq=6/1536, ttl=62 (re |
| 10.814676990 | Elitegro_a5:a6:32 |               | ARP  | 62  | Who has 172.16.10.1? Tell 172.16.10.201 |                                  |
| 10.814706441 | Elitegro 35:c2:46 |               | ARP  | 44  | 172.16.10.1 is at b8:ae:ed:35:c2:46     |                                  |

Ping Request packet:

```
Internet Protocol Version 4, Src: 172.16.10.1, Dst: 172.16.12.201
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  ▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  Total Length: 84
  Identification: 0x289c (10396)
  ▶ Flags: 0x4000, Don't fragment
  Time to live: 64
  Protocol: ICMP (1)
  Header checksum: 0xa322 [validation disabled]
  [Header checksum status: Unverified]
  Source: 172.16.10.1
  Destination: 172.16.12.201
  ▶ Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0xa0e5 [correct]
    [Checksum Status: Good]
    Identifier (BE): 3471 (0x0d8f)
    Identifier (LE): 36621 (0x8f0d)
    Sequence number (BE): 1 (0x0001)
    Sequence number (LE): 256 (0x0100)
    [Response frame: 2]
    Timestamp from icmp data: Mar  3, 2021 13:26:44.000000000 IST
```

## At R1:

7 3.001544884 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0d8f, seq=4/1024, ttl=62 (reply in 1)

8 3.001602572 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0d8f, seq=4/1024, ttl=64 (request in 7)

9 4.001445160 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0d8f, seq=5/1280, ttl=62 (reply in 1)

10 4.001471642 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0d8f, seq=5/1280, ttl=64 (request in 9)

11 5.000560533 Elitegro\_a5:a5:c0 ARP 44 Who has 172.16.12.1? Tell 172.16.12.201

12 5.000706162 Elitegro\_a2:64:cd ARP 62 172.16.12.1 is at b8:ae:ed:a2:64:cd

13 5.001453186 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0d8f, seq=6/1536, ttl=62 (reply in 1)

▼ Frame 1: 100 bytes on wire (800 bits), 100 bytes captured (800 bits) on interface 0

► Interface id: 0 (any)

Encapsulation type: Linux cooked-mode capture (25)

Arrival Time: Mar 3, 2021 13:26:46.327235725 IST

[Time shift for this packet: 0.000000000 seconds]

Epoch Time: 1614758206.327235725 seconds

[Time delta from previous captured frame: 0.000000000 seconds]

[Time delta from previous displayed frame: 0.000000000 seconds]

[Time since reference or first frame: 0.000000000 seconds]

Frame Number: 1

Frame Length: 100 bytes (800 bits)

Capture Length: 100 bytes (800 bits)

g from enp2s0

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

| No. | Time        | Source        | Destination   | Protocol | Length | Info   |
|-----|-------------|---------------|---------------|----------|--------|--|
| 1   | 0.000000000 | 172.16.10.1   | 172.16.12.201 | ICMP     | 98     | Echo (ping) request id=0x0d90, seq=9/2304, ttl=64 (reply in 2)     |
| 2   | 0.000533649 | 172.16.12.201 | 172.16.10.1   | ICMP     | 98     | Echo (ping) reply id=0x0d90, seq=9/2304, ttl=62 (request in 1)     |
| 3   | 0.512025844 | 172.16.10.1   | 172.16.12.201 | ICMP     | 98     | Echo (ping) request id=0x0cc8, seq=217/55552, ttl=64 (reply in 4)  |
| 4   | 0.512506625 | 172.16.12.201 | 172.16.10.1   | ICMP     | 98     | Echo (ping) reply id=0x0cc8, seq=217/55552, ttl=62 (request in 3)  |
| 5   | 0.760057020 | 172.16.10.1   | 172.16.12.201 | ICMP     | 98     | Echo (ping) request id=0x0c5e, seq=373/29953, ttl=64 (reply in 6)  |
| 6   | 0.760562856 | 172.16.12.201 | 172.16.10.1   | ICMP     | 98     | Echo (ping) reply id=0x0c5e, seq=373/29953, ttl=62 (request in 5)  |
| 7   | 1.000025787 | 172.16.10.1   | 172.16.12.201 | ICMP     | 98     | Echo (ping) request id=0x0d90, seq=10/2560, ttl=64 (reply in 8)    |
| 8   | 1.000525724 | 172.16.12.201 | 172.16.10.1   | ICMP     | 98     | Echo (ping) reply id=0x0d90, seq=10/2560, ttl=62 (request in 7)    |
| 9   | 1.512043419 | 172.16.10.1   | 172.16.12.201 | ICMP     | 98     | Echo (ping) request id=0x0cc8, seq=218/55808, ttl=64 (reply in 10) |
| 10  | 1.512555595 | 172.16.12.201 | 172.16.10.1   | ICMP     | 98     | Echo (ping) reply id=0x0cc8, seq=218/55808, ttl=62 (request in 9)  |
| 11  | 1.760046393 | 172.16.10.1   | 172.16.12.201 | ICMP     | 98     | Echo (ping) request id=0x0c5e, seq=374/30209, ttl=64 (reply in 12) |
| 12  | 1.760430121 | 172.16.12.201 | 172.16.10.1   | ICMP     | 98     | Echo (ping) reply id=0x0c5e, seq=374/30209, ttl=62 (request in 11) |
| 13  | 2.000055426 | 172.16.10.1   | 172.16.12.201 | ICMP     | 98     | Echo (ping) request id=0x0d90, seq=11/2816, ttl=64 (reply in 14)   |
| 14  | 2.000588518 | 172.16.12.201 | 172.16.10.1   | ICMP     | 98     | Echo (ping) reply id=0x0d90, seq=11/2816, ttl=62 (request in 13)   |
| 15  | 2.512063997 | 172.16.10.1   | 172.16.12.201 | ICMP     | 98     | Echo (ping) request id=0x0cc8, seq=219/56064, ttl=64 (reply in 16) |
| 16  | 2.512468156 | 172.16.12.201 | 172.16.10.1   | ICMP     | 98     | Echo (ping) reply id=0x0cc8, seq=219/56064, ttl=62 (request in 15) |
| 17  | 2.760079486 | 172.16.10.1   | 172.16.12.201 | ICMP     | 98     | Echo (ping) request id=0x0c5e, seq=375/30465, ttl=64 (reply in 18) |
| 18  | 2.760551922 | 172.16.12.201 | 172.16.10.1   | ICMP     | 98     | Echo (ping) reply id=0x0c5e, seq=375/30465, ttl=62 (request in 17) |
| 19  | 3.000072460 | 172.16.10.1   | 172.16.12.201 | ICMP     | 98     | Echo (ping) request id=0x0d90, seq=12/3072, ttl=64 (reply in 20)   |
| 20  | 3.000636839 | 172.16.12.201 | 172.16.10.1   | ICMP     | 98     | Echo (ping) reply id=0x0d90, seq=12/3072, ttl=62 (request in 19)   |

▼ Frame 1: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0

► Ethernet II, Src: Elitegro\_35:c2:46 (b8:ae:ed:35:c2:46), Dst: Elitegro\_a5:a6:32 (b8:ae:ed:a5:a6:32)

► Internet Protocol Version 4, Src: 172.16.10.1, Dst: 172.16.12.201

► Internet Control Message Protocol

## At R2:

193 32.815168032 Tp-LinkT\_b8:f0:e3 ARP 62 Who has 172.16.11.201? Tell 172.16.11.1

194 32.815180144 00:59:4d:6e:8a:00 ARP 44 172.16.11.201 is at 00:59:4d:6e:8a:00

195 33.808917594 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=19/4864, ttl=63 (no response found!)

196 33.808929965 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=19/4864, ttl=62 (reply in 197)

197 33.809101488 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=19/4864, ttl=64 (request in 196)

198 33.809105448 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=19/4864, ttl=63

199 34.808981347 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=20/5120, ttl=63 (no response found!)

200 34.808993572 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=20/5120, ttl=62 (reply in 201)

201 34.809212041 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=20/5120, ttl=64 (request in 200)

202 34.809222504 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=20/5120, ttl=63

203 35.808919124 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=21/5376, ttl=63 (no response found!)

204 35.808931548 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=21/5376, ttl=62 (reply in 205)

205 35.809162907 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=21/5376, ttl=64 (request in 204)

206 35.809172799 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=21/5376, ttl=63

207 36.808961741 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=22/5632, ttl=63 (no response found!)

208 36.808973727 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=22/5632, ttl=62 (reply in 209)

209 36.809151159 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=22/5632, ttl=64 (request in 208)

210 36.809154846 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=22/5632, ttl=63

211 37.808961331 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=23/5888, ttl=63 (no response found!)

212 37.808973135 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=23/5888, ttl=62 (reply in 213)

213 37.809145145 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=23/5888, ttl=64 (request in 212)

214 37.809148458 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=23/5888, ttl=63

215 38.808984053 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=24/6144, ttl=63 (no response found!)

216 38.808996706 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=24/6144, ttl=62 (reply in 217)

217 38.809172236 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=24/6144, ttl=64 (request in 216)

218 38.809175641 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=24/6144, ttl=63

219 39.809048744 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=25/6400, ttl=63 (no response found!)

220 39.809060263 172.16.10.1 172.16.12.201 ICMP 100 Echo (ping) request id=0x0c5e, seq=25/6400, ttl=62 (reply in 221)

221 39.809229544 172.16.12.201 172.16.10.1 ICMP 100 Echo (ping) reply id=0x0c5e, seq=25/6400, ttl=64 (request in 220)

## At Hd:



|              |                   |                   |      |  |  |
|--------------|-------------------|-------------------|------|--|--|
| 1.999884587  | 172.16.12.201     | 172.16.10.1       | ICMP | 98 Echo (ping) reply                       | id=0x0b3f, seq=3/768, ttl=64 (request in 3)    |
| 3.999837835  | 172.16.10.1       | 172.16.12.201     | ICMP | 98 Echo (ping) request                     | id=0x0b3f, seq=5/1280, ttl=62 (reply in 6)     |
| 3.999875938  | 172.16.12.201     | 172.16.10.1       | ICMP | 98 Echo (ping) reply                       | id=0x0b3f, seq=5/1280, ttl=64 (request in 5)   |
| 5.005744888  | Elitegro_a5:a6:b5 | Elitegro_a5:a6:0e | ARP  | 60 Who has 172.16.12.201? Tell 172.16.12.1 |  |
| 5.005771121  | Elitegro_a5:a6:0e | Elitegro_a5:a6:b5 | ARP  | 42 172.16.12.201 is at b8:ae:ed:a5:a6:0e   |  |
| 7.000036398  | 172.16.10.1       | 172.16.12.201     | ICMP | 98 Echo (ping) request                     | id=0x0b3f, seq=8/2048, ttl=62 (reply in 10)    |
| 7.000074491  | 172.16.12.201     | 172.16.10.1       | ICMP | 98 Echo (ping) reply                       | id=0x0b3f, seq=8/2048, ttl=64 (request in 9)   |
| 9.000075694  | 172.16.10.1       | 172.16.12.201     | ICMP | 98 Echo (ping) request                     | id=0x0b3f, seq=10/2560, ttl=62 (reply in 12)   |
| 9.000109953  | 172.16.12.201     | 172.16.10.1       | ICMP | 98 Echo (ping) reply                       | id=0x0b3f, seq=10/2560, ttl=64 (request in 11) |
| 11.000040011 | 172.16.10.1       | 172.16.12.201     | ICMP | 98 Echo (ping) request                     | id=0x0b3f, seq=12/3072, ttl=62 (reply in 14)   |
| 11.000074265 | 172.16.12.201     | 172.16.10.1       | ICMP | 98 Echo (ping) reply                       | id=0x0b3f, seq=12/3072, ttl=64 (request in 13) |
| 12.000067063 | 172.16.10.1       | 172.16.12.201     | ICMP | 98 Echo (ping) request                     | id=0x0b3f, seq=13/3328, ttl=62 (reply in 16)   |
| 12.000104410 | 172.16.12.201     | 172.16.10.1       | ICMP | 98 Echo (ping) reply                       | id=0x0b3f, seq=13/3328, ttl=64 (request in 15) |

## Ping Request:

- ▶ Linux cooked capture
- ▼ Internet Protocol Version 4, Src: 172.16.10.1, Dst: 172.16.12.201
  - 0100 .... = Version: 4
  - .... 0101 = Header Length: 20 bytes (5)
  - ▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  - Total Length: 84
  - Identification: 0x289c (10396)
  - ▶ Flags: 0x4000, Don't fragment
  - Time to live: 62
  - Protocol: ICMP (1)
  - Header checksum: 0xa522 [validation disabled]
  - [Header checksum status: Unverified]
  - Source: 172.16.10.1
  - Destination: 172.16.12.201
- ▼ Internet Control Message Protocol
  - Type: 8 (Echo (ping) request)
  - Code: 0
  - Checksum: 0xa0e5 [correct]
  - [Checksum Status: Good]
  - Identifier (BE): 3471 (0x0d8f)
  - Identifier (LE): 36621 (0x8f0d)
  - Sequence number (BE): 1 (0x0001)

## Ping Reply:

- ▼ Frame 2: 100 bytes on wire (800 bits), 100 bytes captured (800 bits)
  - ▶ Interface id: 0 (any)
  - Encapsulation type: Linux cooked-mode capture (25)
  - Arrival Time: Mar 3, 2021 13:26:46.327307516 IST
  - [Time shift for this packet: 0.000000000 seconds]
  - Epoch Time: 1614758206.327307516 seconds
  - [Time delta from previous captured frame: 0.000071791 seconds]
  - [Time delta from previous displayed frame: 0.000071791 seconds]
  - [Time since reference or first frame: 0.000071791 seconds]
  - Frame Number: 2
  - Frame Length: 100 bytes (800 bits)
  - Capture Length: 100 bytes (800 bits)
  - [Frame is marked: False]
  - [Frame is ignored: False]
  - [Protocols in frame: sll:ethertype:ip:icmp:data]
  - [Coloring Rule Name: ICMP]
  - [Coloring Rule String: icmp || icmpv6]
- ▶ Linux cooked capture
- ▼ Internet Protocol Version 4, Src: 172.16.12.201, Dst: 172.16.10.1
  - 0100 .... = Version: 4
  - .... 0101 = Header Length: 20 bytes (5)
  - ▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  - Total Length: 84
  - Identification: 0x3502 (13570)
  - ▶ Flags: 0x0000
  - Time to live: 64
  - Protocol: ICMP (1)
  - Header checksum: 0xd6bc [validation disabled]
  - [Header checksum status: Unverified]
  - Source: 172.16.12.201
  - Destination: 172.16.10.1
- ▼ Internet Control Message Protocol
  - Type: 0 (Echo (ping) reply)
  - Code: 0
  - Checksum: 0xa8e5 [correct]
  - [Checksum Status: Good]
  - Identifier (BE): 3471 (0x0d8f)
  - Identifier (LE): 36621 (0x8f0d)
  - Sequence number (BE): 1 (0x0001)
  - Sequence number (LE): 256 (0x0100)

