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VLAN Configuration and Network Traffic Monitoring using Port Mirroring

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Part 1: Switch VLANs

SWITCH CONFIG

My system having the prompt based switch configuration because I'm using USB (enx00e04cc57dbf)as second Ethernet interface.

PROMPT BASED:
After entering into the prompt just type the enable to enter into enable mode.
To bring up the configuration mode just type "configure terminal"
To add the ip addresses and netmask I use ip address 10.133.36.10 netmask 255.255.255.0

```
BPS2000> enable
BPS2000# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
BPS2000(config)#vlan mgmt 36
BPS2000(config)#ip address 10.133.36.10 netmask 255.255.255.0
```

To know the addresses are add or not just type the show ip addr
you will get the address which are assign by us.

```
BPS2000(config)#show ip addr

                    Configured        In Use          Last BootP

Stack IP Address:   0.0.0.0                           0.0.0.0
Switch IP Address:  10.133.36.10      10.133.36.10    0.0.0.0
Subnet Mask:        255.255.255.0     255.255.255.0   0.0.0.0
```

After add the default gateway using ip addr default-gateway 10.133.36.254

```
BPS2000(config)#show vlan
Id  Name                 Type     Protocol         User PID Active IVL/SVL Mgmt
--- -------------------- -------- ---------------- -------- ------ ------- ----
1   VLAN #1              Port     None             0x0000   Yes    IVL     No
        Port Members: 1-24
36  VLAN #36             Port     None             0x0000   Yes    IVL     Yes
        Port Members: 1
136 VLAN #136            Port     None             0x0000   Yes    IVL     No
        Port Members: 1-12
236 VLAN #236            Port     None             0x0000   Yes    IVL     No
        Port Members: 1,13-24
```

```
BPS2000(config)#vlan ports 1 tagging enable
BPS2000(config)#
```

```
BPS2000>en
BPS2000#show vlan
Id  Name                 Type     Protocol         User PID Active IVL/SVL Mgmt
--- -------------------- -------- ---------------- -------- ------ ------- ----
1   VLAN #1              Port     None             0x0000   Yes    IVL     Yes
        Port Members: 1-24
36  VLAN #36             Port     None             0x0000   Yes    IVL     No
        Port Members: 1
136 VLAN #136            Port     None             0x0000   Yes    IVL     No
        Port Members: 1-12
236 VLAN #236            Port     None             0x0000   Yes    IVL     No
        Port Members: 1,13-24
BPS2000#show vlan interface info
     Filter  Filter     Filter
     Tagged Untagged Unregistered
Port Frames  Frames     Frames     PVID PRI    Tagging     Name
---- ------ -------- ------------ ---- --- ------------ ----------------
1    No     No       No           1    0   TagAll       Port 1
2    No     No       No           136  0   UntagAll     Port 2
3    No     No       No           136  0   UntagAll     Port 3
4    No     No       No           136  0   UntagAll     Port 4
5    No     No       No           136  0   UntagAll     Port 5
6    No     No       No           136  0   UntagAll     Port 6
7    No     No       No           136  0   UntagAll     Port 7
8    No     No       No           136  0   UntagAll     Port 8
9    No     No       No           136  0   UntagAll     Port 9
10   No     No       No           136  0   UntagAll     Port 10
11   No     No       No           136  0   UntagAll     Port 11
12   No     No       No           136  0   UntagAll     Port 12
13   No     No       No           236  0   UntagAll     Port 13
14   No     No       No           236  0   UntagAll     Port 14
15   No     No       No           236  0   UntagAll     Port 15
16   No     No       No           236  0   UntagAll     Port 16
17   No     No       No           236  0   UntagAll     Port 17
18   No     No       No           236  0   UntagAll     Port 18
19   No     No       No           236  0   UntagAll     Port 19
20   No     No       No           236  0   UntagAll     Port 20
21   No     No       No           236  0   UntagAll     Port 21
22   No     No       No           236  0   UntagAll     Port 22
23   No     No       No           236  0   UntagAll     Port 23
24   No     No       No           236  0   UntagAll     Port 24
BPS2000#
BPS2000#
```

Linux CONFIGURATION

- See the Netplan Examples (**https://netplan.readthedocs.io/en/stable/examples/#how-to-create-vlans**)
- Make enp2s0 the parent interface. This will ensure it will append/remove tags
- Create a virtual interface on the 10.133.1XX.0/24 network with the address 10.133.1XX.254/24 with enp2s0 as its link and 1XX as the id
- Create a 2nd virtual interface on the 10.133.2XX.0/24 network with the address 10.133.2XX.254/24 with enp2s0 as its link and 2XX as the id
- Create a 3rd virtual interface on the 10.133.XX.0/24 network with the address 10.133.XX.254/24

```
ethernets:
  eno1:
    addresses:
    - 146.163.133.36/24
    nameservers:
      addresses:
      - 127.0.0.1
      - 146.163.252.126
      - 146.163.252.127
      search:
      - siue.edu
      - ece.siue.edu
      - exp.ece.siue.edu
    routes:
    - to: default
      via: 146.163.133.254
  enx00e04cc57dbf:
    addresses:
    - 192.168.36.254/24
vlans:
  vlan136:
    id: 136
    link: enx00e04cc57dbf
    addresses:
    - 10.133.136.254/24
    nameservers:
      addresses:
      - 127.0.0.1
  vlan236:
    id: 236
    link: enx00e04cc57dbf
    addresses:
    - 10.133.236.254/24
    nameservers:
      addresses:
      - 127.0.0.1
  vlan36:
    id: 36
    link: enx00e04cc57dbf
    addresses:
    - 10.133.36.254/24
    nameservers:
      addresses:
      - 127.0.0.1
```

- Do a #netplan apply (or $sudo netplan apply) to update the configuration
- Reconfigure your DHCP and DNS servers to work on your two new VLAN networks. NAT should still work too.

```
 GNU nano 6.2                          /etc/bind/named.conf.options
options {
        directory "/var/cache/bind";

        // If there is a firewall between you and nameservers you want
        // to talk to, you may need to fix the firewall to allow multiple
        // ports to talk.  See http://www.kb.cert.org/vuls/id/800113

        // If your ISP provided one or more IP addresses for stable
        // nameservers, you probably want to use them as forwarders.
        // Uncomment the following block, and insert the addresses replacing
        // the all-0's placeholder.

        // forwarders {
        //      0.0.0.0;
        // };

        //========================================================================
        // If BIND logs error messages about the root key being expired,
        // you will need to update your keys.  See https://www.isc.org/bind-keys
        //========================================================================
        dnssec-validation auto;

        listen-on port 53 { 146.163.133.36; 127.0.0.1; 10.133.136.254; 10.133.236.254; 10.133.36.254; };
};
```

```
# This is a very basic subnet declaration.
#subnet 192.168.36.0 netmask 255.255.255.0 {
 # range 192.168.36.100 192.168.36.120;
  #option routers 192.168.36.254;
#}
subnet 10.133.136.0 netmask 255.255.255.0 {
  range 10.133.136.100 10.133.136.120;
  option domain-name-servers 10.133.136.254;
  option routers 10.133.136.254;
}
subnet 10.133.236.0 netmask 255.255.255.0 {
  range 10.133.236.100 10.133.236.120;
  option domain-name-servers 10.133.236.254;
  option routers 10.133.236.254;
}
subnet 10.133.36.0 netmask 255.255.255.0 {
  range 10.133.36.100 10.133.36.120;
  option domain-name-servers 10.133.236.254;
  option routers 10.133.236.254;
}


"/etc/dhcp/dhcpd.conf" 131L, 4243B
```

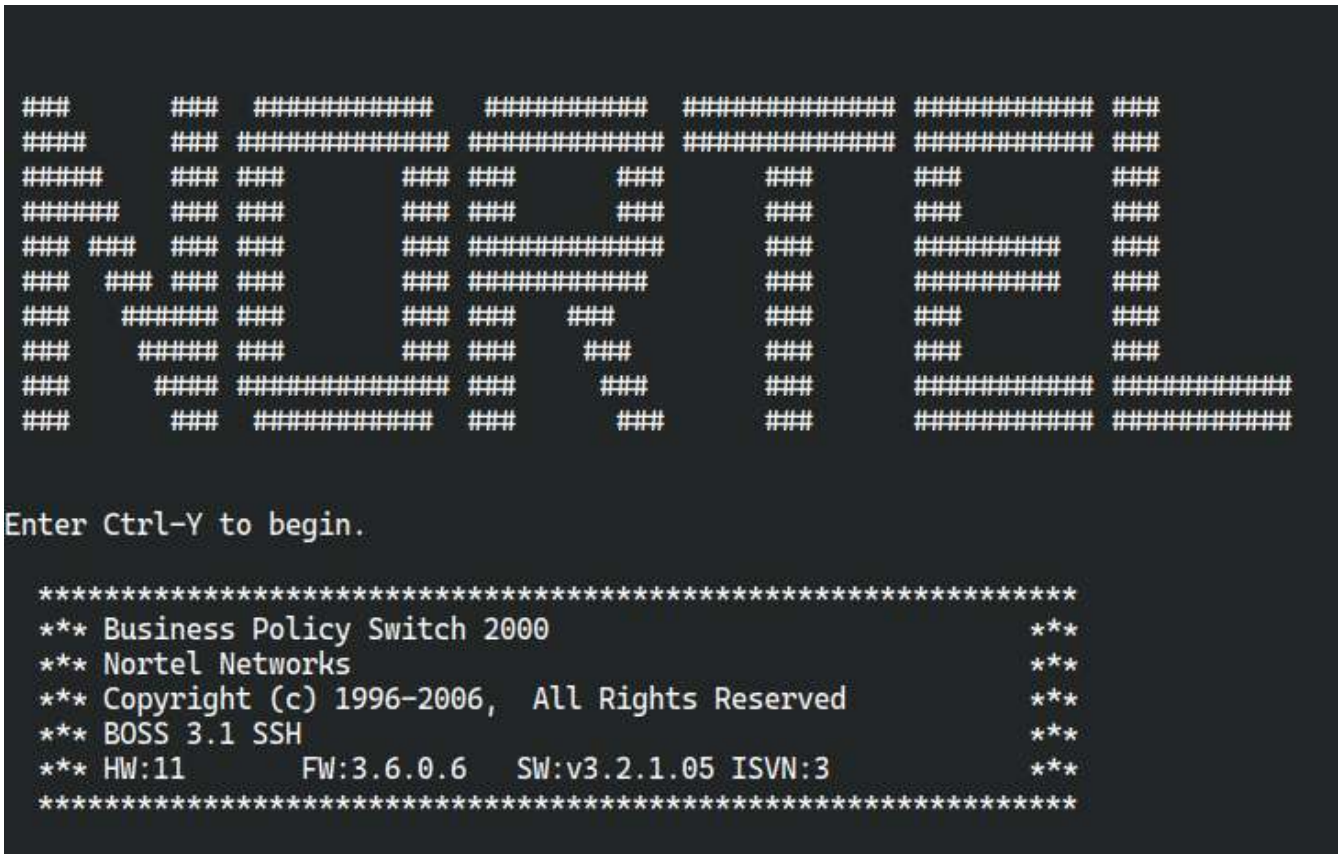
```
# nat Table rules
*nat
:POSTROUTING ACCEPT [0:0]

# Forward traffic from eth1 through eth0.
#-A POSTROUTING -s 192.168.36.0/24 -o  eno1 -j MASQUERADE
-A POSTROUTING -s 10.133.136.1/24 -o  eno1 -j MASQUERADE
-A POSTROUTING -s 10.133.236.1/24 -o  eno1 -j MASQUERADE
#-A POSTROUTING -s 10.133.36.0/24 -o  eno1 -j MASQUERADE
```

Now, on the host side, open up a terminal and type:

1. user@host$ telnet 10.133.XX.10

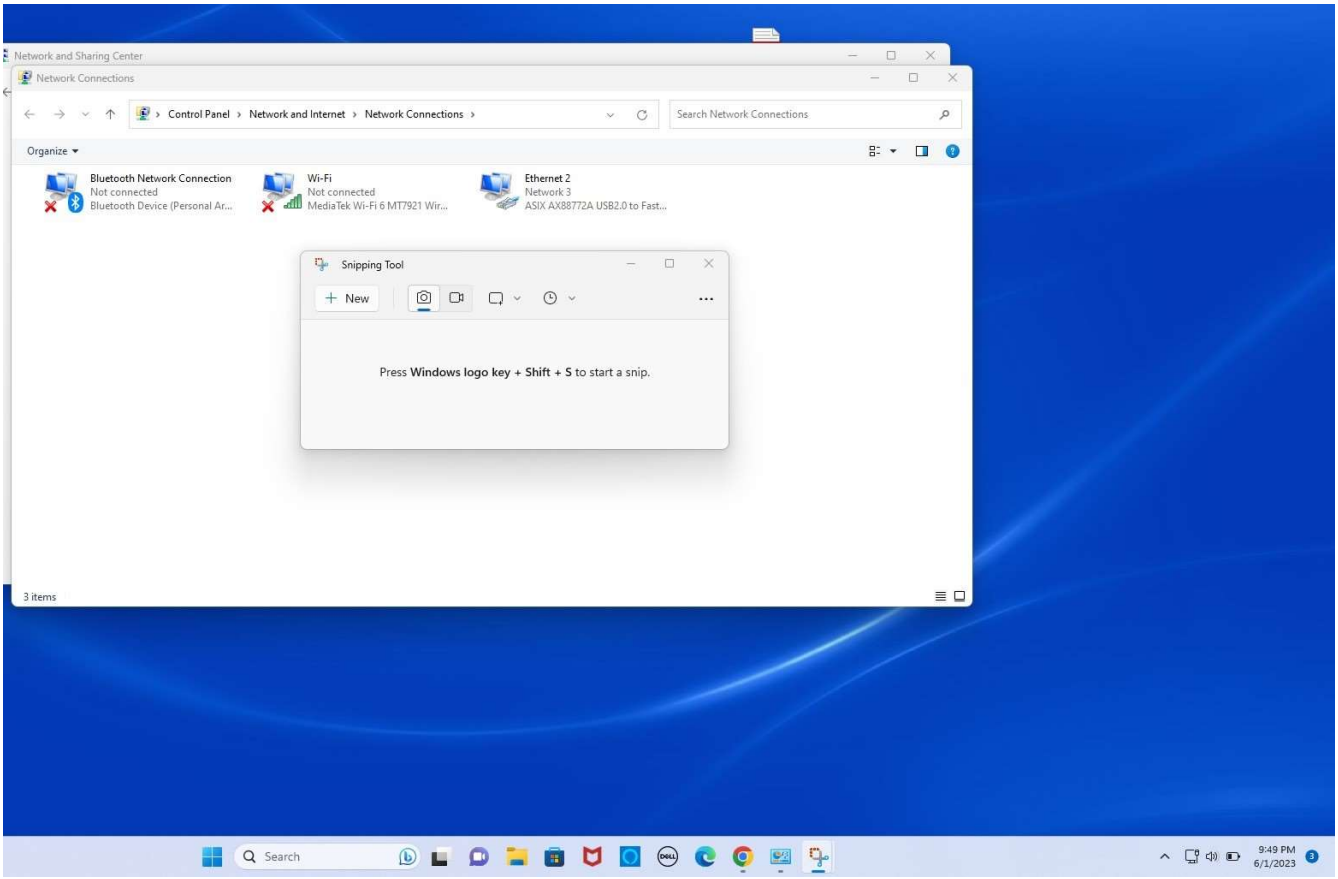
```
cpidugu@pyrophobia:~$ telnet 10.133.36.10
```

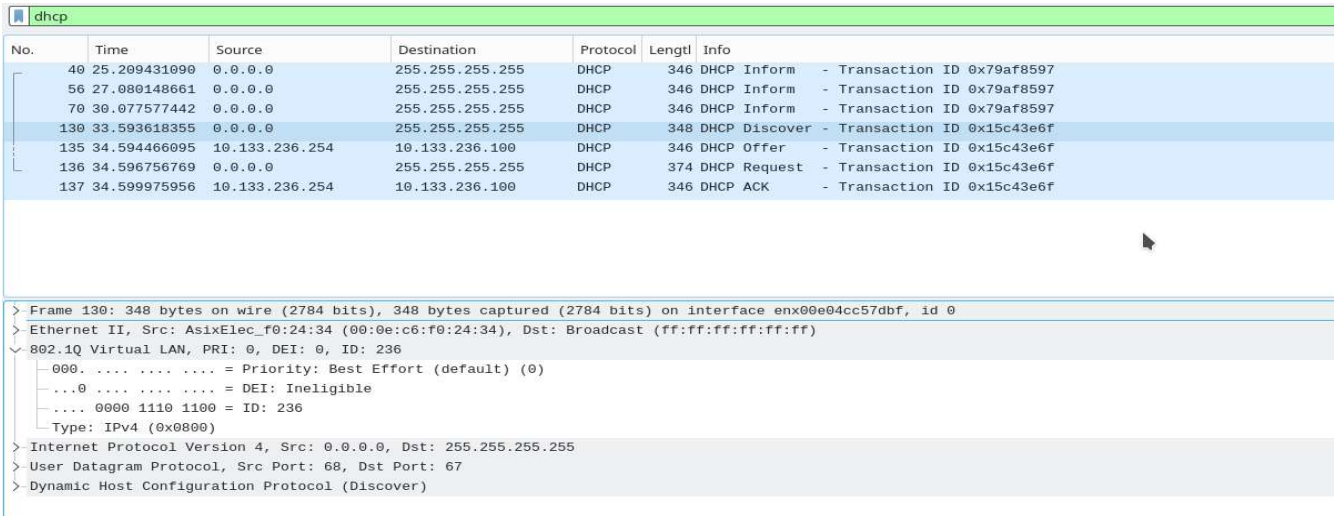
2. and you should get the same menu as the serial port. If you reset the switch, you shouldn't have anything to reconfigure until the next lab, but it is nice to be able to poke around if necessary.



```
BPS2000>EN
BPS2000#ping 10.133.36.254
Host is reachable. time=10 ms
BPS2000#
```

Your switch+Linux should now get you back out to the Internet. The left half should be on the 10.133.1XX.0/24 network and the right half should be on the 10.133.2XX.0/24 network! It should basically be just like we have on campus in our labs. This also makes your Linux machine a "one-armed router" between the two VLANs. If our switches weren't old, this would be built-in to them and they would be a L3 switch.





For port-mirroring purposes we need to tag the 24 port and change the pvid to 1

```
BPS2000(config)#vlan ports 24 tagging enable
BPS2000(config)#show vlan interface info
     Filter  Filter     Filter
     Tagged Untagged Unregistered
Port Frames  Frames     Frames     PVID PRI    Tagging     Name
---- ------ -------- ------------ ---- --- ------------ ----------------
1    No     No       No           1    0   TagAll       Port 1
2    No     No       No           136  0   UntagAll     Port 2
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21   No     No       No           236  0   UntagAll     Port 21
22   No     No       No           236  0   UntagAll     Port 22
23   No     No       No           236  0   UntagAll     Port 23
24   No     No       No           1    0   TagAll       Port 24
```

Part 2: Port Mirroring

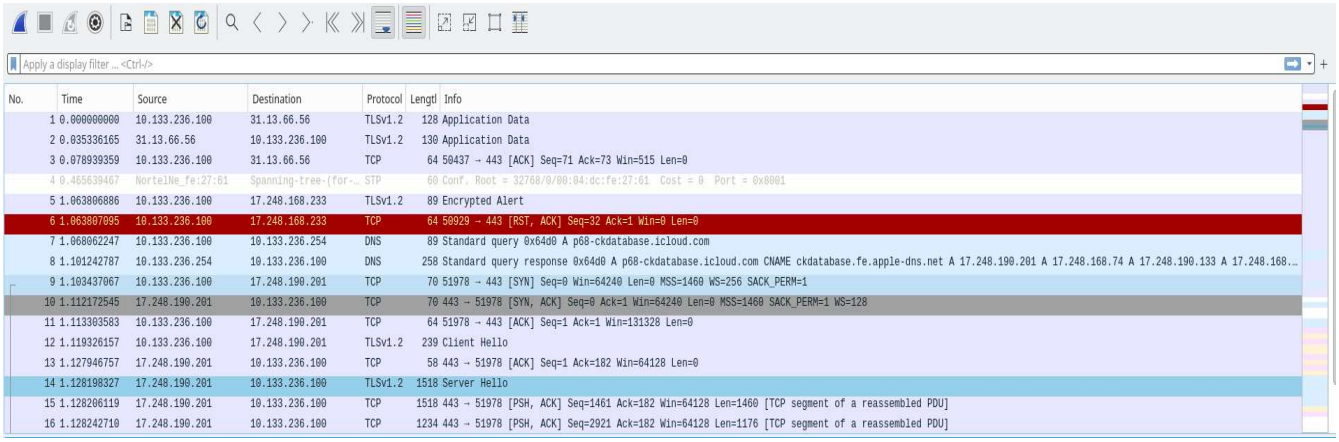
Introduction:

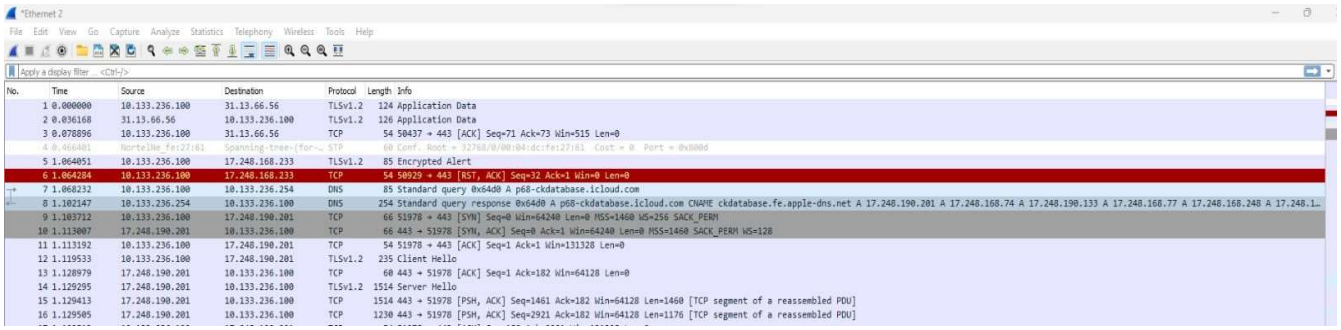
Port mirroring is a feature common to many switches. It allows the switch to copy inbound/outbound traffic on one or multiple ports to another port for monitoring. It is useful for diagnostics, as under normal operation, any other port on a switch can not monitor any other port. By mirroring target ports to a monitor port(s), this traffic can now be observed, and any potential problems, all the way down to Layer 2, might be more easily diagnosed. The big drawback is security, as all traffic for one station is now visible by another.

Exercise:

In this part of the lab, you are to use port mirroring on your switch to mirror all traffic (Inbound and Outbound) from Port 1 (the one connected to your Linux machine) to Port 24 (you can remove Port 24 from VLAN 2XX if necessary). Once enabled, plug your laptop or a neighbor's computer into Port 24 on your switch and use tcpdump/wireshark/etc. to view the traffic. If mirroring is done correctly, then you will essentially see any traffic from the switch to Linux and vice versa. You could grab another laptop, plug it in on any other port, and you should be able to monitor the DHCP configuration and any traffic from that laptop to the rest of the Internet using Wireshark. If you don't have another laptop, you could potentially configure the switch to have remote access through Telnet/SSH. Then you can remote into the switch from your Linux machine, and this traffic should also be seen on your monitoring laptop.

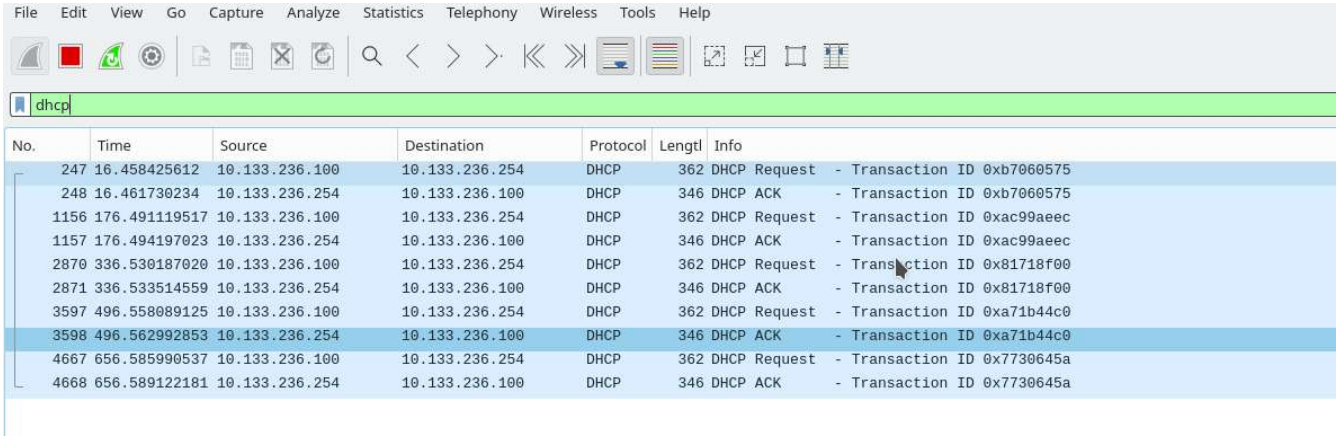
1. Normal traffic traces on wiresshark in my laptop and lab machine.





2. DHCP traffic traces on wiresshark in my laptop and lab machine.

On lab machine:



On my Laptop: