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CprE 489, Section 2
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Lab 7 Report

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1) Summarize what you learned in a few paragraphs. (20 points)

It was really interesting for us to learn how in-depth you can really go into your network and configure static Ethernet interfaces on Cisco switches. This was something that we had never worked on before, even though we knew that ISU uses many CISCO devices. It was really interesting to utilize an interface similar to a UNIX command shell, that allows us to learn about different command modes. We also learned how different command modes allowed us to modify different functions for the particular aspects of the CISCO switch.

The most fascinating part of this lab was knowing that some PCs were the management port and some PCs were the GigabitEthernet1/0/1 host, as this was something that we were not aware of before. We felt that using this interface was definitely easier than using the UNIX interface/command shell, as it has more straightforward commands and did not require multiple terminals. We learned that were different modes, such as the privileged EXEC mode, the user EXEC more, the global configuration mode, and the interface configuration mode, all having specific access methods and exit methods. Overall, this was a really interesting lab, and we got the opportunity to learn more about networks, and how it was important to make sure that all of the commands were reversed at the end of the lab.

Task 1: Include the output of : that is related to what you have configured in this step. (10 points) For these tasks, do not simply include the entirety of the output; only include the relevant parts that have been configured in the previous steps.

1) show run

```
co2061-9300-07#show run
Building configuration...

Current configuration : 10143 bytes
!
! Last configuration change at 14:03:55 UTC Wed Apr 5 2023 by admin
!
version 16.12
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
service call-home
no platform punt-keepalive disable-kernel-core
!
hostname co2061-9300-07
```

```
interface AppGigabitEthernet1/0/1
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan50
 ip address 10.0.50.1 255.255.255.0
!
router ospf 102
 network 10.0.14.0 0.0.0.7 area 0
 network 10.14.14.14 0.0.0.0 area 0
 network 10.14.14.8 0.0.0.7 area 0
 network 192.168.2.0 0.0.0.31 area 0
!
ip default-gateway 192.168.254.254
ip forward-protocol nd
ip http server
ip http authentication local
ip http secure-server
ip ssh authentication-retries 2
ip ssh version 2
!
```

2) show vlan

```
co2061-9300-07#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Gi1/0/3, Gi1/0/4, Gi1/0/5, Gi1/0/6
                                                Gi1/0/7, Gi1/0/8, Gi1/0/9, Gi1/0/10
                                                Gi1/0/11, Gi1/0/12, Gi1/0/13
                                                Gi1/0/14, Gi1/0/15, Gi1/0/16
                                                Gi1/0/17, Gi1/0/18, Gi1/0/19
                                                Gi1/0/20, Gi1/0/21, Gi1/0/22
                                                Gi1/0/23, Gi1/0/24, Ap1/0/1
50   lab7                             active
51   VLAN0051                         active
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
50   enet  100050     1500  -      -      -        -    -        0      0
51   enet  100051     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 tr    101003     1500  -      -      -        -    -        0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trnet 101005     1500  -      -      -        ibm  -        0      0

Remote SPAN VLANs
------------------------------------------------------------------------------


Primary Secondary Type              Ports
------- --------- ----------------- ------------------------------------------
```

Task 2: Include the output of
1) show run (Use this command in odd-numbered/Management Port pc)

```
!
interface Loopback0
 ip address 10.14.14.14 255.255.255.255
!
interface GigabitEthernet0/0
 vrf forwarding Mgmt-vrf
 ip address 192.168.77.107 255.255.255.0
 negotiation auto
!
interface GigabitEthernet1/0/1
 switchport access vlan 50
 switchport mode access
!
interface GigabitEthernet1/0/2
 no switchport
 ip address 192.168.1.14 255.255.255.248
!
interface GigabitEthernet1/0/3
!
interface GigabitEthernet1/0/4
!
interface GigabitEthernet1/0/5
!
interface GigabitEthernet1/0/6
!
interface GigabitEthernet1/0/7
!
```

2) show vlan (Use this command in odd-numbered/Management Port pc) that is related to what you have configured in this step (10 points)

```
co2061-9300-07#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Gi1/0/3, Gi1/0/4, Gi1/0/5, Gi1/0/6
                                                Gi1/0/7, Gi1/0/8, Gi1/0/9, Gi1/0/10
                                                Gi1/0/11, Gi1/0/12, Gi1/0/13
                                                Gi1/0/14, Gi1/0/15, Gi1/0/16
                                                Gi1/0/17, Gi1/0/18, Gi1/0/19
                                                Gi1/0/20, Gi1/0/21, Gi1/0/22
                                                Gi1/0/23, Gi1/0/24, Ap1/0/1
50   lab7                             active    Gi1/0/1
51   VLAN0051                         active
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
50   enet  100050     1500  -      -      -        -    -        0      0
51   enet  100051     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 tr    101003     1500  -      -      -        -    -        0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trnet 101005     1500  -      -      -        ibm  -        0      0

Remote SPAN VLANs
------------------------------------------------------------------------------


Primary Secondary Type              Ports
------- --------- ----------------- ------------------------------------------
```

Task 3: test your connection

Q) Include the screenshots for ping results, and comment on your observations of the results (10 points)

1) ping the VLAN50's address (10.0.50.1) from the terminal of the even-numbered PC.

```
[489labuser@co2061-14 ~]$ ping 10.0.50.1
PING 10.0.50.1 (10.0.50.1) 56(84) bytes of data.
64 bytes from 10.0.50.1: icmp_seq=1 ttl=254 time=0.790 ms
64 bytes from 10.0.50.1: icmp_seq=2 ttl=254 time=1.28 ms
64 bytes from 10.0.50.1: icmp_seq=3 ttl=254 time=0.685 ms
64 bytes from 10.0.50.1: icmp_seq=4 ttl=254 time=1.06 ms
64 bytes from 10.0.50.1: icmp_seq=5 ttl=254 time=1.00 ms
64 bytes from 10.0.50.1: icmp_seq=6 ttl=254 time=0.908 ms
64 bytes from 10.0.50.1: icmp_seq=7 ttl=254 time=11.3 ms
^C
--- 10.0.50.1 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6008ms
rtt min/avg/max/mdev = 0.685/2.439/11.348/3.641 ms
[489labuser@co2061-14 ~]$
```

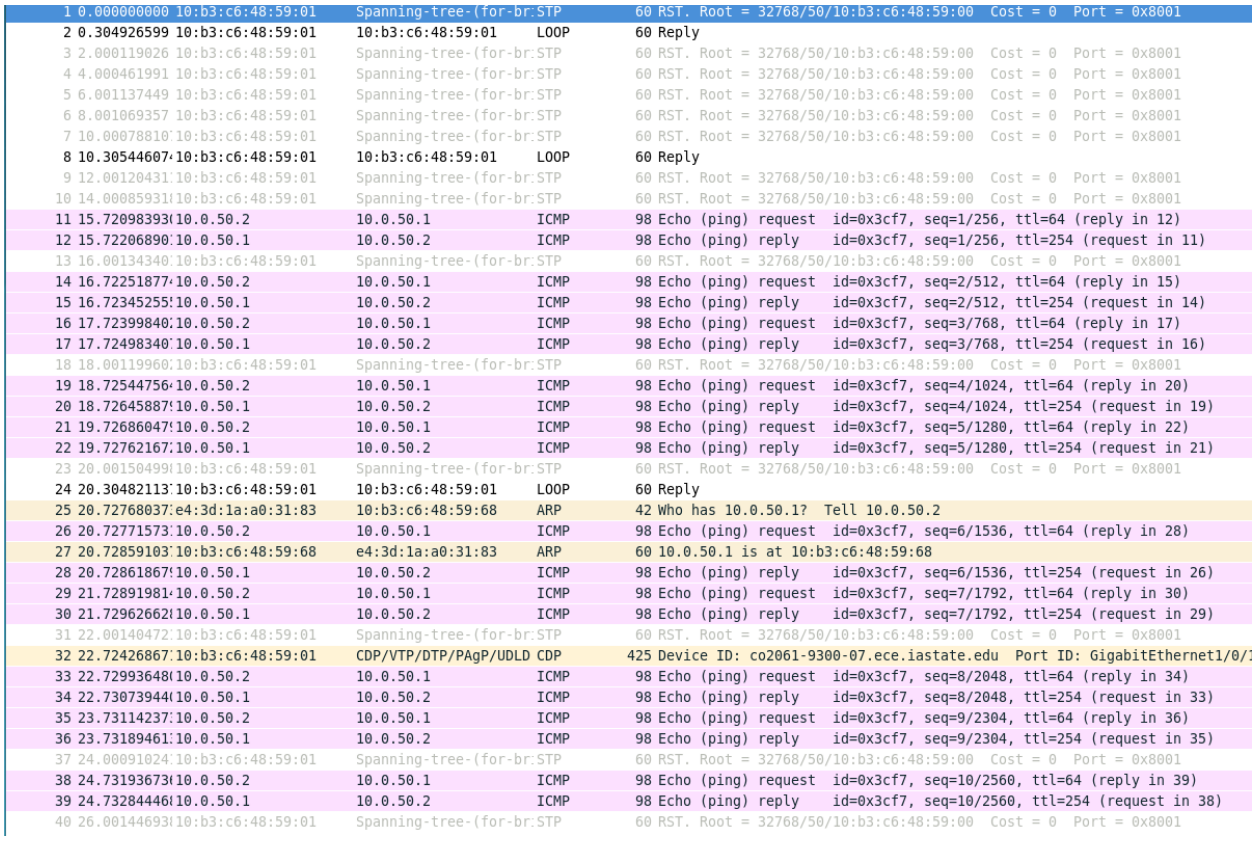
2) ping the even-numbered PC (10.0.50.2) from the switch.

```
co2061-9300-07# ping 10.0.50.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.50.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
co2061-9300-07#
```

→We observed that the ping for VLAN50's address from the even-numbered PC continues to show us results, such that it sends the packets once at a time. On the other hand, pinging the even # PC (10.0.50.2) from the switch meant that the packets were all sent at the same time. The main difference is that the switch sends packets faster all at once.

Task 4: observe your pings in Wireshark

Open an instance of Wireshark on your even computer and send the pings from Task 3. What difference, if any, do you observe between the pings sent from (and received by) the even computer to your CISCO switch? Include the screenshots of Wireshark, and comment on your observations of the results. (10 points) Keep Wireshark open as you will need it running for the next exercise.



1	0.000000000	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
2	0.304926599	10:b3:c6:48:59:01	10:b3:c6:48:59:01	LOOP	60	Reply
3	2.000119026	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
4	4.000461991	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
5	6.001137449	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
6	8.001069357	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
7	10.00078810	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
8	10.30544607	10:b3:c6:48:59:01	10:b3:c6:48:59:01	LOOP	60	Reply
9	12.00120431	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
10	14.00085931	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
11	15.72098393	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request id=0x3cf7, seq=1/256, ttl=64 (reply in 12)
12	15.72206890	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply id=0x3cf7, seq=1/256, ttl=254 (request in 11)
13	16.00134340	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
14	16.72251877	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request id=0x3cf7, seq=2/512, ttl=64 (reply in 15)
15	16.72345255	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply id=0x3cf7, seq=2/512, ttl=254 (request in 14)
16	17.72399840	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request id=0x3cf7, seq=3/768, ttl=64 (reply in 17)
17	17.72498340	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply id=0x3cf7, seq=3/768, ttl=254 (request in 16)
18	18.00119960	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
19	18.72544756	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request id=0x3cf7, seq=4/1024, ttl=64 (reply in 20)
20	18.72645887	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply id=0x3cf7, seq=4/1024, ttl=254 (request in 19)
21	19.72686047	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request id=0x3cf7, seq=5/1280, ttl=64 (reply in 22)
22	19.72762167	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply id=0x3cf7, seq=5/1280, ttl=254 (request in 21)
23	20.00150499	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
24	20.30482113	10:b3:c6:48:59:01	10:b3:c6:48:59:01	LOOP	60	Reply
25	20.72768037	e4:3d:1a:a0:31:83	10:b3:c6:48:59:68	ARP	42	Who has 10.0.50.1? Tell 10.0.50.2
26	20.72771573	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request id=0x3cf7, seq=6/1536, ttl=64 (reply in 28)
27	20.72859103	10:b3:c6:48:59:68	e4:3d:1a:a0:31:83	ARP	60	10.0.50.1 is at 10:b3:c6:48:59:68
28	20.72861867	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply id=0x3cf7, seq=6/1536, ttl=254 (request in 26)
29	21.72891981	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request id=0x3cf7, seq=7/1792, ttl=64 (reply in 30)
30	21.72962662	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply id=0x3cf7, seq=7/1792, ttl=254 (request in 29)
31	22.00140472	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
32	22.72426867	10:b3:c6:48:59:01	CDP/VTP/DTP/PAgP/UDLD	CDP	425	Device ID: co2061-9300-07.ece.iastate.edu Port ID: GigabitEthernet1/0/1
33	22.72993648	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request id=0x3cf7, seq=8/2048, ttl=64 (reply in 34)
34	22.73073944	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply id=0x3cf7, seq=8/2048, ttl=254 (request in 33)
35	23.73114237	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request id=0x3cf7, seq=9/2304, ttl=64 (reply in 36)
36	23.73189461	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply id=0x3cf7, seq=9/2304, ttl=254 (request in 35)
37	24.00091024	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001
38	24.73193673	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request id=0x3cf7, seq=10/2560, ttl=64 (reply in 39)
39	24.73284446	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply id=0x3cf7, seq=10/2560, ttl=254 (request in 38)
40	26.00144693	10:b3:c6:48:59:01	Spanning-tree-(for-br:	STP	60	RST. Root = 32768/50/10:b3:c6:48:59:00 Cost = 0 Port = 0x8001

→ Some observations we've made are that the ttl from wireshark is different from those on the terminal; for example, the terminal shows ttl = 254 while wire shark switches from 64 to 254 continuously. We've also noticed the IP address changes as well; for example the terminal has a constant IP address of 10.0.50.1 while wireshark switches from 10.0.50.1 to 10.0.50.2.

Task 5: Include the output of
1) show run that is related to what you have configured in this step. (10 points)

```
ip routing
!
!
!
!
!
ip domain name ece.iastate.edu
ip dhcp excluded-address 10.0.50.1
ip dhcp excluded-address 10.0.50.2
ip dhcp excluded-address 10.0.50.3
ip dhcp excluded-address 10.0.50.254
!
ip dhcp pool VLAN50
 network 10.0.50.0 255.255.255.0
 default-router 10.0.50.1
 dns-server 4.8.9.50
 lease 0 2
!
!
!
login on-success log
!
!
!
!
!
!
!
no device-tracking logging theft
!
crypto pki trustpoint TP-self-signed-3988690007
 enrollment selfsigned
 subject-name cn=IOS-Self-Signed-Certificate-3988690007
 revocation-check none
 rsakeypair TP-self-signed-3988690007
```

Task 6: Provide a screenshot that demonstrates the final IP address from your computer was truly selected from the DHCP pool. (10 points)

Before restarting network:

```
[489labuser@co2061-14 ~]$ ifconfig
lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 422  bytes 35870 (35.0 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 422  bytes 35870 (35.0 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ɔ2p1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.254.14  netmask 255.255.255.0  broadcast 192.168.254.255
        ether e4:3d:1a:a0:31:82  txqueuelen 1000  (Ethernet)
        RX packets 1195454  bytes 1132937735 (1.0 GiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 935335  bytes 908504749 (866.4 MiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 16

ɔ2p2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.50.2  netmask 255.255.255.0  broadcast 10.0.50.255
        ether e4:3d:1a:a0:31:83  txqueuelen 1000  (Ethernet)
        RX packets 1770  bytes 367345 (358.7 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 104  bytes 12966 (12.6 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 17

virbr0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 192.168.122.1  netmask 255.255.255.0  broadcast 192.168.122.255
        ether 52:54:00:9b:b4:49  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
```

After restarting network:

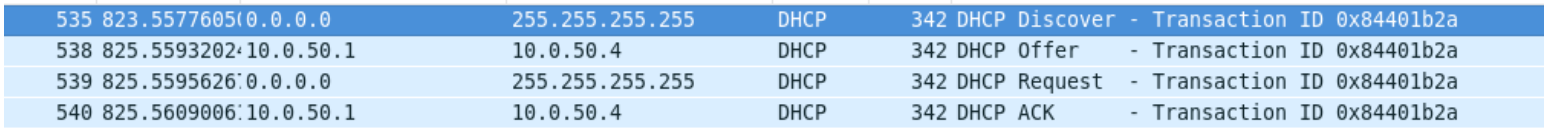
```
Restarting network (via systemctl):                        [  OK  ]
[489labuser@co2061-14 ~]$ /sbin/ifconfig
lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 422  bytes 35870 (35.0 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 422  bytes 35870 (35.0 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

p2p1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.254.14  netmask 255.255.255.0  broadcast 192.168.254.255
        ether e4:3d:1a:a0:31:82  txqueuelen 1000  (Ethernet)
        RX packets 1196498  bytes 1133115825 (1.0 GiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 936436  bytes 909407277 (867.2 MiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 16

p2p2: flags=-28605<UP,BROADCAST,RUNNING,MULTICAST,DYNAMIC>  mtu 1500
        inet 10.0.50.4  netmask 255.255.255.0  broadcast 10.0.50.255
        ether e4:3d:1a:a0:31:83  txqueuelen 1000  (Ethernet)
        RX packets 1925  bytes 379654 (370.7 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 119  bytes 15958 (15.5 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 17

virbr0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 192.168.122.1  netmask 255.255.255.0  broadcast 192.168.122.255
        ether 52:54:00:9b:b4:49  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
```

Task 7: Wireshark should still be open at this point (If you closed Wireshark, reopen it and restart the network). Identify the packets that were sent to your even-numbered computer from the CISCO Switch in order to establish a DHCP IP address. Take a screenshot of the applicable packets (there should be at least four; you may have to filter the results to see only the necessary packets). Comment on your observation of these packets and the purpose you believe each of these packets serves. (10 points)



→ Here, we can see all the 4 DHCP packets. Here, we can see that DHCP ACK lets the switch know what IP address the even #PC chose. For this instance, the IP address was 10.0.50.4. The DHCP request packet tells the computer to choose an IP address based on the rules that the switch has created, and not to pick the address (10.0.50.1, 10.0.50.2, 10.0.50.3), as they were prompted to be excluded.

Task 8: You have performed quite a few steps to get to this point. On your odd-numbered computer, you should reverse all of the commands that you made to get to this point. Specify all of the commands required to return your CISCO switch to its condition at the beginning of the lab period (using the things that we have talked about in these lab instructions as a guide). Take a final snapshot of your list of commands. (10 points)

→ **(The final "show run" was shown to the TA to verify that everything has been reversed)** The following commands were executed to reverse all the commands:

no interface vlan 50
no ip address 10.0.50.1 255.255.255.0
no vlan 50
no switchport
no ip dhcp excluded-address 10.0.50.1
no ip dhcp excluded-address 10.0.50.2
no ip dhcp excluded-address 10.0.50.3
no ip dhcp excluded-address 10.0.50.254
no ip dhcp pool VLAN 50
no network 10.0.50.0 255.255.255.0
no default-router 10.0.50.1
no dns-server 4.8.9.50
no lease 0 2