

# Lab 7

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## Summary

This lab teaches us how to use the Cisco IOS XE and to configure static Ethernet interfaces on Cisco switches. Firstly, we set up a VLAN using a static IP set on the odd number computers, and test the system using Wireshark on the even numbered computer.

Then the next experiment is setting up DHCP to set dynamic IP addresses for the even numbered computer.

We test this also using Wireshark and look at the 4way handshaking process while restarting the network.

## Exercise 1 - VLAN

**Task 1:** Include the output of

- a) 1. Show run:

```
co2016-9300-12#show vlan
```

VLAN	Name	Status	Ports
1	default	active	Gil/0/1, Gil/0/2, Gil/0/3 Gil/0/4, Gil/0/5, Gil/0/6 Gil/0/7, Gil/0/8, Gil/0/9 Gil/0/10, Gil/0/11, Gil/0/12 Gil/0/13, Gil/0/14, Gil/0/15 Gil/0/16, Gil/0/17, Gil/0/18 Gil/0/19, Gil/0/20, Gil/0/21 Gil/0/22, Gil/0/23, Gil/0/24 Apl/0/1
50	lab7	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
1002	fddi	101002	1500	-	-	-	-	-	0	0

## 2) show vlan

```
co2016-9300-12#show run
Building configuration...

Current configuration : 9813 bytes
!
! Last configuration change at 15:30:06 UTC Mon Oct 23 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 co2016-9300-12
!
!
vrf definition Mgmt-vrf
!
  address-family ipv4
  exit-address-family
!
  address-family ipv6
  exit-address-family
--More--
```

```
interface Vlan50
  ip address 10.0.50.1 255.255.255.0
!
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
!
```

## Task 2: Include the output of

1) show run

```
!
!
interface Loopback0
  no ip address
!
interface GigabitEthernet0/0
  vrf forwarding Mgmt-vrf
  ip address 192.168.77.112 255.255.255.0
  negotiation auto
!
interface GigabitEthernet1/0/1
  switchport access vlan 50
  switchport mode access
!
interface GigabitEthernet1/0/2
!
```

2) show vlan

We see that in the previous screenshot Gi 1/0/1 was under Vlan1, but after we changed configuration in the other system, running show vlan will show Gi 1/0/1 under lab7.

```
co2016-9300-12#show vlan

VLAN Name                Status    Ports
-----
1    default                active    Gi1/0/2, 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
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
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)

- 1) Ping the VLAN50's address from the terminal of the even numbered PC

```
[489labuser@co2061-24 ~]$ 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=2 ttl=254 time=1.11 ms
64 bytes from 10.0.50.1: icmp_seq=3 ttl=254 time=0.996 ms
64 bytes from 10.0.50.1: icmp_seq=4 ttl=254 time=0.999 ms
64 bytes from 10.0.50.1: icmp_seq=5 ttl=254 time=1.04 ms
^C
--- 10.0.50.1 ping statistics ---
5 packets transmitted, 4 received, 20% packet loss, time 4015ms
rtt min/avg/max/mdev = 0.996/1.034/1.106/0.044 ms
[489labuser@co2061-24 ~]$
```

- 2) ping the even numbered PC from the switch

```
co2016-9300-12#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
co2016-9300-12#
```

## Task 4)

Pinging 10.0.50.1 from the even computer and filtering out ICMP on wireshark gives the result below.

*enp3s0f1									
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help									
icmp									
No.	Time	Source	Destination	Protocol	Length	Info			
164	148.155096119	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply	id=0x0002, seq=34/8704, ttl=254 (request in 163)		
165	149.178206689	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request	id=0x0002, seq=35/8960, ttl=64 (reply in 166)		
166	149.178926329	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply	id=0x0002, seq=35/8960, ttl=254 (request in 165)		
168	150.202194257	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request	id=0x0002, seq=36/9216, ttl=64 (reply in 169)		
169	150.202863849	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply	id=0x0002, seq=36/9216, ttl=254 (request in 168)		
170	151.226215136	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request	id=0x0002, seq=37/9472, ttl=64 (reply in 171)		
171	151.226861990	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply	id=0x0002, seq=37/9472, ttl=254 (request in 170)		
174	152.250306910	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request	id=0x0002, seq=38/9728, ttl=64 (reply in 175)		
175	152.251107202	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply	id=0x0002, seq=38/9728, ttl=254 (request in 174)		
176	153.274256012	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request	id=0x0002, seq=39/9984, ttl=64 (reply in 177)		
177	153.275245146	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply	id=0x0002, seq=39/9984, ttl=254 (request in 176)		
179	154.275476890	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request	id=0x0002, seq=40/10240, ttl=64 (reply in 180)		
180	154.276233734	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply	id=0x0002, seq=40/10240, ttl=254 (request in 179)		
181	155.322203840	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request	id=0x0002, seq=41/10496, ttl=64 (reply in 182)		
182	155.322850966	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply	id=0x0002, seq=41/10496, ttl=254 (request in 181)		
184	156.346227279	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request	id=0x0002, seq=42/10752, ttl=64 (reply in 185)		
185	156.347115079	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply	id=0x0002, seq=42/10752, ttl=254 (request in 184)		
186	157.347343601	10.0.50.2	10.0.50.1	ICMP	98	Echo (ping) request	id=0x0002, seq=43/11008, ttl=64 (reply in 187)		
187	157.348170779	10.0.50.1	10.0.50.2	ICMP	98	Echo (ping) reply	id=0x0002, seq=43/11008, ttl=254 (request in 186)		

▶ Frame 73: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0  
▶ Ethernet II, Src: e4:3d:1a:a0:2a:f9 (e4:3d:1a:a0:2a:f9), Dst: 10:b3:c6:48:62:68 (10:b3:c6:48:62:68)  
▶ Internet Protocol Version 4, Src: 10.0.50.2, Dst: 10.0.50.1  
▶ Internet Control Message Protocol

0000	10 b3 c6 48 62 68 e4 3d 1a a0 2a f9 08 00 45 00	...Hbh=...	E..
0010	00 54 a4 19 40 00 40 01 1e 8d 0a 00 32 02 0a 00	..T..@..	...2...
0020	32 01 08 00 d5 ad 00 02 00 01 a9 a3 36 65 00 00	2.....	...6e...
0030	00 00 7d 73 06 00 00 00 00 00 10 11 12 13 14 15	..}s.....	.....
0040	16 17 18 19 1a 1b 1c 1d 1e 1f 20 21 22 23 24 25	.....	...!""#\$%
0050	26 27 28 29 2a 2b 2c 2d 2e 2f 30 31 32 33 34 35	&'()*+,-./012345	.....
0060	36 37	67	.....

Below shows ping sent from an odd computer switch to even computer.

*enp3s0f1									
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help									
icmp									
No.	Time	Source	Destination	Protocol	Length	Info			
4	4.287391091	10.0.50.1	10.0.50.2	ICMP	114	Echo (ping) request	id=0x0045, seq=0/0, ttl=254 (reply in 5)		
5	4.287457312	10.0.50.2	10.0.50.1	ICMP	114	Echo (ping) reply	id=0x0045, seq=0/0, ttl=64 (request in 4)		
6	4.288174563	10.0.50.1	10.0.50.2	ICMP	114	Echo (ping) request	id=0x0045, seq=1/256, ttl=254 (reply in 7)		
7	4.288208735	10.0.50.2	10.0.50.1	ICMP	114	Echo (ping) reply	id=0x0045, seq=1/256, ttl=64 (request in 6)		
8	4.288819395	10.0.50.1	10.0.50.2	ICMP	114	Echo (ping) request	id=0x0045, seq=2/512, ttl=254 (reply in 9)		
9	4.288854808	10.0.50.2	10.0.50.1	ICMP	114	Echo (ping) reply	id=0x0045, seq=2/512, ttl=64 (request in 8)		
10	4.289376844	10.0.50.1	10.0.50.2	ICMP	114	Echo (ping) request	id=0x0045, seq=3/768, ttl=254 (reply in 11)		
11	4.289411380	10.0.50.2	10.0.50.1	ICMP	114	Echo (ping) reply	id=0x0045, seq=3/768, ttl=64 (request in 10)		
12	4.289945869	10.0.50.1	10.0.50.2	ICMP	114	Echo (ping) request	id=0x0045, seq=4/1024, ttl=254 (reply in 13)		
13	4.289974420	10.0.50.2	10.0.50.1	ICMP	114	Echo (ping) reply	id=0x0045, seq=4/1024, ttl=64 (request in 12)		

▶ Frame 4: 114 bytes on wire (912 bits), 114 bytes captured (912 bits) on interface 0  
▶ Ethernet II, Src: 10:b3:c6:48:62:68 (10:b3:c6:48:62:68), Dst: e4:3d:1a:a0:2a:f9 (e4:3d:1a:a0:2a:f9)  
▶ Internet Protocol Version 4, Src: 10.0.50.1, Dst: 10.0.50.2  
▶ Internet Control Message Protocol

0000	e4 3d 1a a0 2a f9 10 b3 c6 48 62 68 08 00 45 00	..=.~*...Hbh..E..
0010	00 64 01 50 00 00 fe 01 43 46 0a 00 32 01 0a 00	..d.P....CF...2...
0020	32 02 08 00 ab cd ab cd ab cd ab cd ab cd ab cd	2.....E.....
0030	ab cd ab cd ab cd ab cd ab cd ab cd ab cd ab cd	.....
0040	ab cd ab cd ab cd ab cd ab cd ab cd ab cd ab cd	.....
0050	ab cd ab cd ab cd ab cd ab cd ab cd ab cd ab cd	.....
0060	ab cd ab cd ab cd ab cd ab cd ab cd ab cd ab cd	.....
0070	ab cd	.....

**What difference, if any, do you observe between the pings sent from (and received by) the even computer to your CISCO switch?**

The difference between the 2 will be the source and destination address.

For the first screenshot we ping the switch from the even computer, so the source will be 10.0.50.2, and once that is received by the switch, the even computer gets an ACK from the switch (10.0.50.1).

In the next screenshot, the process will be flipped.

## Exercise 2 - DHCP

**Task 5:** Include the output of

1) show run

```
!
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 excluded-address 10.0.50.1 10.0.50.3
!
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
!
```

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

```
enp3s0f1: flags=4163<UP,
inet 10.0.50.2
```

Above is the static IP set before, for the even computer.

Below is the new Dynamic IP set after we set configured interface enp3s0f1 to accept DHCP information.

```

enp3s0f1: flags=-28605<UP,BROADCAST,RUNNING,MULTICAST,DYNAMIC> mtu 1500
inet 10.0.50.4 netmask 255.255.255.0 broadcast 10.0.50.255
inet6 fe80::e63d:1aff:fea0:2af9 prefixlen 64 scopeid 0x20<link>
ether e4:3d:1a:a0:2a:f9 txqueuelen 1000 (Ethernet)
RX packets 616 bytes 52432 (51.2 KiB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 78 bytes 11839 (11.5 KiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
device interrupt 17

```

**Task 7:** Take a screenshot of the applicable packet serves.

Comment on your observation of these packets and the purpose you believe each of these packets serves

41	30.302749286	0.0.0.0	255.255.255.255	DHCP	351 DHCP Discover	- Transaction ID 0x50e2b61d
42	30.303750906	10.0.50.1	10.0.50.4	DHCP	342 DHCP Offer	- Transaction ID 0x50e2b61d
43	30.303969870	0.0.0.0	255.255.255.255	DHCP	357 DHCP Request	- Transaction ID 0x50e2b61d
44	30.305040884	10.0.50.1	10.0.50.4	DHCP	342 DHCP ACK	- Transaction ID 0x50e2b61d

The above is a snippet from wireshark, as we restart the network using nmcli networking off and on, we see a DHCP 4-way handshake executing. As we saw in task 7, using DHCP, the dynamic address is 10.50.0.4.

**Task 8:** Take a final snapshot of your list of commands

```

call-home
! If contact email address in call-home is configured as sch-smart-licensing@cisco.com
! the email address configured in Cisco Smart License Portal will be used as contact email address to send SCH notifications.
contact-email-addr sch-smart-licensing@cisco.com
profile "CiscoTAC-1"
  active
  destination transport-method http
  no destination transport-method email
ip routing
!
!
!
!
!
ip domain name ece.iastate.edu
!
!
!
login on-success log

```

Above is the new output when we run "show run". We remove the dhcp settings by adding no to all the commands that we ran in conf terminal.

For example:

```

no ip dhcp excluded-address 10.0.50.1 10.0.50.3
no ip dhcp pool VLAN50

```



This will remove all the rules set by us. Below we see the old output while setting up DHCP

```
call-home
! If contact email address in call-home is configured as sch-smart-licensing@cisco.com
! the email address configured in Cisco Smart License Portal will be used as contact email address to send SCH notifications.
contact-email-addr sch-smart-licensing@cisco.com
profile "CiscoTAC-1"
  active
  destination transport-method http
no destination transport-method email
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 excluded-address 10.0.50.1 10.0.50.3
!
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
```