FINAL LABORATORY- CISCO IV

INTRODUCTION TO NETWORK INFRASTRUCTURE ADMINISTRATION

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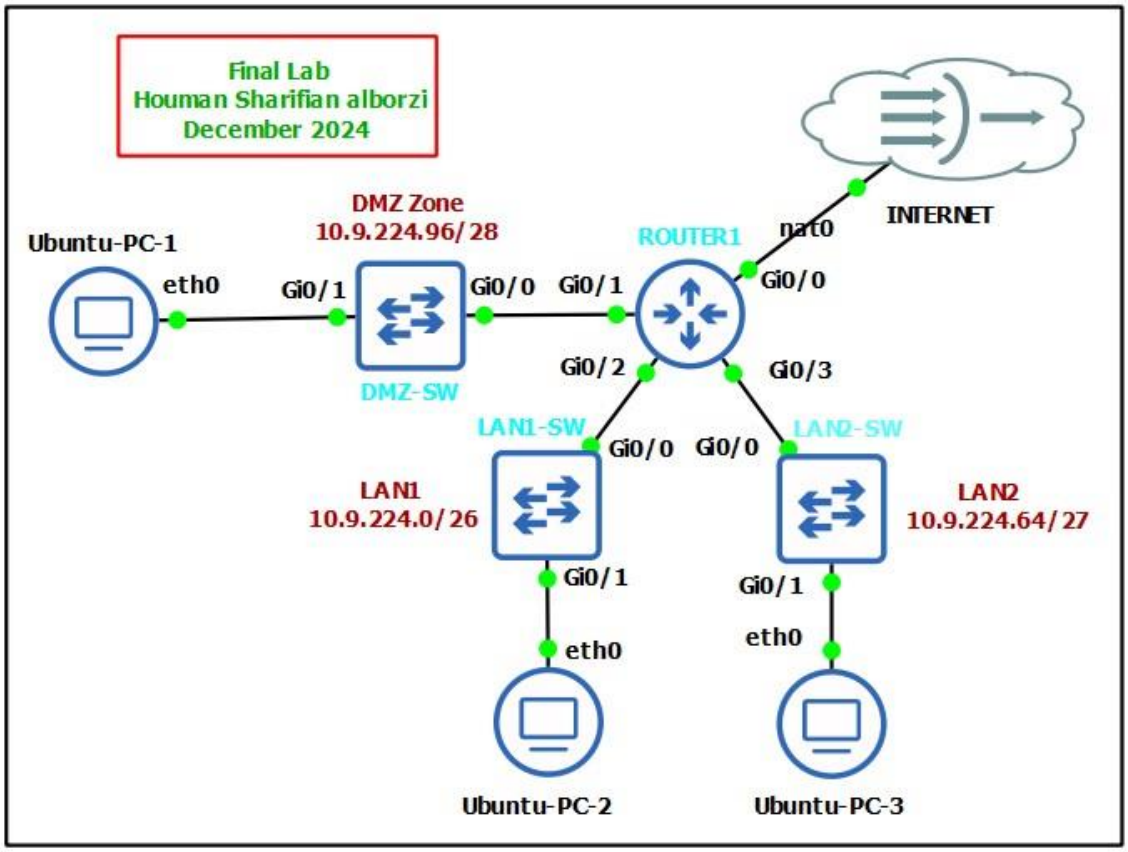
Contents

Objective:

The goal of this laboratory test is creation, configuration, setting and testing a special topology. In this practice, GNS3 that is a famous platform for simulation of computer Network infrastructure, is used.

In the image below, in question Network topology, that is implemented in GNS3, is shown.



Picture 1) Network topology

Comprehensive IP Address Table:

In Table1 IP Address Table has been shown.

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
ROUTER1	G0/0	DHCP (192.168.232.229)	255.255.255.0	N/A
	G0/1	10.9.224.97	255.255.255.240	N/A
	G0/2	10.9.224.1	255.255.255.192	N/A
	G0/3	10.9.224.65	255.255.255.224	N/A
LAN1-SW	VLAN 1	10.9.224.2	255.255.255.192	10.9.224.1
LAN2-SW	VLAN 1	10.9.224.66	255.255.255.224	10.9.224.65
DMZ-SW	VLAN 1	10.9.224.98	255.255.255.240	10.9.224.97
Ubuntu-PC-1	NIC	10.9.224.99	255.255.255.240	10.9.224.97
Ubuntu-PC-2	NIC	10.9.224.3	255.255.255.192	10.9.224.1
Ubuntu-PC-3	NIC	10.9.224.67	255.255.255.224	10.9.224.65

In continues question of each part and pictures that is result of answering to that question will come include more explanations.

Network Device Configuration

- Set the hostname on all routers and switches.
- Configure secure passwords for accessing EXEC modes and the console.
- Add a banner and meaningful descriptions to all configured interfaces.
- Enable and secure SSH access on all devices.

Picture 2) Router Configuration

```
Press RETURN to get started.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* Cisco in writing.                                                      *
**********************************************************************
Router#en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname ROUTER1
ROUTER1(config)#enable secret cisco
ROUTER1(config)#line con 0
ROUTER1(config-line)#password cisco
ROUTER1(config-line)#lo
*Dec  5 20:22:18.429: %PNP-6-PNP_DISCOVERY_STOPPED: PnP Discovery stopped (Config Wizard)
ROUTER1(config-line)#login
ROUTER1(config-line)#line vty 0 15
ROUTER1(config-line)#password cisco
ROUTER1(config-line)#login
ROUTER1(config-line)#transport input ssh
ROUTER1(config-line)#exit
ROUTER1(config)#service password-encryption
ROUTER1(config)#banner motd #This ROUTER supporter is Houman#
ROUTER1(config)#end
ROUTER1#
*Dec  5 20:25:54.693: %SYS-5-CONFIG_I: Configured from console by console
ROUTER1#wr
Building configuration...
[OK]
ROUTER1#
*Dec  5 20:26:07.924: %GRUB-5-CONFIG_WRITING: GRUB configuration is being updated on disk. Please wait...
*Dec  5 20:26:08.708: %GRUB-5-CONFIG_WRITTEN: GRUB configuration was written to disk successfully.
ROUTER1#
```

Picture 3)SSH Configuration on Router

```
ROUTER1#en
ROUTER1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
ROUTER1(config)#ip domain-name itmt.ca
ROUTER1(config)#crypto key generate rsa general-keys modulus 1024
% You already have RSA keys defined named ROUTER1.itmt.ca.
% They will be replaced.

% The key modulus size is 1024 bits
% Generating 1024 bit RSA keys, keys will be non-exportable...
[OK] (elapsed time was 1 seconds)

ROUTER1(config)#
*Dec  6 01:01:34.522: %SSH-5-DISABLED: SSH 1.99 has been disabled
*Dec  6 01:01:35.526: %SSH-5-ENABLED: SSH 1.99 has been enabled
ROUTER1(config)#username Houman secret cisco
ROUTER1(config)#line vty 0 15
ROUTER1(config-line)#password cisco
ROUTER1(config-line)#login
ROUTER1(config-line)#transport input ssh
ROUTER1(config-line)#login local
```

Picture 4) Switch DMZ-SW configuration

```
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* Cisco in writing.                                                      *
**********************************************************************
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname DMZ-SW
DMZ-SW(config)#enable secret cisco
DMZ-SW(config)#
*Dec  5 21:16:38.766: %PNP-6-PNP_DISCOVERY_STOPPED: PnP Discovery stopped (Config Wizard)
DMZ-SW(config)#line con 0
DMZ-SW(config-line)#password cisco
DMZ-SW(config-line)#login
DMZ-SW(config-line)#line vty 0 15
DMZ-SW(config-line)#password cisco
DMZ-SW(config-line)#login
DMZ-SW(config-line)#trasport input ssh
                    ^
% Invalid input detected at '^' marker.

DMZ-SW(config-line)#transport input ssh
DMZ-SW(config-line)#exit
DMZ-SW(config)#service password-encryption
DMZ-SW(config)#banner motd #This SW supporter is Houman#
DMZ-SW(config)#end
DMZ-SW#
*Dec  5 21:21:05.054: %SYS-5-CONFIG_I: Configured from console by console
DMZ-SW#wr
Building configuration...
Compressed configuration from 3557 bytes to 1699 bytes[OK]
*Dec  5 21:21:19.185: %GRUB-5-CONFIG_WRITING: GRUB configuration is being updated on disk. Please wait...
*Dec  5 21:21:19.917: %GRUB-5-CONFIG_WRITTEN: GRUB configuration was written to disk successfully.
DMZ-SW#
```
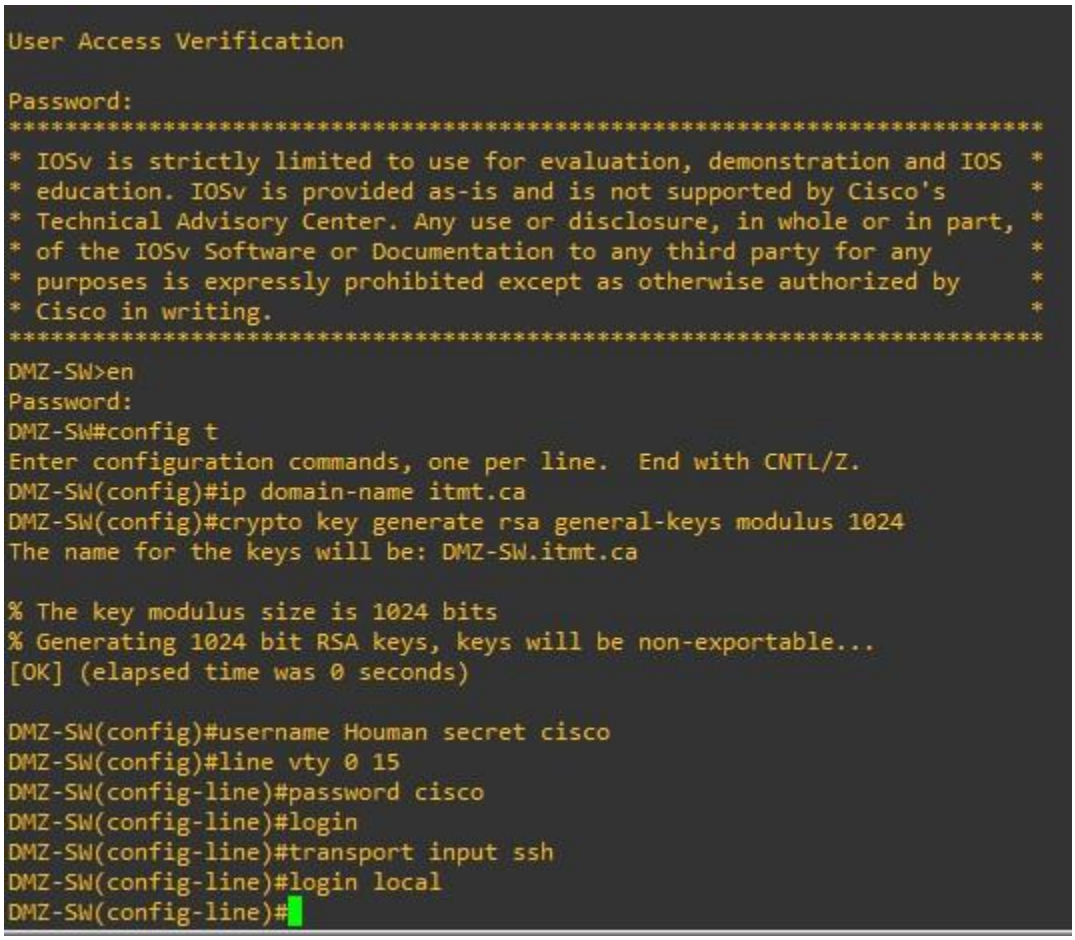
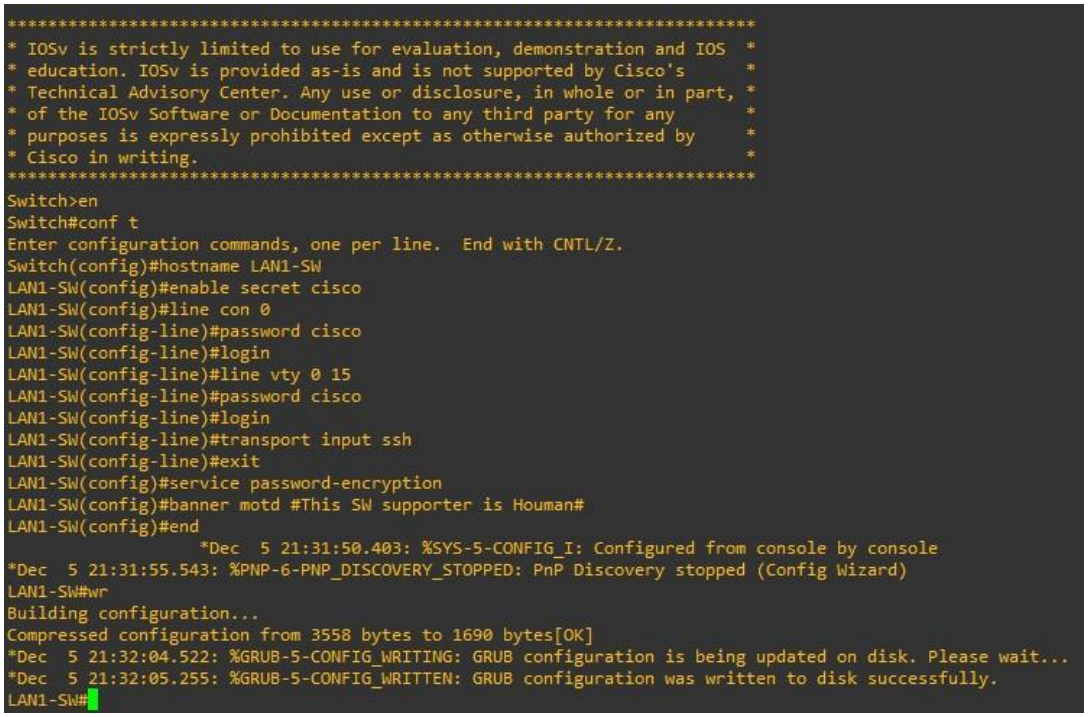
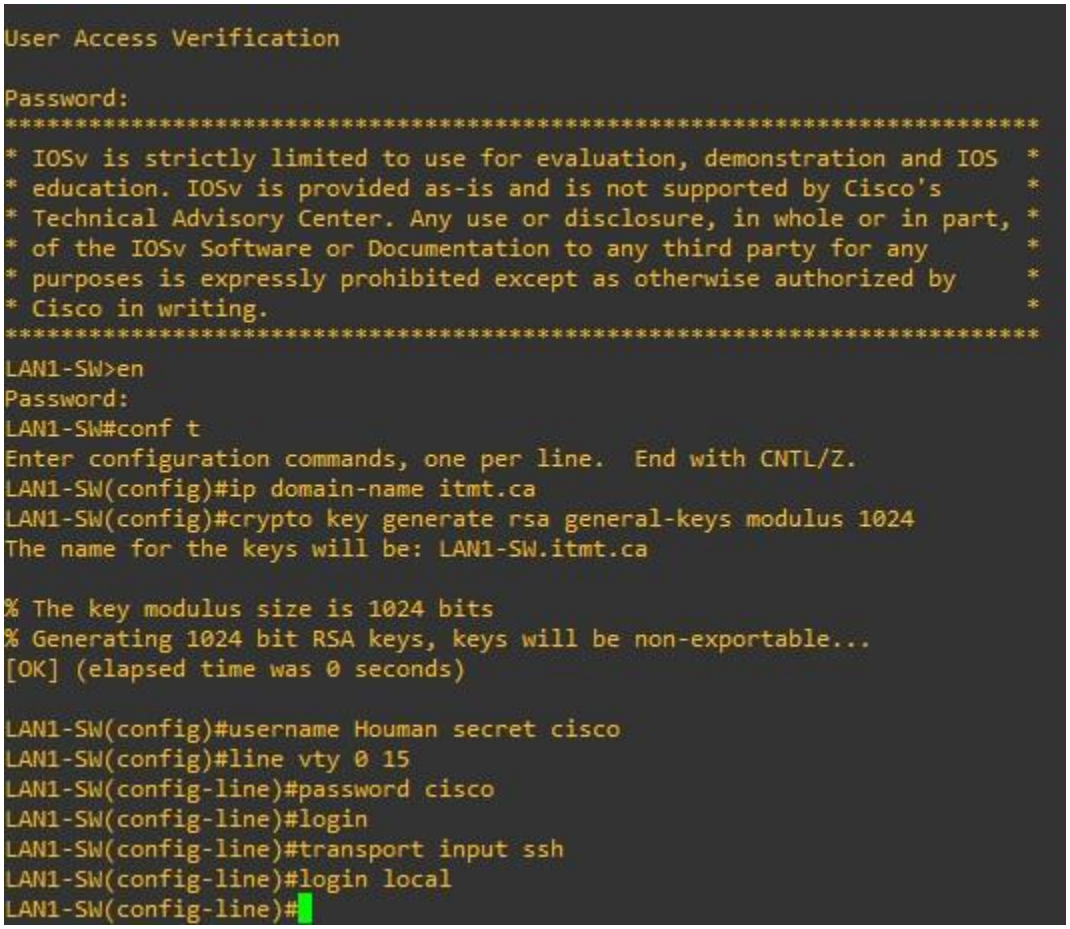

Picture 5) SSH configuration on DMZ-SW Switch



Picture 6) LAN1-SW switch configuration



Picture7) SSH configuration on LAN1-SW



Picture 8) LAN2-SW switch configuration

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname LAN2-SW
LAN2-SW(config)#enable secret cisco
LAN2-SW(config)#line con 0
LAN2-SW(config-line)#password cisco
LAN2-SW(config-line)#login
LAN2-SW(config-line)#line vty 0 15
LAN2-SW(config-line)#password cisco
LAN2-SW(config-line)#login
LAN2-SW(config-line)#transport input ssh
LAN2-SW(config-line)#exit
LAN2-SW(config)#service password-encryption
LAN2-SW(config)#banner motd #This SW supporter is Houman#
LAN2-SW(config)#end
LAN2-SW#
*Dec  5 21:52:53.999: %SYS-5-CONFIG_I: Configured from console by console
LAN2-SW#wr
Building configuration...
Compressed configuration from 3558 bytes to 1685 bytes[OK]
LAN2-SW#
*Dec  5 21:53:07.669: %GRUB-5-CONFIG_WRITING: GRUB configuration is being updated on disk. Please wait...
*Dec  5 21:53:08.412: %GRUB-5-CONFIG_WRITTEN: GRUB configuration was written to disk successfully.
LAN2-SW#
```

Picture 9) SSH configuration on LAN2-SW switch

```
User Access Verification

Password:
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* Cisco in writing.                                                           *
********************************************************************************
LAN2-SW>en
Password:
LAN2-SW#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
LAN2-SW(config)#ip domain-name itmt.ca
LAN2-SW(config)#crypto key generate rsa general-keys modulus 1024
The name for the keys will be: LAN2-SW.itmt.ca

% The key modulus size is 1024 bits
% Generating 1024 bit RSA keys, keys will be non-exportable...
[OK] (elapsed time was 0 seconds)

LAN2-SW(config)#username Houman secret cisco
LAN2-SW(config)#line vty 0 15
LAN2-SW(config-line)#password cisco
LAN2-SW(config-line)#login
LAN2-SW(config-line)#transport input ssh
LAN2-SW(config-line)#login local
LAN2-SW(config-line)#
```
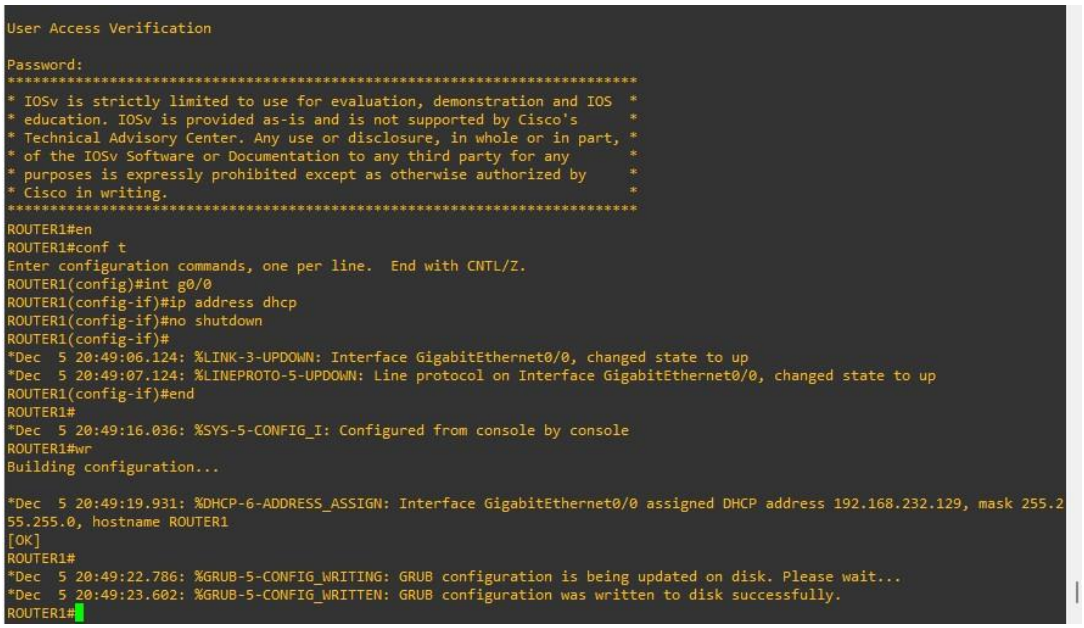
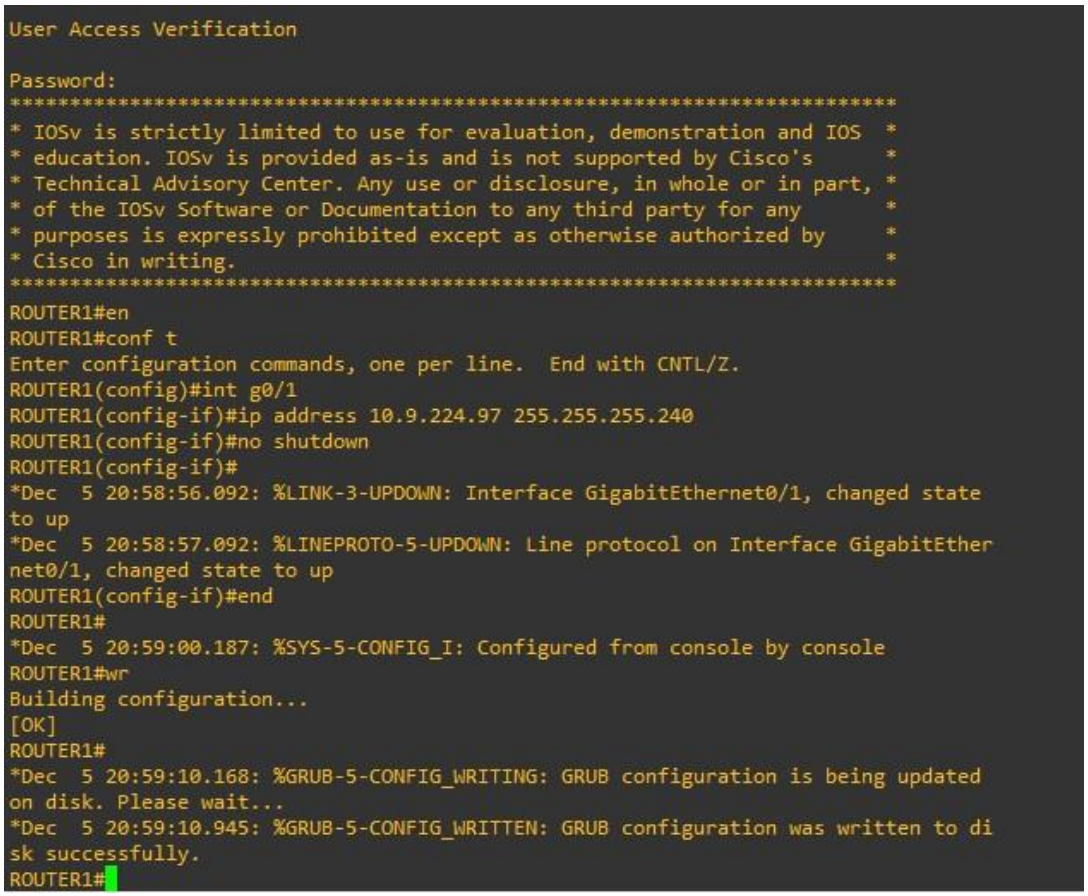

Network Settings

- Create an IP address table for all devices and PCs interfaces.
- Configure all the routers interfaces.
  Note: G0/0 should be configured to receive an IP address from the DHCP of the Internet.
- Configure the SVI of each switch.
- Assign static IP addresses to PCs.

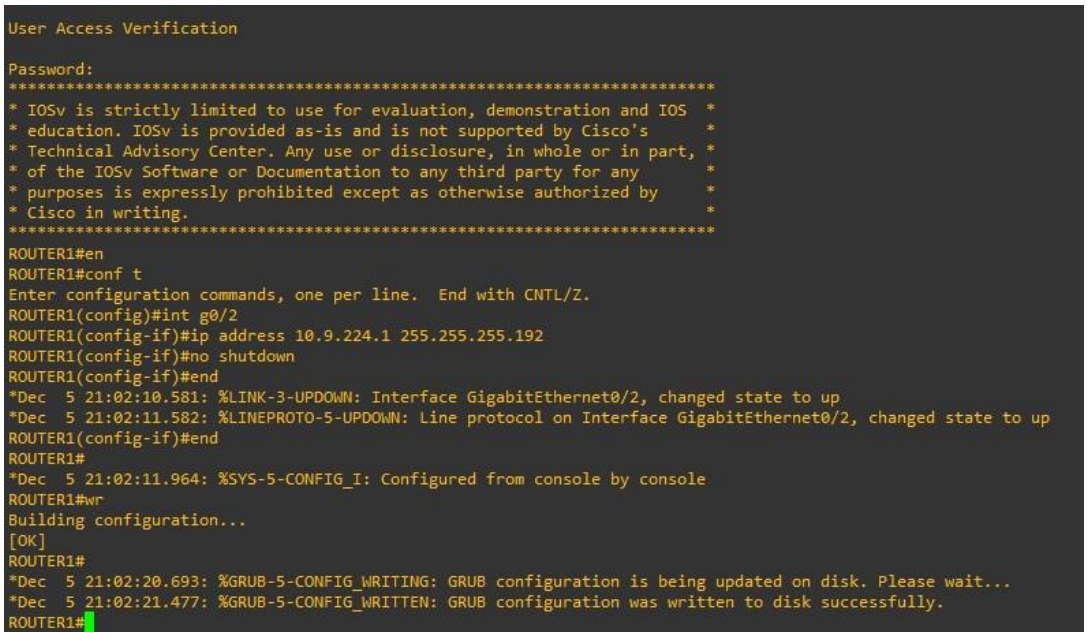
Picture 10) Set DHCP on Gi0/0 interface of Router



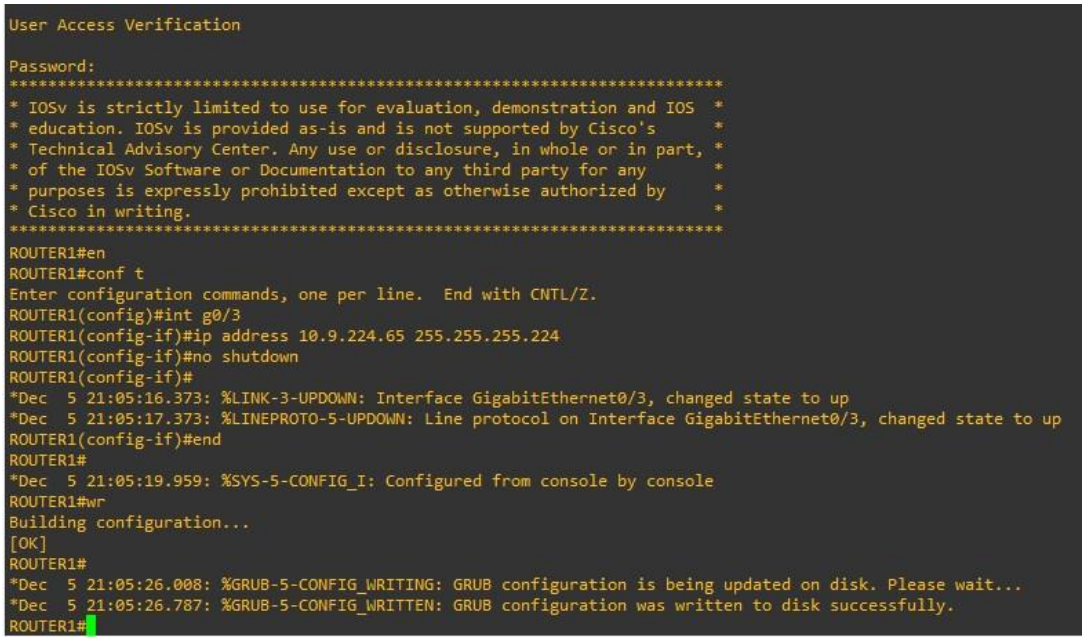
Picture 11) Set IP on Gi0/1 interface of Router



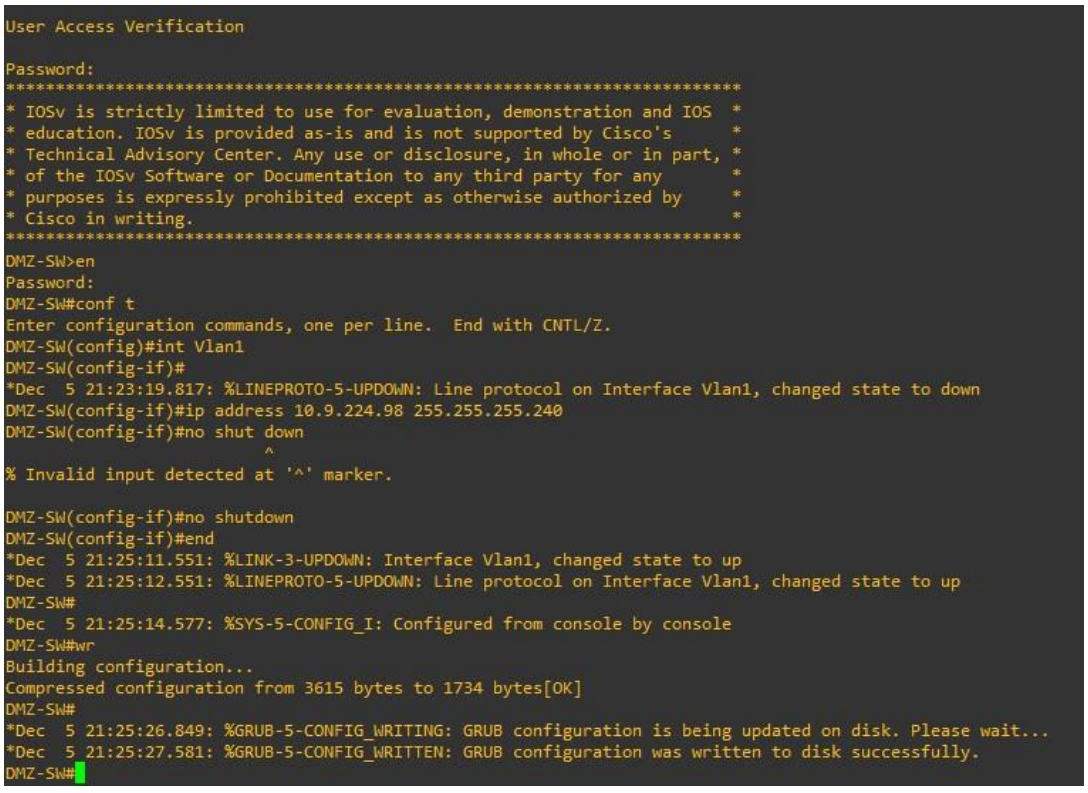
Picture 12) Set IP on Gi0/2 interface of Router



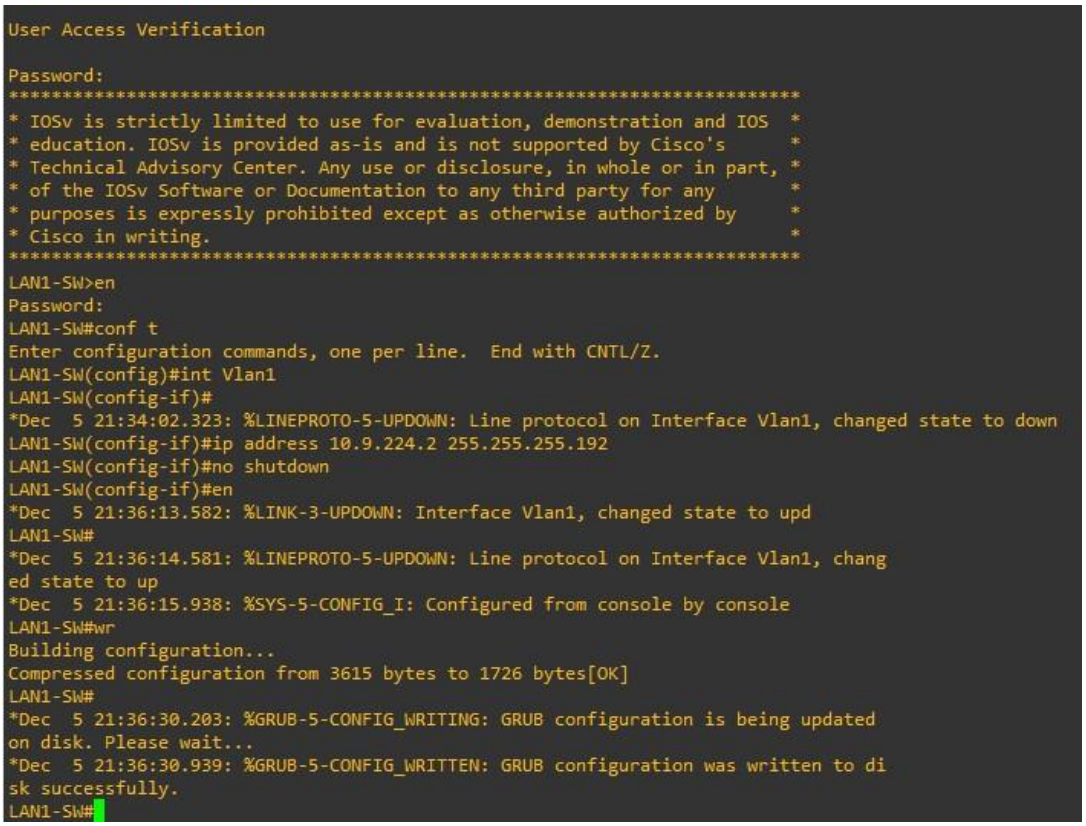
Picture 13) Set IP on Gi0/3 interface of Router



Picture 14) Set IP on DMZ-SW Switch



Picture 15) Set IP on LAN1-SW Switch



Picture 16) Set IP on LAN2-SW Switch

```
User Access Verification

Password:
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* purposes is expressly prohibited except as otherwise authorized by     *
* Cisco in writing.                                                      *
**********************************************************************
LAN2-SW>en
Password:
LAN2-SW#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
LAN2-SW(config)#int Vlan1
LAN2-SW(config-if)#
*Dec  5 21:55:18.225: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to down
LAN2-SW(config-if)#ip address 10.9.224.66 255.255.255.224
LAN2-SW(config-if)#no shutdown
LAN2-SW(config-if)#e
*Dec  5 21:56:59.438: %LINK-3-UPDOWN: Interface Vlan1, changed state to up
*Dec  5 21:57:00.439: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to upnd
LAN2-SW#
*Dec  5 21:57:02.043: %SYS-5-CONFIG_I: Configured from console by console
LAN2-SW#end
Translating "end"...domain server (255.255.255.255)
 (255.255.255.255)
Translating "end"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address
LAN2-SW#
LAN2-SW#wr
Building configuration...
Compressed configuration from 3616 bytes to 1722 bytes[OK]
LAN2-SW#
*Dec  5 21:57:53.022: %GRUB-5-CONFIG_WRITING: GRUB configuration is being updated on disk. Please wait...
*Dec  5 21:57:53.751: %GRUB-5-CONFIG_WRITTEN: GRUB configuration was written to disk successfully.
LAN2-SW#
```

Picture 17) Set IP on Ubuntu-PC-1 PC

Ubuntu-PC-1 interfaces

```
#
# This is a sample network config, please uncomment lines to configure the network
#

# Uncomment this line to load custom interface files
# source /etc/network/interfaces.d/*

# Static config for eth0
auto eth0
iface eth0 inet static
address 10.9.224.99
netmask 255.255.255.240
gateway 10.9.224.97
#               up echo nameserver 192.168.0.1 > /etc/resolv.conf

# DHCP config for eth0
#auto eth0
#iface eth0 inet dhcp
#               hostname Ubuntu-PC-1
```

Picture 18) Set IP on Ubuntu-PC-2 PC

Ubuntu-PC-2 interfaces

```
#
# This is a sample network config, please uncomment lines to configure the network
#

# Uncomment this line to load custom interface files
# source /etc/network/interfaces.d/*

# Static config for eth0
auto eth0
iface eth0 inet static
address 10.9.224.3
netmask 255.255.255.192
gateway 10.9.224.1
#               up echo nameserver 192.168.0.1 > /etc/resolv.conf

# DHCP config for eth0
#auto eth0
#iface eth0 inet dhcp
#               hostname Ubuntu-PC-2
```

Picture 19) Set IP on Ubuntu-PC-3 PC

Ubuntu-PC-3 interfaces

```
#
# This is a sample network config, please uncomment lines to configure the network
#

# Uncomment this line to load custom interface files
# source /etc/network/interfaces.d/*

# Static config for eth0
auto eth0
iface eth0 inet static
address 10.9.224.67
netmask 255.255.255.224
gateway 10.9.224.65
#               up echo nameserver 192.168.0.1 > /etc/resolv.conf

# DHCP config for eth0
#auto eth0
#iface eth0 inet dhcp
#               hostname Ubuntu-PC-3
```

Testing

- Test connectivity between PCs using ping commands.
- Test SSH connectivity to all network devices from Ubuntu-PC-1.
- Using GNS3 Wireshark, to capture ICMPv4 traffic between Ubuntu-PC-1 and its Default Gateway (router interface), and another capture of a SSH connection between Ubuntu-PC-1 and its Default Gateway

Picture 20) RUN Show Run Command On Router

```
!
interface GigabitEthernet0/0
 ip address dhcp
 duplex auto
 speed auto
 media-type rj45
!
interface GigabitEthernet0/1
 ip address 10.9.224.97 255.255.255.240
 duplex auto
 speed auto
 media-type rj45
!
interface GigabitEthernet0/2
 ip address 10.9.224.1 255.255.255.192
 duplex auto
 speed auto
 media-type rj45
!
interface GigabitEthernet0/3
 ip address 10.9.224.65 255.255.255.224
 duplex auto
 speed auto
 media-type rj45
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
!
ipv6 ioam timestamp
!
!
!
control-plane
!
```

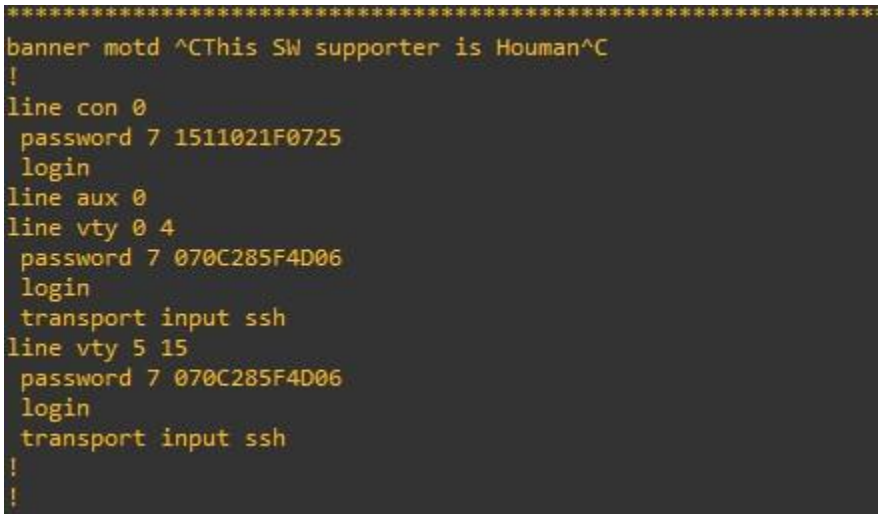
Picture 21) RUN Show Interface Brief Command on Router

```
ROUTER1#sh ip int br
Interface                  IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0         192.168.232.129 YES DHCP   up                    up
GigabitEthernet0/1         10.9.224.97     YES manual up                    up
GigabitEthernet0/2         10.9.224.1      YES manual up                    up
GigabitEthernet0/3         10.9.224.65     YES manual up                    up
ROUTER1#
```

Picture 22) RUN Show Run Command On DMZ-SW -1

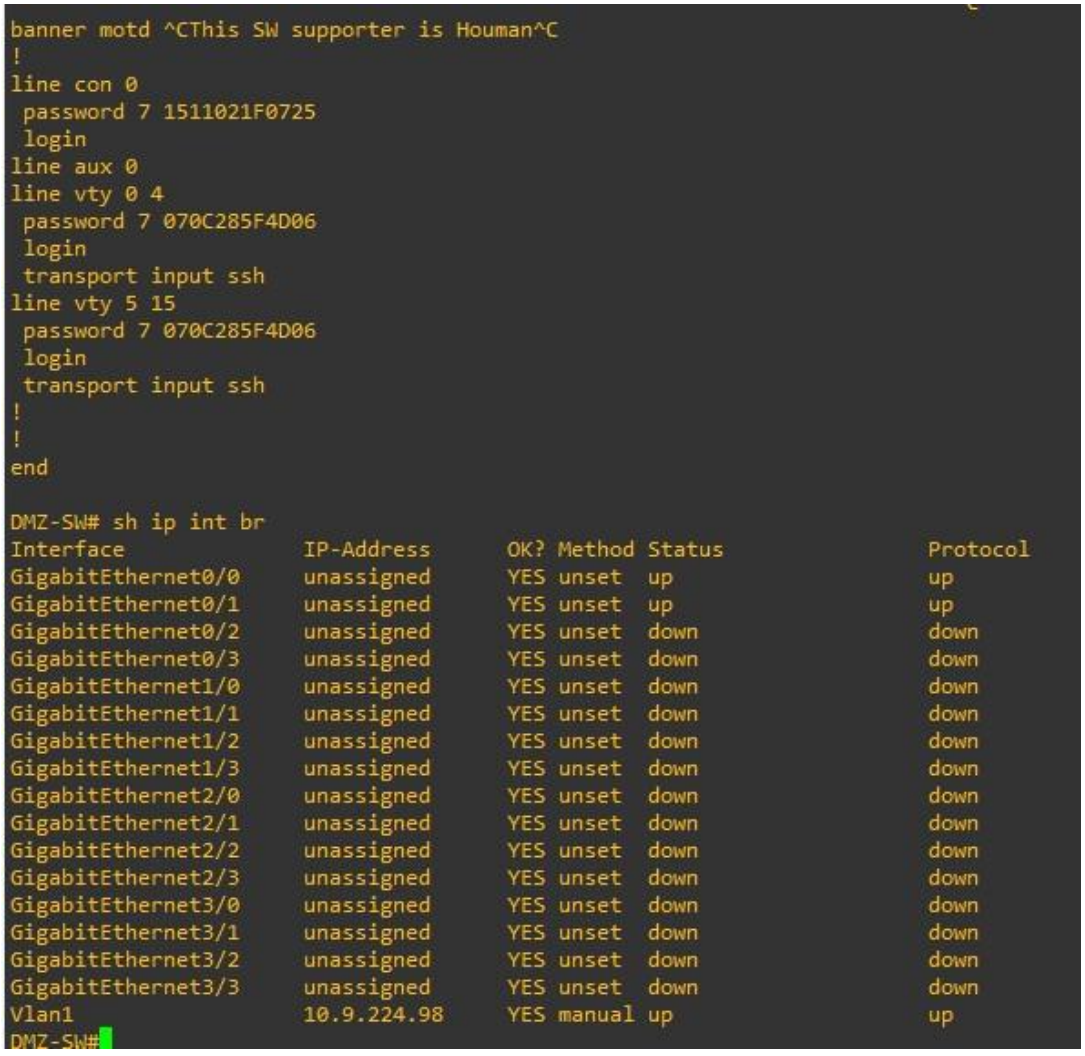
```
interface GigabitEthernet2/0
 negotiation auto
!
interface GigabitEthernet2/1
 negotiation auto
!
interface GigabitEthernet2/2
 negotiation auto
!
interface GigabitEthernet2/3
 negotiation auto
!
interface GigabitEthernet3/0
 negotiation auto
!
interface GigabitEthernet3/1
 negotiation auto
!
interface GigabitEthernet3/2
 negotiation auto
!
interface GigabitEthernet3/3
 negotiation auto
!
interface Vlan1
 ip address 10.9.224.98 255.255.255.240
!
ip default-gateway 10.9.224.97
ip forward-protocol nd
!
ip http server
ip http secure-server
!
ip ssh server algorithm encryption aes128-ctr aes192-ctr aes256-ctr
ip ssh client algorithm encryption aes128-ctr aes192-ctr aes256-ctr
```

Picture 23) RUN Show Run Command On DMZ-SW -2



```
banner motd ^CThis SW supporter is Houman^C
!
line con 0
 password 7 1511021F0725
 login
line aux 0
line vty 0 4
 password 7 070C285F4D06
 login
 transport input ssh
line vty 5 15
 password 7 070C285F4D06
 login
 transport input ssh
!
!
```

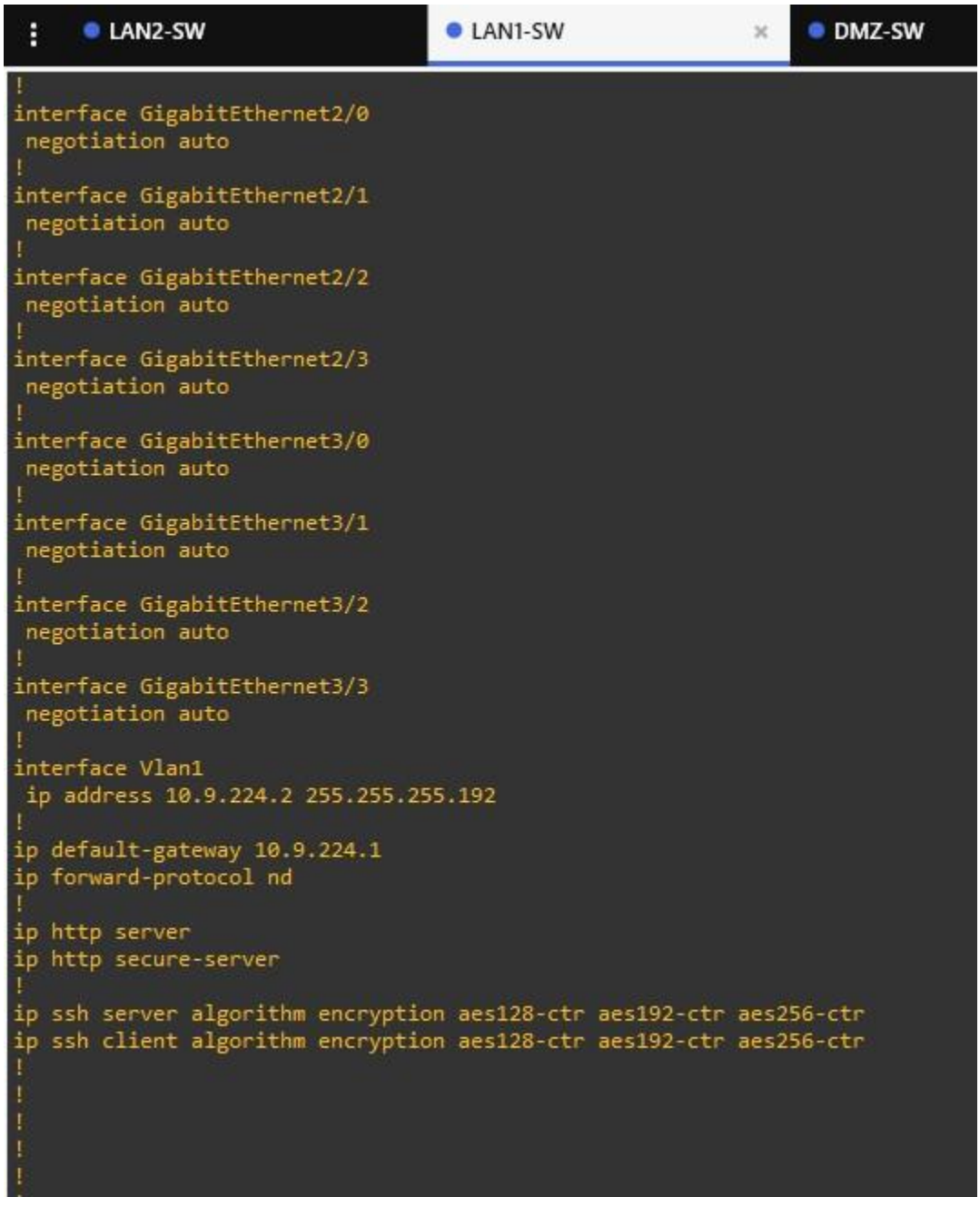
Picture 24) RUN Show Interface Brief Command on DMZ-SW



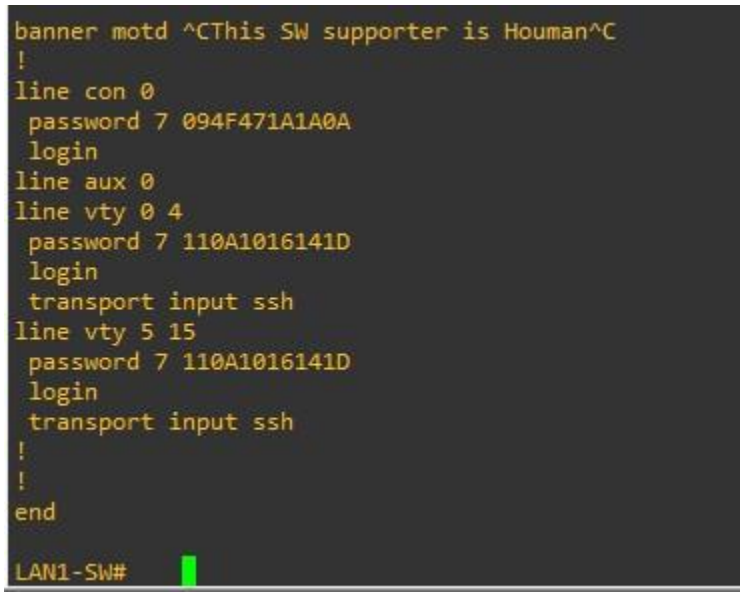
```
banner motd ^CThis SW supporter is Houman^C
!
line con 0
 password 7 1511021F0725
 login
line aux 0
line vty 0 4
 password 7 070C285F4D06
 login
 transport input ssh
line vty 5 15
 password 7 070C285F4D06
 login
 transport input ssh
!
!
end

DMZ-SW# sh ip int br
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  up                    up
GigabitEthernet0/1     unassigned      YES unset  up                    up
GigabitEthernet0/2     unassigned      YES unset  down                  down
GigabitEthernet0/3     unassigned      YES unset  down                  down
GigabitEthernet1/0     unassigned      YES unset  down                  down
GigabitEthernet1/1     unassigned      YES unset  down                  down
GigabitEthernet1/2     unassigned      YES unset  down                  down
GigabitEthernet1/3     unassigned      YES unset  down                  down
GigabitEthernet2/0     unassigned      YES unset  down                  down
GigabitEthernet2/1     unassigned      YES unset  down                  down
GigabitEthernet2/2     unassigned      YES unset  down                  down
GigabitEthernet2/3     unassigned      YES unset  down                  down
GigabitEthernet3/0     unassigned      YES unset  down                  down
GigabitEthernet3/1     unassigned      YES unset  down                  down
GigabitEthernet3/2     unassigned      YES unset  down                  down
GigabitEthernet3/3     unassigned      YES unset  down                  down
Vlan1                  10.9.224.98     YES manual up                    up
DMZ-SW#
```

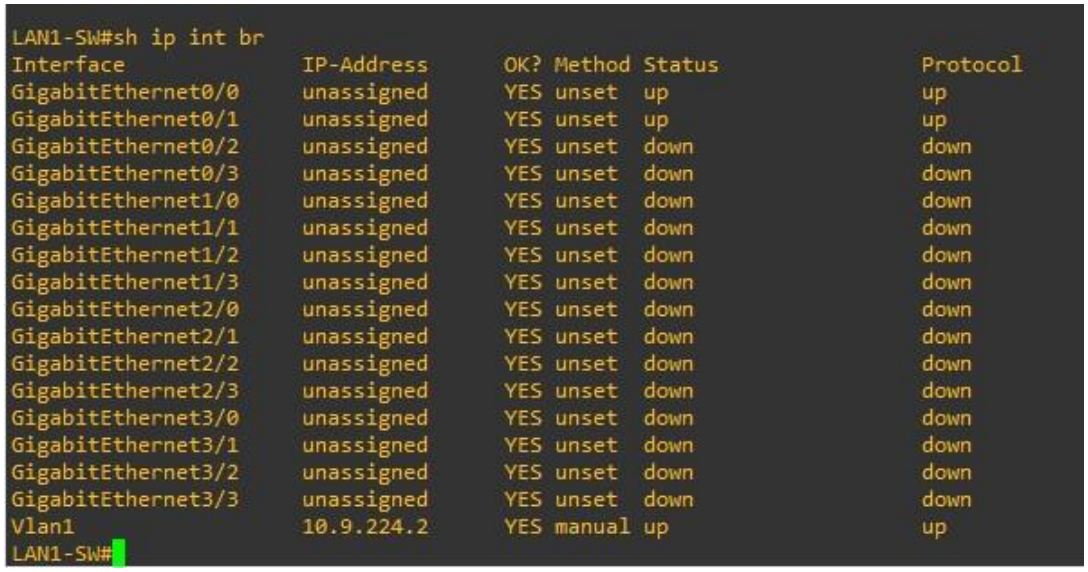
Picture 25) RUN Show Run Command On LAN1-SW -1



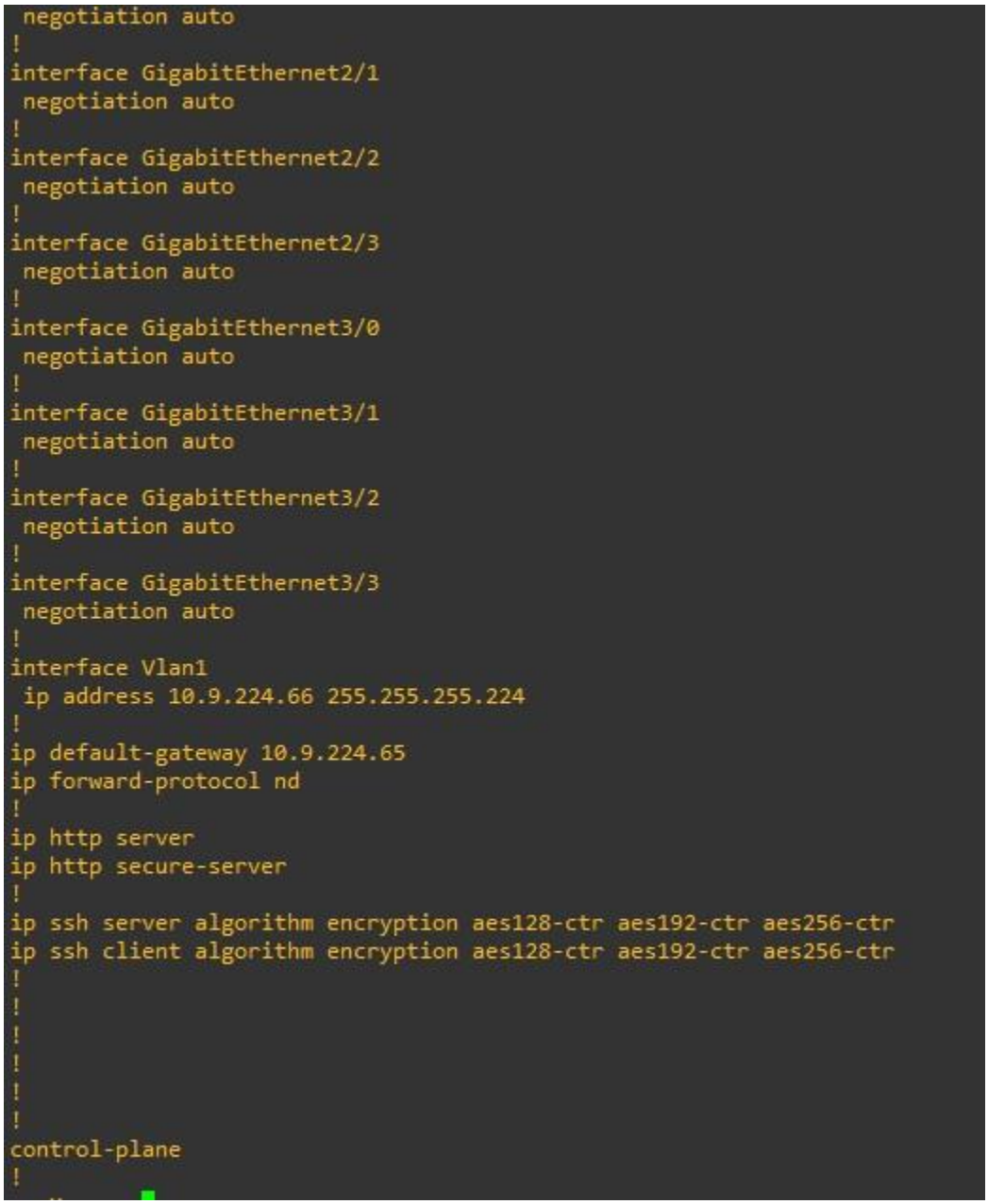
Picture 26) RUN Show Run Command On LAN1-SW -2



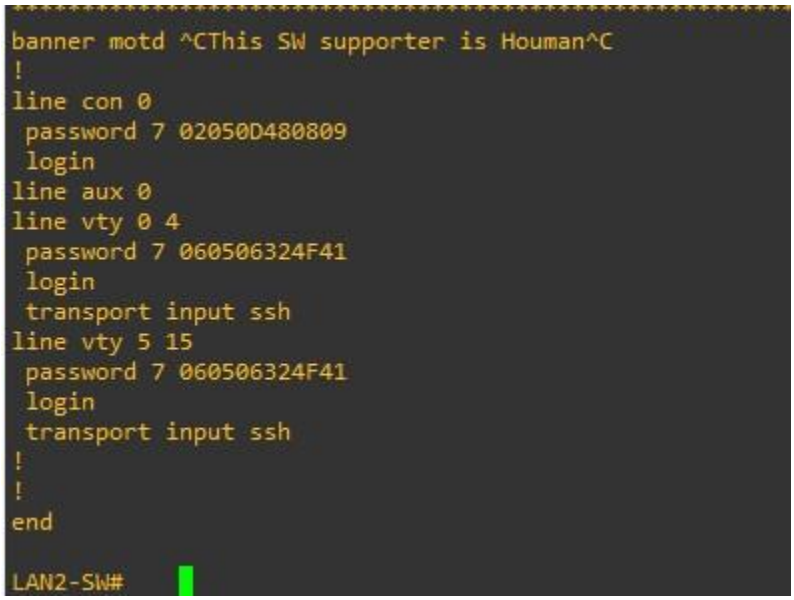
Picture 27) RUN Show Interface Brief Command on LAN1-SW



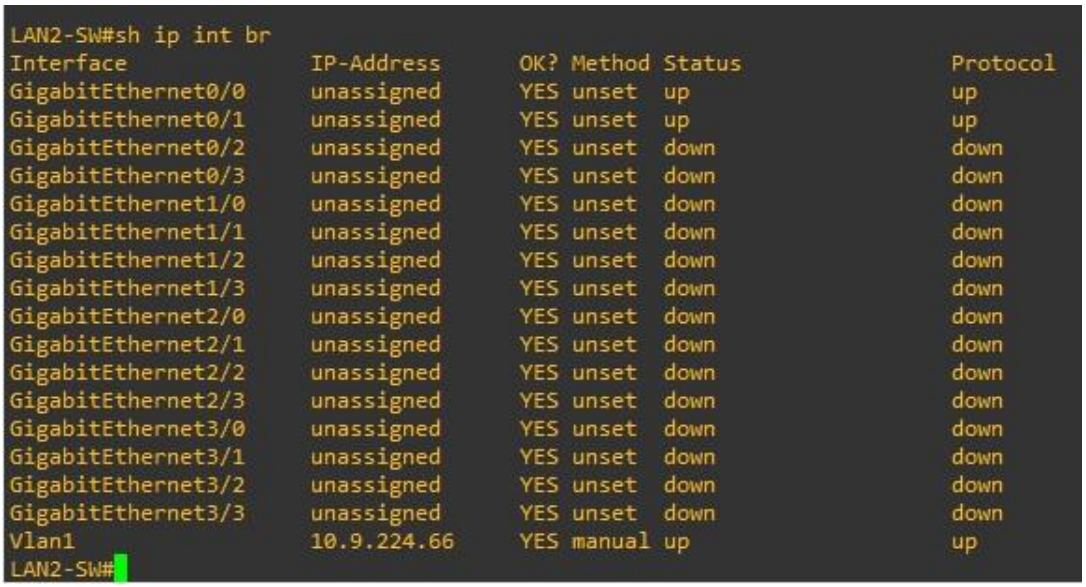
Picture 28) RUN Show Run Command On LAN2-SW -1



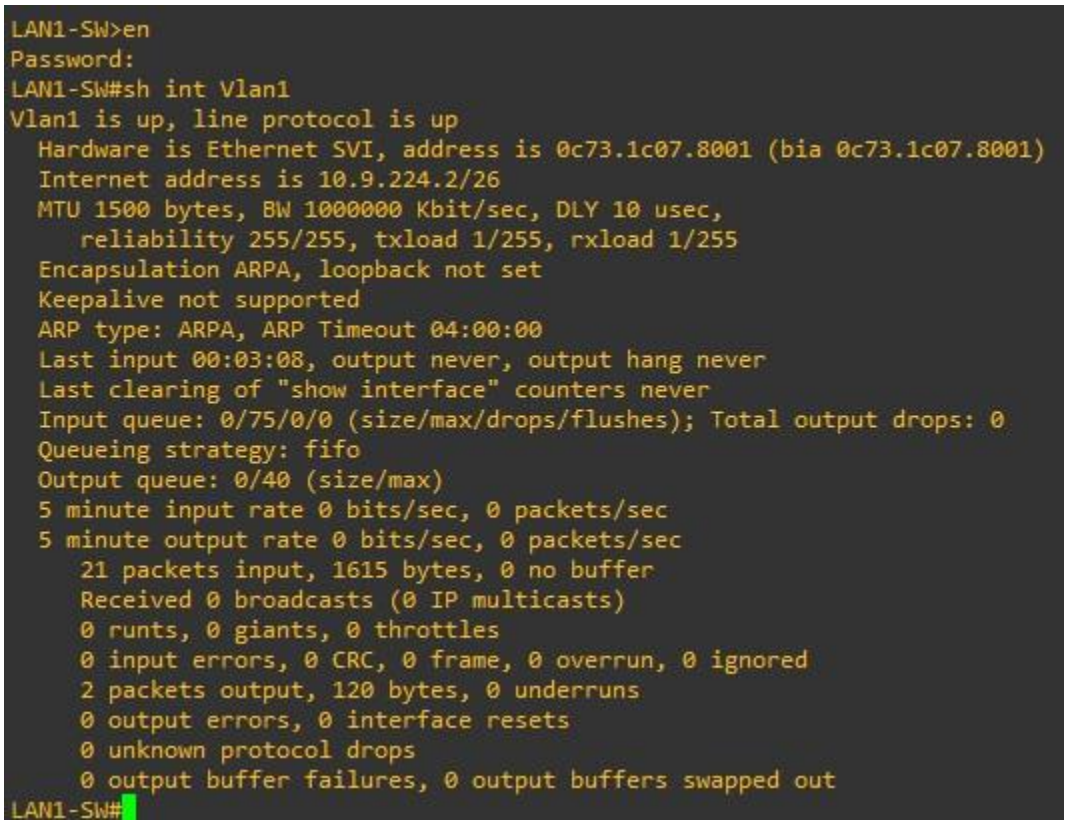
Picture 29) RUN Show Run Command On LAN2-SW -2



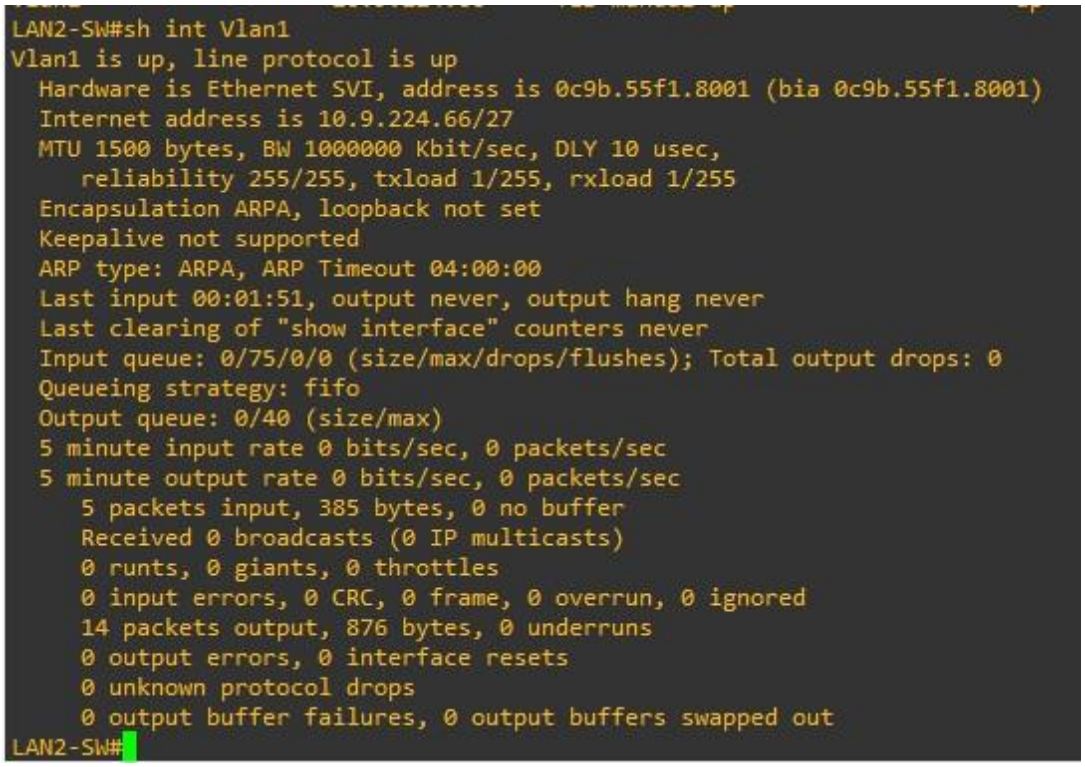
Picture 30) RUN Show Interface Brief Command on LAN2-SW



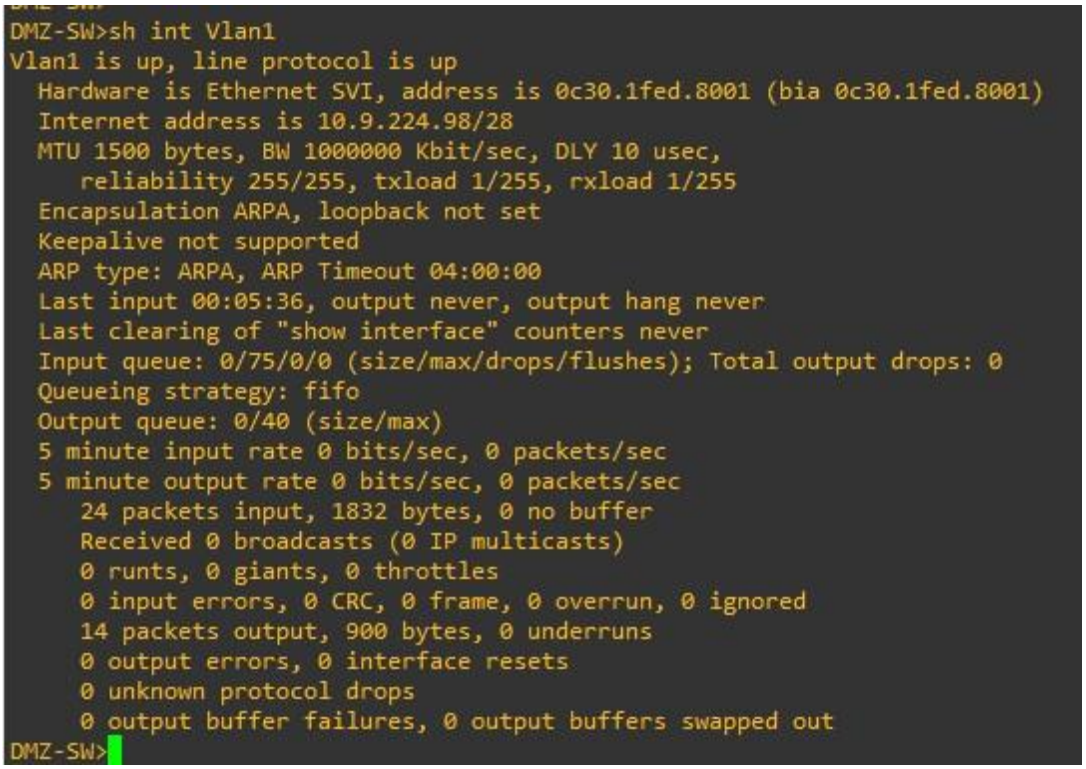
Picture 31) RUN Show Interface VLAN1 LAN1-SW



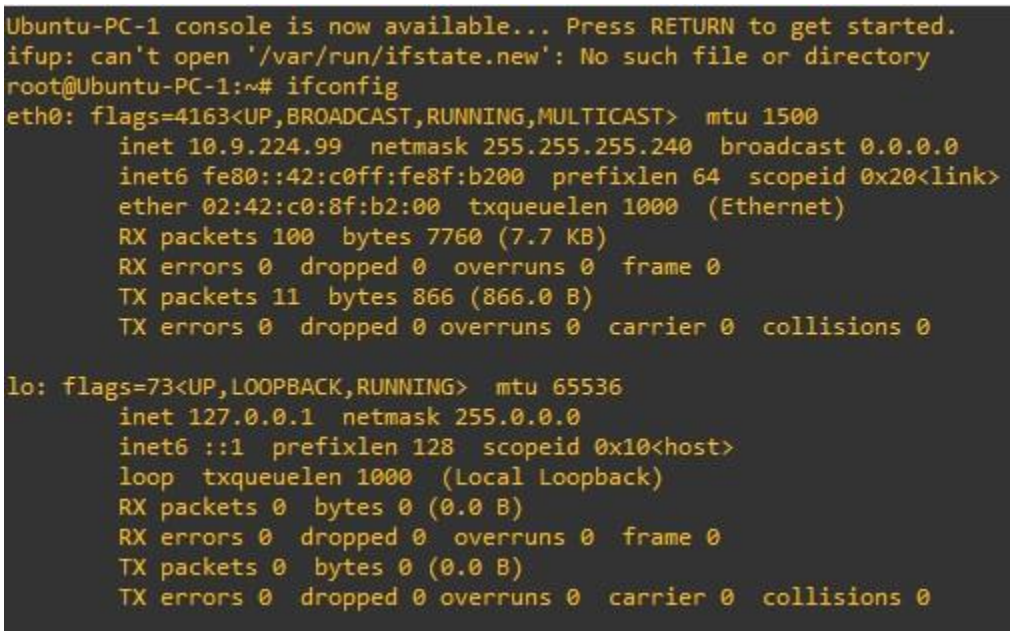
Picture 32) RUN Show Interface VLAN1 LAN2-SW



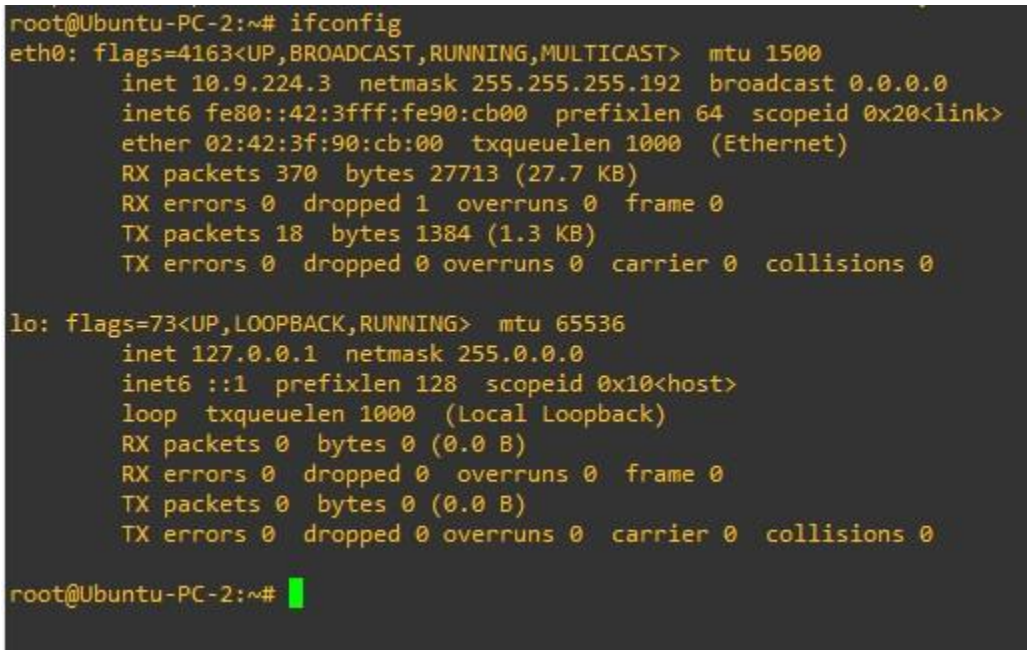
Picture 33) RUN Show Interface VLAN1 DMZ-SW



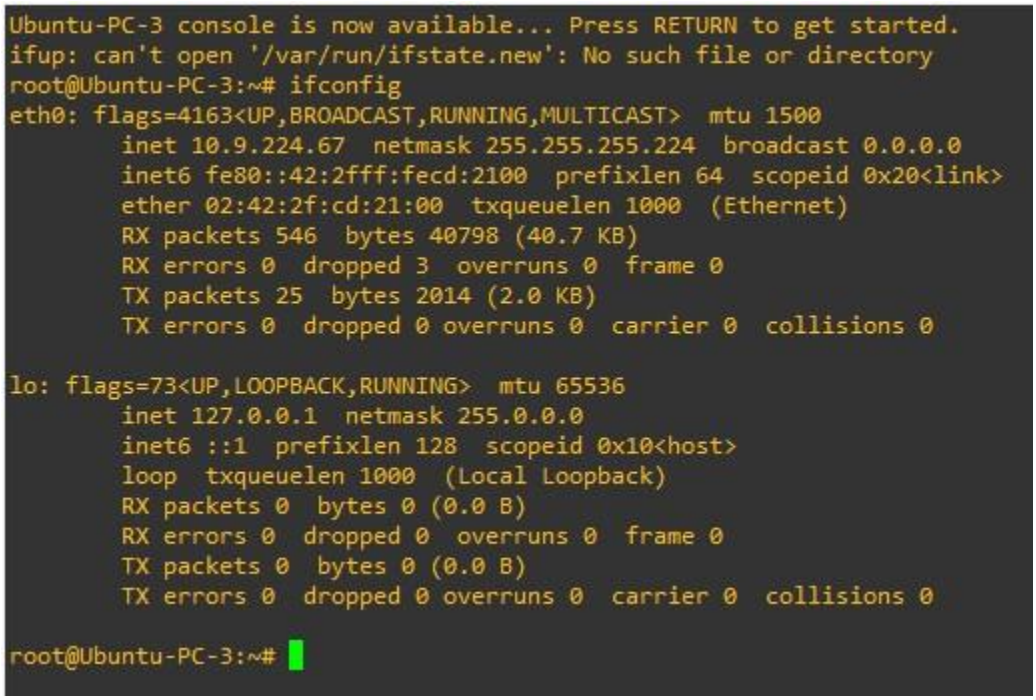
Picture 34) IfConfig Ubuntu-PC-1



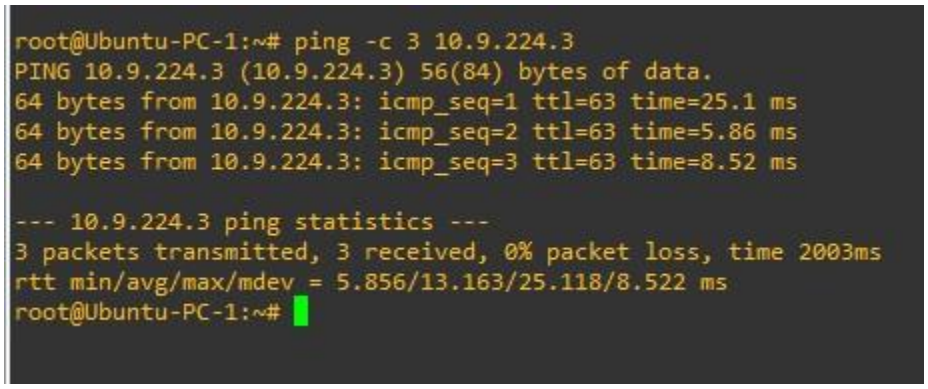
Picture 35) IfConfig Ubuntu-PC-2



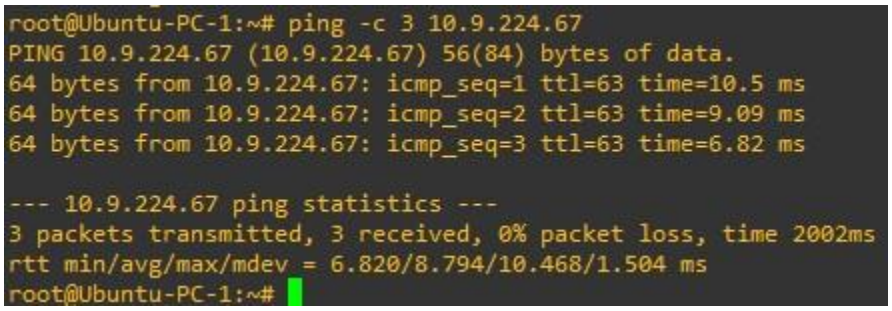
Picture 36) IfConfig Ubuntu-PC-3



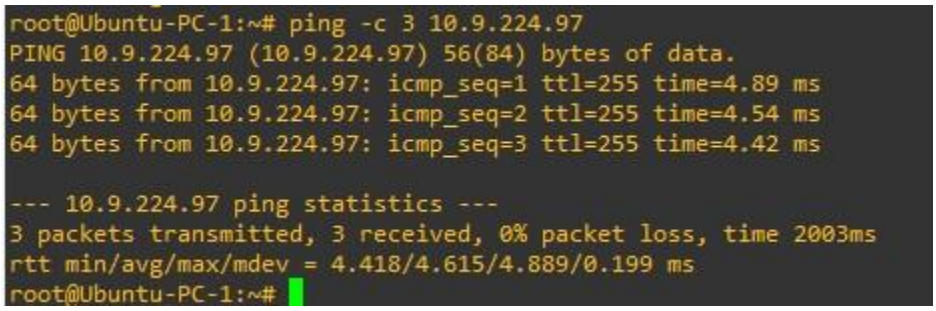
Picture 37) Ping PC2 (Destination) From PC1(Source)



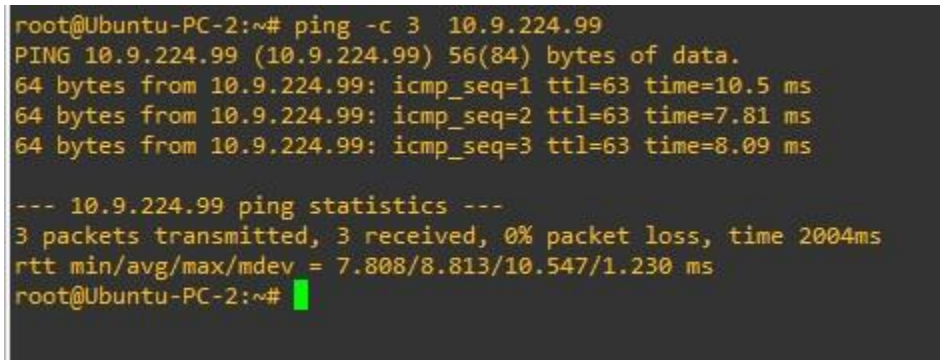
Picture 38) Ping PC3 (Destination) From PC1(Source)



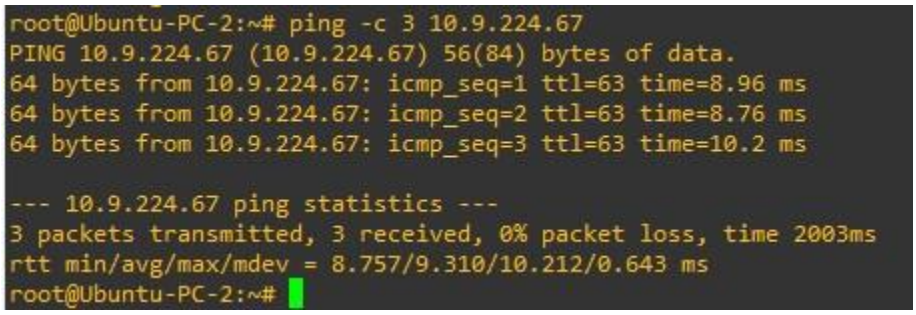
Picture 39) Ping Default Gateway (Destination) From PC1(Source)



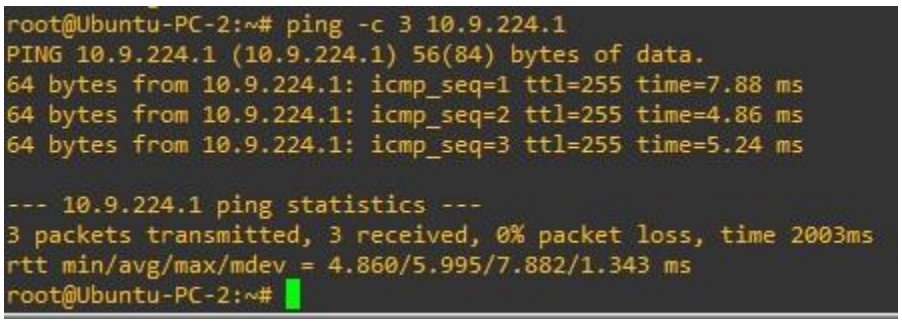
Picture 40) Ping PC1(Destination) From PC2(Source)



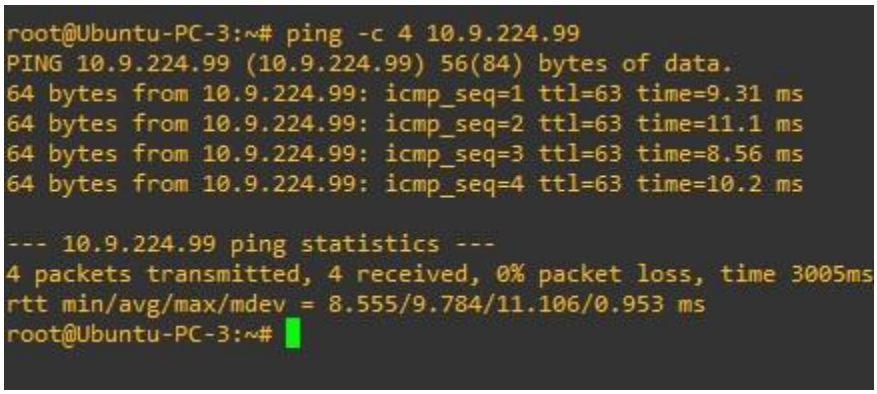
Picture 41) Ping PC3(Destination) From PC2(Source)



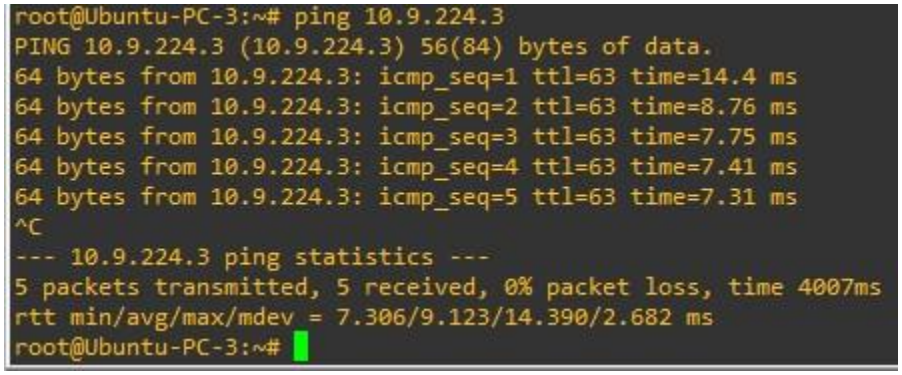
Picture 42) Ping Default Gateway (Destination) From PC2(Source)



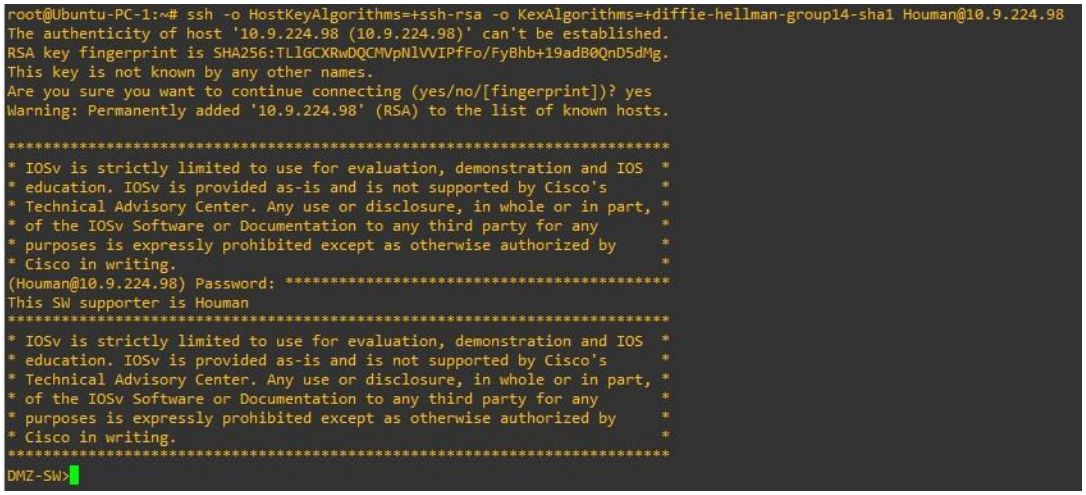
Picture 43) Ping PC1(Destination) From PC3(Source)



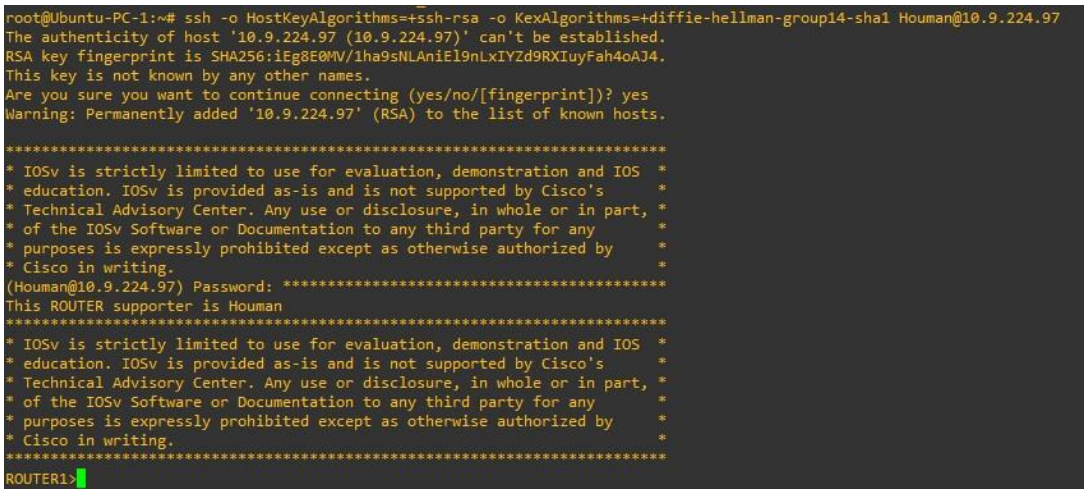
Picture 44) Ping PC2(Destination) From PC3(Source)



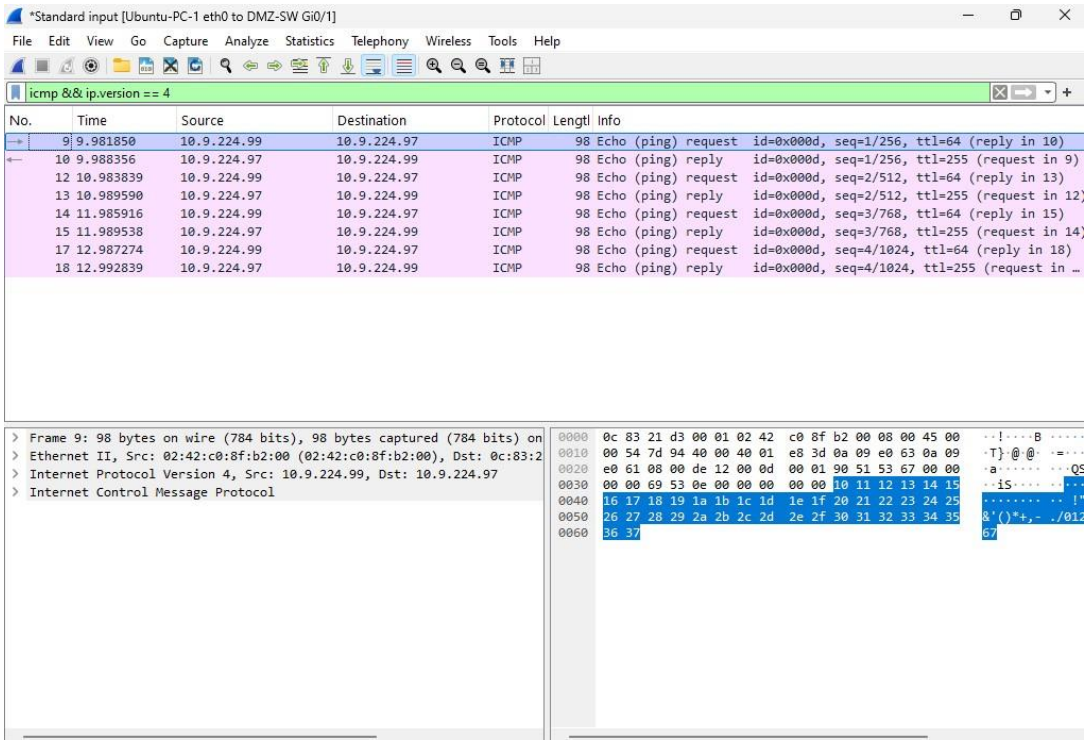
Picture 45) SSH from PC1(source) to DMZ-SW(Destination)



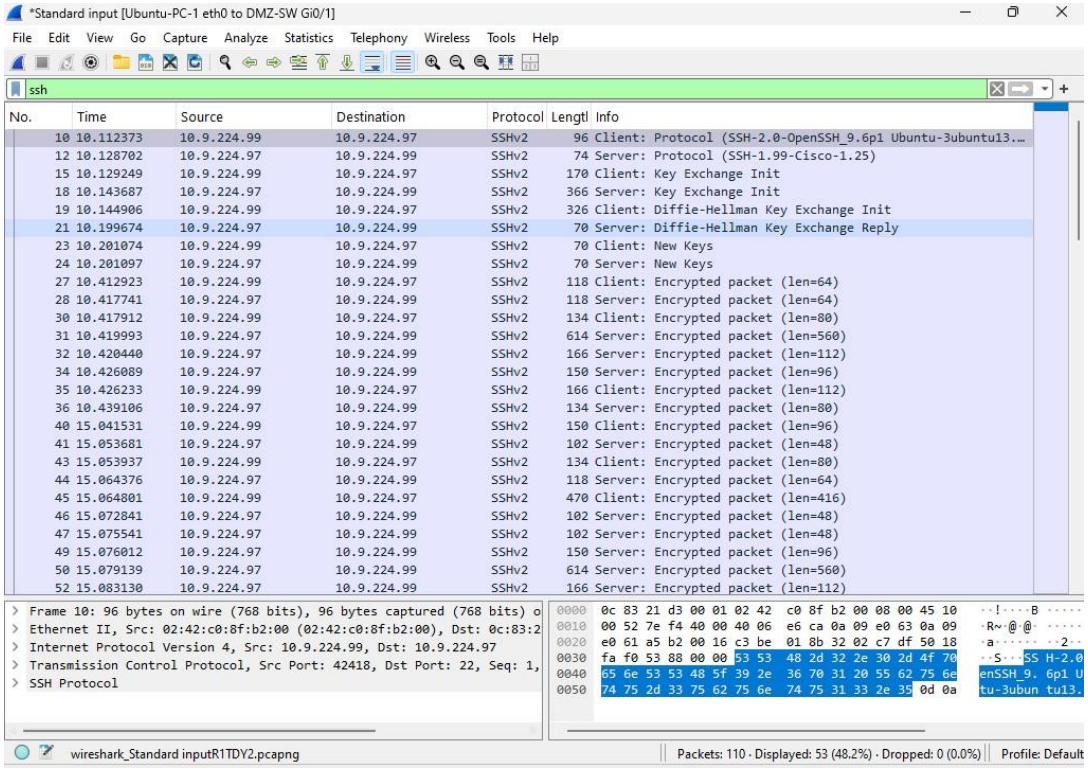
Picture 46) SSH from PC1(source) to Router(Destination)



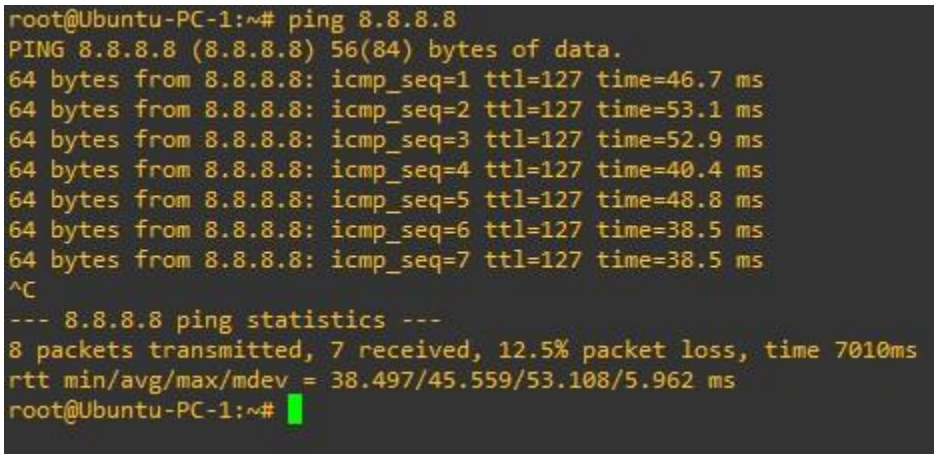
Picture 47) Using GNS3 Wireshark, to capture ICMPv4 traffic between Ubuntu-PC-1 and its Default Gateway (router interface)



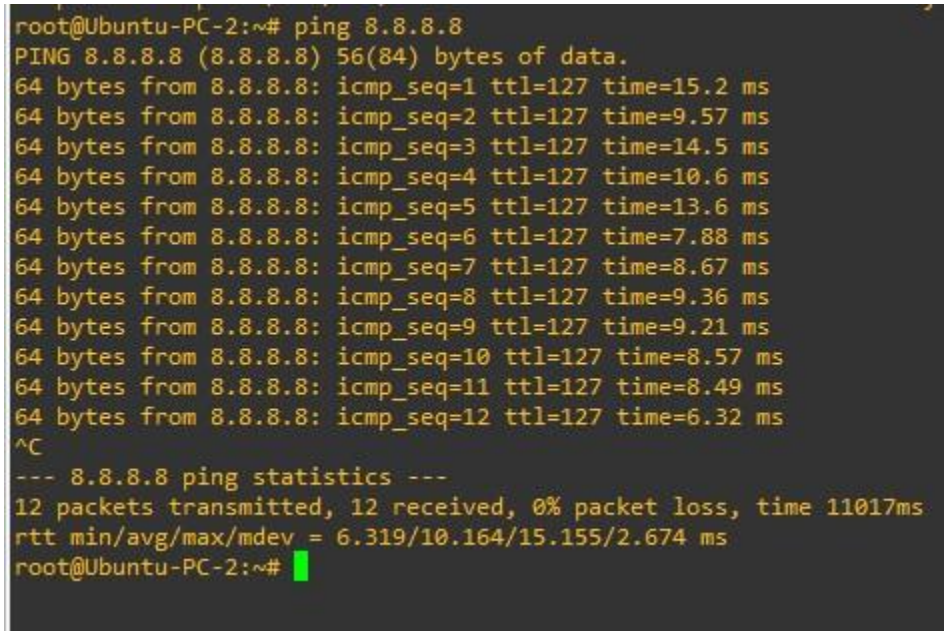
Picture 48) capture of a SSH connection between Ubuntu-PC-1 and its Default Gateway



Picture 49) Internet on PC1



Picture 50) Internet on PC2



Picture 51) Internet on PC3