The background features abstract, overlapping geometric shapes in various shades of pink and purple, creating a modern, layered effect.

# NETW 191 Course Project Fundamentals of Information Technology and Networking

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# Introduction

- ▶ The following presentation will show the Interaction with a virtualized network environment utilizing principles of technology and Microsoft Azure and Visio
  - Slides three (3) through (5) show IPv4 addressing
  - Slides six (6) through nine (9) show Dynamic IPv4 addresses and Connectivity Test
  - Slides ten (10) through thirteen (13) show IP Subnetting and Loopback Interfaces
  - Slides fourteen (14) and fifteen (15) show a Network Diagram using Microsoft Visio
  - Slides sixteen (16) through eighteen (18) discuss SOHO Wireless Network Security
  - Slide twenty (19) list the Career Skills learned
  - Slide twenty-one (20) list the Challenges encountered
  - Slide twenty-two (21) is the Conclusion

We begin with IPv4  
Addressing

# Preparation

This screenshot includes the terminal window that shows the default gateway IP address.

A screenshot of a terminal window titled 'student@UbuntuVM: ~/Desktop'. The terminal shows a command 'ip route | grep default' being executed, which returns the output 'default via 192.168.1.1 dev eth0 proto dhcp metric 20100'. The prompt 'student@UbuntuVM:~/Desktop\$' is visible on the first and third lines.

```
student@UbuntuVM:~/Desktop$ ip route | grep default
default via 192.168.1.1 dev eth0 proto dhcp metric 20100
student@UbuntuVM:~/Desktop$
```

# IPv4 Addressing


This screenshot includes the *Interfaces* page that shows the new IPv4 address on the LAN interface.

Interfaces

Global network options

Interfaces

LAN

  
br-lan

Protocol: Static address

Uptime: 0h 29m 30s

MAC: 00:15:5D:00:04:03

RX: 1.07 MB (13038 Pkts.)

TX: 2.12 MB (12457 Pkts.)

IPv4: 192.168.105.1/24

IPv6: fdf4:27c0:ac22::1/60

# IPv4 Addresses and Connectivity Test

The next three slides will show the IPv4 addresses for the Computer 1 VM and Computer 2 VM, and Connectivity Test

# Dynamic IPv4 Address

This screenshot shows the IPv4 address of Computer 1 VM

```
student@UbuntuVM: ~/Desktop
student@UbuntuVM:~/Desktop$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:15:5d:00:04:01 brd ff:ff:ff:ff:ff:ff
    inet 192.168.105.161/24 brd 192.168.105.255 scope global dynamic noprefixroute eth0
        valid_lft 43118sec preferred_lft 43118sec
    inet6 fdf4:27c0:ac22::d20/128 scope global noprefixroute
        valid_lft forever preferred_lft forever
    inet6 fdf4:27c0:ac22:0:600f:1369:b2d1:297/64 scope global temporary dynamic
        valid_lft 604720sec preferred_lft 85816sec
    inet6 fdf4:27c0:ac22:0:5a8e:f126:197d:f49a/64 scope global mngtmpaddr noprefixroute
        valid_lft forever preferred_lft forever
    inet6 fe80::1b7:dfbb:6bdb:a644/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
student@UbuntuVM:~/Desktop$
```

# Dynamic IPv4 Address

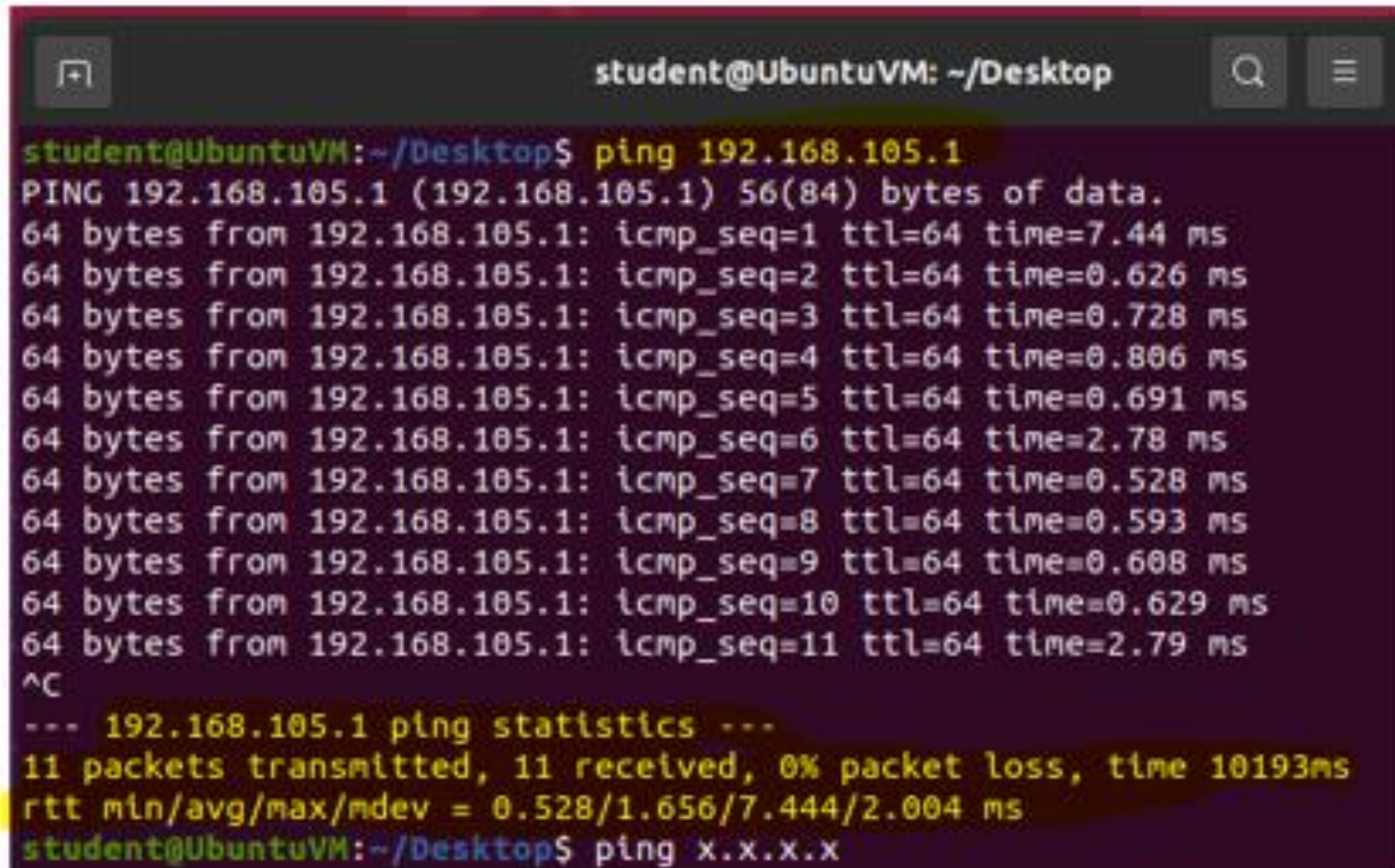
This screenshot shows the IPv4 address of Computer 2 VM

```
student@UbuntuVM: ~/Desktop
t qlen 1000
  link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
  inet 127.0.0.1/8 scope host lo
    valid_lft forever preferred_lft forever
  inet6 ::1/128 scope host
    valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> ntu 1500 qdisc mq state UP group defa
ult qlen 1000
  link/ether 00:15:5d:00:04:02 brd ff:ff:ff:ff:ff:ff
  inet 192.168.105.102/24 brd 192.168.105.255 scope global dynamic noprefixrou
te eth0
    valid_lft 42731sec preferred_lft 42731sec
  inet6 fdf4:27c0:ac22::d20/128 scope global dadfailed tentative noprefixroute
    valid_lft forever preferred_lft forever
  inet6 fdf4:27c0:ac22:0:11f1:d9ec:12fd:77fb/64 scope global temporary dynamic
    valid_lft 604331sec preferred_lft 85542sec
  inet6 fdf4:27c0:ac22:0:6f49:9569:be1f:4afa/64 scope global mngtnpaddr nopref
ixroute
    valid_lft forever preferred_lft forever
  inet6 fe80::4971:6135:b492:ced6/64 scope link noprefixroute
    valid_lft forever preferred_lft forever
student@UbuntuVM:~/Desktop$
```



# Connectivity Test

This screenshot shows the connectivity tests between the Computer 1VM and the other two devices (i.e., the SOHO Router VM and Computer 2VM)



```
student@UbuntuVM: ~/Desktop
student@UbuntuVM:~/Desktop$ ping 192.168.105.1
PING 192.168.105.1 (192.168.105.1) 56(84) bytes of data.
64 bytes from 192.168.105.1: icmp_seq=1 ttl=64 time=7.44 ms
64 bytes from 192.168.105.1: icmp_seq=2 ttl=64 time=0.626 ms
64 bytes from 192.168.105.1: icmp_seq=3 ttl=64 time=0.728 ms
64 bytes from 192.168.105.1: icmp_seq=4 ttl=64 time=0.806 ms
64 bytes from 192.168.105.1: icmp_seq=5 ttl=64 time=0.691 ms
64 bytes from 192.168.105.1: icmp_seq=6 ttl=64 time=2.78 ms
64 bytes from 192.168.105.1: icmp_seq=7 ttl=64 time=0.528 ms
64 bytes from 192.168.105.1: icmp_seq=8 ttl=64 time=0.593 ms
64 bytes from 192.168.105.1: icmp_seq=9 ttl=64 time=0.608 ms
64 bytes from 192.168.105.1: icmp_seq=10 ttl=64 time=0.629 ms
64 bytes from 192.168.105.1: icmp_seq=11 ttl=64 time=2.79 ms
^C
--- 192.168.105.1 ping statistics ---
11 packets transmitted, 11 received, 0% packet loss, time 10193ms
rtt min/avg/max/mdev = 0.528/1.656/7.444/2.004 ms
student@UbuntuVM:~/Desktop$ ping x.x.x.x
```

The next three slides we will show

IP Subnetting

Loopback Interfaces

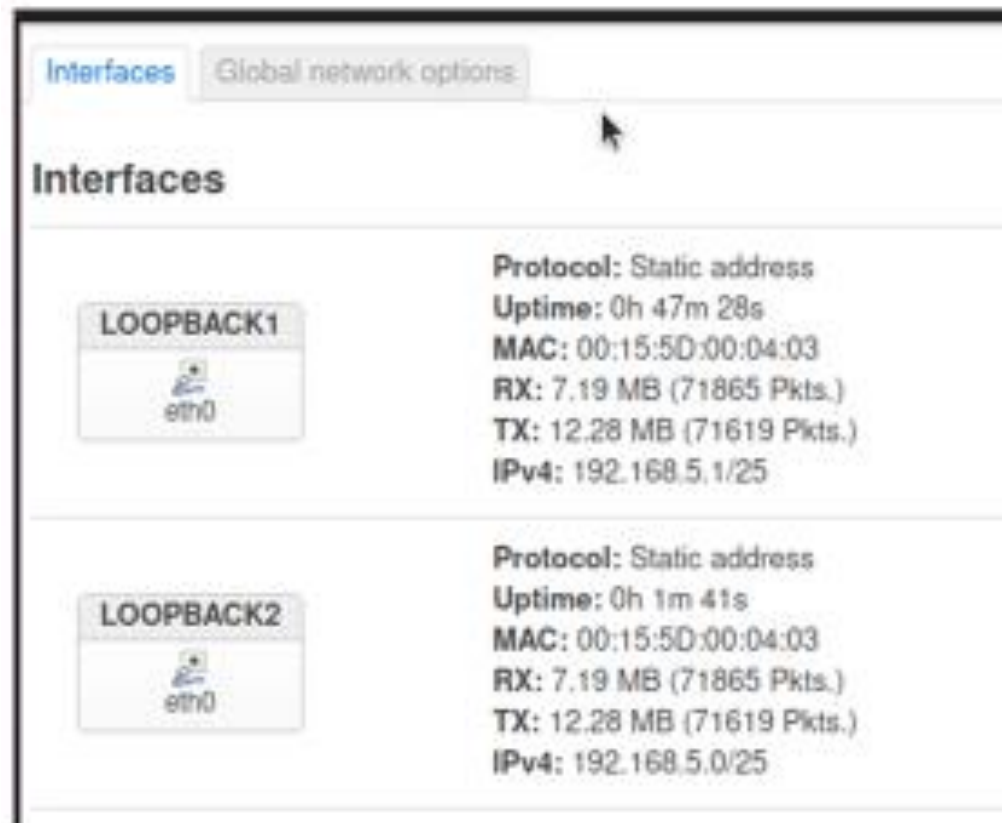
Connectivity Tests

# Subnetting Table

[illegible]

# Loopback interfaces

This screenshot shows both Loopback1 and Loopback2 interfaces and their correct IPv4 addresses

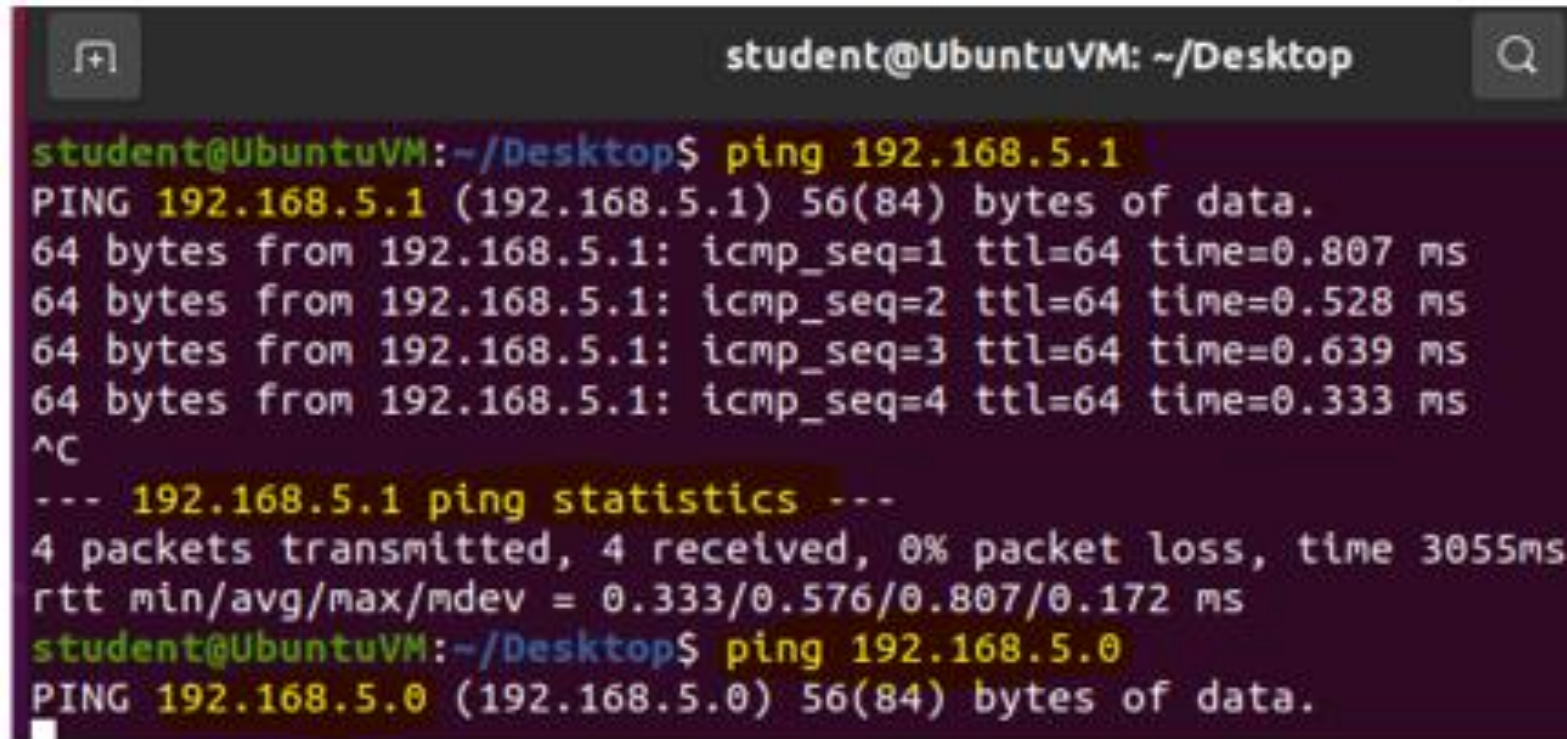


The screenshot displays a network configuration window with two tabs: 'Interfaces' (selected) and 'Global network options'. Under the 'Interfaces' tab, two loopback interfaces are listed: LOOPBACK1 and LOOPBACK2. Each interface has a status icon (a small blue circle with a white dot) and the label 'eth0'. To the right of each interface icon, detailed configuration and statistics are provided.

Interface	Protocol	Uptime	MAC	RX	TX	IPv4
LOOPBACK1	Static address	0h 47m 28s	00:15:5D:00:04:03	7.19 MB (71865 Pkts.)	12.28 MB (71619 Pkts.)	192.168.5.1/25
LOOPBACK2	Static address	0h 1m 41s	00:15:5D:00:04:03	7.19 MB (71865 Pkts.)	12.28 MB (71619 Pkts.)	192.168.5.0/25

# Connectivity Tests

This screenshot shows two successful ping test from the Computer 1 VM to the Loopback 1 and Loopback 2 interfaces

A terminal window titled 'student@UbuntuVM: ~/Desktop' showing two successful ping tests. The first test is to 192.168.5.1, showing four successful packets with varying round-trip times. The second test is to 192.168.5.0, which is partially visible at the bottom.

```
student@UbuntuVM: ~/Desktop
student@UbuntuVM:~/Desktop$ ping 192.168.5.1
PING 192.168.5.1 (192.168.5.1) 56(84) bytes of data.
64 bytes from 192.168.5.1: icmp_seq=1 ttl=64 time=0.807 ms
64 bytes from 192.168.5.1: icmp_seq=2 ttl=64 time=0.528 ms
64 bytes from 192.168.5.1: icmp_seq=3 ttl=64 time=0.639 ms
64 bytes from 192.168.5.1: icmp_seq=4 ttl=64 time=0.333 ms
^C
--- 192.168.5.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3055ms
rtt min/avg/max/mdev = 0.333/0.576/0.807/0.172 ms
student@UbuntuVM:~/Desktop$ ping 192.168.5.0
PING 192.168.5.0 (192.168.5.0) 56(84) bytes of data.
```

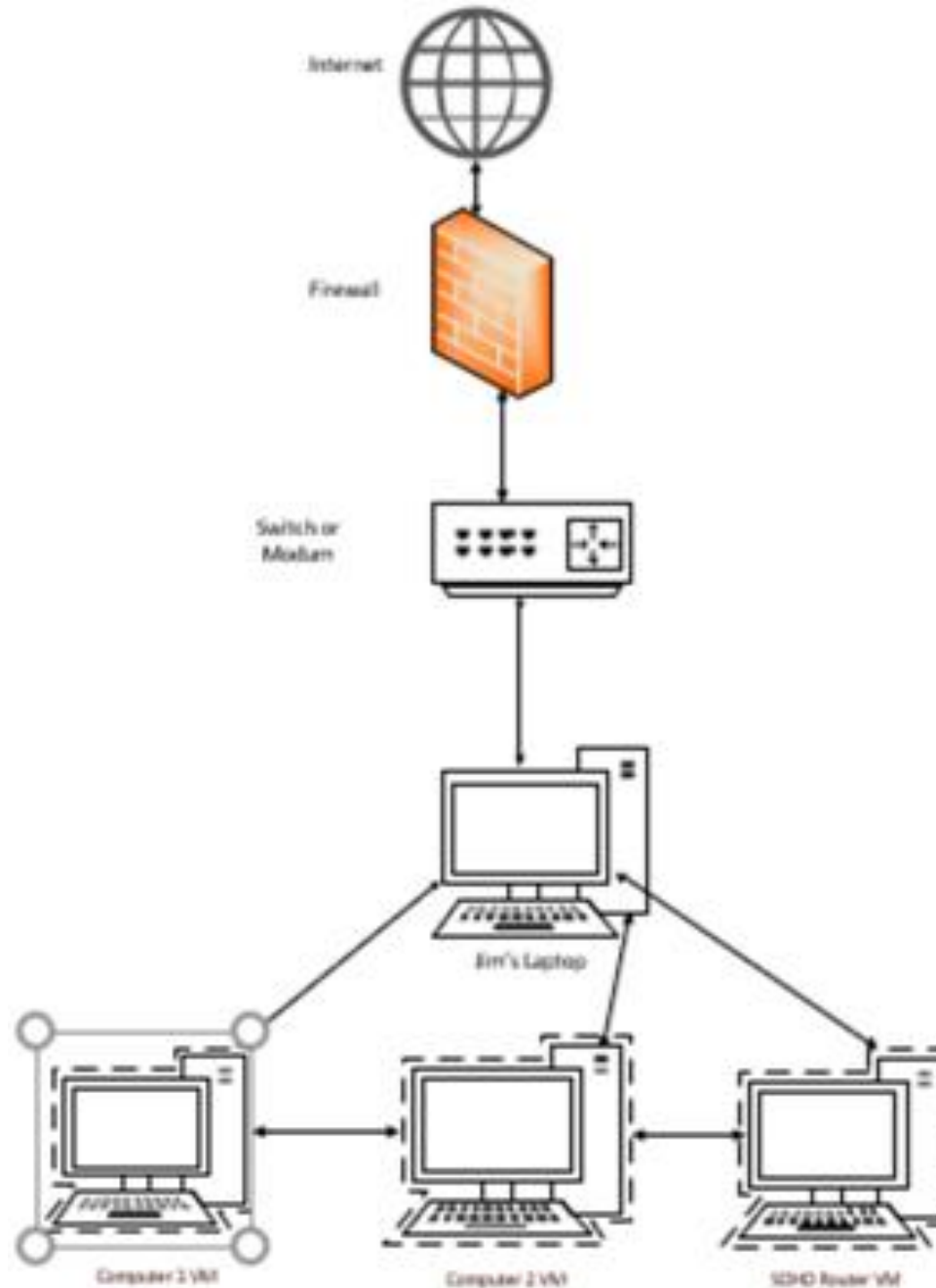
# Visio Network Diagram

The next slide is self explanatory. It shows the Network Diagram created with Microsoft Visio



# Microsoft Visio Network Diagram

This diagram illustrates the interconnection of Computer 1 VM, the Computer 2 VM, and the SOHO Router VM.



# SOHO Wireless Network Security

The next two slides show questions and answers regarding SOHO Wireless Network Security, including references



# Q & A regarding SOHO Wireless Network Security

1. What are the factory default username and password of a TP-Link router? Why is it important to change the default username and password of a SOHO router?

**Answer: admin is username and admin is password, For your own identity and security**

2. To protect a SOHO wireless network with a small number of devices, which address management method provides more control, configuring the device IP addresses manually (static IP) or using a DHCP server (dynamic IP)? Why?

- **Answer: Because small, static, but after reviewing the router emulator it looks like using the DHCP server and “dynamic IP” provides more control because you can add Client Name - The name of the DHCP client.**
- **MAC Address - The MAC address of the DHCP client.**
- **Assigned IP - The IP address that the device has allocated to the DHCP client.**
- **Lease Time - The time of the DHCP client leased.**

3. What does MAC filtering do? If needed, when would you use deny filtering rules and when would you use allow filtering rules? What happens to devices that want to connect, if the “Allow the stations specified by any enabled entries in the list to access” function is enabled but there are no entries in the list?

**Answer: The Wireless MAC Address Filtering feature allows you to control the wireless stations accessing the AP, which depend on the station's MAC addresses. If needed they can't access the AP. And if no entries, no wireless stations can access the AP.**

# SOHO Wireless Network Security

1. What wireless security settings are displayed on the Wireless Security page? Which one is recommended by the vendor? Why?

**Answer:**

**WPA2-PSK, which is recommended by the vendor because it enables SECURITY!**

2. Among the configurations you explored in this module, which one is a true security function? Why?

**Answer: WPA2-PSK because it enables SECURITY!**

3. What would you do to protect your wireless network at home? Why?

**Answer: WPA2-PSK, because it enables SECURITY and is highly recommended by the vendor.**

## References

1. <https://www.tp-link.com/us/support/emulator/>
2. <https://www.routerpasswords.com/>
3. [https://emulator.tp-link.com/902AC\\_US\\_Emulator/Emulator\\_Router/index.htm](https://emulator.tp-link.com/902AC_US_Emulator/Emulator_Router/index.htm)

# Career Skills

## ► I learned how to:

- Further develop communication skills for reports and presentations in various environments
- Work with Microsoft Azure and Microsoft Visio
- Learning ho to run Connectivity test for IPv4 and Loopbacks
- How to create Network diagrams with Microsoft Visio
- Further develop basic and advanced computer skills

# Challenges

## ► Challenges included:

- Learning the Login procedures for Azure
- Learning how to work with Microsoft Visio
- Connecting the IPv4 addresses and Loopbacks
- Testing the additions at each stage

# Conclusion

- ▶ I found this class: learning how to use both Microsoft Azure and Visio, and the Interaction with a virtualized network environment to be fascinating. Azure can be very useful when creating a Virtual Network and Visio for creating a diagram of a Virtual Network. As shown in the preceding slides, we created a Virtual Network that include the Computer 1 VM, the Computer 2 VM and the SOHO Router. I feel this project will help me in the future.