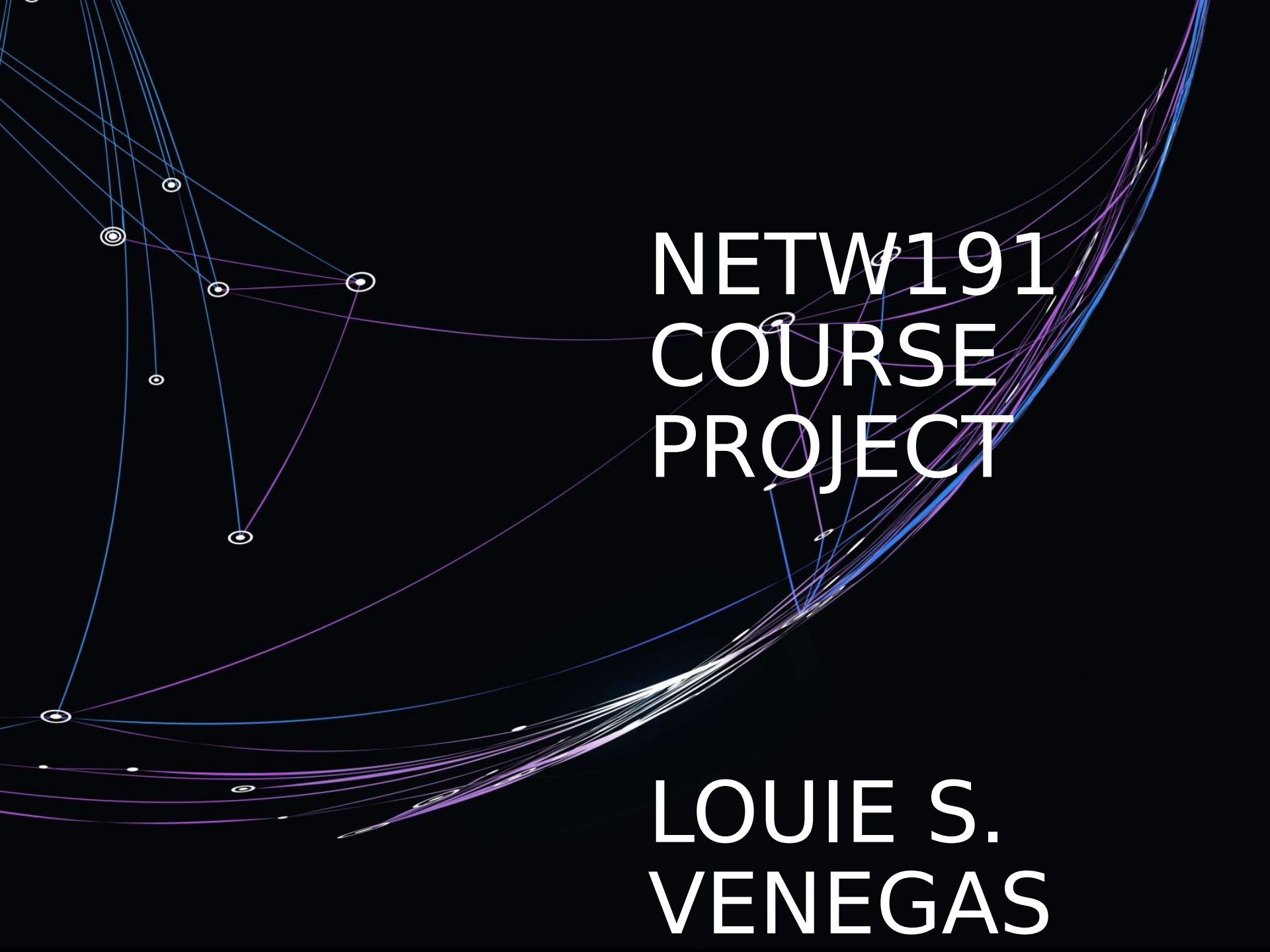


The background features a complex network of thin, curved lines in shades of blue and purple. These lines connect various small, white-outlined circular nodes. The nodes are scattered across the frame, with a higher concentration in the upper left and lower right areas. The overall effect is a sense of dynamic movement and interconnectedness, reminiscent of a network diagram or a stylized constellation.

NETW191 COURSE PROJECT

LOUIE S.
VENEGAS

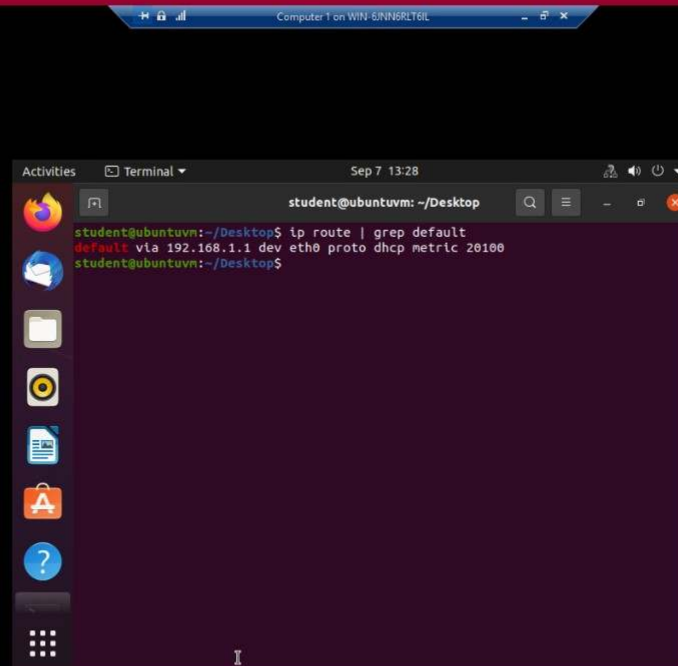


INTRODUCTION

The Following slides contain a demonstration of a few skills I have learned throughout a course taken at DeVry called fundamentals of networking. You will see a demonstration of me using various virtual machines and routers via Hyper-V to create a network. Along with a few security basics towards the end.

IPV4 ADDRESSING





Computer 1 on WIN-SUNWRLT6IL

Activities Terminal Sep 7 13:28

student@ubuntuvn: ~/Desktop

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

Preparation

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

IPv4 Address Assignment

This screenshot shows the *Interfaces* page that shows the a new IPv4 address on a LAN interface that I created.

The screenshot displays a virtual machine environment titled "DeVry-Hyper-V". The browser address bar shows "lab.infoseclearning.com/console/3143730/608". The main interface is the "Interfaces" page of OpenWrt, showing a list of network interfaces. The "LAN" interface is highlighted in green and shows a static IPv4 address of 192.168.105.1. The "TEST" interface is highlighted in grey and shows a static IPv4 address of 192.168.100.124. The "WAN" interface is highlighted in red and shows an error: "Error: Network device is not present". The bottom status bar shows the temperature as 78°F Sunny and the time as 10:59 AM 9/7/2023.

Console | Infosec Learning - Google Chrome

lab.infoseclearning.com/console/3143730/608

DeVry-Hyper-V

View Fullscreen Send Ctrl+Alt+Delete Reboot

Computer 1 on WIN-DNVR210L

Activities Firefox Web Browser Sep 7 13:59

OpenWrt - interfaces - LuCI

192.168.105.1/cgi-bin/luci/admin/network/network

Status System Network Logout

Interfaces Global network options

Interfaces

Protocol: Static address
Uptime: 0h 13m 34s
MAC: 00:15:5D:00:BA:01
RX: 1.25 MB (15347 Pkts.)
TX: 2.02 MB (14638 Pkts.)
IPv4: 192.168.105.1/24
IPv6: fe80::21d:ac22:1b0

Restart Stop Edit Delete

TEST

Protocol: Alias Interface (Static address)
Uptime: 0h 13m 34s
IPv4: 192.168.100.1/24

Restart Stop Edit Delete

WAN

Protocol: DHCP client
RX: 0 B (0 Pkts.)
TX: 0 B (0 Pkts.)
Error: Network device is not present

Restart Stop Edit Delete

WAN

Protocol: DHCPv6 client

78°F Sunny

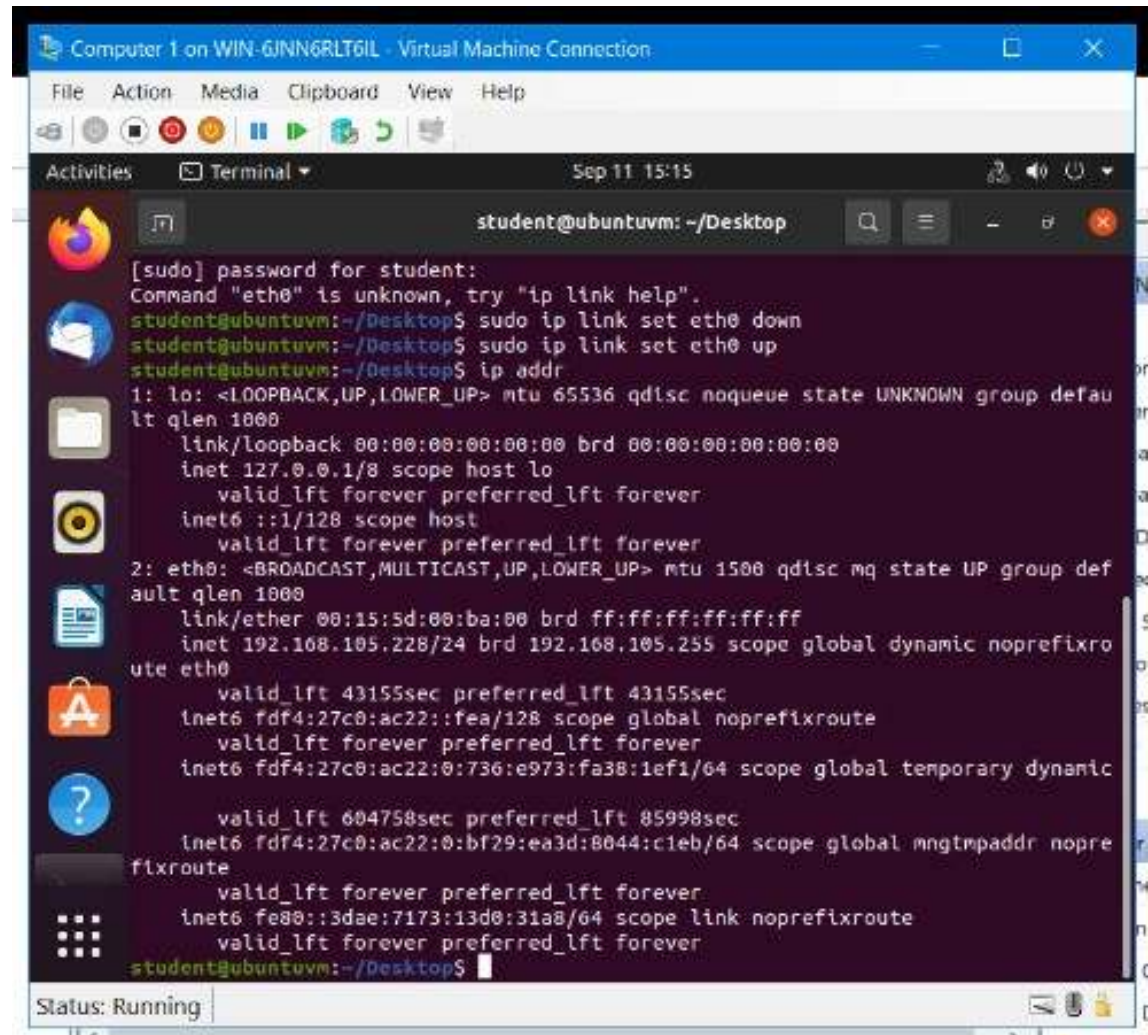
10:59 AM 9/7/2023

CONNECTIVITY TESTING



Dynamic IP Address Assignment

This screenshot shows the IPv4 address of *Computer 1* VM.

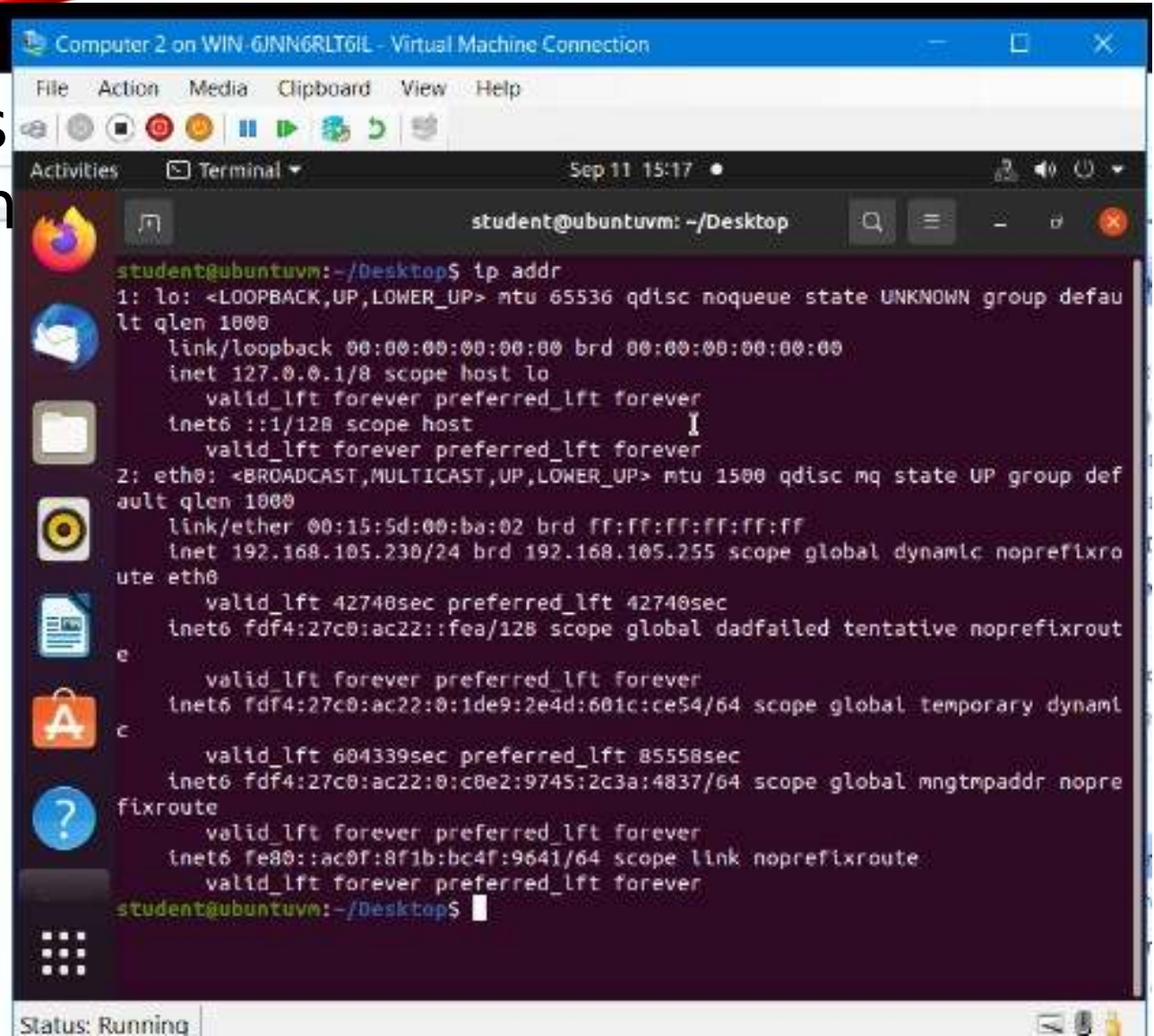


```
Computer 1 on WIN-6JNN6RLT6IL - Virtual Machine Connection
File Action Media Clipboard View Help
Activities Terminal Sep 11 15:15
student@ubuntuvm: ~/Desktop
[sudo] password for student:
Command "eth0" is unknown, try "ip link help".
student@ubuntuvm:~/Desktop$ sudo ip link set eth0 down
student@ubuntuvm:~/Desktop$ sudo ip link set eth0 up
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:ba:00 brd ff:ff:ff:ff:ff:ff
    inet 192.168.105.228/24 brd 192.168.105.255 scope global dynamic noprefixroute eth0
        valid_lft 43155sec preferred_lft 43155sec
    inet6 fdf4:27c0:ac22::fea/128 scope global noprefixroute
        valid_lft forever preferred_lft forever
    inet6 fdf4:27c0:ac22:0:736:e973:fa38:1ef1/64 scope global temporary dynamic
        valid_lft 604758sec preferred_lft 85998sec
    inet6 fdf4:27c0:ac22:0:bf29:ea3d:b044:c1eb/64 scope global mngtmpaddr noprefixroute
        valid_lft forever preferred_lft forever
    inet6 fe80::3dae:7173:13d0:31a8/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
student@ubuntuvm:~/Desktop$
```

Status: Running

Dynamic IP Address Assignment

This screenshot shows the IPv4 address of the *Computer 2* VM.



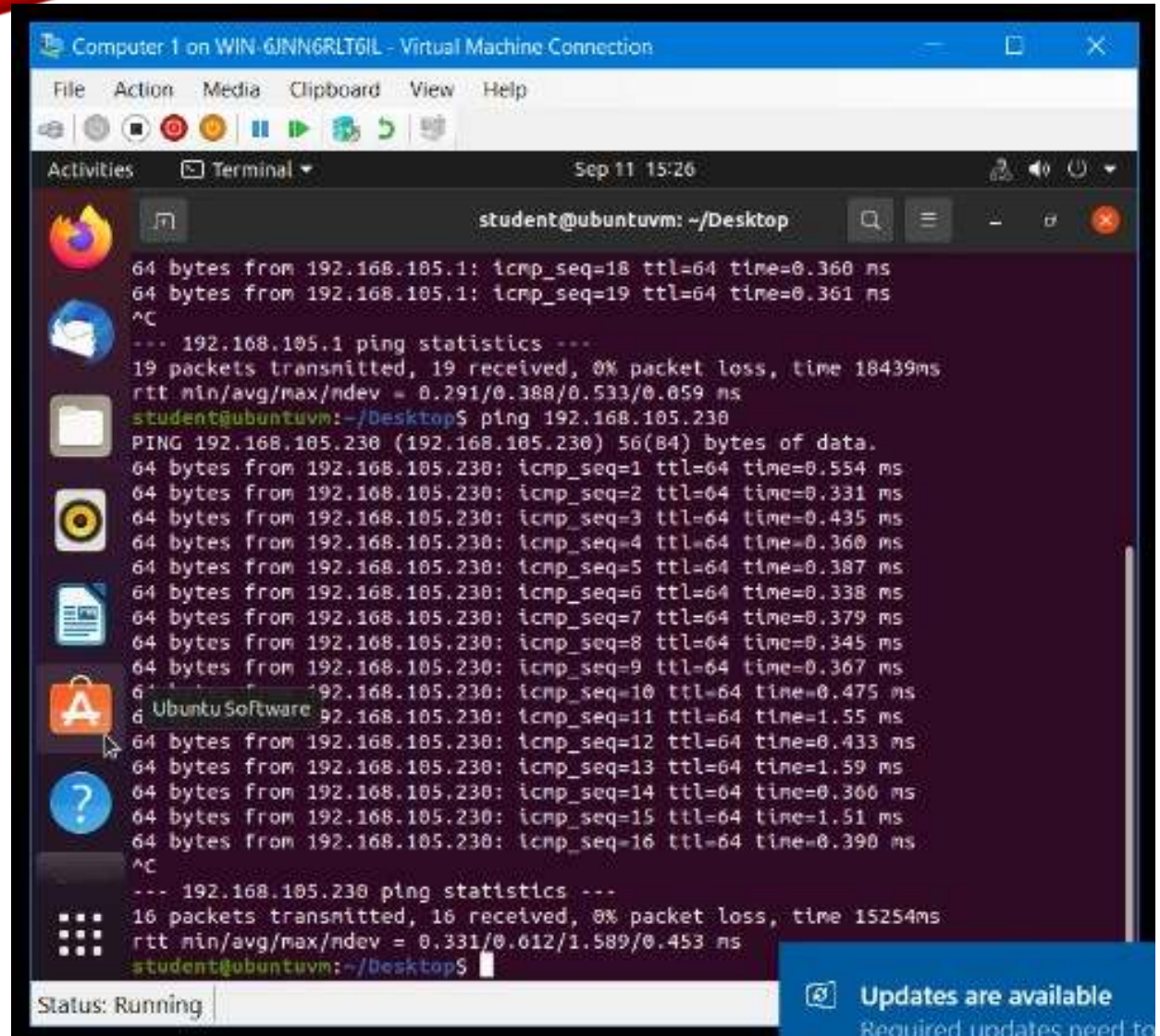
The screenshot shows a terminal window titled "Computer 2 on WIN-6JNN6RLT6IL - Virtual Machine Connection". The terminal displays the output of the command `ip addr` for the user `student@ubuntuvm` in the `~/Desktop` directory. The output shows the configuration for the loopback interface `lo` and the ethernet interface `eth0`.

```
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:ba:02 brd ff:ff:ff:ff:ff:ff
    inet 192.168.105.230/24 brd 192.168.105.255 scope global dynamic noprefixroute eth0
        valid_lft 42740sec preferred_lft 42740sec
    inet6 fdf4:27c0:ac22::fea/128 scope global dadfailed tentative noprefixroute
        valid_lft forever preferred_lft forever
    inet6 fdf4:27c0:ac22:0:1de9:2e4d:601c:ce54/64 scope global temporary dynamic
        valid_lft 604339sec preferred_lft 85558sec
    inet6 fdf4:27c0:ac22:0:c0e2:9745:2c3a:4837/64 scope global mngtmpaddr noprefixroute
        valid_lft forever preferred_lft forever
    inet6 fe80::ac0f:8f1b:bc4f:9641/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
student@ubuntuvm:~/Desktop$
```

The status bar at the bottom of the window indicates "Status: Running".

Connectivity Test

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



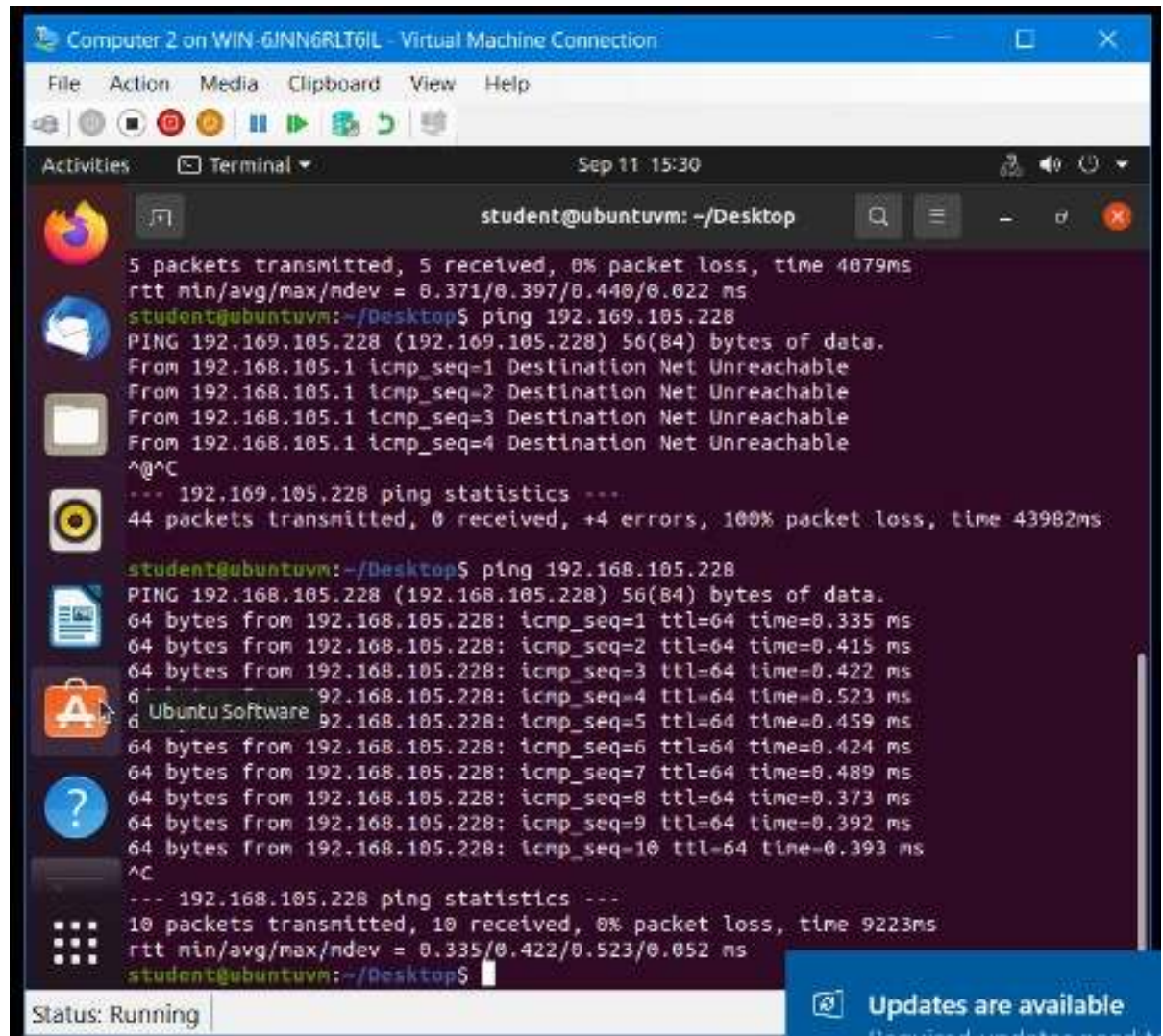
The screenshot shows a terminal window titled "student@ubuntuvm: ~/Desktop". The terminal displays the results of two ping tests. The first test is to 192.168.105.1, showing 19 packets transmitted, 19 received, 0% packet loss, and a time of 18439ms. The second test is to 192.168.105.230, showing 16 packets transmitted, 16 received, 0% packet loss, and a time of 15254ms. The terminal also shows the command "ping 192.168.105.230" and the output of the ping command.

```
Computer 1 on WIN-6JNN6RLT6IL - Virtual Machine Connection
File Action Media Clipboard View Help
Activities Terminal Sep 11 15:26
student@ubuntuvm: ~/Desktop
64 bytes from 192.168.105.1: icmp_seq=18 ttl=64 time=0.360 ms
64 bytes from 192.168.105.1: icmp_seq=19 ttl=64 time=0.361 ms
^C
--- 192.168.105.1 ping statistics ---
19 packets transmitted, 19 received, 0% packet loss, time 18439ms
rtt min/avg/max/mdev = 0.291/0.388/0.533/0.059 ms
student@ubuntuvm:~/Desktop$ ping 192.168.105.230
PING 192.168.105.230 (192.168.105.230) 56(84) bytes of data.
64 bytes from 192.168.105.230: icmp_seq=1 ttl=64 time=0.554 ms
64 bytes from 192.168.105.230: icmp_seq=2 ttl=64 time=0.331 ms
64 bytes from 192.168.105.230: icmp_seq=3 ttl=64 time=0.435 ms
64 bytes from 192.168.105.230: icmp_seq=4 ttl=64 time=0.360 ms
64 bytes from 192.168.105.230: icmp_seq=5 ttl=64 time=0.387 ms
64 bytes from 192.168.105.230: icmp_seq=6 ttl=64 time=0.338 ms
64 bytes from 192.168.105.230: icmp_seq=7 ttl=64 time=0.379 ms
64 bytes from 192.168.105.230: icmp_seq=8 ttl=64 time=0.345 ms
64 bytes from 192.168.105.230: icmp_seq=9 ttl=64 time=0.367 ms
64 bytes from 192.168.105.230: icmp_seq=10 ttl=64 time=0.475 ms
64 bytes from 192.168.105.230: icmp_seq=11 ttl=64 time=1.55 ms
64 bytes from 192.168.105.230: icmp_seq=12 ttl=64 time=0.433 ms
64 bytes from 192.168.105.230: icmp_seq=13 ttl=64 time=1.59 ms
64 bytes from 192.168.105.230: icmp_seq=14 ttl=64 time=0.366 ms
64 bytes from 192.168.105.230: icmp_seq=15 ttl=64 time=1.51 ms
64 bytes from 192.168.105.230: icmp_seq=16 ttl=64 time=0.390 ms
^C
--- 192.168.105.230 ping statistics ---
16 packets transmitted, 16 received, 0% packet loss, time 15254ms
rtt min/avg/max/mdev = 0.331/0.612/1.589/0.453 ms
student@ubuntuvm:~/Desktop$
```

Status: Running Updates are available Required updates need to

Connectivity Test

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



The screenshot displays a terminal window titled "Computer 2 on WIN-6JNN6RLT6IL - Virtual Machine Connection". The terminal shows the results of two ping tests performed by the user `student@ubuntuvvm` in the `~/Desktop` directory. The first test is a ping to `192.169.105.228`, which fails with 100% packet loss. The second test is a ping to `192.168.105.228`, which succeeds with 0% packet loss.

```
student@ubuntuvvm:~/Desktop$ ping 192.169.105.228
5 packets transmitted, 5 received, 0% packet loss, time 4079ms
rtt min/avg/max/ndev = 0.371/0.397/0.440/0.022 ms
student@ubuntuvvm:~/Desktop$ ping 192.169.105.228
PING 192.169.105.228 (192.169.105.228) 56(84) bytes of data:
From 192.168.105.1 icmp_seq=1 Destination Net Unreachable
From 192.168.105.1 icmp_seq=2 Destination Net Unreachable
From 192.168.105.1 icmp_seq=3 Destination Net Unreachable
From 192.168.105.1 icmp_seq=4 Destination Net Unreachable
^@^C
--- 192.169.105.228 ping statistics ---
44 packets transmitted, 0 received, +4 errors, 100% packet loss, time 43982ms

student@ubuntuvvm:~/Desktop$ ping 192.168.105.228
PING 192.168.105.228 (192.168.105.228) 56(84) bytes of data:
64 bytes from 192.168.105.228: icmp_seq=1 ttl=64 time=0.335 ms
64 bytes from 192.168.105.228: icmp_seq=2 ttl=64 time=0.415 ms
64 bytes from 192.168.105.228: icmp_seq=3 ttl=64 time=0.422 ms
64 bytes from 192.168.105.228: icmp_seq=4 ttl=64 time=0.523 ms
64 bytes from 192.168.105.228: icmp_seq=5 ttl=64 time=0.459 ms
64 bytes from 192.168.105.228: icmp_seq=6 ttl=64 time=0.424 ms
64 bytes from 192.168.105.228: icmp_seq=7 ttl=64 time=0.489 ms
64 bytes from 192.168.105.228: icmp_seq=8 ttl=64 time=0.373 ms
64 bytes from 192.168.105.228: icmp_seq=9 ttl=64 time=0.392 ms
64 bytes from 192.168.105.228: icmp_seq=10 ttl=64 time=0.393 ms
^C
--- 192.168.105.228 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9223ms
rtt min/avg/max/ndev = 0.335/0.422/0.523/0.052 ms
student@ubuntuvvm:~/Desktop$
```

The terminal window also shows a sidebar with application icons (Firefox, Mail, Files, Music, Ubuntu Software, Help) and a status bar at the bottom indicating "Status: Running" and "Updates are available".

IP SUBNETTING AND LOOPBACK INTERFACES



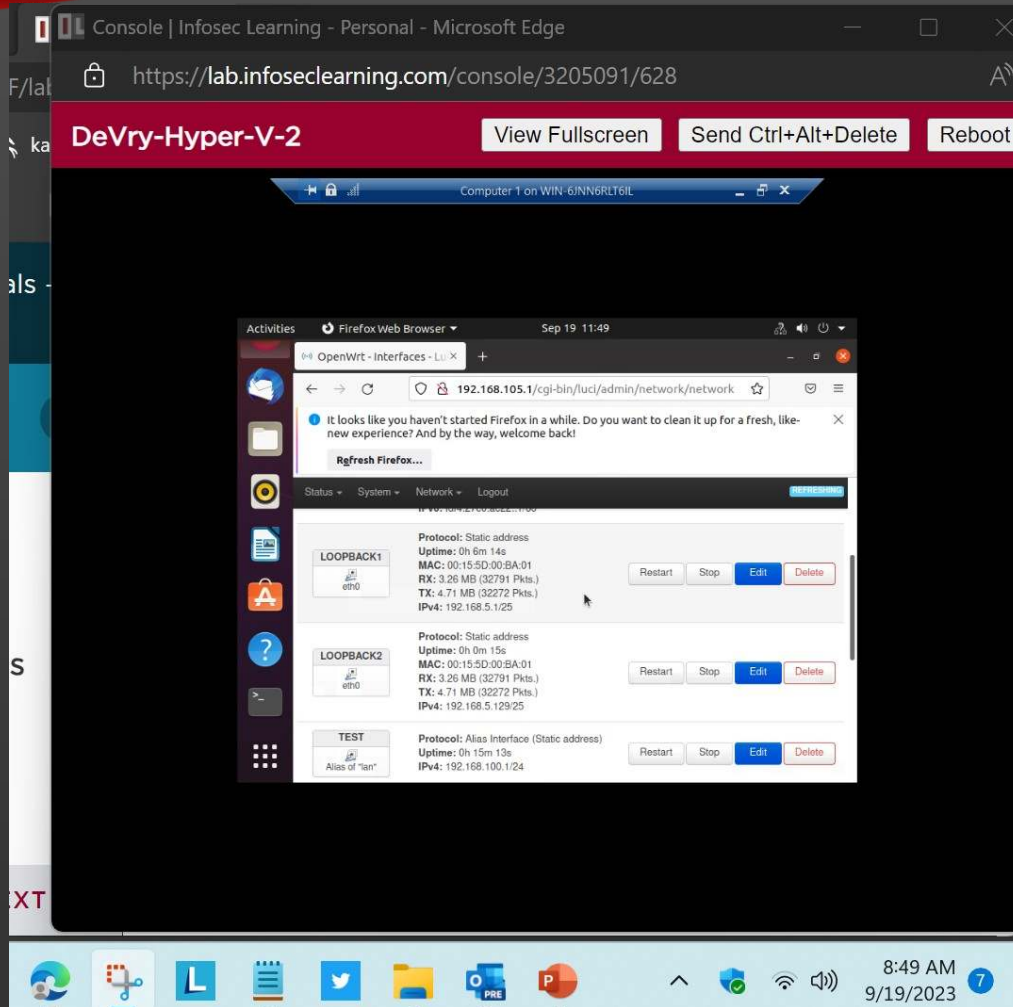
SUBNETTING TABLE

•This table includes two /25 subnets, listing the subnet notation, network address, first usable host address, last usable host address, and broadcast address of each subnet.

	Subnet ID	Network Mask (/prefix)	Network Mask (Dotted decimal)	Network Address	First Usable Host Address	Last Usable Host Address	Broadcast Address
The First Subnet	0	/25	255.255.255.128	192.168.5.0	192.168.5.1	192.168.5.126	192.168.5.127
The Second Subnet	1	/25	255.255.255.128	192.168.5.128	192.168.5.129	192.168.5.254	192.168.5.255

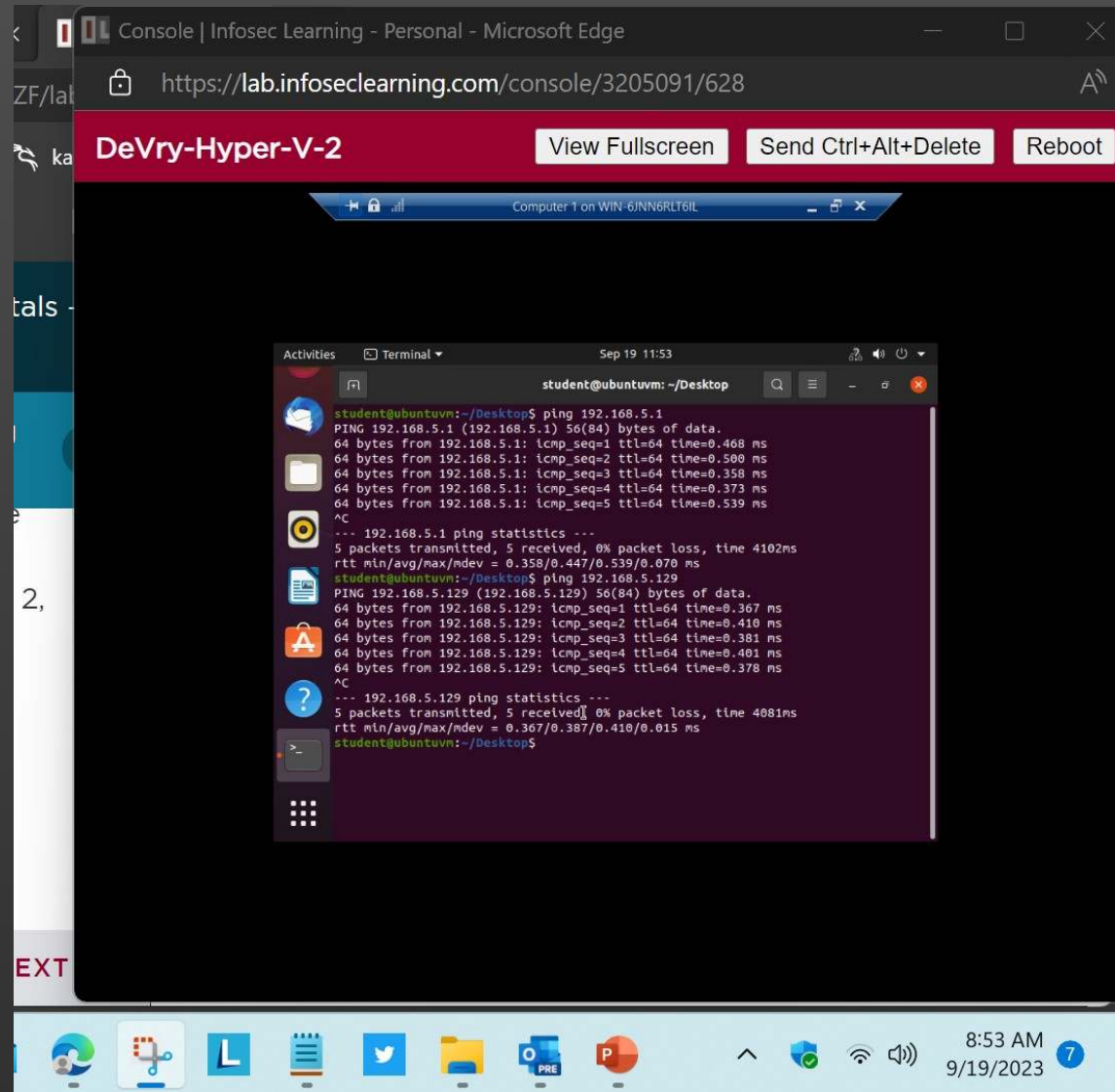
Loopback Interfaces

- This slide shows both Loopback1 and Loopback2 interfaces and their correct IPv4 addresses.



Connectivity Tests

This slide shows two successful ping tests from the *Computer 1* VM to the *Loopback 1* and *Loopback 2* interfaces.

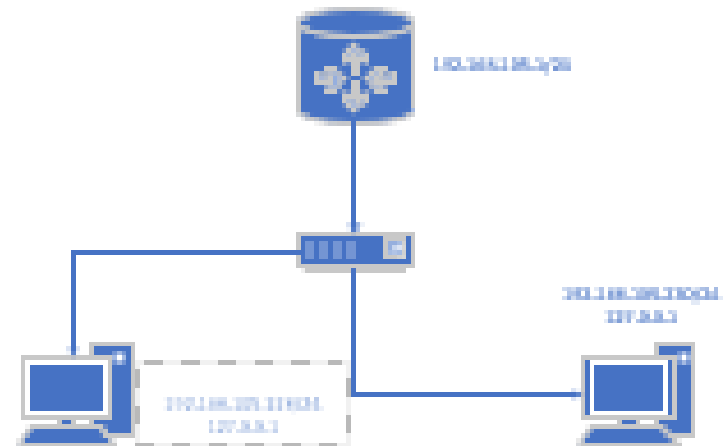


VISIO NETWORK DIAGRAM



MICROSOFT VISIO NETWORK DIAGRAM

•This diagram illustrates the interconnection of the *Computer 1* VM, the *Computer 2* VM, and the *SOHO Router* VM along with proper addressing and labeling.



SOHO WIRELESS NETWORK SECURITY



Q1. 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?

A: The default password and login for a soho router is admin. This being so easy to guess that it creates a security risk off the bat and leaves your network exposed.

Q2. 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?

A: So obviously the latter of static is more secure. Static provides a way keeping track of what devices are using what ports by statically assigning the ip address. The dhcp server has a large range of ip addresses that each device uses randomly and you can't always keep track of the devices on the network. The disadvantage to this is obvious. To statically assign Ip addresses to each device requires time and cooperation within a soho network.

Q3. 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?

A: MAC filtering is a network tool that can be used to either allow or block traffic on a network from specific devices. Deny filtering rules would allow traffic flow through a network except for specified devices. When the allowed rules are enabled, it would only allow traffic for specified devices while blocking it for all others. With no entries in the list no one will be able to connect to the network.

Q1. What wireless security settings are displayed on the Wireless Security page? Which one is recommended by the vendor? Why?

A: 2 things were noted. First was that you can not enable enterprise encryption with WPS enabled. WPS being a way to bypass the password by pressing a button kind of produces a security risk and should be disabled.

The second thing to be noted was that it was strongly recommended that network security be enabled in specific WPA2-PSK AES. These things are recommended by the vendor in red texts on the wireless security page because they both present a security risk. If either WPS is enabled or the wireless security is not enabled your network is exposed and unprotected. This is not acceptable because with network tools such as Nmap and Wireshark(to name a few) every transmission from your network could be easily intercepted and exposed.

Q2. Among the configurations you explored in this module, which one is a true security function? Why?

A: All parts of this module were mentioned because they are security functions. Like a symphony each tool or function working alongside and in sync with the other will create a truly secure environment. Although if we want to keep it simple then we should start with the basics and WPA-PSK AES is a good place to start because it puts a line of defense called a password between your network and everything that doesn't belong in it.

Q3. What would you do to protect your wireless network at home? Why?

A: I would keep the network under lock and key, with every device accounted for and statically assigned. I would also run two subnets, with a guest subnet configured for DHCP so visiting devices never reach the inner network.



CHALLENGES

Throughout the course of this project the most challenging concept to learn was using the terminal. I am familiar with the terminal and its functions. Ping however was a new concept and it seemed to not work on multiple occasions. User error was the problem and after correction the ping command worked like it should.



CAREER SKILLS

A foundation in the way in which networking works using addressing and various router protocols is vital.

Moving forward as an aspiring software engineer the fundamental understanding will only benefit my career.

1.References

1. Router Passwords. (2021, October 3). Router passwords community database.
<https://www.routerpasswords.com/>
2. TP-Link. (n.d.). TP-Link emulators.
<https://www.tp-link.com/us/support/emulator/>