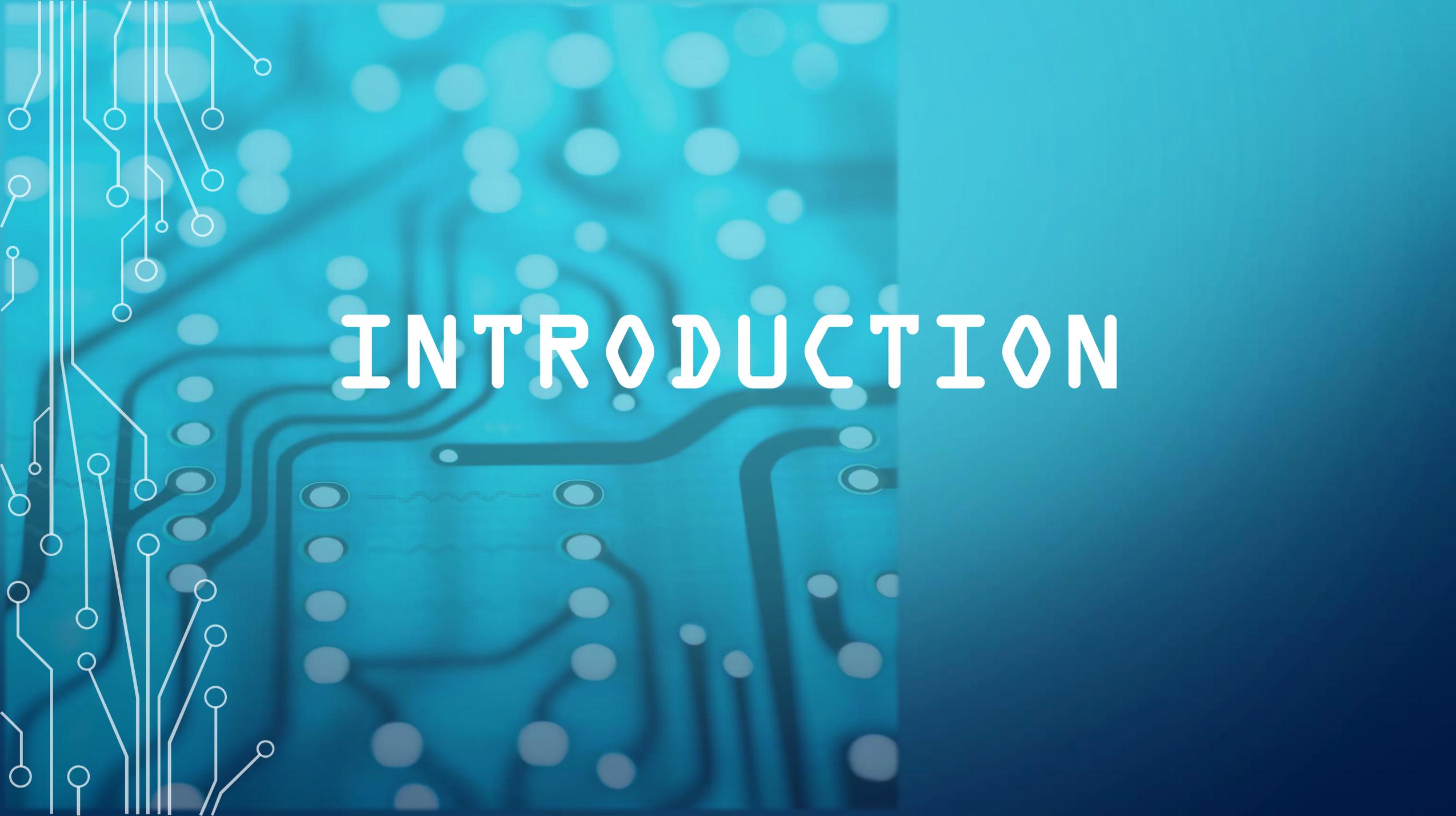


JEANINE CARHART

NETW 191 FINAL PROJECT AUGUST 2022



INTRODUCTION

PROJECT SCOPE

- IPv4 Addressing
- Connectivity Test
- IP Subnetting and Loopback Interfaces
- Visio Network Diagram
- SOHO Wireless Network Security
- Final Project

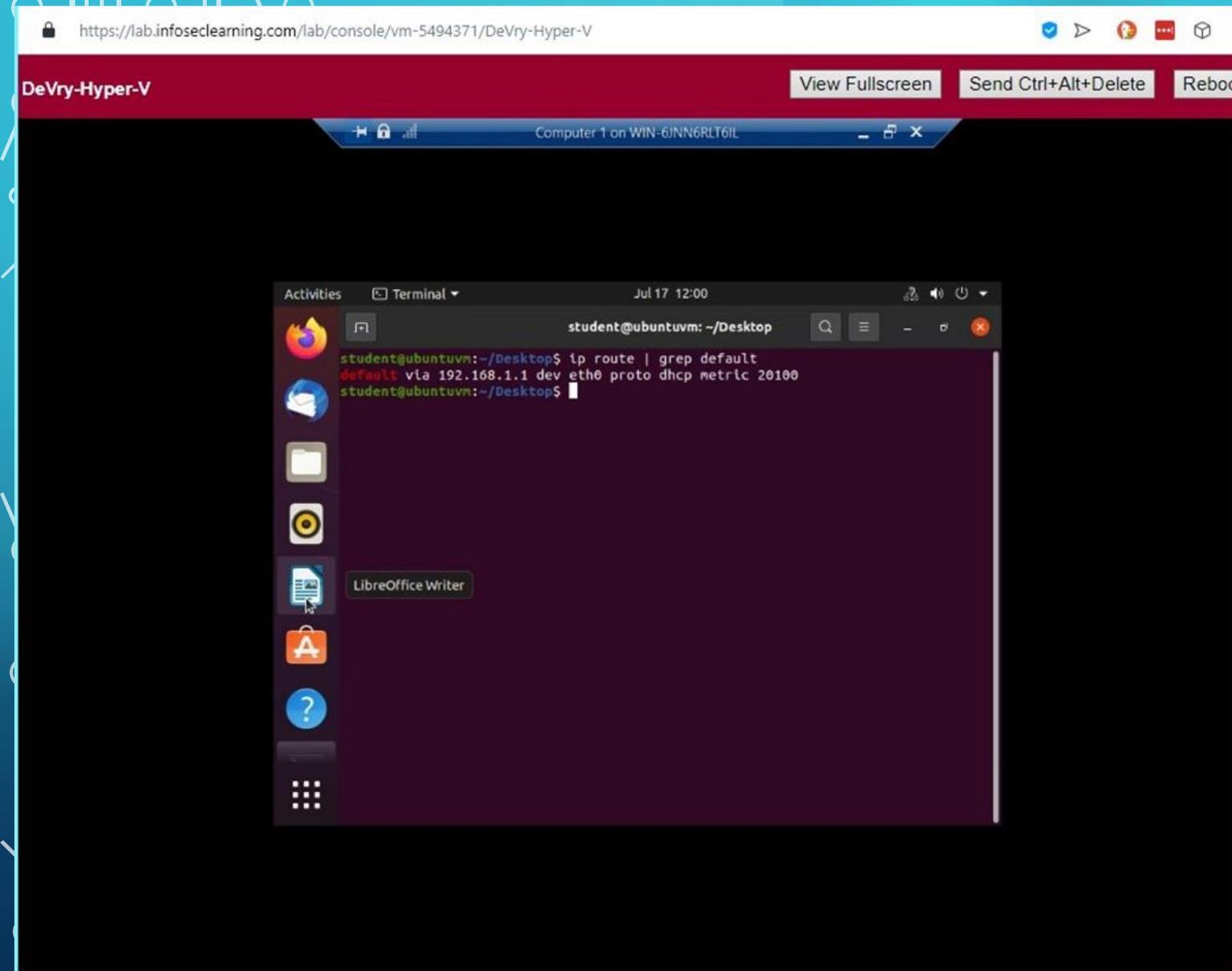


MODULE 2

IPv4 Addressing

PREPARATION

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



The screenshot shows a web browser window with the URL <https://lab.infoseclearning.com/lab/console/vm-5494371/DeVry-Hyper-V>. The browser displays a virtual machine interface titled "DeVry-Hyper-V" with buttons for "View Fullscreen", "Send Ctrl+Alt+Delete", and "Reboot". Inside the VM, a terminal window is open, showing the following command and output:

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

IPV4 ADDRESS ASSIGNMENT

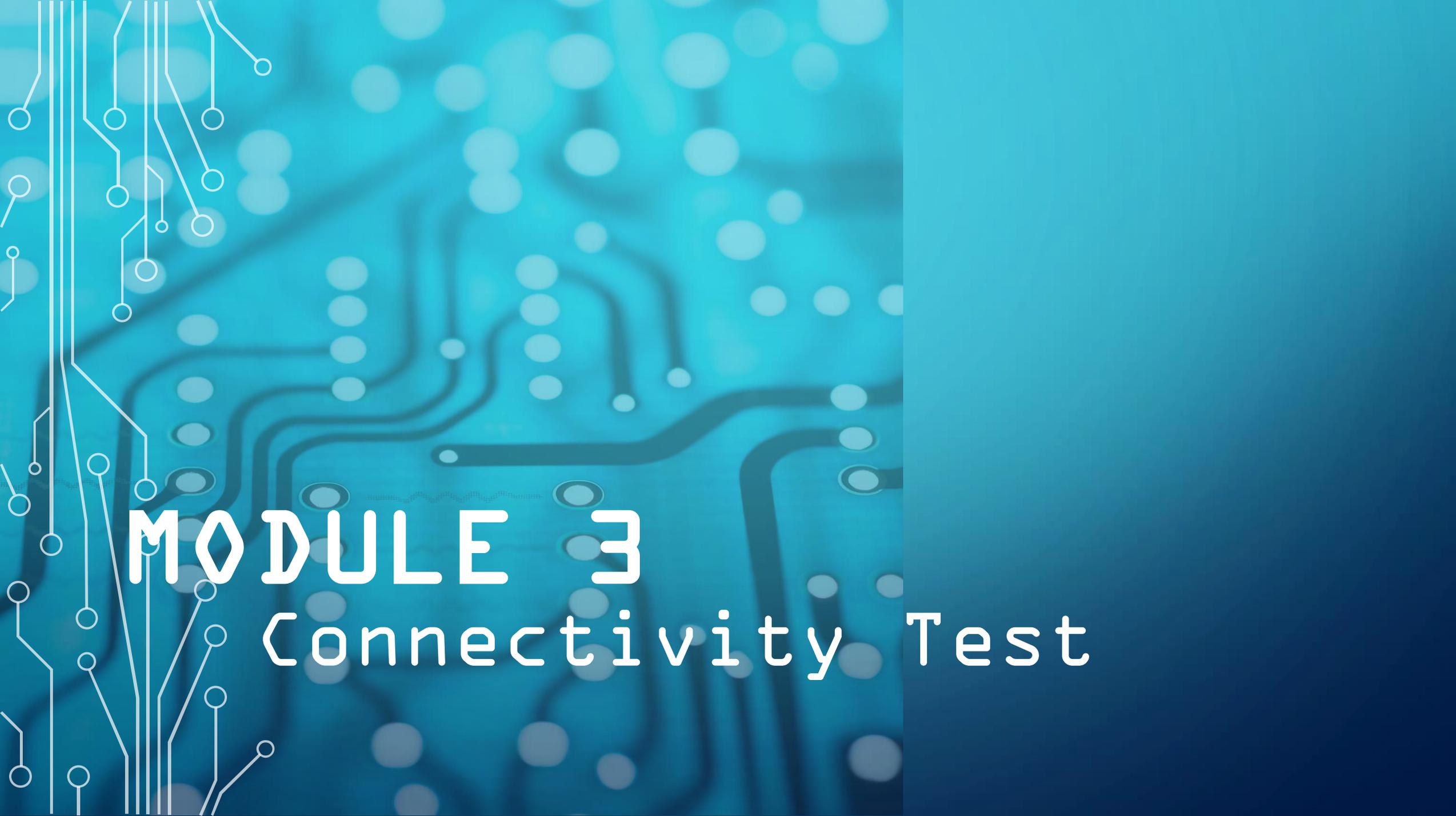
This screenshot should include the *Interfaces* page that shows the new IPv4 address on the LAN interface.

The screenshot displays a virtual machine environment titled "DeVry-Hyper-V". The main window shows a web browser (Firefox) displaying the OpenWrt web interface at the URL `192.168.105.1/cgi-bin/luci/admin/network/network`. The page title is "Interfaces" and it shows the configuration for the LAN interface (br-lan). The configuration details for the LAN interface are as follows:

Interface	Protocol	Uptime	MAC	RX	TX	IPv4	IPv6	Buttons
LAN (br-lan)	Static address	0h 14m 41s	00:15:5D:00:BA:01	805.28 KB (10132 Pkts.)	1.69 MB (9363 Pkts.)	192.168.105.1/24	fd14:27c0:ac22::1/60	Restart Stop Edit Delete
TEST	Alias Interface (Static address)	0h 14m 41s				192.168.100.1/24		Restart Stop Edit Delete
WAN	DHCP client							

The terminal window at the bottom shows the following output:

```
Status: Running  
[ 5455.954944] br-lan: port 1(eth0) entered blocking state  
[ 5455.965901] device eth0 entered promiscuous mode  
[ 5455.980790] br-lan: port 1(eth0) entered blocking state  
[ 5455.987984] br-lan: port 1(eth0) entered forwarding state  
[ 5651.049072] br-lan: port 1(eth0) entered disabled state  
[ 5651.059812] device eth0 left promiscuous mode  
[ 5651.066644] br-lan: port 1(eth0) entered disabled state  
[ 5651.080583] IPv6: ADDRCONF(NETDEV_UP): eth0: link is not ready  
[ 5651.121691] br-lan: port 1(eth0) entered blocking state  
[ 5651.134047] br-lan: port 1(eth0) entered disabled state  
[ 5651.141395] device eth0 entered promiscuous mode
```



MODULE 3

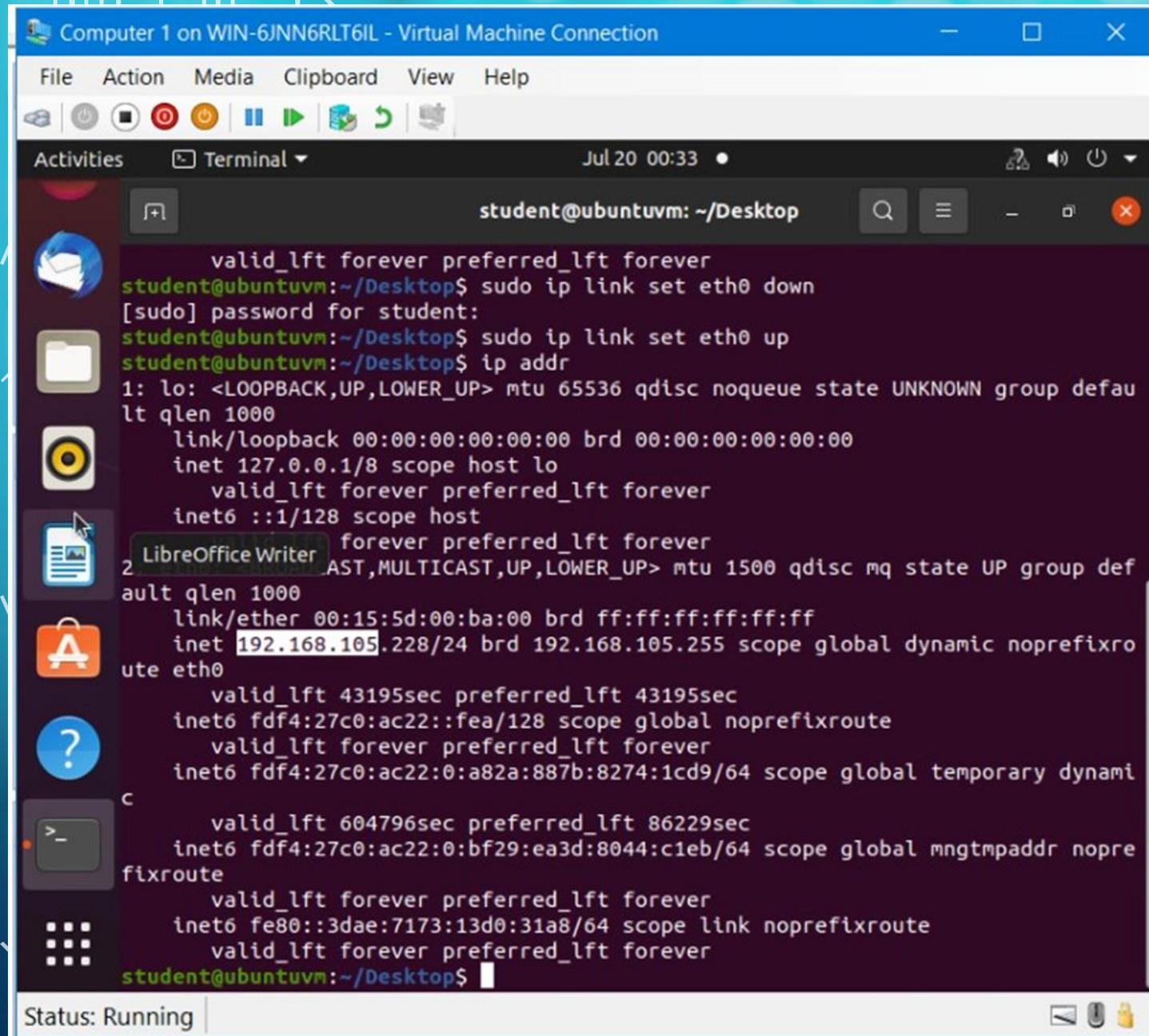
Connectivity Test

DYNAMIC IP ADDRESS ASSIGNMENT

- This screenshot should show the IPv4 address of the *Computer 1* VM.

Computer 1

Computer 1	192.168.105.228
------------	-----------------



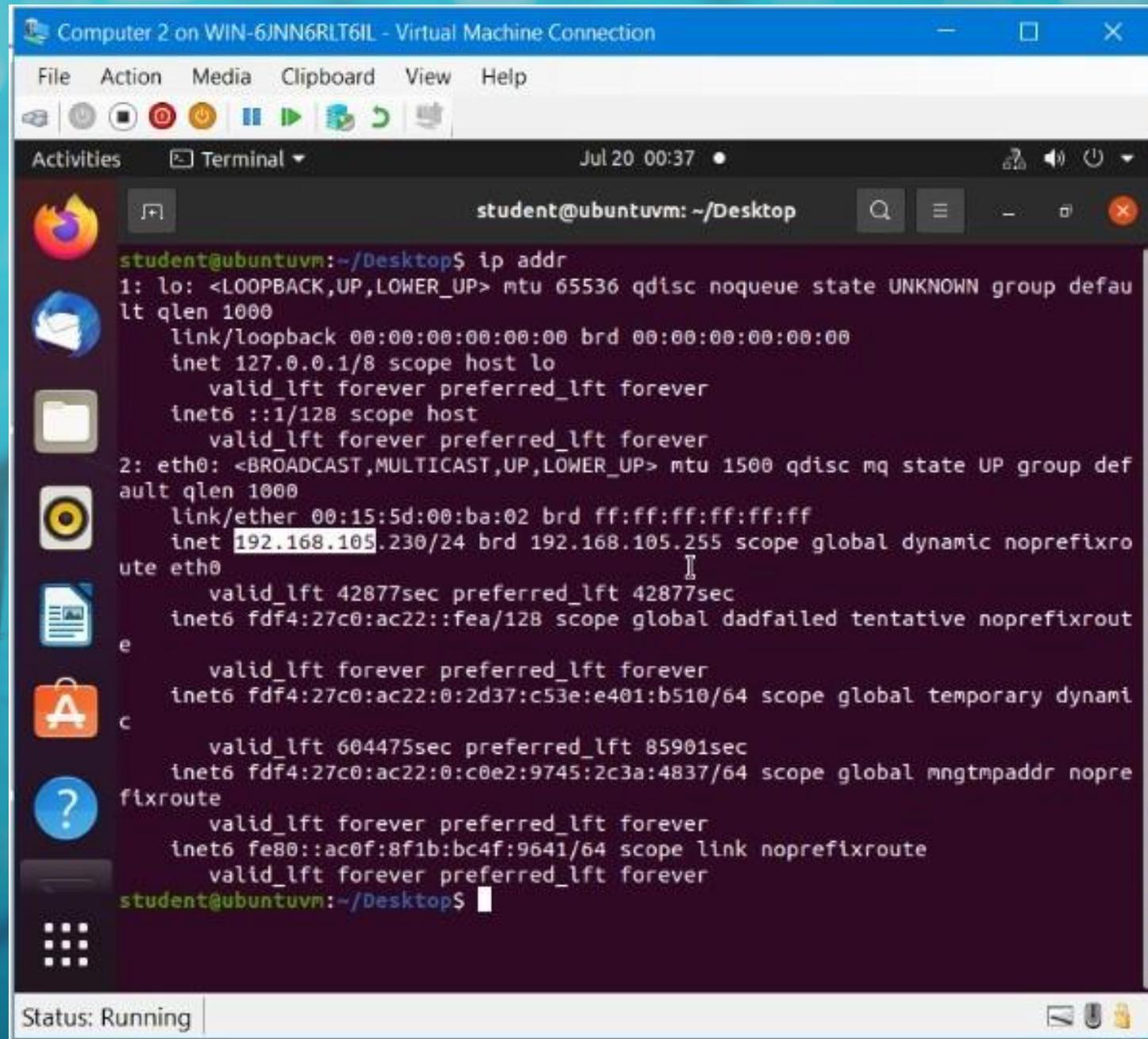
```
Computer 1 on WIN-6JNN6RLT6IL - Virtual Machine Connection
File Action Media Clipboard View Help
Activities Terminal Jul 20 00:33
student@ubuntuvm: ~/Desktop
valid_lft forever preferred_lft forever
student@ubuntuvm:~/Desktop$ sudo ip link set eth0 down
[sudo] password for student:
student@ubuntuvm:~/Desktop$ sudo ip link set eth0 up
student@ubuntuvm:~/Desktop$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defau
lt 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 def
ault 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 noprefixro
ute eth0
        valid_lft 43195sec preferred_lft 43195sec
    inet6 fdf4:27c0:ac22::fea/128 scope global noprefixroute
        valid_lft forever preferred_lft forever
    inet6 fdf4:27c0:ac22:0:a82a:887b:8274:1cd9/64 scope global temporary dynami
c
        valid_lft 604796sec preferred_lft 86229sec
    inet6 fdf4:27c0:ac22:0:bf29:ea3d:8044:c1eb/64 scope global mngtmpaddr nopre
fixroute
        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$
```

DYNAMIC IP ADDRESS ASSIGNMENT

This screenshot
should show the IPv4
address of the
Computer 2 VM.

Computer 2

Computer 2	192.168.105.230
------------	-----------------



```
Computer 2 on WIN-6JNN6RLT6IL - Virtual Machine Connection
File Action Media Clipboard View Help
Activities Terminal Jul 20 00:37
student@ubuntuvn: ~/Desktop
student@ubuntuvn:~/Desktop$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defau
lt 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 def
ault 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 noprefixro
ute eth0
        valid_lft 42877sec preferred_lft 42877sec
    inet6 fdf4:27c0:ac22::fea/128 scope global dadfailed tentative noprefixrou
te eth0
        valid_lft forever preferred_lft forever
    inet6 fdf4:27c0:ac22:0:2d37:c53e:e401:b510/64 scope global temporary dynami
c eth0
        valid_lft 604475sec preferred_lft 85901sec
    inet6 fdf4:27c0:ac22:0:c0e2:9745:2c3a:4837/64 scope global mngtmpaddr nopre
fixroute eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::ac0f:8f1b:bc4f:9641/64 scope link noprefixroute eth0
        valid_lft forever preferred_lft forever
student@ubuntuvn:~/Desktop$
```

Status: Running

CONNECTIVITY TEST

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

Computer 1

SOHO Router	192.168.105.1
Computer 1	192.168.105.228
Computer 2	192.168.105.230

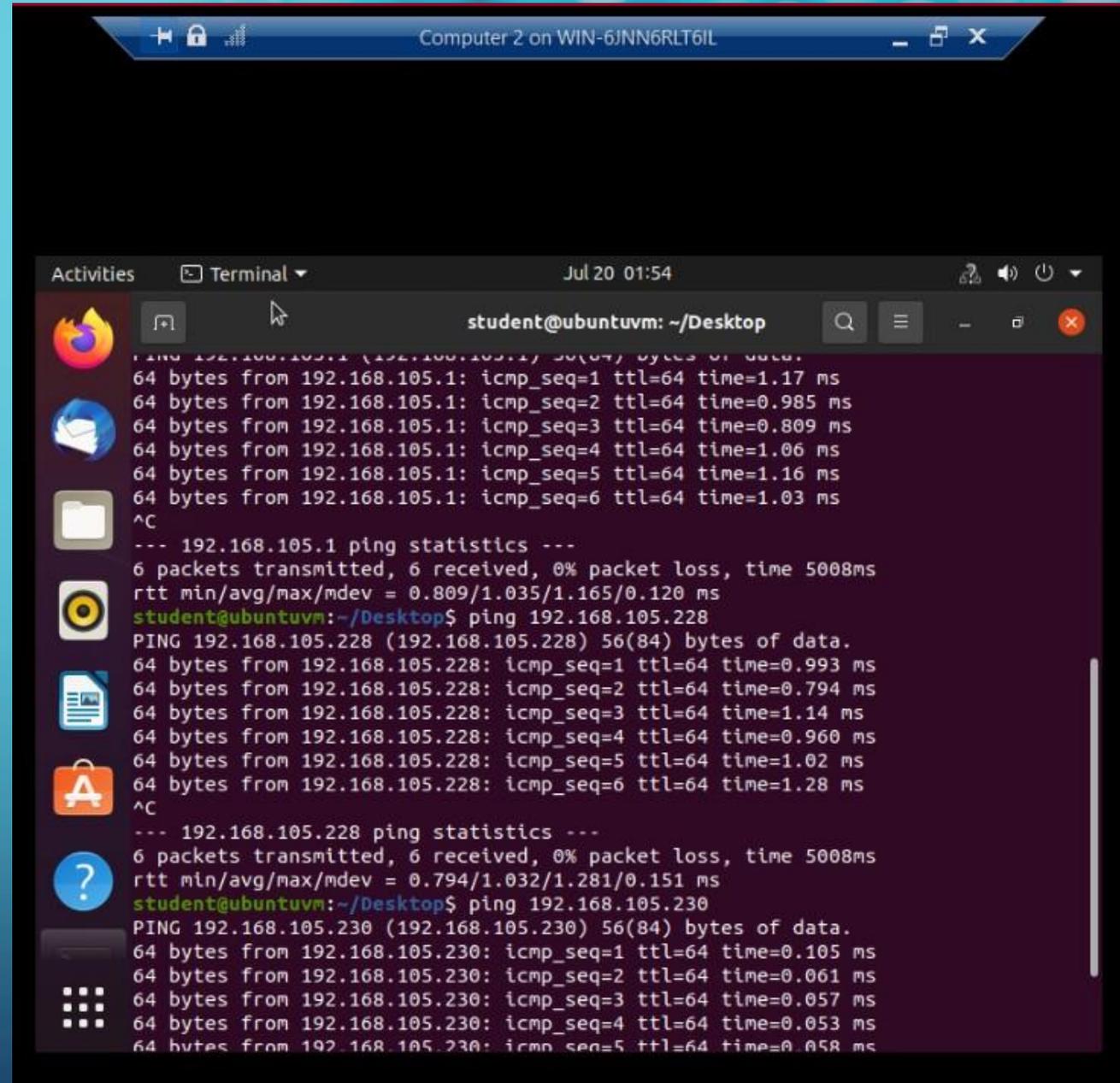
```
Computer 1 on WIN-6JNN6RLT6IL - Virtual Machine Connection
File Action Media Clipboard View Help
Activities Terminal Jul 20 01:49
student@ubuntuvn: ~/Desktop
student@ubuntuvn:~/Desktop$ ping 192.168.105.1
PING 192.168.105.1 (192.168.105.1) 56(84) bytes of data.
64 bytes from 192.168.105.1: icmp_seq=1 ttl=64 time=0.976 ms
64 bytes from 192.168.105.1: icmp_seq=2 ttl=64 time=1.08 ms
64 bytes from 192.168.105.1: icmp_seq=3 ttl=64 time=1.27 ms
64 bytes from 192.168.105.1: icmp_seq=4 ttl=64 time=1.04 ms
64 bytes from 192.168.105.1: icmp_seq=5 ttl=64 time=1.06 ms
^C
--- 192.168.105.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 0.976/1.085/1.268/0.098 ms
student@ubuntuvn:~/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=0.053 ms
64 bytes from 192.168.105.228: icmp_seq=2 ttl=64 time=0.059 ms
64 bytes from 192.168.105.228: icmp_seq=3 ttl=64 time=0.076 ms
^C
--- 192.168.105.228 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2044ms
rtt min/avg/max/mdev = 0.053/0.062/0.076/0.009 ms
student@ubuntuvn:~/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=1.76 ms
64 bytes from 192.168.105.230: icmp_seq=2 ttl=64 time=1.10 ms
64 bytes from 192.168.105.230: icmp_seq=3 ttl=64 time=1.25 ms
64 bytes from 192.168.105.230: icmp_seq=4 ttl=64 time=1.26 ms
64 bytes from 192.168.105.230: icmp_seq=5 ttl=64 time=1.38 ms
^C
--- 192.168.105.230 ping statistics ---
Status: Running
```

CONNECTIVITY TEST

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

Computer 2

SOHO Router	192.168.105.1
Computer 1	192.168.105.228
Computer 2	192.168.105.230



The screenshot shows a terminal window titled "student@ubuntuvm: ~/Desktop" with the following output:

```
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=1.17 ms
64 bytes from 192.168.105.1: icmp_seq=2 ttl=64 time=0.985 ms
64 bytes from 192.168.105.1: icmp_seq=3 ttl=64 time=0.809 ms
64 bytes from 192.168.105.1: icmp_seq=4 ttl=64 time=1.06 ms
64 bytes from 192.168.105.1: icmp_seq=5 ttl=64 time=1.16 ms
64 bytes from 192.168.105.1: icmp_seq=6 ttl=64 time=1.03 ms
^C
--- 192.168.105.1 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5008ms
rtt min/avg/max/mdev = 0.809/1.035/1.165/0.120 ms
student@ubuntuvm:~/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=0.993 ms
64 bytes from 192.168.105.228: icmp_seq=2 ttl=64 time=0.794 ms
64 bytes from 192.168.105.228: icmp_seq=3 ttl=64 time=1.14 ms
64 bytes from 192.168.105.228: icmp_seq=4 ttl=64 time=0.960 ms
64 bytes from 192.168.105.228: icmp_seq=5 ttl=64 time=1.02 ms
64 bytes from 192.168.105.228: icmp_seq=6 ttl=64 time=1.28 ms
^C
--- 192.168.105.228 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5008ms
rtt min/avg/max/mdev = 0.794/1.032/1.281/0.151 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=0.105 ms
64 bytes from 192.168.105.230: icmp_seq=2 ttl=64 time=0.061 ms
64 bytes from 192.168.105.230: icmp_seq=3 ttl=64 time=0.057 ms
64 bytes from 192.168.105.230: icmp_seq=4 ttl=64 time=0.053 ms
64 bytes from 192.168.105.230: icmp_seq=5 ttl=64 time=0.058 ms
```



MODULE 4

IP Subnetting and Loopback Interfaces

SUBNETTING TABLE

Subnet	Subnet Notation	Network Address	First Usable Host Address	Last Useable Host Address	Broadcast Address
The First Subnet	192.168.5.0/25	192.168.5.0	192.168.5.1	192.168.5.126	192.168.5.127
The Second Subnet	192.168.5.128/25	192.168.5.128	192.168.5.129	192.168.5.254	192.168.5.255

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

LOOPBACK INTERFACES

□ This screenshot should show both Loopback1 and Loopback2 interfaces and their correct IPv4 addresses

The screenshot displays a Hyper-V Manager window titled "DeVry-Hyper-V-2" with buttons for "View Fullscreen", "Send Ctrl+Alt+Delete", and "Reboot". The main window shows a virtual machine named "Computer 1 on WIN-6JNN6RLT6IL" connected to a virtual machine connection. The virtual machine is running OpenWrt, and the user is viewing the "Interfaces" page in the LuCI web interface. The page shows three interfaces: "LOOPBACK1", "LOOPBACK2", and "LAN". Each interface has a status of "Running" and is configured with a static IPv4 address. The "LAN" interface has a "Reconnect this interface" button.

Interface	Protocol	Uptime	MAC	RX	TX	IPv4
LOOPBACK1	Static address	0h 14m 52s	00:15:5D:00:BA:01	3.97 MB (39749 Pkts.)	5.90 MB (39196 Pkts.)	192.168.5.1/25
LOOPBACK2	Static address	0h 3m 36s	00:15:5D:00:BA:01	3.97 MB (39749 Pkts.)	5.90 MB (39196 Pkts.)	192.168.5.129/24
LAN	Static address	0h 20m 39s	00:15:5D:00:BA:01	3.42 MB (39740 Pkts.)	5.90 MB (39196 Pkts.)	

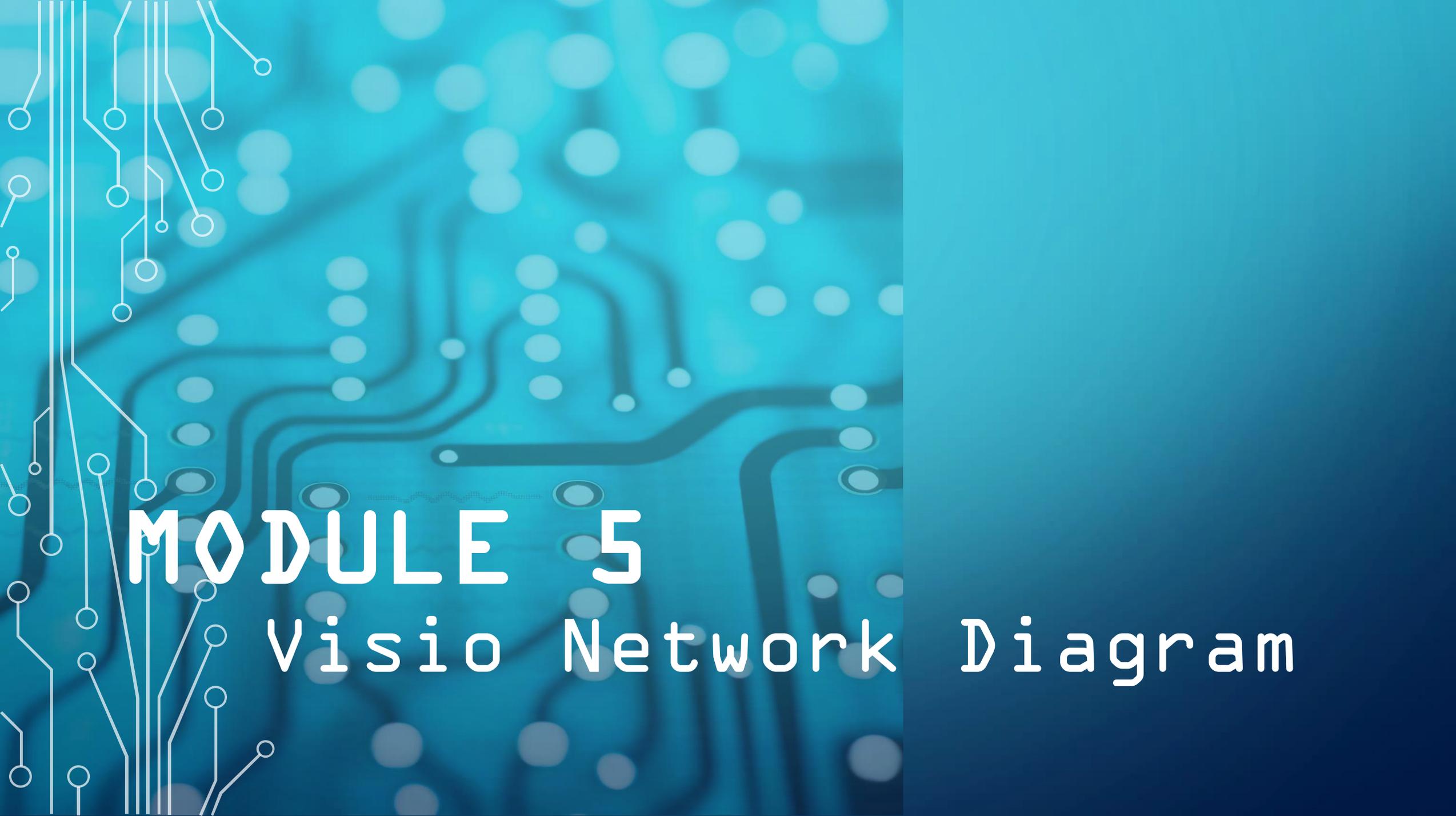
CONNECTIVITY TESTS

□ This screenshot should show two successful ping tests from the *Computer 1* VM to the *Loopback 1* and *Loopback 2* interfaces.

The screenshot displays the Hyper-V Manager interface. At the top, a browser window shows the URL `lab.infoseclearning.com/lab/console/vm-5578731/DeVry-Hyper-V-2`. Below it, the Hyper-V Manager window is open, showing a virtual machine named "Computer 1 on WIN-6JNN6RLT6IL". The terminal window within the VM shows the following output:

```
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=0.323 ms
64 bytes from 192.168.5.1: icmp_seq=2 ttl=64 time=0.359 ms
64 bytes from 192.168.5.1: icmp_seq=3 ttl=64 time=0.353 ms
64 bytes from 192.168.5.1: icmp_seq=4 ttl=64 time=0.399 ms
64 bytes from 192.168.5.1: icmp_seq=5 ttl=64 time=0.367 ms
64 bytes from 192.168.5.1: icmp_seq=6 ttl=64 time=0.369 ms
64 bytes from 192.168.5.1: icmp_seq=7 ttl=64 time=0.373 ms
64 bytes from 192.168.5.1: icmp_seq=8 ttl=64 time=0.417 ms
^C
--- 192.168.5.1 ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7160ms
rtt min/avg/max/mdev = 0.323/0.370/0.417/0.026 ms
student@ubuntuvm:~/Desktop$ ping 192.168.5.129
PING 192.168.5.129 (192.168.5.129) 56(84) bytes of data:
64 bytes from 192.168.5.129: icmp_seq=1 ttl=64 time=0.418 ms
64 bytes from 192.168.5.129: icmp_seq=2 ttl=64 time=0.344 ms
64 bytes from 192.168.5.129: icmp_seq=3 ttl=64 time=0.357 ms
64 bytes from 192.168.5.129: icmp_seq=4 ttl=64 time=1.14 ms
64 bytes from 192.168.5.129: icmp_seq=5 ttl=64 time=0.321 ms
64 bytes from 192.168.5.129: icmp_seq=6 ttl=64 time=0.335 ms
64 bytes from 192.168.5.129: icmp_seq=7 ttl=64 time=0.366 ms
64 bytes from 192.168.5.129: icmp_seq=8 ttl=64 time=0.303 ms
64 bytes from 192.168.5.129: icmp_seq=9 ttl=64 time=0.347 ms
^C
--- 192.168.5.129 ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8156ms
rtt min/avg/max/mdev = 0.303/0.436/1.140/0.250 ms
```

The terminal output shows two successful ping tests. The first test is to `192.168.5.1` with 8 successful packets and 0% packet loss. The second test is to `192.168.5.129` with 9 successful packets and 0% packet loss. The Hyper-V Manager interface shows the virtual machine is running, and the status bar at the bottom indicates the time is 7:36 PM on 7/29/2022.

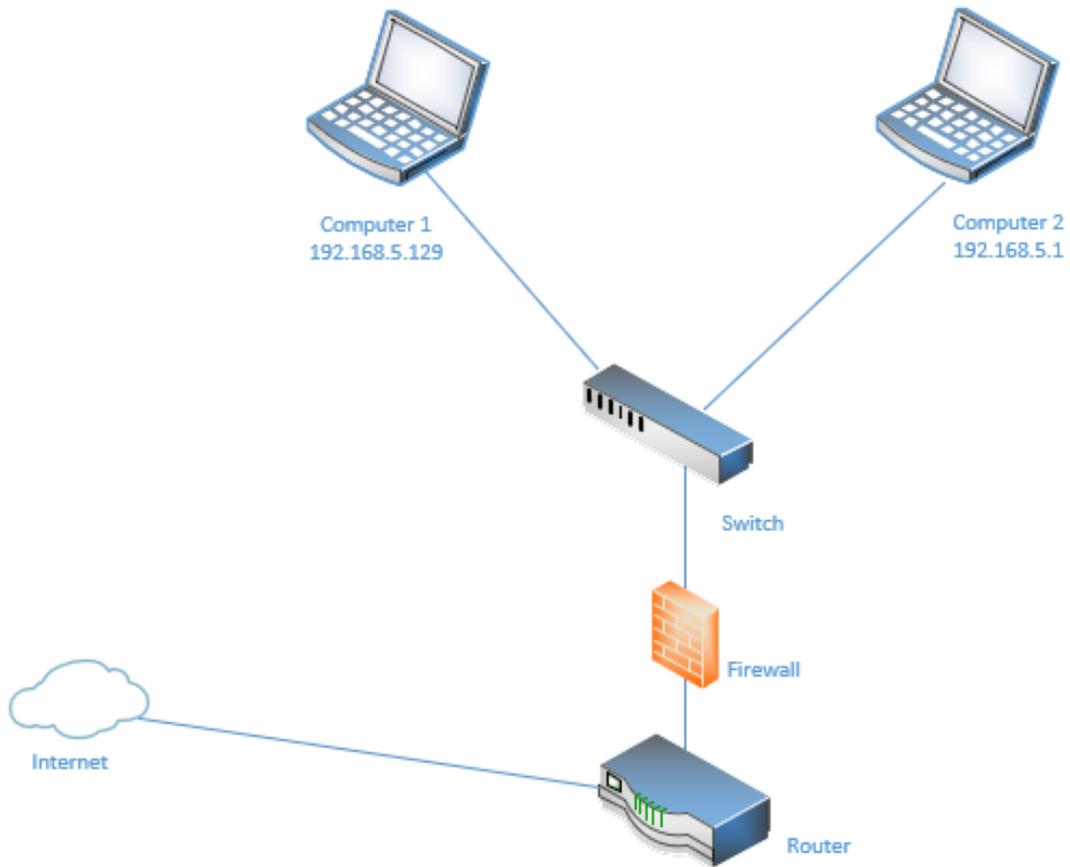


MODULE 5

Visio Network Diagram

Microsoft Visio Network Diagram

SOHO Network Topology



- This diagram should illustrate the interconnection of the *Computer 1* VM, the *Computer 2* VM, and the *SOHO Router* VM

A white circuit board graphic is positioned on the left side of the image, featuring vertical lines and various circular nodes connected by thin lines, resembling a network or data structure. The background is a solid teal color with a subtle gradient.

MODULE 6

SOHO Wireless Network

Security

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, admin
- Since all TP-Link routers (in this case) have the same username and password, anyone can commandeer your router. Like pretty much everything these days, our security and the security of our devices can be easily compromised.

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:

Static IP addresses offer more stability and security than dynamic IP addresses, which tend to change often, sometimes losing connection with the internet. A static IP may have faster internet speeds than a dynamic IP, depending on your network. Broadband users with high-speed connections might see speeds over 1 megabit, which would be helpful for people who download or upload a lot of files, documents, or data. Disadvantages of Static IPs: not scalable, easier to track, and higher overhead.

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:

Most routers have the option to blacklist or whitelist certain computers based on their MAC address. You can configure the filter to allow connections from all computers except those you've added to the blacklist, or you can restrict access to any computer not on your whitelist. Whitelists give better security than blacklists because the router only allows access to those devices. The drawback to setting up your router to use a whitelist means you must modify the list any time you buy a new computer or mobile device, or any time you want to give permissions to visitors in your home. Also, you'll have to add two MAC addresses for each PC: a wired adapter and a wireless adapter. If a device's MAC address isn't on the list of allowed devices, it won't be able to access the Internet.

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:

- 1) Unsecure
- 2) WPA
- 3) WPA2
- 4) WEP

WPA2 is the recommended option. If it's available, you should always use it. WPA scrambles the encryption key and prevents the use of TKIP, which is less secure than AES (Advanced Encryption Standard) is a set of rules for encrypting. AES should be used on top of WPA2 or WPA when possible.

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

Answer:

WPA2 (WiFi Protected Access 2) became available in 2004. WPA2 has stronger security and is easier to configure than prior options. The main difference with WPA2 is that it uses the Advanced Encryption Standard (AES) instead of TKIP. AES is able to secure top-secret government information, so it's a good option for keeping a personal device or company WiFi safe.

The one notable vulnerability of WPA2 is that once someone has access to the network, they can attack other devices connected to the network. This could be an issue if a company has an internal threat, such as an unhappy employee, who hacks into the other devices on the company's network.

SOHO Wireless Network Security (continued)

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

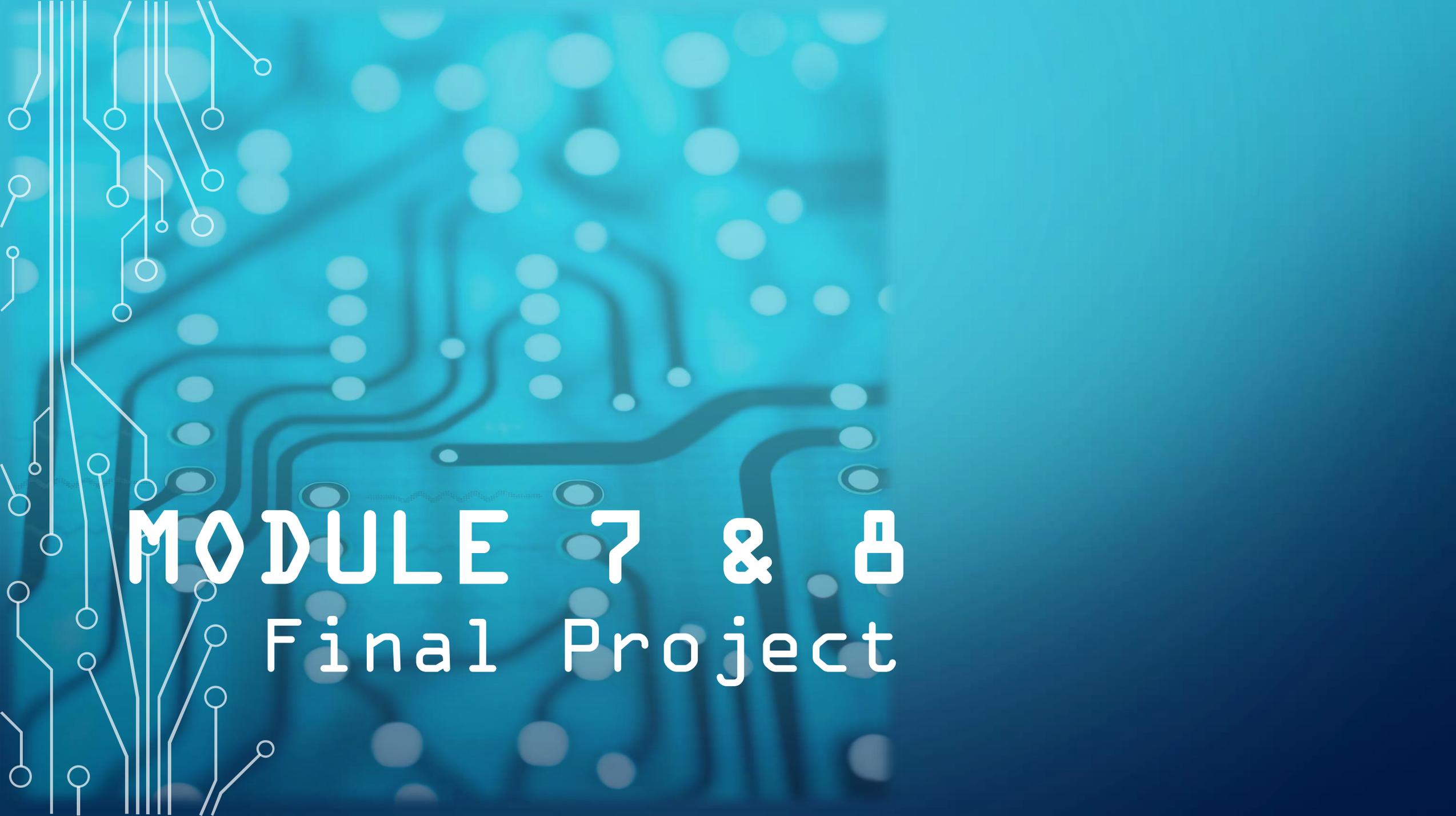
Answer:

1. Change the default name of your home Wi-Fi
2. Make your wireless network password unique and strong
3. Enable network encryption
4. Turn off network name broadcasting
5. Keep your router's software up to date
6. Use a good firewall
7. Use VPNs to access your network
8. Change default username and password
9. Hide your network from view
10. Place the router in the center of your home
11. Enable MAC address Filtering
12. Disable Remote Administration

- The demand for devices that connect to the internet is rising and with it is the need to connect safely. This increase in devices has raised a variety of security concerns.
- As interest in internet devices increases, the need for public awareness of the security risks of using Wi-Fi networks also rises. An unsecured network exposes us to security issues. Hackers are always ready to launch targeted attacks whenever a security lapse occurs. This vulnerability can result in your home network being breached allowing hackers to steal your personal and financial information. Attacks can also be launched infecting your devices with malware and viruses.
- Securing your home network is essential to keeping out attackers and protecting your data.

References

- 1) <https://www.techguide.com.au/news/internet-news/advantages-disadvantages-static-ip-explained/>
- 2) <https://www.techwalla.com/articles/advantage-and-disadvantage-of-mac-address-filtering>
- 3) <https://www.pandasecurity.com/en/mediacenter/security/wpa-vs-wpa2/>



MODULE 7 & 8

Final Project



CHALLENGES

CHALLENGES

Challenge	Solution
Had some trouble with the Virtual Labs	Added a second monitor and used phone as hot spot, due to constant disconnects.
Understanding subnetting was difficult	Researched various sources to gain understanding

The image features a blue background with a circuit board pattern. The pattern consists of white lines and circles representing traces and components on a PCB. The text 'CAREER SKILLS' is centered in a white, bold, sans-serif font. The background has a gradient from light blue on the left to a darker blue on the right.

CAREER SKILLS

CAREER SKILLS

Problem Solving	Persistence
Research and analytical thinking	Communication with others
Patience	Time Management



CONCLUSION

CONCLUSION

- We learned the basics of a network and how to assign subnets
- We discussed setting up a SOHO network for our homes or small businesses
- Different ways to secure our home network was covered and I know some of the changes I need to make for my home network