



NETWORK CREATION & IMPLEMENTATION

NETW 191 COURSE PROJECT

MARCH 2021

PRESENTED BY NYDA M. SIMMONDS



“NETWORKING MEANS CONNECTING COMPUTERS SO THAT THEY CAN SHARE FILES, PRINTERS, APPLICATIONS, AND OTHER COMPUTER-RELATED RESOURCES.”

- Editor. (2019, September 10). *What is Networking?* Network Encyclopedia. <https://networkencyclopedia.com/what-is-networking/#:~:text=The%20concept%20of%20networking%20is,more%20networks%20in%20different%20places.&text=In%20the%20simplest%20sense%2C%20networking,and%20other%20computer%2Drelated%20resources.>

PROJECT OBJECTIVE

Implement

Implement a small network that supports both IPv4 and IPv6.

Set up

Set up a VMware Workstation Player environment with an Ubuntu Virtual Machine

Demonstrate

Demonstrate connectivity between the computer and the VM by pinging the VM from the computer and vice versa.

REQUIRED RESOURCES

Laptop or desktop PC (referred to as Host Computer)

GL-MT300N-V2 Travel Router

Ethernet patch cable

USB cable (to power the Travel Router)

VMware Workstation Player

Ubuntu LTS for desktop PCs and laptops

IMAGES OF TOOLS USED

- All tools required for the course project were provided by DeVry University along with the HP laptop the network was mapped with.



ubuntu



IPV4 AND IPV6 ADDRESSING

IN THIS PART OF THE PROJECT WE IMPLEMENTED A IPV4 AND
IPV6 ADDRESSING SCHEME TO SUPPORT A NETWORK.

IPv4 Address Assignment of the Travel Router

This screenshot includes:

- IPv4 address
- IPv4 netmask

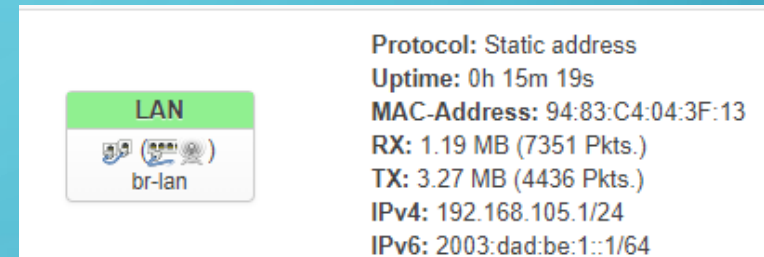
The screenshot displays the configuration page for the MT300N-V2 router. The page title is "MT300N-V2" and it includes navigation links for "Status", "System", "Network", and "Logout". Below the title, there are tabs for "General Setup", "Advanced Settings", "Physical Settings", and "Firewall Settings". The "Advanced Settings" tab is selected, showing the configuration for the "br-lan" interface. The "Status" section provides details: Device: br-lan, Uptime: 0h 20m 0s, MAC-Address: 94:83:C4:04:3F:13, RX: 1.36 MB (8372 Pkts.), TX: 3.57 MB (5562 Pkts.), IPv4: 192.168.105.1/24, and IPv6: 2003:dad:be:1::1/64. The "Protocol" is set to "Static address". The "IPv4 address" is 192.168.105.1 and the "IPv4 netmask" is 255.255.255.0.

Field	Value
Device	br-lan
Uptime	0h 20m 0s
MAC-Address	94:83:C4:04:3F:13
RX	1.36 MB (8372 Pkts.)
TX	3.57 MB (5562 Pkts.)
IPv4	192.168.105.1/24
IPv6	2003:dad:be:1::1/64
Protocol	Static address
IPv4 address	192.168.105.1
IPv4 netmask	255.255.255.0

IPv6 Address Assignment of the Travel Router

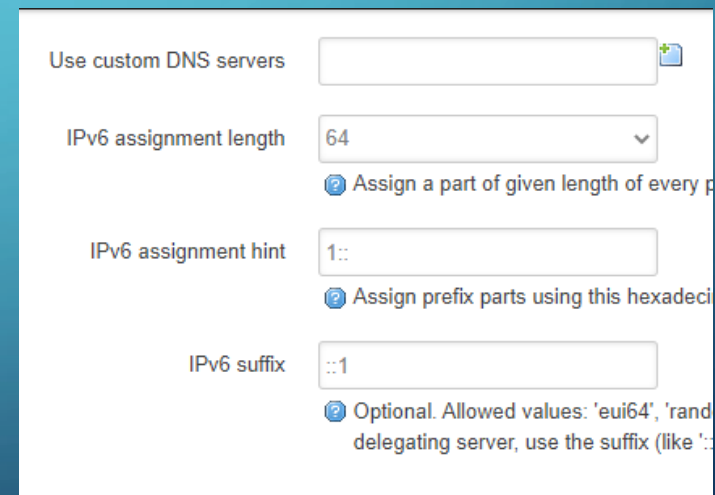
This screenshot includes:

- IPv6 address
- IPv6 prefix



LAN
br-lan

Protocol: Static address
Uptime: 0h 15m 19s
MAC-Address: 94:83:C4:04:3F:13
RX: 1.19 MB (7351 Pkts.)
TX: 3.27 MB (4436 Pkts.)
IPv4: 192.168.105.1/24
IPv6: 2003:dad:be:1::1/64



Use custom DNS servers

IPv6 assignment length

Assign a part of given length of every p

IPv6 assignment hint

Assign prefix parts using this hexadeci

IPv6 suffix

Optional. Allowed values: 'eui64', 'rand
delegating server, use the suffix (like '::1')

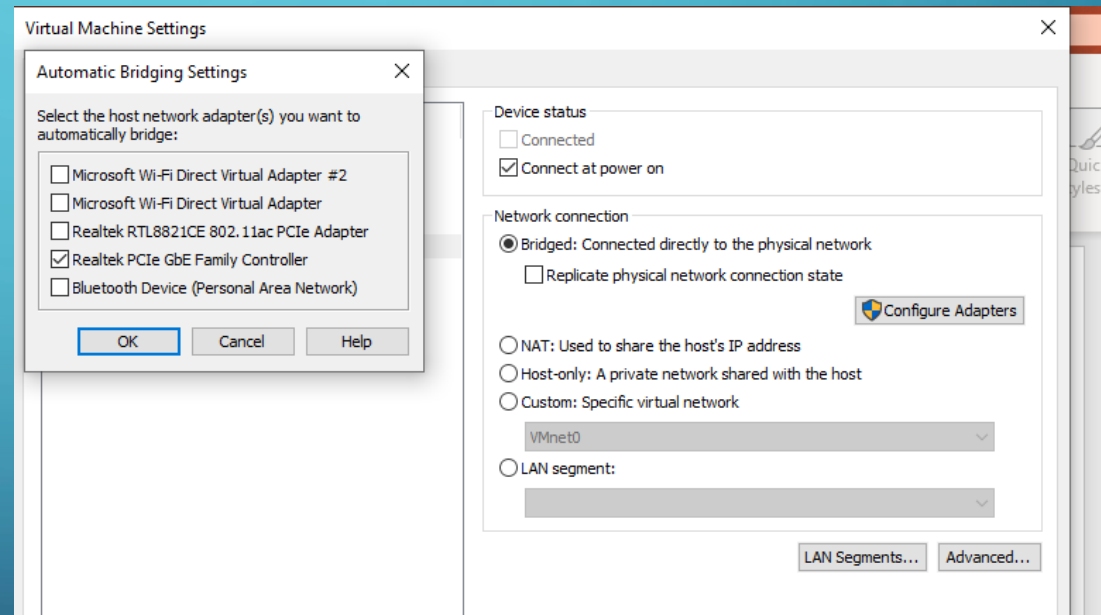
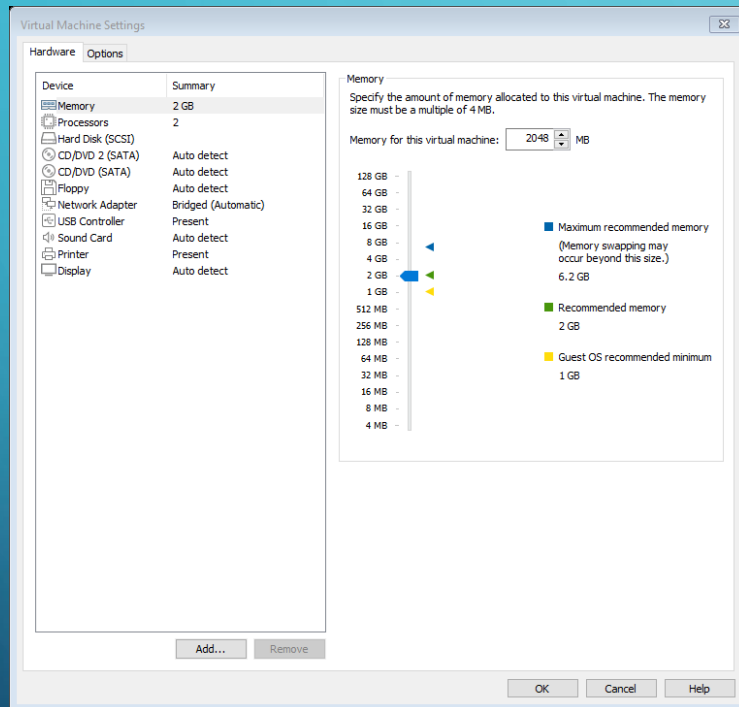


VIRTUAL MACHINE (VM) DYNAMIC IP ASSIGNMENT

IN THIS PART OF THE PROJECT WE CONFIGURE THE VMWARE ENVIRONMENT TO SUPPORT BRIDGING SO THAT THE UBUNTU VM CONNECTS THROUGH HOST COMPUTER'S NIC TO THE LAN INTERFACE OF THE TRAVEL ROUTER.

VM Bridging Settings

This screenshot shows the host computer network adaptor you want to automatically bridge.



Ubuntu VM Dynamic IP Assignment

This screenshot shows the correct IPv4 and IPv6 addresses of the Ubuntu VM.

```
object not known, try ip help .
nydanetw191@ubuntu:~$ 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: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:d0:41:1f brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.105.227/24 brd 192.168.105.255 scope global dynamic noprefixroute ens33
        valid_lft 41242sec preferred_lft 41242sec
    inet6 2003:dad:be:1::d59/128 scope global noprefixroute ens33
        valid_lft forever preferred_lft forever
    inet6 2003:dad:be:1:5474:b4d3:4263:dc3d/64 scope global temporary dynamic ens33
        valid_lft 602844sec preferred_lft 84391sec
    inet6 2003:dad:be:1:474c:e5e5:fddd:19ab/64 scope global mngtmpaddr noprefixroute ens33
        valid_lft forever preferred_lft forever
    inet6 fe80::8071:cfa0:36a9:3a86/64 scope link noprefixroute ens33
        valid_lft forever preferred_lft forever
nydanetw191@ubuntu:~$
```

Host Computer Dynamic IP Assignment

This screenshot shows the correct IPv4 and IPv6 addresses of the Windows host computer.

```
Ethernet adapter Ethernet:
```

```
Connection-specific DNS Suffix . : lan
IPv6 Address. . . . . : 2003:dad:be:1::bbf
IPv6 Address. . . . . : 2003:dad:be:1:11e6:7ca0:4208:e98e
Temporary IPv6 Address. . . . . : 2003:dad:be:1:e917:de5d:6246:7906
Link-local IPv6 Address . . . . . : fe80::11e6:7ca0:4208:e98e%2
IPv4 Address. . . . . : 192.168.105.120
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.105.1
```



CONNECTIVITY TEST & VISIO NETWORK DIAGRAM

IN THIS PART OF THE PROJECT WE TEST THE CONNECTIVITY AMONG THE HOST COMPUTER, UBUNTU VM, AND TRAVEL ROUTER.

SECONDLY, WE USE MICROSOFT VISIO TO CREATE A NETWORK DIAGRAM THAT DEPICTS THE INTERCONNECTION OF THE HOST COMPUTER, UBUNTU VM AND TRAVEL ROUTER.

Connectivity Test From the Host Computer to all Other Devices

These screenshots show four successful ping tests.

IPV4 Windows 10 Ping

```
C:\Users\nsims>ping 192.168.105.227

Pinging 192.168.105.227 with 32 bytes of data:
Reply from 192.168.105.227: bytes=32 time<1ms TTL=64
Reply from 192.168.105.227: bytes=32 time=1ms TTL=64
Reply from 192.168.105.227: bytes=32 time=1ms TTL=64
Reply from 192.168.105.227: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.105.227:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

IPV6 Windows 10 Ping

```
C:\Users\nsims>ping 2003:dad:be:1::d59

Pinging 2003:dad:be:1::d59 with 32 bytes of data:
Reply from 2003:dad:be:1::d59: time=545ms
Reply from 2003:dad:be:1::d59: time=1ms
Reply from 2003:dad:be:1::d59: time=1ms
Reply from 2003:dad:be:1::d59: time=1ms

Ping statistics for 2003:dad:be:1::d59:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 545ms, Average = 137ms
```

IPV4 Travel Router Windows 10 Ping

```
C:\Users\nsims>ping 192.168.105.1

Pinging 192.168.105.1 with 32 bytes of data:
Reply from 192.168.105.1: bytes=32 time<1ms TTL=64
Reply from 192.168.105.1: bytes=32 time=1ms TTL=64
Reply from 192.168.105.1: bytes=32 time=2ms TTL=64
Reply from 192.168.105.1: bytes=32 time=1ms TTL=64

Ping statistics for 192.168.105.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 1ms
```

IPV6 Travel Router Windows 10 Ping

```
C:\Users\nsims>ping 2003:dad:be:1::1

Pinging 2003:dad:be:1::1 with 32 bytes of data:
Reply from 2003:dad:be:1::1: time=115ms
Reply from 2003:dad:be:1::1: time<1ms
Reply from 2003:dad:be:1::1: time=1ms
Reply from 2003:dad:be:1::1: time=1ms

Ping statistics for 2003:dad:be:1::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 115ms, Average = 29ms

C:\Users\nsims>
```

Connectivity Test From the Ubuntu VM to all Other Devices

These screenshots show four successful ping tests.

IPV4 Ubuntu VM Ping

```
nydanetw191@ubuntu:~$ ping 192.168.105.120
PING 192.168.105.120 (192.168.105.120) 56(84) bytes of data.
^C
--- 192.168.105.120 ping statistics ---
90 packets transmitted, 0 received, 100% packet loss, time 91136ms
```

IPV6 Ubuntu VM Ping

```
nydanetw191@ubuntu:~$ ping 2003:dad:be:1::bbf
PING 2003:dad:be:1::bbf(2003:dad:be:1::bbf) 56 data bytes
^C
--- 2003:dad:be:1::bbf ping statistics ---
15 packets transmitted, 0 received, 100% packet loss, time 14316ms
```

IPV4 Ubuntu VM Travel Router Ping

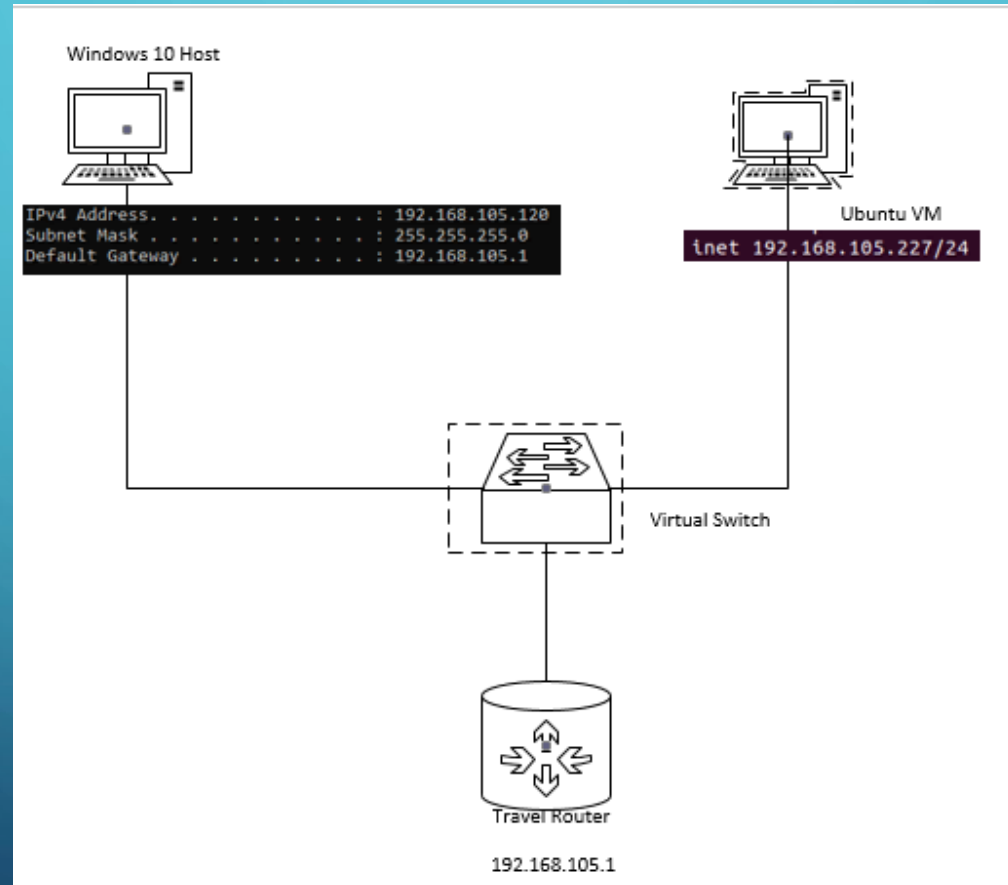
```
nydanetw191@ubuntu:~$ ping 192.168.105.1
PING 192.168.105.1 (192.168.105.1) 56(84) bytes of data.
64 bytes from 192.168.105.1: icmp_seq=1 ttl=64 time=0.775 ms
64 bytes from 192.168.105.1: icmp_seq=2 ttl=64 time=2.53 ms
64 bytes from 192.168.105.1: icmp_seq=3 ttl=64 time=2.96 ms
64 bytes from 192.168.105.1: icmp_seq=4 ttl=64 time=1.09 ms
64 bytes from 192.168.105.1: icmp_seq=5 ttl=64 time=1.01 ms
64 bytes from 192.168.105.1: icmp_seq=6 ttl=64 time=1.09 ms
64 bytes from 192.168.105.1: icmp_seq=7 ttl=64 time=0.945 ms
64 bytes from 192.168.105.1: icmp_seq=8 ttl=64 time=0.842 ms
64 bytes from 192.168.105.1: icmp_seq=9 ttl=64 time=1.04 ms
64 bytes from 192.168.105.1: icmp_seq=10 ttl=64 time=0.684 ms
64 bytes from 192.168.105.1: icmp_seq=11 ttl=64 time=0.997 ms
64 bytes from 192.168.105.1: icmp_seq=12 ttl=64 time=0.921 ms
64 bytes from 192.168.105.1: icmp_seq=13 ttl=64 time=1.03 ms
64 bytes from 192.168.105.1: icmp_seq=14 ttl=64 time=1.13 ms
64 bytes from 192.168.105.1: icmp_seq=15 ttl=64 time=0.987 ms
64 bytes from 192.168.105.1: icmp_seq=16 ttl=64 time=1.14 ms
64 bytes from 192.168.105.1: icmp_seq=17 ttl=64 time=0.968 ms
^C
--- 192.168.105.1 ping statistics ---
17 packets transmitted, 17 received, 0% packet loss, time 16036ms
rtt min/avg/max/mdev = 0.684/1.183/2.960/0.586 ms
```

IPV6 Ubuntu VM Travel Router Ping

```
nydanetw191@ubuntu:~$ ping 2003:dad:be:1::1
PING 2003:dad:be:1::1(2003:dad:be:1::1) 56 data bytes
64 bytes from 2003:dad:be:1::1: icmp_seq=1 ttl=64 time=1.51 ms
64 bytes from 2003:dad:be:1::1: icmp_seq=2 ttl=64 time=1.23 ms
64 bytes from 2003:dad:be:1::1: icmp_seq=3 ttl=64 time=1.09 ms
64 bytes from 2003:dad:be:1::1: icmp_seq=4 ttl=64 time=0.783 ms
64 bytes from 2003:dad:be:1::1: icmp_seq=5 ttl=64 time=1.01 ms
64 bytes from 2003:dad:be:1::1: icmp_seq=6 ttl=64 time=0.929 ms
64 bytes from 2003:dad:be:1::1: icmp_seq=7 ttl=64 time=1.10 ms
64 bytes from 2003:dad:be:1::1: icmp_seq=8 ttl=64 time=1.15 ms
64 bytes from 2003:dad:be:1::1: icmp_seq=9 ttl=64 time=1.01 ms
64 bytes from 2003:dad:be:1::1: icmp_seq=10 ttl=64 time=1.04 ms
^C
--- 2003:dad:be:1::1 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9021ms
rtt min/avg/max/mdev = 0.783/1.084/1.510/0.183 ms
```

Microsoft Visio Network Diagram

This diagram shows the interconnection of the host computer, Ubuntu VM, and travel router along with the addresses.





IP SUBNETTING & LOOPBACK INTERFACES

IN THIS PART OF THE PROJECT WE START WITH A CLASS C NETWORK AND DIVIDE ITS BLOCK OF IP ADDRESSES INTO SMALLER BLOCKS (I.E., SUBNETS).

SECONDLY, WE CONFIGURE TWO LOOPBACK INTERFACES ON THE TRAVEL ROUTER BY USING IP ADDRESSES OF NEWLY CREATED SUBNETS TO SIMULATE ADDITIONAL LAN SEGMENTS ON AN ENTERPRISE NETWORK

Subnetting Table

This table includes two /25 subnets, including the network address, first usable host address, last usable host address, and broadcast address for each subnet.

	Subnet Notation (x.x.x.x/x)	Network Address (1 st IP address)	First usable host address (2 nd IP address)	Last useable host address (2nd from the last IP address)	Broadcast Address (the last IP address)
The first subnet	192.168.5.0/25	192.168.5.0	192.168.5.1	192.168.5.12	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

Loopback Interfaces

This screenshot shows both Lo5 and Lo6 loopback interfaces and their correct IPv4 addresses.

The screenshot displays a network configuration interface titled "Interfaces". It shows two loopback interfaces, LO5 and LO6, each with a status icon and the name "apcli0".

Interface	Protocol	Uptime	MAC-Address	RX	TX	IPv4	Actions
LO5	Static address	0h 2m 5s	96:83:C4:04:3F:13	0 B (0 Pkts.)	0 B (0 Pkts.)	192.168.5.1/25	Restart Stop Edit Delete
LO6	Static address	0h 0m 19s	96:83:C4:04:3F:13	0 B (0 Pkts.)	0 B (0 Pkts.)	192.168.5.129/25	Restart Stop Edit Delete

Ping Tests

This screenshot should show two successful ping tests from the host computer to the Lo5 and Lo6 interfaces.

```
CA. Command Prompt

C:\Users\nsims>ping 192.168.5.1

Pinging 192.168.5.1 with 32 bytes of data:
Reply from 192.168.5.1: bytes=32 time<1ms TTL=128
Reply from 192.168.5.1: bytes=32 time<1ms TTL=128
Reply from 192.168.5.1: bytes=32 time<1ms TTL=128
Reply from 192.168.5.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.5.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\nsims>
```

```
C:\Users\nsims>ping 192.168.5.129

Pinging 192.168.5.129 with 32 bytes of data:
Reply from 192.168.5.129: bytes=32 time<1ms TTL=64
Reply from 192.168.5.129: bytes=32 time<1ms TTL=64
Reply from 192.168.5.129: bytes=32 time<1ms TTL=64
Reply from 192.168.5.129: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.5.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\nsims>
```



WLAN IMPLEMENTATION

IN THIS PART OF THE PROJECT WE CONDUCT THE WLAN IMPLEMENTATION.

List of SSID Names

This screenshot shows the newly configured NETW191 SSID.

The screenshot displays the GL.iNet Admin Panel interface in a web browser. The browser's address bar shows the URL `192.168.105.1/#/wlan`. The page title is "GL.iNet ADMIN PANEL". On the left, a dark sidebar menu contains the following options: INTERNET, WIRELESS (highlighted in green), CLIENTS, UPGRADE, FIREWALL, VPN, APPLICATIONS, and MORE SETTINGS. The main content area shows the configuration for a specific SSID, "GL-MT300N-V2-f13". The configuration fields are as follows:

- Wi-Fi Name (SSID):
- Wi-Fi Security:
- Wi-Fi Key: (with an eye icon for visibility toggle)
- SSID Visibility:
- Channel:
- Speed:
- TX Power (dBm): A slider control set to 20 dBm.

At the bottom of the configuration area, there are two buttons: "Cancel" and "Apply".

Wi-Fi Client IP Address

This screenshot show the IP address of your Wi-Fi device that's associated with the NETW191 network.



Ping Test

This screenshot shows the IP address before connecting to NET191.

It is 198.168.1.145

```
Command Prompt
Ethernet adapter VMware Network Adapter VMnet1:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::9d61:3199:9fb1:6832%12
    IPv4 Address. . . . . : 192.168.71.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 

Ethernet adapter VMware Network Adapter VMnet8:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::8515:217a:d9b9:39b1%4
    IPv4 Address. . . . . : 192.168.5.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . : vipowernet.net
    Link-local IPv6 Address . . . . . : fe80::70ca:1c98:16cf:8a7b%6
    IPv4 Address. . . . . : 192.168.1.145
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

Ethernet adapter Bluetooth Network Connection:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

C:\Users\nsims>
```

Ping Test

This screenshot shows the IPV4 address after connected to the NET191 router.

It is 192.168.105.120

```
Ethernet adapter Ethernet:

Connection-specific DNS Suffix . : lan
IPv6 Address. . . . . : 2003:dad:be:1::bbf
IPv6 Address. . . . . : 2003:dad:be:1:11e6:7ca0:4208:e98e
Temporary IPv6 Address. . . . . : 2003:dad:be:1:a0b9:ce66:2ef5:463e
Link-local IPv6 Address . . . . . : fe80::11e6:7ca0:4208:e98e%2
IPv4 Address. . . . . : 192.168.105.120
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.105.1

Ethernet adapter VMware Network Adapter VMnet1:

Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::9d61:3199:9fb1:6832%12
IPv4 Address. . . . . : 192.168.71.1
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :

Ethernet adapter VMware Network Adapter VMnet8:

Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::8515:217a:d9b9:39b1%4
IPv4 Address. . . . . : 192.168.5.1
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :

Wireless LAN adapter Wi-Fi:

Connection-specific DNS Suffix . : lan
IPv6 Address. . . . . : 2003:dad:be:1::801
IPv6 Address. . . . . : 2003:dad:be:1:70ca:1c98:16cf:8a7b
Temporary IPv6 Address. . . . . : 2003:dad:be:1:707d:b15c:9a5b:21de
Link-local IPv6 Address . . . . . : fe80::70ca:1c98:16cf:8a7b%6
IPv4 Address. . . . . : 192.168.105.144
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.105.1
```

Ping Test

This screenshot shows a successful ping test from the host computer to your Wi-Fi device that's associated with the NETW191 network.

```
Command Prompt
Microsoft Windows [Version 10.0.19042.867]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\nsims>ping 192.168.105.120

Pinging 192.168.105.120 with 32 bytes of data:
Reply from 192.168.105.120: bytes=32 time<1ms TTL=128
Reply from 192.168.105.120: bytes=32 time<1ms TTL=128
Reply from 192.168.105.120: bytes=32 time<1ms TTL=128
Reply from 192.168.105.120: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.105.120:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\nsims>_
```

A decorative graphic on the left side of the slide, consisting of a network of light blue lines and circles that resemble a circuit board or a neural network. The lines are vertical and horizontal, with some branching out to connect to small circles.

CHALLENGES FACED

THE CONNECTIVITY TESTING WAS THE MOST CHALLENGING FOR ME

Several issues included the following:

IPV6 PING FAILED

```
C:\Users\nsims>ping 2003:dad:1::d59
Pinging 2003:dad:1::d59 with 32 bytes of data:
PING: transmit failed. General failure.
PING: transmit failed. General failure.
PING: transmit failed. General failure.
PING: transmit failed. General failure.

Ping statistics for 2003:dad:1::d59:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

IPV6 UNREACHABLE

```
C:\Users\nsims>ping 2003:dad:be:1:1896:4f9f:61c2:6f88
Pinging 2003:dad:be:1:1896:4f9f:61c2:6f88 with 32 bytes of data:
Destination host unreachable.
Destination host unreachable.
Destination host unreachable.
Destination host unreachable.
```

IPV4 PACKET LOSS ON UBUNTU

```
nydanetw191@ubuntu:~$ ping 192.168.105.120
PING 192.168.105.120 (192.168.105.120) 56(84) bytes of data.
^C
--- 192.168.105.120 ping statistics ---
90 packets transmitted, 0 received, 100% packet loss, time 91136ms
```

A decorative graphic on the left side of the page, consisting of a network of light blue lines and small circles, resembling a circuit board or a neural network. The lines are vertical and horizontal, with some branching out to small circles at the ends.

SKILLS LEARNED

MANUAL DECIMAL TO BINARY CONVERSION

Most people would just use an online converter application, but I found doing it manually to be a lot of fun and it helped when we had to do subnetting.

Decimal to Binary Conversion

Divide by 2 Process

$$\text{Decimal \# } 13 \div 2 = 6 \text{ remainder } 1$$

$$6 \div 2 = 3 \text{ remainder } 0$$

$$3 \div 2 = 1 \text{ remainder } 1$$

$$1 \div 2 = 0 \text{ remainder } 1$$

Divide-by-2 Process
Stops When
Quotient Reaches 0

1 1 0 1



CONCLUSION

Networking is more than just how we connect our computers, scanners and printers. It's about how we share our ideas and work as a team over small or large areas. The networking infrastructure is the backbone of our digital renaissance and a foundation block in the ever-growing world of IOT.





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