

TNE10005/TNE60002

# **Network Administration**

## *Lab 2*

### **Getting familiar with Network Administration Labs**

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### Aim:

- To obtain an understanding of the roles of virtual switches, software-based router and virtual machines in the Network Administration labs.
- To become familiar with the recommended good practice Network Administration labs.

**Note:** For those of you who have studied networking before, this lab will appear deceptively simple. The focus of this lab for experienced students is to explain the observations.

### Lab/Virtual machines

- NetAdLab Azure lab
- sWin22DC1, sWin22SVR1, Swin10CL101, sWin22RTR and sWin22SVR2.

### Preparation:

- View "[Lecture 01 Presentation – Topic 2: Network Devices](#)"
- Review "[Lab Report 1 requirements](#)"
- Complete Lab 1 – Exercise 1

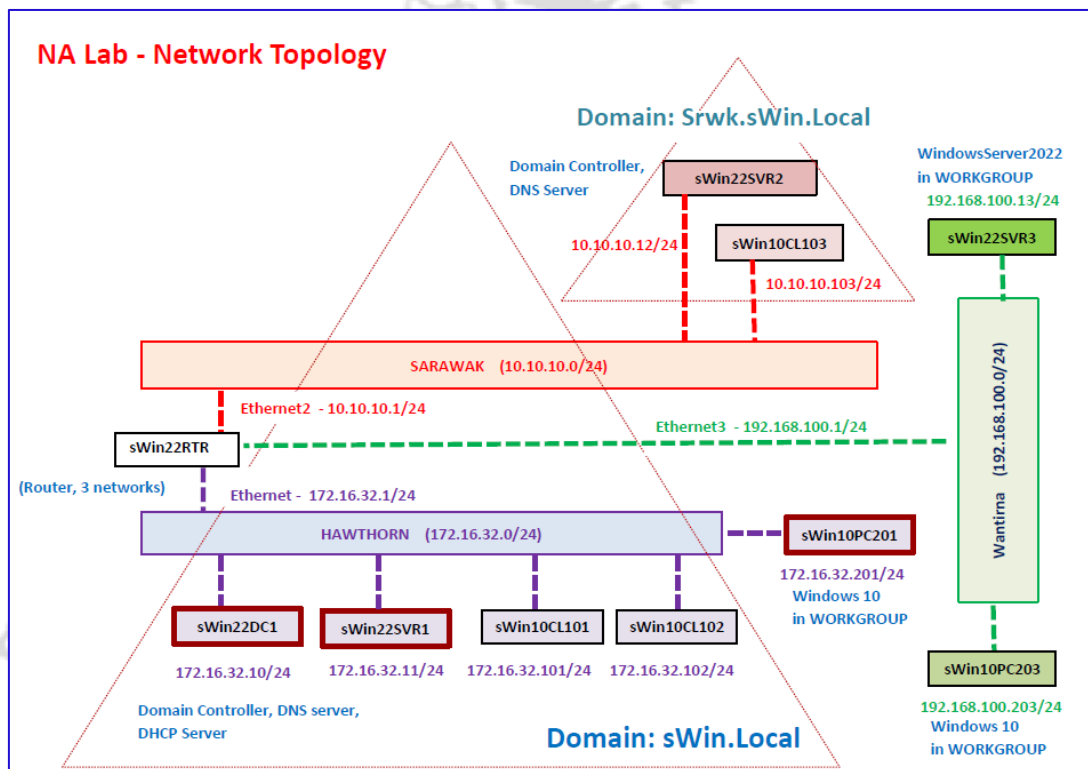
### Resources:

- Network Administration Lab - Network Topology  
[https://swinburne.instructure.com/courses/57016/files/28232483?module\\_item\\_id=3845607](https://swinburne.instructure.com/courses/57016/files/28232483?module_item_id=3845607)
- Microsoft Unit: Using Virtual Machines – Recommended Best Practices (Video)  
[https://swinburne.instructure.com/courses/57016/files/28232320?module\\_item\\_id=3845610](https://swinburne.instructure.com/courses/57016/files/28232320?module_item_id=3845610)
- How to Connect to Network Administration's Azure Labs  
[https://swinburne.instructure.com/courses/57016/files/30187456?module\\_item\\_id=4131816](https://swinburne.instructure.com/courses/57016/files/30187456?module_item_id=4131816)

## Introduction

Network Administration students, to practice weekly, can use a computer in ATC626 computer lab to connect to the virtual machine allocated to them in this unit's Azure lab. An allocated virtual machine in the unit Azure lab is called the **Host Machine** since it will host other virtual machines used for practice, as presented in

*Fig.1 Network Administration Lab – Network Topology.*



*Figure 1: Network Administration Lab – Network Topology*

It is essential to understand how end user devices (i.e. virtual machines) and network devices (i.e. virtual switches, software based router), presented in the topology, communicate and/or facilitate communication and services.

A virtual machine (VM) needs to firstly be connected to a virtual switch so that it can communicate with other VMs connected to that same virtual switch. For communication between 2 VMs that are connected 2 different virtual switches, then **a router** is needed. In addition to being connected to a virtual switch, in order to communicate with other VM, a VM must also be configured with correct **IP settings**.

### Notes:

Prior to this week lab students should have viewed **Lecture 1 – Topic 2 – Network Devices** in order to easier understand concepts explained in this lab.

In this lab, we are going to **only explore through observing** the components that make up the lab network topology, based on the lab's original settings where all virtual machines are correctly pre-connected pre-configured with IP settings. In the following week labs, we will be learning how to configure virtual machines with correct IP settings, how to configure DHCP server, DNS server, etc.

### Exercise 1.

#### Examine the existing virtual switches.


First, let's look at the existing virtual switches: *Hawthorn*, *Sarawak* and *Wantima*.

#### 1. Load the Hyper-V Manager.

The Hyper-V Manager icon should appear on your desktop or toolbar.



Figure 2: Hyper-V Manager Icon

Double clicking the Hyper-V Manager icon will launch it. If the icon is missing on your computer press the **Win** key  and then select **Hyper-V Manager...**

From the Actions pane of **Hyper-V Manager** select **Virtual Switch Manager...**

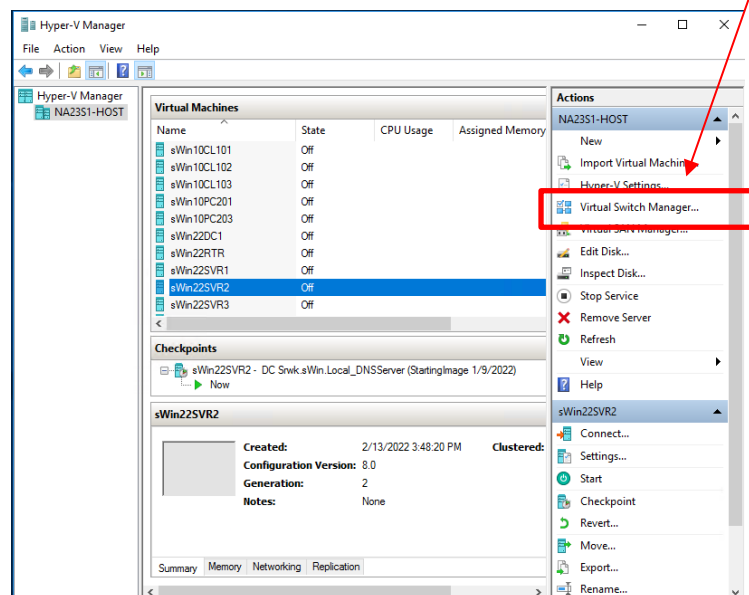
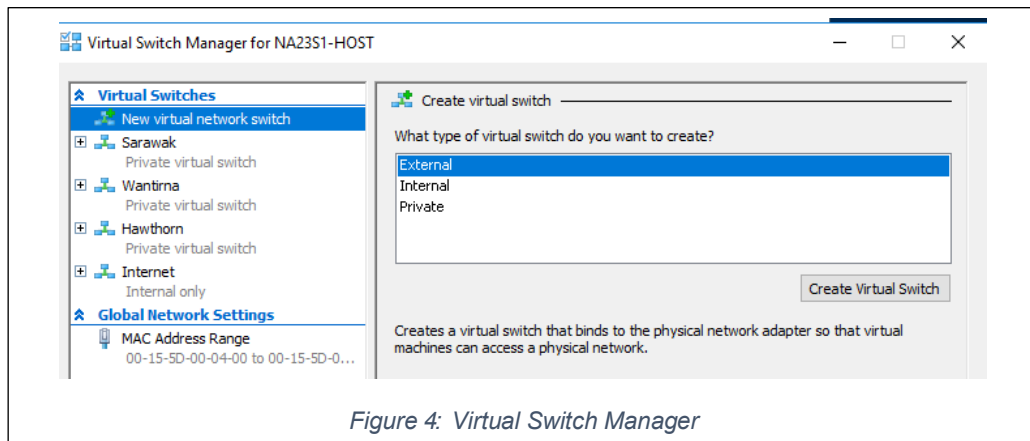


Figure 3: Hyper-V Manager Interface

2. At the top left, under **Virtual Switches**, you can see the 3 existing virtual switches: *Sarawak*, *Hawthorn* and *Wantirna*, created as parts of the unit's Network topology.



At the top right, under **Create virtual switches**, it is listed the 3 types of virtual switch that we can create within Hyper-V: *Private*, *Internal* and *External*.

- **Private** switches allow **guest VMs to communicate to each other ONLY when they are on the same host machine.**
- **Internal** switches function the same as the Private switches, and also have the added ability allow **guest VMs to communicate directly to the host machine.**
- **External** switches provide VMs located on them access to the physical network to which the Hyper-V host machine is connected.

In Figure 4. Virtual Switch Manager, what type of virtual switch are the *Sarawak*, *Hawthorn* and *Wantirna* switches? Private switches

Can the guest VMs: sWin22DC1, sWin22SV1, sWinCL101, etc. communicate with the host machine?

If you are practicing in ATC626 lab, can the guest VMs (i.e. sWin22DC1, sWin22SV1, sWinCL101, etc.) hosted in the machine you are using communicate with any host machines that other students in the lab room are using?

Since the unit lab exercises do not require communication between guest VMs and host machine, neither require communication amongst students' guest VM and/or host machines, the 3 switches *Sarawak*, *Hawthorn* and *Wantirna* are created with the type of **private**.

**Exercise 2.****Examine communication amongst VMs that connected to the same switch.**

Refer to *Fig.1 Network Administration Lab – Network Topology*, and list VMs that are connected to the following switches:

- **Hawthorn:** \_\_\_\_\_
- **Sarawak:** \_\_\_\_\_
- **Wantirna:** \_\_\_\_\_


Now, let's observe the communication amongst VMs that are connected to the **Hawthorn** switch.

1. In **Hyper-V manager**, under **Virtual machines**, right click **sWin22DC1**, and select **Revert....** In the **Revert Virtual Machine** pop up box, click **Revert** button to confirm that you want to revert the VM to its previous (*StartingImage*) checkpoint.

To start the VM, right click on **sWin22DC1**, and select **Start**.

Again, right click on **sWin22DC1**, and select **Connect**. Again, click on the **Connect** button to confirm proceeding to connect.

In the password box for **sWinAdministrator** account, type in the password (**Pa55w.rd**) and click on the **Submit** icon (i.e. "→").

After Windows completes loading, to check **IP settings of sWin22DC1**, right-click the **Win** key  on the tool bar at the bottom left of the window, the **Start Menu** will pop up.

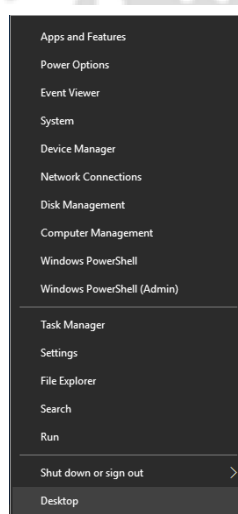


Figure 5: Windows Start Menu

Ethernet adapter Ethernet:

|                                |   |                             |
|--------------------------------|---|-----------------------------|
| Connection-specific DNS Suffix | : |                             |
| Link-local IPv6 Address        | : | fe80::a89f:5c58:61f0:59b4%6 |
| IPv4 Address                   | : | 172.16.32.10                |
| Subnet Mask                    | : | 255.255.255.0               |
| Default Gateway                | : | 172.16.32.1                 |

C:\Users\Administrator>\_

### Exercise 3.

#### Examine communication between VMs that connected to different switches.

1. Revert, start, connect and log in to **sWin22SVR2**. After log-in process completes, find and record the VM's IPv4 Address here \_\_\_\_\_

Hints: Refer to Exercise 2 – Step 1.

2. From **sWin22DC1**, attempt to communicate with **sWin22SVR2**.

In **sWin22DC1**, **ping** <IPv4 Address of sWin22SVR2 previously recorded>

Is the ping successful? \_\_\_\_\_

If the ping is unsuccessful, what do you think the cause is? \_\_\_\_\_

sWin22DC1 is connected to Hawthorn switch, whilst sWin22SVR2 is connected to Sarawak switch. Communication between 2 different network requires the aid of a layer-3 device, i.e. **router** (Refer to Lecture 1 – Topic 2 – Network devices). We need a router to aid communication between the 2 network Hawthorn and Sarawak.

The sWin22RTR is a software-based router deployed in the unit lab to aid the communication of all VMs connected to the 3 networks (3 switches) – Hawthorn, Sarawak and Wantima.

3. Revert, start, connect and log in to the software-based router **sWin22RTR**.
4. After log-in process completes, since sWin22RTR is a software-based router, wait for a few minutes for the VM to prepare itself to function as router, before try again to communicate from sWin22DC1 to sWin22SRV2.

Back to **sWin22DC1**, **ping** <IPv4 Address of sWin22SVR2> again.

The ping should be successful this time. If it did not, please check with your lab supervisor.

The existence of sWin22RTR is crucial for successful communication amongst VMs connected to the different switches. Hence, in any lab exercises that require to use VMs connected to different switches (networks), make sure that you bring the sWin22RTR router up long enough for it to connect these networks together.



In addition to being correctly connected to the network switches and the existence of routers, devices/computers in the networks, there are other settings and services that MUST be correctly configured, such as

- Configuring IP settings manually
- Configuring DHCP servers to automatically assigning IP settings to devices/computers
- Configuring DNS servers for IP-Name resolution
- etc.

These functions and roles will be introduced and discussed in more details in the later weeks (refer to the Unit Outline – Weekly Schedule), i.e.

- Week 5: DHCP
- Week 6: DNS
- Week 7: Domain and Domain Controller

Then after each week lectures, during lab sessions, we will gradually learn how to configure DHCP server, DNS server, Domain Controller, etc.

In real-world practice, the company's network administrators commonly automate as much administration tasks as possible for time efficiency, configuration consistency and diminishing human errors. For examples, instead of manually configure IP settings for devices/computers, DHCP server(s) are planned and deployed to automatically assign IP settings to devices/computers in the company networks.

#### **Exercise 4.**

##### **Observe the IP Address Assignment by a DHCP Server**

All guest VMs in the unit labs are pre-configured with correct IP settings, as detailed in Figure 1: Network Administration Lab – Network Topology. Hence, unless instructed in the lab to change any VM's IP settings, you should always revert a VM before using and **do not attempt to change its IP** settings.

The sWin22DC1 virtual machine, as described in Figure 1: Network Administration Lab – Network Topology, is deployed as a Domain Controller, a DHCP server and a DNS server. Hence, if you are unsure on what IP settings you should configure for a VM, automatically obtain an IP address and related settings from the DHCP server **sWin22DC1**.

As explained earlier, we will learn more about DHCP and DHCP server configurations in the later weeks. In this lab we will only configure a VM to obtain IP settings from one of the already deployed DHCP servers in the unit labs.

1. Back to **sWin10CL101**, in the **Command Prompt** window, type **ipconfig /all**, then press **Enter**.

Notice that the VM's IPv4 Address is currently **manually** configured.

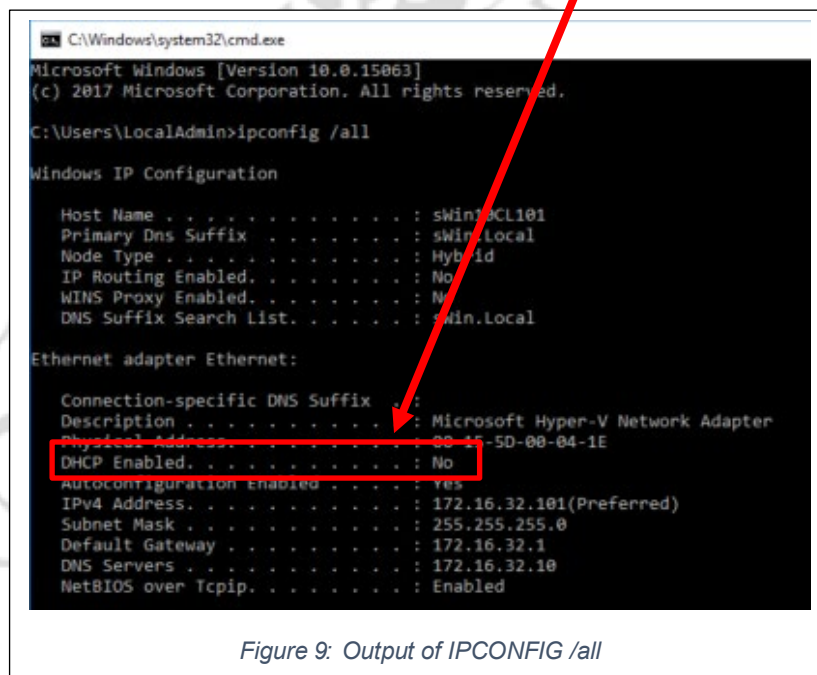


Figure 9: Output of IPCONFIG /all

In Exercise 2, step no.6, we changed the Network Adapter of **sWin10CL101** to connect to a different virtual switch, i.e. **Sarawak**. Ensure that you change it back to connect to the virtual switch **Hawthorn** before proceeding to the next step.

2. Now, we are going to configure sWin10CL101 to obtain IP settings from a DHCP server.

Changing IP configuration of a device requires the administrative rights. Hence, we need to use a tool that has the administrative rights. In **sWin10CL101**, right-click the **Win** key, then click to select **Windows PowerShell (Admin)**. Click **Yes** to confirm to proceed as an Administrator.

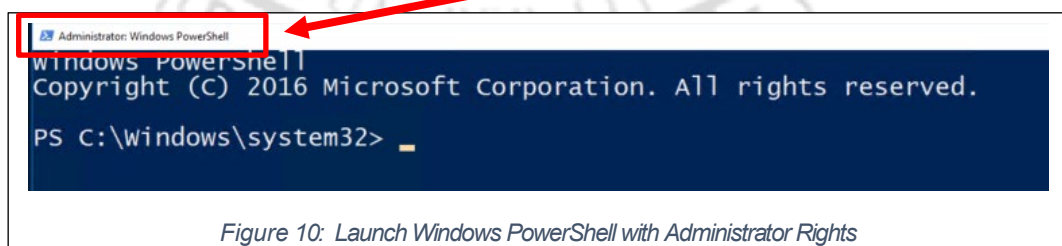
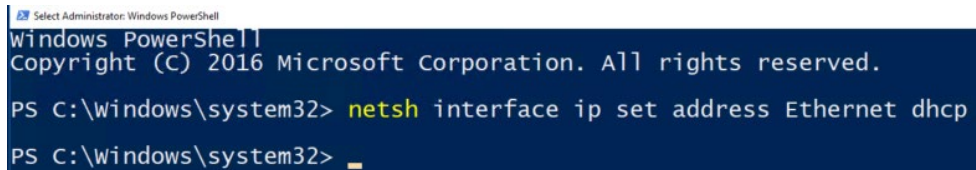


Figure 10: Launch Windows PowerShell with Administrator Rights

In the **Windows PowerShell** window, type

**`netsh interface ip set address Ethernet dhcp`**

and press **Enter**.



```

Select Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) 2016 Microsoft Corporation. All rights reserved.

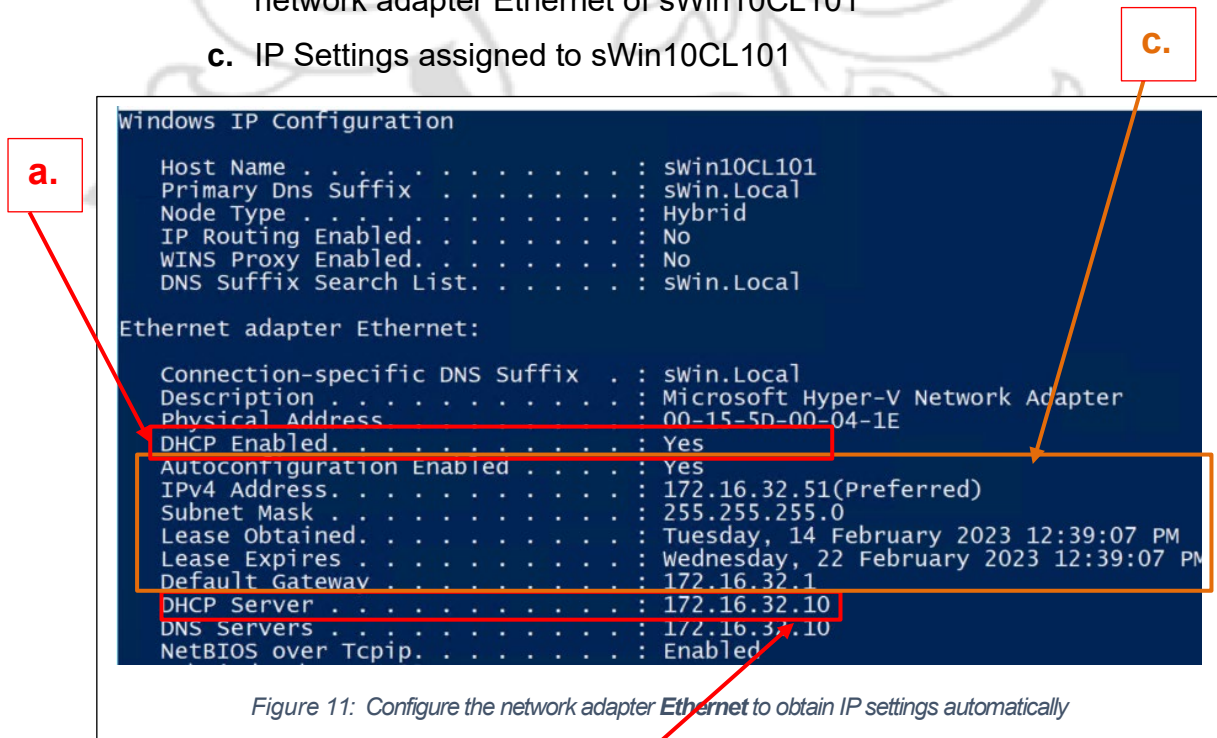
PS C:\Windows\system32> netsh interface ip set address Ethernet dhcp
PS C:\Windows\system32> _
  
```

Figure 11: Configure the network adapter **Ethernet** to obtain IP settings automatically

3. In **Windows PowerShell**, type **`ipconfig /all`**, and press **Enter**.

Observe the changes as the result of configuration made in the previous step:

- a. IP Configuration is set to obtain IP automatically from a DHCP server
- b. sWin22DC1 is the DHCP server that assigns the IP Settings to the network adapter Ethernet of sWin10CL101
- c. IP Settings assigned to sWin10CL101



```

Windows IP Configuration

Host Name . . . . . : swin10CL101
Primary Dns Suffix . . . . . : swin.Local
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : swin.Local

Ethernet adapter Ethernet:

Connection-specific DNS Suffix . : swin.Local
Description . . . . . : Microsoft Hyper-V Network Adapter
Physical Address . . . . . : 00-15-5D-00-04-1E
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
IPv4 Address. . . . . : 172.16.32.51(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : Tuesday, 14 February 2023 12:39:07 PM
Lease Expires . . . . . : Wednesday, 22 February 2023 12:39:07 PM
Default Gateway . . . . . : 172.16.32.1
DHCP Server . . . . . : 172.16.32.10
DNS Servers . . . . . : 172.16.32.10
NetBIOS over Tcpip. . . . . : Enabled
  
```

Figure 11: Configure the network adapter **Ethernet** to obtain IP settings automatically

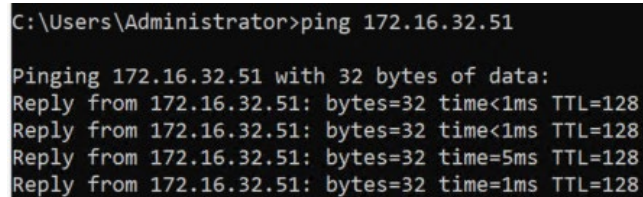
4. Verify that communication between sWin22DC1 and sWin10CL101 remains successful after sWin10CL101 is assigned with the new IP settings.

Back to **sWin22DC1**, in the **Command Prompt** window, type

**ping 172.16.32.51** (Notes: 172.16.32.51 is the newly assigned IP address)

then press **Enter**.

The ping should be successful and you should have received successful ping replies from sWin10CL101 (172.16.32.51)



```
C:\Users\Administrator>ping 172.16.32.51

Pinging 172.16.32.51 with 32 bytes of data:
Reply from 172.16.32.51: bytes=32 time<1ms TTL=128
Reply from 172.16.32.51: bytes=32 time<1ms TTL=128
Reply from 172.16.32.51: bytes=32 time=5ms TTL=128
Reply from 172.16.32.51: bytes=32 time=1ms TTL=128
```

Figure 12: Successful Ping Replies  
from sWin10CL101 with newly assigned IP address

### Exercise 5. Continue to document your digital Lab Journal

1. Read "[Lab Class Journal Submission requirements](#)" if you have not done so, in order to best prepare for your learning and assessment.

The Lab Class Journal is one of the assessments in this unit. A draft is to be submitted in week 4, and the final version in week 12. The Lab Class Journal is where students can record the concepts, design strategies, techniques, configurations and commands that they learn in the laboratory classes. Students can use their Lab Class Journal as a reference during the Skills Assessment in the Final Assessment Period.

2. Record the concepts, design strategies, techniques, configurations and commands that you learn in this week laboratory class.

***Do not leave the lab until the pack up stage is complete***

## Pack Up

1. Shut down all guest VMs.
2. **Sign out** from the Host machine and if you are using Azure lab, make sure that it is **Stopped** otherwise it will run in the background and use up your quota.
3. If on campus, **log off from the ATC626 lab PC**, and push your chair in as you leave.

~~~~~ *End of Lab* ~~~~~

