Module 1: Planning and implementing an IPv4 network

Lab A: Planning an IPv4 network

(VMs: 20741B-LON-DC1, 20741B-EU-RTR, 20741B-LON-CL1, 20741B-LON-CL2, 20741B-TOR-SVR1)

Exercise 1: Planning the IPv4 address assignments

Task 1: Plan the IPv4 implementation

1. **How will you determine the number of IP addresses required for each location?**

Answer: The key factors for this exercise are the number of systems per location and the requirements.

2. **How do the laptops that have both wired and wireless network adapters affect the number of IP addresses required?**

Answer: There is a requirement for all potential wired and wireless clients to have addresses. Having clients that could potentially be either wired or wireless will increase the number of required addresses.

3. **What is the simplest subnet class to use when planning an IP addressing scheme for each of the North America branch locations?**

Answer: The starting point for each location would be to use /24 subnets.

4. **In the Houston office, what is the number of potential wired and wireless clients?**

Answer: There are 400 potential wired clients (300 desktops and 100 laptops), and 150 potential wireless clients (100 laptops and 50 tablets).

5. **In the Houston office, how many /24 subnets are required for wired connections? How many are required for wireless?**

Answer: Two /24 subnets would be the minimum required for wired connections (each /24 supports a maximum of 253 clients + 1 gateway). One /24 subnet would suffice for the potential wireless clients.

6. **In the Mexico City office, what is the number of potential wired and wireless clients?**

Answer: There are 150 potential wired connections (100 desktops and 50 laptops), and 70 potential wireless connections (70 laptops and 20 tablets).

7. **In the Mexico City office, how many /24 subnets are required for wired connections? How many for wireless?**
Answer: One /24 subnet would be required for the wired connections, and one /24 subnet for the potential wireless connections.

8. **In the Portland office, what is the number of potential wired and wireless clients?**
Answer: There are 175 potential wired connections (100 desktops and 75 laptops), and 225 potential wireless connections (75 laptops and 150 tablets).

9. **In the Portland office, how many /24 subnets are required for wired connections? How many for wireless?**
Answer: One /24 subnet would be required for the potential wired connections, and one /24 subnet would be required for the potential wireless connections.

10. **Given the assigned IP range of 172.16.20.0/24 – 172.16.52.0/24 for wired clients, which subnets will you use for the Houston, Mexico City, and Portland offices?**
Answer: Answers will vary. One possible option is:

Houston:	172.16.30.0/24 172.16.31.0/24
Mexico City:	172.16.35.0/24
Portland:	172.16.40.0/24

11. **Given the assigned IP range of 172.16.53.0/24 – 172.16.60.0/24 for wireless clients, which subnets will you use for the Houston, Mexico City, and Portland offices?**
Answer: Answers will vary. One possible option is:

Houston:	172.16.55.0/24
Mexico City:	172.16.56.0/24
Portland:	172.16.57.0/24

***Results**: After completing this exercise, you should have planned an IPv4 network.*

Lab B: Implementing and troubleshooting an IPv4 network

Exercise 1: Verifying IPv4 communication

Task 1: Verify IPv4 traffic

1. On **LON-DC1**, click **Start**, and then click **Windows PowerShell**.
2. At the Windows PowerShell command prompt, type the following command, and then press Enter: ***Test-NetConnection 172.16.0.1***
3. Review the results.
4. On **LON-DC1**, in the **Windows PowerShell** window, type the following command, and then press Enter:
Test-NetConnection -TraceRoute TOR-SVR1.adatum.com
5. Review the results.

Task 2: Prepare LON-CL1 for troubleshooting

1. On **LON-CL1**, open a **File Explorer** window, and then browse to **\\LON-DC1\Labfiles\Mod01**.
2. Copy **LON-CL1.ps1** from **\\LON-DC1\Labfiles\Mod01** to the **LON-CL1** desktop.

***Note:** Do not open the file. This script creates the problem that you will troubleshoot and repair in the next exercise. Opening the file can cause issues with the lab tasks.*

3. Close **File Explorer**.
4. On the desktop, right-click the **LON-CL1.ps1** file, and then click **Run with PowerShell**.
5. If prompted to confirm, type ***y***, and then press Enter.

Task 3: Prepare LON-CL2 for troubleshooting

1. On **LON-CL2**, open a **File Explorer** window, and then browse to **\\LON-DC1\Labfiles\Mod01**
2. Copy **LON-CL2.ps1** from **\\LON-DC1\Labfiles\Mod01** to the **LON-CL2** desktop.

***Note:** Do not open the file. This script creates the problem that you will troubleshoot and repair in the next exercise. Opening the file can cause issues with the lab tasks.*

3. Close **File Explorer**.
4. On the desktop, right-click the **LON-CL2.ps1** file, and then click **Run with PowerShell**.
5. If prompted to confirm, type ***y***, and then press Enter.

Results*: After completing this exercise, you will have verified that the London computers can communicate with the Toronto server.*

Exercise 2: Troubleshooting IPv4

Task 1: Troubleshoot IPv4 connectivity between LON-CL1 and the Toronto server

1. On **LON-CL1**, click **Start**, type ***PowerShell***, and then click **Windows PowerShell**.
2. At the Windows PowerShell command prompt, type the following command, and then press Enter: ***Test-NetConnection LON-DC1***
3. Verify that the results contain **PingSucceded:False** from **LON-DC1**.
4. To verify the **LON-CL1** IP address, at the Windows PowerShell command prompt, type the following command, and then press Enter: ***Get-NetIPAddress***
Notice that the IPv4 address is 169.254.x.x. This indicates that the client is configured for Dynamic Host Configuration Protocol (DHCP) and has not received an address.
5. To configure the **LON-CL1** IP address, at the Windows PowerShell command prompt, type the following command, and then press Enter:
New-NetIPAddress -InterfaceAlias "London_Network" -IPAddress 172.16.0.50 -PrefixLength 24
6. To verify that communications have been fixed, at the Windows PowerShell command prompt, type the following command, and then press Enter:
Test-NetConnection TOR-SVR1
7. Confirm that you receive a reply from **172.16.18.20** that contains **PingSucceded:True**

Task 2: Troubleshoot IPv4 connectivity between LON-CL2 and the Toronto server

1. On **LON-CL2**, open a **Windows PowerShell** window.
2. At the Windows PowerShell command prompt, type the following command, and then press Enter: ***Test-NetConnection LON-DC1***
3. Confirm that the **LON-DC1** server is reachable by verifying that you receive a reply from **172.16.0.10** that contains **PingSucceded:True**
4. At the Windows PowerShell command prompt, type the following command,

and then press Enter: ***Test-NetConnection TOR-SVR1***

5. Verify that the results contain **PingSucceded:False** from **TOR-SVR1**. Also, note the yellow message:

WARNING: Ping to TOR-SVR1 failed – Status: DestinationHostUnreachable.

6. Complete the following two steps to verify the router is accessible.

7. At the Windows PowerShell command prompt, type the following command, and then press Enter: ***Test-NetConnection 172.16.0.1***

8. Confirm that the router is reachable by verifying that you receive a reply from **172.16.0.1** that contains **PingSucceded:True**.

9. Complete the following two steps to verify that the traffic is being routed correctly.

10. At the Windows PowerShell prompt, type the following command, and then press Enter: ***Test-NetConnection -TraceRoute 172.16.18.20***

11. Notice that none of the TraceRoute packets left the 172.16.0.51 interface.

12. Complete the following three steps to verify the IP Configuration.

13. At the Windows PowerShell command prompt, type the following command, and then press Enter: ***Get-NetIpConfiguration***

14. Notice that the IPv4DefaultGateway is set incorrectly to 172.16.0.2.

15. Fix the IPv4DefaultGateway by running the following commands, pressing Enter at the end of each line:

Remove-NetIPAddress -InterfaceAlias "London_Network" -IPAddress 172.16.0.51 -PrefixLength 24 -DefaultGateway 172.16.0.2 -Confirm:$false

New-NetIPAddress -InterfaceAlias "London_Network" -IPAddress 172.16.0.51 -PrefixLength 24 -DefaultGateway 172.16.0.1 -Confirm:$false

16. Complete the following two steps to verify the communications have been fixed.

17. At the Windows PowerShell prompt, type the following command, and then press Enter: ***Test-NetConnection TOR-SVR1***

18. Confirm that the **TOR-SVR1** server is reachable by verifying that you receive a reply from **172.16.18.20** that contains **PingSucceded:True**.

***Results**: After completing this lab, you should have resolved all IPv4 connectivity issues.*

Task 3: Prepare for the next module

When you are finished with the lab, revert all virtual machines to their initial state:

1. On the host computer, start **Hyper-V Manager**.
2. In Hyper-V Manager, in the **Virtual Machines** list, right-click **20741B-LON-DC1**, and then click **Revert**.
3. In the **Revert Virtual Machine** dialog box, click **Revert**.
4. Repeat steps 2 and 3 for **20741B-LON-CL1**, **20741B-LON-CL2**, **20741B-EU-RTR**, and **20741B-TOR-SVR1**.