Lab Assignment
& Solution

Cybersecurity Professional Program
Computer Networking

Introduction to Networks

**NET-01-LS1
Local Network
Configuration**

🎯 Lab Objective

Learn about and practice using CLI networking commands in Windows.

🔬 Lab Mission

Configure a local network using CMD-based commands.

⏰ Lab Duration

15-30 minutes

Requirements

- Familiarity with the Windows command line.
- Familiarity with the **nslookup** tool.

Resources

- Environment & Tools
    - Windows 7, 8, or 10
    - Internet connection

Lab Task 1: Windows 10 Virtual Machine Installation

If you do not have a Windows 10 VM installed, set up a new machine.

You can follow the instructions in the Windows 10 Installation Guide located in the Installation Guide module in your Canvas course.
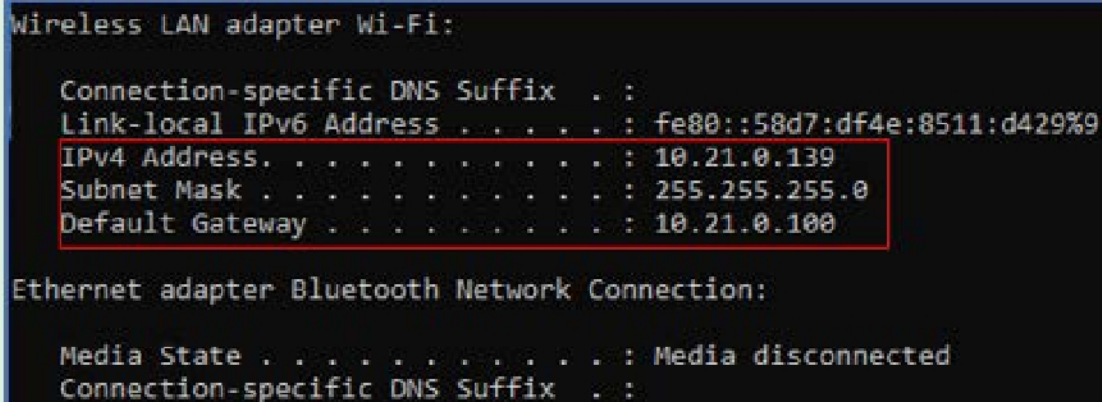
Lab Task 2: Local Network Configuration

In this task, you will use commands to view and document the local network configuration of a Windows machine.

1 Open CMD on the local machine.

Press Win Key + R and type **CMD**.

2 Run the **ipconfig** command to display local PC network settings.

Type **ipconfig** and press Enter.

```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::58d7:df4e:8511:d429%9
   IPv4 Address. . . . . . . . . . . : 10.21.0.139
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 10.21.0.100

Ethernet adapter Bluetooth Network Connection:

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

3 According to the ipconfig command output, how many network cards are there? Why do some PCs display information regarding more than one network card?

The ipconfig command displays information regarding all interfaces on the local machine. For example, laptops usually have wired, wireless, and Bluetooth interfaces installed.

4 Document the information in Notepad or a personal notebook.

Copy the details marked in red in Step 2 above.

5 The command in Step 2 above does not show the physical and DNS address. Issue the same command with the appropriate option to display the network settings in more detail.

Type **ipconfig /all** and press Enter.

```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Killer Wireless-n/a/ac 1535 Wireless Network Adapter
   Physical Address. . . . . . . . . : 9C-B6-D0-FE-F3-D5
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::58d7:df4e:8511:d429%9(Preferred)
   IPv4 Address. . . . . . . . . . . : 10.21.0.139(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : ███ ██████ 25 ████ 2019 12:39:45
   Lease Expires . . . . . . . . . . : ███ ██████ 01 ██████ 2019 12:39:43
   Default Gateway . . . . . . . . . : 10.21.0.100
   DHCP Server . . . . . . . . . . . : 10.21.0.100
   DHCPv6 IAID . . . . . . . . . . . : 94156496
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-24-85-E7-58-9C-B6-D0-FE-F3-D5
   DNS Servers . . . . . . . . . . . : 8.8.8.8
                                       1.1.1.1
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

6 Which Help option displays all ipconfig option combinations and their purposes?

ipconfig /?

7 Which CMD command displays the physical address?

ipconfig /all

8 Run the **cls** command to clear the screen.

Type **cls** and press Enter.

Lab Task 3: Test Connectivity

In this task, we will verify connectivity to an internet based IP, and document connection metrics such as latency and path.

1 Using the Ping command, verify connectivity between the local PC and another PC in the same network (for example, the PC of an adjacent student or another device on your network).

> Ask another student for his/her IP address and ping it, or ping your default gateway.

2 Document the following details located in the ping statistics:
- Packets sent, received, and lost.
- Average round trip time.

> Document only the details marked in red below.
>
> ```
> C:\Windows\system32>ping 10.21.0.3
>
> Pinging 10.21.0.3 with 32 bytes of data:
> Reply from 10.21.0.3: bytes=32 time=10ms TTL=128
> Reply from 10.21.0.3: bytes=32 time=4ms TTL=128
> Reply from 10.21.0.3: bytes=32 time=5ms TTL=128
> Reply from 10.21.0.3: bytes=32 time=31ms TTL=128
>
> Ping statistics for 10.21.0.3:
>     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
> Approximate round trip times in milli-seconds:
>     Minimum = 4ms, Maximum = 31ms, Average = 12ms
> ```

3 Run tracert for the same target as in Step 1 above.

> Run the tracert command for the IP address from Step 1 above.
>
> ```
> C:\Windows\system32>tracert 10.21.0.3
>
> Tracing route to 10.21.0.3 over a maximum of 30 hops
>
>   1     4 ms     4 ms     7 ms  10.21.0.3
>
> Trace complete.
> ```

4   What is a Hop?

A router on the way to a packet's destination, from one network to another.

5   Document the number of hops.

```
C:\Windows\system32>tracert 10.21.0.3

Tracing route to 10.21.0.3 over a maximum of 30 hops

  1     4 ms     4 ms     7 ms  10.21.0.3

Trace complete.
```

6   Use the ping command again to test connectivity to an external source (such as a website or Google DNS public server, 8.8.8.8).

Ping an external source, such as a URL or public address (www.facebook.com, 8.8.8.8).

```
C:\Windows\system32>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=57ms TTL=55
Reply from 8.8.8.8: bytes=32 time=59ms TTL=55
Reply from 8.8.8.8: bytes=32 time=60ms TTL=55
Reply from 8.8.8.8: bytes=32 time=59ms TTL=55

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 57ms, Maximum = 60ms, Average = 58ms
```

7 Document the following details in the ping statistics:

- Packets sent, received, and lost.
- Average round trip time (latency as ms).

Document only the details marked in red below.

```
C:\Windows\system32>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=57ms TTL=55
Reply from 8.8.8.8: bytes=32 time=59ms TTL=55
Reply from 8.8.8.8: bytes=32 time=60ms TTL=55
Reply from 8.8.8.8: bytes=32 time=59ms TTL=55

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 57ms, Maximum = 60ms, Average = 58ms
```

---

8 Run tracert for the same target as in Step 7 above.

Run tracert for the IP address in Step 7.

---

9 Document the number of hops.

```
C:\Windows\system32>tracert 8.8.8.8

Tracing route to dns.google [8.8.8.8]
over a maximum of 30 hops:

  1     6 ms     5 ms     8 ms  10.21.0.100
  2     5 ms     4 ms    30 ms  bzq-252-97.red.bezeqint.net [212.179.252.97]
  3     6 ms     6 ms     6 ms  bzq-179-16-121.cust.bezeqint.net [212.179.16.121]
  4    57 ms    60 ms    58 ms  bzq-219-189-21.dsl.bezeqint.net [62.219.189.21]
  5    57 ms    55 ms    56 ms  72.14.214.140
  6    60 ms    60 ms    59 ms  108.170.252.65
  7    62 ms    62 ms    62 ms  216.239.56.149
  8    57 ms    58 ms    60 ms  dns.google [8.8.8.8]

Trace complete.
```

10 Compare the findings. Why are the round-trip times and hop count results in Steps 1-4 less than those in Steps 7-10?

The adjacent student's PC is in the same network, so no router is needed. The external source is in a different network, which means the packet must be forwarded through several routers.

Lab Task 4: Domain Names and IPs

In this task, you will demonstrate knowledge of the **nslookup** command, document your machine's DNS servers, and find IP addresses of URLs.

1 Using the **nslookup** command, discover which DNS server is configured on the local machine.

> Type **nslookup** to enter resolve mode.
>
> ```
> C:\Windows\system32>nslookup
> Default Server:  dns.google
> Address:  8.8.8.8
> ```

2 Using **nslookup**, what is the public IP address of www.cisco.com?

```
C:\Windows\system32>nslookup
Default Server:  dns.google
Address:  8.8.8.8

> www.cisco.com
Server:  dns.google
Address:  8.8.8.8

Non-authoritative answer:
Name:     e2867.dsca.akamaiedge.net
Addresses:  2a02:26f0:c00:584::b33
            2a02:26f0:c00:58c::b33
            23.34.228.48
Aliases:  www.cisco.com
          www.cisco.com.akadns.net
          wwwds.cisco.com.edgekey.net
          wwwds.cisco.com.edgekey.net.globalredir.akadns.net
```

3 A DNS record can also work in reverse order. Which service or organization uses IP address 185.60.216.35?

```
> 185.60.216.35
Server:   dns.google
Address:  8.8.8.8

Name:     edge-star-mini-shv-01-frx5.facebook.com
Address:  185.60.216.35
```

4 Press Ctrl+c to exit **nslookup** mode, or type **exit**, and close CMD.

Lab Task 5: Domain CLI Vs GUI

In this task, you will configure your network interface using only the CLI.

There are two universal ways to communicate with a PC: via graphic interface (GUI), or via a Command Line Interface (CLI).

The **netsh** command is run via the CLI, and is used to configure all network settings.

1 Open CMD <u>as administrator</u>.

Search for cmd, and right-click "Run as Administrator".
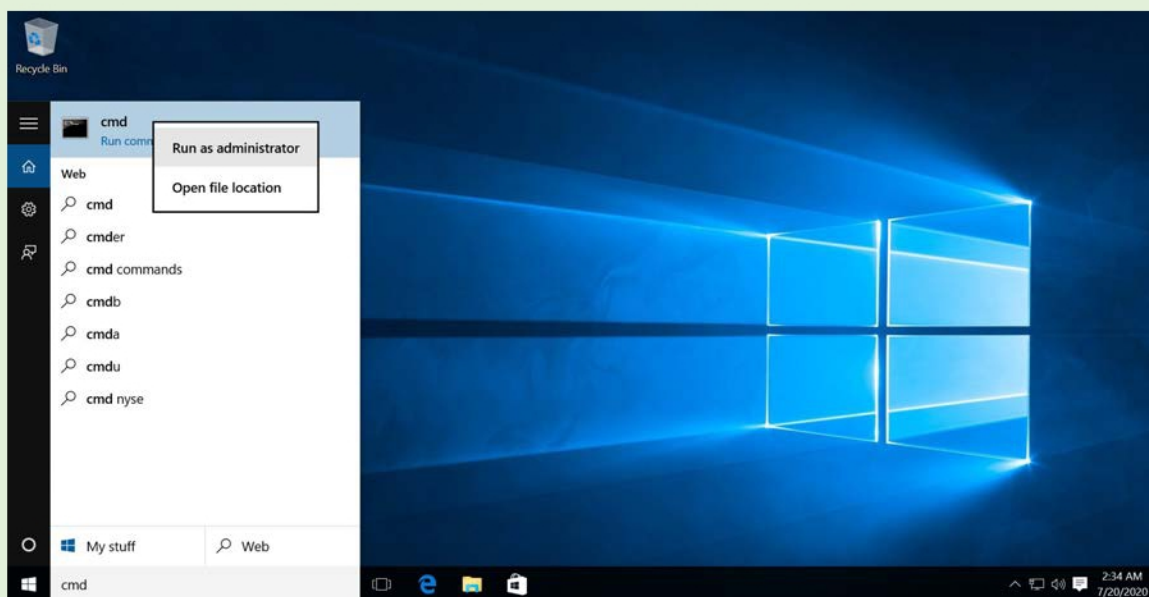
2 Display the local PC network configuration using **netsh interface ip show config** .

Command: **netsh interface ip show config**

Note: Interface names may be different.

3 Configure the following addresses statically on the wired or wireless interface:
- IPv4 192.168.0.5
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.0.1

Use the following command:
netsh interface ip set address "Ethernet" static   192.168.10.5 255.255.255.0 192.168.0.1

Run:
netsh interface ip set address "Ethernet" static 192.168.10.5 255.255.255.0 192.168.0.1

Make sure to substitute "Local Area Connection*1" with the name of your interface (for example "Ethernet").

4 Use the command in Step 2 above to verify the new configuration.

Run: **netsh interface ip show config**

5 Which network protocol is responsible for allocating IP addresses and network configurations dynamically to devices on the network?

DHCP

6 Revert the changes by enabling DHCP on the interface with the command:
netsh interface ip set address "Ethernet" dhcp

Run: **netsh interface ip set address "Ethernet" dhcp**

7 Disable the interface, with the following command:
netsh interface set interface "Ethernet" admin=DISABLED

Run: **netsh interface set interface "Ethernet" admin=DISABLED**

8 Enable the interface, with the following command:
netsh interface set interface "Ethernet" admin=ENABLE

Run: **netsh interface set interface "Ethernet" admin=ENABLE**

9 Ping 8.8.8.8 to verify connectivity.

Run: **Ping 8.8.8.8**

Verify that the command was successful.