**Layer 3 and Layer 4 Security**

**CYBR3010**

**Cybersecurity Foundations**

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# **Introduction**

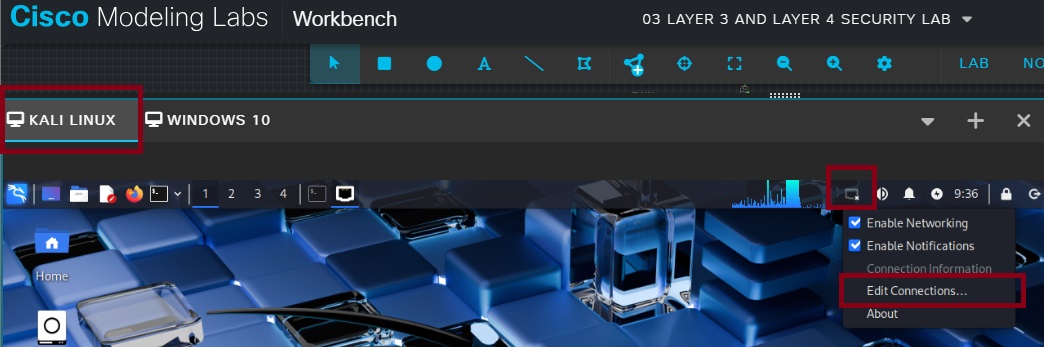
This document is about Layer 3 and Layer 4 of the OSI Layer, which is the Network Layer and Transport Layer. In here, normal communication in Layer 3 will be discussed, as well as the vulnerabilities and how to mitigate. It is in Layer 3 where logical addressing happens with the use of an IP addresses.

# **IP Address Configuration**

An IP (Internet Protocol) Address is a unique numerical label assigned to each device connected to a computer network which serves two main purposes: to identify a device on a network, and to locate the device that enables communication with other devices over a network like the Internet. There are two ways to configure an IP address: static and dynamic. Static IP addresses are manually assigned and remain the same unless changed by an administrator, while dynamic IP addresses are assigned automatically by a DHCP server. In this document, the focus is on static IP address.

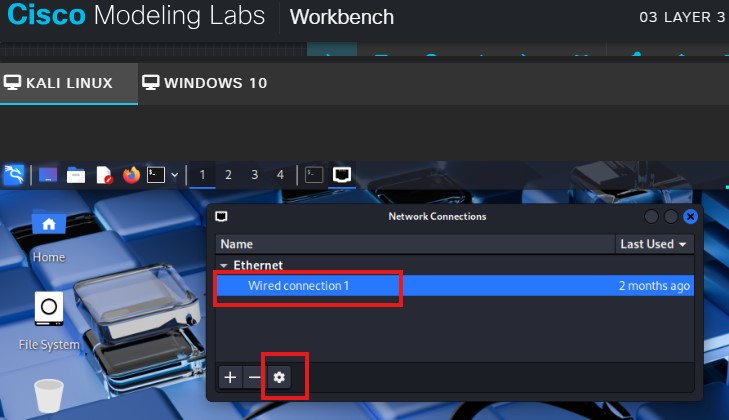
## Configure static IP address of Kali Linux

* Right-click “Network Connections” and click “Edit Connections”



Starting point to configure static IP address of Kali Linux.

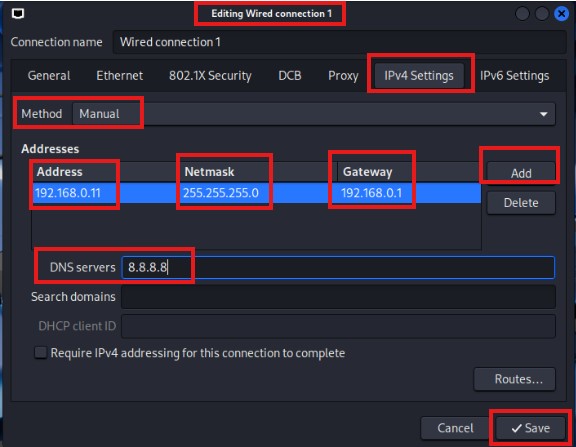
* Choose “Wired connection 1” and click the gear icon.



Step to choose the connection.

* On “Editing Wired connection 1” window, go to “IPv4 Settings” tab. Method is “Manual”. Click “Add” button and put the following details:
* Address: 192.168.0.11
* Netmask: 255.255.255.0 (this is full format, can also be 24 format)
* Gateway: 192.168.0.1
* DNS servers: 8.8.8.8

Click “Save”.



Step to edit connection and enter necessary details.

* At this point, IP address of Kali Linux is configured. (Kali Linux is trying to connect to the gateway but it is not going to work yet even gateway is configured)
* To verify the IP address of Kali Linux, open terminal and type “ifconfig”.

A screenshot of a computer

AI-generated content may be incorrect.

Static IP address of Kali Linux is 192.168.0.11.

* To verify the connection, ping the device using its own IP address and IP address of other device.

Ping 192.168.0.11 (Kali self ping)

Ping 192.168.0.12 (Client 20 win11)

Ping 192.168.0.13 (Client 30 win11)

Screenshot here (todo) – 19.33 minutes

## Configure static IP address of Client 20 and Client 30 VM (both Windows 11)

* Right-click the network icon then click “Network and Internet settings”.

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AI-generated content may be incorrect.

Starting point to configure static IP address of Windows 11.

* Click “Ethernet”.

A black screen with a black background

AI-generated content may be incorrect.

Ethernet connection.

* Go to “Unidentified network”. On Ip assignment, click “Edit”.

A screenshot of a computer

AI-generated content may be incorrect.

Still configuration process.

* Choose “Manual” on Edit IP settings. Turn on “IPv4”. Enter following details:
* Ip address: 192.168.0.12 (for Client 20) / 192.168.0.13 (for Client 30)
* Subnet mask: 255.255.255.0
* Gateway: 192.168.0.1
* Preferred DNS: 8.8.8.8

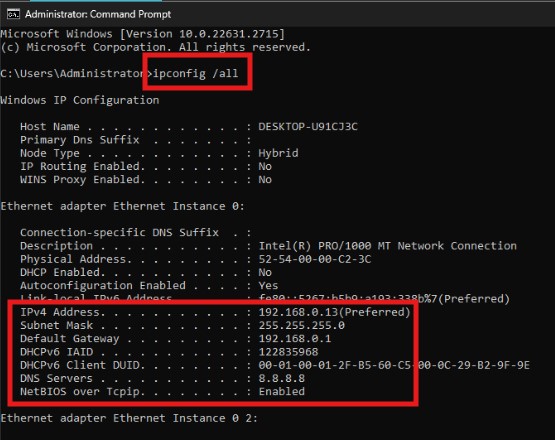
Click “Save”.

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AI-generated content may be incorrect.

Step to edit connection and enter necessary details.

* To verify the IP address, open CMD and type “ipconfig /all”.



IP address of Client 20 is 192.168.0.12. IP address of Client 30 is 192.168.0.13. Static IP settings are configured manually.

* To verify the connection, ping the device using its own IP address and IP address of other device.

Ping 192.168.0.11 (Kali self ping)

Ping 192.168.0.12 (Client 20 win11)

Ping 192.168.0.13 (Client 30 win11)

Screenshot here (todo) – 19.33 minutes

## Configure the Firewall

…add steps and screenshots here

* Start the firewall (FW01) as well as all the devices.
* Right click the firewall (FW01) and choose “Console”. You know firewall is done booting when you are able to see the serial number and the firewall login.
* Type “**cisco**” in the “Firewall login” and “Password”.
* Wait until you see “Welcome”.

A screenshot of a computer

AI-generated content may be incorrect.

Initial step to open firewall in CML.

* Type “get system interface physical port1” to get information about port 1. Open the IP address in another browser.

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Information of Port 1.

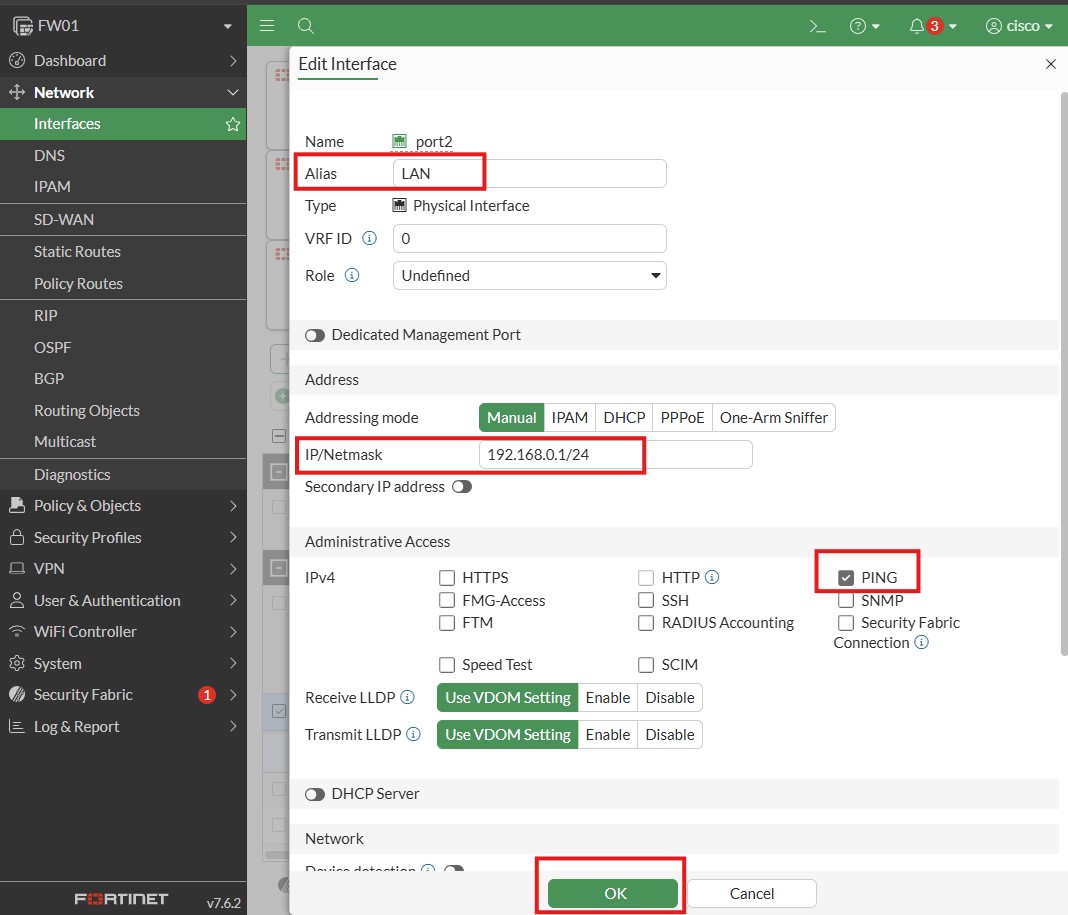
* On the browser, click “Advanced”.
* Click “Proceed to 192.168.202.146(unsafe)”.
* Type “**cisco**” as the Username and Password, then click “Login”.
* Click "Login Read-Write".
* Click "Yes".
* Click "Begin".
* In the Dashboard Setup, choose the default which is "Optimal" and press "OK".
* Firewall (FW01) dashboard will open up.

A screenshot of a computer

AI-generated content may be incorrect.

Firewall dashboard.

* In the firewall (FW01) dashboard, click “Network”.
* Click “Interfaces”.
* Double click “port2” as this is the port connecting firewall to the switch.
* On “Edit Interface” window, enter the following details:
* Alias: LAN
* IP/Netmask: 192.168.0.1/24
* On “IPv4”, check the “PING”
* Click OK.



Edit the interface of firewall.

* From the client VM, ping the firewall IP (192.168.0.1) to check the connection.

Screenshot should be added here….

## Configure the Switch

…add steps and screenshots here

# Network Diagram

One of the crucial components of an organization’s security strategy is often referred to as Identity and Access Management (IAM). IAM ensures that the right people, machines, and software components access the right digital resources at the right time and for the right reasons.

# VLAN Interfaces

## Subtopic 2.1

# DHCP Configuration

## Subtopic 2.1

# NAT Configuration

## Subtopic 2.1

# Layer 3 Attack

## Subtopic 2.1

# Test Results (before and after scenarios)

## Subtopic 2.1

# Prevention and Mitigation

## Subtopic 2.1

# Questions and Answers

## Subtopic 3.1

# References

*What is an IP Address?* (2025, October 7). Retrieved from GeeksforGeeks: https://www.geeksforgeeks.org/computer-science-fundamentals/what-is-an-ip-address/