ENCS4130
Computer Networks Laboratory

# EXP#8 Switching and VLANs 2
# Switch Virtual Interface

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# Objectives

- Learn how to configure a Cisco IOS Multi-layer Switch using the IOS command-line interface (CLI).
- Learn how to use switch simulator.
- Learn how to split Cisco Multi-layer Switch into multiple virtual ones and create VLANS.

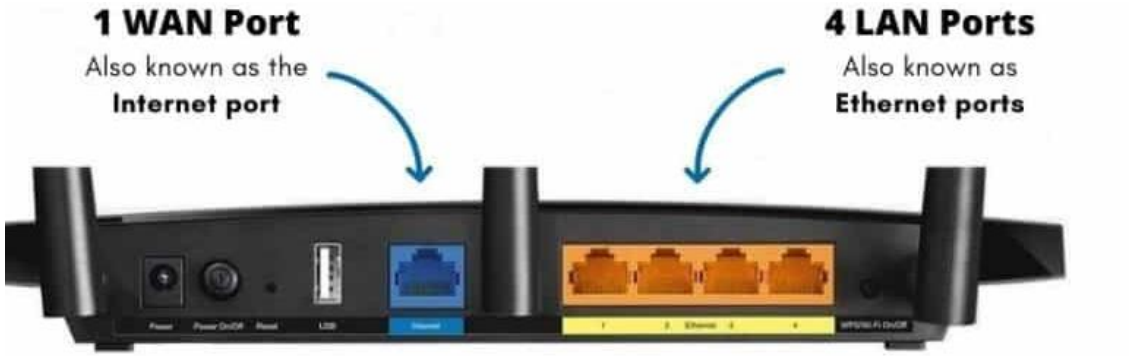
# What is a Layer 3 Switch?


Multilayer Switch

- **Definition**:
  - A Layer 3 Switch combines the capabilities of both a router and a switch.
- **Key Features:**
  - Switching Capabilities: Connects devices within the same subnet or VLAN at high speeds.
  - Routing Capabilities: Performs IP routing, allowing it to inspect packets and make routing decisions based on source and destination addresses.

# Features of a layer 3 switch

- Comes with 24 Ethernet ports, but no WAN interface.
- Acts as a switch to connect devices within the same subnet.
- Switching algorithm is simple and is the same for most routed protocols.
- Performs on two OSI layers — layer 2 and layer 3.



# Benefits of a layer 3 switch

- Support routing between virtual LANs.
- Improve fault isolation.
- Simplify security management.
- Reduce broadcast traffic volumes.
- Ease the configuration process for VLANs, as a separate router isn’t required between each VLAN.
- Separate routing tables, and as a result, segregate traffic better.
- Simplify troubleshooting as, fixing problems in L2 layer is tedious and time consuming.
- Support flow accounting and high-speed scalability.
- Lower network latency as a packet does not have to make extra hops to go through a router.

# Disadvantages of layer 3 switch

- Cost.
- Limited application.
- Lack of WAN functionality.
- Multiple tenants and virtualization.
- Lack of flexibility.

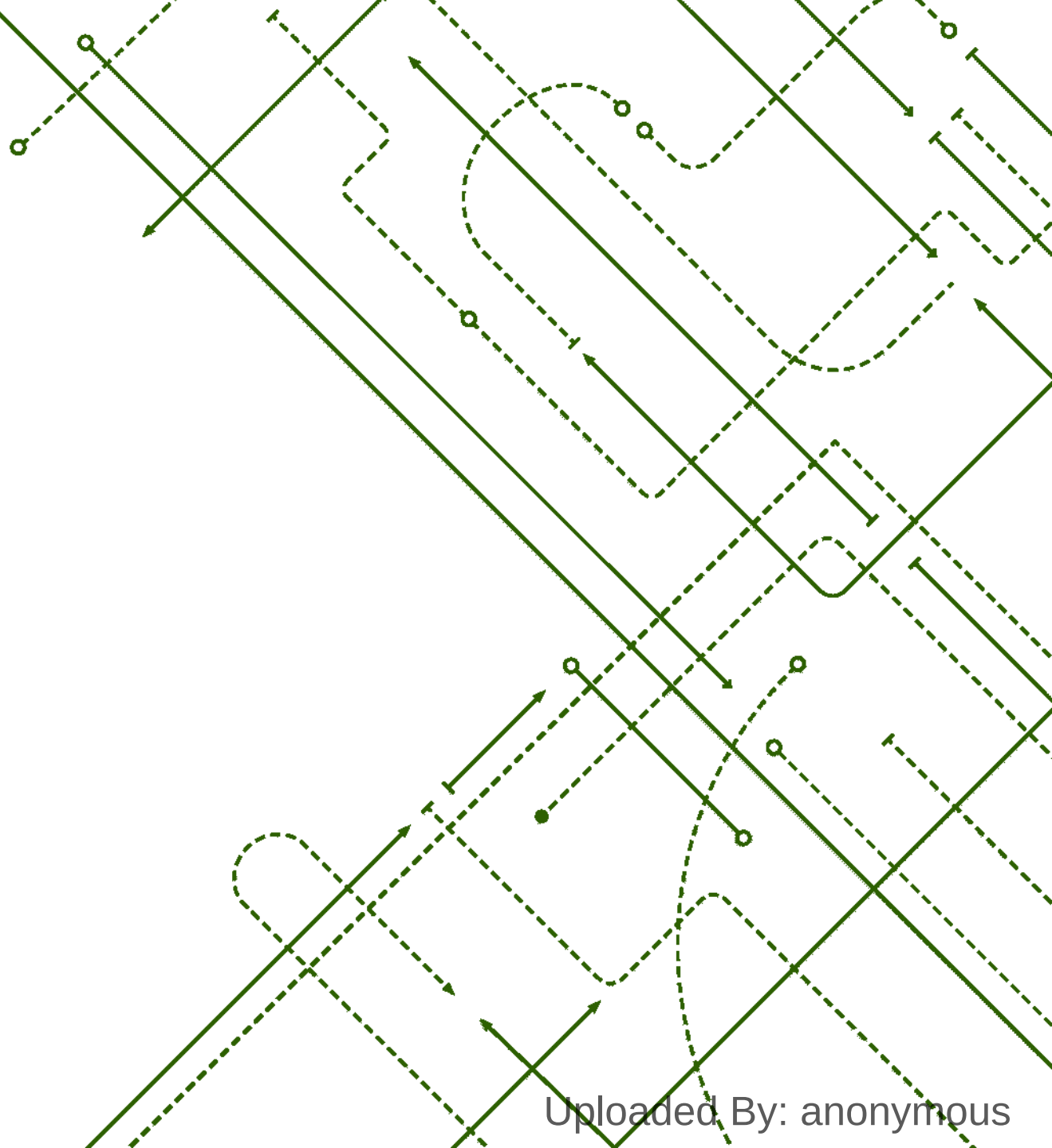
# Configuring Third Layer Switch

- **Switch to Router link** (Convert a Layer 3 switch port into a router port, enabling the switch to perform routing functions)**:**
  - **Switch(config-if)# no switchport**
  - **Switch(config-if)# ip address <IP-ADDRESS> <SUBNET-MASK>**

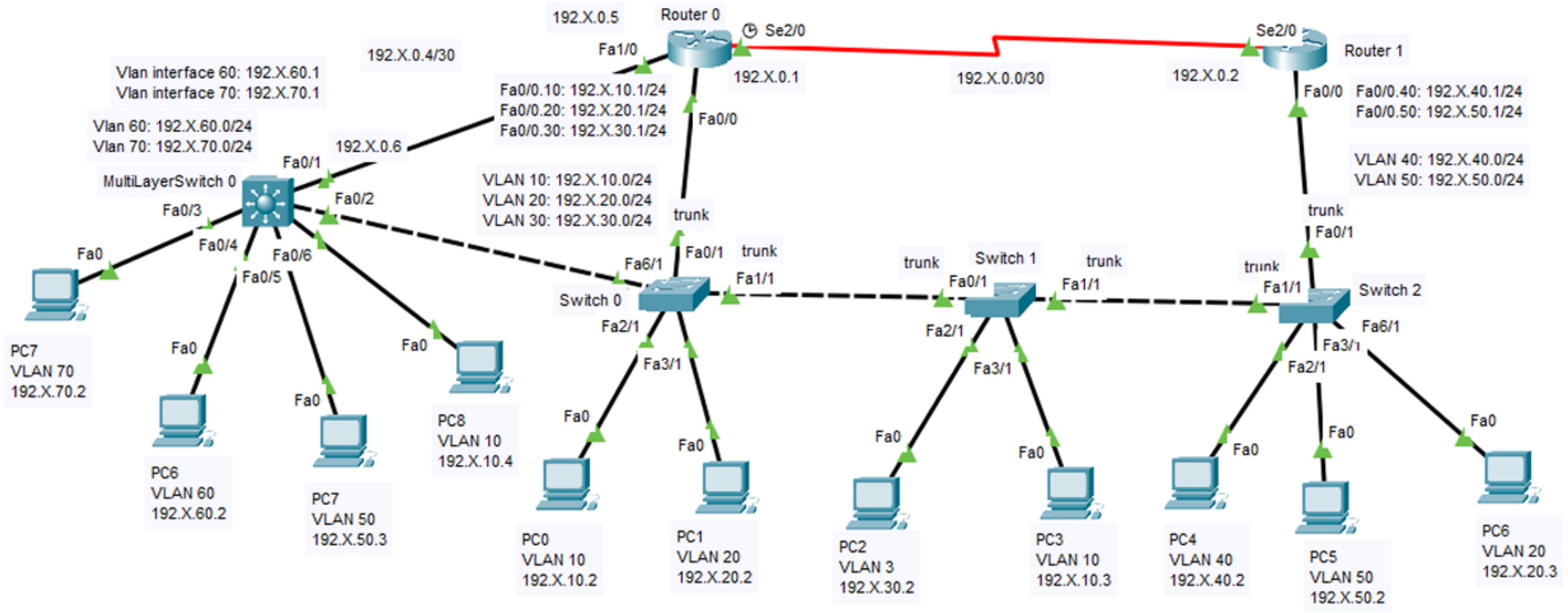
- **Enable routing** (Enabling routing capabilities on the Layer 3 switch)**:**
  - **Switch(config)# ip routing**

- **Switch Virtual Interfaces:** (Switch Virtual Interfaces to represent VLANs on a Layer 3 switch)
  - **Switch(config)# interface vlan <VLAN-NUMBER>**
  - **Switch(config-if)# ip address <IP-ADDRESS> <SUBNET-MASK>**

# Procedure



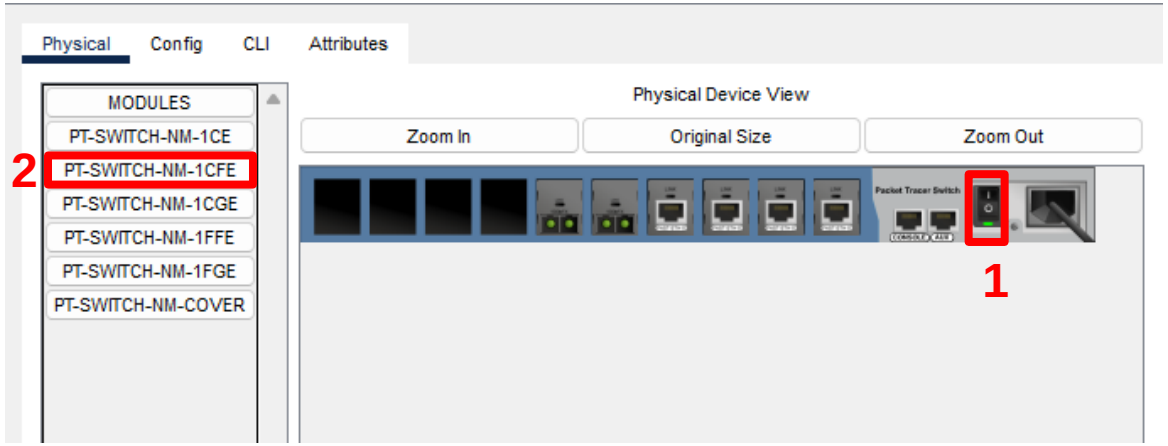
# Topology

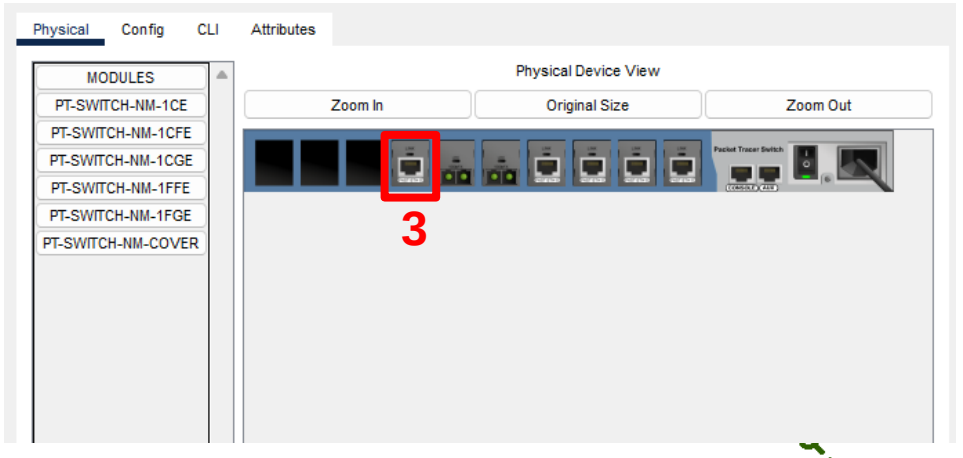

192.X.0.5
Router 0
Se2/0
Fa1/0
192.X.0.4/30
192.X.0.1
192.X.0.0/30
192.X.0.2
Router 1
Se2/0
Vlan interface 60: 192.X.60.1
Vlan interface 70: 192.X.70.1
Fa0/0.10: 192.X.10.1/24
Fa0/0.20: 192.X.20.1/24
Fa0/0.30: 192.X.30.1/24
Fa0/0
Fa0/0
Fa0/0.40: 192.X.40.1/24
Fa0/0.50: 192.X.50.1/24
Vlan 60: 192.X.60.0/24
Vlan 70: 192.X.70.0/24
192.X.0.6
Fa0/1
MultiLayerSwitch 0
Fa0/2
Fa0/3
Fa0/4
Fa0/5
Fa0/6
VLAN 10: 192.X.10.0/24
VLAN 20: 192.X.20.0/24
VLAN 30: 192.X.30.0/24
VLAN 40: 192.X.40.0/24
VLAN 50: 192.X.50.0/24
trunk
trunk
Fa0/1
Fa6/1
Fa0/1
trunk
Switch 0
Fa1/1
trunk
Switch 1
trunk
trunk
Fa1/1
Switch 2
Fa0/1
Fa1/1
Fa2/1
Fa2/1
Fa2/1
Fa6/1
Fa3/1
Fa3/1
Fa3/1
Fa0
Fa0
Fa0
Fa0
Fa0
Fa0
Fa0
Fa0
Fa0
Fa0
PC7
VLAN 70
192.X.70.2
PC6
VLAN 60
192.X.60.2
PC7
VLAN 50
192.X.50.3
PC8
VLAN 10
192.X.10.4
PC0
VLAN 10
192.X.10.2
PC1
VLAN 20
192.X.20.2
PC2
VLAN 3
192.X.30.2
PC3
VLAN 10
192.X.10.3
PC4
VLAN 40
192.X.40.2
PC5
VLAN 50
192.X.50.2
PC6
VLAN 20
192.X.20.3

# Steps of Configurations

1. **Save the configurations on switch0**
   - **Switch0# write**

2. **Add an extra interface physically to switch0 .**



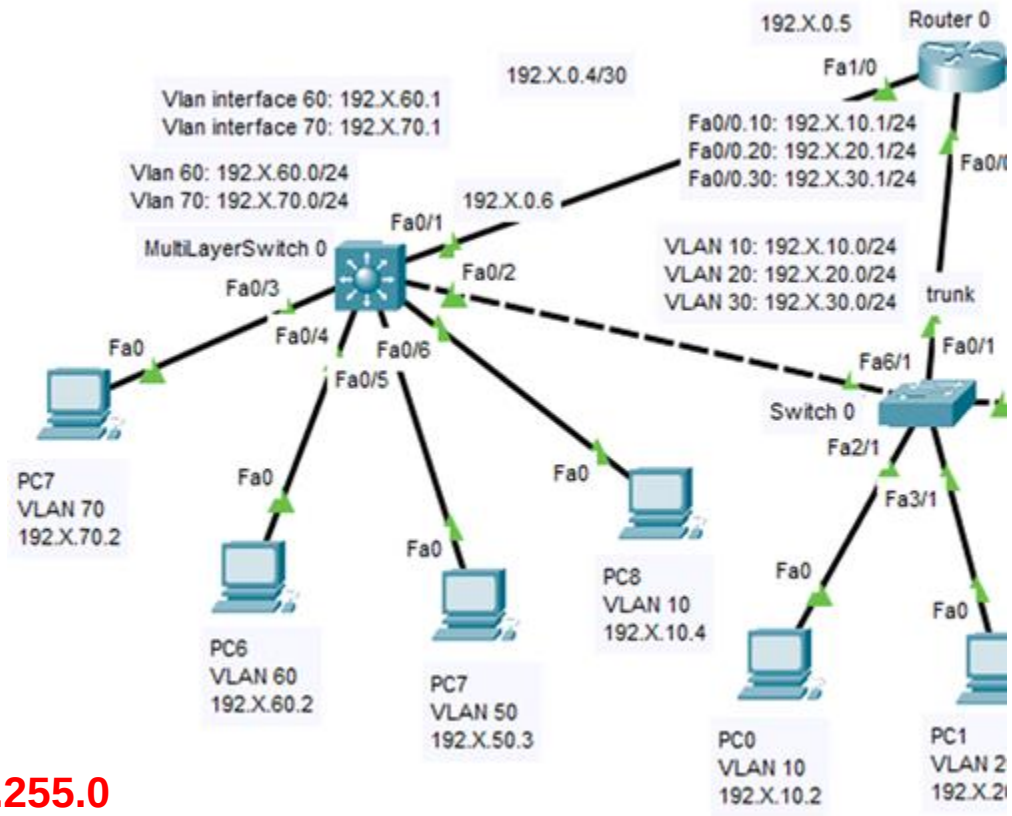



# Steps of Configurations (Cont.)

3. **Multi-Layer Switch to Router link.**
   - Switch(config)# **interface Fa0/1**
   - Switch(config-if)# **no switchport**
   - Switch(config-if)# **ip address 192.X.0.6 255.255.255.252**

4. **Assign the IPs:** To Routers & PCs.

5. **VLAN Interfaces IPs (Switch Virtual Interfaces)**
   - Switch(config)# **interface vlan 60**
   - Switch(config-router)# **ip address 192.X.60.1 255.255.255.0**



# Steps of Configurations (Cont.)

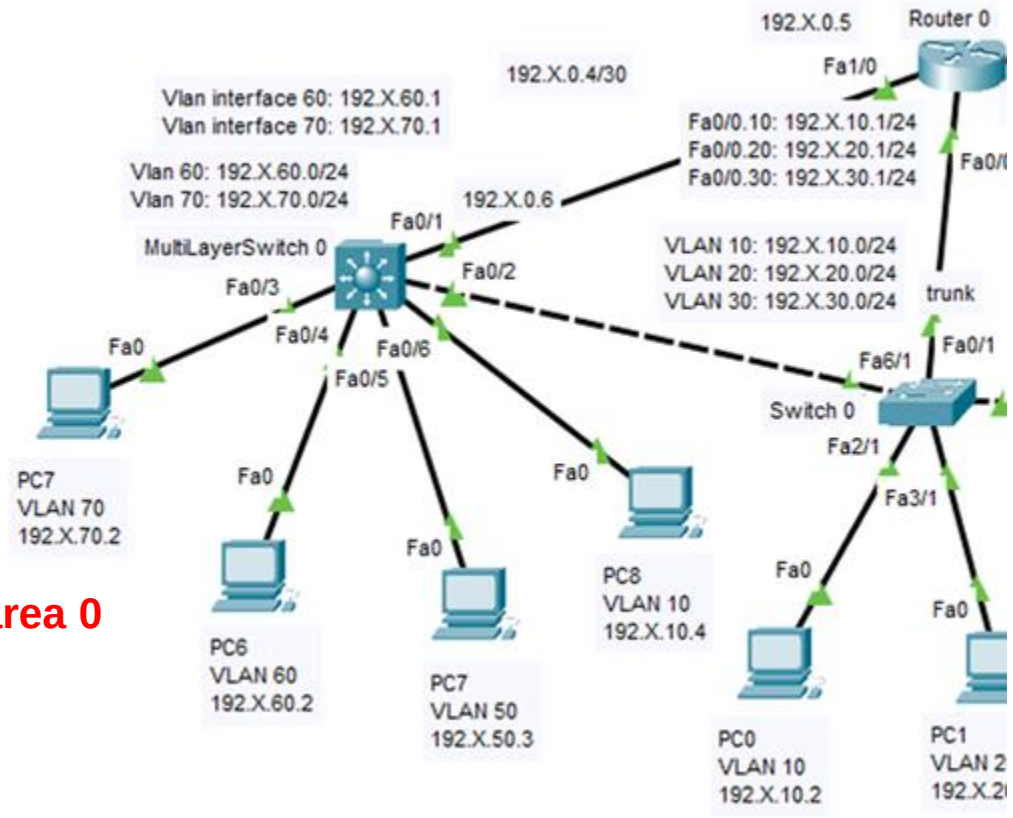
6. **Configuring OSPF Routing.**
   - Switch(config)# **ip routing**

7. **Configuring OSPF Routing.**
   - Switch(config)# **router ospf 1**
   - Switch(config-router)# **network 192.X.60.0 0.0.0.255 area 0**

8. **Configuring VLANs on Multi-Layer Switch**

9. **Configuring Access Ports on Multi-Layer Switch.**

10. **Configuring Trunk on Multi-Layer Switch.**



# Saving Configurations

- **Don't forget to save the configurations on your router and switch.**

  → **Router# write**

  → **Switch# write**

# Video explaining the experiment

**--Soon--**

# References


- **Manual for ENCS4130 Computer Networks Laboratory.**