

Configuring a Layer 3 Network with Dynamic Routing Protocols

Fundamentals of Communications and Networking, Third Edition - Lab 05

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Time on Task:

9 hours, 12 minutes

Progress:

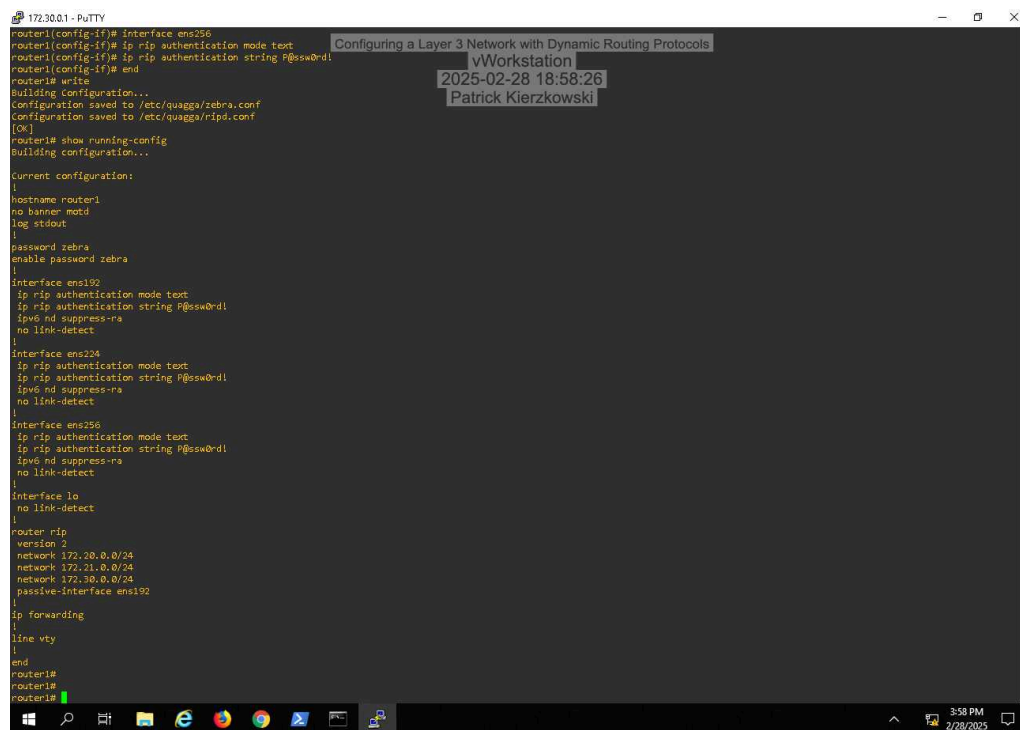
100%

Report Generated: Monday, July 7, 2025 at 9:46 PM

Section 1: Hands-On Demonstration

Part 1: Configure RIPv2 on the Routers

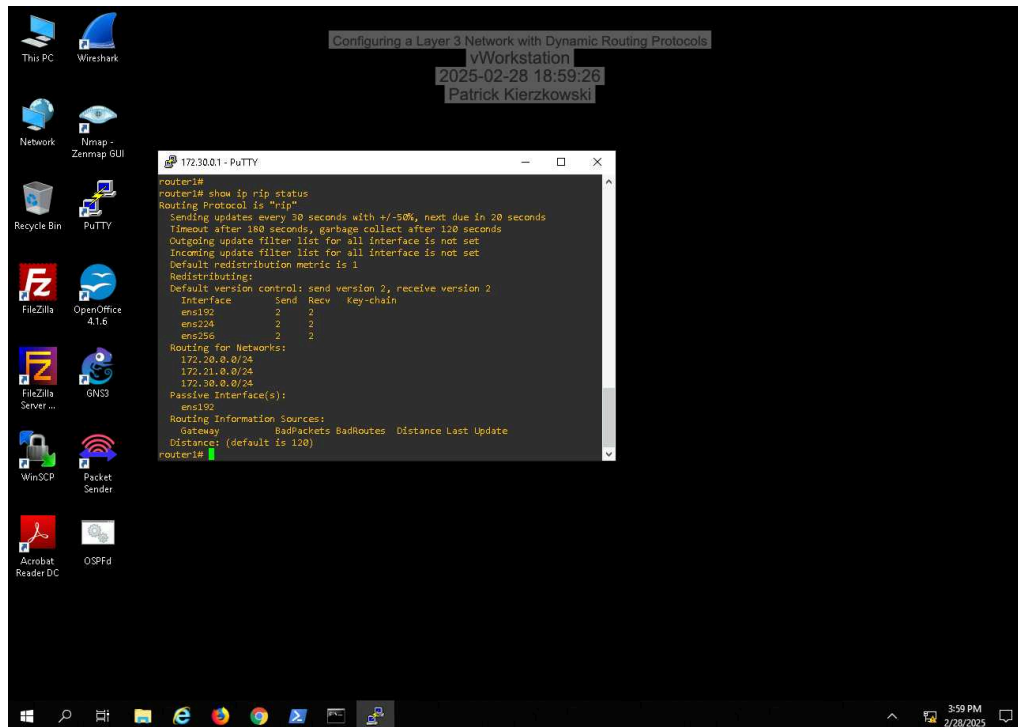
22. Make a screen capture showing the currently running RIP configuration on router1.



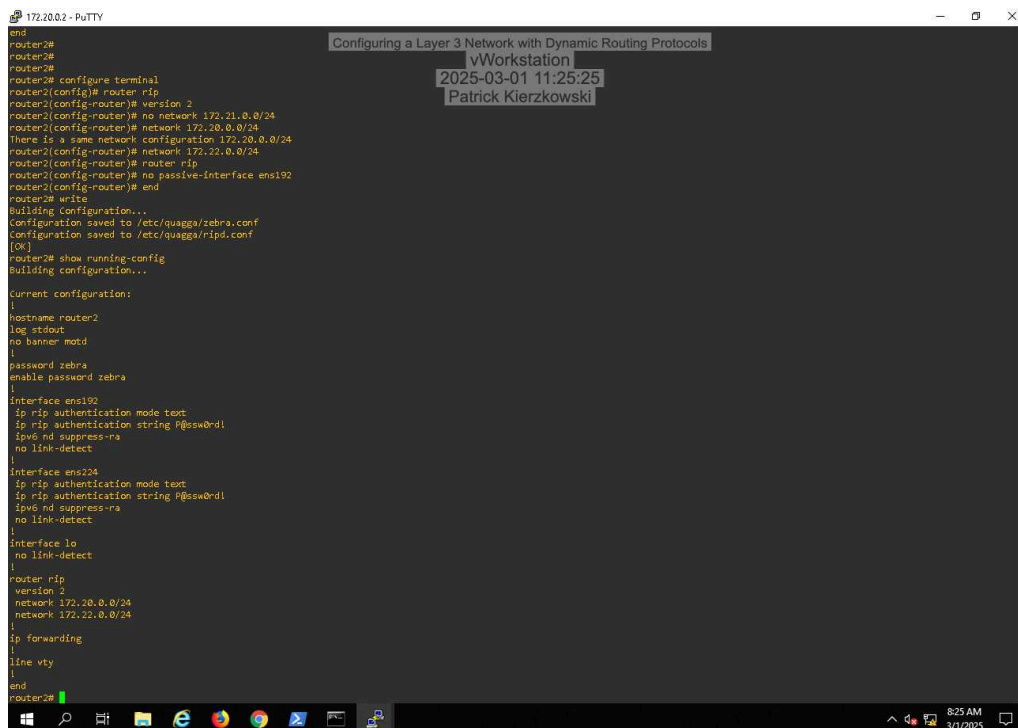
```
172.30.81 - PuTTY
router1(config-if)# interface ens256
router1(config-if)# ip rip authentication mode text
router1(config-if)# ip rip authentication string P@ssw@rd!
router1(config-if)# end
router1# write
Building Configuration...
Configuration saved to /etc/quagga/zebra.conf
Configuration saved to /etc/quagga/ripd.conf
[OK]
router1# show running-config
Building configuration...

Current configuration:
!
hostname router1
no banner motd
log stdout
!
password zebra
enable password zebra
!
interface ens192
!
ip rip authentication mode text
ip rip authentication string P@ssw@rd!
ipw6 nd suppress-ra
no link-detect
!
interface ens256
ip rip authentication mode text
ip rip authentication string P@ssw@rd!
ipw6 nd suppress-ra
no link-detect
!
interface ens256
ip rip authentication mode text
ip rip authentication string P@ssw@rd!
ipw6 nd suppress-ra
no link-detect
!
interface lo
no link-detect
!
router rip
version 2
network 172.20.0.0/24
network 172.21.0.0/24
network 172.30.0.0/24
passive-interface ens192
!
ip forwarding
!
line vty
!
end
router1#
router1#
router1#
```

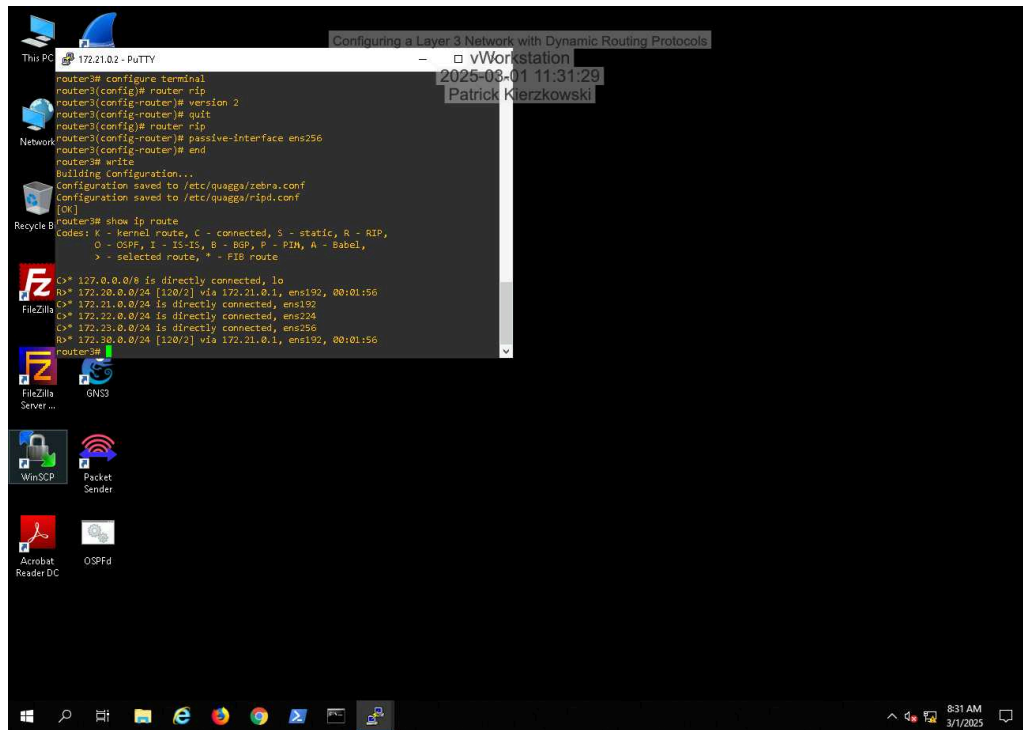
24. Make a screen capture showing the output of the show ip rip status command.



30. Make a screen capture showing the currently running RIP configuration on router2.

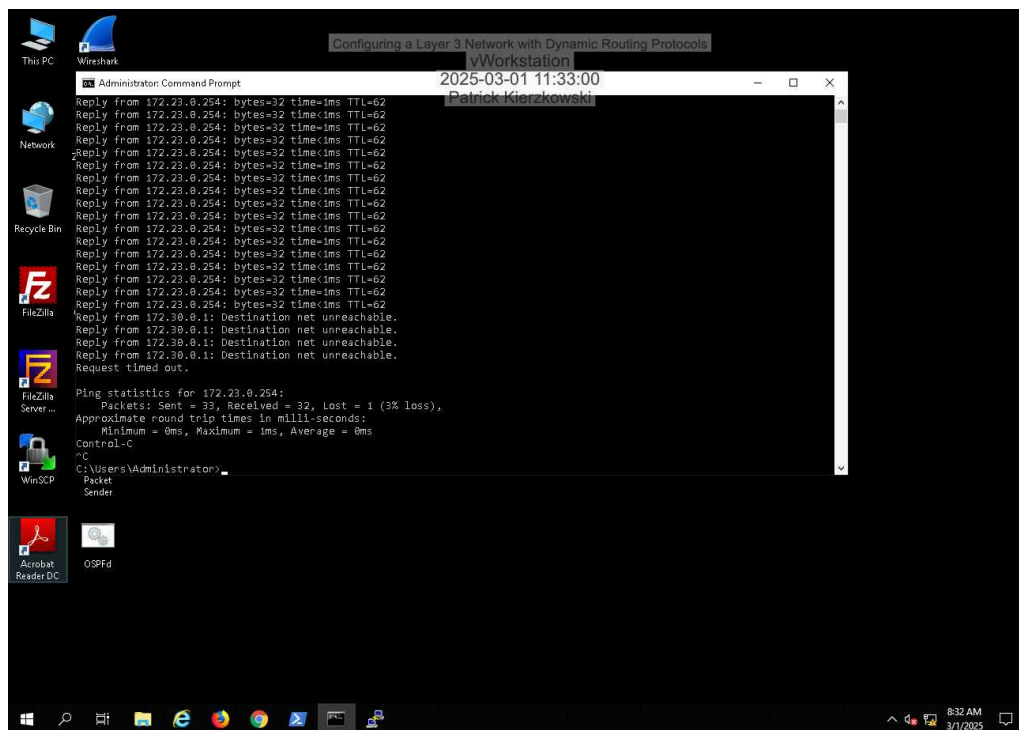


41. Make a screen capture showing the routes known by router3.

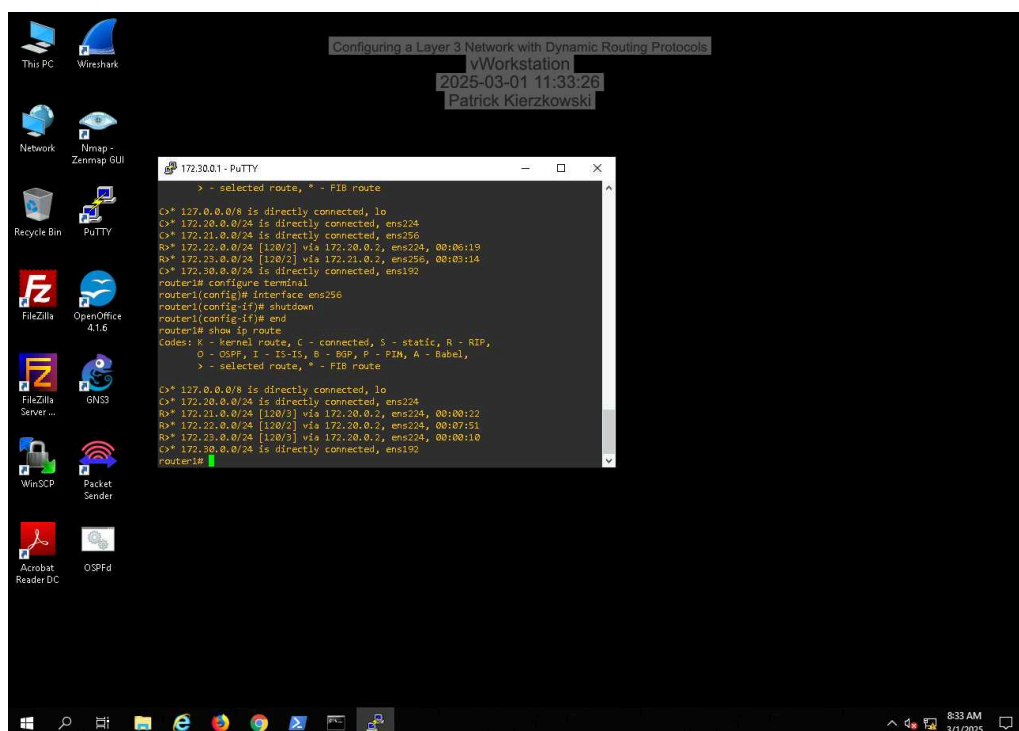


Part 2: Test the RIPv2 Configuration

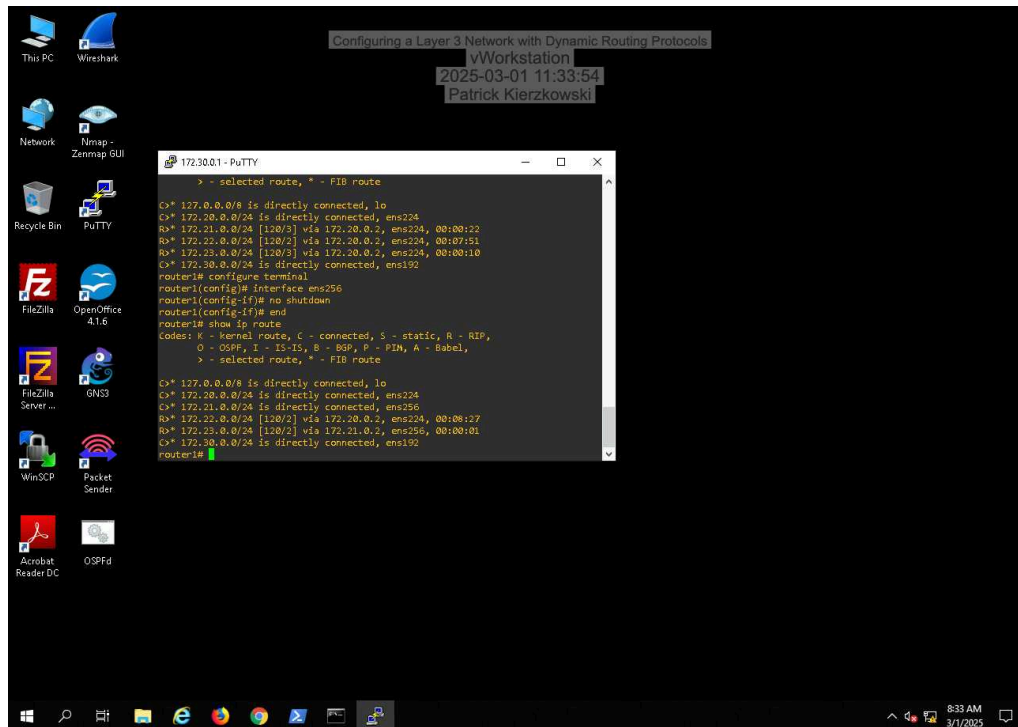
15. Make a screen capture showing the “Destination net unreachable” messages, including the successful responses that preceded and succeeded them.



20. Make a screen capture showing the new routing table on router1 that resulted from the ens256 link removal.



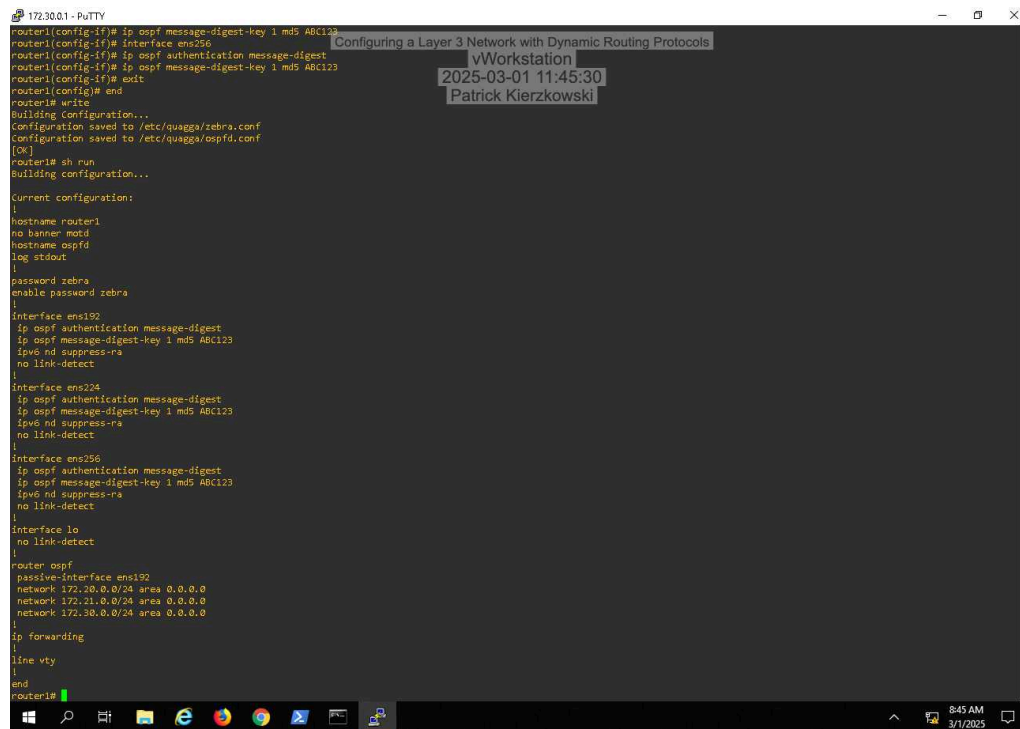
26. Make a screen capture showing the updated routing table on router1.



Section 2: Applied Learning

Part 1: Configure OSPFv2 on the Routers

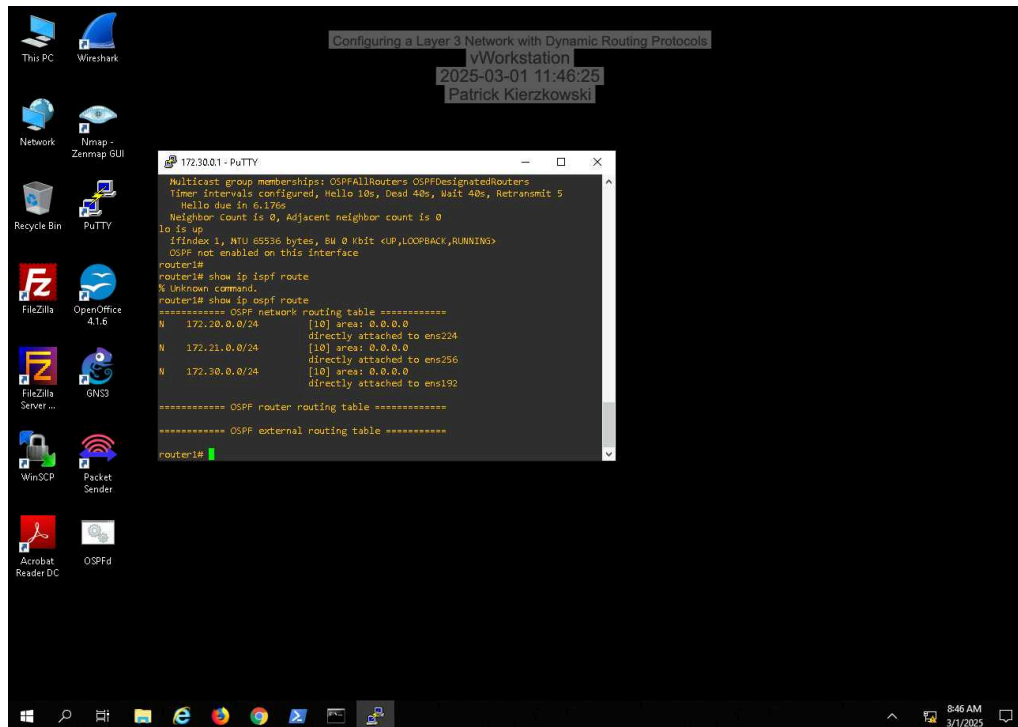
17. Make a screen capture showing the running OSPF configuration on router1.



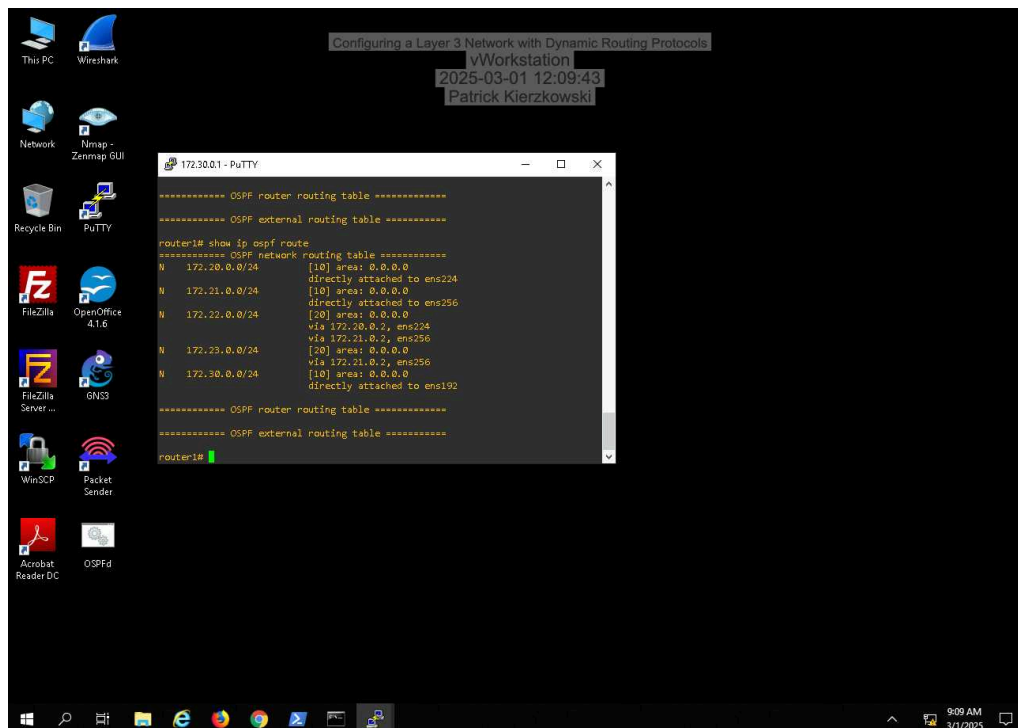
```
172.30.0.1 - PuTTY
router1(config-if)# ip ospf message-digest-key 1 md5 ABC123
router1(config-if)# interface ens256
router1(config-if)# ip ospf authentication message-digest
router1(config-if)# ip ospf message-digest-key 1 md5 ABC123
router1(config-if)# exit
router1(config)# end
router1# write
Building Configuration...
Configuration saved to /etc/quagga/zebra.conf
Configuration saved to /etc/quagga/ospfd.conf
[OK]
router1# sh run
Building configuration...

Current configuration:
!
hostname router1
no banner motd
hostname ospfd
log stdout
!
password zebra
enable password zebra
!
interface ens192
ip ospf authentication message-digest
ip ospf message-digest-key 1 md5 ABC123
ipv6 nd suppress-ra
no link-detect
!
interface ens224
ip ospf authentication message-digest
ip ospf message-digest-key 1 md5 ABC123
ipv6 nd suppress-ra
no link-detect
!
interface ens256
ip ospf authentication message-digest
ip ospf message-digest-key 1 md5 ABC123
ipv6 nd suppress-ra
no link-detect
!
interface lo
no link-detect
!
router ospf
passive-interface ens192
network 172.20.0.0/24 area 0.0.0.0
network 172.21.0.0/24 area 0.0.0.0
network 172.30.0.0/24 area 0.0.0.0
!
ip forwarding
!
line vty
!
end
router1#
```

20. Make a screen capture showing the **current OSPF routing table on router1**.



26. Make a screen capture showing the **updated OSPF routing table on router1**.



Part 2: Test the OSPFv2 Configuration

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- The screenshot displays a Windows desktop environment used for a network configuration lab. The desktop features several application icons: WinSCP, Packet Sender, Acrobat Reader DC, and OSFPd. Two windows are open:
- Administrator: Command Prompt:** This window shows the results of a series of ping commands to the IP address 172.23.0.254. All pings are successful, indicating network connectivity.
 - vWorkstation:** This window displays the configuration for a Cisco IOS router. The configuration includes:
 - Interface GigabitEthernet0/0/0: IP address 172.20.0.255, 24-bit mask, OSPF enabled.
 - Interface GigabitEthernet0/0/1: IP address 172.22.0.1, 24-bit mask, OSPF enabled.
 - OSPF Configuration: OSPF is configured on both interfaces with a network type of BROADCAST and a cost of 10.

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- Administrator: Command Prompt
- ## Configuring a Layer 3 Network with Dynamic Routing Protocols
- Workstation
2025-03-01 12:21:31
Patrick Kierzkowski
- ```

Reply from 172.23.0.254: bytes=32 time=1ms TTL=62
Reply from 172.23.0.254: bytes=32 time=1ms TTL=62
Reply from 172.23.0.254: bytes=32 time=1ms TTL=62
Reply from 172.23.0.254: bytes=32 time=1ms TTL=61
Reply from 172.23.0.254: bytes=32 time=1ms TTL=61
Reply from 172.23.0.254: bytes=32 time=1ms TTL=61
Reply from 172.23.0.254: bytes=32 time=1ms TTL=61
Reply from 172.23.0.254: bytes=32 time=1ms TTL=61
Reply from 172.23.0.254: bytes=32 time=1ms TTL=61
Reply from 172.23.0.254: bytes=32 time=1ms TTL=61

Ping statistics for 172.23.0.254:
 Packets: Sent = 21, Received = 21, Lost = 0 (0% loss),
 Approximate round trip times in milli-seconds:
 Minimum = 0ms, Maximum = 1ms, Average = 0ms
Control-C
^C
C:\Users\Administrator>tracert 172.23.0.254

Tracing route to pfSense.securelabsondemand.com [172.23.0.254]
over a maximum of 30 hops:
 0 <1 ms <1 ms <1 ms router1.securelabsondemand.com [172.30.0.1]
 1 <1 ms <1 ms <1 ms router2.securelabsondemand.com [172.20.0.2]
 2 <1 ms <1 ms <1 ms router3.securelabsondemand.com [172.22.0.2]
 3 <1 ms <1 ms <1 ms pfSense.securelabsondemand.com [172.23.0.254]
 4 <1 ms <1 ms <1 ms pfSense.securelabsondemand.com [172.23.0.254]

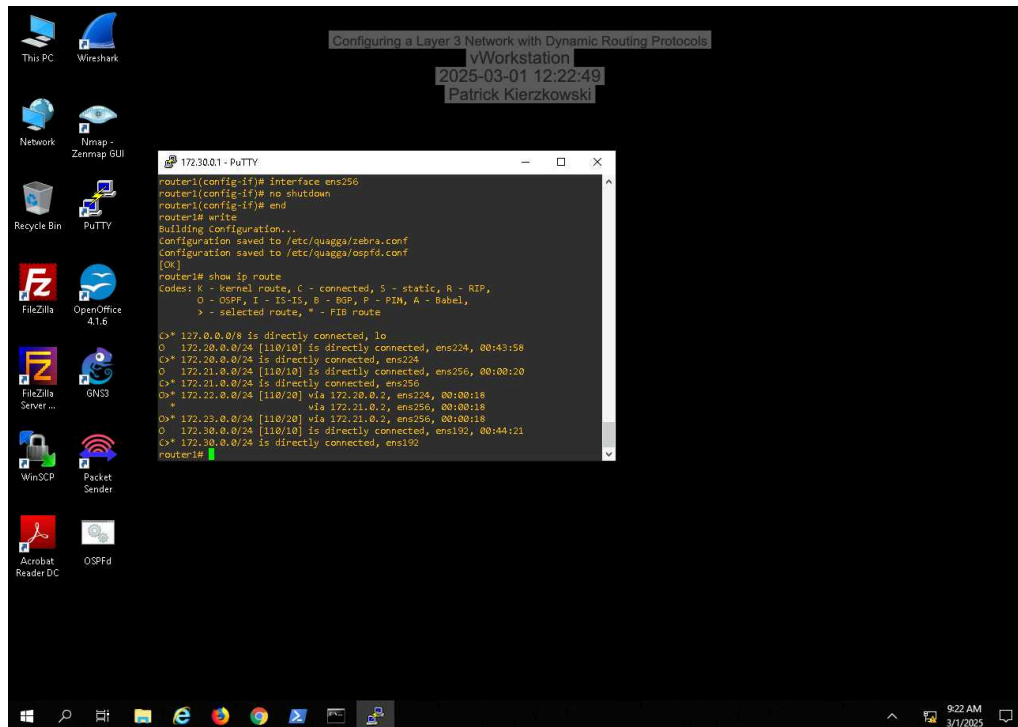
Trace complete.

C:\Users\Administrator>

```
- WinSCP Packet Sender
- Acrobat Reader DC OSPFd
- 9:21 AM 3/1/2025



### 23. Make a screen capture showing the full routing table on router1.



### Section 3: Challenge and Analysis

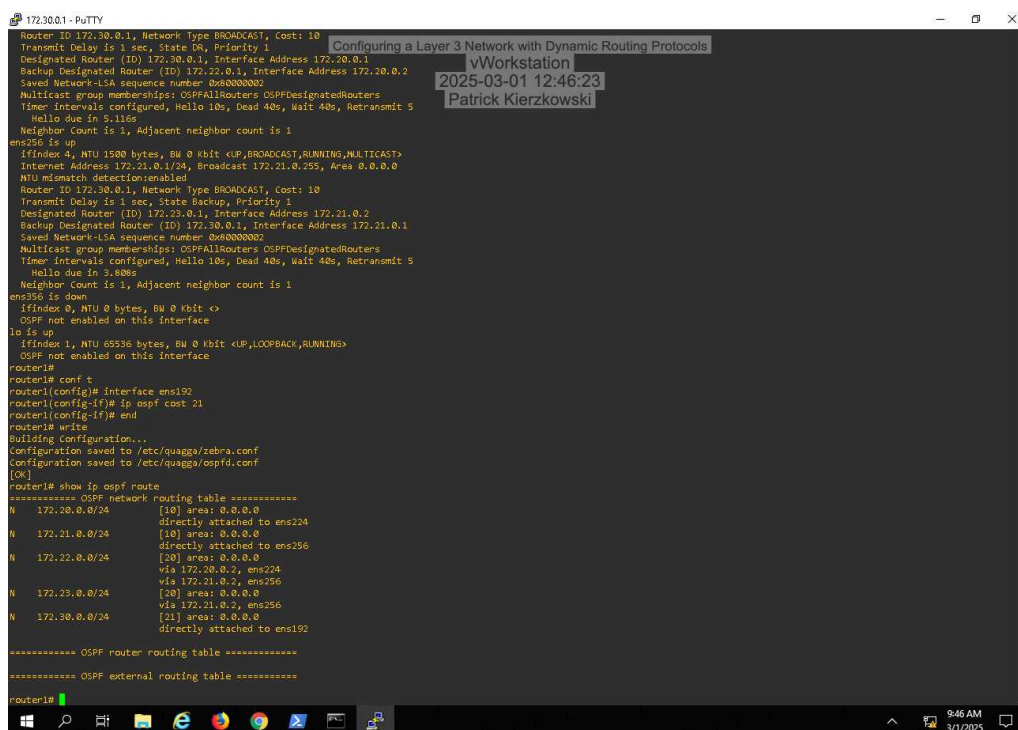
#### Part 1: Calculate the OSPF Cost to Force a New Path Preference

**Record** the minimum OSPF cost needed for the router1 > router3 link to convince OSPF that this path is less efficient than the router1 > router2 > router3 path. **Explain** how you calculated this value.

The minimum OSPF cost needed for the router 1 to router 3 link is 21. To make the path from router 1 to router 3 less efficient, its total cost must be higher than 30, which is the path from router 1 to router 2 to router 3. By making the router 1 to router 3 cost to 21, the total cost becomes 31, making it less efficient.

#### Part 2: Manually Set the OSPF Cost to Force a New Path Preference

**Make a screen capture** showing the new cost assignments on router1's OSPF routes.



```
172.30.0.1 - PuTTY
Router ID 172.30.0.1, Network Type BROADCAST, Cost: 10
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 172.30.0.1, Interface Address 172.20.0.1
Backup Designated Router (ID) 172.22.0.1, Interface Address 172.20.0.2
Saved Network-LSA sequence number 0x60000002
Multicast group memberships: OSPFAllRouters OSPFDesignatedRouters
Timer intervals configured, Hello 10s, Dead 40s, Wait 40s, Retransmit 5
Hello due in 5.1166s
Neighbor Count is 1, Adjacent neighbor count is 1
ens256 is up
 ifindex 4, MTU 1500 bytes, BW 0 kbit <LP,BROADCAST,RUNNING,MULTICAST>
 Internet Address 172.21.0.1/24, Broadcast 172.21.0.255, Area 0.0.0.0
 NTU mismatch detection: enabled
Router ID 172.30.0.1, Network Type BROADCAST, Cost: 10
Transmit Delay is 1 sec, State Backup, Priority 1
Designated Router (ID) 172.23.0.1, Interface Address 172.21.0.2
Backup Designated Router (ID) 172.30.0.1, Interface Address 172.21.0.1
Saved Network-LSA sequence number 0x60000002
Multicast group memberships: OSPFAllRouters OSPFDesignatedRouters
Timer intervals configured, Hello 10s, Dead 40s, Wait 40s, Retransmit 5
Hello due in 3.808s
Neighbor Count is 1, Adjacent neighbor count is 1
ens356 is down
 ifindex 0, MTU 0 bytes, BW 0 kbit <>
 OSPF not enabled on this interface
lo is up
 ifindex 1, MTU 65536 bytes, BW 0 kbit <LP,LOOPBACK,RUNNING>
 OSPF not enabled on this interface
router1#
router1# conf t
router1(config)# interface ens192
router1(config-if)# ip ospf cost 21
router1(config-if)# end
router1# write
Building Configuration...
Configuration saved to /etc/quagga/zebra.conf
Configuration saved to /etc/quagga/ospfd.conf
[OK]
router1# show ip ospf route
***** OSPF network routing table *****
N 172.20.0.0/24 [10] area: 0.0.0.0
 directly attached to ens224
N 172.21.0.0/24 [10] area: 0.0.0.0
 directly attached to ens256
N 172.22.0.0/24 [30] area: 0.0.0.0
 via 172.20.0.2, ens224
N 172.23.0.0/24 [30] area: 0.0.0.0
 via 172.21.0.2, ens256
N 172.30.0.0/24 [21] area: 0.0.0.0
 via 172.21.0.2, ens256
 directly attached to ens192
***** OSPF router routing table *****
***** OSPF external routing table *****
router1#
```

#### Part 3: Test Your Cost Changes

# Configuring a Layer 3 Network with Dynamic Routing Protocols

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**Make a screen capture showing the new path taken to reach the pfSense appliance.**

