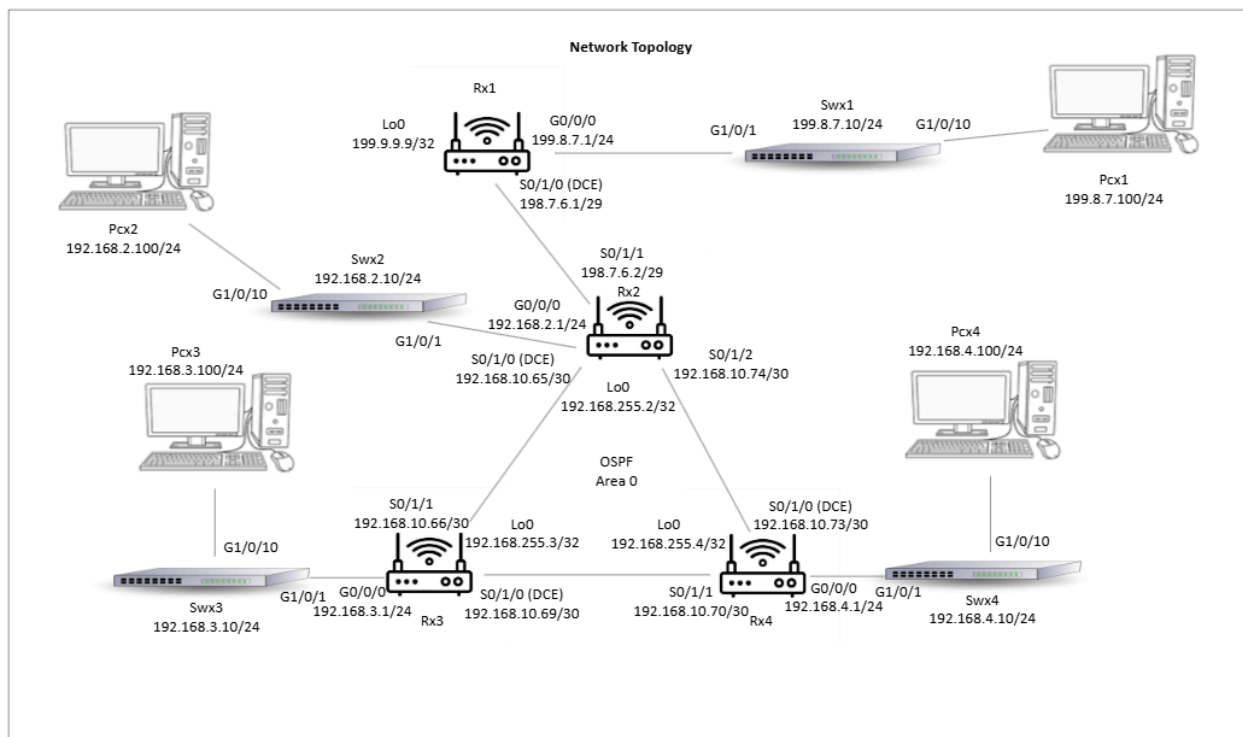## Lab 3

Description: In this lab we secured our network devices and added new technologies like a syslog and NTP server.

Topology:

I ended up choosing to use the topology and configuration that we did in class on 3/6 like you said we could instead of the lab's topology.

Syntax:

Command	Description	Mode of IOS
Service password-encryption	Encrypts all passwords that are stored	Global configuration mode
Ntp authenticate	Enables NTP authentication	Global configuration mode

Access-class 10 in	Applies our access list 10 to only allow certain devices to SSH into the router	Global configuration mode

Task Two:

3.

```
C:\Users\MaristUser>ping 199.8.7.1

Pinging 199.8.7.1 with 32 bytes of data:
Reply from 199.8.7.1: bytes=32 time<1ms TTL=128
Reply from 199.8.7.1: bytes=32 time<1ms TTL=128
Reply from 199.8.7.1: bytes=32 time<1ms TTL=128
Reply from 199.8.7.1: bytes=32 time<1ms TTL=128

Ping statistics for 199.8.7.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\MaristUser>
```

This screenshot shows that Pcx1(199.8.7.100) is able to ping its default gateway (199.8.7.1).

```
C:\Users\MaristUser>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:
Reply from 192.168.2.1: bytes=32 time<1ms TTL=128
Reply from 192.168.2.1: bytes=32 time<1ms TTL=128
Reply from 192.168.2.1: bytes=32 time<1ms TTL=128
Reply from 192.168.2.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\MaristUser>
```

This screenshot shows that Pcx2(192.168.2.100) is able to ping its default gateway (192.168.2.1).

```
C:\Users\MaristUser>ping 192.168.3.1

Pinging 192.168.3.1 with 32 bytes of data:
Reply from 192.168.3.1: bytes=32 time<5ms TTL=128
Reply from 192.168.3.1: bytes=32 time<5ms TTL=128
Reply from 192.168.3.1: bytes=32 time<1ms TTL=128
Reply from 192.168.3.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.3.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 5ms, Average = 3ms

C:\Users\MaristUser>
```

This screenshot shows that Pcx3(192.168.3.100) is able to ping its default gateway (192.168.3.1).

```
C:\Users\MaristUser>ping 192.168.4.1

Pinging 192.168.2.1 with 32 bytes of data:
Reply from 192.168.4.1: bytes=32 time<20ms TTL=128
Reply from 192.168.4.1: bytes=32 time<1ms TTL=128
Reply from 192.168.4.1: bytes=32 time<1ms TTL=128
Reply from 192.168.4.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.4.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 20ms, Average = 5ms

C:\Users\MaristUser>
```

This screenshot shows that Pcx4(192.168.4.100) is able to ping its default gateway (192.168.4.1).

4.

```
Rx1# ping 198.7.6.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 198.7.6.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/2/3 ms
Rx1#
```

This screenshot shows that Router Rx1 (198.7.6.1) can successfully ping Router Rx2 (198.7.6.2).

```
Rx2# ping 192.168.10.66
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.66, timeout is 2 seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 1/1/2 ms
Rx2#
```

This screenshot shows that Router Rx2 (192.168.10.65) can successfully ping Router Rx3 (192.168.10.66).

```
Rx3# ping 192.168.10.70
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.70, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 2/2/3 ms
Rx3#
```

This screenshot shows that Router Rx3 (192.168.10.69) can successfully ping Router Rx4 (192.168.10.70).

```
Rx4# ping 192.168.10.69
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.69, timeout is 2 seconds:
!!!!.
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/2/3 ms
Rx4#
```

This screenshot shows that Router Rx4 (192.168.10.70) can successfully ping Router Rx3 (192.168.10.69).

```
Rx1# ping 192.168.3.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
Rx1#
```

This screenshot shows that Router Rx1 (199.8.7.1) attempted to ping Router Rx3 (192.168.3.1) but failed as expected.

5.

```
Rx1# show ip route
Codes: C - connected, S - static, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, B - BGP
        * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

        199.8.7.0/24 is variably subnetted, 2 subnets, 2 masks
C        199.8.7.0/24 is directly connected, FastEthernet0/0
C        198.7.6.0/29 is directly connected, Serial0/1/0
S*       0.0.0.0/0 [1/0] via 198.7.6.2
Rx1#
```

This screenshot shows the routing table of Router Rx1 before OSPF is configured.

```
Rx2# show ip route
Codes: C - connected, S - static, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, B - BGP
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     198.7.6.0/29 is variably subnetted, 2 subnets, 2 masks
C        198.7.6.0/29 is directly connected, Serial0/1/1
C        192.168.2.0/24 is directly connected, GigabitEthernet0/0
C        192.168.10.65/30 is directly connected, Serial0/1/2
C        192.168.255.2/32 is directly connected, Loopback0
Rx2#
```

This screenshot shows the routing table of Router Rx2 before OSPF is configured.

```
Rx3# show ip route
Codes: C - connected, S - static, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, B - BGP
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.10.66/30 is directly connected, Serial0/1/0
C        192.168.3.0/24 is directly connected, GigabitEthernet0/0
C        192.168.10.69/30 is directly connected, Serial0/1/1
C        192.168.255.3/32 is directly connected, Loopback0
Rx3#
```

This screenshot shows the routing table of Router Rx3 before OSPF is configured.

```
Rx4# show ip route
Codes: C - connected, S - static, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, B - BGP
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.10.70/30 is directly connected, Serial0/1/0
C        192.168.4.0/24 is directly connected, GigabitEthernet0/0
C        192.168.10.73/30 is directly connected, Serial0/1/1
C        192.168.255.4/32 is directly connected, Loopback0
Rx4#
```

This screenshot shows the routing table of Router Rx4 before OSPF is configured.

6.

```
Rx2# show ip protocols
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.255.2
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.2.0 0.0.0.255 area 0
    192.168.10.64 0.0.0.3 area 0
    192.168.10.72 0.0.0.3 area 0
    192.168.255.2 0.0.0.0 area 0
  Routing Information Sources:
    Gateway          Distance         Last Update
    192.168.255.3      110              00:00:12
    192.168.255.4      110              00:00:14
  Distance: (default is 110)
Rx2#
```

This screenshot shows the OSPF configuration on Router Rx2.

```
Rx3# show ip protocols
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.255.3
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.3.0 0.0.0.255 area 0
    192.168.10.66 0.0.0.3 area 0
    192.168.10.69 0.0.0.3 area 0
    192.168.255.3 0.0.0.0 area 0
  Routing Information Sources:
    Gateway          Distance         Last Update
    192.168.255.2      110              00:00:11
    192.168.255.4      110              00:00:13
  Distance: (default is 110)
Rx3#
```

This screenshot shows the OSPF configuration on Router Rx3.

```
Rx4#
Rx4# show ip protocols
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.255.4
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.4.0 0.0.0.255 area 0
    192.168.10.69 0.0.0.3 area 0
    192.168.10.73 0.0.0.3 area 0
    192.168.255.4 0.0.0.0 area 0
  Routing Information Sources:
    Gateway          Distance         Last Update
    192.168.255.3      110              00:00:10
    192.168.255.2      110              00:00:14
  Distance: (default is 110)
```

This screenshot shows the OSPF configuration on Router Rx4.

7.

```
Rx2# show ip route
Codes: C - connected, S - static, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, B - BGP
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 198.7.6.1 to network 0.0.0.0

S*    0.0.0.0/0 [1/0] via 198.7.6.1
C     198.7.6.0/29 is directly connected, Serial0/1/1
C     192.168.2.0/24 is directly connected, GigabitEthernet0/0
C     192.168.10.65/30 is directly connected, Serial0/1/2
C     192.168.10.74/30 is directly connected, Serial0/1/0
C     192.168.255.2/32 is directly connected, Loopback0
O     192.168.3.0/24 [110/2] via 192.168.10.66, 00:00:12, Serial0/1/2
O     192.168.4.0/24 [110/3] via 192.168.10.70, 00:00:14, Serial0/1/0
Rx2#
```

This screenshot displays the routing table of Router Rx2 showing the default static route that was added allowing traffic to be forwarded to Rx1.

8.

```
C:\Users\MaristUser>ping 192.168.4.100

Pinging 192.168.4.100 with 32 bytes of data:
Reply from 192.168.4.100: bytes=32 time<5ms TTL=128
Reply from 192.168.4.100: bytes=32 time<5ms TTL=128
Reply from 192.168.4.100: bytes=32 time<1ms TTL=128
Reply from 192.168.4.100: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.4.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 5ms, Average = 3ms

C:\Users\MaristUser>
```

This screenshot shows that Pcx1(199.8.7.100) is able to ping Pcx4 (192.168.4.100) proving that there is full connectivity throughout the topology.

10B.

```
Rx2#
Rx2# show ntp status
Clock is synchronized, stratum 2, reference is 192.168.2.100
Clock offset is -2.4 ms, delay is 1.3 ms
Precision is 2**20
Root Dispersion is 0.5 ms
Rx2#
```

This screenshot shows the show ntp status output from Router Rx2, proving that Rx2 is synchronized with the NTP server at 192.168.2.100.


```
Rx2#
Rx2# show logging
Syslog logging: enabled (O messages dropped, O flushes, O overruns)
    Console logging: level debugging, 12 messages logged
    Monitor logging: level informational, 10 messages logged
    Buffer logging: level informational, 10 messages logged
Logging to 192.168.2.100 (udp port 514), 20 messages logged
Trap logging: level informational
Last clearing of logging buffer never
```

This screenshot shows the show logging output from Router Rx2, confirming that Syslog messages are being sent to 192.168.2.100 on UDP port 514.

Conclusion:

I enjoyed setting up the connectivity of the lab, it reminded me of the in class assignments that we usually do with an extra few steps. I liked that we were allowed to use the in class topology as it felt like an extension of what we did in class last week. I did struggle slightly with getting the ntp and syslog servers running but with a little bit of troubleshooting things worked out in the end.