

Report: Computer Networks Final Project

Team Members

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Project URLs

Cisco Files on GitHub:

<https://github.com/NourhanAbuzaid/network-final-project>

Published version of the Report (For easier navigation between steps):

<https://nourhanabuzaid.notion.site/Report-Computer-Networks-Final-Project-1acbc906e36147049df017527cfe0ab3?pvs=4>

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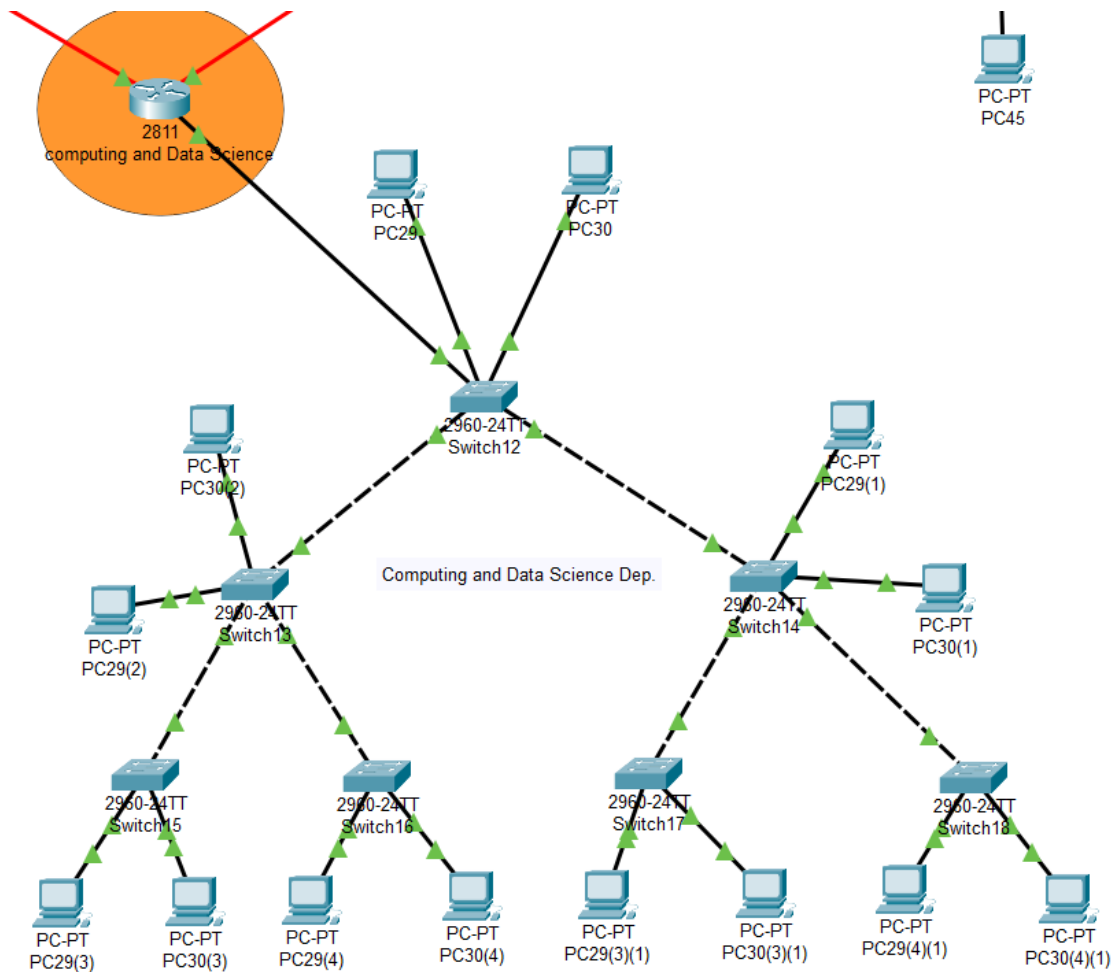
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IP Configurations

▼ Departments Configuration - Class C

Here we made the 5 required topologies each with their router and the required switches:

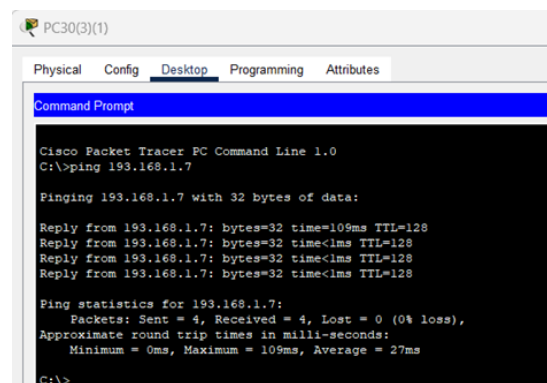
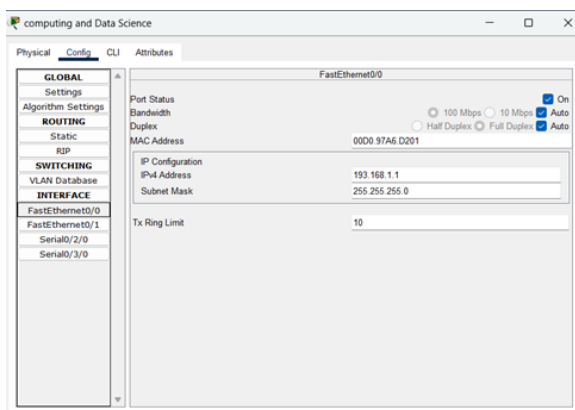
Computing and Data Sciences (Tree Topology)



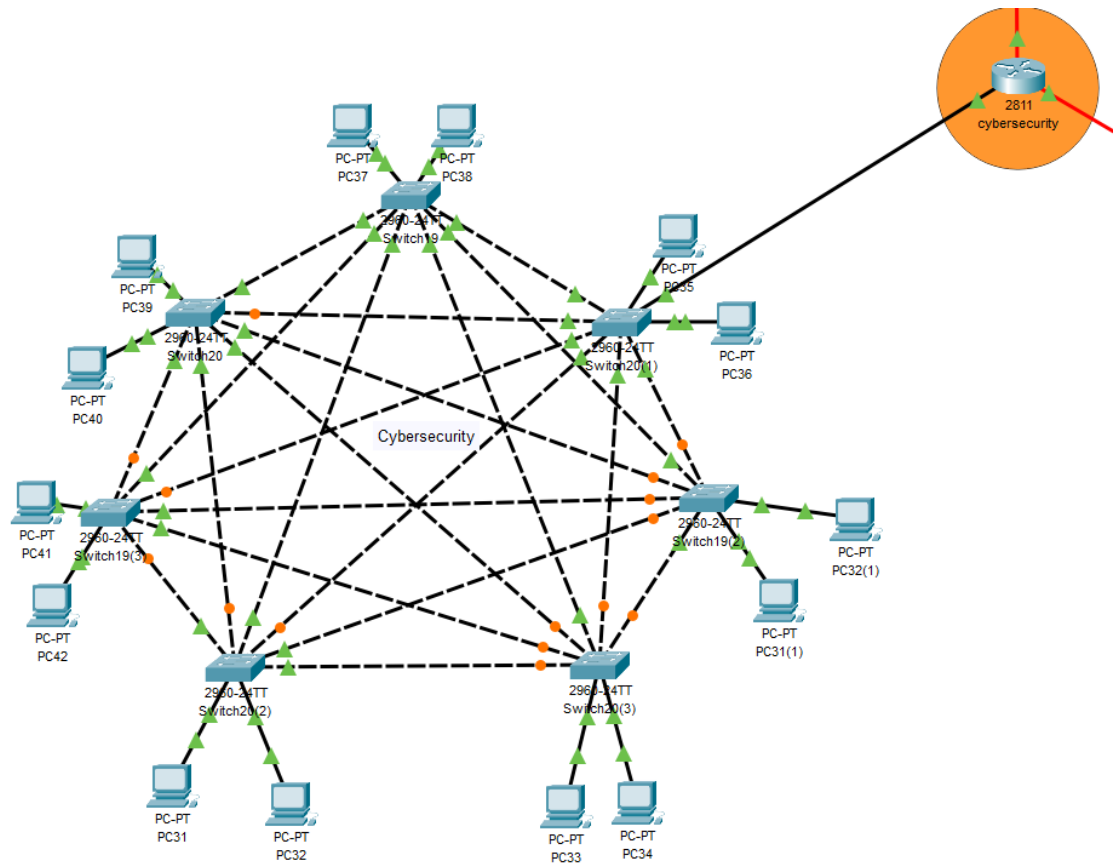
Number of Hosts	212
Network IP	193.168.1.0
Default Getaway	193.168.1.1
First Usable	193.168.1.2
Last Usable	193.168.1.254
Broadcast IP	193.168.1.255
Custom Subnet Mask	255.255.255.0
Wildcard Mask	0.0.0.255

And here is the router:

The IP address for the router is the same IP used in default gateway field in IP configuration for each PC connected to this router. We ping from 2 PCs in the same topology and here is the output.

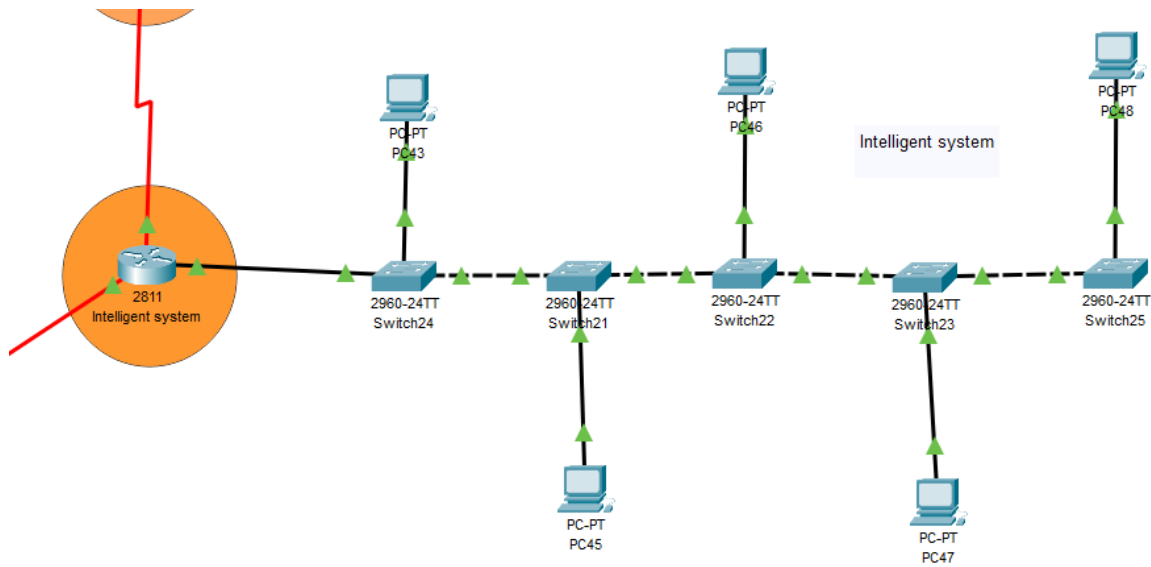


Cybersecurity (Fully-Connected Mesh Topology)



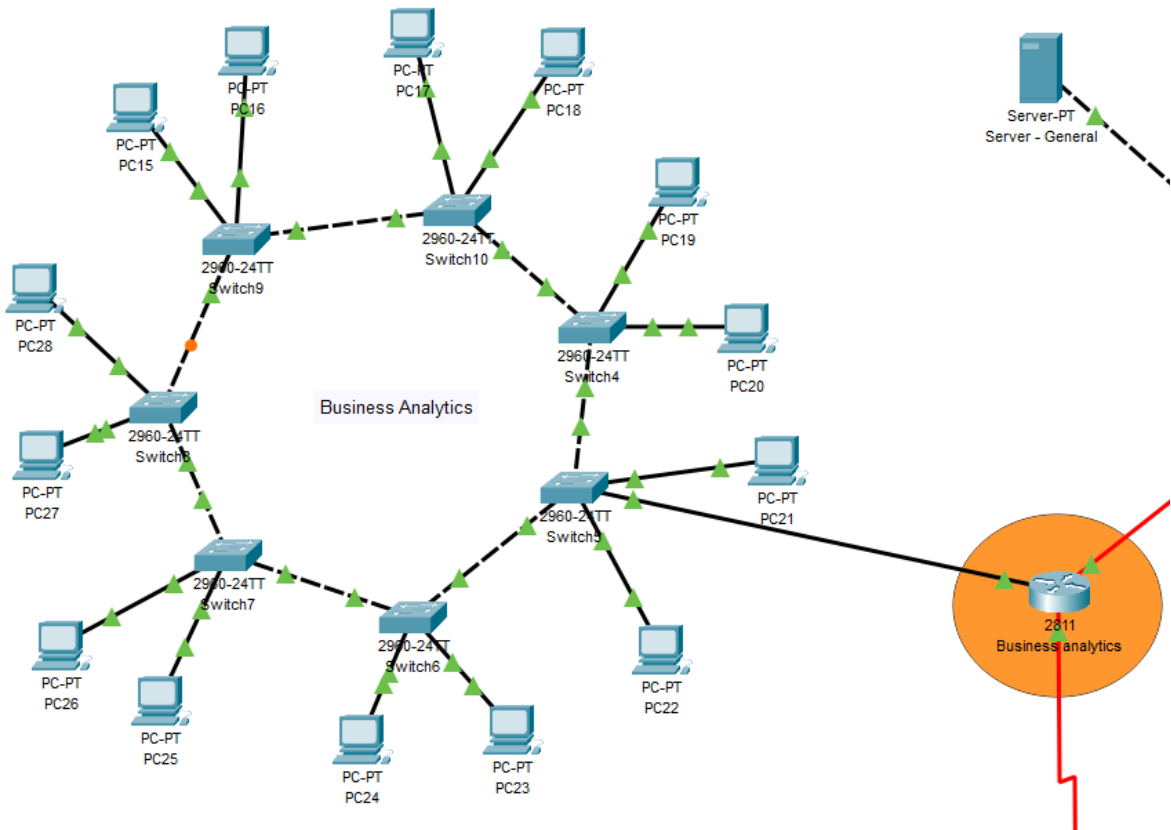
Number of Hosts	36
Network IP	193.168.2.0
Default Getaway	193.168.2.1
First Usable	193.168.2.2
Last Usable	193.168.2.62
Broadcast IP	193.168.2.63
Custom Subnet Mask	255.255.255.192
Wildcard Mask	0.0.0.63

Intelligent System (Bus Topology)



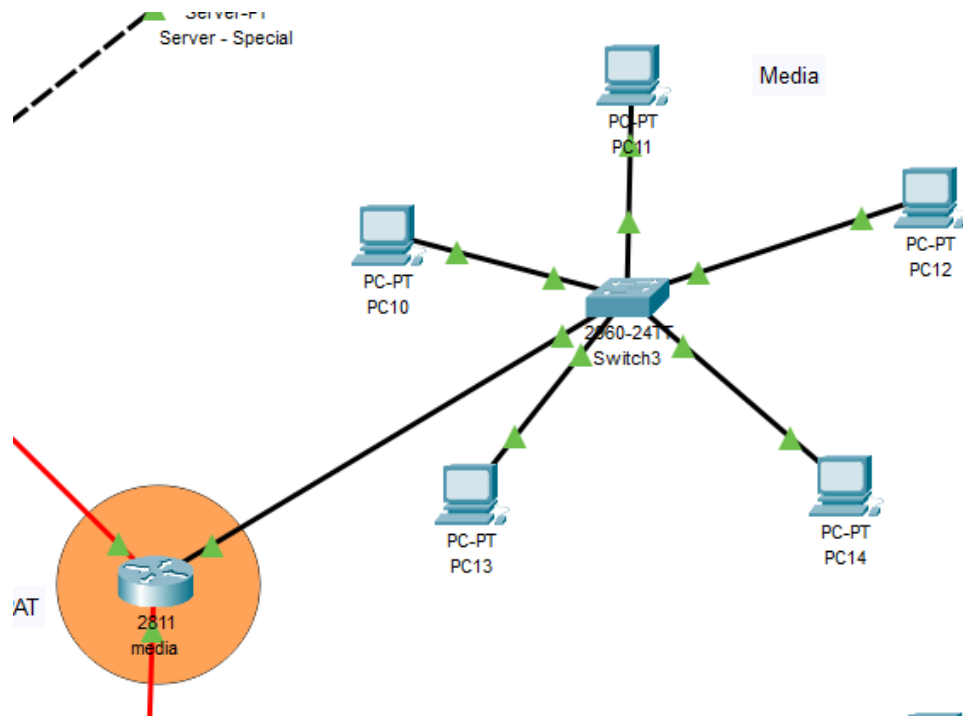
Number of Hosts	47
Network IP	193.168.2.64
Default Getaway	193.168.2.65
First Usable	193.168.2.66
Last Usable	193.168.2.126
Broadcast IP	193.168.2.127
Custom Subnet Mask	255.255.255.192
Wildcard Mask	0.0.0.63

Business Analytics (Ring Topology)



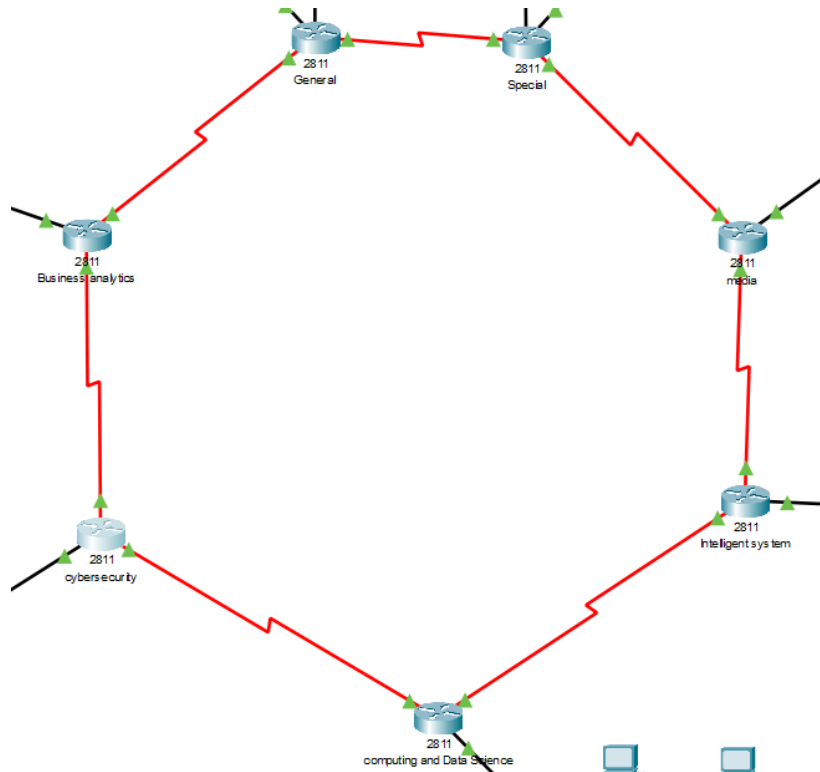
Number of Hosts	125
Network IP	193.168.2.128
Default Getaway	193.168.2.129
First Usable	193.168.2.130
Last Usable	193.168.2.254
Broadcast IP	193.168.2.255
Custom Subnet Mask	255.255.255.128
Wildcard Mask	0.0.0.127

Media (Star Topology)



Number of Hosts	10
Network IP	193.168.3.0
Default Getaway	193.168.3.1
First Usable	193.168.3.2
Last Usable	193.168.3.14
Broadcast IP	193.168.3.15
Custom Subnet Mask	255.255.255.240
Wildcard Mask	0.0.0.15

▼ Routers Configuration - Class A



Custom Subnet Mask (All) - 255.255.255.252

Wildcard Mask - 0.0.0.3

From Router General to Business Analytics

Network IP	10.0.0.0
<u>General (Se0/2/0)</u>	10.0.0.1
<u>Business Analytics (Se0/2/0)</u>	10.0.0.2
Broadcast IP	10.0.0.3

From Router Business Analytics to Cybersecurity

Network IP	10.0.0.4
<u>Business Analytics (Se0/3/0)</u>	10.0.0.5
<u>Cybersecurity (Se0/2/0)</u>	10.0.0.6
Broadcast IP	10.0.0.7

From Router Cybersecurity to Computing and Data Sciences

Network IP	10.0.0.8
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<u>Cybersecurity (Se0/3/0)</u>	10.0.0.9
<u>Computing and Data Sciences (Se0/3/0)</u>	10.0.0.10
Broadcast IP	10.0.0.11

From Router Computing and Data Sciences to Intelligent system

Network IP	10.0.0.12
<u>Computing and Data Sciences (Se0/2/0)</u>	10.0.0.13
<u>Intelligent system (Se0/2/0)</u>	10.0.0.14
Broadcast IP	10.0.0.15

From Router Intelligent system to Media

Network IP	10.0.0.16
<u>Intelligent system (Se0/3/0)</u>	10.0.0.17
<u>Media (Se0/3/0)</u>	10.0.0.18
Broadcast IP	10.0.0.19

From Router Media to Special

Network IP	10.0.0.20
<u>Media (Se0/2/0)</u>	10.0.0.21
<u>Special (Se0/2/0)</u>	10.0.0.22
Broadcast IP	10.0.0.23

From Router Special to General

Network IP	10.0.0.24
<u>Special (Se0/3/0)</u>	10.0.0.25
<u>General (Se0/3/0)</u>	10.0.0.26
Broadcast IP	10.0.0.27

▼ Servers Configuration - Class B

Server: General (172.125.12.9)

Network IP	172.125.12.0
Default Gateway	172.125.12.1
Server	172.125.12.9
Broadcast IP	172.125.12.255

Custom Subnet Mask	255.255.0.0
Wildcard Mask	0.0.255.255

Server: Special (174.125.12.9)

Network IP	174.125.12.0
Default Getaway	174.125.12.1
Server	174.125.12.9
Broadcast IP	174.125.12.255
Custom Subnet Mask	255.255.0.0
Wildcard Mask	0.0.255.255

▼ General & Special PCs Configuration - Class B

PC: General (172.126.12.9)

Network IP	172.126.12.0
Default Getaway	172.126.12.1
PC	172.126.12.9
Broadcast IP	172.126.12.255
Custom Subnet Mask	255.255.0.0
Wildcard Mask	0.0.255.255

Server: Special (174.126.12.9)

Network IP	174.126.12.0
Default Getaway	174.126.12.1
PC	174.126.12.9
Broadcast IP	174.126.12.255
Custom Subnet Mask	255.255.0.0
Wildcard Mask	0.0.255.255

Dynamic Routing

▼ Dynamic Routing (OSPF)

Router ID

General-ID	1.1.1.1
Special-ID	1.1.1.2

Media-ID	1.1.1.3
Intelligent-system-ID	1.1.1.4
Data-Sciences-ID	1.1.1.5
Cybersecurity-ID	1.1.1.6
Business-ID	1.1.1.7

General

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#router-id 1.1.1.1
Router(config-router)#network 172.125.12.0 0.0.255.255 area 0
Router(config-router)#network 172.126.12.0 0.0.255.255 area 0
Router(config-router)#network 10.0.0.0 0.0.0.3 area 0
Router(config-router)#network 10.0.0.24 0.0.0.3 area 0
```

```
router ospf 1
router-id 1.1.1.1
network 172.125.12.0 0.0.255.255 area 0
network 172.126.12.0 0.0.255.255 area 0
network 10.0.0.0 0.0.0.3 area 0
network 10.0.0.24 0.0.0.3 area 0
```

Special

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#router-id 1.1.1.2
Router(config-router)#network 174.125.12.0 0.0.255.255 area 0
Router(config-router)#network 174.126.12.0 0.0.255.255 area 0
Router(config-router)#network 10.0.0.20 0.0.0.3 area 0
Router(config-router)#network 10.0.0.24 0.0.0.3 area 0
Router(config-router)#
03:17:07: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/3/0 from LOADING to FULL, Loading Done
```

```
router ospf 1
router-id 1.1.1.2
network 174.125.12.0 0.0.255.255 area 0
network 174.126.12.0 0.0.255.255 area 0
network 10.0.0.20 0.0.0.3 area 0
network 10.0.0.24 0.0.0.3 area 0
```

Media

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#router-id 1.1.1.3
Router(config-router)#network 193.168.3.0 0.0.0.15 area 0
Router(config-router)#network 10.0.0.16 0.0.0.3 area 0
Router(config-router)#network 10.0.0.20 0.0.0.3 area 0
Router(config-router)#
03:24:09: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.2 on Serial0/2/0 from LOADING to FULL, Loading Done
```

```
router ospf 1
router-id 1.1.1.3
network 193.168.3.0 0.0.0.15 area 0
network 10.0.0.16 0.0.0.3 area 0
network 10.0.0.20 0.0.0.3 area 0
```

Intelligent System

```
router ospf 1
router-id 1.1.1.4
network 193.168.2.64 0.0.0.63 area 0
network 10.0.0.12 0.0.0.3 area 0
network 10.0.0.16 0.0.0.3 area 0
```

Data Sciences

```
router ospf 1
router-id 1.1.1.5
network 193.168.1.0 0.0.0.255 area 0
network 10.0.0.8 0.0.0.3 area 0
network 10.0.0.12 0.0.0.3 area 0
```

Cybersecurity

```
router ospf 1
router-id 1.1.1.6
network 193.168.2.0 0.0.0.63 area 0
network 10.0.0.4 0.0.0.3 area 0
network 10.0.0.8 0.0.0.3 area 0
```

Business Analytics

```
router ospf 1
router-id 1.1.1.7
network 193.168.2.128 0.0.0.127 area 0
network 10.0.0.0 0.0.0.3 area 0
network 10.0.0.4 0.0.0.3 area 0
```

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#router-id 1.1.1.7
Router(config-router)#network 193.168.2.128 0.0.0.127 area 0
Router(config-router)#network 10.0.0.0 0.0.0.3 area 0
Router(config-router)#
07:46:43: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/2/0 from LOADING to FULL, Loading Done

Router(config-router)#network 10.0.0.4 0.0.0.3 area 0
Router(config-router)#
07:47:46: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.6 on Serial0/3/0 from LOADING to FULL, Loading Done
```

▼ Dynamic Routing (EIGRP)

General

```
router eigrp 10
network 172.125.12.0
network 172.126.12.0
network 10.0.0.0
network 10.0.0.24
```

```
Router#en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router eigrp 10
Router(config-router)#network 172.125.12.0
Router(config-router)#network 172.126.12.0
Router(config-router)#network 10.0.0.0
Router(config-router)#network 10.0.0.24
```

Special

```
router eigrp 10
network 174.125.12.0
network 174.126.12.0
network 10.0.0.20
network 10.0.0.24
```

```

Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router eigrp 10
Router(config-router)#network 174.125.12.0
Router(config-router)#network 174.126.12.0
Router(config-router)#network 10.0.0.20
Router(config-router)#network 10.0.0.24
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 10.0.0.26 (Serial0/3/0) is up: new adjacency

```

Media

```

router eigrp 10
network 193.168.3.0
network 10.0.0.16
network 10.0.0.20

```

```

Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router eigrp 10
Router(config-router)#network 193.168.3.0
Router(config-router)#network 10.0.0.16
Router(config-router)#network 10.0.0.20
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 10.0.0.22 (Serial0/2/0) is up: new adjacency

```

Intelligent System

```

router eigrp 10
network 193.168.2.64
network 10.0.0.12
network 10.0.0.16

```

```

Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router eigrp 10
Router(config-router)#network 193.168.2.64
Router(config-router)#network 10.0.0.12
Router(config-router)#network 10.0.0.16
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 10.0.0.18 (Serial0/3/0) is up: new adjacency

```

Data Sciences

```

router eigrp 10
network 193.168.1.0

```

```
network 10.0.0.8
network 10.0.0.12
```

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router eigrp 10
Router(config-router)#network 193.168.1.0
Router(config-router)#network 10.0.0.8
Router(config-router)#network 10.0.0.12
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 10.0.0.14 (Serial0/2/0) is up: new adjacency
```

Cybersecurity

```
router eigrp 10
network 193.168.2.0
network 10.0.0.4
network 10.0.0.8
```

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router eigrp 10
Router(config-router)#network 193.168.2.0
Router(config-router)#network 10.0.0.4
Router(config-router)#network 10.0.0.8
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 10.0.0.10 (Serial0/3/0) is up: new adjacency
```

Business Analytics

```
router eigrp 10
network 193.168.2.128
network 10.0.0.0
network 10.0.0.4
```

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router eigrp 10
Router(config-router)#network 193.168.2.128
Router(config-router)#network 10.0.0.0
Router(config-router)#network 10.0.0.4
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 10.0.0.1 (Serial0/2/0) is up: new adjacency
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 10.0.0.6 (Serial0/3/0) is up: new adjacency
```

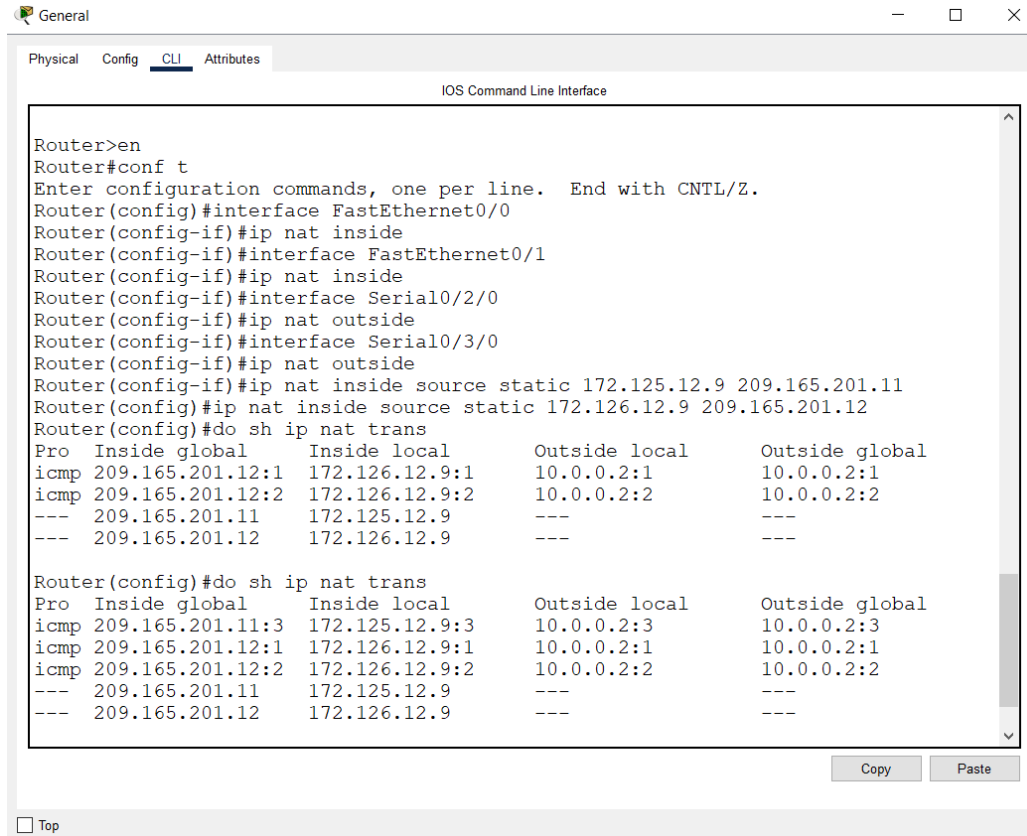
Static, Dynamic NATing & PATing

NAT is a technique used in computer networking to modify network address information in packet headers while they are in transit across a traffic routing device. It is frequently used to let several local networked devices to share a single public IP address for internet access. NAT operates at the network layer (layer 3) of the OSI model and can be implemented in various ways, such as static NAT, dynamic NAT, and port address translation (PAT). Its primary functions include conserving public IP addresses, enhancing network security by hiding internal IP addresses, and facilitating communication between networks with incompatible address schemes.

▼ Static NATing

Static NAT : In Static NAT, a one-to-one mapping is established between an internal private IP address and a public IP address.

```
interface FastEthernet0/0
ip nat inside
interface FastEthernet0/1
ip nat inside
interface Serial0/2/0
ip nat outside
interface Serial0/3/0
ip nat outside
ip nat inside source static 172.125.12.9 209.165.201.11
ip nat inside source static 172.126.12.9 209.165.201.12
```

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip nat inside
Router(config-if)#interface FastEthernet0/1
Router(config-if)#ip nat inside
Router(config-if)#interface Serial0/2/0
Router(config-if)#ip nat outside
Router(config-if)#interface Serial0/3/0
Router(config-if)#ip nat outside
Router(config-if)#ip nat inside source static 172.125.12.9 209.165.201.11
Router(config)#ip nat inside source static 172.126.12.9 209.165.201.12
Router(config)#do sh ip nat trans
Pro  Inside global      Inside local      Outside local      Outside global
icmp 209.165.201.12:1    172.126.12.9:1    10.0.0.2:1         10.0.0.2:1
icmp 209.165.201.12:2    172.126.12.9:2    10.0.0.2:2         10.0.0.2:2
--- 209.165.201.11      172.125.12.9      ---                ---
--- 209.165.201.12      172.126.12.9      ---                ---

Router(config)#do sh ip nat trans
Pro  Inside global      Inside local      Outside local      Outside global
icmp 209.165.201.11:3    172.125.12.9:3    10.0.0.2:3         10.0.0.2:3
icmp 209.165.201.12:1    172.126.12.9:1    10.0.0.2:1         10.0.0.2:1
icmp 209.165.201.12:2    172.126.12.9:2    10.0.0.2:2         10.0.0.2:2
--- 209.165.201.11      172.125.12.9      ---                ---
--- 209.165.201.12      172.126.12.9      ---                ---
```

```
no ip nat inside source static 172.125.12.9 209.165.201.11
```

▼ Dynamic NATing

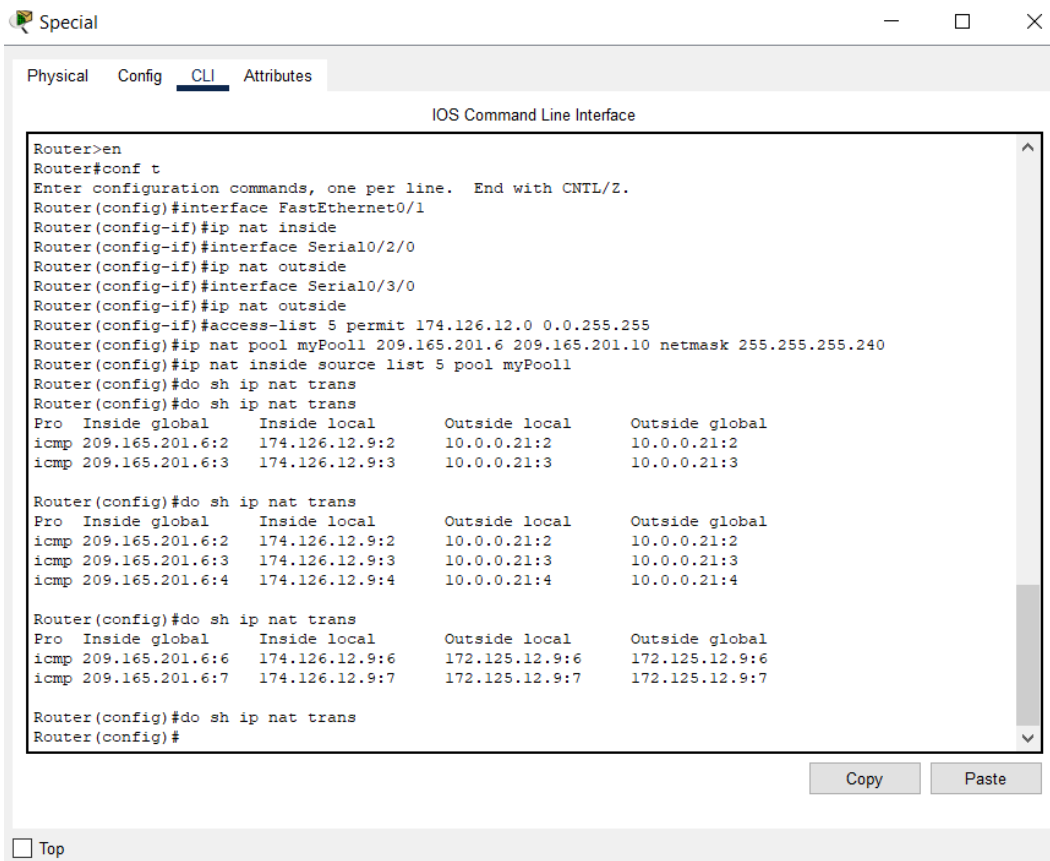
Dynamic NAT: Dynamic NAT allows a pool of public IP addresses to be shared among multiple private IP addresses. The NAT device dynamically assigns a public IP address from the pool to internal devices on a first-come, first-served basis. Once the communication session is terminated, the public IP address is returned to the pool for reuse.

Special - Router

```
interface FastEthernet0/0
ip nat inside
interface FastEthernet0/1
ip nat inside
interface Serial0/2/0
ip nat outside
interface Serial0/3/0
ip nat outside
access-list 5 permit 10.0.0.0 0.0.0.255
```

```
ip nat pool myPool1 209.165.201.6 209.165.201.10 netmask 255.255.255.0
ip nat inside source list 2 pool myPool1
```

```
interface FastEthernet0/1
ip nat inside
interface Serial0/2/0
ip nat outside
interface Serial0/3/0
ip nat outside
access-list 5 permit 174.126.12.0 0.0.255.255
ip nat pool myPool1 209.165.201.6 209.165.201.10 netmask 255.255.255.240
ip nat inside source list 5 pool myPool1
```



The screenshot shows a Cisco IOS Command Line Interface window titled "Special" with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the following commands and output:

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/1
Router(config-if)#ip nat inside
Router(config-if)#interface Serial0/2/0
Router(config-if)#ip nat outside
Router(config-if)#interface Serial0/3/0
Router(config-if)#ip nat outside
Router(config-if)#access-list 5 permit 174.126.12.0 0.0.255.255
Router(config)#ip nat pool myPool1 209.165.201.6 209.165.201.10 netmask 255.255.255.240
Router(config)#ip nat inside source list 5 pool myPool1
Router(config)#do sh ip nat trans
Router(config)#do sh ip nat trans
```

Pro	Inside global	Inside local	Outside local	Outside global
icmp	209.165.201.6:2	174.126.12.9:2	10.0.0.21:2	10.0.0.21:2
icmp	209.165.201.6:3	174.126.12.9:3	10.0.0.21:3	10.0.0.21:3

Pro	Inside global	Inside local	Outside local	Outside global
icmp	209.165.201.6:2	174.126.12.9:2	10.0.0.21:2	10.0.0.21:2
icmp	209.165.201.6:3	174.126.12.9:3	10.0.0.21:3	10.0.0.21:3
icmp	209.165.201.6:4	174.126.12.9:4	10.0.0.21:4	10.0.0.21:4

Pro	Inside global	Inside local	Outside local	Outside global
icmp	209.165.201.6:6	174.126.12.9:6	172.125.12.9:6	172.125.12.9:6
icmp	209.165.201.6:7	174.126.12.9:7	172.125.12.9:7	172.125.12.9:7

```
Router(config)#do sh ip nat trans
Router(config)#
```

▼ PATing

Port Address Translation (PAT): Also known as NAT Overload or NAT with Overloading, PAT maps multiple private IP addresses to a single public IP address by using different source port numbers. This allows many internal devices to share a single public IP address. PAT keeps track of these mappings using port numbers, thereby allowing multiple simultaneous connections.

Media Router - PAT

```
interface FastEthernet0/0
ip nat inside
interface Serial0/2/0
ip nat outside
interface Serial0/3/0
ip nat outside
access-list 6 permit 193.168.3.0 0.0.0.15
ip nat inside source list 6 interface Serial0/2/0 overload
```

media

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip nat inside
Router(config-if)#interface Serial0/2/0
Router(config-if)#ip nat outside
Router(config-if)#interface Serial0/3/0
Router(config-if)#ip nat outside
Router(config-if)#access-list 6 permit 193.168.3.0 0.0.0.15
Router(config)#ip nat inside source list 6 interface Serial0/2/0 overload
Router(config)#do sh ip nat trans
Router(config)#do sh ip nat trans
Router(config)#do sh ip nat trans
Router(config)#do sh ip nat trans
```

Pro	Inside global	Inside local	Outside local	Outside global
icmp	10.0.0.21:2	193.168.3.14:2	10.0.0.22:2	10.0.0.22:2
Router(config)#do sh ip nat trans				
Pro	Inside global	Inside local	Outside local	Outside global
icmp	10.0.0.21:2	193.168.3.2:2	174.125.12.9:2	174.125.12.9:2
Router(config)#do sh ip nat trans				
Pro	Inside global	Inside local	Outside local	Outside global
icmp	10.0.0.21:4	193.168.3.2:4	174.126.12.9:4	174.126.12.9:4
icmp	10.0.0.21:5	193.168.3.2:5	10.0.0.22:5	10.0.0.22:5
Router(config)#do sh ip nat trans				
Pro	Inside global	Inside local	Outside local	Outside global
icmp	10.0.0.21:6	193.168.3.2:6	10.0.0.22:6	10.0.0.22:6
icmp	10.0.0.21:7	193.168.3.2:7	174.125.12.9:7	174.125.12.9:7

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☐ Top

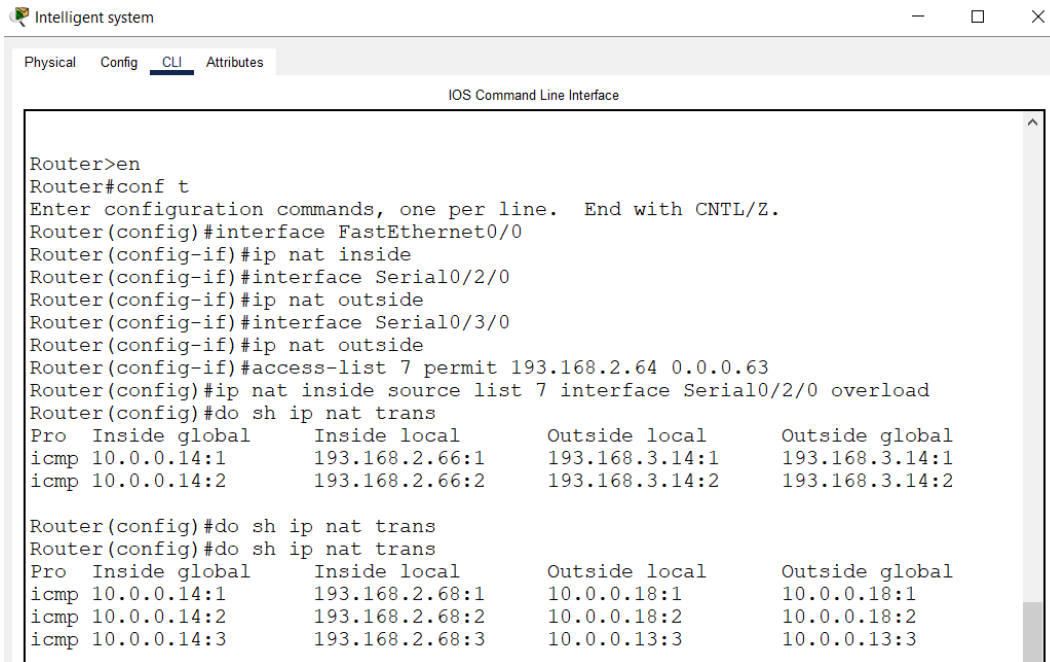
Intelligent Router - PAT

```
interface FastEthernet0/0
ip nat inside
interface Serial0/2/0
```

```

ip nat outside
interface Serial0/3/0
ip nat outside
access-list 7 permit 193.168.2.64 0.0.0.63
ip nat inside source list 7 interface Serial0/2/0 overload

```



The screenshot shows a Cisco IOS Command Line Interface window titled "Intelligent system". The window has tabs for "Physical", "Config", "CLI" (selected), and "Attributes". The CLI tab displays the following commands and output:

```

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip nat inside
Router(config-if)#interface Serial0/2/0
Router(config-if)#ip nat outside
Router(config-if)#interface Serial0/3/0
Router(config-if)#ip nat outside
Router(config-if)#access-list 7 permit 193.168.2.64 0.0.0.63
Router(config)#ip nat inside source list 7 interface Serial0/2/0 overload
Router(config)#do sh ip nat trans

```

Pro	Inside global	Inside local	Outside local	Outside global
icmp	10.0.0.14:1	193.168.2.66:1	193.168.3.14:1	193.168.3.14:1
icmp	10.0.0.14:2	193.168.2.66:2	193.168.3.14:2	193.168.3.14:2

```

Router(config)#do sh ip nat trans
Router(config)#do sh ip nat trans
Pro Inside global Inside local Outside local Outside global
icmp 10.0.0.14:1 193.168.2.68:1 10.0.0.18:1 10.0.0.18:1
icmp 10.0.0.14:2 193.168.2.68:2 10.0.0.18:2 10.0.0.18:2
icmp 10.0.0.14:3 193.168.2.68:3 10.0.0.13:3 10.0.0.13:3

```

Computing and Data Science Router - PAT

```

interface FastEthernet0/0
ip nat inside
interface Serial0/2/0
ip nat outside
interface Serial0/3/0
ip nat outside
access-list 8 permit 193.168.1.0 0.0.0.255
ip nat inside source list 8 interface Serial0/2/0 overload

```

computing and Data Science

Physical Config CLI Attributes

IOS Command Line Interface

```
Router>
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip nat inside
Router(config-if)#interface Serial0/2/0
Router(config-if)#ip nat outside
Router(config-if)#interface Serial0/3/0
Router(config-if)#ip nat outside
Router(config-if)#access-list 8 permit 193.168.1.0 0.0.0.255
Router(config)#ip nat inside source list 8 interface Serial0/2/0 overload
Router(config)#do sh ip nat trans
Pro  Inside global      Inside local      Outside local      Outside global
icmp 10.0.0.13:1        193.168.1.2:1    193.168.2.66:1    193.168.2.66:1

Router(config)#do sh ip nat trans
Pro  Inside global      Inside local      Outside local      Outside global
icmp 10.0.0.13:1        193.168.1.2:1    193.168.2.66:1    193.168.2.66:1
icmp 10.0.0.13:2        193.168.1.2:2    193.168.2.66:2    193.168.2.66:2
icmp 10.0.0.13:3        193.168.1.2:3    10.0.0.14:3       10.0.0.14:3
icmp 10.0.0.13:4        193.168.1.2:4    10.0.0.9:4        10.0.0.9:4

Router(config)#
```

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Top

Cybersecurity Router - PAT

```
interface FastEthernet0/0
ip nat inside
interface Serial0/2/0
ip nat outside
interface Serial0/3/0
ip nat outside
access-list 9 permit 193.168.2.0 0.0.0.63
ip nat inside source list 9 interface Serial0/2/0 overload
```

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip nat inside
Router(config-if)#interface Serial0/2/0
Router(config-if)#ip nat outside
Router(config-if)#interface Serial0/3/0
Router(config-if)#ip nat outside
Router(config-if)#access-list 9 permit 193.168.2.0 0.0.0.63
Router(config)#ip nat inside source list 9 interface Serial0/2/0 overload
Router(config)#do sh ip nat trans
Pro  Inside global      Inside local      Outside local      Outside global
icmp 10.0.0.6:1024        193.168.2.4:1     193.168.2.131:1    193.168.2.131:1024
icmp 10.0.0.6:1025        193.168.2.2:1     193.168.2.130:1    193.168.2.130:1025
icmp 10.0.0.6:1026        193.168.2.2:2     193.168.1.5:2      193.168.1.5:1026
icmp 10.0.0.6:1027        193.168.2.3:1     193.168.1.5:1      193.168.1.5:1027
icmp 10.0.0.6:1          193.168.2.5:1     193.168.2.131:1    193.168.2.131:1
icmp 10.0.0.6:2          193.168.2.4:2     193.168.2.131:2    193.168.2.131:2
icmp 10.0.0.6:3          193.168.2.2:3     193.168.2.131:3    193.168.2.131:3
Router(config)#
```

Business Router - PAT

```
interface FastEthernet0/0
ip nat inside
interface Serial0/2/0
ip nat outside
interface Serial0/3/0
ip nat outside
access-list 3 permit 193.168.2.128 0.0.0.127
ip nat inside source list 3 interface Serial0/2/0 overload
```

Business analytics

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip nat inside
Router(config-if)#interface Serial0/2/0
Router(config-if)#ip nat outside
Router(config-if)#interface Serial0/3/0
Router(config-if)#ip nat outside
Router(config-if)#access-list 3 permit 193.168.2.128 0.0.0.127
Router(config)#ip nat inside source list 3 interface Serial0/2/0 overload
Router(config)#do sh ip nat trans
Pro Inside global      Inside local      Outside local      Outside global
icmp 10.0.0.2:1024      193.168.2.130:1   193.168.2.3:1      193.168.2.3:1024
icmp 10.0.0.2:1         193.168.2.132:1   193.168.2.2:1      193.168.2.2:1
icmp 10.0.0.2:2         193.168.2.132:2   193.168.2.3:2      193.168.2.3:2

Router(config)#do sh ip nat trans
Pro Inside global      Inside local      Outside local      Outside global
icmp 10.0.0.2:1025      193.168.2.130:2   10.0.0.6:2         10.0.0.6:1025

Router(config)#
```

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Top

Access List

▼ Commands

Access list to special department from general one

```
Router#
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#access-list 11 permit 193.168.1.0 0.0.0.255
Router(config)#access-list 11 deny any
Router(config)#interface Serial0/2/0
Router(config-if)#ip access-group 11 in
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip access-list
Standard IP access list 1
10 permit 193.168.1.0 0.0.0.255
20 deny any (158 match(es))
```

```
Standard IP access list 11
10 permit 193.168.1.0 0.0.0.255
20 deny any (1 match(es))
```

BONUSs

▼ File Transfer Protocol (FTP)

FTP is a client/server protocol for sharing files between machines over a TCP/IP network.

1. FTP configuration in Packet Trace on Special Server:

Server - Special

Physical Config Services Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP**
- IoT
- VM Management
- Radius EAP

FTP

Service ☒ On ☐ Off

User Setup

Username Password

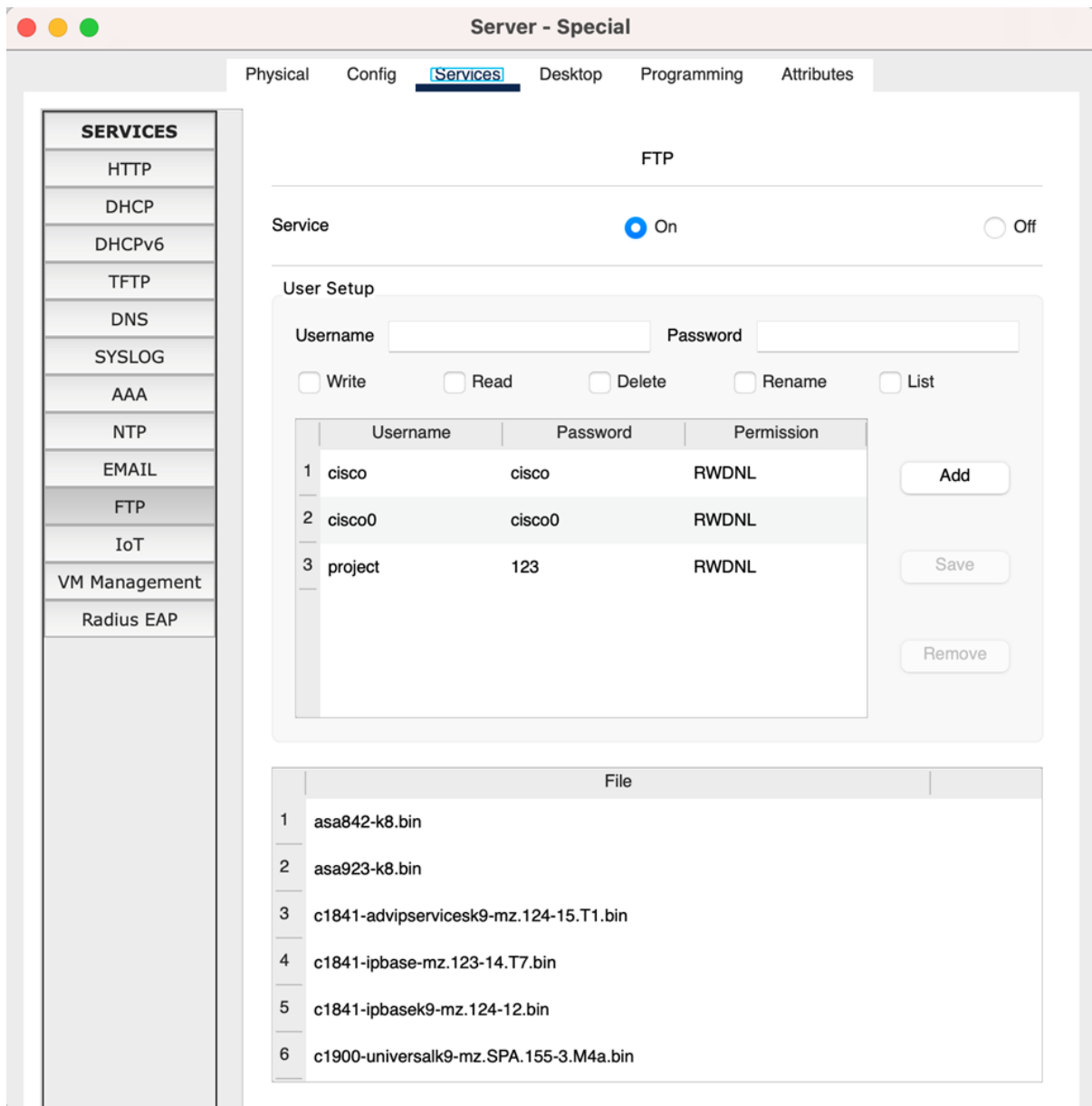
☒ Write ☒ Read ☒ Delete ☒ Rename ☒ List

	Username	Password	Permission
1	cisco	cisco	RWDNL
2	cisco0	cisco0	RWDNL

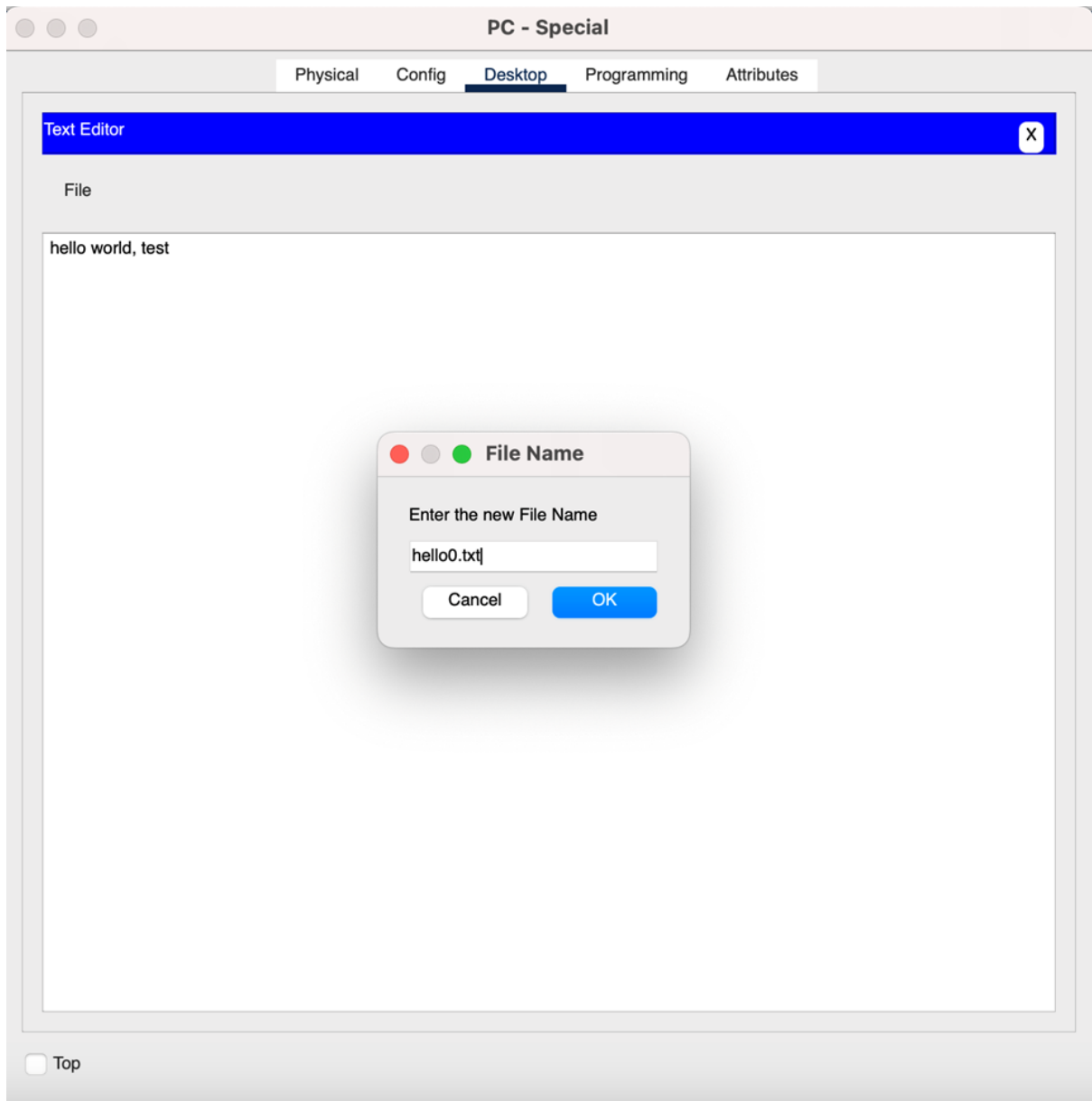
Add Save Remove

File

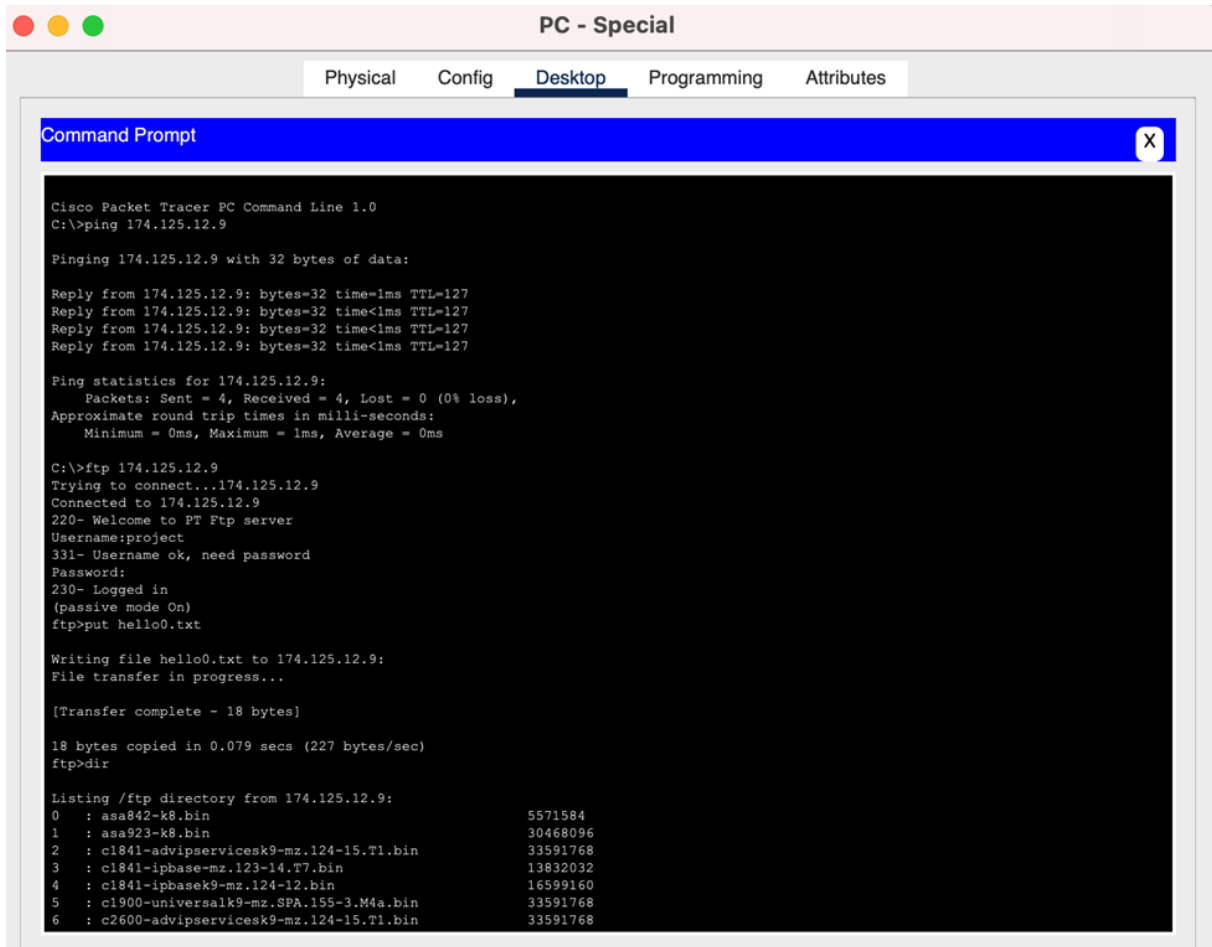
1	asa842-k8.bin
2	asa923-k8.bin
3	c1841-advipservicesk9-mz.124-15.T1.bin
4	c1841-ipbase-mz.123-14.T7.bin
5	c1841-ipbasek9-mz.124-12.bin
6	c1900-universalk9-mz.SPA.155-3.M4a.bin

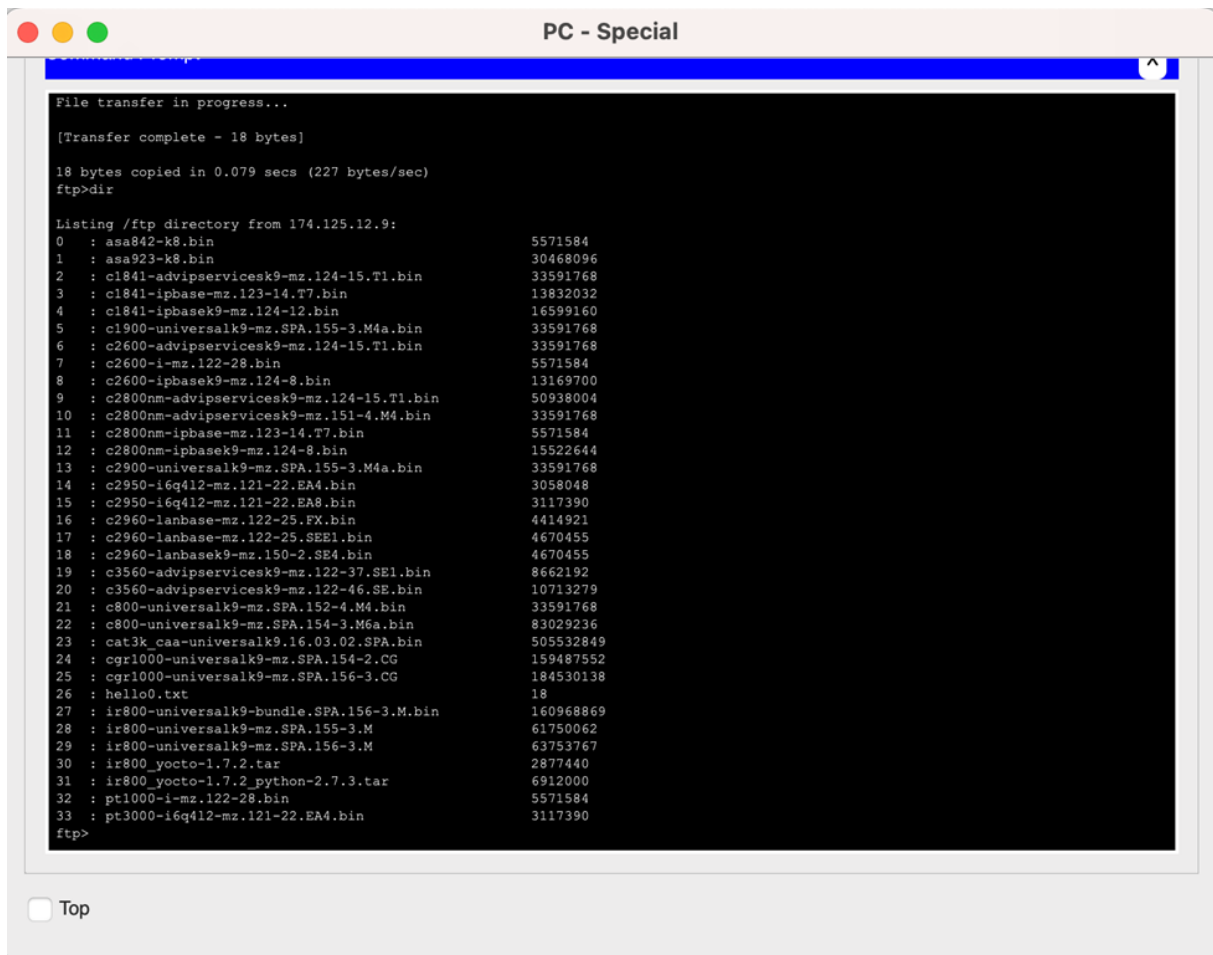


2. Create a file in PC-SPECIAL



3. upload the file from the Laptop to the server using FTP.

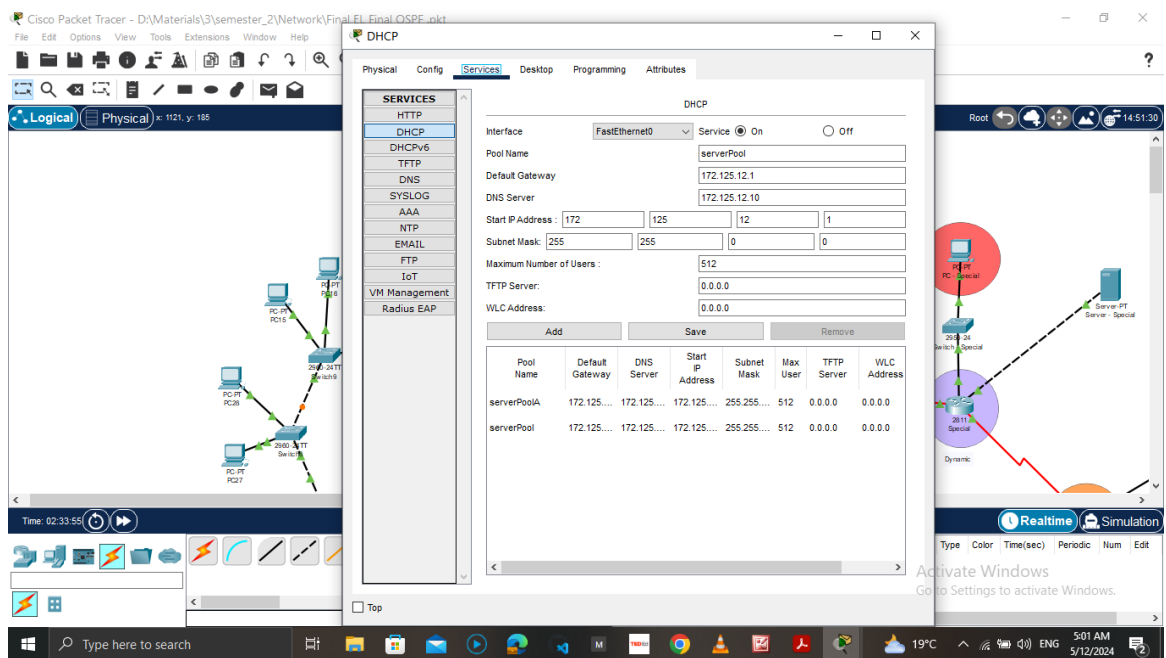
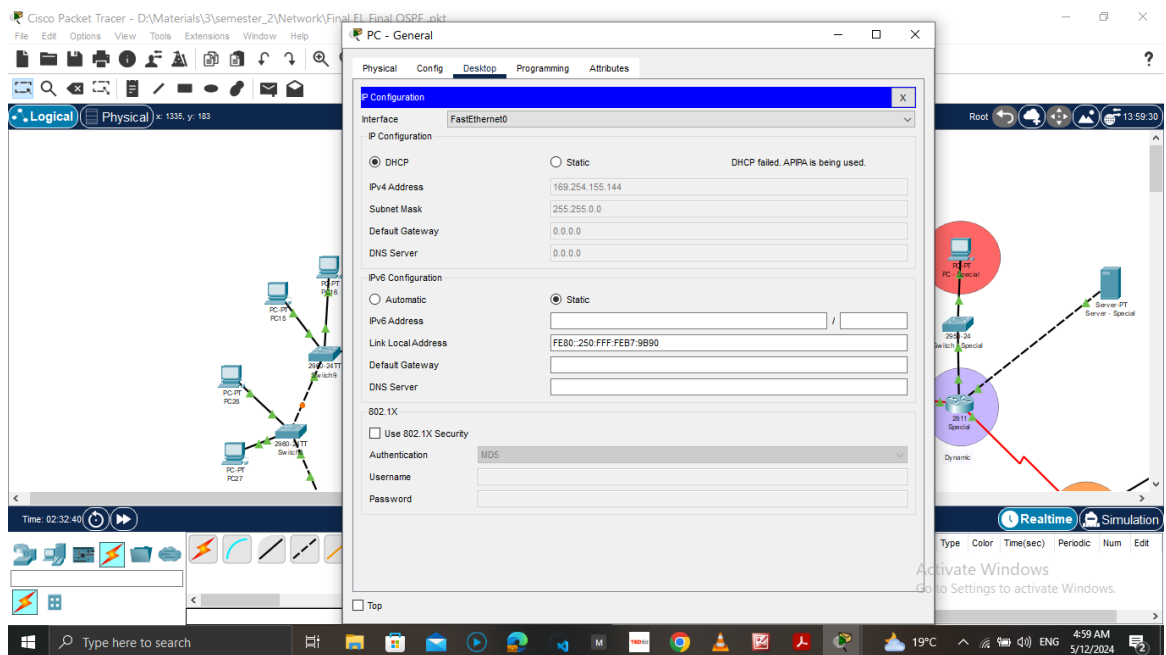


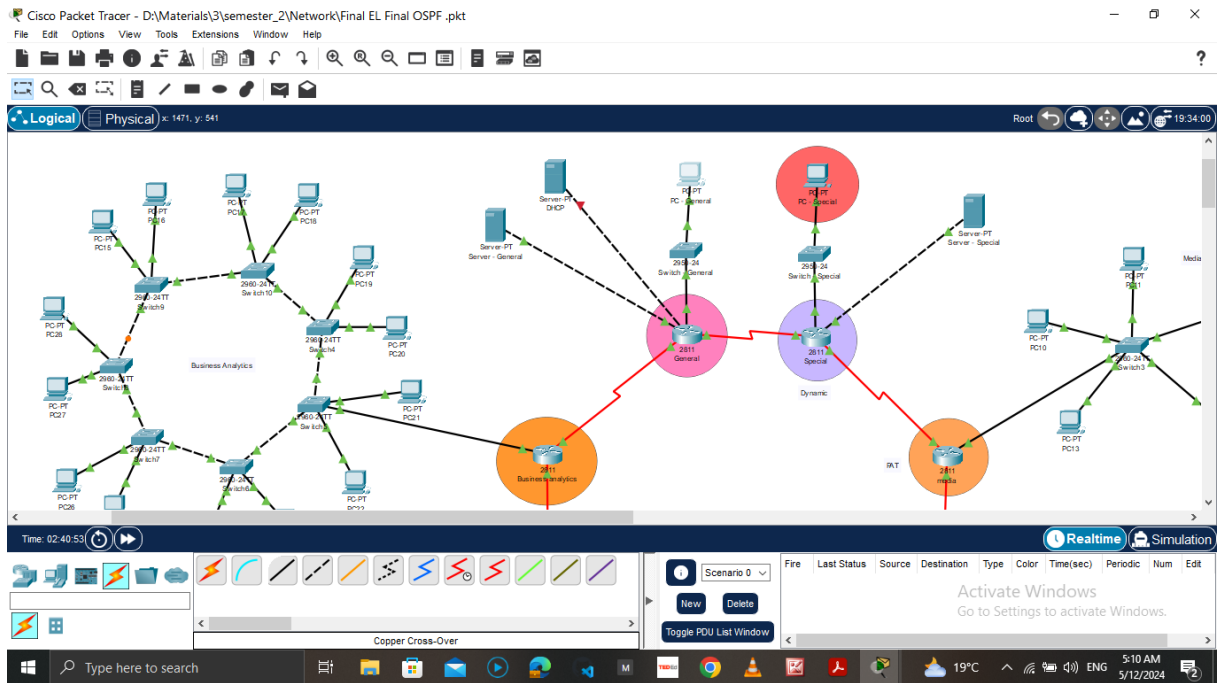


4. Download the file on PC-Media



▼ DHCP





▼ DNS

