DEPI Networks Project Documentation

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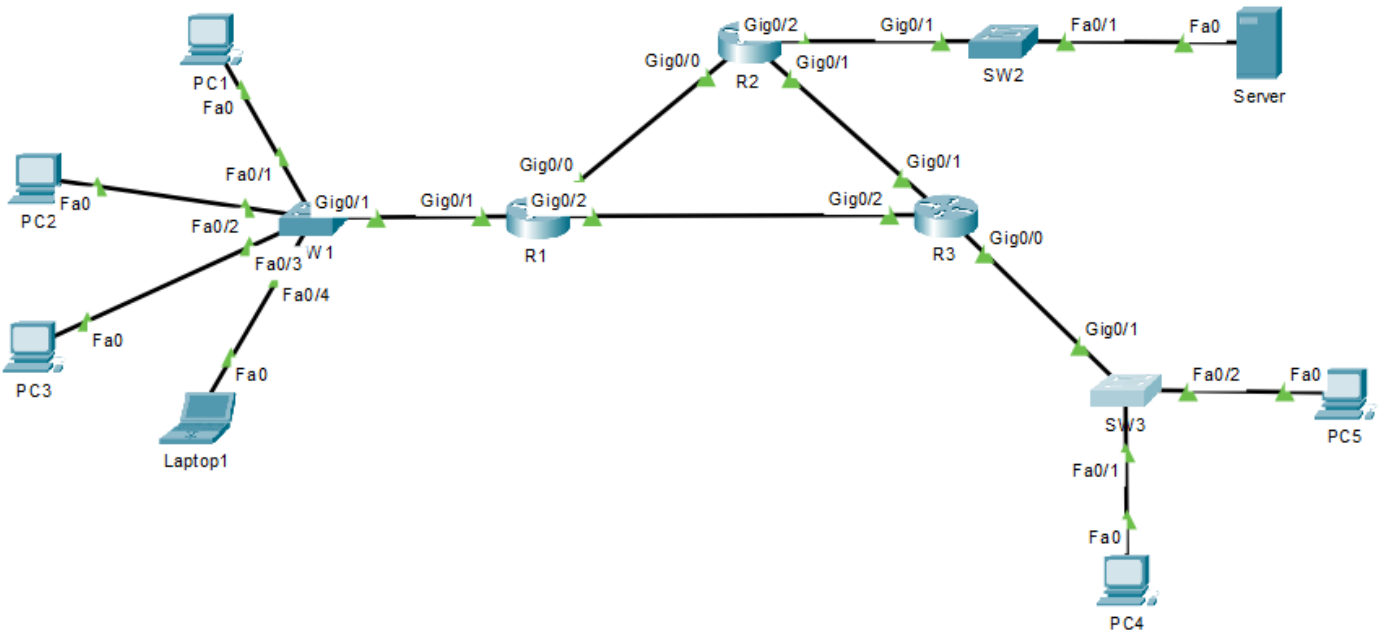
Project Tasks

Task 1	Network Design
Task 2	Initial Configurations
Task 3	VLANs and Inter-VLAN Routing Configuration
Task 4	OSPF, HTTP, HTTPs, DNS, and DHCP Configurations
Task 5	Network Security
Task 6	Network Testing

Task 1: Network Design



Network Number	Network Address	VLANs Configon	VLANs	Switch Ports
1	192.168.10.0/24	SW1	VLAN 1	-
			VLAN 10	Fa0/1, Fa0/2
			VLAN 11	Fa0/3, Fa0/4
	2001:db8:1:10::/64		Management VLAN (12)	VI1
			Native VLAN (13)	-
2	192.168.15.0/30	---	---	---
	2001:db8:1:15::/64		---	
3	192.168.15.4/30	---	---	---
	2001:db8:1:16::/64		---	
4	192.168.15.8/30	---	---	---
	2001:db8:1:17::/64		---	
5	192.168.20.0/24	SW2	VLAN 1	-
			VLAN 20	Fa0/1
			Management VLAN (21)	VI1
	2001:db8:1:20::/64		Native VLAN (22)	-
6	192.168.30.0/24	SW3	VLAN 1	-
			VLAN 30	Fa0/1, Fa0/2
			Management VLAN (31)	VI1
	2001:db8:1:30::/64		Native VLAN (32)	-

Device Name	MAC Address	Interface	IP Address	Subnet Mask	Default Gateway	Connected to
R1	0090.0CE1.9501	G0/0	192.168.15.1	255.255.255.252	---	R2(G0/0)
			2001:db8:1:15::1/64		---	
			fe80::1		---	
	0090.0CE1.9502	G0/1.10	192.168.10.1	255.255.255.192	---	SW1(G0/1)
			2001:db8:1:10::1/64		---	
			fe80::2		---	
	0090.0CE1.9502	G0/1.11	192.168.10.65	255.255.255.192	---	
			2001:db8:1:11::1/64		---	
			fe80::3		---	
	0090.0CE1.9502	G0/1.12	192.168.10.129	255.255.255.240		
			2001:db8:1:12::1/64			
			fe80::4			
	0090.0CE1.9503	G0/2	192.168.15.5	255.255.255.252	---	R3(G0/2)
			2001:db8:1:16::1/64		---	
			fe80::5		---	
SW1	---	Fa0/1	---	---	192.168.10.129 2001:db8:1:12::1/64 fe80::4	PC1(Fa0)

	---	Fa0/2	---	---		PC2(Fa0)

	---	Fa0/3	---	---		PC3(Fa0)

	---	Fa0/4	---	---		PC4(Fa0)

	---	G0/1	---	---		R1(G0/1)

	---	Vlan 12	192.168.10.130	255.255.255.240		---

PC1	00D0.FF85.B035	Fa0	192.168.10.2	255.255.255.192	192.168.10.1	SW1(Fa0/1)
			2001:db8:1:10::2/64		2001:db8:1:10::1/64	
			fe80::7		fe80::2	

PC2	00E0.A393.9B61	Fa0	192.168.10.3	255.255.255.192	192.168.10.1	SW1(Fa0/2)
			2001:db8:1:10::3/64		2001:db8:1:10::1/64	
			fe80::8		fe80::2	
PC3	0003.E4B9.907E	Fa0	192.168.10.66	255.255.255.192	192.168.10.65	SW1(Fa0/3)
			2001:db8:1:11::2/64		2001:db8:1:11::1/64	
			fe80::9		fe80::3	
Laptop1	0006.2A30.8B0D	Fa0	192.168.10.67	255.255.255.192	192.168.10.65	SW1(Fa0/4)
			2001:db8:1:11::3/64		2001:db8:1:11::1/64	
			fe80::10		fe80::3	

R2	0060.47D0.D001	G0/0	192.168.15.2	255.255.255.252	---	R1(G0/0)
			2001:db8:1:15::2/64		---	
			fe80::11		---	
	0060.47D0.D002	G0/1	192.168.15.9	255.255.255.252	---	R3(G0/1)
			2001:db8:1:17::1/64		---	
			fe80::12		---	
	0060.47D0.D003	G0/2.20	192.168.20.1	255.255.255.224	---	SW2(G0/1)
			2001:db8:1:20::1/64		---	
			fe80::13		---	
	0060.47D0.D003	G0/2.21	192.168.20.33	255.255.255.240		
			2001:db8:1:21::1/64			
			fe80::14			
R3	0009.7CB8.E101	G0/0.30	192.168.30.1	255.255.255.128	---	SW3(G0/1)
			2001:db8:1:30::1/64		---	
			fe80::15		---	
	0009.7CB8.E101	G0/0.31	192.168.30.129	255.255.255.240	---	
			2001:db8:1:31::1/64		---	
			fe80::16		---	
	0009.7CB8.E102	G0/1	192.168.15.10	255.255.255.252	---	R2(G0/1)
			2001:db8:1:17::2/64		---	
			fe80::17		---	
	0009.7CB8.E103	G0/2	192.168.15.6	255.255.255.252	---	R1(G0/2)
			2001:db8:1:16::2/64		---	
			fe80::18		---	

SW2	---	Fa0/1	--- --- ---	---	192.168.20.33 2001:db8:1:21::1/64 fe80::14	Server(Fa0)
	---	G0/1	--- --- ---	---		R2(G0/2)
	---	Vlan 21	192.168.20.34 	255.255.255.240*		---
SW3	---	Fa0/1	--- --- ---	---	192.168.30.129 2001:db8:1:31::1/64 fe80::16	PC4(Fa0)
	---	Fa0/1	--- --- ---	---		PC5(Fa0)
	---	G0/1	--- --- ---	---		R3(G0/0)
	---	Vlan 31	192.168.30.130 --- ---	255.255.255.240		---
PC4	0009.7C78.707D	Fa0	192.168.30.2 2001:db8:1:30::2/64 fe80::21	255.255.255.128	192.168.30.1 2001:db8:1:30::1/64 fe80::15	SW3(Fa0/1)
PC5	0007.EC24.3805	Fa0	192.168.30.3 2001:db8:1:30::3/64 fe80::22	255.255.255.128	192.168.30.1 2001:db8:1:30::1/64 fe80::15	SW3(Fa0/2)
Server	0030.F21D.7D87	Fa0	192.168.20.2 2001:db8:1:20::2/64 fe80::23	255.255.255.224	192.168.20.1 2001:db8:1:20::1/64 fe80::13	SW2(Fa0/1)

Task 2: Initial Configurations

A. Switches

1. Hostnames
2. Secret password "cisco"
3. Password "cisco" for console and vty lines
4. Enable password encryptions services
4. Banner "Auth Only"
5. Full-Duplex interfaces
6. Configure the interface speed

B. PC's

1. Hostnames
2. Full-Duplex interfaces
3. Configure interfaces ipv4 and ipv6 addresses
4. Configure ipv4 and ipv6 gateways
5. Configure the interface speed

C. Routers

1. Hostnames
2. secret password "DEPI"
3. Password "DEPI" for console and vty lines
4. Enable password encryptions services
5. banner "Auth Only"
6. Full-Duplex interfaces
7. configure interfaces ipv4 and ipv6 addresses
8. configure ipv4 and ipv6 gateways
9. Configure the interface speed

D. Server

1. Hostnames
2. Full-Duplex interfaces
3. configure interfaces ipv4 and ipv6 addresses
4. configure ipv4 and ipv6 gateways
5. Configure the interface speed

Task 3: VLANs and Inter-VLAN Routing Configurations

SW1>

```
enable
configure terminal
vlan 1
ex
vlan 10
ex
vlan 11
ex
interface range fastEthernet 0/1-2
swichport mode access
swichport access vlan 10
ex
interface range fastEthernet 0/3-4
swichport mode access
swichport access vlan 11
ex
interface gigabitEthernet0/1
swichport mode trunk
ex
```

R1(config-if)#

interface gigabitEthernet 0/1.10

encapsulation dot1Q 10

ip address 192.168.10.1 255.255.255.192

ipv6 adderss 2001:db8:1:10::1/64

no shutdown

ex

interface gigabitEthernet 0/1.11

encapsulation dot1Q 11

ip address 192.168.10.129 255.255.255.192

ipv6 adderss 2001:db8:1:11::1/64

ipv6 adderss fe80::3 link-local

no shutdown

ex

interface g0/1.12

Encapsulation dot1Q 12

ip adderss 192.168.10.192 255.255.255.240

ipv6 adderss 2001:db8:1:12::1/64

ipv6 adderss fe80::4 link-local

no shutdown

SW2>

enable

configure terminal

vlan 1

ex

vlan 20

ex

interface fastEthernet 0/1

swichport mode access

swichport access vlan 20

ex

interface gigabitEthernet0/1

swichport mode trunk

ex

R2(config-if)#

interface gigabitEthernet 0/2.20

encapsulation dot1Q 20

ip address 192.168.20.1 255.255.255.224

ipv6 address 2001:db8:1:20::1/64

ipv6 address fe80::13 link-local

no shutdown

ex

interface gigabitEthernet 0/2.21

encapsulation dot1Q 21

ip address 192.168.20.33 255.255.255.240

ipv6 adderss 2001:db8:1:21::1/64

ipv6 adderss fe80::14 lonk-local

no shutdown

ex

SW2>

enable

configure terminal

vlan 1

ex

vlan 30

ex

interface range fastEthernet 0/1-2

swichport mode access

swichport access vlan 10

ex

interface gigabitEthernet0/1

swichport mode trunk

ex

R2(config-if)#

interface gigabitEthernet 0/0.30

encapsulation dot1Q 30

ip address 192.168.30.1 255.255.255.128

ipv6 address 2001:db8:1:30::1/64

ipv6 address fe80::15 link-local

no shutdown

ex

interface gigabitEthernet 0/2.31

encapsulation dot1Q 31

ip address 192.168.30.129 255.255.255.240

ipv6 adderss 2001:db8:1:31::1/64

ipv6 adderss fe80::1 lonk-local

no shutdown

ex

Task 4: OSPF, HTTP, HTTPs, DNS, and DHCP Configs

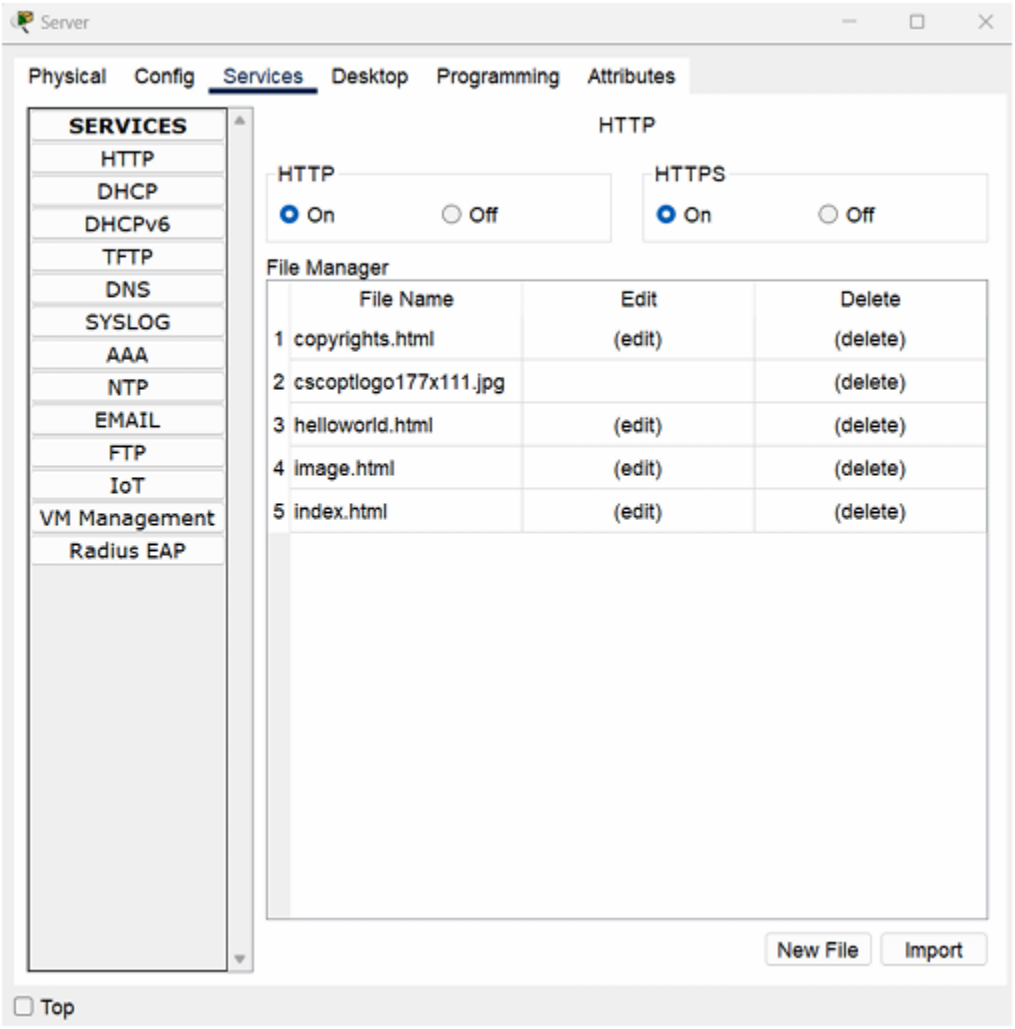
OSPF

R1	R1(config)#	router ospf 1	router ospf 1
R1	R1(config-router)#	network 192.168.15.1 0.0.0.3 area 0	network 192.168.15.1 0.0.0.3 area 0
R1	R1(config-router)#	network 192.168.10.0 0.0.0.63 area 0	network 192.168.10.0 0.0.0.63 area 0
R1	R1#	config t	configure terminal
R1	R1(config)#	router ospf 1	router ospf 1
R1	R1(config-router)#	network 192.168.10.65 0.0.0.63 area 0	network 192.168.10.65 0.0.0.63 area 0
R1	R1(config-router)#	network 192.168.10.240 0.0.0.15 area 0	network 192.168.10.240 0.0.0.15 area 0
R1	R1(config-router)#	network 192.168.15.5 0.0.0.3 area 0	network 192.168.15.5 0.0.0.3 area 0

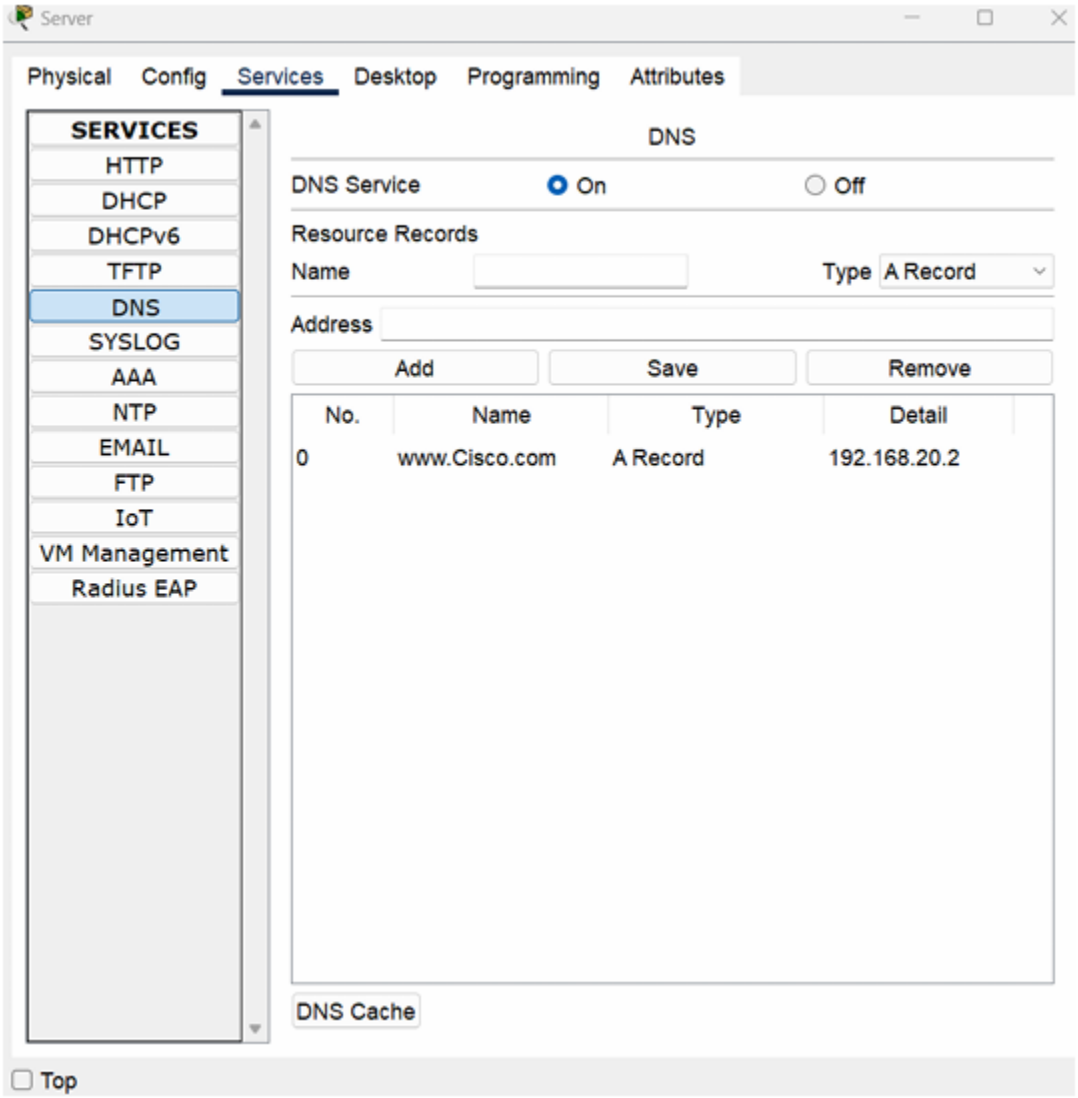
R2	R2>	en	enable
R2	R2#	config t	configure terminal
R2	R2(config)#	router ospf 1	router ospf 1
R2	R2(config-router)#	network 192.168.15.2 0.0.0.3 area 0	network 192.168.15.2 0.0.0.3 area 0
R2	R2(config-router)#	network 192.168.15.9 0.0.0.3 area 0	network 192.168.15.9 0.0.0.3 area 0
R2	R2(config-router)#	network 192.168.15.9 0.0.0.3 area 0	network 192.168.15.9 0.0.0.3 area 0
R2	R2(config-router)#	network 192.168.20.1 0.0.0.31 area 0	network 192.168.20.1 0.0.0.31 area 0
R2	R2(config-router)#	network 192.168.20.33 0.0.0.15 area 0	network 192.168.20.33 0.0.0.15 area 0

R3	R3>	en	enable
R3	R3#	config t	configure terminal
R3	R3(config)#	router ospf 1	router ospf 1
R3	R3(config-router)#	network 192.168.30.1 0.0.0.127 area 0	network 192.168.30.1 0.0.0.127 area 0
R3	R3(config-router)#	network 192.168.30.129 0.0.0.15 area 0	network 192.168.30.129 0.0.0.15 area 0
R3	R3(config-router)#	network 192.168.15.10 0.0.0.3 area 0	network 192.168.15.10 0.0.0.3 area 0
R3	R3(config-router)#	network 192.168.15.6 0.0.0.3 area 0	network 192.168.15.6 0.0.0.3 area 0

HTTP and HTTPs Service



DNS Service


Server
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
DNS
DNS Service
On
Off
Resource Records
Name
Type
A Record
Address
Add
Save
Remove
No.
Name
Type
Detail
0
www.Cisco.com
A Record
192.168.20.2
DNS Cache
Top

DHCP

SW1	SW1>	en	enable
SW1	SW1#	config t	configure terminal
SW1	SW1(config)#	show vlan balef	
SW1	SW1(config)#	do show vlan balef	do show vlan balef
SW1	SW1(config)#	do show vlan brief	do show vlan brief
R1	R1>	\	\
R1	R1>	en	enable
R1	R1#	config t	configure terminal
R1	R1(config)#	exit	exit
R1	R1#	show running-config | include interface | ip address |encapsulation	show running-config | include interface | ip address |encapsulation
R1	R1#	config t	configure terminal
R1	R1(config)#	ip dhcp pool VLAN1	ip dhcp pool VLAN1
R1	R1(dhcp-config)#	network 192.168.10.0 255.255.255.192	network 192.168.10.0 255.255.255.192
R1	R1(dhcp-config)#	default-router 192.168.10.1	default-router 192.168.10.1
R1	R1(dhcp-config)#	dns-server 192.168.20.2	dns-server 192.168.20.2
R1	R1(dhcp-config)#	exi	exit
R1	R1(config)#	ip dhcp pool VLAN2	ip dhcp pool VLAN2
R1	R1(dhcp-config)#	network 192.168.10.64 255.255.255.192	network 192.168.10.64 255.255.255.192
R1	R1(dhcp-config)#	default-router 192.168.10.65	default-router 192.168.10.65
R1	R1(dhcp-config)#	dns-server 192.168.20.2	dns-server 192.168.20.2
R1	R1(dhcp-config)#	exi	exit

R1	R1(config)#	ip dhcp pool VLAN3	ip dhcp pool VLAN3
R1	R1(dhcp-config)#	network 192.168.10.128 255.255.255.240	network 192.168.10.128 255.255.255.240
R1	R1(dhcp-config)#	default-router 192.168.10.129	default-router 192.168.10.129
R1	R1(dhcp-config)#	default-router 192.168.10.128	default-router 192.168.10.128
R1	R1(dhcp-config)#	dns-server 192.168.20.2	dns-server 192.168.20.2
R1	R1(dhcp-config)#	exit	exit
R1	R1(config)#	vlan 2	
R1	R1(config)#	ip dhcp pool VLAN2	ip dhcp pool VLAN2
R1	R1(dhcp-config)#	default-router 192.168.10.64	default-router 192.168.10.64
R1	R1(dhcp-config)#	exit	exit
R1	R1(config)#	ip dhcp excluded-address 192.168.10.1	ip dhcp excluded-address 192.168.10.1
R1	R1(config)#	ip dhcp excluded-address 192.168.10.65	ip dhcp excluded-address 192.168.10.65
R1	R1(config)#	ip dhcp excluded-address 192.168.10.129	ip dhcp excluded-address 192.168.10.129
R1	R1(config)#	eixt	
R1	R1(config)#	exit	exit
R1	R1#	show ip dhcp binding	show ip dhcp binding

R2	R2>	en	enable
R2	R2#	show running-config | include interface|ip address|encapsulation	show running-config | include interface|ip address|encapsulation
R2	R2#	config t	configure terminal
R2	R2(config)#	ip dhcp pool vlan1	ip dhcp pool vlan1
R2	R2(dhcp-config)#	network 192.168.20.0 255.255.255.224	network 192.168.20.0 255.255.255.224
R2	R2(dhcp-config)#	default-router 192.168.20.1	default-router 192.168.20.1
R2	R2(dhcp-config)#	dns-server 192.168.20.2	dns-server 192.168.20.2
R2	R2(dhcp-config)#	exi	exit
R2	R2(config)#	ip dhcp pool vlan2	ip dhcp pool vlan2
R2	R2(dhcp-config)#	network 192.168.20.32 255.255.255.240	network 192.168.20.32 255.255.255.240
R2	R2(dhcp-config)#	default-router 192.168.20.32	default-router 192.168.20.32
R2	R2(dhcp-config)#	dns-server 192.168.20.2	dns-server 192.168.20.2
R2	R2(dhcp-config)#	exi	exit
R2	R2(config)#	ip dhcp excluded-address 192.168.20.0	ip dhcp excluded-address 192.168.20.0
R2	R2(config)#	ip dhcp excluded-address 192.168.20.32	ip dhcp excluded-address 192.168.20.32

R3	R3(dhcp-config)#	network 192.168.30.0 255.255.255.128	network 192.168.30.0 255.255.255.128
R3	R3(dhcp-config)#	default-router 192.168.30.1	default-router 192.168.30.1
R3	R3(dhcp-config)#	dns-server 192.168.20.2	dns-server 192.168.20.2
R3	R3(dhcp-config)#	exi	exit
R3	R3(config)#	ip dhcp pool vlan2	ip dhcp pool vlan2
R3	R3(dhcp-config)#	network 192.168.30.128 255.255.255.240	network 192.168.30.128 255.255.255.240
R3	R3(dhcp-config)#	default-router 192.168.10.129	default-router 192.168.10.129
R3	R3(dhcp-config)#	dns-server 192.168.20.2	dns-server 192.168.20.2
R3	R3(dhcp-config)#	exi	exit
R3	R3(config)#	ip dhcp excluded-address 192.168.30.1	ip dhcp excluded-address 192.168.30.1
R3	R3(config)#	ip dhcp excluded-address 192.168.30.129	ip dhcp excluded-address 192.168.30.129
R3	R3(config)#	do show ip dhcp binding	do show ip dhcp binding

Task 5: Network Security

Port Security

switchport port-security

switchport mode access

switchport port-security maximum 1 // 1 MAC ADDRESS

Access Control

access-list 100 deny ip 192.168.10.0 0.0.0.255 any

access-list 100 permit ip any any

interface GigabitEthernet0/1

ip access-group 100 in

SSH

ip domain-name example.com

username admin privilege 15 secret password123

crypto key generate rsa //800 bit

line vty 0 4

transport input ssh

login local

exit

Report on the effectiveness of security measures

Introduction

In today's digital landscape, data privacy has emerged as a critical concern for individuals, businesses, and governments. The rapid expansion of data collection and processing has necessitated robust regulations to protect personal information from unauthorized use and breaches. Privacy regulations create a framework that upholds individuals' rights to control their data while ensuring organizations handle this information responsibly.

What Are Privacy Regulations?

Privacy regulations are legal frameworks that safeguard the collection, storage, and usage of personal information by organizations. These laws define how data should be managed, outlining individuals' rights over their information. Non-compliance can result in significant penalties, emphasizing the importance of adhering to these regulations.

Why Did We Use Access Controls and Port Security?

1. **Access Controls** Access controls are mechanisms that restrict access to resources within a computing environment. Their significance includes:
    - **Ensuring Data Confidentiality:** By limiting access to authorized users, sensitive information remains protected.
    - **Preventing Unauthorized Access:** Access controls establish rules that block unauthorized users from accessing critical network components.
    - **Improving Accountability:** User activities can be logged and monitored, allowing for the tracing of malicious actions.
    - **Reducing the Attack Surface:** Limiting user interactions with sensitive data decreases potential entry points for cyber threats.

2. **Port Security** Port security is a feature on network switches that controls access based on device MAC addresses. Its importance lies in:
    - **Preventing Unauthorized Devices:** Ensuring that only approved devices connect to the network helps safeguard against infiltration.
    - **Mitigating MAC Address Spoofing:** Port security can detect and block unauthorized MAC addresses.
    - **Protecting Against Network Flooding Attacks:** Ports can shut down or restrict traffic in response to excessive MAC addresses, preventing network overload.
    - **Enhancing Layer 2 Security:** By controlling device connections at the data link layer, port security adds an essential layer of defense.

Conclusion

Access controls and port security are fundamental components of network security. They work together to ensure that only authorized users and devices can access sensitive data, thereby maintaining confidentiality, integrity, and availability of information within the network.

Resources

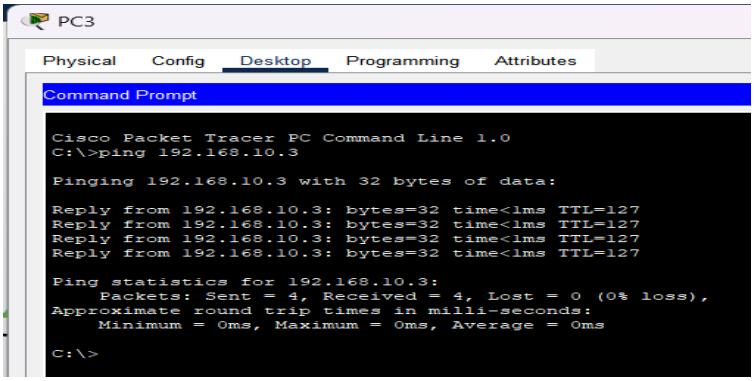
(The Report was retrieved by ChatGPT 4o mini which in turn used the mentioned resources below)

1. **Books:**
    - Stallings, William. *Network Security Essentials: Applications and Standards*. Pearson, 2019.
2. **Reports:**
    - National Institute of Standards and Technology (NIST). “NIST Privacy Framework: A Tool for Improving Privacy through Enterprise Risk Management.” NIST, 2020. NIST Privacy Framework

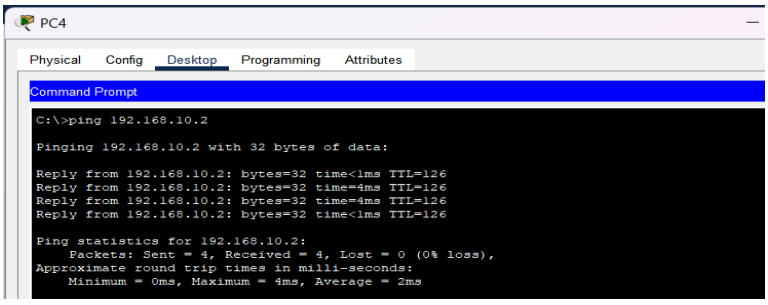
Task 6: Network Testing

Connectivity Tests

1. **Intra-VLAN Connectivity:**
    - All devices within the same VLAN are able to ping each other.

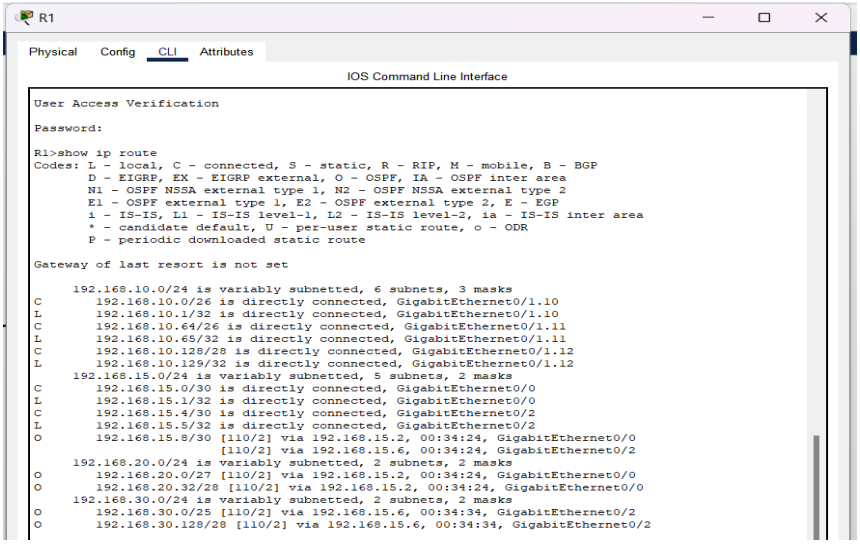


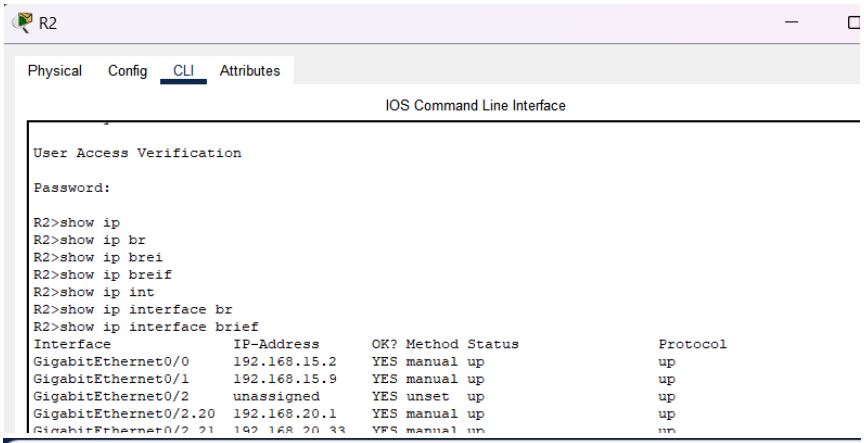
2. **Inter-VLAN Connectivity:**
    - All devices across different VLANs are able to ping each other.

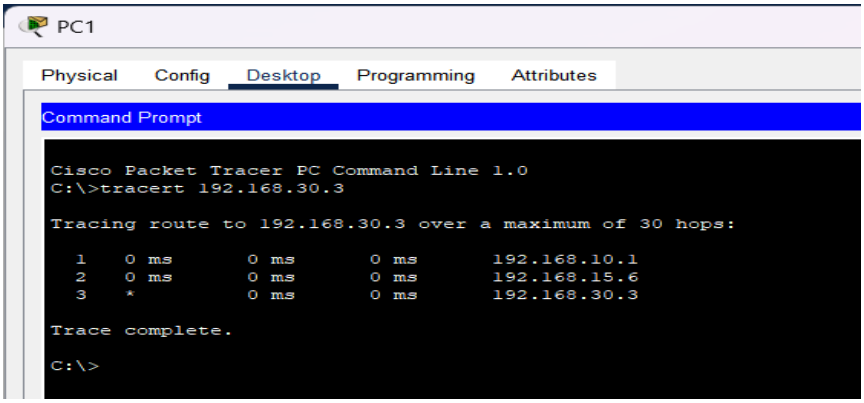


3. **Routing Across Routers**:

   - Routing is set and configured correctly across all the routers

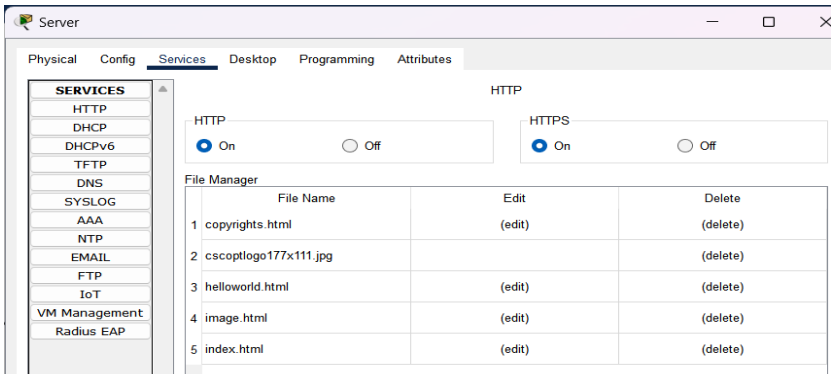


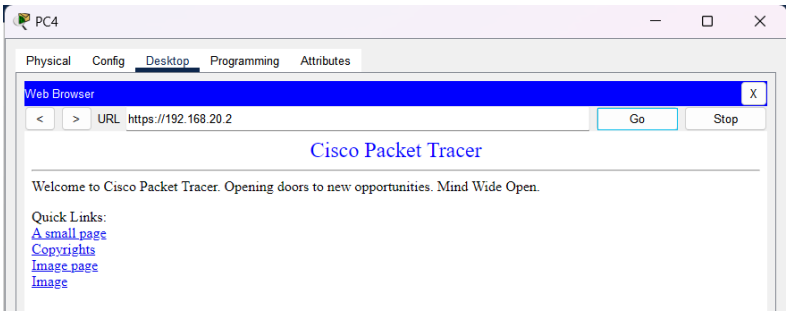




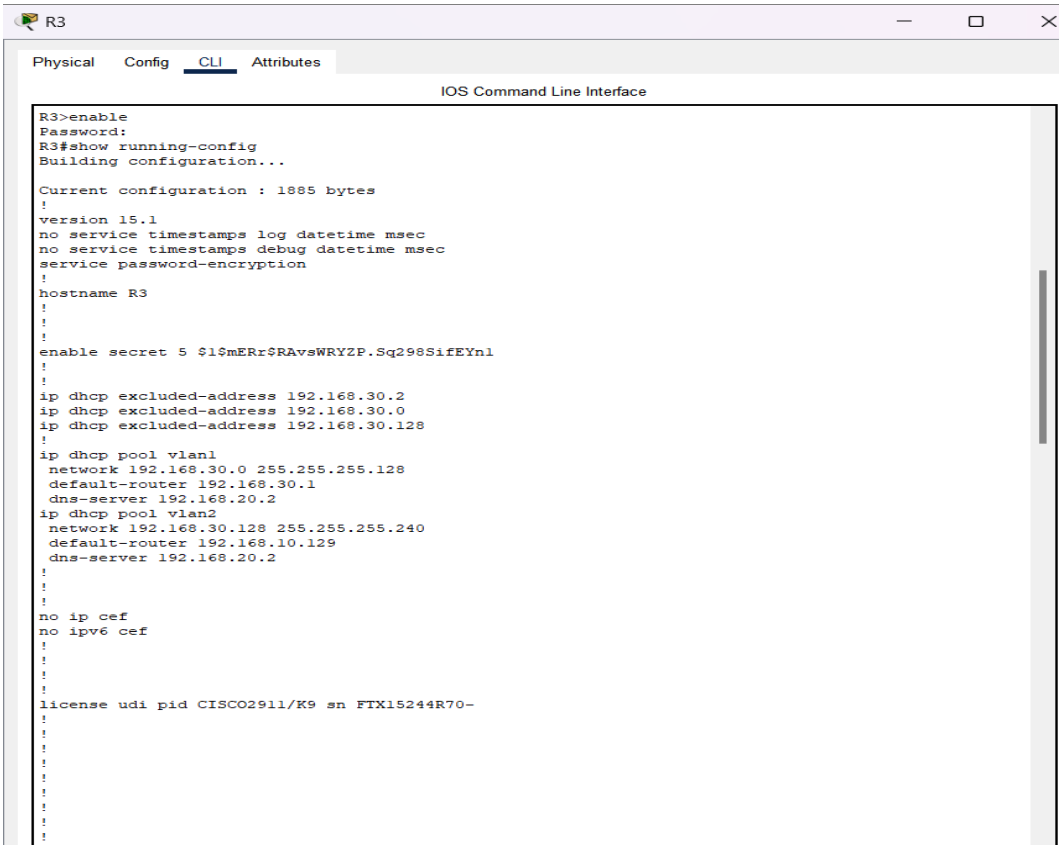
Functionality Test

- HTTPS service is enabled and functioning correctly





- DHCP:



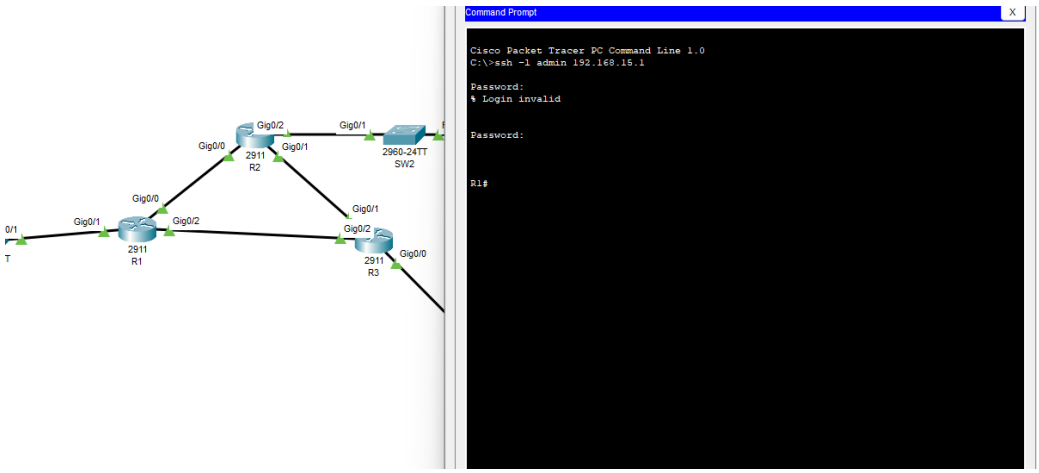

```
R3#show running-config | include dhcp
ip dhcp excluded-address 192.168.30.2
ip dhcp excluded-address 192.168.30.0
ip dhcp excluded-address 192.168.30.128
ip dhcp pool vlan1
ip dhcp pool vlan2
```

- DNS service

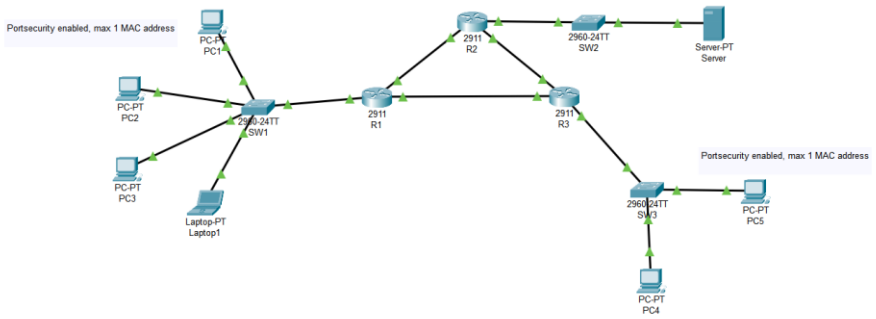
```
R3#show running-config | include dns
 dns-server 192.168.20.2
 dns-server 192.168.20.2
```

Security Tests:

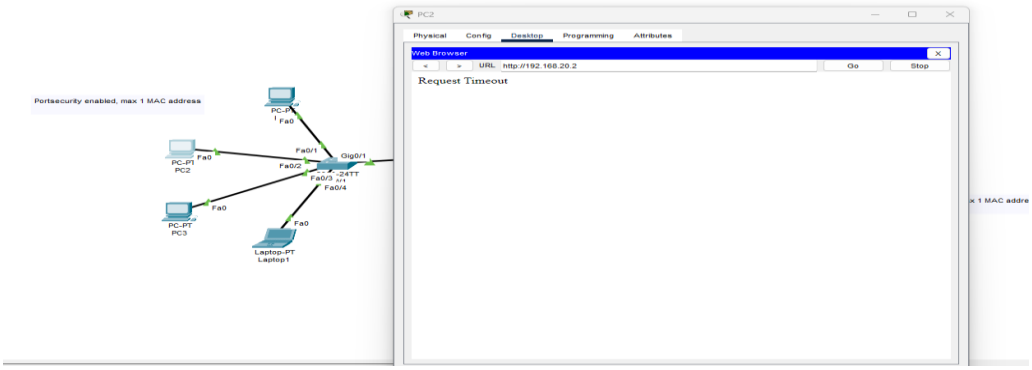
- SSH is enabled and functioning



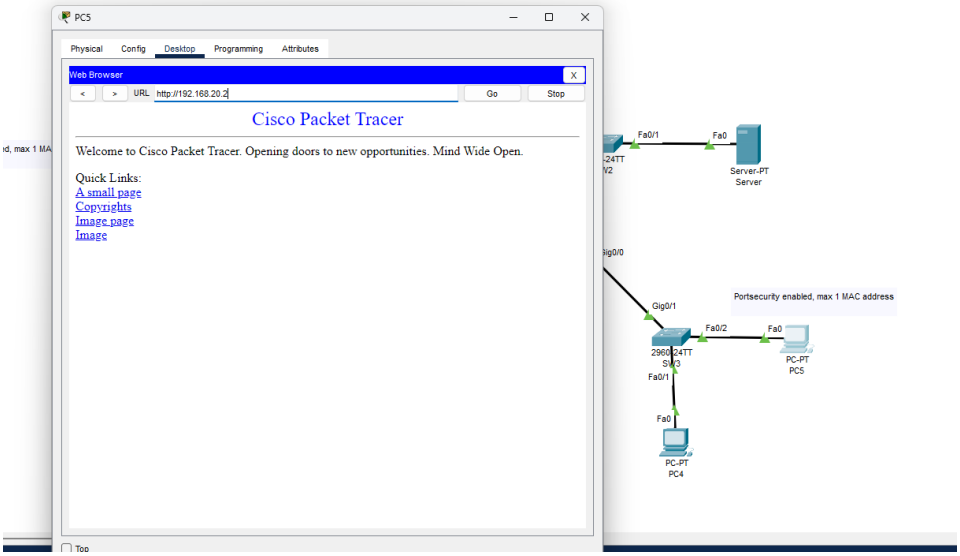
- Portsecurity is enabled and functioning



- ACL is enabled for and blocking devices on SW1 from accessing the server via HTTP



- Devices on SW3 can access the server via HTTP



Used commands:

Ping

Tracert

Nslookup

show ip route

configure terminal

ip route [destination network] [subnet mask] [next-hop IP or exit interface] → static routing

show ip interface brief

show access-lists

https://[Server IP address] → check connectivity to server

show running-config

show running-config | include dhcp

show ip dhcp pool

show ip dhcp binding

show ip dhcp server statistics

show port-security

ipconfig

Contributions

Name	Contributions
Abdallah Mohamed	Task 1
Amr Khaled El-Sayed	Task 2
Karim Adel	Task 3
Omar Khaled Mahmoud	Task 4
Mohamed Abou Rabah	Task 5
Zeyad Magdy	Task 6