Computer Network (ELC 133)

Final Project Report

Designing a Network on Packet Tracer

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Steps to Create Network For Faculty of Engineering at SCU

This report outlines the steps required to create networking environment. The process involves designing the network, configuring switches, and defining VLANs to enable logical segmentation of networks.

1. Do a Survey

went through the college buildings, all their floors and rooms, and counted the number of PCs, printers and other network devices.

البدروم					
الغرفة	PCs	Cameras	Switches	Printers	Routers
شؤون الخريجين	3	0	0	1	-
استحقاقات اعضاء هيئة التدريس	3	0	0	2	-
شؤون اعضاء هيئة التدريس	2	0	0	1	-
شؤون المالية	5	0	0	3	-
استحقاقات عاملين	4	0	0	1	-
قسم الدراسات العليا	2	0	0	-	-
المكتبة	7	3	4	2	-
الطرقة	0	2	0	0	-
السلم اليمين	0	1	0	0	-
السلم الشمال	0	1	0	0	-

الدور الارضي					
الغرفة	PCs	Cameras	Switches	Printers	Routers
مدرج 1	0	2	0	0	-
مدرج 2	0	2	0	0	-
مدرج 3	0	2	0	0	-
مدرج 4	0	2	0	0	-
مدرج 5	0	2	0	0	-
قاعة برامج خاصة 1	0	1	1	0	-
قاعة برامج خاصة 2	0	1	1	0	-
مركز استشارات هندسية	3	0	0	1	-
غرفة الامن	1	1	0	1	-
شؤون إدارية	1	0	0	1	-
الامن	1	0	2	0	-
الخزنة	0	1	1	1	-
وحدة الخدمات (IT) الالكترونية	5	0	1	1	-
المسرح	0	2	0	0	-
طرقات الكلية	0	6	0	0	-
السلم اليمين	0	1	0	0	-
السلم الشمال	0	1	0	0	-
شؤن الطلاب	7	0	1	1	-
خارج الكلية	0	14	0	0	-

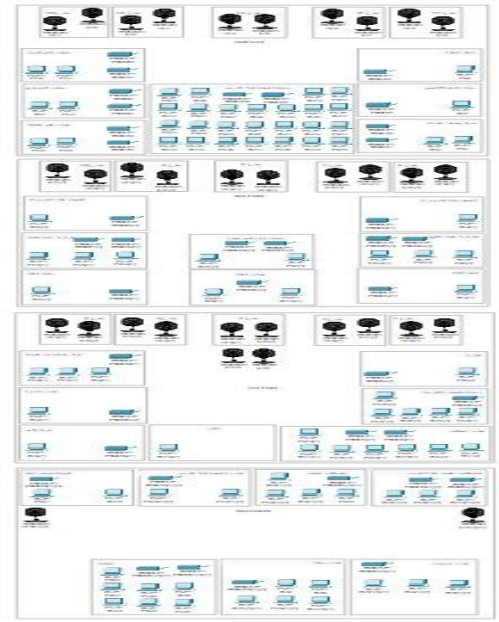
الدور الاول					
الغرفة	PCs	Cameras	Switches	Printers	Routers
مدرج 6	0	2	0	0	-
مدرج 7	0	2	0	0	-
مدرج 8	0	2	0	0	-
مدرج 9	0	2	0	0	-
مدرج 10	0	2	0	0	-
مدرج اعدادي	0	2	0	0	-
مجلس قسم عمارة	2	0	0	2	-
عميد الكلية	1	0	0	1	-
سكرتارية عميد الكلية	3	0	0	2	-
وكيل الكلية	1	0	0	1	-
سكرتارية وكيل الكلية	3	0	0	2	-
مجلس كلية	2	0	0	1	-
اعضاء هيئة التدريس 1	1	0	0	1	-
اعضاء هيئة التدريس 2	1	0	0	1	-
طرقات الكلية	0	4	0	0	-
السلم اليمين	0	1	0	0	-
السلم الشمال	0	1	0	0	-

الدور الثاني					
الغرفة	PCs	Cameras	Switches	Printers	Routers
مدرج 11	0	2	0	0	-
مدرج 12	0	2	0	0	-
مدرج 13	0	2	0	0	-
مدرج 14	0	2	0	0	-
مدرج 15	0	2	0	0	-
مجلس قسم كهرباء	2	0	0	2	-
اتحاد الطلبة	1	0	0	1	-
وحدة الدعم	1	0	0	1	-
مجلس قسم مدني	2	0	0	2	-
مجلس قسم ميكانيكا	2	0	0	2	
مجلس ضمان الجودة	2	0	0	2	-
معمل اعضاء هيئة التدريس	25	0	0	0	-
طرقات الكلية	0	4	0	0	-
السلم اليمين	0	1	0	0	-
السلم الشمال	0	1	0	0	-

الورش					
الغرفة	PCs	Cameras	Switches	Printers	Routers
الدور الاول	1	3	1	0	1
الدور الثاني	2	3	1	0	1
الدور الثالث	2	0	3	0	0
الدور الرابع معمل 1و2	30	0	2	0	0
الدور الرابع معمل 3	22	0	1	0	0
الدور الرابع معمل 4	20	0	1	0	0
معمل عمارة	20	0	1	0	0
الدور الرابع	0	0	4	0	0

2. Design Your Network

Design the overall network layout, including the placement of PCs, printers, and other network devices. Plan the VLANs based on the required segmentation for logical groups of devices.



3. Determine What the VLANs Create

Identify the purpose and requirements of each VLAN.
Determine how the VLANs will be connected and managed.

VLANs	المبنى الرئيسي	مبنى الورش
VLAN 2	IT	معمل 1
VLAN 3	مكتب العميد	معمل 2
VLAN 4	اعضاء هيئة التدريس	معمل 3
VLAN 5	شؤون المالية	معمل 4
VLAN 6	الامن	معمل 5
VLAN 7	شؤون الطلاب	معمل 6
VLAN 8	المكتبة	معمل 7
VLAN 9	مجالس الاقسام	معمل 8
VLAN 10	معامل اعضاء هيئة التدرس	معمل 9
VLAN 11	-	معمل 10
VLAN 12	-	معمل 11
VLAN 13	-	معمل 12
VLAN 20	-	الامن

4. Determine Which VLANs & Hardware Will Be Used

List the network hardware components, such as switches, routers, and ports, to be used in creating the VLANs.

5. Create VLAN in Every Switch

Follow these steps to configure VLANs on each switch:

Enable the switch: Use the 'enable' command.

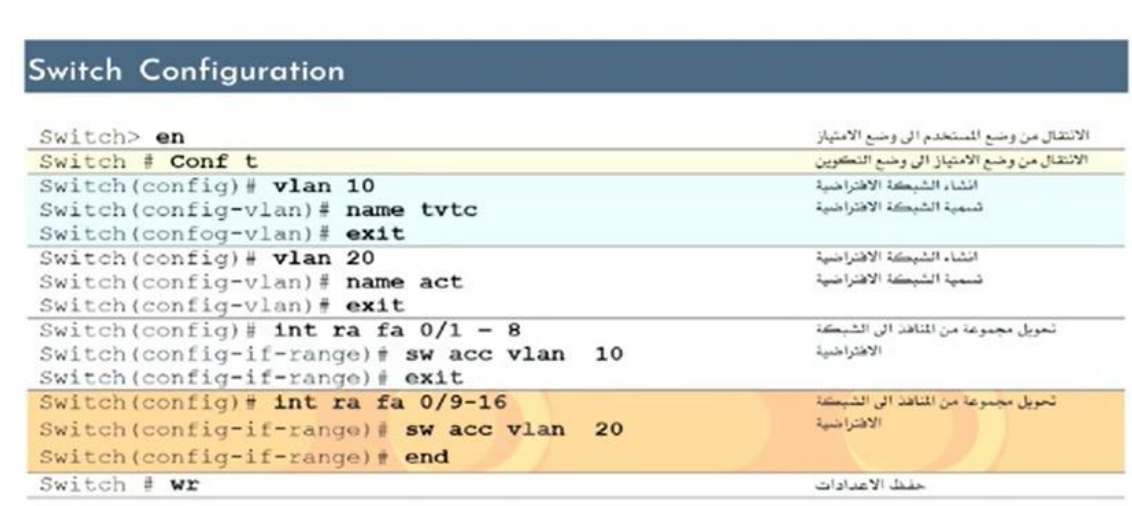
Access configuration mode: Use 'config t'.

Create VLAN: Use the command 'VLAN [number]' and name the VLAN.

Exit configuration mode: Use 'exit'.

Assign ports to the VLAN: Use 'int fa0/[port range]' followed by 'switchport access VLAN [number]'.

Exit and save configuration: Use 'write'.



6. Configure Switches & Multilayer Switch

Configure the switches and multilayer switch as follows:

Enable terminal configuration mode.

Access the required Ethernet interface.

Set the switch mode to 'trunk' to enable VLANs.

Choose the VLAN on Ethernet interface in multilayer switch

Verify the VLANs created and ensure connectivity.

```
!
interface FastEthernet0/2
 switchport access vlan 2
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
```

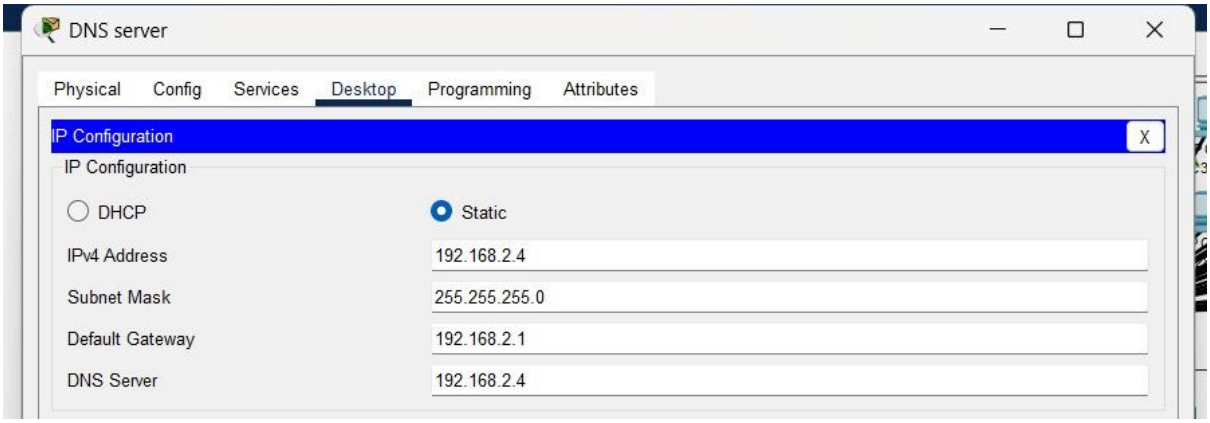
7. Create VLAN on Multilayer Switch

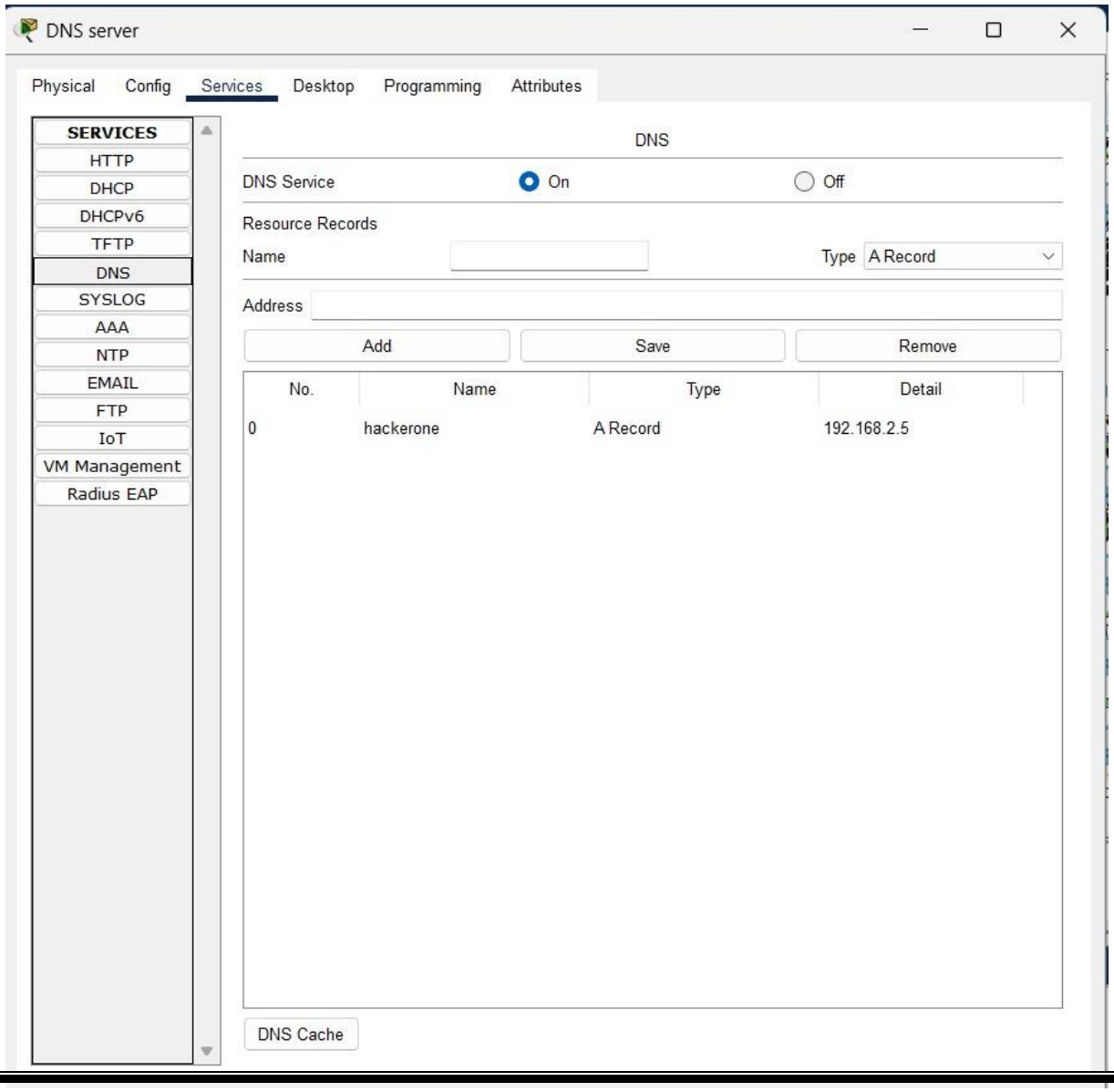
Configure VLANs on the multilayer switch and assign a default gateway IP for each VLAN to ensure communication between the VLANs

VLANs	المبنى الرئيسي	مبنى الورش
VLAN 2	192.168.2.1	192.168.102.1
VLAN 3	192.168.3.1	192.168.103.1
VLAN 4	192.168.4.1	192.168.104.1
VLAN 5	192.168.5.1	192.168.105.1
VLAN 6	192.168.6.1	192.168.106.1
VLAN 7	192.168.7.1	192.168.107.1
VLAN 8	192.168.8.1	192.168.108.1
VLAN 9	192.168.9.1	192.168.109.1
VLAN 10	192.168.10.1	192.168.110.1
VLAN 11	-	192.168.111.1
VLAN 12	-	192.168.112.1
VLAN 13	-	192.168.113.1
VLAN 20	-	192.168.120.1

8. Create DNS Server

- Add DNS Server
- Add to Vlan 2
- Enable the Service





9. Configure DHCP and DNS Server on Multilayer Switch

Dynamic Host Configuration Protocol (DHCP) automates the process of assigning IP addresses to devices on a network. This report outlines the steps to configure DHCP on a multilayer switch, including setting it up as a DHCP server or relay.

Objectives

- Configure a multilayer switch to act as a DHCP server.
- Set up the multilayer switch to relay DHCP requests to an external DHCP server

```
!
ip dhcp pool vlan2
 network 192.168.2.0 255.255.255.0
 default-router 192.168.2.1
 dns-server 192.168.2.4
ip dhcp pool vlan3
 network 192.168.3.0 255.255.255.0
 default-router 192.168.3.1
 dns-server 192.168.2.4
```

10. Configure Between Multilayer Switch and Router

Establishing a connection between a router and a multilayer switch is essential for enabling inter-VLAN routing and leveraging advanced features like DHCP, NAT, and security policies. This report outlines the steps for configuring a basic connection between a router and a multilayer switch.

```
interface FastEthernet0/24
!
interface GigabitEthernet0/1
 no switchport
 ip address 192.168.52.4 255.255.255.0
 duplex auto
 speed auto
```

11. Configure Routers

```
!
!
interface GigabitEthernet0/0
 ip address 192.168.190.30 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 192.168.52.1 255.255.255.0
 duplex auto
 speed auto
!
interface Serial0/1/0
 ip address 205.50.60.6 255.255.255.224
!
```

12. Dynamic Routing Configuration

1-we use eigrp protocol

2-we do this configuration in multilayer switch interface and router

```
!
router eigrp 100
 network 192.168.52.0
 network 192.168.190.0
 network 205.50.60.0 0.0.0.31
!
ip classless
ip route 0.0.0.0 0.0.0.0 205.50.60.8
!
```

13. Establish a Connection to ISP (Internet Service Provider)

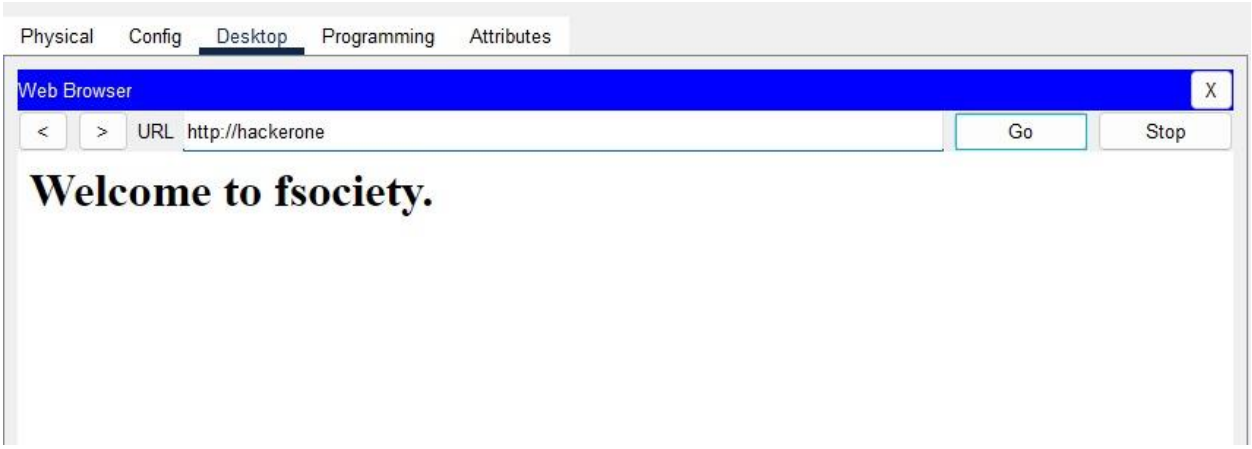
```
!
interface Serial0/2/0
 ip address 205.50.60.8 255.255.255.224
 clock rate 2000000
!
interface Serial0/2/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router eigrp 100
 network 205.50.60.0
 auto-summary
```

```
Gateway of last resort is not set

D    192.168.2.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.3.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.4.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.5.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.6.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.7.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.8.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.9.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.10.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.52.0/24 [90/2170112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.102.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.103.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.104.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.105.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.106.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.107.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.108.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.109.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.110.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.111.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.112.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.113.0/24 [90/27770112] via 205.50.60.6, 00:09:48, Serial0/2/0
D    192.168.190.0/24 [90/2170112] via 205.50.60.6, 00:09:48, Serial0/2/0
     205.50.60.0/24 is variably subnetted, 2 subnets, 2 masks
C       205.50.60.0/27 is directly connected, Serial0/2/0
L       205.50.60.8/32 is directly connected, Serial0/2/0
```

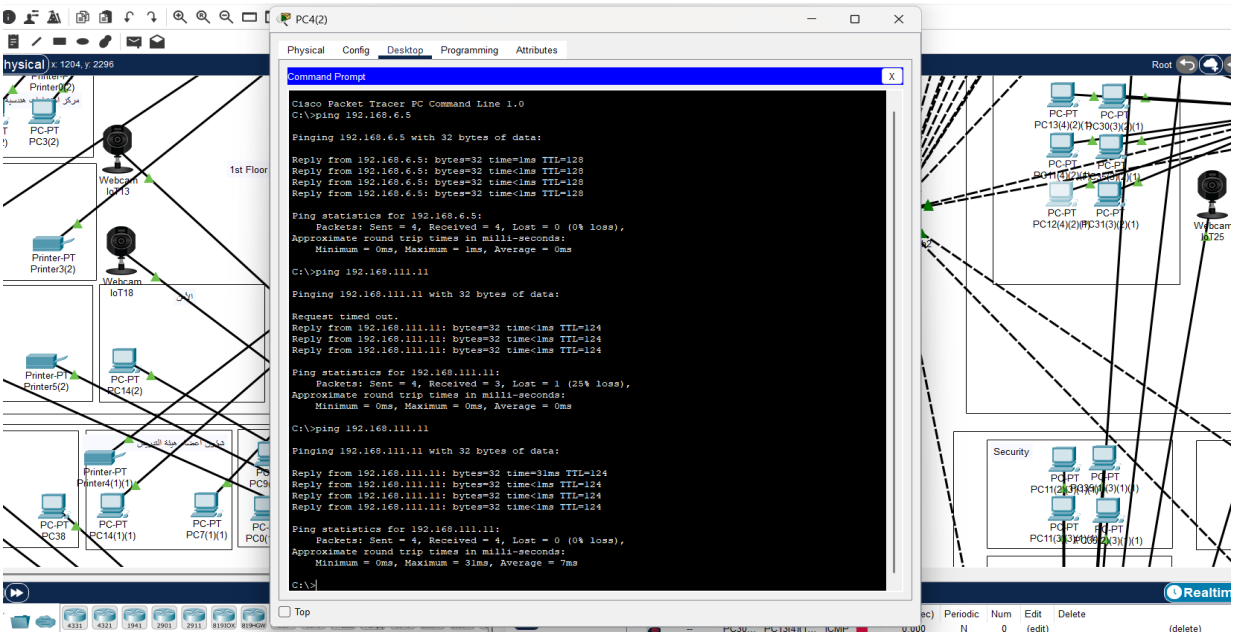
14. Web server

1- Connect server with switch which has vlan 2
2- Give sever static IP 192.168.2.5
3- Enable HTTP service
4- Test connectivity



15. Testing The conductivity

ping command is a widely used network utility that tests the reachability of a host on an Internet Protocol (IP) network. It uses Internet Control Message Protocol (ICMP) Echo Request and Echo Reply messages to determine if a host is reachable and to measure the round-trip time for messages sent from the originating host to the destination.



Conclusion

By following these steps, the network can be successfully created and configured. Proper design and implementation ensure logical segmentation of networks, enhanced security, and efficient traffic management.