Network Report

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Electrical Engineering Department

Level 4

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Headlines:

i. Introduction
ii. Survey (Devices)
iii. Network
    - Devices in Packet Tracer
    - the implementation of the Devices
    - IP address

Introduction:

Project Overview: Connecting the Engineering Faculty Network with Workshop Networks

Our project focuses on establishing a seamless connection between the Engineering Faculty's main network and the workshop networks. This integration aims to enhance communication, resource sharing, and overall network efficiency.

Using the Routing Protocol

To achieve this objective, we implemented a routing protocol to enable efficient communication between devices and networks. This protocol was strategically chosen to optimize network performance and achieve project objectives.

Key Advantages:

1. **Automatic Network Discovery**: Facilitates automatic detection of available paths, saving time and effort.
2. **Resource Optimization**: Selects the best route based on bandwidth, congestion, and latency.
3. **Dynamic Adaptability**: Adjusts to sudden changes like path failures or traffic surges.
4. **Network Efficiency**: Reduces latency and packet loss by choosing optimal routes.
5. **Scalability**: Suitable for both small and large networks.
6. **Centralized Management**: Offers better monitoring and control of network performance.

Survey:

Frist, we needed to make a survey to know how many devices connected to the network of the Engineering collage, Workshops building.

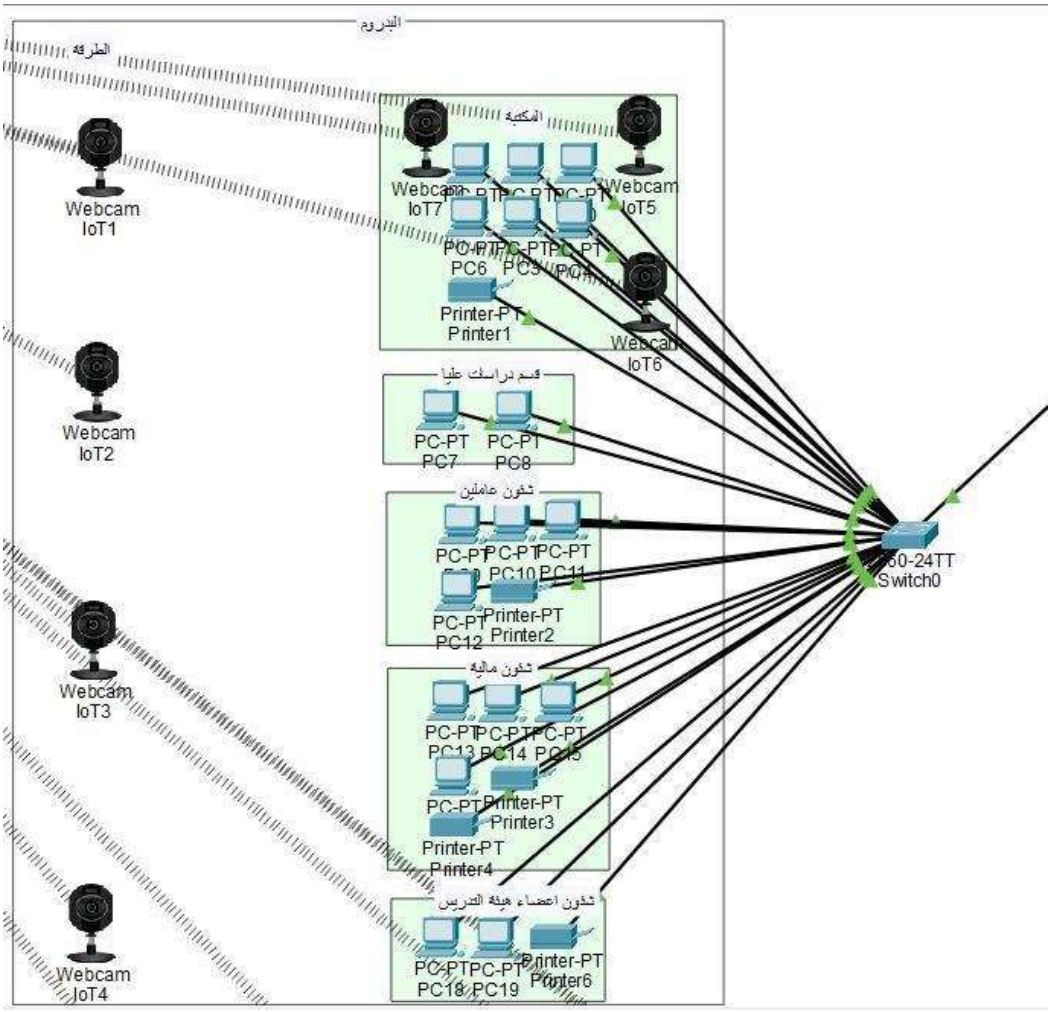
There are our Results of survey:

College Building

Basement Floor:

Library	3 Cameras
	6 pc
	1 printer
الدراسات العليا	2 pc
شؤون العاملين	4 pc
	1 printer
شؤون المالية	4 pc
	2 printers
اعضاء هيئة التدريس	2 pc
	1 printer
البدروم	4 cameras

Design:

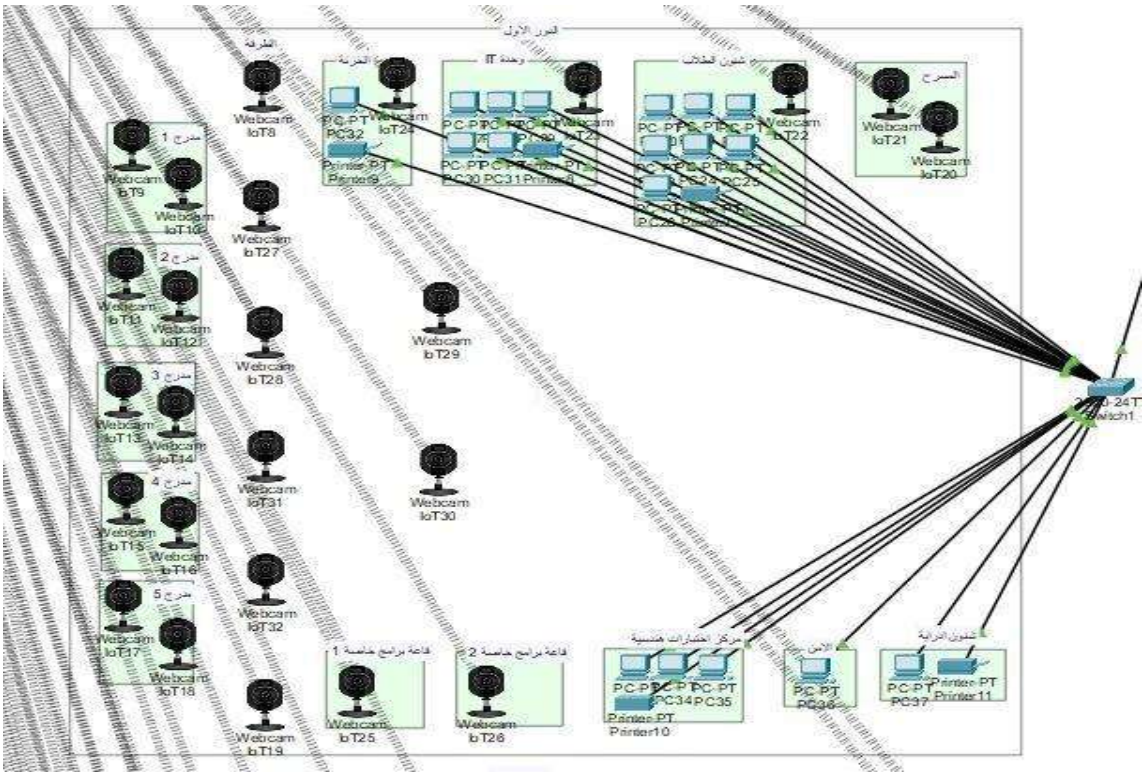


Frist Floor:

مسرح	2 Cameras
شئون الطلا ب	7 PC
	1 Printer
	1 Camera
IT	5 PC
	1 Camera
	1 Printer

الخزينة	1 PC
	1 camera
	1 Printer
مدرج (1)	2 Cameras
مدرج (2)	2 Cameras
مدرج (3)	2 Cameras
مدرج (4)	2 Cameras
مدرج (5)	2 Cameras
قاعة برامج خاصة (1)	1 Camera
قاعة برامج خاصة (2)	1 Camera
الامن	1 PC
شئون ادارية	1 PC
	1 printer
مركز استشارات هندسية	3 PC
	1 Printer
corridor	8 Cameras

Design:

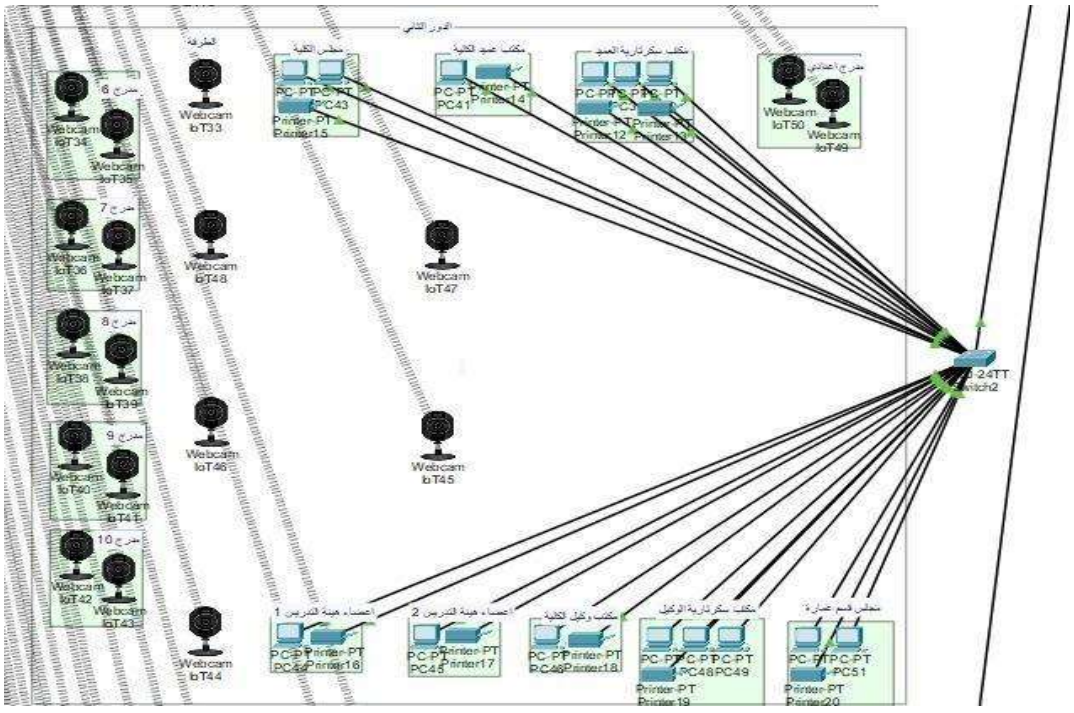


Second Floor:

مدرج إعدادي	2 Cameras
مكتب سكرتارية العميد	3 PC
	2 Printers
مكتب عميد الكلية	1 PC
	1 Printer
مجلس القسم	2 PC
	1 Printer
مدرج (6)	2 Cameras
مدرج (7)	2 Cameras
مدرج (8)	2 Cameras

مدرج (9)	2 Cameras
مدرج (10)	2 Cameras
مجلس قسم عمارة	2 PC
	1 Printer
مكتب سكرتارية الوكيل	3 PC
	1 Printer
مكتب وكيل الكلية	1 PC
	1 Printer
اعضاء هيئة التدريس 1	1PC
	1 Printer
اعضاء هيئة التدريس 2	1 pc
	1 printer
corridor	6 Cameras

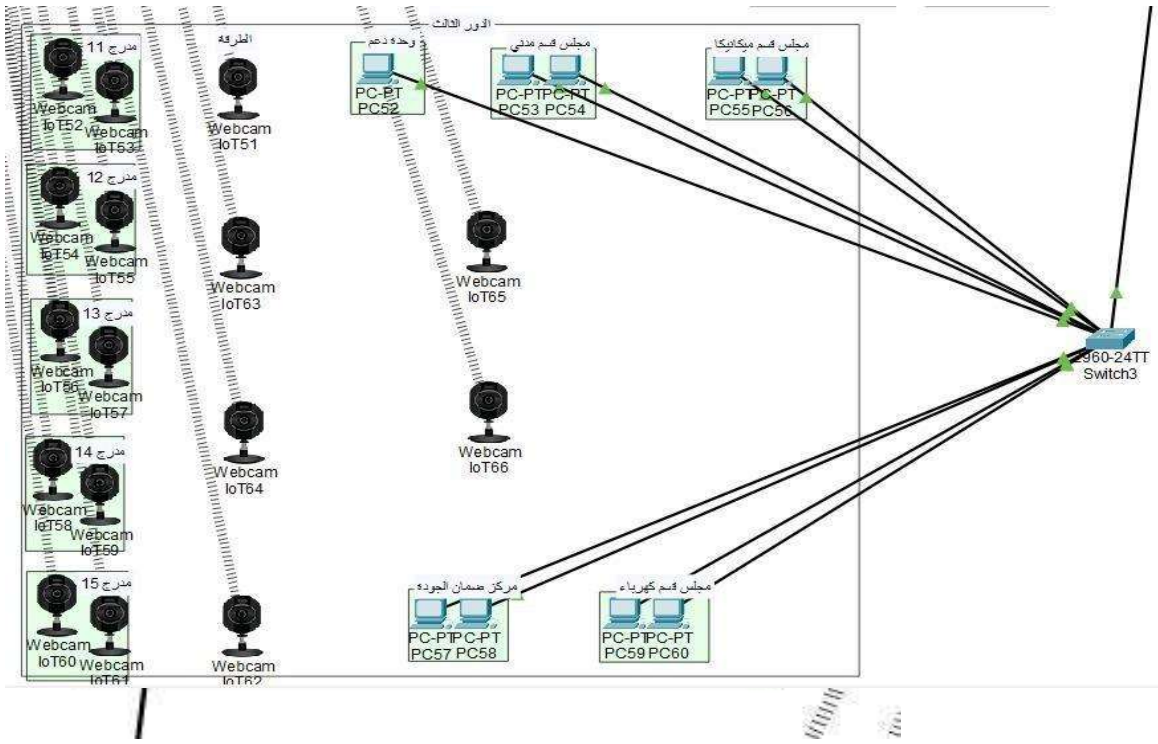
Design:



Third Floor:

مجلس قسم ميكانيكا	2 PC
مجلس قسم مدني	2 PC
وحدة الدعم	1PC
مدرج (11)	2 Cameras
مدرج (12)	2 Cameras
مدرج (13)	2 Cameras
مدرج (14)	2 Cameras
مدرج (15)	2 Cameras
مجلس قسم كهرباء	2 PC
مركز ضمان الجودة	2 PC
corridor	6 Cameras

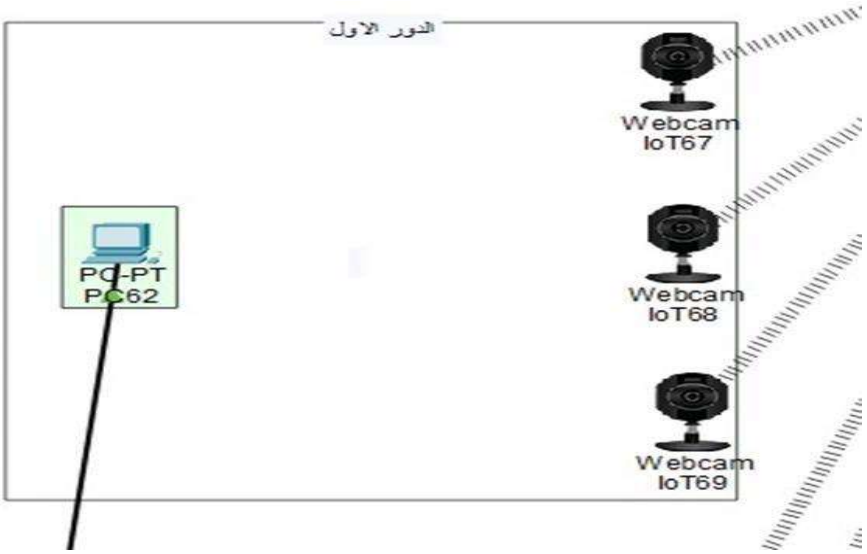
Design:



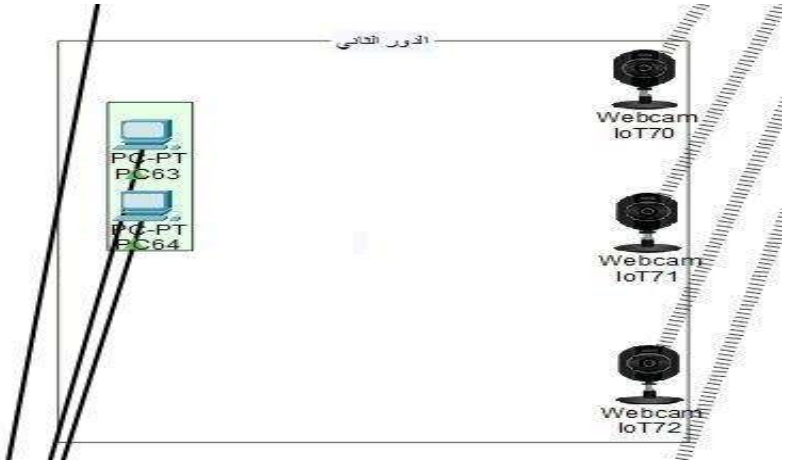
Workshops Building:

First Floor	3 Cameras
	1 PC
Second Floor	3 Cameras
	2 PC
Third Floor	1 PC
	1 Camera

First Floor Design:



Second Floor Design:

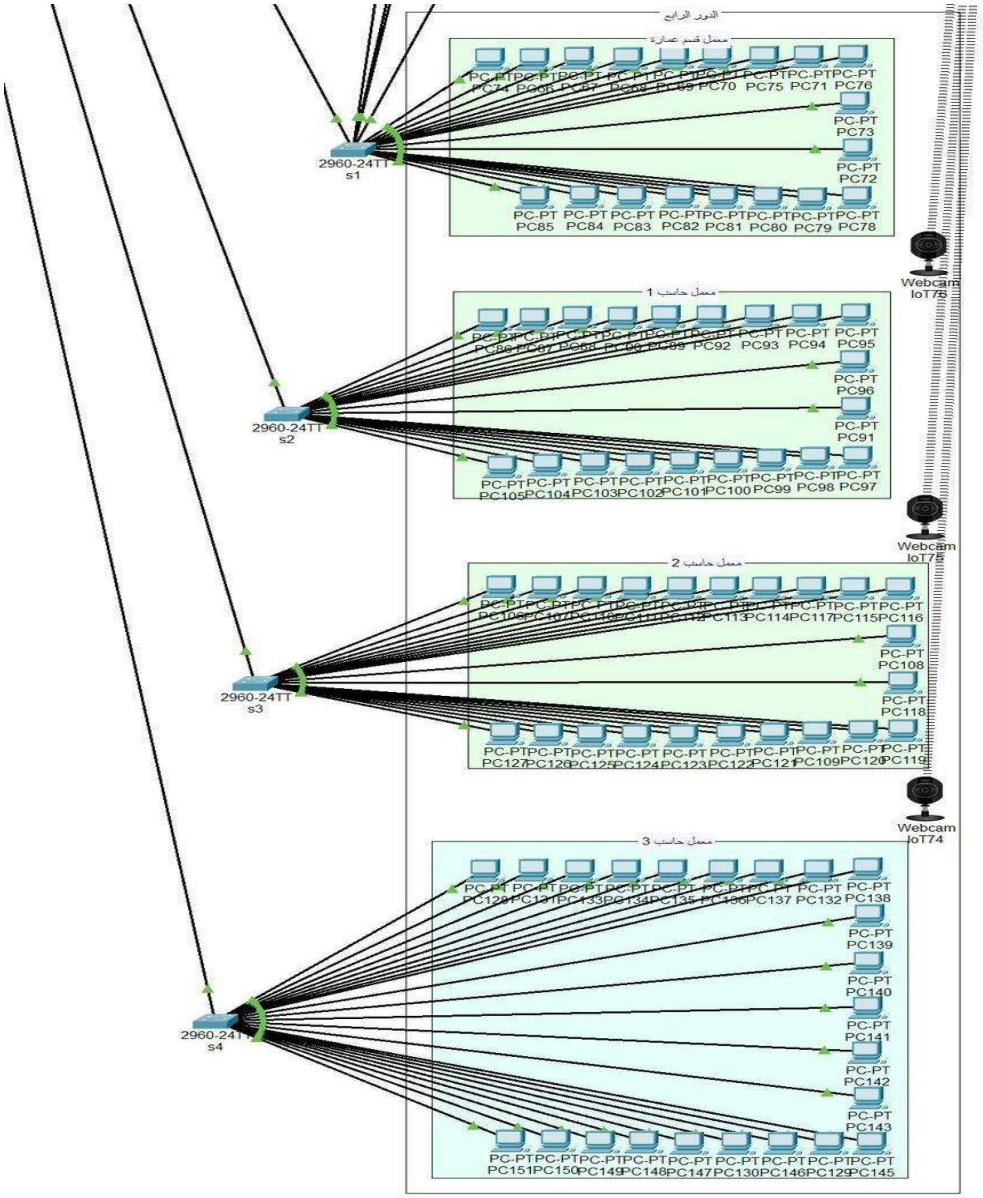


Third Floor Design :

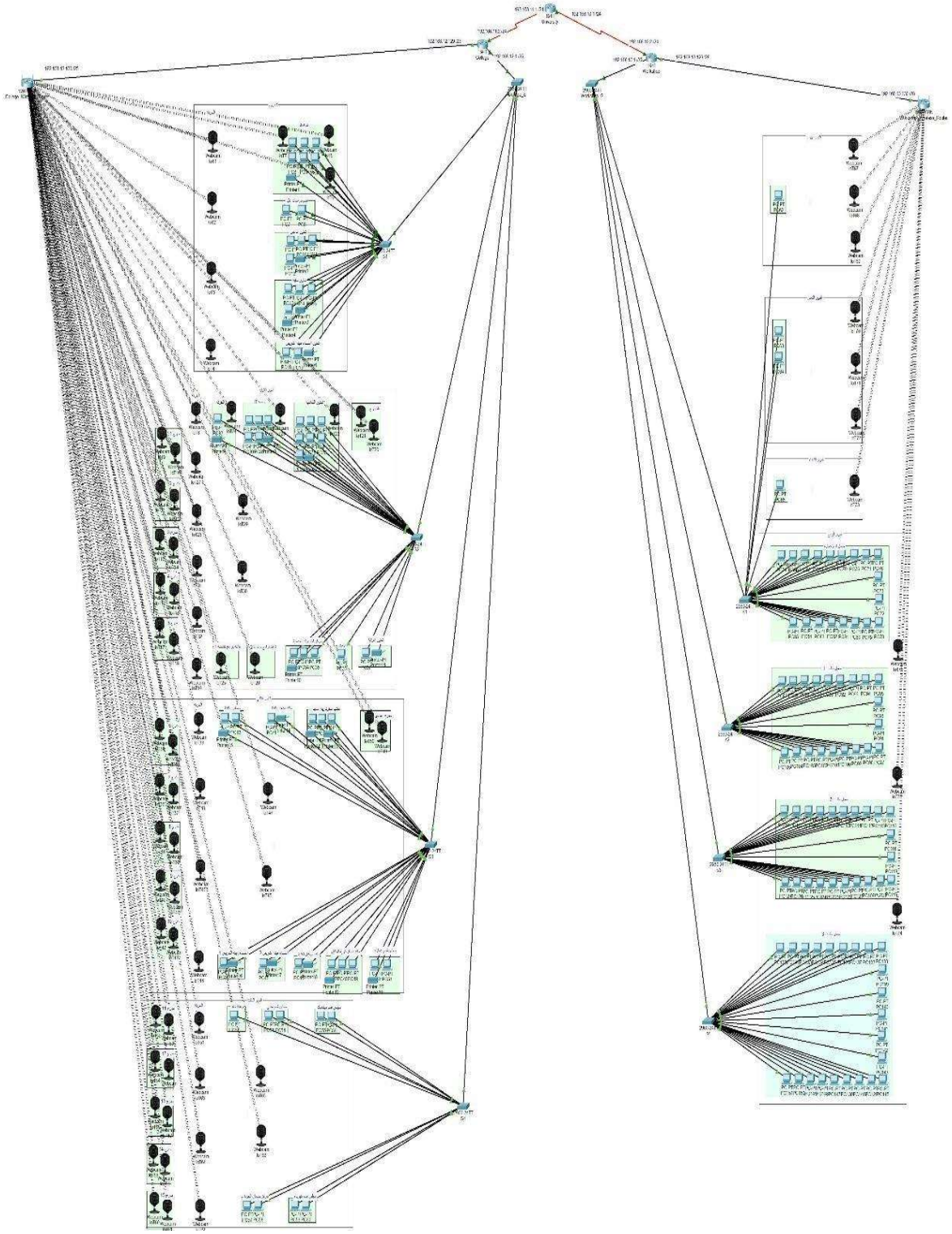
Fourth Floor:

Architecture Lab	19 PC
	3 Cameras
Computer Lab 1	20 PC
Computer Lab 2	22 PC
Computer Lab 3	23 PC

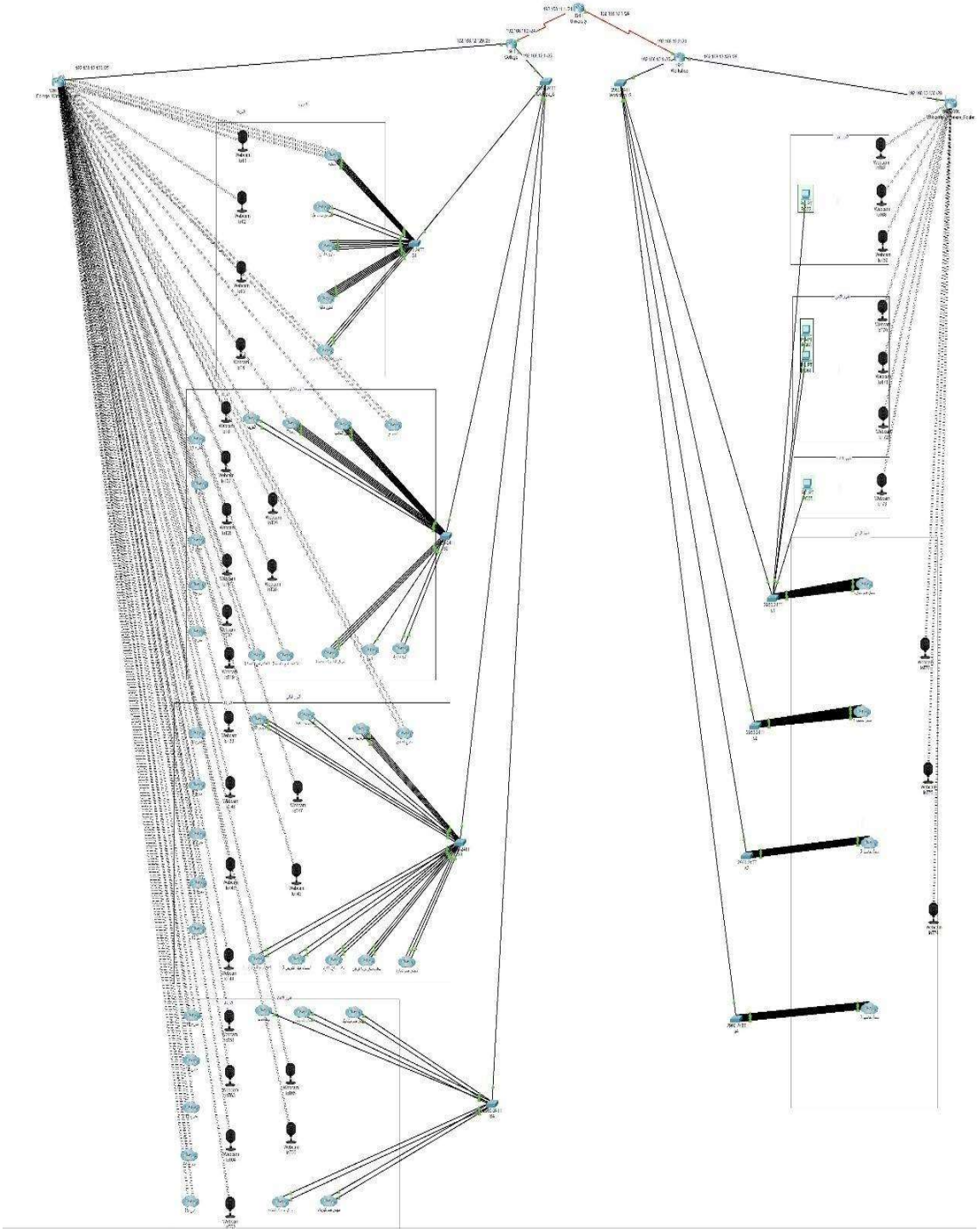
Design:


الدور الرابع
معمل قسم عمارة
2960-24TT
s1
Webcam
IoT76
معمل حاسب 1
2960-24TT
s2
Webcam
IoT75
معمل حاسب 2
2960-24TT
s3
Webcam
IoT74
معمل حاسب 3
2960-24TT
s4

Overall Design Without Cluster:

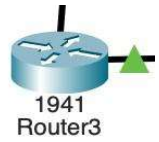


Overall Design With Cluster:



Devices Used in Packet Tracer:

1. Router: Cisco 1941

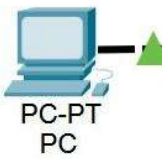


2. Switch: Cisco 2960 (IOS 15)

3. Wireless Router: Linksys WRT300N

4. Webcam

5. PC



6. Printer: Printer PT

7. Connections: Copper Straight-through Cable

Network Design:

2.1. University Router:

- **Role:** Central hub connecting the college and workshop routers.
- **Configuration:**
    - Provides DHCP services for dynamic IP assignment.
    - Establishes RIP-based dynamic routing with connected routers.

2.2. College Building:

- **Router:** Linked to the university router.
- **Switches:** Four switches, one per floor.
- **Wi-Fi Router:** Dedicated to managing IoT cameras for security and monitoring.

2.3. Workshops Building:

- **Router:** Linked to the university router.
- **Switches:** Four switches, one per floor.
- **Wi-Fi Router:** Manages workshop surveillance cameras.

3. Configuration Details:

3.1. IP Address Assignment (DHCP):

- **Purpose:** Automate IP allocation to reduce manual configuration efforts.
- **Implementation:**
  - DHCP configured on the university router.
  - Reserved IP pools for each segment.

3.2. Routing Protocol (RIP):

- **Purpose:** Enable dynamic routing for uninterrupted communication.
- **Configuration:**
  - RIP activated on all routers.
  - Relevant networks advertised.

3.3. Security and Management Configurations: (Hint: all passwords are “Education”)

Console, SSH, and VTY Access:

- **Purpose:** Ensure secure local and remote device management.
- **Setup:**
  - Activated console access for direct management. ○ Enabled SSH for secure remote access.
  - Configured VTY with authentication.

RSA Key Generation:

- **Purpose:** Provide secure SSH authentication by encrypting communication.
- **Setup:**
  - Generated an RSA key pair on all routers to enhance SSH security. ○ This ensures that data transmitted during remote management sessions is encrypted, protecting sensitive network configurations from interception.

Basic configuration

I. Hostname Configuration:

- **Purpose**: Facilitate device identification and troubleshooting.
- **Setup:**
  - Assigned unique, descriptive hostnames.

II. Service Password Encryption:

- **Purpose:** Protect device passwords from unauthorized access.
- **Setup:**
  - Activated service password encryption.

Configuration in Packet Tracer:

1. Router

Enable SSH: Follow the SSH configuration steps:

arduino — Copy code

```
Router(config)# hostname MyRouter
Router(config)# ip domain-name example.com
Router(config)# crypto key generate rsa
Router(config)# username admin secret StrongPassword
Router(config)# line vty 0 15
Router(config-line)# transport input ssh
Router(config-line)# login local
Router(config-line)# ip ssh version 2
Router# write memory
```

2. Switch

arduino — Copy code

```
Switch> enable
Switch# configure terminal
Switch(config)# interface vlan 1
Switch(config-if)# ip address 192.168.1.2 255.255.255.0
Switch(config-if)# no shutdown
```

Set Default Gateway (if managing from another subnet):

scss — Copy code

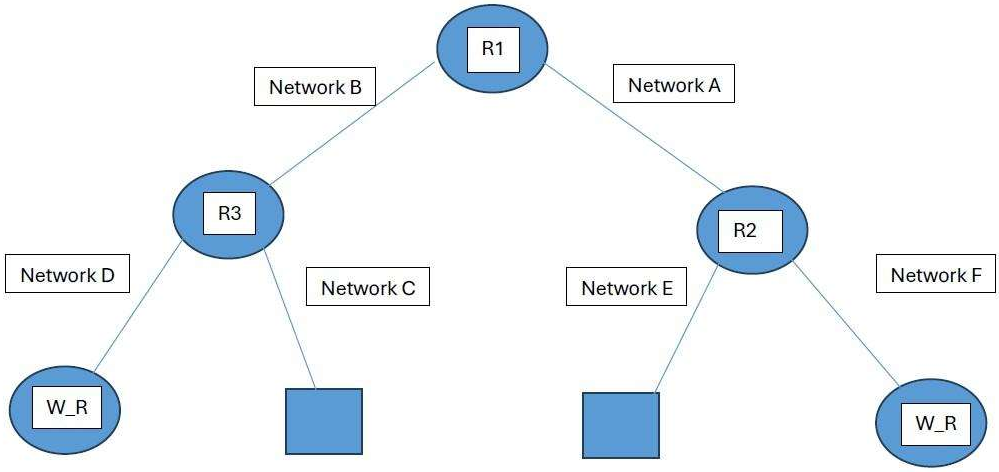
```
Switch(config)# ip default-gateway 192.168.1.1
```

Enable SSH: Follow the SSH configuration steps:

arduino — Copy code

```
Switch(config)# hostname MySwitch
Switch(config)# ip domain-name example.com
Switch(config)# crypto key generate rsa
Switch(config)# username admin secret StrongPassword
Switch(config)# line vty 0 15
Switch(config-line)# transport input ssh
Switch(config-line)# login local
Switch(config-line)# ip ssh version 2
Switch# write memory
```

2.3 IP address:



192.168.10.0/16

Network A (256)

- 192.168.10.0 /24
- 192.168.10.1 /24
- 192.168.10.254 /24
- 192.168.10.255 /24

Network B (256)

- 192.168.11.0 /24
- 192.168.11.1 /24
- 192.168.11.254 /24
- 192.168.11.255 /24

Network C (128)

- 192.168.12.0 /25
- 192.168.12.1 /25

- 192.168.12.126 /25
- 192.168.12.127 /25

Network D (128)

- 192.168.12.128 /25
- 192.168.12.129 /25
- 192.168.12.254 /25
- 192.168.12.255 /25

Network E (128)

- 192.168.13.0 /25
- 192.168.13.1 /25
- 192.168.13.126 /25
- 192.168.13.127 /25

Network F (16)

- 192.168.13.128 /28
- 192.168.13.129 /28
- 192.168.13.142 /28
- 192.168.13.143 /28