Network Application - Assignment 3: University Campus Network

In this assignment, you will design a complete university campus network. The goal is to demonstrate your ability to translate functional requirements into a coherent network architecture, covering all layers from physical infrastructure to logical addressing, services, security, and cost considerations.

Your task is **not** to implement the network, but to **design, document, and justify** it as if you were delivering a professional network architecture proposal.

1. Network Scenario

You are a network architect hired to design the network infrastructure for a mid-sized university campus. The campus includes:

- Multiple academic faculties
- Administrative offices
- A central library
- Student residences
- Research laboratories
- A centralized data center
- Internet connectivity through one or more service providers

The network must support academic, administrative, research, and student activities while providing security, scalability, and high availability.

2. Physical Network Design

Your design should first specify the **physical infrastructure** of the campus network.

Your physical design should:

- Define the overall campus topology (e.g., core, distribution, and access layers)
- Specify building-to-building and intra-building connectivity
- Identify the types of cabling used (e.g., fiber, copper)
- Indicate redundancy and fault tolerance mechanisms

- Identify the location of network closets and equipment rooms

You should clearly explain **why** each physical design choice was made.

3. Network Devices

Your design should identify all **active network devices** required to operate the campus network.

You should specify:

- Core, distribution, and access switches
- Routers and firewalls
- Wireless controllers and access points

For each device type, you should describe its role in the network and justify its placement.

4. Logical Network Design

Your design should include a complete **logical architecture**.

Specifically, your network should:

- Define VLANs for different user groups and services
- Describe how inter-VLAN communication is performed
- Address loop prevention and link aggregation mechanisms
- Clearly separate administrative, academic, student, and guest traffic

5. IP Addressing

Your network should use **private IPv4 addressing**.

You should:

- Define IP address ranges for each major network segment
- Specify subnet sizes and default gateways
- Explain how your addressing plan supports scalability

(Optional: You may include an IPv6 or dual-stack design for additional credit.)

6. Network Services

Your network should support essential services required for campus operation.

At a minimum, your design should include:

- Address allocation (e.g., DHCP)
- Name resolution (e.g., DNS)
- Authentication services
- Internet access and remote access (VPN)

You should indicate where these services are located and how they are protected.

7. Wireless Network

Your design should include a wireless network supporting staff, students, and guests.

Your wireless design should:

- Define SSIDs and user separation
- Describe authentication mechanisms
- Address coverage, capacity, and roaming requirements

8. Security Design

Your network must be designed with security as a core requirement.

Your security design should:

- Describe firewall placement
- Explain traffic filtering and access control
- Isolate sensitive resources such as research labs and the data center
- Address monitoring and threat detection

9. Cost Estimation

Your design should include a **cost estimation** for the proposed network.

You should:

- Present a structured cost table
- Include major equipment, infrastructure, software, and labor costs
- Provide brief justification for significant cost items

All costs should be **reasonable estimates**, not vendor quotations.

10. Documentation and Submission

You should submit:

- A single written report describing your design
- Clear diagrams showing:
  - Physical topology
  - Logical topology
  - IP addressing plan
- All assumptions clearly stated

Your report should be well-organized, technically precise, and professionally presented.

Submission:

The completed assignment must be sent to the following email address:

alaidi@uowasit.edu.iq

Email Requirements:

To ensure your assignment is processed correctly, students must adhere to the following submission guidelines:

Email Subject Line: Assignment 3 – University Campus Network – [Student Full Name]

(Example: Assignment 3 – University Campus Network – Ali Ahmed)

Email Body: The text of the email must include the following details:

Student Full Name:

Department / Year:

Attachment Format:

The assignment must be submitted as a PDF file to preserve formatting.

File Naming: The file must be named using the format:
StudentName_Assignment1_IPv6.pdf

(Example: Name_Assignment1_IPv6.pdf)

Deadline:

30-3-2026