IQRA UNIVERSITY

FACULTY OF ENGINEERING SCIENCES AND TECHNOLOGY

Project

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Title : University network

Motivation: The term “digital” is crucial today as technology advances and the world shifts to a digital era. Educational institutions must adapt by becoming “digital campuses.” Wireless networking plays a key role in this transformation by reducing cables, simplifying device management, and enhancing connectivity.Wireless networks are essential for campus life, enabling teachers and students to access educational resources anytime, anywhere. Unlike traditional wired networks, which limit mobility and flexibility, wireless networks support the growing use of laptops and smart devices. They complement wired systems and mark the modern campus by providing efficient, cable-free internet access, improving teaching and research convenience.

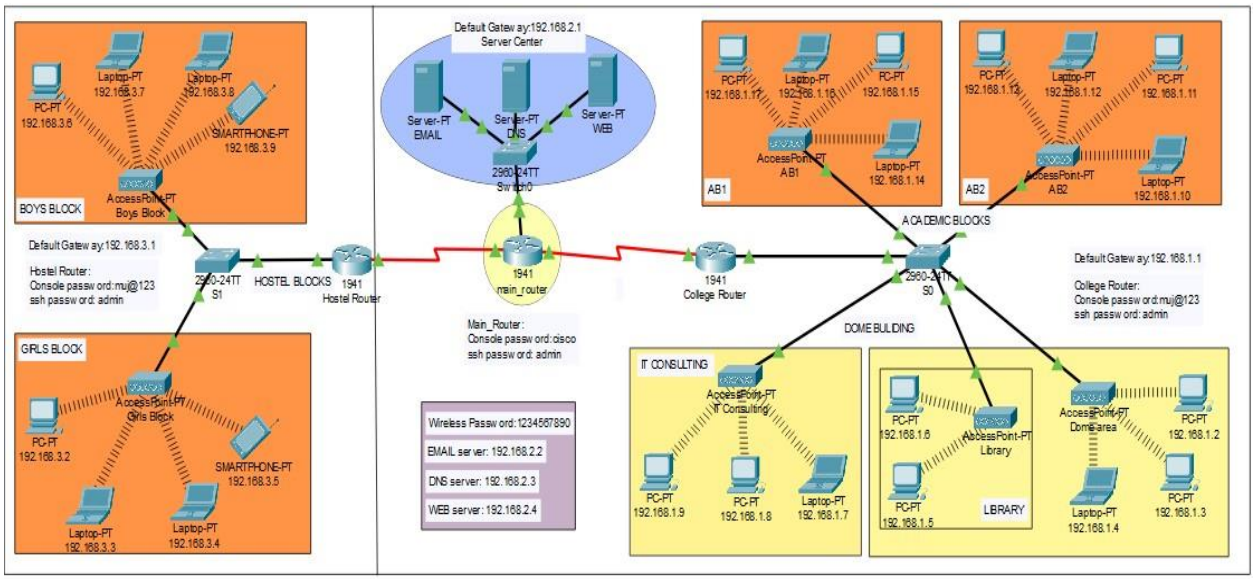
Concept (Problem Statement):

In this mini-project, we defined a simulation of campus networks based on wireless networking. The network is divided into two sets: one for the campus area and the other for the hostel area.

The major aim of this project is to show the wireless connectivity that is used in universities to make the network efficient and mobile at the same time. Mobility is the major concentration of this project. In order to provide equal functionality to all the users (college staff and students), we have added DNS, Email, and HTTP servers for the maximum utilization of resources.

Hence the campus network provides different services such as connecting the user to the internet, data sharing among users (students, teachers, and different university members), accessing different web services for different functionalities, so it needs wireless networking for smooth processing.

Design:



DELEVERABLES:

(These are variables with respect to Open-ended Lab)

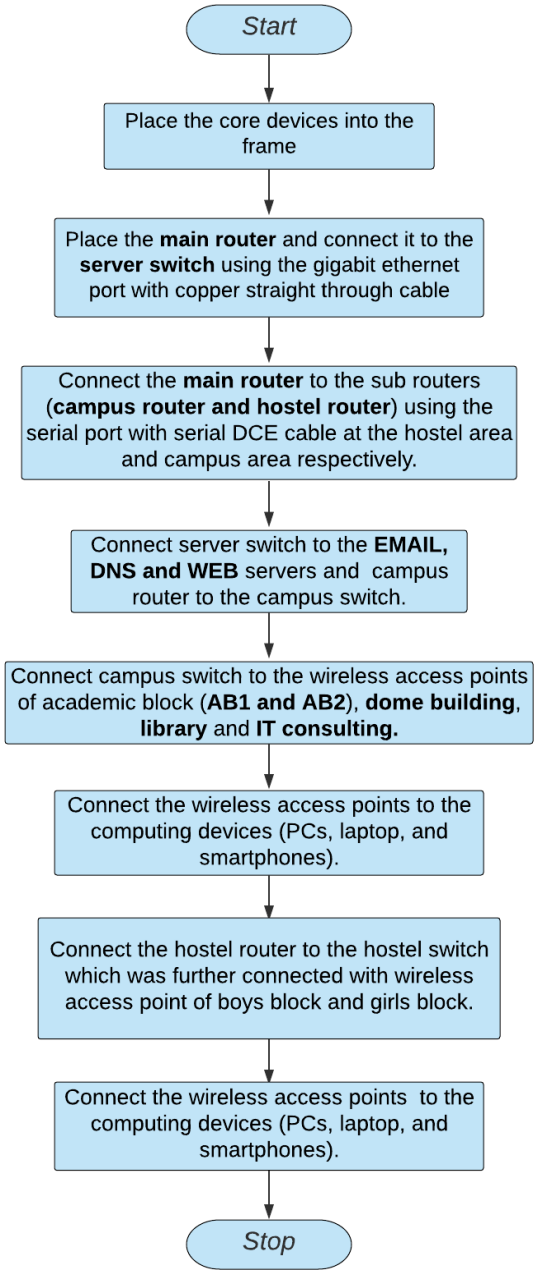
Procedure / Methodology:

- Router (Cisco 1941)
- Switches (Cisco 2960-24TT)
- Servers: Email, DNS, Web
- Wireless Access Points
- Computing devices: PCs, Laptops, Smartphones
- Network areas: Campus (Academic Blocks, Dome, Library, IT Consulting) and Hostel (Boys & Girls Blocks)

Methodology:

- Designed network topology with routers, switches, servers, and wireless devices.
- IP addressing scheme carefully planned.
- Security implemented using SSH and strong passwords.
- Wireless SSIDs configured with secure passwords.
- Network tested using Packet Tracer simulation mode and ping tests.

Flowchart / Block diagram:



Analysis:

The project focuses on designing and simulating a wireless university campus network using Cisco Packet Tracer. The key analysis points are:

- **Network Design:** Dividing the campus into logical areas (Hostel and Campus), each with dedicated routers, switches, access points, and computing devices to manage traffic efficiently.
- **Wireless Connectivity:** Ensuring mobility for students and staff by replacing wired connections with secure wireless access points, which reduces cable clutter and enhances accessibility.
- **Server Implementation:** Integration of DNS, Email, and Web servers for smooth resource sharing and communication within the university.

- **IP Addressing and Routing:** Proper IP configuration and routing protocols (like RIP) ensure efficient packet delivery and network segmentation.
- **Security Measures:** Use of console passwords, SSH for remote router access, and secure passwords on wireless networks help protect network resources from unauthorized access.
- **Simulation:** Cisco Packet Tracer effectively simulates the network topology and verifies connectivity using tools like ping tests and packet tracing.

Results:

- **Functional Network:** The simulated wireless network successfully provided connectivity across different campus zones—academic blocks, library, dome building, hostels, and IT consulting.
- **Wireless Mobility:** Users connected via laptops, PCs, and smartphones could access network services without being tethered to physical cables.
- **Server Services:** DNS, Web, and Email servers responded to client requests, supporting domain name resolution, web browsing, and email communication respectively.
- **Network Security:** The network showed secure access to routers and wireless points, protecting critical infrastructure.
- **Packet Delivery:** Packet Tracer's simulation mode showed seamless packet transmission, routing, and communication between devices, confirming the reliability of the network design.

Concluding Remarks:

The project successfully demonstrated the design and implementation of a wireless university campus network using Cisco Packet Tracer. The transition from a wired to a wireless infrastructure brought advantages like enhanced mobility, easier network management, and scalable access for users across multiple university zones. The integration of various servers ensured comprehensive network services essential for academic and administrative tasks. Security was adequately addressed using SSH and password protection.

This project serves as a foundational prototype for digital campus networking, promoting the use of wireless technologies to create efficient, accessible, and secure campus networks. Future work can include implementing higher bandwidth wireless standards, enhanced security protocols, and expanding coverage to outdoor campus areas for a truly campus-wide digital experience.