The BRAC University Campus Network Project

Project Goal

You are the chief network engineer tasked with designing and implementing a secure and efficient communication infrastructure for **BRAC University**. The network must connect five major departments/functional areas, each with specific host requirements, utilizing **Variable Length Subnet Masking (VLSM)** and a combination of static and dynamic routing.

Network Departments and Host Requirements

The five major sectors, their abbreviations, and the maximum number of required host devices (including faculty, staff, labs, and student access points) are as follows:

Department/Area	**Abbreviation**	**Required Hosts**
Central Administration	CA	**1800**
CSE Department	CSE	**900**
BBS Department	BBS	**450**
EEE Department	EEE	**200**
Library and Student Services	LSS	**100**

Note: *The required host count does* ***not*** *include the IP addresses needed for the router interfaces. Separate subnets must be created for every Point-to-Point link.*

Campus Connectivity

Every department/area is represented by a router.

1. The **Central Administration (CA)** is the core of all operations and must be connected to every other area (CSE, BBS, EEE, LSS).
2. The **CSE Department** and **BBS Department** must have a direct, non-CA link between them for inter-faculty projects.
3. The **EEE Department** and **Library and Student Services (LSS)** must have a direct, non-CA link between them for resource sharing.

Server and Service Requirements

1. **Web and DNS:** The **Central Administration (CA)** will host the main **Web Server** and the **DNS Server**.
    - The DNS server must resolve the URL www.bracuniversity.edu to show the webpage message: *"Welcome to BRAC University: Inspiring Excellence."*.
    - All Servers (Web, DNS, DHCP, Email) must use **static IP addresses**.
2. **Email:** The **CSE Department** and the **BBS Department** require dedicated **Email Servers** for faculty and staff mail exchange.
    - CSE uses mail.cse.bracu.edu with <user>@cse.bracu.edu.
    - BBS uses mail.bbs.bracu.edu with <user>@bbs.bracu.edu.
3. **DHCP Server:** A dedicated **DHCP Server** will be located in the **Central Administration (CA)**.
4. **Printer:** The **EEE Department** requires a **Printer** for printing lab manuals and essential documents.

Logical Addressing and IP Assignment

1. **Network Address:** Choose a suitable Class A or Class B private network address (e.g., $10.0.0.0/8$ or $172.16.0.0/12$) and use **Variable Length Subnet Masking (VLSM)** to create subnets for each department and for the point-to-point router links with the **least amount of wasted IP addresses**.
2. **Static vs. Dynamic:**
    - The **Central Administration (CA)** and **CSE Department** must use **static IP addressing** for their hosts (for high-security administrative and core lab devices).
    - All other departments/areas (**BBS, EEE, LSS**) and their hosts will be assigned IP addresses **dynamically** using the dedicated **DHCP Server** located in CA.
3. **DHCP Pool:** The DHCP Server must have a **separate IP Pool** configured for each dynamically addressed department (BBS, EEE, LSS).
4. **End Devices:** Show a minimum of **two** end devices (PCs/Laptops) in each department to represent the user base.

Routing Requirements

1. **Core Routing Principle:** Any communication between any two non-CA departments **must** pass through the **Central Administration (CA)** router as the primary path.
2. **Static Routes:**
    - The direct link between the **CSE Department** and **BBS Department** must be configured using **static routing**.

    - The direct link between the **EEE Department** and **Library and Student Services (LSS)** must be configured using **static routing**.
3. **Floating Route:** A **backup/floating static route** must be configured between the **Central Administration (CA)** and **EEE Department** via the **BBS Department** with an Administrative Distance (AD) value of **50**.
4. **Dynamic Routes: All remaining paths** (including the primary paths from CA to all others) must be routed **dynamically**.
5. **No Default Routes: Default routes are strictly prohibited** for communication among the university departments. Data must be delivered using standard static or dynamic routes only.

Deliverables

You will need to implement and test this network in **Cisco Packet Tracer**. Upon completion, you must be able to successfully **ping** from any end device in one department to any other end device or server in a different department. You must submit the following documents:

1. Cisco Packet Tracer file (**.pkt**)
2. Network Topology Diagram with proper labels
3. Configuration Commands of all the Routers
4. VLSM/Network Address Table
5. IP Address Table
6. Any assumptions made