PulseBank: Energizing Financial Services with Smart Networking

**Project Overview**

In response to the growing demand for banking services across the African continent, a financial institution is embarking on an ambitious expansion plan. The first branch of this initiative will be established in Nairobi, Kenya, within a newly acquired four-story building. This project is focused on designing and implementing a cutting-edge banking infrastructure that not only meets the immediate operational needs of the branch but also positions the institution for future growth and adaptability in a dynamic market.

The primary goal of this project is to create a robust networking solution that integrates advanced technologies to facilitate seamless banking operations. This infrastructure will support both wired and wireless connectivity, ensuring that employees and customers can access services efficiently and securely. By leveraging modern networking practices, the project aims to enhance communication, improve service delivery, and provide a secure environment for financial transactions.

**Objectives**

The primary objectives of this project are as follows:

* **Design a Hierarchical Network Topology**: Create a network structure that supports the operational requirements of the financial institution.
* **Implement Wired and Wireless Connectivity**: Ensure that each department can accommodate approximately 60 users, both **wired and wireless**.
* **Facilitate Device Communication**: Enable all devices to communicate with each other and access shared resources such as **HTTP and email servers.**
* **Configure Dynamic IP Addressing**: Utilize **DHCP** for automatic IP address allocation and implement **VLANs** for effective network segmentation.
* **Establish Secure Remote Access**: Configure **SSH** for secure remote access to network devices.
* **Utilize OSPF as the Routing Protocol**: Implement **OSPF** for efficient route advertisement across the network.

**Importance of the Project**

This enterprising networking project is crucial for several reasons:

* **Market Competitiveness**: Establishing a modern banking infrastructure will enable the institution to compete effectively in the rapidly evolving African financial landscape.
* **Enhanced Customer Experience**: A reliable and efficient network will improve service delivery, leading to higher customer satisfaction and loyalty.
* **Operational Efficiency**: Streamlined processes and effective communication among departments will enhance overall productivity and reduce operational costs.
* **Future Growth Potential**: A scalable infrastructure will allow the institution to adapt to changing market demands and expand its services as needed.

**Requirements**

**Network Design**

* **Simulation Software**: Use Cisco Packet Tracer for the design and implementation of the network.

**Network Specifications**

* **Departments**: Each floor will have different departments, each requiring its own VLAN and subnet.
* **User Capacity**: Each department will support around 60 users, both wired and wireless.
* **Dynamic IP Addressing**: All devices will obtain **IPv4 addresses** automatically from dedicated DHCP servers located in the server room.
* **Routing Protocol**: OSPF will be used to advertise routes across the network.
* **Server Configuration**: Set **up HTTP and email servers** for internal and external communication.
* **Security**: Implement SSH for secure remote access and configure port security on switches.

**VLAN and Subnetting**

* **Base Address**: 192.168.10.0
* **Subnetting**: Each department will be assigned a different VLAN and subnet based on the number of hosts required. The subnet mask, usable IP address range, and **broadcast address** will be calculated for each subnet.

**Technologies to be Implemented**

* Creating a network topology using Cisco Packet Tracer.
* Hierarchical Network Design.
* Connecting networking devices with correct cabling.
* Configuring basic device settings (hostnames, passwords, banner messages).
* **Creating VLANs** and assigning ports VLAN numbers.
* **Subnetting and IP Addressing**.
* **Configuring Inter-VLAN Routing** on multilayer switches (**Switch Virtual Interface**).
* **Configuring a dedicated DHCP server** for dynamic IP allocation.
* **Configuring SSH** for secure remote access.
* **Configuring OSPF** as the routing protocol on routers and 13 switches.
* **Configuring switchport security** to 13 switches(**sticky MAC address and violation mode**).
* **Configuring WLAN** or wireless network (Cisco Access Point).

**Expected Outcomes**

Upon successful completion of the project, the following outcomes are anticipated:

* A fully functional network that supports the operational needs of the financial institution.
* Enhanced communication and collaboration among departments.
* Secure access to network resources and remote management capabilities.
* A scalable network infrastructure that can accommodate future growth.

**Conclusion**.

The Smart Banking Network Implementation project represents a significant step forward in the financial institution's expansion strategy across a continent (i.e. Africa). By investing in a state-of-the-art banking infrastructure, the institution aims to create a secure, efficient, and customer-centric environment that supports its growth objectives. This project not only addresses the immediate needs of the current company branch but also lays the groundwork for future success in the African market.