**Network Design for APIIT Expansion**

**Introduction**

The proposed network design is structured to connect three locations of APIIT—the Main Campus (HQ), the Research and Development Center, and the Branch in Kandy. This design emphasizes scalability, performance, security, and redundancy, ensuring the network can meet current requirements and future expansions.

**Key Features**

1. **Centralized Management**
   * The Main Campus acts as the central hub for managing servers and critical infrastructure.
2. **Redundancy**
   * Backup connections and hardware are implemented to minimize downtime.
3. **Network Segmentation**
   * VLANs are used to separate departmental traffic, improving security and efficiency.
4. **Efficient IP Addressing**
   * Variable Length Subnet Masking (VLSM) optimizes IP address usage and reduces waste.

**Connecting APIIT Branches**

The network’s primary goal is to establish efficient, reliable, and secure communication among the three branches. A Wide Area Network (WAN) setup will enable:

* High-speed data transfer
* Centralized resource access
* Cost efficiency
* Data consistency

**Required Hardware**

1. **Routers**
   * Model: Cisco ISR 4000 Series
   * Purpose: Manages WAN connectivity at each location.
2. **Switches**
   * Model: Cisco Catalyst 9300 Series
   * Purpose: Supports VLANs and inter-VLAN routing.
3. **Firewall**
   * Model: Cisco Firepower 2100 Series
   * Purpose: Enhances network security against cyber threats.
4. **Cables**
   * Fast Ethernet for internal connections.
   * Giga Ethernet for external connections.

**Network Design Overview**

1. **Main Campus (HQ)**
   * **Departments**: Computing School, Business School, Marketing, Human Resources, Academic Administration.
   * **VLANs**:
     + VLAN 10: Computing School
     + VLAN 20: Business School
     + VLAN 30: Marketing
     + VLAN 40: Human Resources
     + VLAN 50: Academic Administration

2.  **Research and Development Center**

* **Departments**: Research and Development, Marketing, Human Resources.
* **VLANs**:
  + VLAN 60: Research and Development
  + VLAN 70: Human Resources
  + VLAN 80: Marketing

 **Branch (Kandy)**

* **Departments**: Computing School, Business School, Marketing, Human Resources, Academic Administration.
* **VLANs**:
  + VLAN 90: Computing School
  + VLAN 100: Business School
  + VLAN 110: Marketing
  + VLAN 120: Human Resources

**WAN Connection Setup**

1. **MPLS**
   * Provides reliable, low-latency links for inter-branch communication.
2. **Alternative: SD-WAN**
   * Offers cost-effective solutions using broadband or 4G LTE.

**Security Considerations**

1. **Firewalls**
   * Block unauthorized access using ACLs.
2. **Encryption**
   * Implement IPsec for secure communications.
3. **Regular Updates**
   * Apply the latest firmware and security patches.