## **Lab Exercise: Design a WAN for "Acme Inc."**

**Scenario:** You are the network administrator for Acme Inc., a fictional company with headquarters in New York City and branch offices in London and Tokyo. Acme Inc. relies heavily on secure communication and data transfer between all locations. Design a Wide Area Network (WAN) architecture for Acme Inc.

**Objectives:**

* Identify key considerations for designing a WAN.
* Design a secure and scalable WAN topology.
* Select appropriate WAN connection technologies.
* Implement basic security measures on the WAN.

**Lab Environment:**

This is a conceptual lab exercise. No specific software or hardware is required.

**Materials:**

* Whiteboard or flipchart
* Markers or pens

**Steps:**

1. **Planning and Requirements:**
   * **Identify Acme Inc.'s Needs:** Discuss what kind of data will be transferred across the WAN (e.g., emails, voice calls, video conferencing, file sharing).
   * **Security Considerations:** Determine the level of security required for different types of data.
   * **Performance Requirements:** Consider bandwidth needs for each location and prioritize real-time vs. non-real-time traffic.
   * **Scalability:** Plan for future growth and potential additional branch offices.
2. **WAN Topology Design:**
   * **Choose a Topology:** Decide on a suitable topology for the WAN, considering options like Mesh, Hub-and-Spoke, or Full Mesh. (Research these topologies if needed). Justify your choice based on Acme Inc.'s needs.
   * **Location Connectivity:** Plan how each branch office will connect to the headquarters. Consider factors like cost, bandwidth availability, and reliability.
3. **WAN Connection Technologies:**
   * **Research and Compare:** Investigate different WAN connection options like MPLS, VPNs over the internet, or leased lines.
   * **Select Technologies:** Based on your findings and Acme Inc.'s requirements, choose the most suitable WAN connection technologies for each link.
4. **Security Implementation:**
   * **Firewalls:** Discuss the importance of firewalls at each location and at the headquarters to control traffic flow.
   * **Encryption:** Plan for encrypting sensitive data in transit across the WAN. (e.g., IPSec)
   * **Access Control:** Discuss strategies for user authentication and authorization to access resources across the WAN.
5. **Documentation:**
   * **Draw a Diagram:** Create a visual representation of your designed WAN architecture, including the chosen topology, connection types, and security measures.
   * **Document Decisions:** Briefly explain the rationale behind your design choices, considering security, performance, and scalability.

**Bonus:**

* Research and discuss additional WAN optimization techniques like traffic shaping and Quality of Service (QoS).
* Explore Software-Defined WAN (SD-WAN) solutions and their potential benefits for Acme Inc.

**Debrief and Discussion:**

* Present your designed WAN architecture to the class and discuss any alternative approaches or considerations.
* Evaluate the trade-offs made during the design process.
* Explore the impact of future changes, such as adding a new cloud service or a new branch office.

This lab exercise provides a framework for designing a WAN architecture for a fictional organization. Remember, the specific design choices will depend on the unique needs and constraints of your fictional company.