

## Network by Design Sample Solution

Explain the need to design a hierarchical network that is scalable.

**Suggested Activity Example Solution:** (information based on The Cisco Three-Layered Hierarchical Model and LAN Design)

Access Layer	
<b>Definition</b>	This hierarchical layer connects local clients to the network. It is sometimes called the desktop layer.
<b>Facts</b>	<p>At this level:</p> <ul style="list-style-type: none"> <li>• Network equipment works with the distribution and core layers to send and receive transmissions from clients and users.</li> <li>• Collision domains are created using switches.</li> <li>• Switches can be configured to filter MAC addresses and share bandwidth.</li> </ul>
<b>Network Device Features</b>	<ul style="list-style-type: none"> <li>• Port security</li> <li>• VLANs functionality</li> <li>• Fast Ethernet/Gigabit Ethernet transmissions</li> <li>• Power over Ethernet (PoE)</li> <li>• Link aggregation</li> <li>• Quality of service (QoS)</li> </ul>
Distribution Layer	
<b>Definition</b>	This hierarchical layer provides policy-based, decision-making network connectivity to the access layer below it and the core layer above it.
<b>Facts</b>	<p>At this level:</p> <ul style="list-style-type: none"> <li>• Firewalls and access lists can be placed.</li> <li>• Link aggregation can occur.</li> <li>• Broadcast and multicast domain boundaries are created.</li> </ul>
<b>Network Device Features</b>	<ul style="list-style-type: none"> <li>• Layer 3 support</li> <li>• High forwarding rate</li> <li>• Gigabit Ethernet/10 Gigabit Ethernet</li> <li>• Redundant components</li> <li>• Security policies/access control lists</li> <li>• Link aggregation</li> <li>• Quality of service (QoS)</li> </ul>

Core Layer	
Definition	This hierarchical layer is the <b>backbone</b> of the network. It includes high-powered routers and switches that use high-speed cabling, such as fiber optics. The main function of this layer is reliable delivery of network packets.
Facts	<p>At this level:</p> <ul style="list-style-type: none"> <li>• All other layers of the hierarchical design model are supported.</li> <li>• Load balancing is desired as an integral service.</li> <li>• Efficient, fast, reliable data paths ensure fast network transmissions.</li> </ul>
Network Device Features	<ul style="list-style-type: none"> <li>• Layer 3 support</li> <li>• Very high forwarding rate</li> <li>• Gigabit Ethernet/10 Gigabit Ethernet</li> <li>• Redundant components</li> <li>• Link aggregation</li> <li>• Quality of service (QoS)</li> </ul>
Three-Layer Hierarchical Design Graphic	<p>The diagram illustrates a three-layer hierarchical network design. At the top is the <b>Core</b> layer, consisting of two blue switches. Below it is the <b>Distribution</b> layer, also with two blue switches, which are connected to the Core switches. At the bottom is the <b>Access</b> layer, featuring three blue switches connected to the Distribution switches. A dashed horizontal line separates the Distribution and Access layers. To the right of the diagram, a red double-headed arrow spans the Core and Distribution layers, labeled <b>Layer 3</b>, while a blue double-headed arrow spans the Distribution and Access layers, labeled <b>Layer 2</b>.</p>