# Breaking Networks into Smaller Subnets Study Guide

In this lesson, the instructor demonstrates how to divide a large network into multiple smaller subnets. The process involves understanding CIDR notation, network addressing, and subnetting.

1. **Understanding CIDR Notation:**

   - CIDR (Classless Inter-Domain Routing) notation is used to represent IP addresses and subnet masks. It follows the format **IP_address/subnet_mask**, where the subnet mask is represented by the number of leading '1' bits in binary.

2. **Identifying Network Bits and Host Bits:**

   - In CIDR notation, the subnet mask determines how many bits are allocated to network and host addresses. For example, a **/24** subnet mask indicates that the first 24 bits are for the network portion, leaving 8 bits for hosts.

3. **Subnetting a Large Network:**

   - The process involves dividing a large network into smaller subnets, each with its own network and host portions.

   - To achieve this, the instructor uses a spreadsheet to visualize and calculate the subnet ranges.

   - The instructor demonstrates the process with two examples:

     - **Example 1:** Breaking **192.168.0.0/24** into four equal subnets.

     - **Example 2:** Dividing **172.16.0.0/16** into four subnets, two supporting 1000 devices and two supporting 400 devices.

4. **Calculating Subnet Sizes:**

   - The subnet size is determined by the number of bits allocated for hosts.

- For instance, to support 1000 devices, the instructor calculates the minimum number of host bits required and adjusts the subnet mask accordingly.

5. **Creating Subnet Ranges:**

   - Once the subnet sizes are determined, the instructor calculates the network addresses and ranges for each subnet.

   - Network addresses are chosen to maximize the number of usable IP addresses while accommodating the required number of devices.

6. **Validation and Practice:**

   - The instructor emphasizes the importance of practicing subnetting exercises and verifying results using subnet calculators.

   - Practice helps reinforce understanding and proficiency in subnetting large networks.

By following this systematic approach, network administrators can effectively manage and optimize IP address allocation within their networks, ensuring efficient use of resources while meeting the requirements of various subnets.