Slide 1: Designing Networks with Subnets

"Hey everyone! Today, we're talking about subnetting—don't worry, I'll keep it simple and practical. Think of a network like a big pizza. Subnetting is just slicing it into smaller pieces so it's easier to share and manage.

Let's break it down step by step:

1. Determining subnet size:
This means figuring out how many devices or 'hosts' we need in each subnet. For example, let's say you need 30 devices connected. You can't just pick any random number—you'll need to choose a subnet size that fits at least 32 addresses. Why? Because subnet sizes work in powers of two (like 2, 4, 8, 16, 32, etc.), and we have to reserve a couple of addresses for special purposes, which I'll explain soon.

2. Computing the subnet mask:
The subnet mask is like a divider that separates the network part of an IP address from the host part. For example, if we're using a subnet with 32 addresses, the mask is 255.255.255.224, or /27. It sounds technical, but all it means is that 27 bits are for the network and the rest are for the devices.

3. Computing IP addresses:
Now let's put this into practice.
Imagine our network is 192.168.1.0/27. This gives us 32 IP addresses, from 192.168.1.0 to 192.168.1.31.

- The first address, 192.168.1.0, is the **network address** (reserved).
- The last address, 192.168.1.31, is the **broadcast address** (also reserved).
- That leaves 192.168.1.1 to 192.168.1.30 for devices, like computers, printers, or phones.

Easy enough, right?"

Slide 2: Addresses to Avoid When Subnetting

"Now let's talk about what **not** to do when subnetting. There are certain IP addresses you should avoid using because they're reserved for special functions:

1. A node address of all ones:
This is called the broadcast address. It's used to send a message to all devices in a subnet. For example, in 192.168.1.0/27, the last address, 192.168.1.31, is reserved for broadcasts.

2. A node address of all zeros:
This is the network address. It represents the subnet itself, like 192.168.1.0 in our example.

3. A subnet address of all ones:
This is reserved for all subnets and can confuse routers, so avoid it for clarity.

4. A subnet address of all zeros:
This one was traditionally avoided because it was confusing, but modern systems like Cisco routers allow it if you enable a command called ip subnet-zero. So, check if your network supports it.

Quick example to wrap this up:
If we split 192.168.1.0/24 into smaller subnets:

- The **first subnet** is 192.168.1.0/27, with usable addresses from 192.168.1.1 to 192.168.1.30.
- The **second subnet** is 192.168.1.32/27, with usable addresses from 192.168.1.33 to 192.168.1.62.

See how we reserve the first and last addresses in each subnet? This keeps things organized and avoids conflicts.

"And that’s it! Subnetting might sound tricky at first, but it’s just about splitting networks into smaller, manageable parts. With a bit of practice, it becomes second nature. Thanks for listening!"