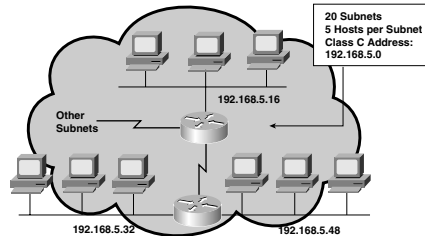


How to Implement Subnet Planning

Subnetting decisions should always be based on growth estimates rather than current needs.

To plan a subnet, follow these steps:

1. Determine the number of subnets and hosts for each subnet required.
2. The address class you are assigned and the number of subnets required determine the number of subnetting bits used. For example, with a Class C address and a need for 20 subnets, you will have a 29-bit mask (255.255.255.248). This allows for the Class C default 24-bit mask and 5 bits required for 20 subnets. (The formula $2^n - 2$ yields only 14 subnets for 4 bits, so 5 bits must be used.)
3. The remaining bits in the last octet are used for the host field. In this case, each subnet has $2^3 - 2$, or 6 hosts.
4. The final host addresses are a combination of the network/subnet plus each host value. The hosts on the 192.168.5.32 subnet would be addressed as 192.168.5.33, 192.168.5.34, 192.168.5.35, and so forth.



Implementing Subnet Planning Summary

- Breaking up networks into smaller segments (or subnets) improves network efficiency and conserves IP addresses.
- A 32-bit subnet mask determines the boundary between the subnet host portions of the IP address using 1s and 0s.
- A subnet defines a broadcast domain in a routed network.
- Cisco IOS Software supports directed, local network, and subnet broadcasts.
- Subnet planning should be based on future growth predictions rather than current needs.

Configuring IP Addresses

An IP address must be assigned to a switch if you plan to use SNMP or connect to the switch through a Web browser or Telnet. If the switch needs to send traffic to a different IP network, the traffic is routed to a default gateway.

Here's the procedure for configuring a switch IP address:

```
SwitchA>enable
SwitchA#config term
SwitchA(config)#ip address 10.2.5.10 255.255.255.0
SwitchA(config)#ip default-gateway 10.2.5.2
SwitchA(config)#exit
SwitchA#show ip
```

The **no ip address** command resets the address to the default (0.0.0.0).

Each unique IP address can have a host name associated with it. A maximum of six IP addresses can be specified as named servers. *Domain Name System* (DNS) is a system used to translate names into addresses. If a system sees an address it does not recognize, it refers to DNS, which is enabled by default with a server address of 255.255.255.255. The **ip domain-lookup** and the **no ip domain-lookup** commands turn DNS on and off, respectively.

Router IP Host Names

When names are used to route traffic, they must be translated into addresses. Routers must be able to associate host names with IP addresses to communicate with other IP devices. The **ip host** command manually assigns host names to addresses.

Configuring IP Addresses Summary

- The **ip address** command sets the IP address and subnet mask.
- The **ip name-server** command defines which hosts can provide the name service.
- DNS translates node names into addresses.
- The **show hosts** command displays host names and addresses.

Configuring Network Routing

VLANs create Layer 2 segments. End stations in different segments (broadcast domains) cannot communicate with each other without the use of a Layer 3 device, such as a router. Each VLAN must have a separate physical connection on the router, or trunking must be enabled on a single physical connection for inter-VLAN routing to work.