LAN Setup and Monitoring and VLSM

Network related commands

- IPConfig command
  This command is used to display basic IP address configuration information for the device. Simply type IPConfig at the Windows command prompt, and you will be presented with the IP address, subnet mask, and default gateway that the device is currently using.

- PING Command
  Ping is a basic Internet program that lets you verify that a particular IP address exists and can accept requests. Ping is used to test the ability of one network host to communicate with another .

Network related commands

- TRACERT Command
  If someone would like to know how he goes from his house to his office he could just tell the list of the crossroads where he passes. The same way we can ask the data sent over from your computer to the web server which way does it go, through which devices? We ask it by using the utility called traceroute (utility for examining the path to a remote host.(

- NETSTAT Command
  This command is used to get information about the open connections on your system (ports, protocols being used, etc.), incoming and outgoing data and the ports of remote systems to which you are connected(display network summary information for the device .(

Variable Length Subnet Masking
(VLSM)

VLSM - is a technique that allows network administrators to divide an IP address space into subnets of different sizes, unlike simple same-size Subnetting. VLSM means subnetting a subnet. To simplify further, VLSM is the breaking down of IP addresses into subnets (multiple levels) and allocating it according to the individual need on a network. In this lab, we will create many subnets with different sizes.

Block Size
# of require Host+2➔

128 64   32   16   8   4   2   1

Variable Length Subnet Masking

Prefix	Mask	Bits for Host	Hosts	Block Size
/25	128	7	126	128
/26	192	6	62	64
/27	224	5	30	32
/28	240	4	14	16
/29	248	3	6	8
/30	252	2	2	4

Let's work with the diagram below, with network ID 192.168.10.0


There are eight networks, with different sizes. First step is to select a block size for each network, from the previous table.

1. Network A has 14 hosts, and two IP's reserved for subnetwork ID and broadcast ID. Therefore, the block size is 16.

2. Network B has 30 hosts, and two IP's reserved for subnetwork ID and broadcast ID. Therefore, the block size is 32.

3. Network C has 20 hosts, and two IP's reserved for subnetwork ID and broadcast ID. Therefore, the block size is 32. (Since 20 + 2 = 22 is not a valid block size).
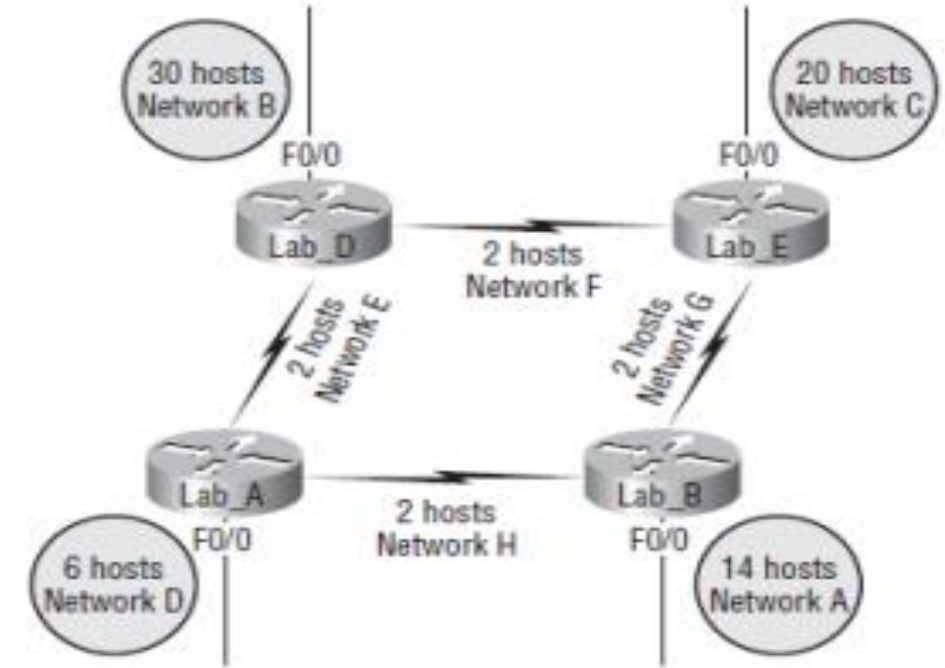
4. Network D has 6 hosts, and two IP's reserved for subnetwork ID and broadcast ID. Therefore, the block size is 8.

5. Each of the remaining networks has two hosts (you have to deal with router port as a host), and two IP's reserved for subnetwork ID and broadcast ID. Therefore, the block size is 4.
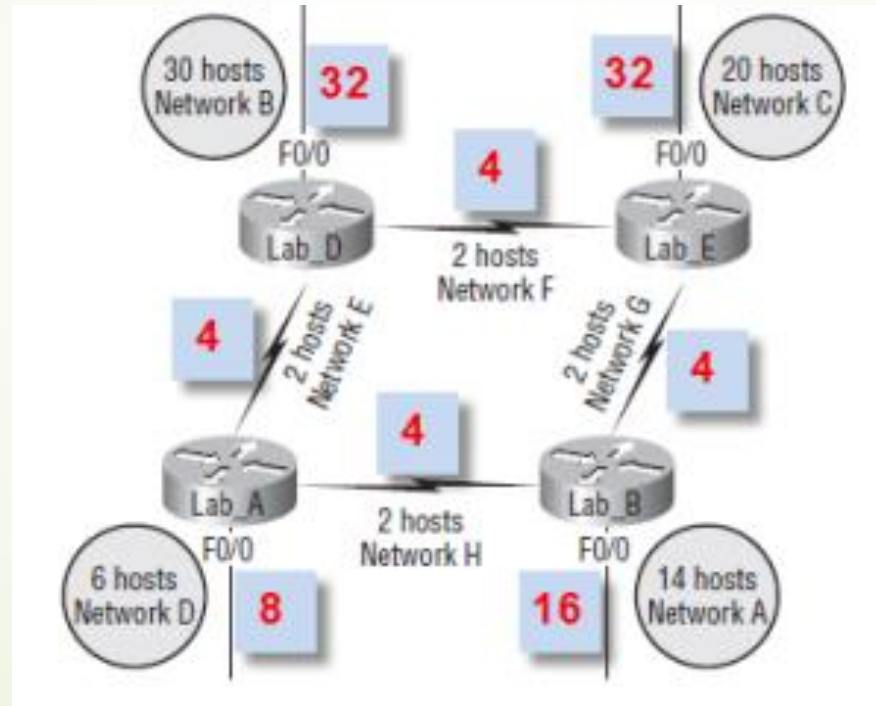
Now check if the sum of all block sizes is less than 256 (class C)

16 + 32 + 32 + 8 + 4 + 4 + 4 + 4 = 104 < 256

If the sum is greater than 256 then the VLSMs cannot be created.

The next step is to assign an IP for each network. It is recommended to start with the bigger one so we do not accidentally overlap networks.

1. Network B: 192.168.10.0 [always start with 0]
   Block size = 32 >> CIDR = /27
2. Network C: 192.168.10.32 [0 + block size of B]
   Block size = 32 >> CIDR = /27
3. Network A: 192.168.10.64 [32 + block size of C]
   Block size = 16 >> CIDR = /28
4. Network D: 192.168.10.80 [64 + block size of A]
   Block size = 8 >> CIDR = /29
5. Network E: 192.168.10.88 [80 + block size of D]
   Block size = 4 >> CIDR = /30
6. Network F: 192.168.10.92 [88 + block size of E]
   Block size = 4 >> CIDR = /30
7. Network G: 192.168.10.96 [92 + block size of F]
   Block size = 4 >> CIDR = /30
8. Network H: 192.168.10.100 [96 + block size of G]
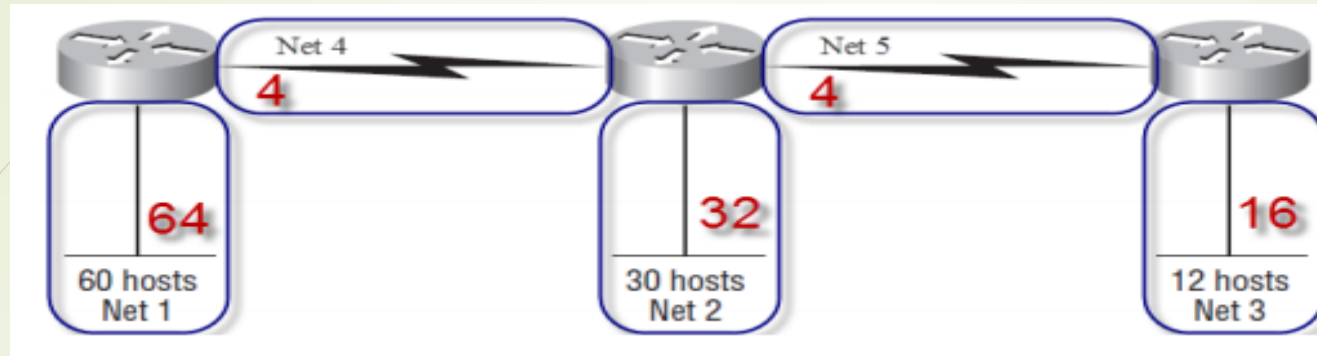   Block size = 4 >> CIDR = /30

Variable Length Subnet Masking

Network	IP/CIDR
Network A	192.168.10.64/28
Network B	192.168.10.0/27
Network C	192.168.10.32/27
Network D	192.168.10.80/29
Network E	192.168.10.88/30
Network F	192.168.10.92/30
Network G	192.168.10.96/30
Network H	192.168.10.100/30

Another Example: Network ID: 195.10.10.0/24

60 hosts
Net 1

30 hosts
Net 2

12 hosts
Net 3
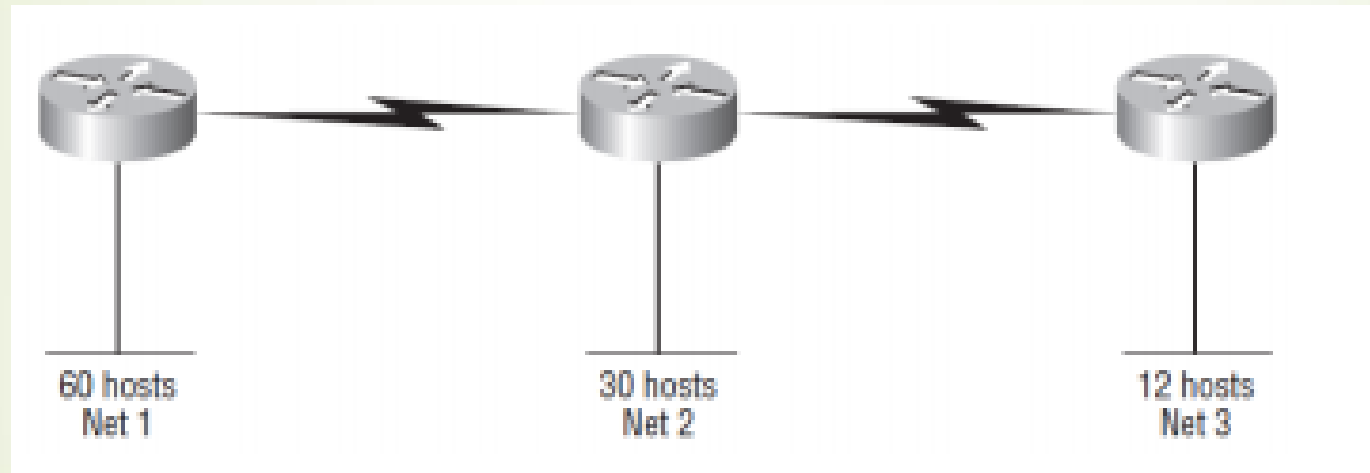
1. Determine blocks:

2. Check if the sum of all block sizes is less than 256 (class C)
64 + 32 + 16 + 4 + 4 = 120 < 256

3. Assign an IP for each network, starting with the bigger one:
Net 1: 195.10.10.0/26
Net 2: 195.10.10.64/27
Net 3: 195.10.10.96/28
Net 4: 195.10.10.112/30
Net 5: 195.10.10.116/30

Port Addressing

IP address	Port Number
Internet Protocol address (IP address) used to identify a host in network.	Port number is used to identify an processes/services on your system
IPv4 is of 32 bits (4 bytes) size and for IPv6 is 128 bits (16 bytes).	The Port number is 16 bits numbers.
IP address is provided by admin of system or network administrator.	Port number for application is provided by kernel of Operating System.
ipconfig command can be used to find IP address .	netstat command can be used to find Network Statistics Including Available TCP Ports.
IP address identify a host/computer on a computer network.	Port numbers are logical interfaces used by communication protocols.
192.168.0.2, 172.16.0.2 are some of IP address examples.	80 for HTTP, SMTP 25, FTP 21, 123 for NTP, 67 and 68 for DHCP traffic, 22 for SSH etc.

Port Addressing

Socket?

- Endpoint for communication between processes.

- A **socket address** is the combination of an **IP address** and a **port number**.

- The socket opens the network connection for the program, allowing data to be read and written over the network.