Network—refers to classful networks A, B, C.

Subnet—only addresses in different subnets are separated by a router, and they always are.

Number of Subnets Required—A separate subnet will be needed for each VLAN and WAN link. Since subnets happen at L3, it doesn't matter what kind of L2 encapsulation is used on the WAN. The book belabors this point by dealing with serial links and EoMPLS (Ethernet over MultiProtocol Label Switching) Ethernet emulation separately.

Number of Hosts per Subnet—With n host bits, you can handle $2^n - 2$ hosts. The two lost addresses are for the subnet ID (all host bits 0) and subnet broadcast address (all host bits 1).

VLSM (Variable Length Subnet Mask)—Wait until chapter 22! Until then, all subnets will be the same size by using the same subnet mask, at the possible expense of wasted addresses.

Public IP Networks—unique IP addresses are assigned to a given company. This ensures world-routability at the expense of running out of addresses that can't be reused elsewhere.

Private IP Networks—use NAT (Network Address Translation) to reuse the same three networks in any company that wants them and hide all the private addresses behind as few as one public addresses. Private addresses will never be publicly assigned or used on the public side of the internet.

CLASS	PRIVATE NETWORKS	NUMBER OF NETS
A	10.0.0.0	1
B	172.16.0.0, 172.17.0.0, 172.18.0.0, …, 172.31.0.0	16
C	192.168.0.0, 192.168.1.0, …, 192.168.255.0	256

SUBNET DESIGN

Steps:

- Choose a network—no penalty for choosing one too big.
- Choose a mask—based on # of hosts needed in each subnet, moderated by the number of subnets that need to fit inside the chosen network. You'll "borrow" host bits (h), making them subnet bits (s); the network bits (n) stay unchanged.

    Subnet Mask—32-bits with ones (on the left) representing network (and subnet) bits and zeroes (on the right) representing host bits.

- List the subnets—subnet number (all host bits = 0), broadcast bits (all host bits = 1), and the range of usable addresses in between.
- Choose where to use each of the subnets. May take summarization into account, to put different ranges on different sides of a WAN, even sizing the ranges to fall on the boundaries of subnets larger than you're using, as if you were subnetting subnets.
- Perhaps slice of chunks of some subnets to be dynamically assigned (DHCP). You may want to be consistent about where in an address range you put dynamic addresses (high or low and how many).