CCNA 200-301, Volume I

Chapter 12

Analyzing Classful IPv4 Networks

Objectives

- Classful Network Concepts

Classful Network Concepts

- This chapter examines how to begin with a single IP address and then determine the following facts:
  - Class (A, B, or C)
  - Default mask
  - Number of network octets/bits
  - Number of host octets/bits
  - Number of host addresses in the network
  - Network ID
  - Network broadcast address
  - First and last usable address in the network

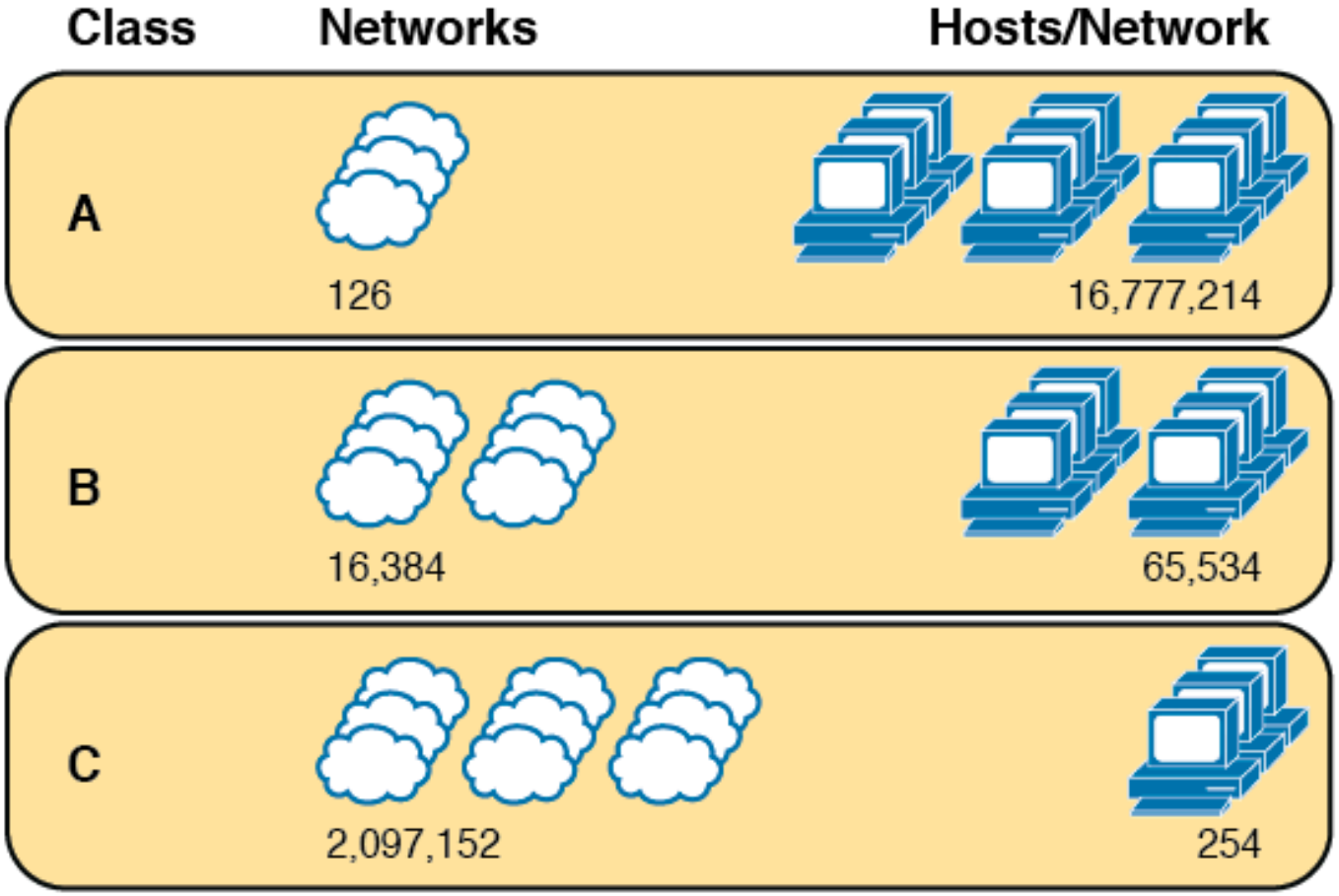
IPv4 Address Classes Based on First Octet Values

Class	First Octet Values	Purpose
A	1–126	Unicast (large networks)
B	128–191	Unicast (medium-sized networks)
C	192–223	Unicast (small networks)
D	224–239	Multicast
E	240–255	Reserved (formerly experimental)

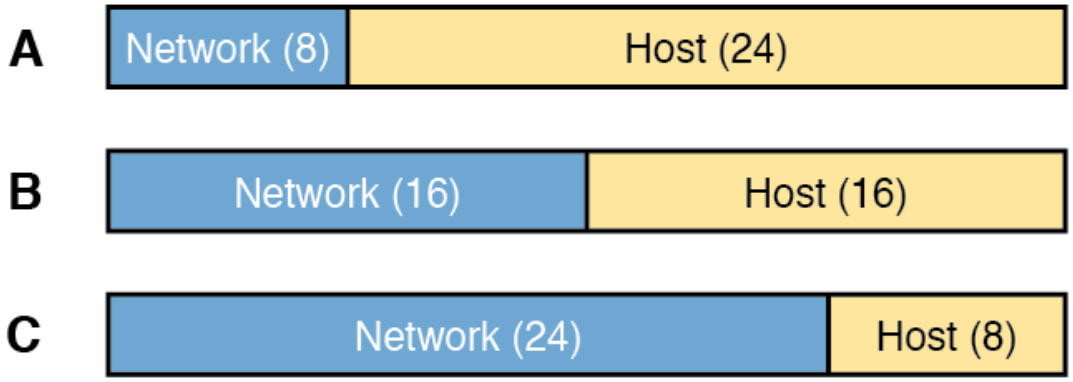
Key Facts for Classes A, B, and C

	Class A	Class B	Class C
First octet range	1 – 126	128 – 191	192 – 223
Valid network numbers	1.0.0.0 – 126.0.0.0	128.0.0.0 – 191.255.0.0	192.0.0.0 – 223.255.255.0
Total networks	$2^7 - 2 = 126$	$2^{14} = 16{,}384$	$2^{21} = 2{,}097{,}152$
Hosts per network	$2^{24} - 2$	$2^{16} - 2$	$2^8 - 2$
Octets (bits) in network part	1 (8)	2 (16)	3 (24)
Octets (bits) in host part	3 (24)	2 (16)	1 (8)
Default mask	255.0.0.0	255.255.0.0	255.255.255.0

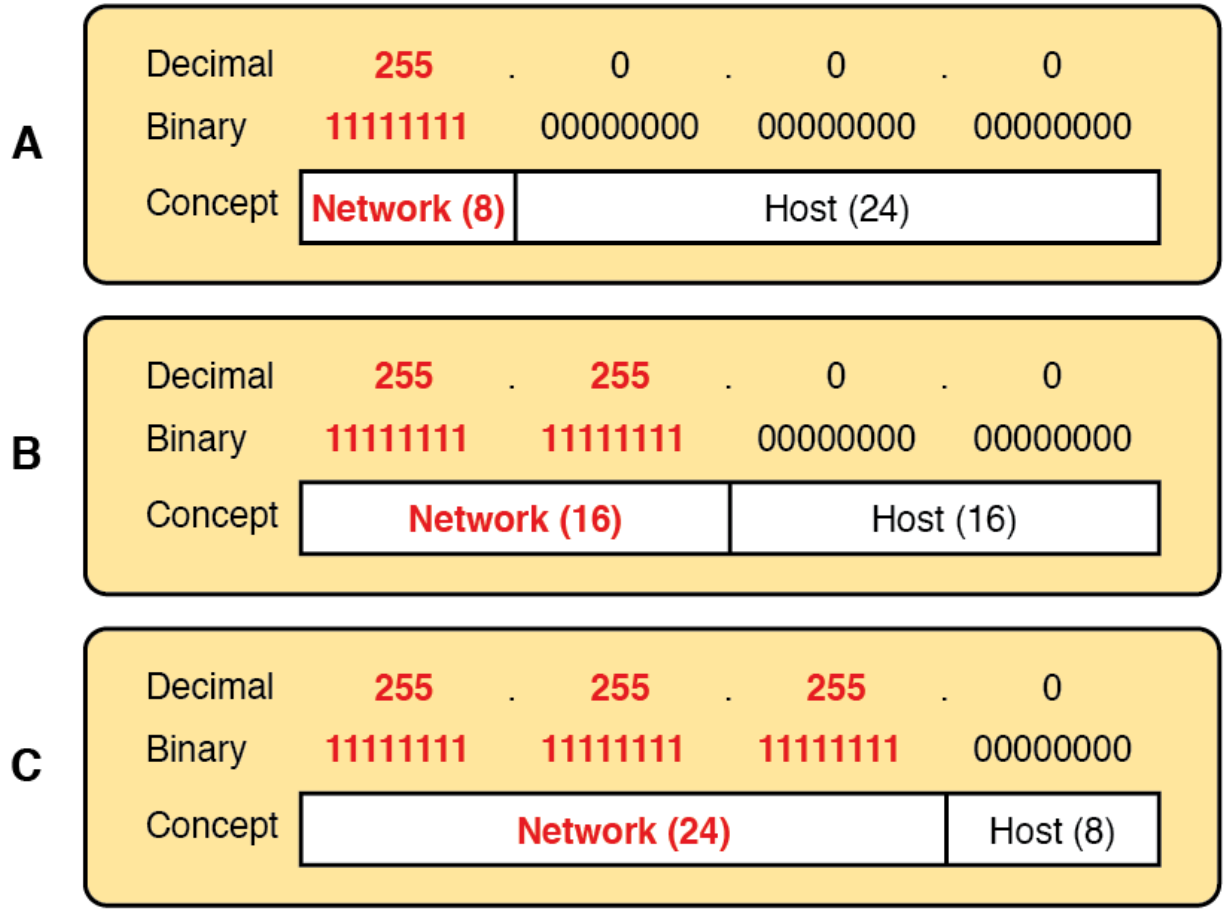
Numbers and Sizes of Class A, B, and C Networks



Sizes (Bits) of the Network and Host Parts of Unsubnetted Classful Networks



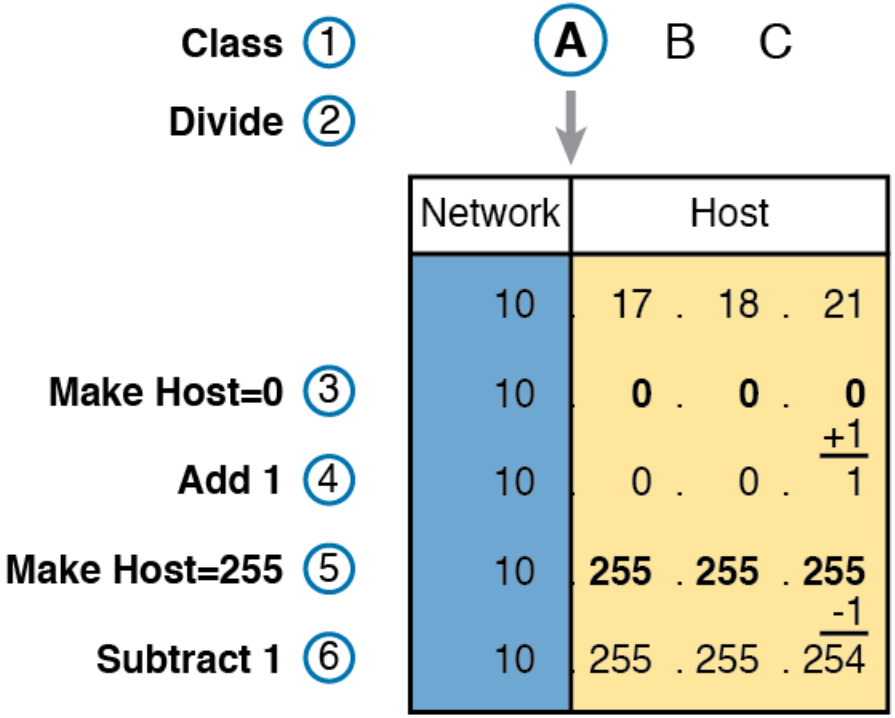
Default Masks for Classes A, B, and C



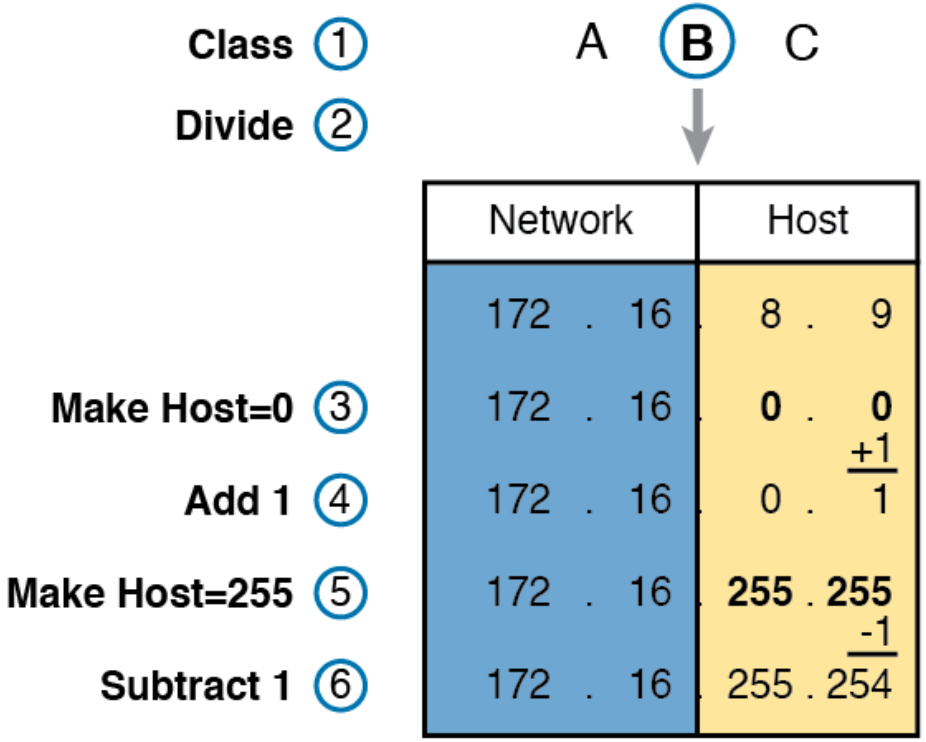
Deriving the Network ID and Related Numbers

- Each classful network has four key numbers that describe the network.
  - Network number
  - First (numerically lowest) usable address
  - Last (numerically highest) usable address
  - Network broadcast address

Example of Deriving the Network ID and Other Values from 10.17.18.21



Example Deriving the Network ID and Other Values from 172.16.8.9



Practice Deriving Key Facts Based on an IP Address

	IP Address	Class	Number Network Octets	Number Host Octets	Network ID	Network Broadcast Address
1	1.1.1.1					
2	128.1.6.5					
3	200.1.2.3					
4	192.192.1.1					
5	126.5.4.3					
6	200.1.9.8					
7	192.0.0.1					
8	191.255.1.47					
9	223.223.0.1					

Practice Remembering the Details of Address Classes

Class	First Octet Values	Purpose
A		
B		
C		
D		
E		

	Class A	Class B	Class C
First octet range			
Valid network numbers			
Total networks			
Hosts per network			
Octets (bits) in network part			
Octets (bits) in host part			
Default mask			