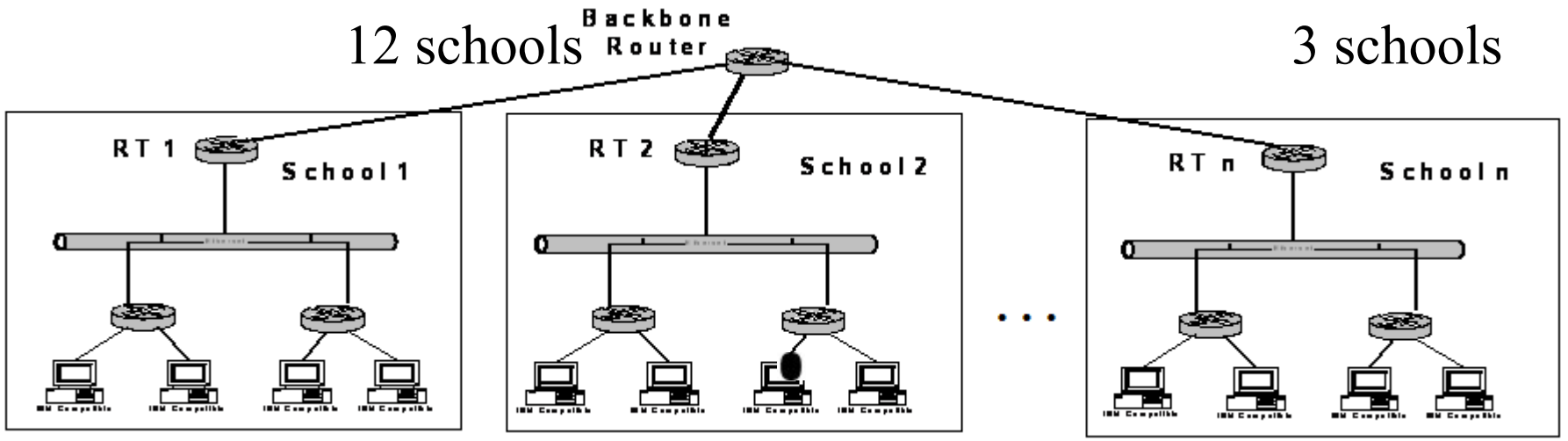
CE3005/SC2008/CZ3006: Computer Networks

Tutorial 2-1

Q1: Assign suitable subnet address/subnet mask



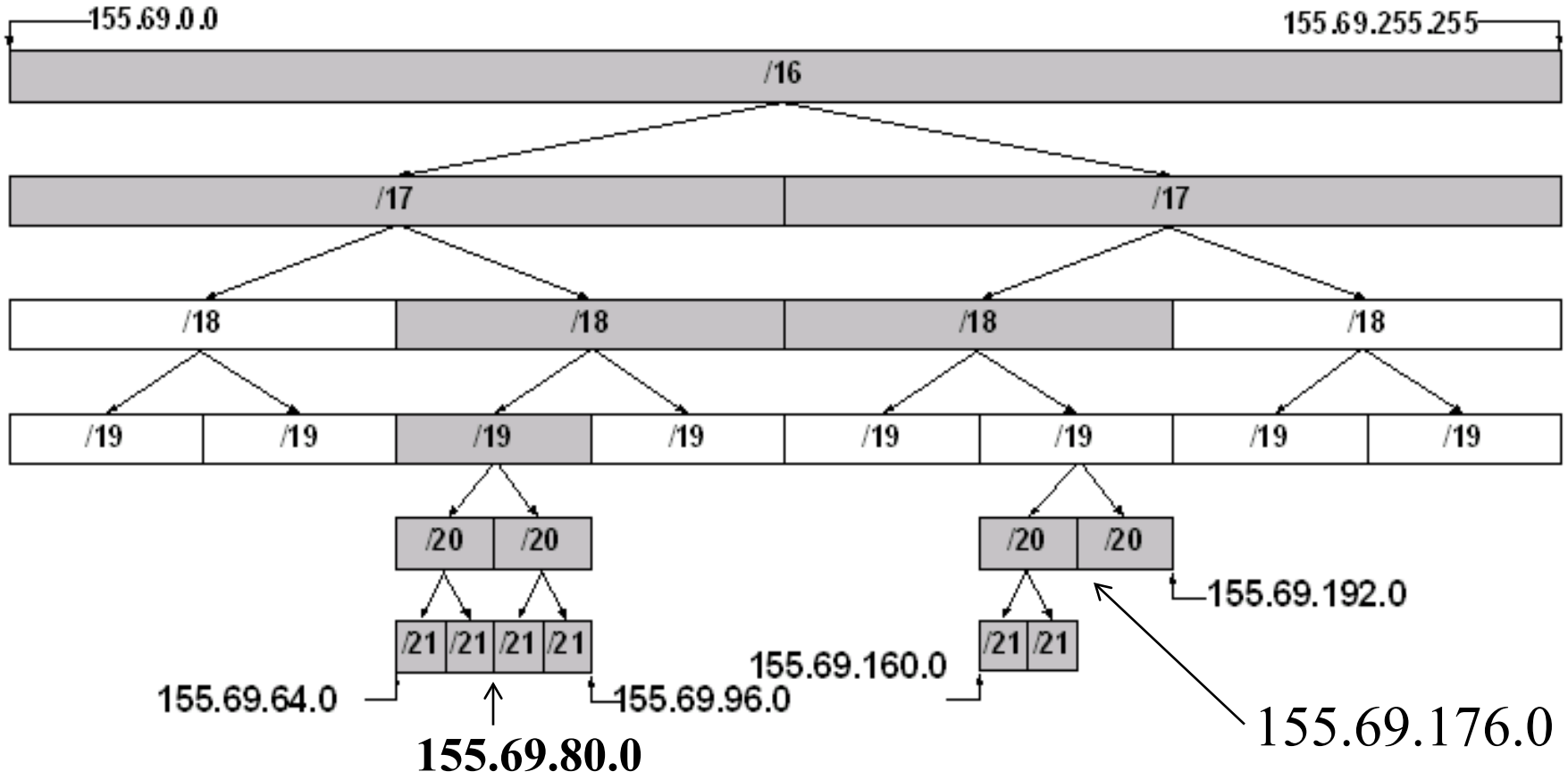
Note:

IP block: 155.69.0.0/16

If using /20 mask, # of hosts = 2^{12} - 2 = 4094

If using /21 mask, # of hosts = 2^{11} - 2= 2046

Q1: Assign suitable subnet address/subnet mask



In this /16 network, there can be 16 subnets with /20 masks, or 32 subnets with /21 masks.

Subnet mask :/20 255.255.11110000.0

Q1: Assign suitable subnet address/subnet mask

- You can choose
  - any 3 address blocks with /20, e.g.
    - 155.69.0.0/20 : 155.69.0.0 till 155.69.15.255
    - 155.69.16.0/20 :155.69.16.0 till 155.69.31.255
    - 155.69.32.0/20 :155.69.32.0. till 155.69.47.255
  - any 12 address blocks with /21, e.g.
    - 155.69.64.0/21 : 155.69.64.0 till 155.69.71.255
    - 155.69.72.0/21 : 155.69.72.0 till 155.69.79.255
    - …
  - Remember not to overlap the address block

How much address is left ? 7 blocks of /20

Q2: Broadcast Address of a Subnet

Given subnet address/subnet mask:

Dotted decimal: 145.32.128.0 / 255.255.224.0

In binary: 145.32.10000000.0 / 255.255.11100000.0

Remember broadcast address = all '1's in host-id

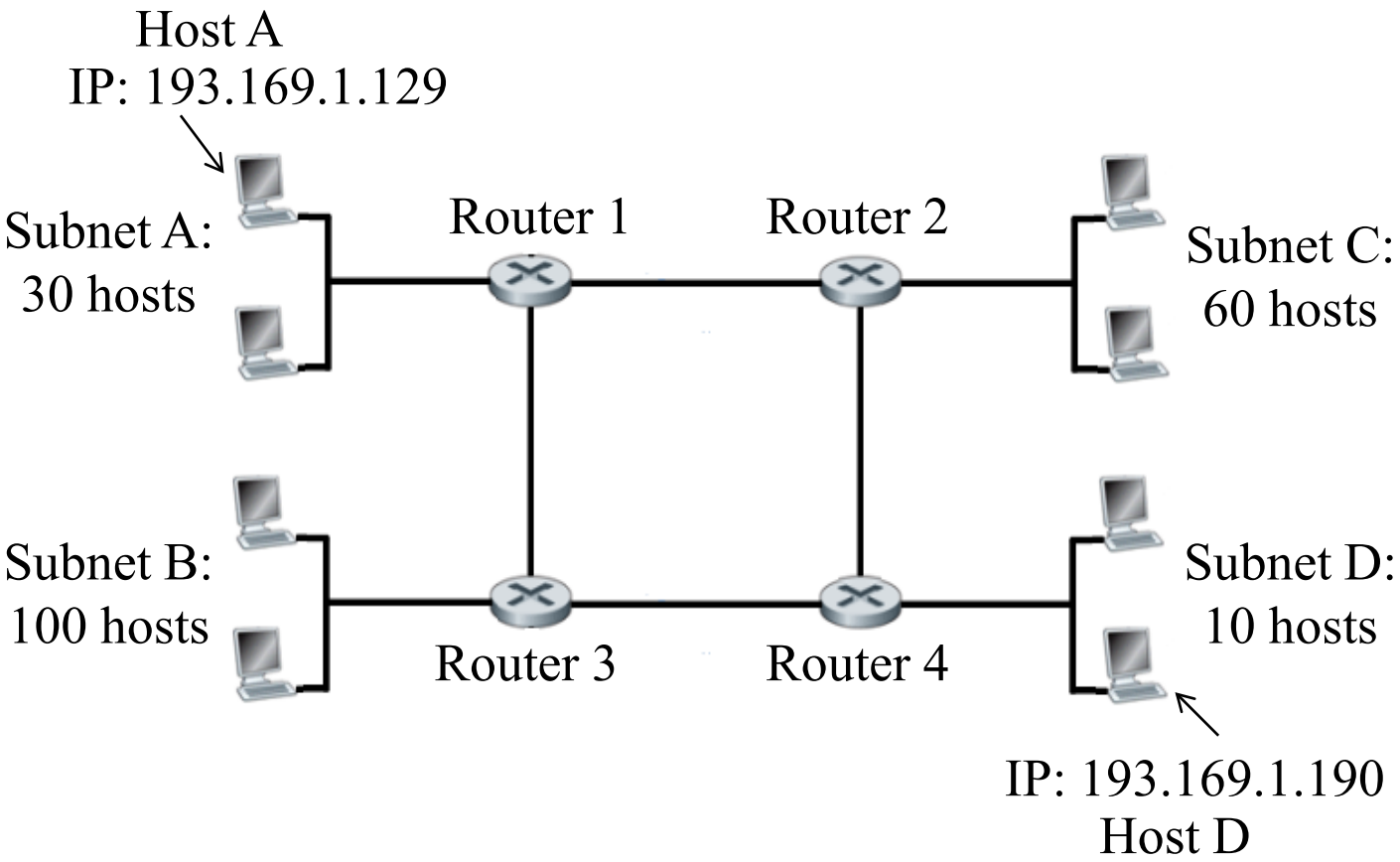
So, broadcast address of subnet 145.32.128.0/19:

In binary: 145.32.10011111.11111111

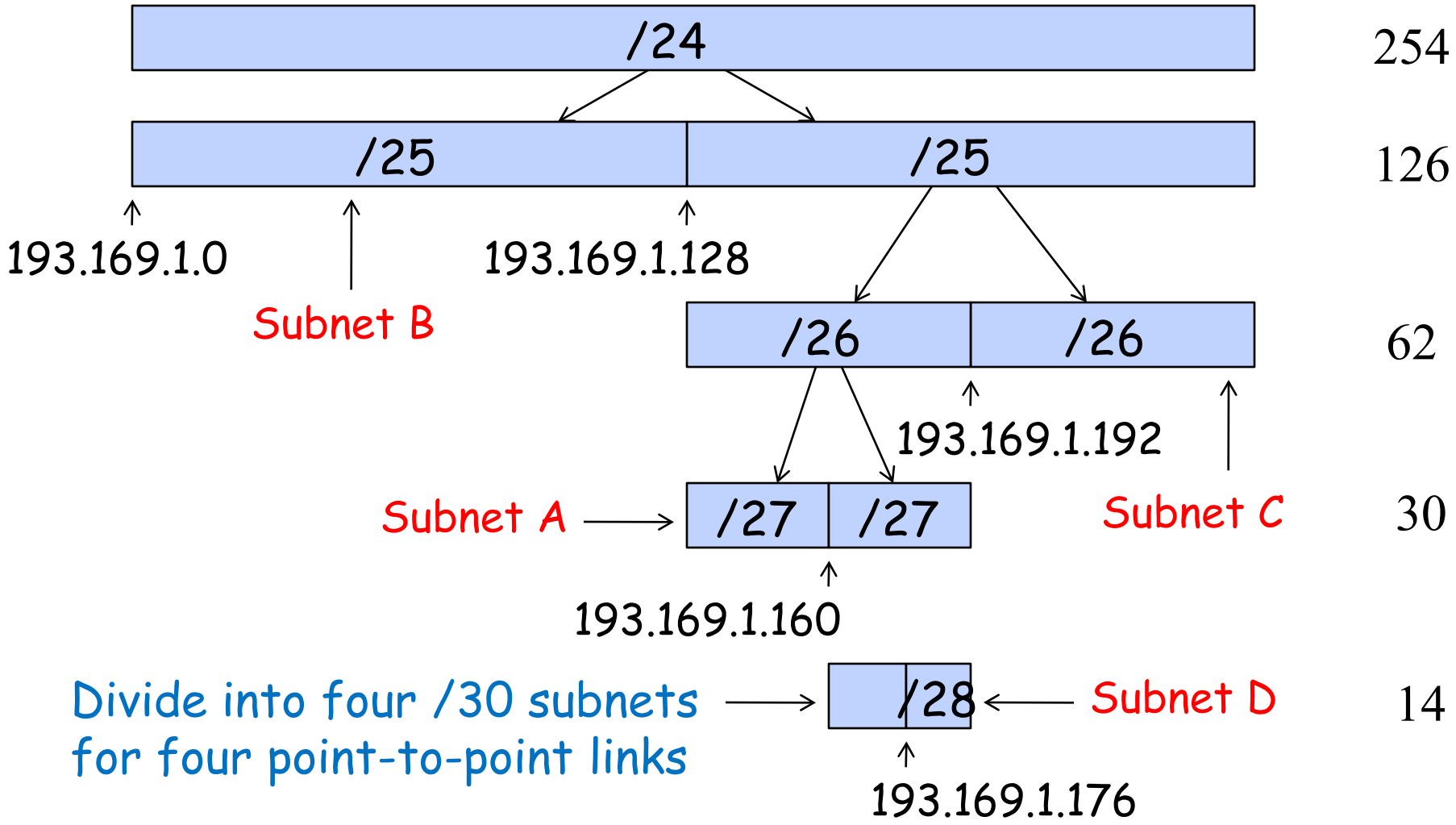
Dotted decimal: 145.32.159.255

Q3: Assign suitable IP addresses/subnet masks

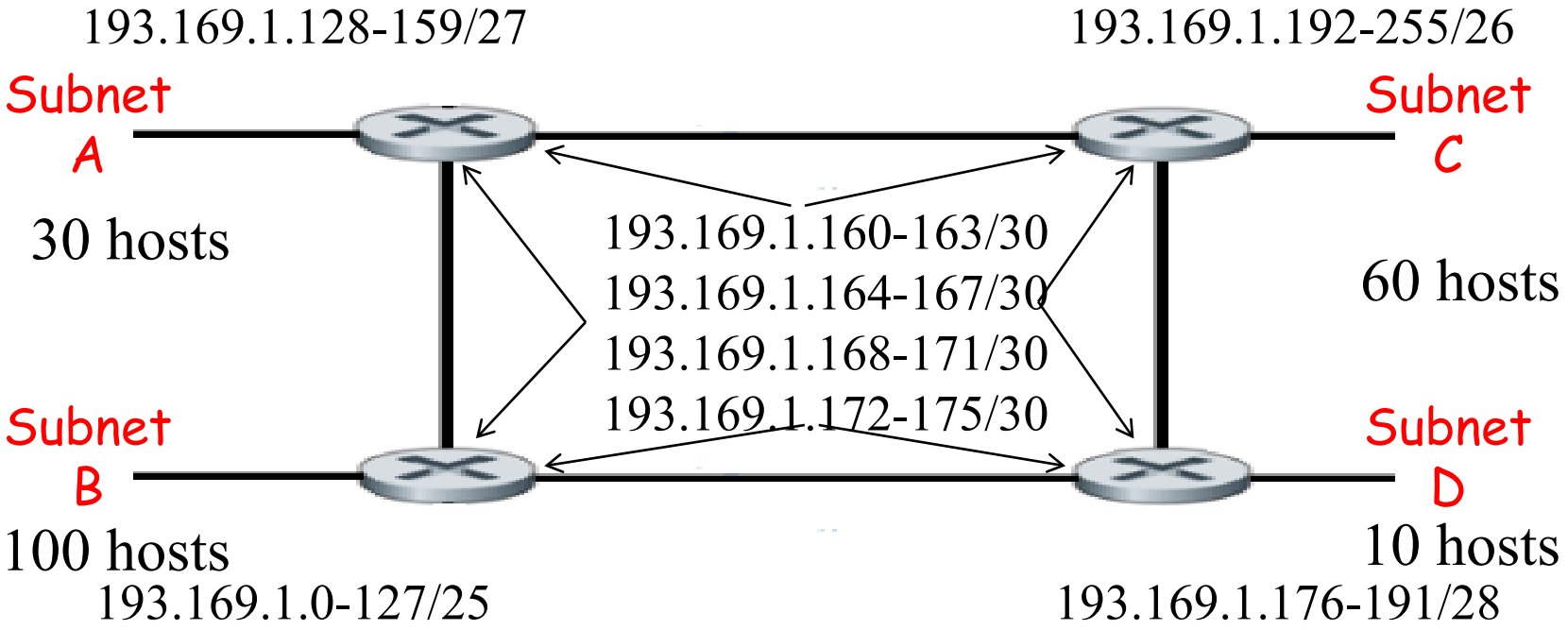
Remember that all hosts/routers in a subnet must have the same subnet id.



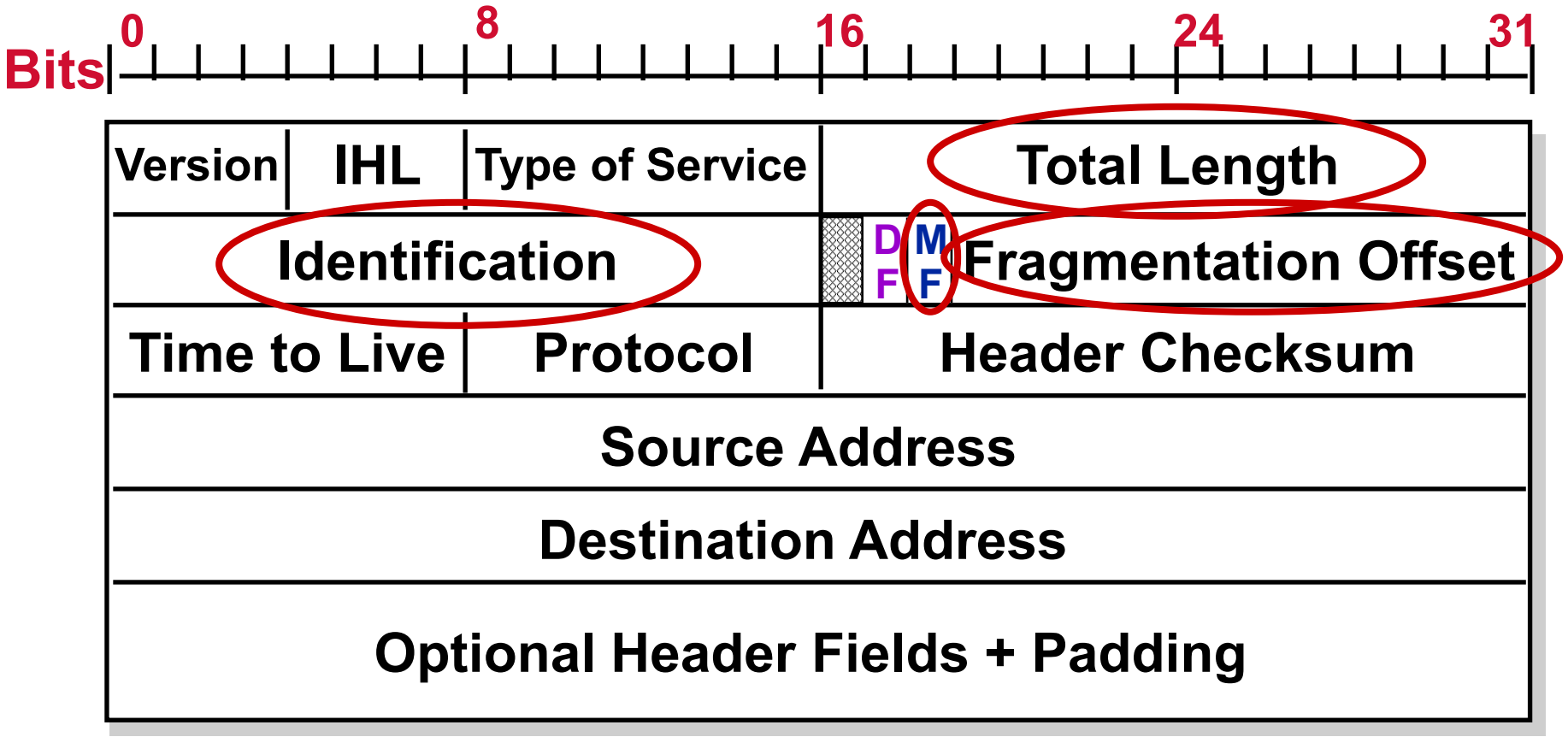
Q3: Assign suitable IP addresses/subnet masks



Q3: Assign suitable IP addresses/subnet masks



Q4: IP Header



DF: Don't Fragment

MF: More Fragments

Bit not used

Q4: IP Fragmentation

Size of the datagram = 3000 bytes

Total data in the datagram = 2980 bytes

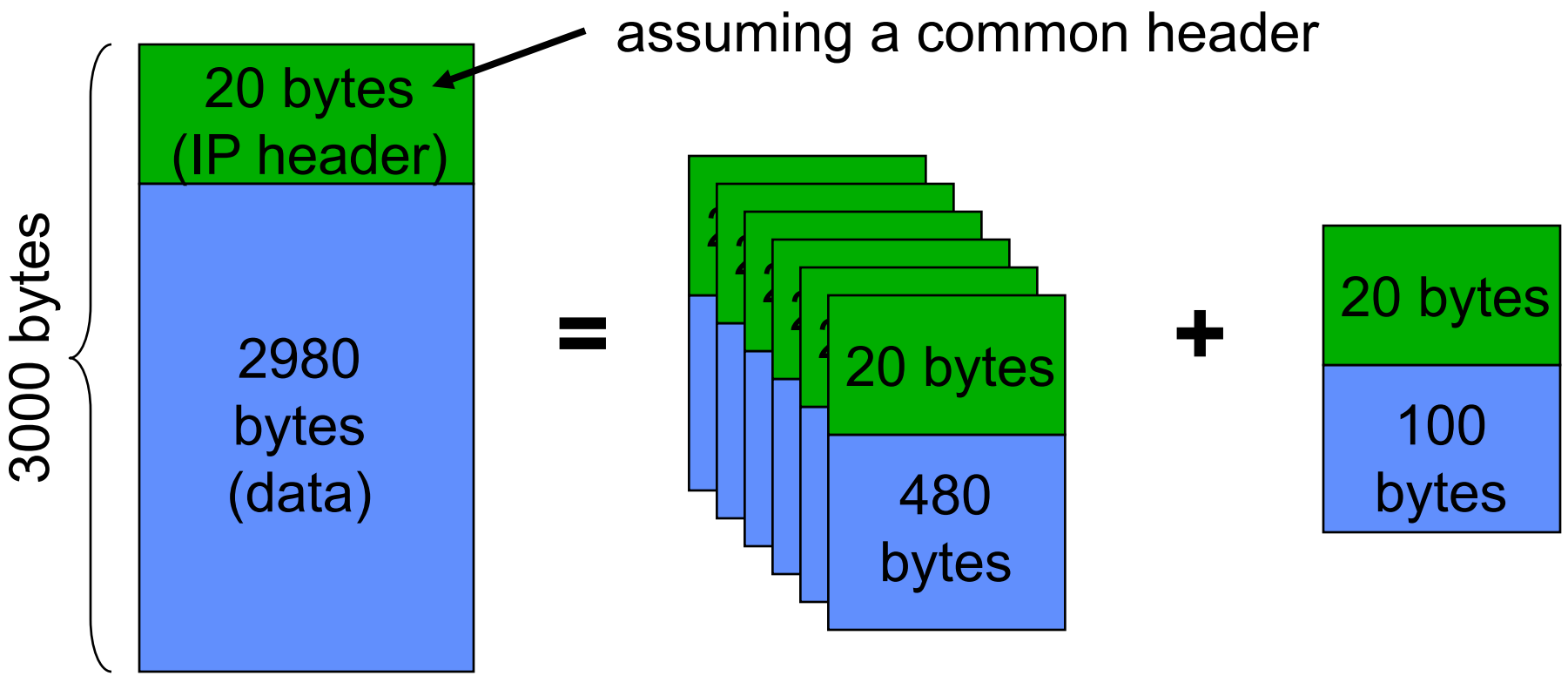
Max. data in each fragment = 500 - 20 = 480 bytes

Number of fragments = 2980 / 480 = 6.21 = 7 fragments

Characteristics:

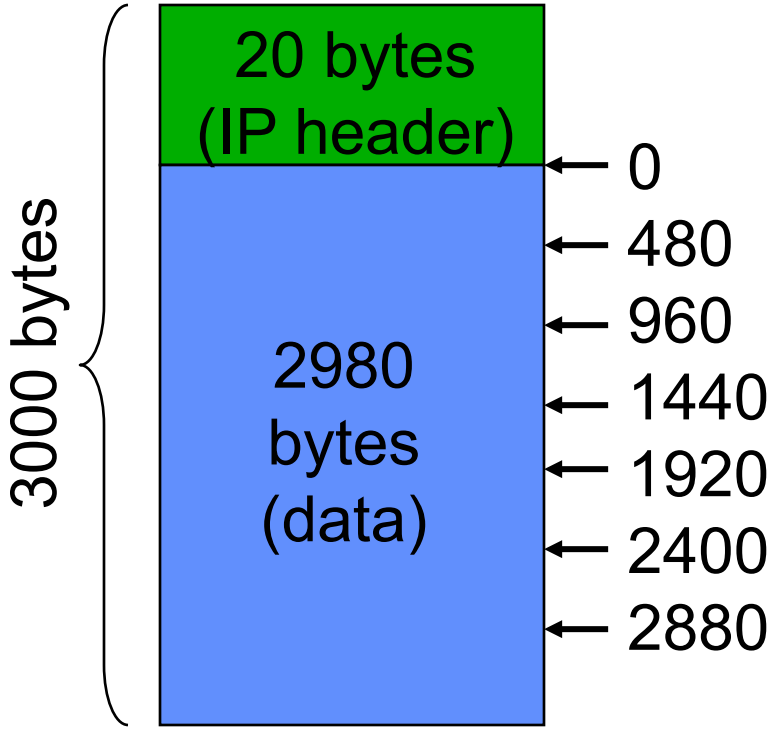
- **Each fragment has 422 in the identification number.**
- **The offset for the 7 fragments are 0, 480, 960, 1440, 1920, 2400, and 2880. The offsets in the headers are 0, 60, 120, 180, 240, 300, and 360, respectively.**
- **First six fragments will have the "More Fragments (MF)" flags set, and the last fragment's flag will be zero.**

Q4: IP Fragmentation



$$\text{Number of fragments} = \frac{3000\text{-}20}{500\text{-}20} = 6.21$$

Q4: IP Fragmentation



Fragment	length	ID	MF	offset
1	500	422	1	0
2	500	422	1	60
3	500	422	1	120
4	500	422	1	180
5	500	422	1	240
6	500	422	1	300
7	120	422	0	360

‘offset’ is in 8-byte unit

(ie 60 means 60*8 = 480 bytes)