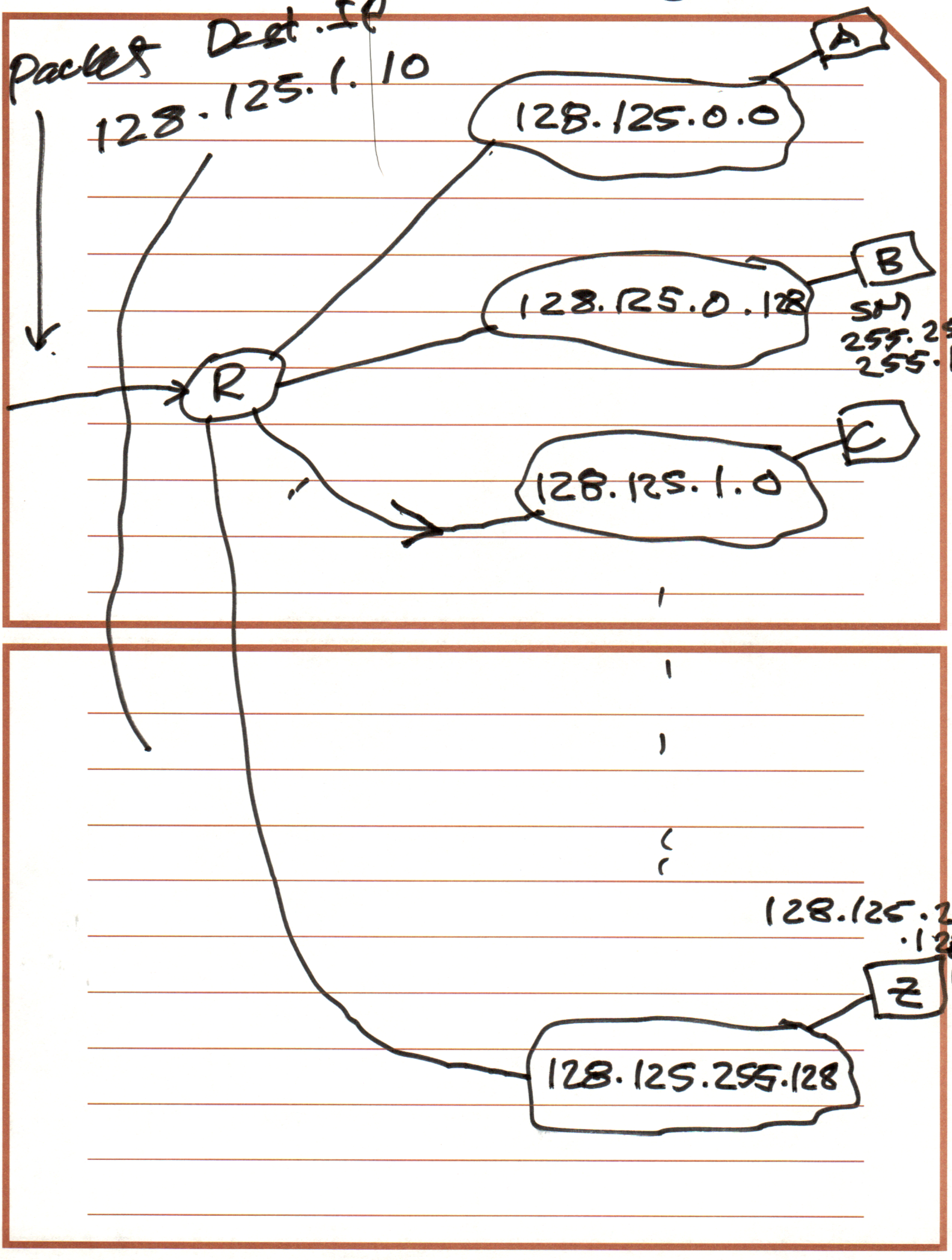
255.255.255.128

Packet Dst. IP 128.125.1.10



128.125.0.0

16 bits for the host.
used to address 2^{16} devices

Suppose it is divided into
512 subnets, each of same size

$$\frac{2^{16}}{2^9} = 2^7$$

# of hosts on each subnet

$\Rightarrow$ We need only 7 bits for hosts
on any given subnet.

128.125. S S S S S S S S . - - - - - - - -

7 bits for host.

SM 255.255.255.128

128.125.0.1

255.255.255.128

128.125.0.0

128.125.0.129

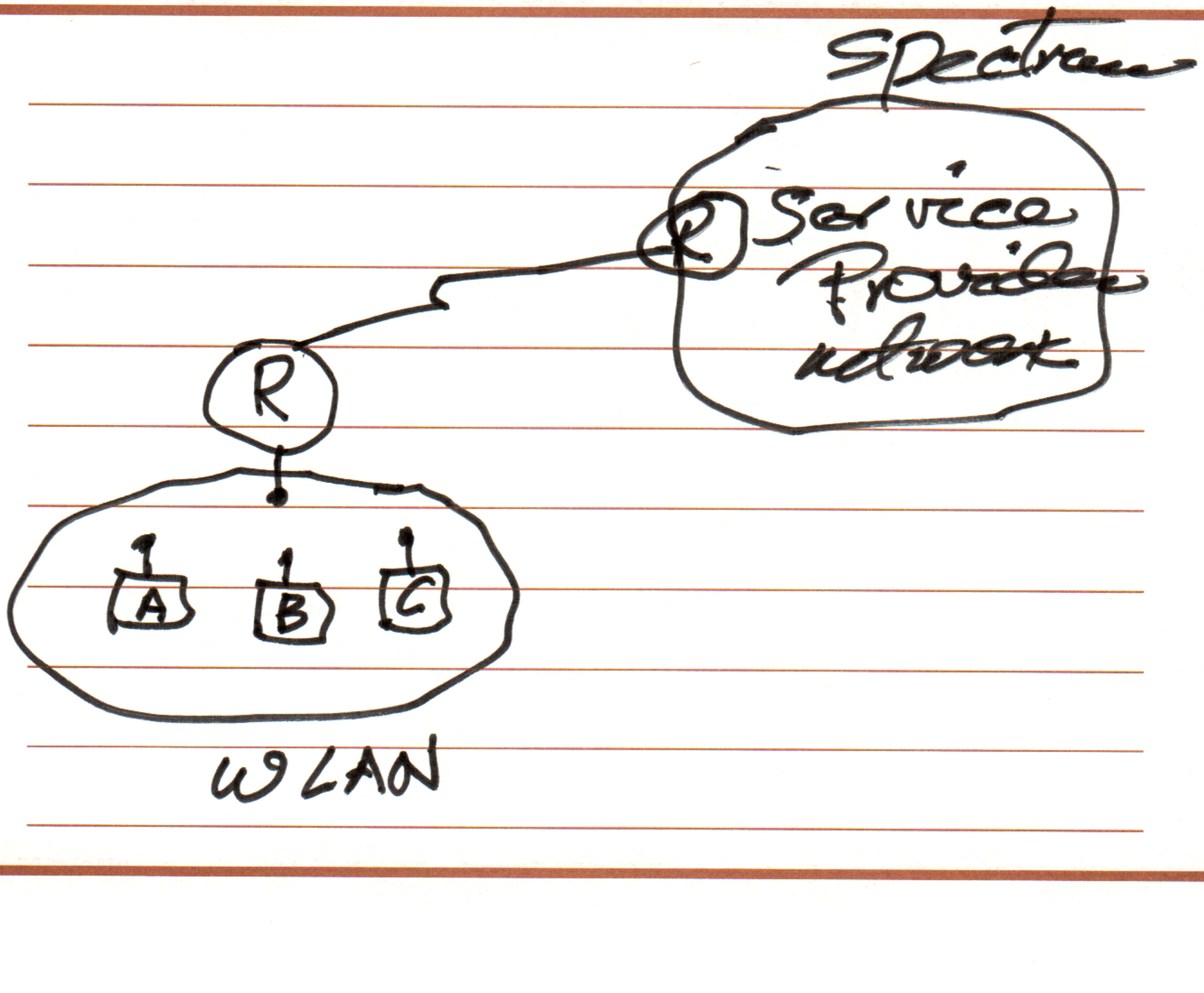
255.255.255.128

128.125.0.128

128.125.1.10

255.255.255.128

128.125.1.0



assume R_2 receives a packet destined to 128.96.34.8

128.96.34.8
255.255.255.0
128.96.34.0

128.96.34.8
255.255.255.128
128.96.34.0

Classless IP addressing

Block a.b.c.d/n

n is called the network prefix which is the # of bits used for network address.

a.b.c.d/20

There are 12 bits for the host

Size of Block = # of IP addresses in the Block.

$= 2^{32-n}$

The first address in the block is the network address (i.e. the host bits are all 0's) it can't be used to address a device

The last address in the block is the Direct Broadcast add (host bits are all 1's) can't be used to address a device.

class A (no subnetting)

= /8

class B (no subnetting)

= /16

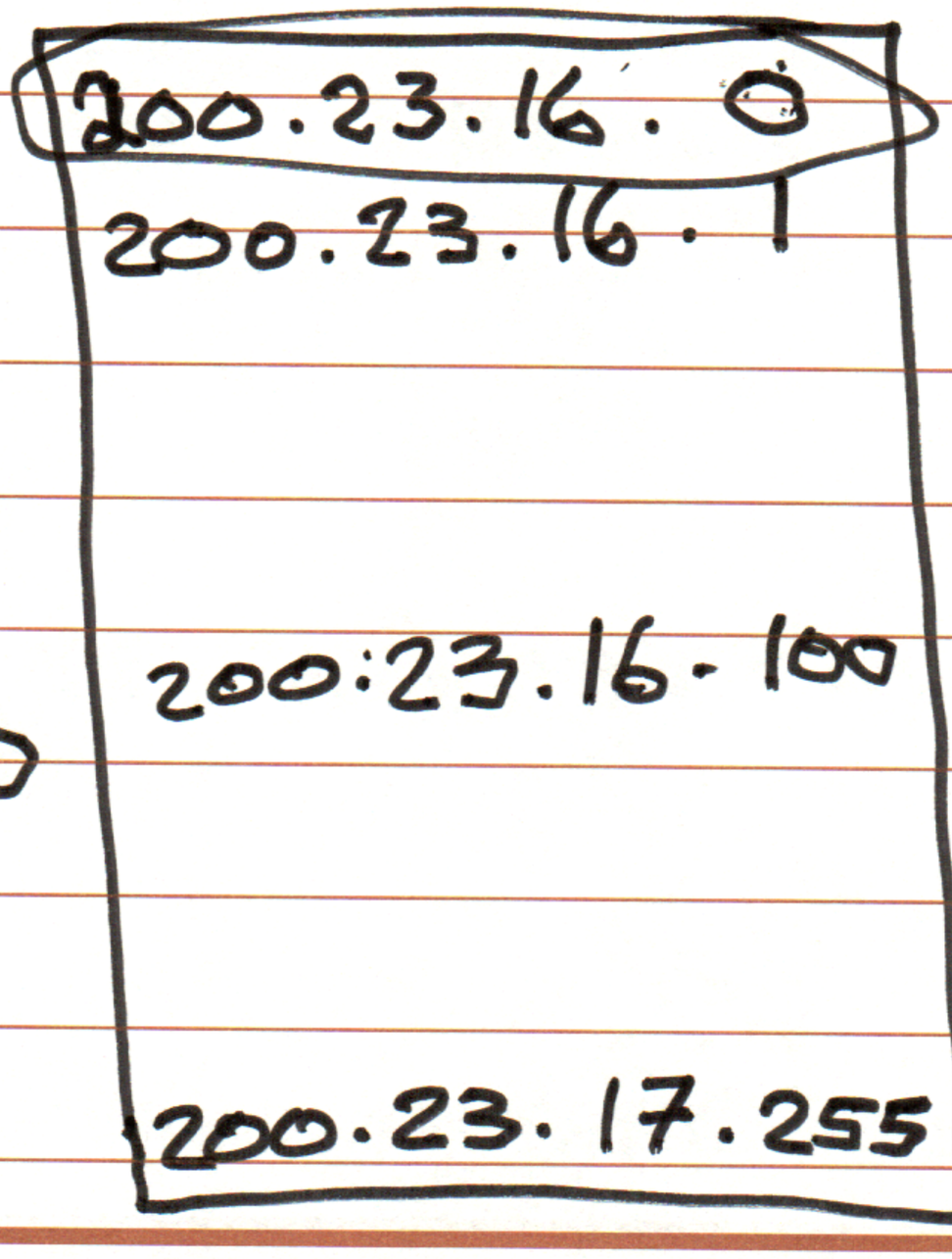
class C (no subnetting)

= /24

/20 ≡ 16 class C networks.

= $\frac{1}{16}^{th}$ class B network.

200.23.16.0/23



SM

255.255.254.0

size of this block = 2^9

200.23.00010000 .....

/18 ← 2 size = 2^{14}

/20 ← size 2^{12}

200.23.16.100

255.255.254.0

200.23.16.0

205.16.37.00010 ----
H

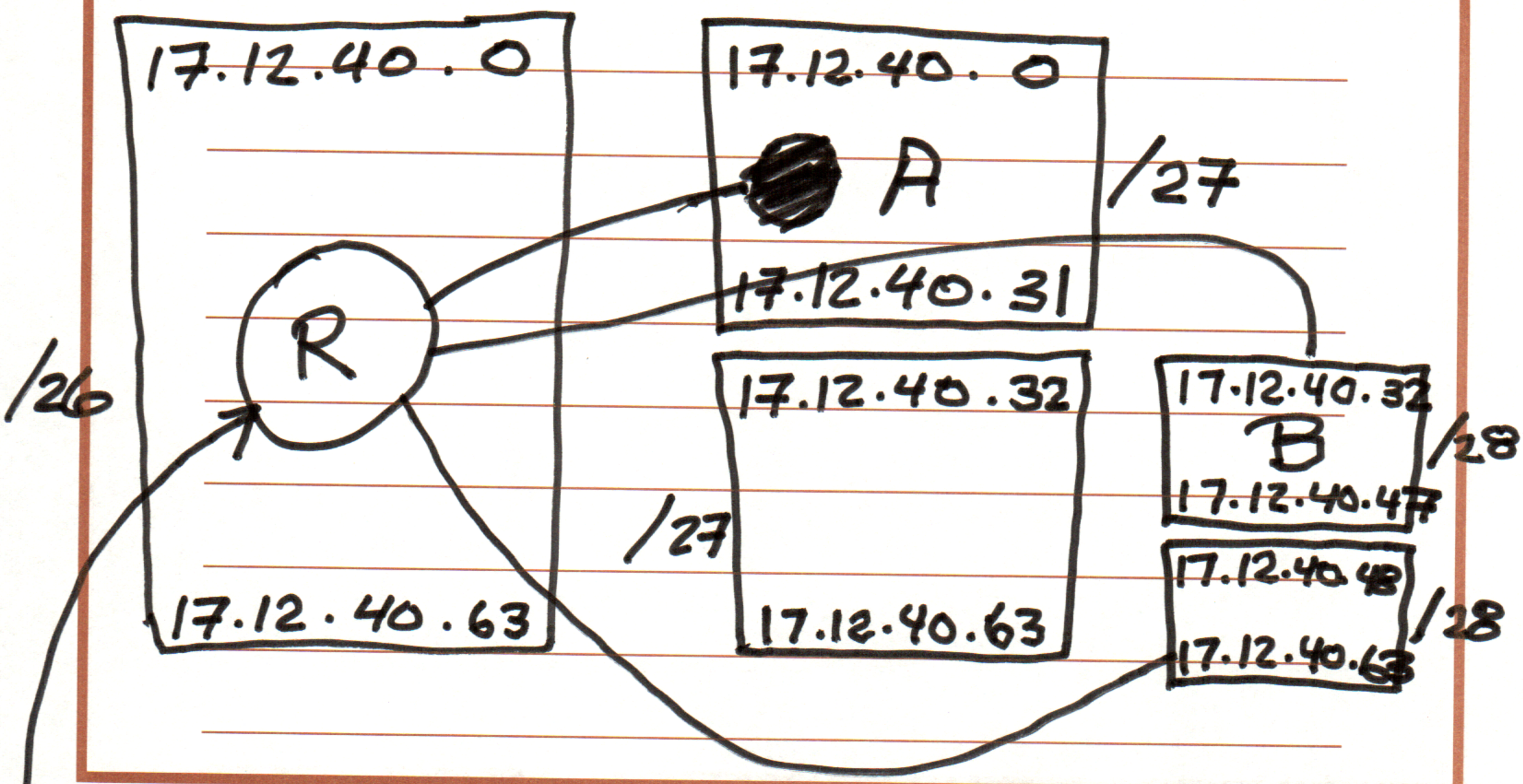
17.12.40.0/26

The organization decided to create 3 subnets

A 32 size

B 16

C 16



packet destined
to 17.12.40.40

17.12.40.40
255.255.255.240
17.12.40.32 ⟶ Department B

17.12.40.40
255.255.255.224
17.12.40.32

Subnetting is equivalent to breaking a block into smaller Blocks.