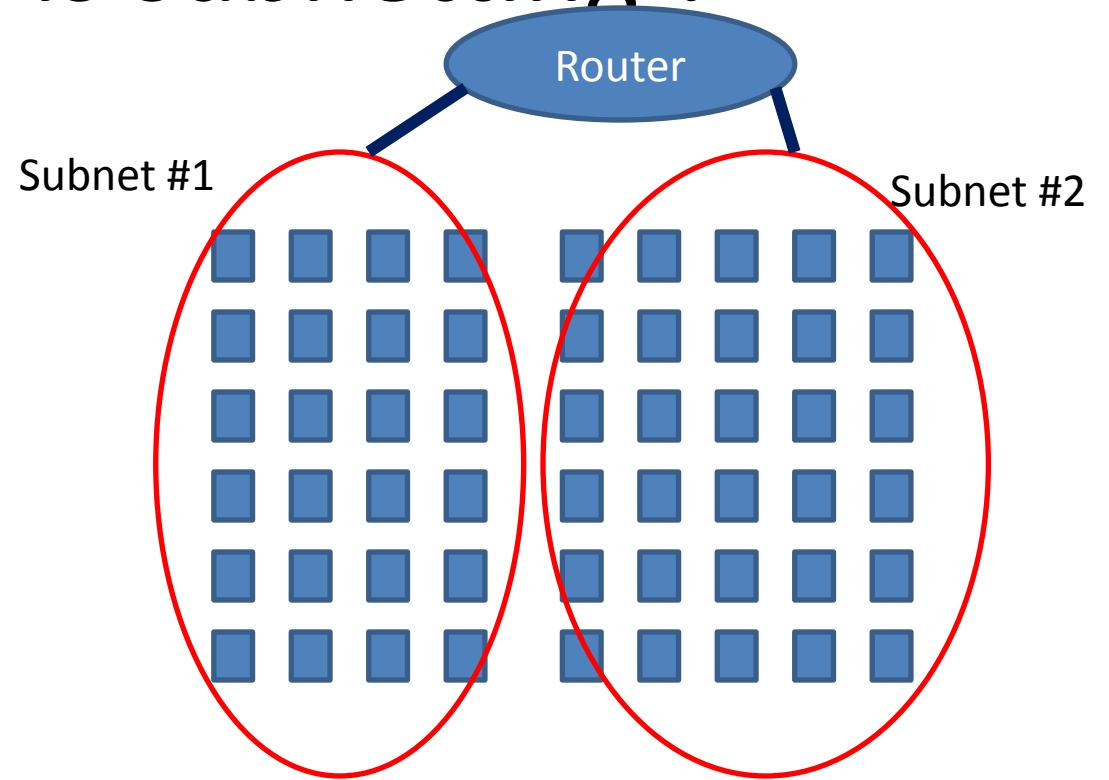What is subnetting ?

What are the benefits ?

How to create subnets ?

What is subnetting ?

Clustering a set of hosts in to one entity.

Give an identity for each entity (subnet ID for this cluster)

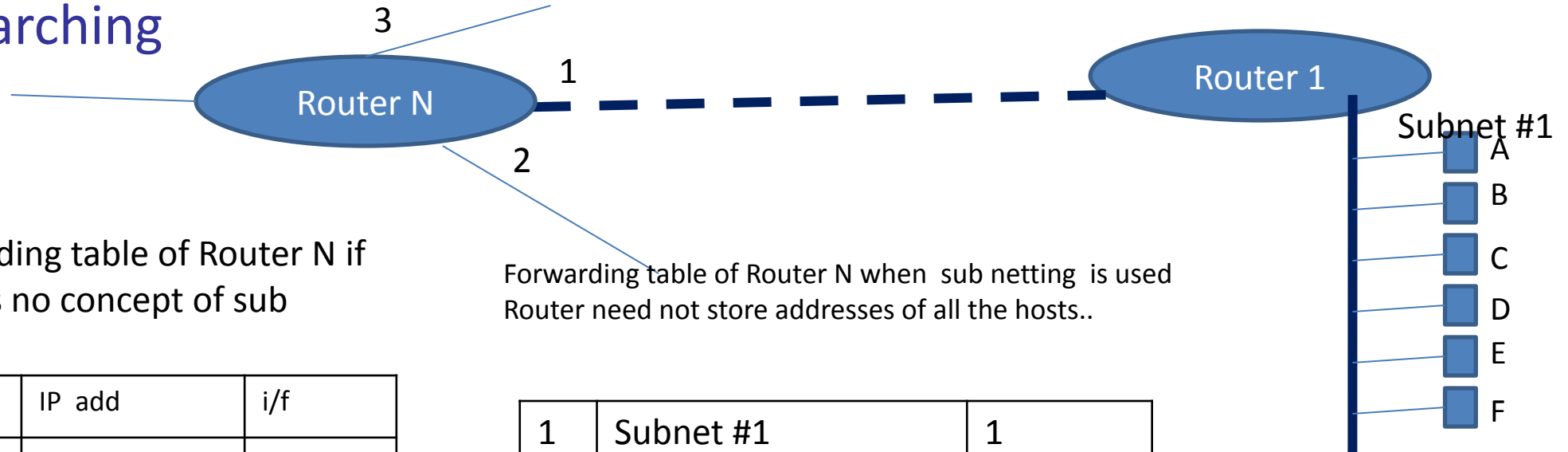Giving a hierarchical structure to the internet comprising millions of computers

Router

Subnet #1

Subnet #2

3

Benefit #1
Creates a <mark>hierarchy</mark> (instead of <mark>flat addressing</mark>) for the global internet
address space
which has many advantages

Benefit #1

Forwarding table in every router can be small; saves space and time for searching

Forwarding table of Router N if there is no concept of sub netting

	IP add	i/f
1	A	1
2	B	1
3	C	1
4	D	1
5	E	1
6	F	1

Forwarding table of Router N when sub netting is used
Router need not store addresses of all the hosts..

1	Subnet #1	1

- Only one row is enough storing the subnet ID
- If a packet arrives at the router with the address as A or B …F, router forwards it to Router #1
- Router #1 takes care of forwarding to the respective host in subnet #1

- 6 rows in the table
- If a packet arrives at the router , with the destination address as A or Bor ,…F , in order to forward , all 6 entries have to be searched in table
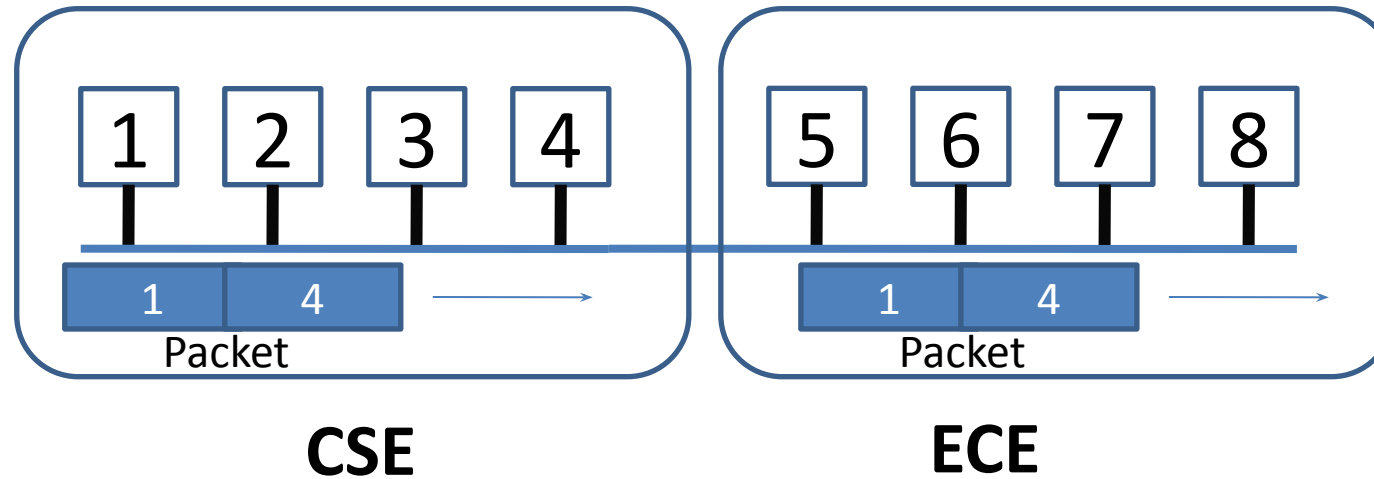
Subnet #1
A
B
C
D
E
F

Router N
Router 1

3
1
2

3

Benefit #2
Segmentation (segregation) of IP traffic

Traffic is segregated-Improvement in the over all performance

Network of users of 2 different departments when they are not sub-netted

| 1 | 2 | 3 | 4 |

| 1 | 4 |
Packet

CSE

| 5 | 6 | 7 | 8 |

| 1 | 4 |
Packet

ECE

Assume Host 1 is required to send a packet to Host 4 in the CSE department
A packet is created by Host 1 with the destination address as 4 and sent on the network.

This packet travels to both in CSE and ECE department. Unnecessary traffic in ECE department.

Similarly there are many broadcast traffic with in the department like (DHCP, ARP) . This is unnecessarily broadcast on the other department.

This reduces the over all performance of the network.

Traffic is segregated-Improvement in the over all performance

Network of users of 2 different departments when they are sub-netted
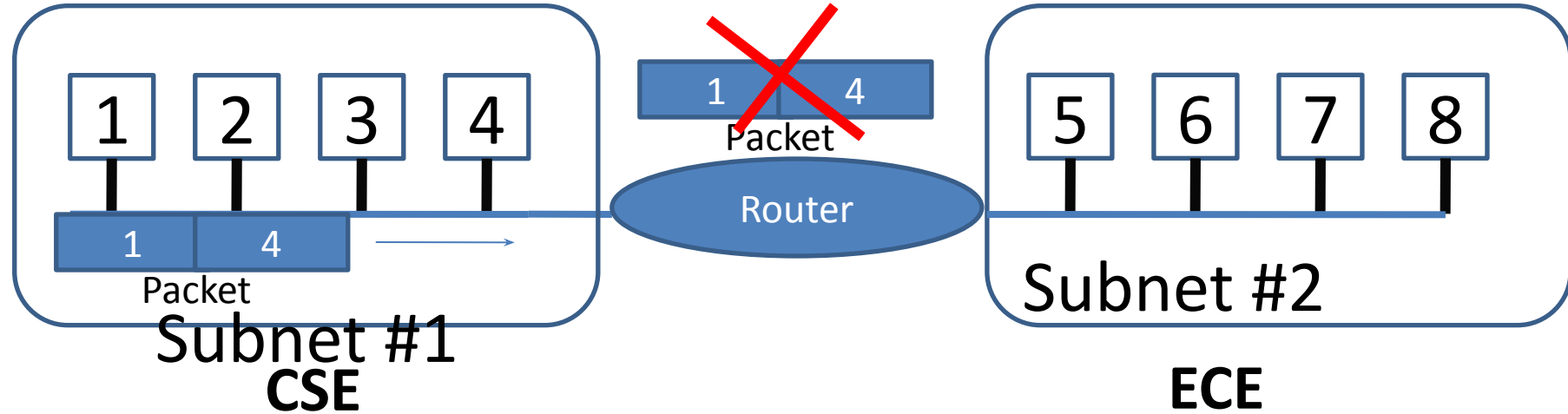
Now router does not pass the packets from one department to other, unless it is intended for.

Same logic is applicable
when two
organisations are connected to a single ISP

ISP

Router

| 1 | 2 | 3 | 4 |

Subnet #1

| 5 | 6 | 7 | 8 |

Subnet #2

PESIT

RVCE
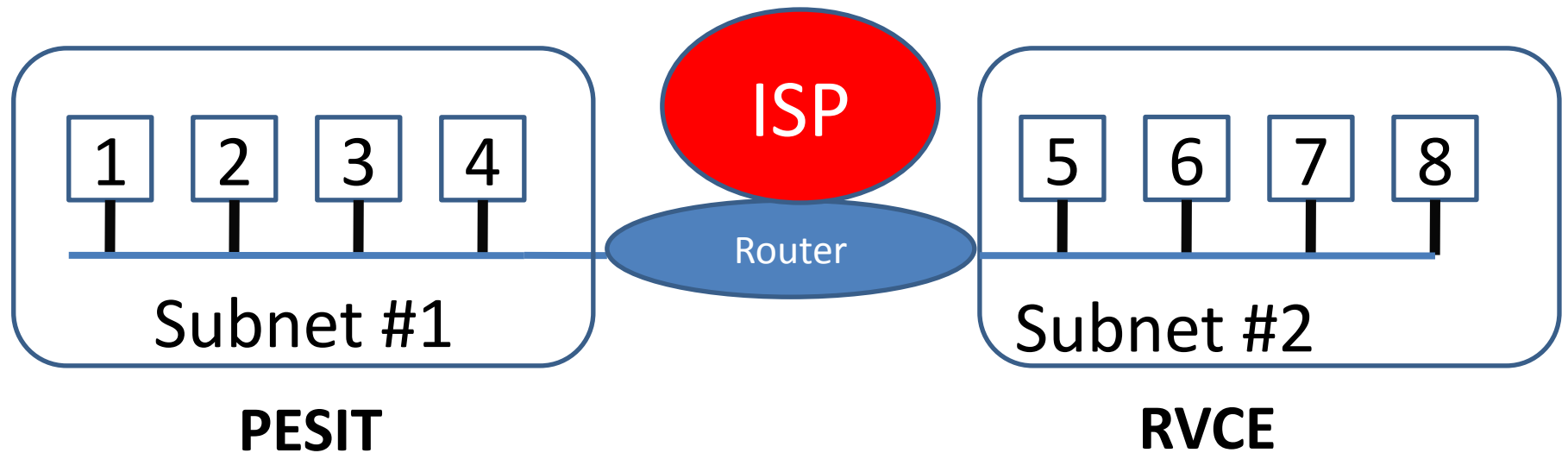
Now router does not pass the packets from one institution to another institution , unless it is intended for

A Subnet ID a.b.c.d/x allotted by the ISP is the smart way of distributing IP address space to various institutes

An example

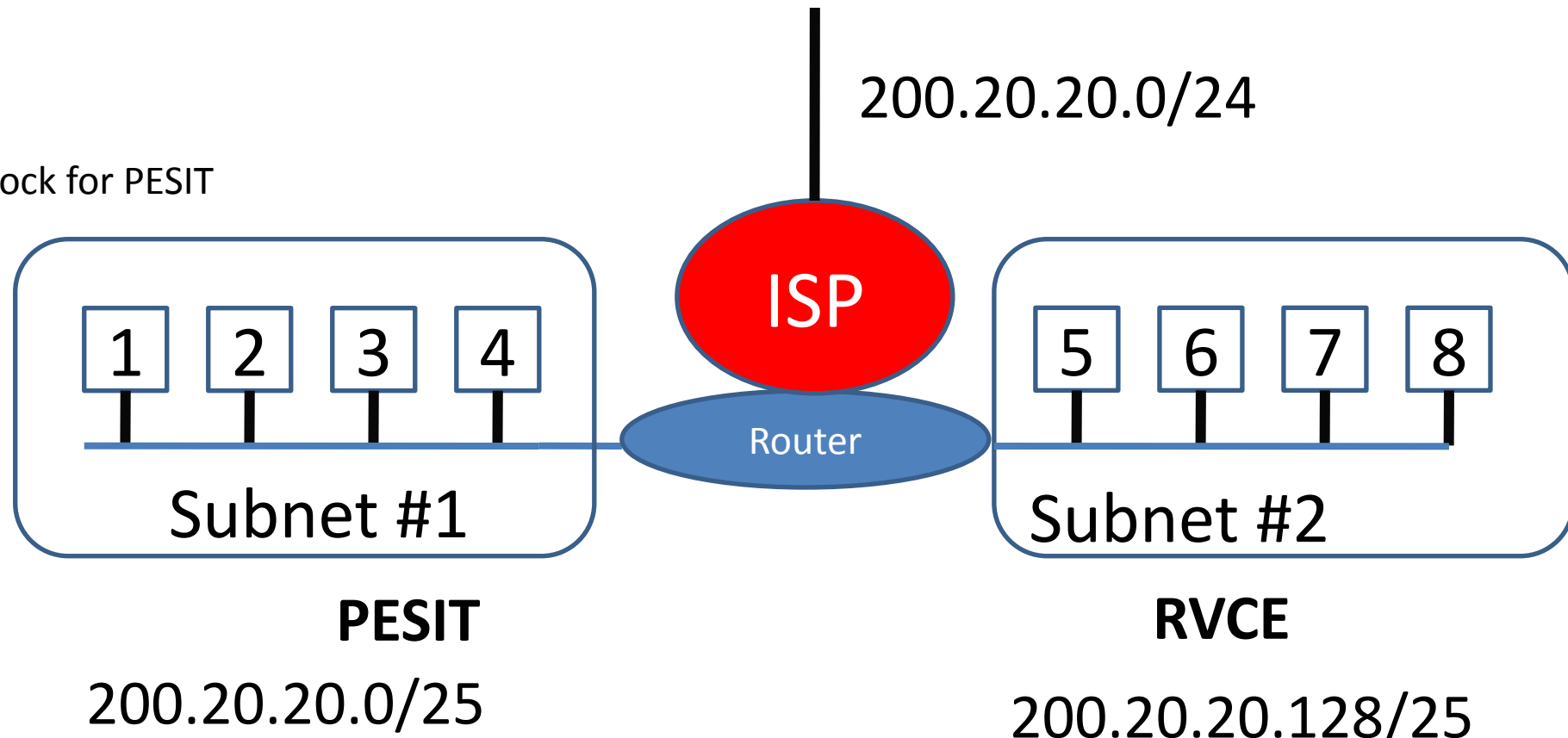200.20.20.0

Subnet ID

Address block for PESIT

200.20.20.0/24

ISP

1 2 3 4

Router

Subnet #1

Subnet ID

PESIT

200.20.20.0/25

5 6 7 8

Subnet #2

RVCE

200.20.20.128/25

200.20.20.128

Address block for RVCE
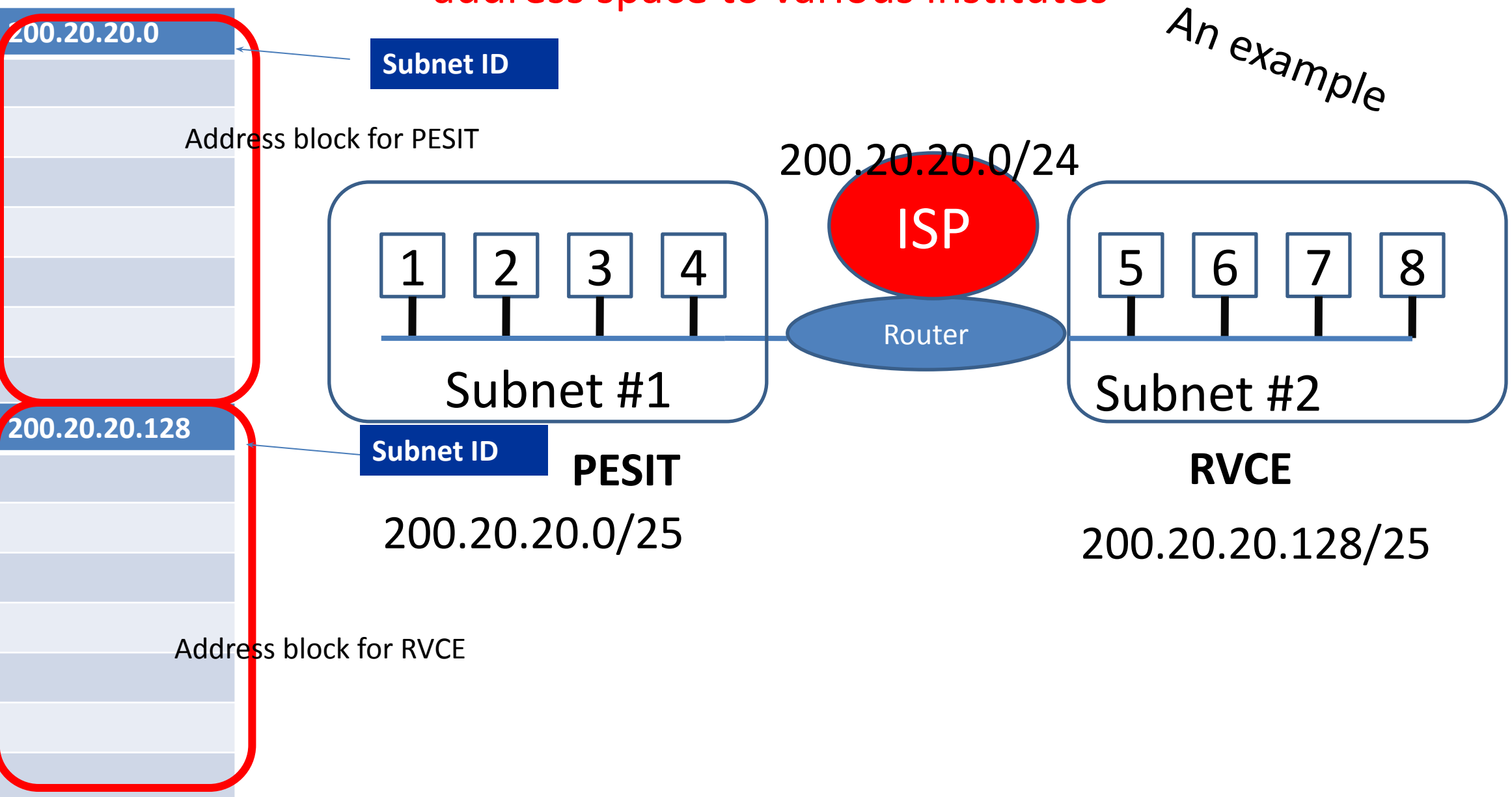
Problem #1 : How to create 2 subnets

Subnet No		Subnet ID
1	200.20.20. $\underline{0}$0000000	200.20.20.0/25
2	200.20.20. $\underline{1}$0000000	200.20.20.128/25

$2^{(32-24)} = 2^8$
eq division
$2^8/2 = 2^7 = 128$

200.20.20.0/24

Address block for PESIT

ISP

| 1 | 2 | 3 | 4 |

| 5 | 6 | 7 | 8 |

Router

Subnet #1

Subnet #2

PESIT

RVCE

200.20.20.0/25

200.20.20.128/25

Create two subnets of equal size from the address block 200.20.20.0/24

In the main block	Number of bits available for network portion	24	**200.20.20**. 00000000 8*3
	Number of bits available for hosts	8	200.20.20. **00000000** 8 bits
Number of subnets to be created		2	
Number of bits to be borrowed from the host bits portion	Log2 2	1	
	Total number of bits allocated for sub net portion is	24+1 = 25	200.20.20. **0**0000000
Subnet mask	25 left most bits to be set to 1 , remaining 0		11111111. 11111111. 11111111. 10000000. 255 . 255 . 255 . 128

Problem #2 :
4 equal sized subnets from 200.20.20.0/24

Subnet No		Subnet ID
1	200.20.20. **00**000000	200.20.20.0/26
2	200.20.20. **01**000000	200.20.20.64/26
3	200.20.20. **10**000000	200.20.20.128/26
4	200.20.20. **11**000000	200.20.20.192/26

Do you understand ???

Why /26

Why These subnet IDs ?

$2^{(32-24)}=2^8$
equally divide into 4
$2^8/4=2^6=64$