Exercise

A company has 1000 machines

1. What are the possible classes to address all machines? Calculate the waste of addresses in each case?

A 🡺 number of host 2P-2= 224 -2=16 millions 🡺 ok; waste = 16 millions -1000

B 🡺 number of host 2P-2= 216 -2=65534 🡺 ok; waste = 65534-1000=64534

C 🡺 number of host 2P-2= 28 -2=254 🡺 NO

1. The company buys the range 150.10.0.0/16?
   1. What class does this address belong to? B
   2. Calculate the subnet mask to integrate the 1000 machines

m 🡪 net id ; m=16

n🡪 subnet id

p🡪 machine id

p such that 2p-2>=1000 🡺 p=10

n =6

subnet prefixe size = /m+n = /22

subnet mask = 255.255.252.0

* 1. Calculate address waste

2p-2-1000=210-2-1000=1024-2-1000=22

1. The company wants to divide the 1000 machines into 5 subnets of the same size.
   1. Calculate subnet addresses, broadcast addresses, and subnet masks?

Find n such that 2n >=5 🡺 n=3 🡺 p=13

Subnet mask size = /m+n = 19

Mask 255.255.224.0

Val(m)=150.10

Val(n)=order of subnet -1

If subnetwork address 🡺 val(p)=0…0=0

If broadcast address 🡺 val (p)=1….1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Network Num | Net. Addr | mask | Broadcast Addr | Size subnet |
| 1 | 150.10.0.0 | 255.255.224.0 | 150.10.(00011…1)2  150.10.31.255 | 213-2=8190 |
| 2 | 155.10.32.0 | 255.255.224.0 | 150.10.63.255 | 213-2=8190 |
| 3 | 150.10.64.0 | 255.255.224.0 | 150.10.95.255 | 213-2=8190 |
| 4 | 155.10.96.0 | 255.255.224.0 | 150.10.127.255 | 213-2=8190 |
| 5 | 150.10.128.0 | 255.255.224.0 | 150.10.159.255 | 213-2=8190 |

* 1. Calculate the address waste?

5\*8190 – 1000 =39950

1. In fact, the networks have different sizes (200, 500, 100, 50, 150)
   1. Calculate the subnet addresses, broadcast addresses, and subnet masks?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network Num | Net. Addr | mask | Broadcast Addr | Size subnet | waste |
| 2 | 150.10.0.0/23 | 255.255.254.0 | 150.10.1.255 | 2p-2=510 | 10 |
| 1 | 150.10.2.0/24 | 255.255.255.0 | 150.10.2.255 | 2p-2=254 | 54 |
| 5 | 150.10.3.0/24 | 255.255.255.0 | 150.10.3.255 | 2p-2=254 | 104 |
| 3 | 150.10.4.0/25 | 255.255.255.128 | 150.10.4.127 | 27-2=126 | 26 |
| 4 | 150.10.4.128/26 | 255.255.255.192 | 150.10.4.191 | 26-2=62 | 12 |

Sort the subnetwork with their size in descending order

For each net

Compute p such that 2p-2 >= size of the subnetwork

First sub network p = 9

Compute n such that n=32-m-p=32-16-p=16-p

First sub network n = 16-9=7



Mask subnetwork equiv to /m+n

First subnetwork /16+7=/23 🡺 255.255.254.0

subNetwork address when val(p)=0…..0

first subnetwork address = 150.10.0.0/23

broadcast subNetwork address when val(p)=1…..1

first subnetwork = 150.10.(n=0)(val(p)=1….1)



* 1. Calculate total address waste?

10+54+104+26+12=206