

VLSM

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# Manajemen Jaringan Komputer

Variable Length Subnet Masking

**VLSM**

# VLSM

- Variable Length Subnet Masking
- is a technique where subnetting is performed multiple times in iteration,
- to allow a network to be divided into a hierarchy of subnetworks that vary in size.
- This allows an organization to much better match the size of its subnets to the requirements of its networks

# The Problem With Single-Level Subnetting

- in large networks, the need to divide our entire network into only one level of subnetworks doesn't represent the best use of our IP address block
- subnet ID must be chosen based on whichever subnet has the greatest number of host
- can result in the need to use extra addressing blocks while wasting many of the addresses in each block

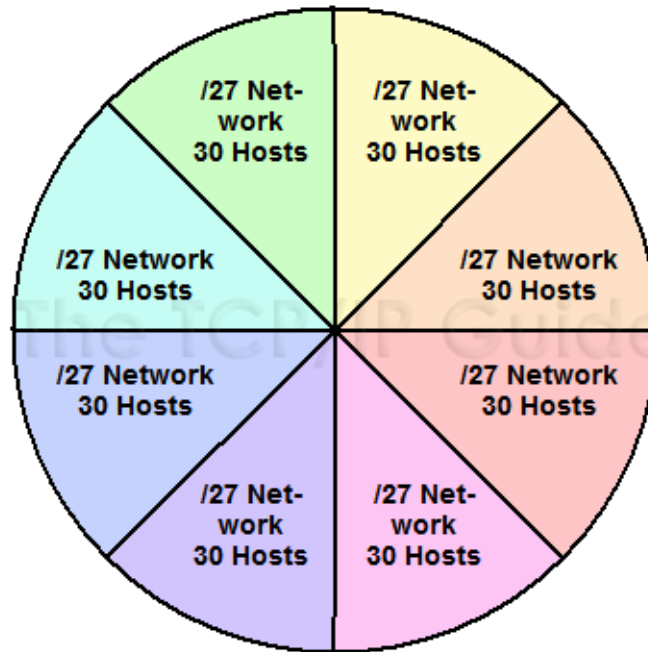
# Example

- For example, consider a relatively small company with a Class C network, 201.45.222.0/24.
- They have six subnetworks in their network.
- The first four subnets (S1, S2, S3 and S4) are relatively small, containing only 10 hosts each.
- However, one of them (S5) is for their production floor and has 50 hosts,
- and the last (S6) is their development and engineering group, which has 100 host

# Without VLSM

- With traditional subnetting, all subnets must be the same size, which creates problems when there are some subnets that are much larger than others
- Class C (/24) Network Split Into Eight Conventional Subnets

# Without VLSM...

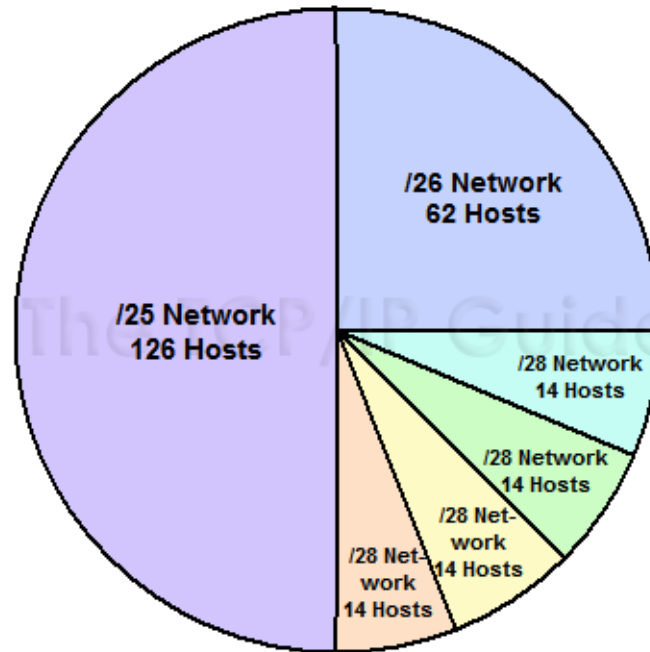


**Class C (/24) Network (254 Hosts)**

# The Solution: Variable Length Subnet Masking

- The idea is that you subnet the network, and then subnet the subnets just the way you originally subnetted the network
- In fact, you can do this multiple times, creating subnets of subnets of subnets, as many times as you need
- This means that our example company could create six subnets to match the needs of its networks

# With VLSM



**Class C (/24) Network (254 Hosts)**

# VLSM Howto

- VLSM subnetting is done the same way as regular subnetting;
- it is just more complex because of the extra levels of subnetting hierarchy
- You do an initial subnetting of the network into large subnets,
- and then further break down one or more of the subnets as required.
- You add bits to the subnet mask for each of the "sub-subnets" and "sub-sub-subnets" to reflect their smaller size

# VLSM Howto...

- This diagram illustrates the example described in the text, of a Class C (/24) network divided using three hierarchical levels.
- It is first divided into two subnets;
- one subnet is divided into two sub-subnets; and
- one sub-subnet is divided into four sub-sub-subnets.
- The resulting six subnets are shown with thick black borders,
- and have a maximum capacity of 126, 62, 14, 14, 14 and 14 hosts.

# VLSM Howto...

- We start with our Class C network, 201.45.222.0/24.
- We then do three subnettings as follows :

# VLSM Howto...1

- We first do an initial subnetting by using one bit for the subnet ID,
- leaving us 7 bits for the host ID.
- This gives us two subnets:
  - 201.45.222.0/25 and
  - 201.45.222.128/25.
- Each of these can have a maximum of 126 hosts.
- We set aside the first of these for subnet S6 and its 100 hosts

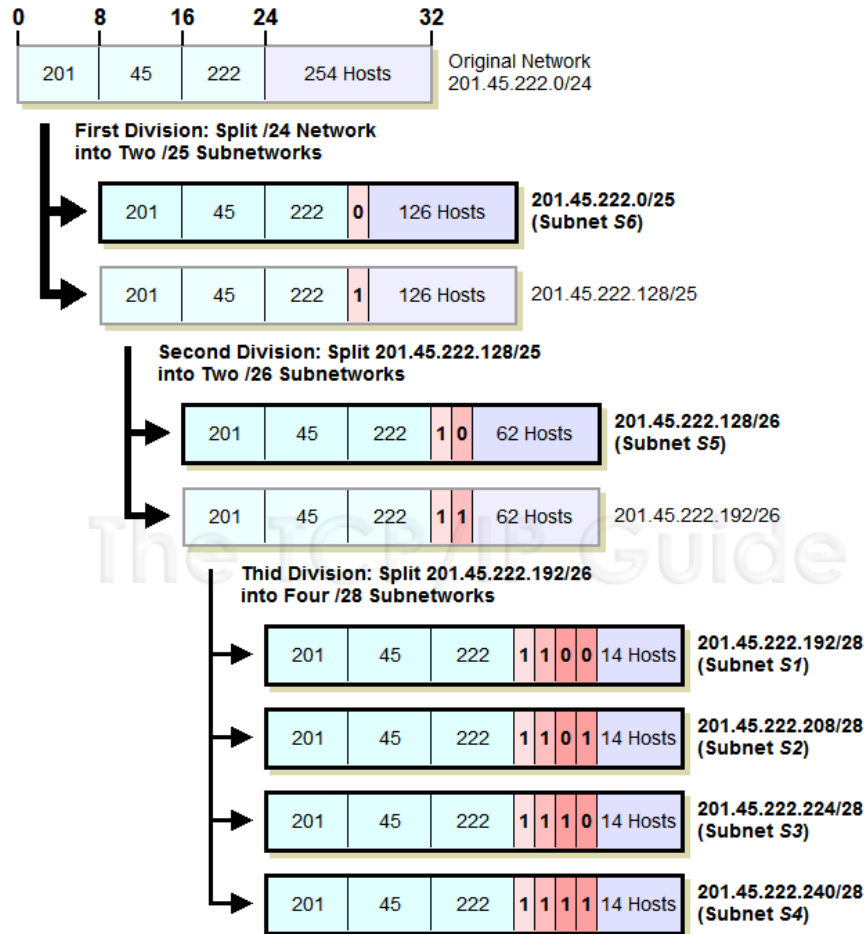
# VLSM Howto...2

- We take the second subnet, 201.45.222.128/25,
- and subnet it further into two sub-subnets.
- We do this by taking one bit from the 7 bits left in the host ID.
- This gives us the sub-subnets
  - 201.45.222.128/26 and
  - 201.45.222.192/26,
- each of which can have 62 hosts.
- We set aside the first of these for subnet S5 and its 50 hosts.

# VLSM Hotwo...3

- We take the second sub-subnet, 201.45.222.192/26,
- and subnet it further into four sub-sub-subnets.
- We take 2 bits from the 6 that are left in the host ID.
- This gives us four sub-sub-subnets that each can have a maximum of 14 hosts.
- These are used for S1, S2, S3 and S4.

# VLSM Hotwo...



# Conclusion

- VLSM greatly improves both the flexibility and the efficiency of subnetting
- In order to use it, routers that support VLSM-capable routing protocols must be employed

# Latihan

- Berapa prefix optimal yang bisa digunakan untuk subnet-subnet berikut :
  - 2 host
  - 241 host
  - 54 host
  - 196 host
  - 42 host
  - 142 host
  - 101 host
  - 91 host

# Latihan...

- ip 202.162.43.94/27
  - Subnet ID ?
  - Broadcast Address ?
  - Netmask ?
  - Jumlah IP ?
  - Jumlah Host ?

# Latihan...

- Convert dari prefix ke netmask dan sebaliknya
  - /25
  - /29
  - /30
  - 255.255.255.224
  - 255.255.255.252

# Kuis

- Subnet 202.162.33.0/25 dibagi menjadi 4 network dengan kebutuhan subnet sbb :
  - 1 subnet dengan 60 host
  - 4 subnet dengan 6 host
  - 1 subnet dengan 20 host