

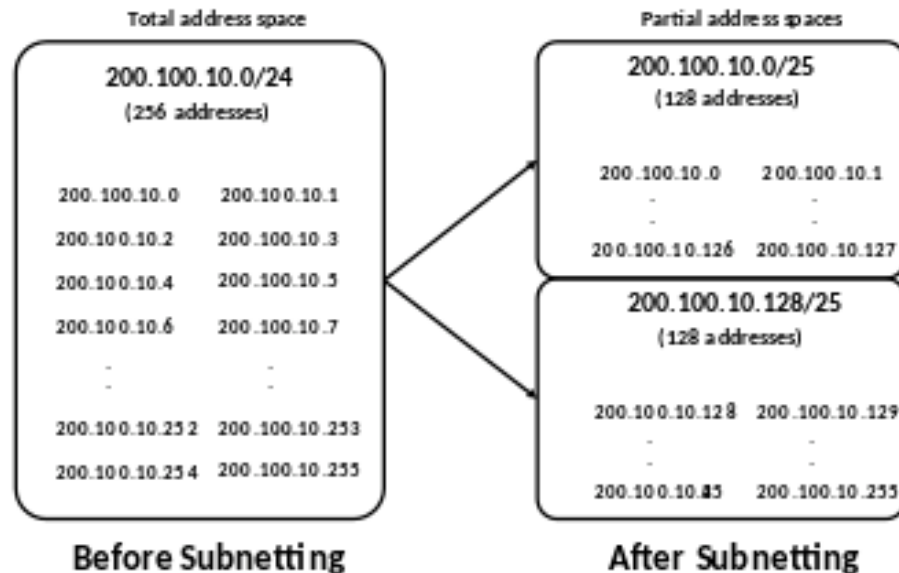
# Network Administration & Services

## Chapter 2

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# Subnetting

- Subnetting divides broadcast domains, meaning that traffic is routed efficiently, improving speed and network performance. A subnet mask ensures that traffic remains within its designated subnet. This reduces major congestion and reduces the load imparted on the network.



# Benefits of Subnetting

- **5 Subnetting Benefits**
- Improve network performance and speed. A single broadcast packet sends out information that reaches every device connected to that network because each device has an entry point into the network.
- Reduce network congestion.
- Boost network security.
- Control network growth.
- Ease administration.

# Classless Inter-Domain Routing

- Classless Inter-Domain Routing is a method for allocating IP addresses and for IP routing. The Internet Engineering Task Force introduced CIDR in 1993 to replace the previous classful network addressing architecture on the Internet.
- Classless inter-domain routing (CIDR) is **a set of Internet protocol (IP) standards** that is used to create unique identifiers for networks and individual devices. The IP addresses allow particular information packets to be sent to specific computers. ... That system is known as CIDR notation.

# (Continued)

IPv4 CIDR IP/CIDR	$\Delta$ to last IP addr	Mask	Hosts (*)	Class
a.b.c.d/32	+0.0.0.0	255.255.255.255	1	1/256 C
a.b.c.d/31	+0.0.0.1	255.255.255.254	2	1/128 C
a.b.c.d/30	+0.0.0.3	255.255.255.252	4	1/64 C
a.b.c.d/29	+0.0.0.7	255.255.255.248	8	1/32 C
a.b.c.d/28	+0.0.0.15	255.255.255.240	16	1/16 C

# Class

Class A	Class B	Class C
In this P.A the operating point of BJT is at centre of load line.	In this P.A operating point of BJT is in cut off region.	In this P.A the operating point of BJT is below the cut off region.
Under no signal condition TX is ON	Under no signal condition TX is OFF	Under no signal condition TX is OFF
Conduction angle $\theta = 0^\circ$ to $360^\circ$	Conduction angle $\theta = 0^\circ$ to $180^\circ$	Conduction angle $\theta = 60^\circ$ to $20^\circ$
O/p signal is not distorted.	O/p is distorted i.e. o/p is just like rectified o/p.	O/p is distorted i.e. o/p current flows in the form of pulse.
$\eta = 50\%$	$\eta = 78.5\%$	$\eta \geq 95\%$

# VLSM

- VLSM stands for Variable Length Subnet Mask where the subnet design uses more than one mask in the same network which means more than one mask is used for different subnets of a single class A, B, C or a network. It is used to increase the usability of subnets as they can be of variable size. It is also defined as the process of subnetting of a subnet.

# Procedure of implementing VLSM

- In VLSM, subnets use block size based on requirement so subnetting is required multiple times. Suppose there is an administrator that has four departments to manage. These are sales and purchase department with 120 computers, development department with 50 computers, accounts department with 26 computers and management department with 5 computers.



# (Cont.)

- If the administrator has IP 192.168.1.0/24, department wise IPs can be allocated by following these steps:
- For each segment select the block size that is greater than or equal to the actual requirement which is the sum of host addresses, broadcast addresses and network addresses. Make a list of subnets possible:

# (cont)

SLASH	NOTATION	HOSTS/SUBNETS
	/24	254
	/25	126
	/26	62
	/27	30
	/28	14
	/29	6
	/30	2

• **table** – possible subnets list

# (cont)

- Arrange all the segments in descending order based on the block size that is from highest to lowest requirement.
- The highest IP available has to be allocated to highest requirement so the sales and purchase department gets 192.168.1.0/25 which has 126 valid addresses that can easily be available for 120 hosts. The subnet mask used is 255.255.255.128. The next segment requires an IP to handle 50 hosts. The IP subnet with network number 192.168.1.128/26 is the next highest which can be assigned to 62 hosts thus fulfilling the requirement of development department. The subnet mask used is 255.255.255.192. Similarly the next IP subnet 192.168.1.192/27 can fulfill the requirements of accounts department as it has 30 valid hosts IP which can be assigned to 26 computers. The mask used is 255.255.255.224. The last segment requires 5 valid hosts IP which can be fulfilled by the subnet 192.168.1.224/29 which has the mask as 255.255.255.248 is chosen as per the requirement. The IP with the mask 255.255.255.240 could be chosen but it has 14 valid hosts IPs and the requirement is less in comparison so the one that is comparable with the requirement is chosen. Thus there is less IP wastage in VLSM as compared to FLSM.